6701 Shellmound Street

INITIAL STUDY

RECIRCULATED DRAFT
JANUARY 2015

LEAD AGENCY

CITY OF EMERYVILLE
PLANNING DIVISION
1333 PARK AVENUE
EMERYVILLE, CA 94608

URBAN
PLANNING
PARTNERS
INC.

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1. PROJECT DESCRIPTION

1. **Project Title:** 6701 Shellmound Street

2. **Lead Agency Name and Address:**
   City of Emeryville
   Planning Division
   1333 Park Ave.
   Emeryville, CA 94608

3. **Contact Person and Phone Number:**
   Miroo Desai
   Senior Planner
   mdesai@ci.emeryville.ca.us
   510-596-3785

4. **Project Location:**
   The project site is located at 6701 Shellmound Street in the City of Emeryville, Alameda County.

5. **Project Applicant's Name and Address:**
   Cecil (Trey) Teller, MAI, Development Manager
   Anton Development Company, LLC
   1415 L Street, Suite 450
   Sacramento, CA 95814

6. **General Plan Designation:**
   Mixed Use with Residential

7. **Zoning:**
   Mixed Use with Residential

8. **Description of Project:**

Project Site

The project site is a triangular-shaped parcel (Assessor's Parcel Number 49-1490-2) comprised of approximately 2.3 acres. It is bounded by Interstate-80 (I-80) to the west, the Ashby Avenue exit on- and off-ramps to the north, Shellmound Street and the Union Pacific Railroad tracks to the east, and Ex'pression College for Digital Arts immediately to the south. 65th Street is located further south of the site. Figure 1 shows the regional location of the site and identifies the project boundaries.

Project Site Map

Source: Fehr & Peers, Urban Planning Partners, 2014

LEGEND

Project Site

Emeryville Border

Greenway

Railroad

Figure 1

Project Location

The site lies on the northwest end of the City of Emeryville. The City of Berkeley border lies immediately to the north, across the I-80 off-ramp. The California Department of Transportation (Caltrans) owns and operates the I-80 right-of-way including the landscaped area between the Ashby Avenue exit off-ramp that arcs around the north and west edge of the project site and the project site.

There are two existing structures on the property: a two-story office building and a warehouse connected by a passageway, which total 65,738 square feet, according to the Realquest database used by the Emeryville Planning and Building Department. Vegetation is limited on the site with some landscaping around the existing buildings and trees in the setback area along Shellmound Street. The project includes demolition of the two structures and removal of three trees along the edge of the property, near the I-80 off-ramp, and eight trees adjacent to the existing buildings. The trees within the Caltrans right-of-way and within the City's right-of-way would remain following implementation of the project. The site is generally flat, although the adjacent Caltrans right-of-way includes a slight depression.

Project Components

The project includes residential units and parking in a single seven-story wood-frame building on a podium over a two-story parking garage. The building height is 84 feet at its maximum. The first two floors cover the entire building footprint, while the third through seventh floors have large recesses around a central core, providing light and air to the residential units on the upper floors.

The project includes the following elements, as bulleted below and detailed in Table 1:

- **Market Rate Rental Units**: A total of 211 units are proposed. The units are primarily located on the third through seventh floors, with a limited number of units wrapping the first and second floors. The unit mix includes: 11 studios, 101 one-bedrooms, and 88 two-bedrooms, and 11 three-bedrooms. Unit sizes range from 630 to 1,685 square feet, with an average unit size of approximately 1,005 square feet. The residential density of the building is 93 dwelling units per acre.
- **Common Space and Amenities**: The main pedestrian entrance to the building faces Shellmound Street and provides a lobby, leasing office, mail room, and the main elevator bank in a ground-floor space. A fitness room is also located on the ground-floor at the corner facing Shellmound Street and the I-80 off-ramp. A dog spa and a bike spa are located on the ground-floor facing Shellmound Street. Trash rooms are located interior of the lobby and in the rear of the building. Landscaping lines the building frontage on Shellmound Street and the walkways around the perimeter of the building. A garden with raised vegetable planters and picnic tables is located in the west corner of the property. Four common areas are

located on the third-floor podium level, three of which include landscaping features. A landscaped roof deck is located on the seventh floor.

TABLE 1 PROJECT COMPONENTS

Use	Amount
Residential, by Type	*Units*
Studios	11
One-Bedroom	101
Two-Bedroom	88
Three-Bedroom	11
Common Spaces/Amenities	*Square Feet*
Dog Spa	425
Bike Spa	590
Roof Deck	860
Fitness Area	1,200
Club Room (Seventh Floor)	749
Lobby/Leasing Area/Mail	2,030
Residential Parking	*Spaces*
Stalls	201
Stackers	63
Total	264
Bicycle Parking	*Spaces*
Long-Term	211
Short-Term	14

Source: MBH Arch, Project Plans, dated June 26, 2014.

- **Circulation and Parking**: Two vehicular entrances are provided from Shellmound Street at the north and south ends of the site, leading to a fire/access lane that encircles the site. The north entrance provides emergency access only. The southern entrance provides access to the parking garage and loading area. Two levels of parking are provided within the building—at-grade and on the second floor—providing a total of 264 spaces. Parking stackers in 63 of the stalls allow for two cars to share one space and allows automated access to vehicles on the upper level through a "puzzle" system. (See Section XVI: Transportation for details on the parking system.) Two loading spaces are provided on the southeast corner of the site, between Shellmound Street and the parking area entrance. A total of 211 long-term bicycle parking stalls are located on the first garage floor behind the fitness area and bike spa, and on the second garage floor behind the lobby area and in the rear of the building. An additional 14 short-term bicycle stalls are provided along Shellmound Street.

General Plan and Zoning Designations

The City of Emeryville General Plan designates the project site as “Mixed Use with Residential.” This land use designation allows a variety of residential and non-residential uses, such as offices, retail and hotels. On larger sites, a mix of residential and non-residential uses is required; on smaller sites, a single use may be permitted. The General Plan also identifies the following development standards for the project site:[1]

- Maximum Building Height: 100+ feet
- Maximum Intensity (Floor Area Ratio): 4.0 base/6.0 with bonus
- Maximum Residential Density (dwelling units per acre): 100 base/135 with bonus

The City’s Zoning Map also designates the site as “Mixed Use with Residential.” This district requires that sites of 1 to 5 acres obtain a conditional use permit or planned unit development designation. A mix of uses is required unless the applicant can demonstrate that it is infeasible to develop the project with a mix of uses on the site.

It may be noted that, based on the project's consistency with the General Plan, the project qualifies for a CEQA exemption. Pub. Res. Code Section 21083.3 provides:

> if a development project is consistent with the general plan of a local agency and an environmental impact report was certified with respect to that general plan, the application of this division shall be limited to effects on the environment which are peculiar to the parcel or to the project and which were not addressed as significant effects in the prior environmental impact report, or which new significant effects in the prior environmental impact report, or which substantial new information shows will be more significant than described in the prior environmental impact report." (Pub. Res. Code § 21083.3). CEQA Guidelines Section 15183(i)(2) provides further guidance explaining that "'consistent' means that the density of the proposed project is the same or less than the standard expressed for the involved parcel in the general plan….and that the project complies with the density-related standards contained in that plan or zoning."

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[1] City of Emeryville, 2009. Emeryville General Plan, Chapter 2: Land Use.

In 2008, the City updated its General Plan to guide future growth within the City's 1.2 square miles of land area. Concurrent with the General Plan, the City prepared a General Plan Environmental Impact Report (EIR) (State Clearinghouse No. 2006022008). The General Plan EIR evaluated the potential environmental impacts from implementing designated land uses and policies in the General Plan. The General Plan identified the project site as an area of potential change and designated the site as "Mixed Use with Residential" with the development standards noted above. *Section X.b: Land Use and Planning*, below, includes a detailed analysis of the project's consistency with the General Plan. Notably, the project's proposed 93 unit per acre density is consistent with the General Plan's 100 units per acre (or 135 units per acre with bonus) density standard for the site. While the project qualifies for the exemption noted above, additional analysis has been provided for the purpose of additional disclosure.

9. Surrounding Land Uses and Setting:

The project site is surrounded by a variety of industrial, office, residential, open space, and transportation infrastructure uses.

The Union Pacific Railroad tracks run north-south along on the east side of Shellmound Street and the site, accommodating both freight and Amtrak passenger trains. A mix of small- and large-lot industrial, technology, and office uses are located east of the railroad tracks. These uses are primarily housed in one- and two-story warehouse-type structures. The Ex'pression College for Digital Arts, an educational institution, lies immediately to the south, along with a self-storage facility and office building south of the college—all generally two-story buildings.

Several large housing developments are located on the south side of 65th Street, including the six-story Archstone apartments and, across the tracks, the four-story Courtyards at 65th apartments. Several retail uses, including restaurants and cafes, are clustered one block east of the site on Hollis Street.

I-80 runs north-south, west of the project site. The on- and off-ramps from the Ashby Avenue exit provide the closest freeway access to the project and are located immediately north and west of the project site. Undeveloped open land lies between the on- and off-ramps; this Caltrans right-of-way between the project boundary and the edge of the off-ramps is fairly heavily landscaped with eucalyptus trees.

The City of Berkeley border lies immediately north of the project site, across the I-80 off-ramp. The former KRE radio station building and a radio tower are located north of the project site, across the ramps. At the Berkeley border, Shellmound Street becomes Bay Street and leads to the City of Berkeley's Aquatic Park, the largest park within the vicinity of the project site. The linear park is more than 1 mile in length and encompasses nearly

32 acres of land (with an additional 68 acres of water). Its amenities include trails, water sports access, a tot lot, and fitness areas.[2]

The project site is served by regional and local public transit. The site is located approximately 0.6 miles north of the Emeryville Amtrak Station and approximately 1.5 miles west of the Ashby BART Station. There are several Alameda-Contra Costa (AC) Transit bus lines that stop within a couple blocks of the site including the 72 line to Downtown Oakland, the West Oakland BART Station, and Lakeshore Avenue; and two “transbay” bus lines (J and Z) which provide peak hour service to San Francisco. The Emery Go-Round shuttle’s Shellmound-Powell line also has a stop within two blocks of the project, providing access through Emeryville and to the MacArthur BART Station.

10. Requested Applications:

Lead Agency	Permit/Approval
City of Emeryville	Conditional Use Permit for Mixed Use with Residential site between 1 and 5 acres Conditional Use Permit for single use in Mixed Use with Residential District Conditional Use Permit to allow reduced parking Design Review
Responsible Agencies	
San Francisco Bay Regional Water Quality Control Board	Construction General Permit

11. Other public agencies whose approval may be required (e.g., permits, financing approval, or participation agreement):

None.

12. Infill characteristics

It may be noted that the project meets the infill project eligibility criteria pursuant to SB 226. While SB 226 streamlining has not been specifically utilized here, the project's qualification as an infill project is discussed for the purpose of additional disclosure.

First, the site was formerly developed with office and industrial uses and is therefore located on a site that was formerly developed. (14 Cal Code Regs. § 15183.3(b)(1)). It will implement remediation and air quality recommendations and therefore meets the

[2] City of Berkeley, 2014. “Parks: Aquatic Park.” Accessed February 5. http://www.ci.berkeley.ca.us/Parks_Rec_Waterfront/Trees_Parks/Parks__Aquatic_Park.aspx.

performance standards related the project design. (14 Cal Code Regs. § 15183.3(b)(2); Appendix M). Finally, the site is location within 1/2-mile of an existing major transit stop and high quality transit corridors. As explained in detail below, the project would therefore qualify as an infill project pursuant to SB 226.

Projects located on sites that are included on a list compiled pursuant to Government Code 65962.5 must document the status of past and future remediation in order to qualify as an infill project. As discussed in Section VIII, the project site is on lists compiled pursuant to Government Code 65962.5. The site has been the subject of ongoing investigations and remediation efforts since 1989, and implementation of Mitigation Measure HAZ-1 would reduce impacts associated with potential hazardous materials in soil, groundwater, and soil vapor at the project site to a less-than-significant level. Specifically, project construction will not be permitted until the regulatory agencies with oversight authority have determined that subsurface conditions are not likely to cause adverse health effects to future users of, and workers associated with, the project. Design and construction of the residential units will ensure people are adequately protected from hazardous materials in the subsurface. Therefore the project would meet the Soil and Water Remediation infill performance standard found in Appendix M of the Guidelines.

The project site is located approximately 440 feet from I-80 and therefore proposes residential units within 500 feet of a high-volume roadway. Consistent with Appendix M and as explained in Section III, the project will comply with Mitigation Measure AQ-2 that requires installation of a high efficiency air filtration system with a MERV-13 rating or higher to reduce cancer risks and PM exposure for residents. Therefore the project would meet the Residential Units Near High-Volume Roadways and Stationary Sources infill performance standard found in Appendix M of the Guidelines.

The project complies with an additional performance standard specific to residential development because the site is located approximately 1/- mile from the Amtrak Station on Horton St. Additionally, the site is within 1/2-mile of Christie Avenue, 65th Street, and Shellmound Avenue, all of which are designated as transit streets in the General Plan and likely qualify as high-quality transit corridors. (14 Cal Code Regs. § 15183.3(b)(2); Appendix M)[3]. The project therefore satisfies one of the three options for additional performance standards for residential projects found in Appendix M of the Guidelines, and would qualify as an infill project.

[3] An "high-quality transit corridor" is defined as "an existing corridor with fixed route bus service with service intervals no longer than 15 minutes during peak commute hours. For the purposes of this Appendix, an "existing stop along a high-quality transit corridor" may include a planned and funded stop that is included in an adopted regional transportation improvement program." Appendix M, § II.

Accordingly, the project meets the performance standards by project type. As discussed in *Section X: Land Use and Planning*, the project is consistent with Plan Bay Area, the region's Sustainable Community Strategy.

2. ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

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

Determination. (To be completed by the Lead Agency.) On the basis of this initial evaluation:

☐ **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, nothing further is required.**

Charles S. Bryant 1/20/15

Charles. S. Bryant **Date**

3. ENVIRONMENTAL CHECKLIST

I. AESTHETICS Would the project:	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?	❐	❐	■	❐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?	❐	❐	❐	■
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	❐	❐	■	❐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	❐	❐	■	❐

Affected Environment

The visual landscape surrounding the project site is heavily developed, consisting primarily of industrial and mixed-use residential uses in the nearby area. The project site is surrounded by a mix of one- and two-story industrial and institutional buildings, a railroad corridor, and Interstate 80 (I-80). Various one- and two-story commercial and institutional uses, including a digital arts college and a self-storage facility, are located south of the project site. Further south, across 65th Street, there are two four- to six-story mixed-use residential buildings. The blocks immediately east of the railroad corridor are mostly occupied by one- to two-story industrial buildings. North of the project site, across the I-80 off-ramp and overpass, is Aquatic Park, a City of Berkeley park that provides a wide range of recreational opportunities, including boating, hiking, and a children's play area. Aquatic Park is surrounded by large trees that obscure views to and from the park. West of the project site, across I-80, is the San Francisco Bay, Bay Trail, and Point Emery Park. I-80 is not a designated State scenic highway. The San Francisco Bay and the East Bay Hills are prominent visual features within Emeryville. However, views of these features are often obscured by development and vegetation because Emeryville is relatively flat. Limited views of the San Francisco Bay and the hills are available from some of the upper floors of taller buildings, and from some roadways, trails, and parks in Emeryville.

Development of the project would replace the existing two-story office building and warehouse with a seven-story multi-family residential building.

The project site is visible from several public locations. Photographs were taken at five representative public viewpoints, which are shown in Figure I-1: Viewpoint Location Map and listed below:

- Viewpoint 1: View from West Bolivar Drive in the Berkeley Aquatic Park (Figure I-2)
- Viewpoint 2: View from 67th Street Looking West (Figure I-3)
- Viewpoint 3: View from Shellmound Street Looking North (Figure I-4)
- Viewpoint 4: View from Westbound I-80/Ashby Avenue Off-ramp (Figure I-5)
- Viewpoint 5: View from Emeryville Marina Park Looking Northeast (Figure I-6)

These viewpoint locations were chosen based on the most representative views of the project site and the highest potential for visual impact.

Discussion

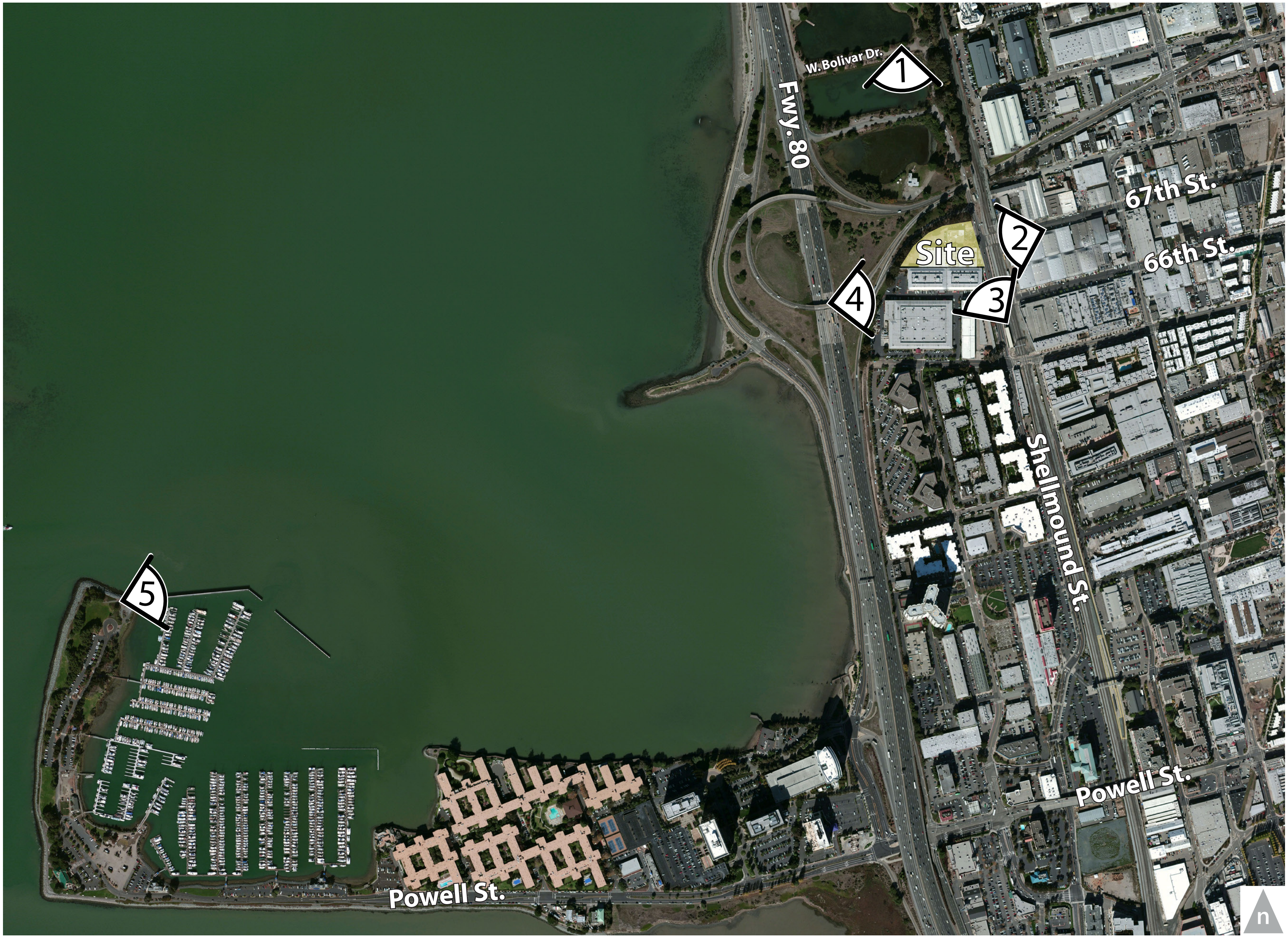
a) *Have a substantial adverse effect on a scenic vista?*

Less Than Significant. The General Plan states that the East Bay Hills and San Francisco Bay are visual assets in Emeryville. The General Plan contains goals and policies that seek to protect views of the San Francisco Bay and the East Bay Hills.

> Goal - UD-G-9: An appealing and functional system of bridges and crossings—Crossings at major barriers (e.g. freeways and rail lines). Protected public views of the San Francisco Bay and the East Bay Hills.
>
> Policy - UD-P-29: Public views of the San Francisco Bay and the East Bay hills shall be maintained.

Public views of the East Bay Hills from the project vicinity are from Shellmound Street, 67th Street, the Ashby Avenue/I-80 overcrossings, I-80, West Frontage Road, and the Bay Trail. Public views of the San Francisco Bay are from the Ashby Avenue/I-80 overcrossings, West Frontage Road, and the Bay Trail; there are no views of the San Francisco Bay from the ground level of the project site or adjacent public sidewalk. Public views of the project site are available from the I-80 on- and off-ramps, and the Ashby Avenue/I-80 overcrossings, but are limited from the main artery of I-80.

Views of the East Bay Hills from certain locations along I-80, West Frontage Road, the Bay Trail, and around the Point Emery Park, may be partially obstructed by the proposed seven-story development; however, the project would not be prominent to highway viewers passing quickly, particularly since the project site elevation is lower than the highway travel lanes and partially obscured by mature trees.



Source: Andrew McNichol

Figure I-1

Viewpoint Location Map


Existing view of project site


Simulated view of project

Source: Andrew McNichol

Figure I–2

Viewpoint 1

Existing view of project site

Simulated view of project

Source: Andrew McNichol

Figure I–3

Viewpoint 2

Existing view of project site

Simulated view of project

Source: Andrew McNichol

Figure I–4

Viewpoint 3

Existing view of project site

Simulated view of project

Source: Andrew McNichol

Figure I–5

Viewpoint 4

Existing view of project site

Simulated view of project

Source: Andrew McNichol

Figure I–6

Viewpoint 5

Viewpoint 1: View from West Bolivar Drive in the Berkeley Aquatic Park
Viewpoint 1, represented in Figure I-2, shows the project site from the Berkeley Aquatic Park looking south. Mature trees that meet the skyline, the radio tower, and the 30-story Pacific Park Plaza are prominent features in the existing view. The visual simulation of the proposed project shows that a portion of the seven-story building would be visible through and above the trees surrounding the park and along the I-80 off-ramp. As shown in the simulation, development of the project would slightly reduce the amount of sky visible and add to existing urban elements—including the Pacific Park Plaza and radio tower buildings—in this viewpoint, but would not affect views of the San Francisco Bay or the East Bay Hills.

Viewpoint 2: View from 67th Street Looking West
Viewpoint 2, represented in Figure I-3, shows the project site from 67th Street looking west. The existing two-story office and industrial warehouse buildings are in the mid-ground and trees along the Caltrans right-of-way are in the background of the existing view. San Francisco Bay is not visible in the existing view. The simulated view of the project shows the seven-story development with new street trees and landscaping. The increased density and activity proposed are apparent from this viewpoint. Development of the project would increase the urban/built character of the area, but would not alter views of the San Francisco Bay or the East Bay Hills.

Viewpoint 3: View from Shellmound Street Looking North
Viewpoint 3, represented in Figure I-4, shows the project site from Shellmound Street looking north. The existing buildings on the project site are mostly obstructed by the adjacent two-story Ex'pression College building and trees in this viewpoint. The simulated image of the project shows a more prominent seven-story building that reaches above the surrounding trees. Development of the project would increase the urban character of this view, but would not affect views of the San Francisco Bay or the East Bay Hills.

Viewpoint 4: View from Westbound I-80/Ashby Avenue Off-ramp
Viewpoint 4, represented in Figure I-5, shows the project site from the elevated westbound I-80/Ashby Avenue off-ramp and overcrossing just after it crosses over I-80. The project site and existing buildings are mostly obstructed in the existing view except at a small gap in the trees along the Caltrans right-of-way. The East Bay Hills and sky are dominant features in the mid-ground and background of this viewpoint. The simulated development can be seen through the small gap in the trees and just over the treetops. Views of the East Bay Hills are currently obstructed by trees and views would not be substantially altered with development of the project from this viewpoint. From other vantage points along the I-80 off-ramp and the Bay Trail west of the freeway, the project may partially obstruct views of the East Bay Hills, but would not create a substantial adverse effect.

Viewpoint 5: View from Emeryville Marina Park Looking Northeast

Viewpoint 5, represented in Figure I-6, shows the project site from the Emeryville Marina Park. The existing view shows the San Francisco Bay in the foreground, the Berkeley, Emeryville, and Oakland skylines in the mid-ground, and the East Bay Hills in the background. The proposed development can be seen along the Bay front in the simulated view (in the middle of the simulation behind the blue buoy), but is partially obscured by the trees that will remain in the Caltrans right-of-way. The project would cause change to the Emeryville skyline, but would not be very noticeable due to the range of existing development that is visible from this viewpoint. The scale of the project is generally consistent with other buildings along the I-80 frontage, south of the project site. From this view, development of the project would not obstruct or substantially affect views of the East Bay Hills.

Other Views

The project would also be visible from some private viewpoints, including the upper floors of the Pacific Park Plaza building at 6363 Christie Avenue; however, the project would not substantially affect views of the San Francisco Bay or East Bay Hills. Development of the project would also create new private views of the San Francisco Bay and East Bay Hills from the upper floors of the seven-story structure.

The changes in views resulting from the project would not significantly impact any visual assets. Additionally, the changes in views that would result would not significantly alter views from public viewpoints, nor would they degrade public views of the San Francisco Bay and the East Bay Hills, and therefore would have a less-than-significant impact on scenic vistas.

b) *Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State Scenic Highway?*

No Impact. California's Scenic Highway Program serves to protect and enhance California's natural scenic beauty and to protect the social and economic values provided by the State's scenic resources. I-80 is not designated as a Scenic Highway, according to California Scenic Highway mapping system.[4] As a result, the project would not substantially damage scenic resources within a State Scenic Highway and no impact would occur.

[4] Caltrans, 2014. Scenic Highway Program, Eligible and Designated Routes. Accessed April 21. http://www.dot.ca.gov/hq/LandArch/scenic_highways/index.htm.

c) *Substantially degrade the existing visual character or quality of the site and its surroundings?*

Less Than Significant. The visual character of the site would change with the introduction of a seven-story new residential development in place of a two-story commercial building, new sidewalks, and increased landscaping. The project site is located in Emeryville's North Bayfront area, between the waterfront and the rail corridor, which is one of the fastest changing districts. Several tall residential and office buildings have been developed in this historically industrial area over the past decade, consistent with the General Plan vision for this district.

The General Plan Urban Design Element highlights themes of high-quality design and pedestrian-scaled street frontages. Specifically, the project addresses the following goals and policies from the General Plan:

> Goal UD-G-19 High-quality—Design and construction that respects existing architecture, but creates new signature places.
>
> Goal UD-G-15 Development along streets that offers a rich visual experience—Development that is engaging to pedestrians, is unobstructed by parking facilities, and contributes to street life, vitality, and safety.
>
> Policy UD-P-27 All ground-level street frontages should be activated. Driveways, loading zones, and curb cuts shall be provided but minimized.
>
> Policy UD-P-33 Bulky and monolithic buildings shall be prevented through:
>
> - Vertical articulation, such as step backs at higher floors, and less floor area as heights increase to reduce the apparent bulk of buildings.
> - Horizontal articulation, such as varied setbacks, recessions/projections, change in materials, and building transparency, especially in Pedestrian Priority Zones.

As demonstrated in the simulations in Figures I-3 and I-4 (Viewpoints 2 and 3), the proposed development incorporates exterior building materials and textures, including metal, corrugated metal, and panelized brick, which are reflective of and consistent with the visual and historical context of the surrounding industrial neighborhood. The mix of textured materials and articulated façade and roof would offer visual interest from Shellmound Street and distant views. Resident amenities such as a lobby, fitness center, leasing office, and bike and dog spas along the Shellmound Street frontage would activate the public sidewalk. Courtyards on the third and seventh floors create stepbacks that reduce the bulk of the building and provide opportunities for additional landscaping.

The General Plan EIR concludes that buildout of the General Plan, including development on the project site, would have beneficial cumulative impacts to the City's visual quality and character. The project would change the overall visual character of the existing industrial office and warehouse on the site, but would not substantially degrade the existing visual character of the site or its surroundings and the potential impact is less than significant.[5]

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

Less Than Significant. The site is currently occupied by office and warehouse buildings with minimal on-site lighting. The project would increase the amount of lighting to provide for the comfort, safety, and security of residents and visitors. Although the project does not yet include a detailed lighting plan, exterior lighting information required as part of the City's standard Conditions of Approval will be submitted prior to issuance of the building permit. Building materials include windows and some light corrugated metal, but do not include substantial amounts of reflective materials. For these reasons, the impact of new light or glare sources would be less than significant.

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[5] It may be noted that that SB 743, signed into law on September 27, 2013, adds Section 21099(d)(1) to the California Public Resources Code. This section provides that "[a]esthetic and parking impacts of a residential, mixed-use residential, or employment center project on an infill site within a transit priority area shall not be considered significant impacts on the environment [for purposes of CEQA]." The law further defines "transit priority area" as "an area within one-half mile of a major transit stop that is existing or planned, if the planned stop is scheduled to be completed within the planning horizon included in a Transportation Improvement Program adopted pursuant to Section 450.216 or 450.322 of Title 23 of the Code of Federal Regulations." (Pub. Res. Code 21099(a)(7)). The project site is approximately one-half mile of a major transit stop, that is, the Amtrak station and is located on an infill site. Nonetheless, both aesthetics and parking analysis have been conducted for the purpose of public disclosure.

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporation	Less Than Significant Impact	No Impact
II. AGRICULTURAL AND FOREST RESOURCES				
In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California agricultural land evaluation and site assessment model (1997) prepared by the California Dept. of conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significantly environmental effects, lead agencies may refer to information compiled by the California department of forestry and fire protection regarding the state's inventory of forest land, including the forest and range assessment project and the forest legacy assessment project; and forest carbon measurement methodology provided in forest protocols adopted by the California air resources board. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to a 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 Governmental 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 conversion of forest land to non-forest use?	❐	❐	❐	■

No Impact. The project site is currently developed with office and manufacturing uses and does not include agricultural or forest resources. Because the project site is already developed, the project would not convert any Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to nonagricultural use, nor would the project result in the loss of forest land or convert forest land to non-forest use. Therefore, the project would not result in impacts related to agricultural resources.

III. AIR QUALITY	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporation	Less Than Significant Impact	No Impact
Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	❐	❐	■	❐
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	❐	■	❐	❐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	❐	❐	■	❐
d) Expose sensitive receptors to substantial pollutant concentrations?	❐	■	❐	❐
e) Create objectionable odors affecting a substantial number of people?	❐	❐	■	❐

Affected Environment

Regulatory Framework

The United States Environmental Protection Agency (EPA) is responsible for implementing the programs established under the federal Clean Air Act, such as establishing and reviewing the national ambient air quality standards (NAAQSs) and judging the adequacy of State Implementation Plans (SIPs). The California Air Resources Board (CARB) is responsible for establishing and reviewing the California ambient air quality standards (CAAQSs), developing and managing the California SIP, identifying Toxic Air Contaminants (TACs), and overseeing the activities of regional air quality management districts. In California, mobile emissions sources (e.g., construction equipment, trucks, and automobiles) are regulated by CARB and stationary emissions sources (e.g., industrial facilities) are regulated by the air quality management districts. The project is located in San Francisco Bay Area Air Basin (SFBAAB), which is under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD).

Criteria Air Pollutants

Under the federal Clean Air Act of 1970, the EPA has identified six criteria air pollutants that are pervasive in urban environments. EPA calls these pollutants criteria air pollutants because the agency has regulated them by developing specific public health- and welfare-based criteria as the basis for setting the NAAQSs. The six criteria air pollutants are ozone, carbon monoxide (CO), sulfur dioxide (SO2), nitrogen dioxide (NO2), lead, and particulate matter (PM).

Criteria air pollutants are emitted directly into the atmosphere and/or are formed in the atmosphere. For example, ozone is formed in the atmosphere through a series of photochemical reactions involving reactive organic gases (ROG) and nitrogen oxides (NOx). ROG and NOx are known as precursor compounds for ozone. There are two fractions of PM emissions that are regulated based on aerodynamic resistance diameters equal to or less than 10 microns (PM10) and 2.5 microns (PM2.5). These PM fractions are a concern because they are small enough to be inhaled into the air passages and lungs, which can cause adverse health effects. Larger dust particles with aerodynamic resistance diameters greater than 10 microns settle out rapidly and are easily filtered by human breathing passages. The finer PM2.5 fraction, which includes diesel exhaust particles, poses a more significant threat to human health because these smaller particles can penetrate deeper into the lungs.

The regulation of criteria air pollutants in California is generally achieved through regional air quality plans and emission limitations (i.e., permits) on stationary sources to achieve ambient air quality standards. The CAAQSs and NAAQSs are intended to incorporate an adequate margin of safety to protect the public health and welfare. They are designed to protect people who are most susceptible to air pollutants, known as “sensitive receptors”. Land uses associated with sensitive receptors include schools, convalescent homes, and hospitals because the very young, the old, and the infirm are more susceptible to air-quality-related health problems than the general public. Residential areas are also considered sensitive to poor air quality because people are often at home for extended periods.

The CAAQSs, which are based on meteorological conditions unique to California, are either equal to or more stringent than the NAAQSs. In accordance with the federal Clean Air Act and California Clean Air Act, areas in California are classified as either in “attainment” or “non-attainment” for each criteria air pollutant, based on whether or not the NAAQSs or CAAQSs have been achieved. The Bay Area is currently designated “non-attainment” for the State one-hour and eight-hour ozone standards, the national eight-hour ozone standard, and for the State PM10 and PM2.5 standards. The Bay Area is "in attainment" or "unclassified" with respect to the other ambient air quality standards.[6]

Toxic Air Contaminants

TACs, which are considered non-criteria air pollutants, are airborne substances that are capable of causing adverse human health effects (i.e., injury or illness). Common sources of TAC emissions include stationary sources, such as gasoline stations and dry cleaners, and mobile sources, such as vehicle exhaust along highways and major roadways. Unlike criteria pollutants which are regionally regulated based on the CAAQSs, TAC emissions are evaluated based on estimations of localized concentrations and risk assessments. For risk assessment purposes, TACs are separated into carcinogens and non-carcinogens. Carcinogens are assumed to have no safe threshold below which health impacts would not occur, and cancer risk is expressed as excess cancer cases per one million exposed individuals over a lifetime of exposure. Non-carcinogenic substances are generally assumed to have a safe threshold below which health impacts would not occur. Acute and chronic exposure to non-carcinogens is expressed as a hazard index (HI), which is the sum of expected exposure levels divided by the corresponding acceptable exposure levels. In the Bay Area, adverse air quality impacts to public health from TACs are predominantly from diesel PM2.5.[7]

Air Quality Plans

In accordance with the federal Clean Air Act and California Clean Air Act, the BAAQMD is required to prepare and update an air quality plan that outlines measures by which both stationary and mobile sources of pollutants can be controlled in order to achieve NAAQSs and CAAQSs in areas designated as non-attainment. In September 2010, the BAAQMD adopted the *Bay Area 2010 Clean Air Plan* (CAP),[8] which serves as an update to the previous *Bay Area 2005 Ozone Strategy*.[9] The 2010 CAP includes 55 control measures to reduce ozone precursors, PM, TACs, and greenhouse gases (GHGs). The 2010 CAP was developed based on computer modeling and analysis of existing air quality monitoring data and emissions inventories, and incorporated traffic and population growth projections prepared by the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Government (ABAG), respectively.

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[6] Bay Area Air Quality Management District (BAAQMD), 2014. *Air Quality Standards and Attainment Status*. Accessed February 18. http://hank.baaqmd.gov/pln/air_quality/ambient_air_quality.htm.
[7] BAAQMD, 2010a. *Bay Area 2010 Clean Air Plan*. September 15.
[8] Ibid.
[9] BAAQMD, 2006. *Bay Area 2005 Ozone Strategy*. January 6.

BAAQMD CEQA Air Quality Guidelines

In accordance with the 2010 CAP, the BAAQMD developed and adopted thresholds of significance (Thresholds) that were incorporated into the 2010 *CEQA Air Quality Guidelines*.[10] The purpose of the *CEQA Air Quality Guidelines* is to assist lead agencies in the evaluation and mitigation of air quality impacts generated from new developments during the construction and operational phases of a project. The 2010 Thresholds established levels at which air pollution emissions would cause significant environmental impacts. The 2010 Thresholds include emission values for ozone precursors (ROG and NOx), PM2.5, PM10, local CO, TACs, and GHGs. Relative to the established Thresholds, the BAAQMD also developed and incorporated screening criteria into the 2010 *CEQA Air Quality Guidelines*. The screening criteria can be used to conservatively indicate whether a proposed project would result in potentially significant air quality impacts and if more detailed air quality assessments are necessary.

On March 5, 2012, the Alameda County Superior Court issued a judgment finding that the BAAQMD had failed to comply with CEQA before adopting the 2010 Thresholds, because the 2010 Thresholds are considered a “project” subject to CEQA review. The court issued a writ of mandate ordering BAAQMD to set aside and cease dissemination of the adopted 2010 Thresholds until approved under CEQA. In view of the court’s order, the BAAQMD updated the *CEQA Air Quality Guidelines* in 2012 to exclude the recommended use of the 2010 Thresholds and associated screening criteria for CEQA analysis.

On August 13, 2013, the California First Appellate District Court of Appeal reversed the trial court's decision by finding that the adoption of the 2010 Thresholds was not itself a “project” requiring CEQA review. The Court of Appeal's decision has since been appealed to the California Supreme Court, and the matter is currently pending there. The Supreme Court's review is limited to the following issue: "Under what circumstances, if any, does CEQA require an analysis of how existing environmental conditions will impact future residents or users (receptors) of a proposed project?" Accordingly, the precise issue under review is not related to the scientific soundness of the 2010 Thresholds or even the process under which BAAQMD adopted the 2010 Thresholds. Rather, the issue under review by the Supreme Court is whether "converse-CEQA" analysis is required. Several courts have held that it is not.[11] While this issue is under review by the Supreme Court, converse-CEQA analysis has been conducted in this initial study (e.g., how existing Toxic

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[10] BAAQMD, 2010b. *California Environmental Quality Act Air Quality Guidelines*. May.

[11] See, for example, *Ballona Wetlands Land Trust et al. v. City of Los Angeles* (2011) 201 Cal. App. 4th 455; *Baird v. County of Contra Costa; City of Long Beach v. Los Angeles Unified School District* (2009) 176 Cal.App.4th 889; *South Orange County Wastewater Authority v. City of Dana Point (*2011) 196 Cal.App.4th 1604.

Air Contaminants may affect future project residents) for the purpose of additional disclosure.

Further, since the scientific soundness of the 2010 Thresholds have not been challenged, lead agencies may continue to use the 2010 Thresholds and associated screening criteria for CEQA analysis at their discretion.[12] The 2010 Thresholds and associated screening criteria are used in this initial study in conjunction with 2012 *CEQA Air Quality Guidelines*[13] for the evaluation of air quality impacts related to the proposed project.

Discussion

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

Less than Significant. The General Plan EIR stated that development within the City would conflict with or obstruct implementation of the *Bay Area 2005 Ozone Strategy* (the applicable air quality plan at that time) because the population growth projections under the General Plan were higher than the growth projections used in the *Bay Area 2005 Ozone Strategy*. Since population growth and related emissions above the levels projected for the *Bay Area 2005 Ozone Strategy* could delay attainment of the CAAQS, the General Plan was considered inconsistent with the applicable air quality plan and the inconsistency resulted in a significant and unavoidable impact. The General Plan EIR acknowledged that individual projects proposed in the future would require further environmental review to determine the significance of project-level impacts.

The current and applicable air quality plan is the 2010 CAP. Based on the current 2012 *CEQA Air Quality Guidelines*, the following criteria should be considered to determine if a project would conflict with or obstruct implementation of the 2010 CAP:

- Does the project support the primary goals of the air quality plan?
- Does the project include applicable control measures from the air quality plan?
- Does the project disrupt or hinder implementation of any air quality plan control measures?

The goals of the 2010 CAP are to reduce the emissions and ambient concentrations of ozone precursors, PM, TACs, and GHGs, and to reduce public exposure to harmful pollutants. Since the project would not result in any significant and unavoidable air quality

[12] Specifically, CEQA Guidelines Section 15064.7 provides: "[w]hen adopting thresholds of significance, a lead agency may consider thresholds of significance previously adopted or recommended by other public agencies, or recommended by experts, provided the decision of the lead agency to adopt such thresholds is supported by substantial evidence."
[13] BAAQMD, 2012a. *California Environmental Quality Act Air Quality Guidelines*. May.

impact-related emissions, ambient concentrations, or public exposures (see Sections b-d, below), the project supports the primary goals of the 2010 CAP.

Control measures in the 2010 CAP aim to reduce air pollution from stationary, area, and mobile sources, as well as promote dense mixed-use development to reduce vehicle emissions and public exposure to pollutants. Consistent with the 2010 CAP, the project's proposed increase in the density of residential development within the City rather than a peripheral location within the Bay Area would reduce vehicle miles traveled and thereby reduce air pollutant emissions from motor vehicles. Other control measures in the 2010 CAP are generally regional in effect (e.g., transit service improvements) and the project would not disrupt or hinder implementation of these measures.

According to the 2012 *CEQA Air Quality Guidelines*, the project would have a less-than-significant impact on implementation of the applicable air quality plan.

b) *Violate any air quality standard or contribute substantially to an existing or projected air quality violation?*

Potentially Significant Unless Mitigation Incorporation. Potential impacts of construction of the project related to the air quality violations can be mitigated to a less-than-significant level, as described below. Potential operational impacts are found to be less than significant.

Construction

The General Plan EIR acknowledges that construction activities can create fugitive dust and other criteria pollutant emissions that could adversely affect local air quality. Common pollutant emissions of concern during construction include ROG, NOx, exhaust PM2.5 and PM10 from equipment, and fugitive dust PM2.5 and PM10 from earth-moving activities. The General Plan EIR requires all construction projects in the City to reduce potential PM impacts from earth-moving activities by implementing the following policy:

> Policy CSN-P-4: Dust abatement actions are required for all new construction and redevelopment projects.

In addition, the General Plan EIR recognizes that renovation or demolition of buildings containing hazardous building materials could adversely affect local air quality. Building materials such as thermal system insulation, surfacing materials, and asphalt and vinyl flooring materials installed in buildings prior to 1981 may contain asbestos.[14] Lead compounds may be present in interior and exterior paints used for commercial buildings,

[14] Title 8 of the California Code of Regulations §5208. *Asbestos*.

regardless of construction date.[15] Lead and asbestos are State-recognized carcinogens.[16] In addition to lead-based paint, existing buildings on the project site were constructed before 1981[17] and could contain asbestos. The General Plan EIR requires all renovation and/or demolition projects in the City to mitigate potential releases of hazardous building materials by implementing the following policy:

> Policy CSN-P-40: The City requires abatement of lead-based paint and asbestos prior to structural renovation or demolition, and compliance with all State, Federal, Occupational Safety and Health Administration, Bay Area Air Quality Management District, Alameda County, and local rules and regulations.

According to the screening criteria in the 2010 CEQA *Air Quality Guidelines*, construction projects that include demolition are required to estimate emissions of ozone precursors and PM to determine if emissions could exceed the applicable Thresholds and substantially contribute to existing violations of CAAQSs in the SFBAAB.[18] Potential emission sources for the project would include demolition, grading, building construction, paving, and architectural coatings. The BAAQMD recommends using the most current version of the California Emissions Estimator Model (CalEEMod)[19] to estimate the construction emissions of a proposed project. A copy of the CalEEMod report for the project, which summarizes the input parameters, assumptions, and findings, is included in Appendix A. Unmitigated pollutant emissions during project construction were estimated using the CalEEMod default values, except as noted below.

- The lot acreage and building square footage were modified to equal the values in the proposed project description.

The estimated average daily emissions of ozone precursors and PM10 and PM2.5 from equipment exhaust during construction are compared to the 2010 Thresholds in Table III-1. The estimated emissions for ROG, NOx, and exhaust PM2.5 and PM10 were below the 2010 Thresholds and, therefore, would have a less-than-significant impact on air quality standards.

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[15] Department of Toxic Substances Control (DTSC), 2006. *Interim Guidance Evaluation of School Sites with Potential Soil Contamination as a Result of Lead from Lead-Based Paint, Organochlorine Pesticides from Termiticides, and Polychlorinated Biphenyls from Electrical Transformers*. Revised June 9.
[16] California Environmental Protection Agency, 2010. *Safe Drinking Water and Toxic Enforcement Act of 1986, Chemicals Known to the State to Cause Cancer or Reproductive Toxicity*. May 21.
[17] PES Environmental, Inc., 2014a. *Phase I Environmental Site Assessment, 6701, 6705, and 6707 Shellmound Street, Emeryville, California*. January 17.
[18] Note that the screening criteria for high-rise apartment construction projects is 249 units. The project's proposed 211 units fall below this screening criteria. However, due to the project's demolition activities, the project's construction emissions have been evaluated.
[19] ENVIRON International Corporation and the California Air Districts, 2013. *California Emissions Estimator Model Version 2013.2.2*. July.

TABLE III-1 SUMMARY OF AVERAGE CRITERIA POLLUTANT EMISSIONS DURING PROJECT CONSTRUCTION

Pollutant	ROG	NOx	Exhaust PM10	Exhaust PM2.5
Units	lb/day	lb/day	lb/day	lb/day
Emissions	13	27	2	2
Thresholds	54	54	82	54
Exceedance	No	No	No	No

Note: lb/day = pounds per day
Source: CalEEMod (Appendix A)

Regardless of estimated emissions, the BAAQMD recommends implementing *Basic Construction Mitigation Measures*[20] for all construction projects to reduce ozone precursors and PM. The dust abatement activities required by Policy CSN-P-4 are further described by the BAAQMD *Basic Construction Mitigation Measures*. There are no quantitative Threshold values for fugitive dust PM2.5 and PM10; however, the BAAQMD considers implementation of best management practices, such as the *Basic Construction Mitigation Measures,* sufficient to reduce related air quality impacts from fugitive dust to a less-than-significant level.

Implementation of Policies CSN-P-4 and CSN-P-40 and the *Basic Construction Mitigation Measures* summarized under **Mitigation Measure AQ-1**, below, would reduce potential project impacts to existing air quality standards to a less-than-significant level.

Mitigation Measure AQ-1: The project shall comply with the following BAAQMD *Basic Construction Mitigation Measures*:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
- All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads shall be limited to 15 miles per hour.

[20] BAAQMD, 2012a. op. cit.

- All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations). Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified visible emissions evaluator.
- Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.

Operation

The General Plan EIR acknowledges that individual projects would require further environmental review to determine whether operations would generate site-specific air quality impacts. Common pollutant emissions of concern during the operational phase of a project include ROG, NOx, exhaust PM2.5 and PM10 from equipment, and CO. Emissions of ozone precursors and PM above applicable Thresholds could substantially contribute to the existing violations of CAAQSs within the SFBAAB. Ambient CO concentrations in the SFBAAB do not currently violate CAAQS; however, the BAAQMD considers emissions of CO to be significant if localized concentrations (also known as "hot spots") exceed the CAAQSs.[21]

Pollutant emissions of concern during the operational phase of the project would primarily be from mobile sources (i.e., vehicle trips). Other common emissions would include energy use (e.g., electricity and natural gas) and area sources (e.g., consumer products, architectural coatings, and landscape maintenance equipment). The pollutant emissions during project operations were estimated using CalEEMod and a copy of the report, which summarizes the input parameters, assumptions, and findings, is included in Appendix A. Emissions were estimated from a total of 211 residential units. The unmitigated pollutant emissions during project operations were estimated using the CalEEMod default values, except as noted below.

- The lot acreage (2.27 acres) and building square footage were modified to equal the values in the proposed project description.

[21] Ibid.

- The weekday and Saturday vehicle trip rates were reduced to 5.17 and 5.36 trips/dwelling unit/day, respectively, based on the assumptions of the transportation analysis conducted for the project.[22]

The estimated average daily emissions of ozone precursors and PM10 and PM2.5 from equipment exhaust during the operational phase of the project are compared to applicable Thresholds in Table III-2. The estimated unmitigated emissions for ROG, NOx, and exhaust PM2.5 and PM10 were below the 2010 Thresholds. Therefore, the project would have a less-than-significant impact on air quality standards and would not result in a substantial increase in the severity of previously identified significant effects.

TABLE III-2 SUMMARY OF AVERAGE CRITERIA POLLUTANT EMISSIONS DURING PROJECT OPERATION

Pollutant	ROG	NOx	Exhaust PM10	Exhaust PM2.5
Units	lb/day	lb/day	lb/day	lb/day
Emissions	12	16	0.3	0.3
Thresholds	54	54	82	54
Exceedance	No	No	No	No

Source: CalEEMod (Appendix A)

The 2010 *CEQA Air Quality Guidelines* provide screening criteria to conservatively assess if a proposed project could result in CO emissions that would cause local CO concentrations to exceed the 2010 Thresholds, which are equivalent to the CAAQS. The proposed project would result in a less-than-significant impact to localized CO concentrations if the following screening criteria are met:

- The project is consistent with an applicable Congestion Management Program (CMP) established by the County Congestion Management Agency for designated roads or highways, regional transportation plans, and local congestion management agency plans.

- The project traffic would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour.

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[22] Fehr & Peers, 2014. *Memorandum regarding 6701 Shellmound (City of Emeryville) Transportation Analysis Assumptions*. February 19.

- The project traffic would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., tunnel, parking garage, bridge underpass, natural or urban street canyon, below-grade roadway).

The Alameda County Transportation Commission (CTC) serves as the County Congestion Management Agency. The Alameda CTC updates the County's CMP every two years to assess, monitor, and improve the performance of the County's multimodal transportation system and strengthen the integration of transportation and land use planning. The current 2013 CMP[23] requires an analysis of any project that is expected to generate more than 100 PM peak-hour vehicle trips. The proposed project is expected to generate 85 PM peak-hour vehicle trips during the weekdays.[24] Since the project would generate less than 100 PM peak-hour vehicle trips, the project is consistent with the current CMP.

The intersection of I-80 and SR 13 north of the project site is the most heavily congested intersection in the project vicinity with a peak PM traffic volume of 15,933 vehicles per hour reported in 2000. Based on Alameda CTC traffic volume forecasts, the peak PM traffic volume at this intersection would increase to about 30,729 vehicles per hour by 2035.[25] Therefore, additional traffic from the project (less than 100 trips per hour) would not increase traffic volumes at the intersection to more than 44,000 vehicles per hour.

Vertical and/or horizontal mixing is not substantially limited at intersections near the project site. Since the project meets the BAAQMD screening criteria, the project would have a less-than-significant air quality impact related to local CO concentrations.

c) *Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?*

Less than Significant. Air pollution in the SFBAAB is generally a cumulative impact and, therefore, future development projects contribute to the region's adverse air quality impacts on a cumulative basis. In developing the 2010 Thresholds, the BAAQMD considered the emission levels for which an individual project's emissions would be cumulatively considerable; including the emissions of criteria pollutants already exceeding CAAQSs. The SFBAAB is currently designated a nonattainment area for ozone and PM. As discussed under Section III(b), above, emissions of ozone precursors and PM during the construction and operational phases of the project would not exceed the 2010

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[23] Alameda County Transportation Commission (CTC), 2013. *Congestion Management Program*. October.

[24] Fehr & Peers, 2014. op. cit.

[25] Alameda CTC, 2011. *Alameda Countywide Transportation Model Update; Projections 2009 Model Documentation*. August 9.

Thresholds. Therefore, the cumulative impact of ozone precursors and PM from the project would be less than significant.

d) *Expose sensitive receptors to substantial pollutant concentrations?*

Potentially Significant Unless Mitigation Incorporation. Potential impacts of operation of the project associated with exposure of sensitive receptors to substantial pollutant concentrations can be mitigated to a less-than-significant level, as described below. As described in the Affected Environment section above and in the discussion below, sensitive receptors include young people in schools and residents. Nearby sensitive receptors may include students at the adjacent Ex'pression College and residents to the south on Shellmound Street. Potential construction impacts are found to be less than significant.

Construction

TAC emissions during construction are typically limited to diesel PM from heavy-duty diesel vehicles and equipment. Construction-phase TACs, however, would be temporary, and cancer risk modeling methodologies are associated with longer-term exposure periods of 9, 30 and 70 years, which do not correlate well with the temporary and highly variable nature of construction activities. Construction equipment would be required to comply with all of California Air Resource Board's regulations related to off-road equipment, including limits on emissions of PM. **Mitigation Measure AQ-1** includes requirements that reduce construction exhaust emissions by limiting idle times for equipment when not in use and that construction equipment be maintained and properly tuned in accordance with manufacturer's specifications. Therefore, the temporary construction activities would have a less-than-significant impact on nearby receptors.

Operation

Residents at the project site could potentially be exposed to existing sources of TAC emissions. The General Plan EIR determined that developments near freeways and railroads could expose sensitive receptors to potentially significant concentrations of TACs and would require implementation of the following policy to reduce associated impacts to a less-than-significant level:

> Policy LU-P-25: If new residential buildings are proposed adjacent to freeways and railroad tracks impacts of these corridors, including noise, vibration, and air pollution, should be considered during site planning. Noise, vibration, and air pollution shall be mitigated to the extent possible.

The BAAQMD recommends using their online screening tools to further evaluate TAC emissions from stationary and mobile sources within 1,000 feet of a new receptor (i.e., the project site). The screening tools provide conservative estimates of how much existing

TAC sources would increase cancer risk levels, HI, and/or PM2.5 concentrations in a community-based on worst-case assumption scenarios. Sources of TAC emissions identified near the project site included five stationary sources (permitted facilities) and three mobile sources (I-80, SR 13, and Hollis Street). Screening values for the stationary sources were determined using the BAAQMD's *Stationary Source Screening Analysis Tool*.[26] The screening values for I-80 and SR 13 were linearly interpolated from screening tables provided in the BAAQMD's *Highway Screening Analysis Tool*.[27] According to the California Environmental Health Tracking Program's *Traffic Spatial Linage Web Service*, the average traffic volume along Hollis Street is 11,200 vehicles per day.[28] Based on the average traffic volume, the screening values for Hollis Street were linearly interpolated from the BAAQMD's *Roadway Screening Analysis Tables*.[29]

Conservative estimates of both the individual and cumulative risks and hazards to receptors at the proposed project site from nearby TAC sources are summarized and compared to the 2010 Thresholds in Table III-3. The individual estimates for cancer risk or PM2.5 exceeded the 2010 Thresholds from the "Fifth & Potter Street Assoc" and "Coulter Forge Company, Inc" permitted facilities and from the I-80. The cumulative estimate for PM2.5 also exceeded the 2010 Thresholds.

Four railroad lines that serve Amtrak passenger trains and freight trains are located approximately 75 feet east of the project site. The BAAQMD has not yet developed a screening tool to evaluate TAC emissions from railroad lines. However, based on the BAAQMD's air dispersion modeling for the MTC and ABAG's *Plan Bay Area EIR*, any sensitive receptors located within 200 feet of a railroad line in the Bay Area could result in a potentially significant impact. [30] Since the proposed project is located within 200 feet of a railroad line, TAC emissions from freight and passenger trains could have a potentially significant impact on receptors at the project site.

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[26] BAAQMD, 2012b. *Stationary Source Screening Analysis Tool*. May 30.

[27] BAAQMD, 2011a. *Highway Screening Analysis Tool*. April 29.

[28] California Department of Public Health, 2014. *California Environmental Health Tracking Program's Traffic Spatial Linage Web Service*. Environmental Health Investigations Branch. Accessed February 17. http://www.ehib.org/traffic_tool.jsp.

[29] BAAQMD, 2011b. *Roadway Screening Analysis Tables*. April 29.

[30] Association of Bay Area Governments and Metropolitan Transportation Commission (ABAG and MTC), 2013. *Plan Bay Area Final Environmental Impact Report*. July.

TABLE III-3 SUMMARY OF RISKS AND HAZARDS FROM NEARBY TAC EMISSIONS

Plant ID	Name	Location	Cancer Risk (10^{-6})	Chronic Hazard Index	PM2.5 ($\mu g/m^3$)
14949	Fifth & Potter Street Assoc	725 Potter St, Berkeley	**18.8***	0.17	0.03*
18174	Siemens Healthcare Diagnostics, Inc	725 Potter Street, Berkeley	0.00	0.00	0.00
13938	Evocative, Inc	1400 65th Street, Emeryville	0.00	0.00	0.00
15235	Coulter Forge Company, Inc	1494 67th St, Emeryville	0.09	0.00	**1.83**
14688	Qwest Communications Corporation	6440 Shellmound St, Emeryville	2.51*	0.01	0.00*
NA	Hollis Street	900 feet east of the project	0.45	---	0.02
NA	SR13 (Ashby Avenue)	160 feet north of the project	5.51	0.01	0.07
NA	I-80	440 feet west of the project	**14.4**	0.01	0.09
		Individual Thresholds:	10.0	1.0	0.3
		Individual Exceedance:	**Yes**	No	**Yes**
		Cumulative Risks and Hazards:	42	0.2	**2.0**
		Cumulative Thresholds:	100	10.0	0.8
		Cumulative Exceedance:	No	No	**Yes**

Notes: * Value adjusted using the BAAQMD's Diesel Internal Combustion Engine Distance Multiplier Tool.[31]
Bold font indicates a 2010 Threshold exceedance.
The 20 foot elevation exposure table (second floor exposures) was referenced to assess impacts from I-80 and SR 13.
Source: BAAQMD, 2014. *Tools & Methodology*. http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Tools-and-Methodology.aspx

CARB has identified high efficiency filtration as the most effective method for residences to reduce incoming diesel PM and other contaminants from outdoor air. Air filters with a Minimum Efficiency Reporting Value rating of 13 (MERV-13) to 16 (MERV-16) are considered high efficiency filters and are able to reduce levels of indoor fine PM more than 90% relative to the incoming outdoor air. CARB is currently funding two studies that should help further identify the approximate reduction in exposure that high efficiency filtration can provide in homes.[32]

[31] BAAQMD, 2012c. *Diesel Internal Combustion Engine Distance Multiplier Tool*. June 13.
[32] California Air Resources Board (CARB), 2012. *Status of Research on Potential Mitigation Concepts to Reduce Exposure to Nearby Traffic Pollution*. August 23.

The potentially significant TAC emissions identified from nearby facilities, I-80, and the railroad are primarily associated with diesel PM2.5. Based on the current research, implementation of high efficiency filters at the project site could reduce more than 90% of the incoming diesel PM2.5 levels *from outdoor air*. In accordance with Policy LU-P-25 of the General Plan EIR, potentially significant TAC emissions from nearby sources shall be reduced to a less-than-significant level by implementing **Mitigation Measure AQ-2**, below.

> Mitigation Measure AQ-2: The project shall install high efficiency air filtration with a MERV-13 rating or higher to capture at least 90 percent of fine particulates, and reduce cancer risks and PM exposure for residents. As part of implementing this measure, an ongoing maintenance plan for the building's HVAC air filtration system shall be required. Documentation of the maintenance (in accordance with manufacturer's recommendations) and operation of the high-efficiency filtration systems shall be provided to the City's Planning & Building Department on an annual basis.

e) *Create objectionable odors affecting a substantial number of people?*

Less than Significant. Odor impacts could result from creating a new odor source or from exposing a new receptor to an existing odor source. Typical odor sources are generally associated with municipal, industrial, or agricultural land uses, such as wastewater treatment plants, landfills, confined animal facilities, composting stations, food manufacturing plants, refineries, and chemical plants. The occurrence and severity of odor impacts depend on the nature, frequency, and intensity of the source, the wind speed and direction, and the sensitivity of receptors.

The project is a residential development that would not be expected to generate significant odors. The project site is surrounded by mixed residential and commercial land uses, which would also not be expected to generate significant odors. Therefore, project impacts related to odors would be less than significant.

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

Affected Environment

The project site is located within a developed area of Emeryville. The project site is currently occupied by two buildings and has no natural vegetation, habitat for special-status species, wetlands, or riparian habitats. Approximately 12 planted trees occur on the project site in the front parking lot area and along the perimeter of the property. A row of planted eucalyptus trees occur within the Caltrans right-of-way between the I-80/Shellmound/Ashby off-ramp and the project site. The General Plan EIR determined that there are eight special status wildlife species and seven special status plant species with potential to occur within the Emeryville area, most of which are associated with the Northern Coastal Salt March habitat. No special status wildlife or plant species have potential to occur within the project site, according to the General Plan EIR and there are no sensitive habitats within or adjacent to the project site.

Discussion

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

Less Than Significant. The General Plan EIR analyzed the potential impacts of development to special-status species in accordance to the California Natural Diversity Database (CNDDB), the California Native Plant Society (CNPS), and the U.S. Fish and Wildlife (USFWS) website species list and found that no sensitive plant or animal species occur on the project site. Consequently, the project would have a less-than-significant impact on identified candidate, sensitive, or special status species.

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

Less Than Significant. The project site has been extensively disturbed by past development, eliminating all native plant species and natural communities that may have been present at one time. The nearest sensitive natural communities to the project site are located in the Berkeley Aquatic Park, north of Ashby Avenue, and in the Eastshore State Park, west of I-80. No riparian habitat or other sensitive natural community types identified in local or regional plans, policies, regulations or by the CDFW or U.S. Fish and Wildlife Service (USFWS) are present on the site. Due to the lack of any sensitive natural communities on the site, the impact would be less than significant as a result of project implementation.

c) *Would the project have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?*

No Impact. No jurisdictional wetlands or waters occur within the project site.[33] As required by the City's Conditions of Approval, and further discussed in *Section IX: Hydrology and Water Quality*, the applicant must show compliance with the City's Stormwater Measures,

[33] PES Environmental, Inc., 2014a. op. cit.

including the City's and National Pollutant Discharge Elimination System (NPDES) Stormwater Permit, prior to issuance of a building permit.

d) *Would the project 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?*

Potentially Significant Unless Mitigation Incorporation. The General Plan EIR analyzes potential biological resource impacts within and immediately surrounding Emeryville and includes a figure showing sensitive biological resources, none of which are located on the project site. The closest sensitive species are located approximately ¼ mile southwest of the project site on the opposite side of I-80, according to the General Plan EIR, which inhibits wildlife movement to the project site. Furthermore, the General Plan EIR states that new development would not interfere with any resident or migratory fish or wildlife movement.

Trees and shrubs within the project site could be suitable for nesting birds. The proposed project would involve removal of 11 existing trees from the project site, which could cause adverse impacts to nesting birds and raptors protected by the Migratory Bird Treaty Act and CDFG Code 3503 and 3503.5. In addition, noise and vibration from project construction could cause adverse impacts to nesting birds in nearby trees within the Caltrans right-of-way. Impacts to nesting birds or raptors would be a potentially significant impact. Implementation of **Mitigation Measure BIO-1** would reduce this potential impact to a less-than-significant level. Implementation of **Mitigation Measure BIO-1** would also reduce the potential for the project to contribute to cumulative impacts on nesting birds, when considering other General Plan projects anticipated in the General Plan EIR.

<u>Mitigation Measure BIO-1: Nesting Birds</u>: To avoid construction-related direct impacts (nest removal) or indirect impacts (increased noise levels) on nesting birds, one of the following measures shall be implemented:

- Conduct tree removal and/or tree trimming between September 1 and January 31, outside of the nesting season, to avoid or minimize potential impacts to nesting birds.

OR

- Conduct pre-construction surveys for nesting birds if construction and tree removal activities take place during the nesting season (from February 1 to August 31). A qualified wildlife biologist shall conduct a pre-construction nest survey no more than 5 days prior to initiation of construction activities. If active nests are encountered, species-specific measures shall be prepared by a qualified biologist and implemented to prevent abandonment of the active nest. At a minimum, grading in the vicinity of the nest shall be deferred until the young birds have fledged. A minimum exclusion buffer of 50 feet (300 feet or more for raptors) shall be maintained during construction, depending on the species and location. The perimeter of the nest-setback zone shall be fenced or adequately demarcated with staked flagging at 20-foot intervals, and construction personnel and activities would be restricted in the area. A survey report by a qualified biologist verifying that (1) no active nests are present, or (2) the young have fledged, shall be submitted to the City and CDFW prior to initiation of grading in the nest-setback zone. The qualified biologist shall serve as a construction monitor during those periods when construction activities occur near active nest areas to ensure that no inadvertent impacts to these nests occur.

e) *Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?*

Less Than Significant. The proposed project would not conflict with any relevant goals and policies in the City of Emeryville related to protection of biological and wetland resources. The City of Emeryville's Urban Forestry Ordinance (Title 7, Chapter 10) protects street trees and requires a tree removal permit for removal of any street tree. No street trees or trees outside of the property line would be removed as part of the proposed project.

f) *Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan or other approved local, regional, or State habitat conservation plan?*

No Impact. There is no Habitat Conservation Plan or other approved local, regional, or State habitat conservation plan that applies to the project site. The project would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan or other approved local, regional, or State habitat conservation plan. As a result, no impact would occur.

V. CULTURAL RESOURCES Would the project:	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	❒	❒	■	❒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	❒	■	❒	❒
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	❒	❒	■	❒
d) Disturb any human remains, including those interred outside of formal cemeteries?	❒	■	❒	❒

Affected Environment

The analysis considers the project's impact to historic architectural, archeological resources and human remains, and paleontological resources on the project site.

Discussion

a) *Would the project cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?*

Less than Significant. There are no buildings or structures on the project site that qualify as historical resources; therefore the project would have a less-than-significant impact on historical resources, as described below.

The General Plan EIR documented known historic resources and rated historic buildings in the City of Emeryville and identified no historic resources on the project site. The City's Preservation Ordinance (No. 06-013) guides how historically significant structures can be modified, moved, removed, or demolished to help ensure that replacement buildings are compatible with the surrounding community. The Preservation Ordinance requires City Council approval for moving, removal, or demolition of a significant structure. Under the Preservation Ordinance, structures that are more than 50 years old and contain particular design features on the street-facing façade could be considered significant.

Historical topographic maps, aerial photographs, and Sanborn fire insurance maps show that the project site is located on what was historically part of San Francisco Bay tidal mud flats and was below sea level until the mid- to late 1930's. Between the 1930's and 1950's, imported soil (fill) was placed on the project site and surrounding properties to create buildable land. The current structures on the site were constructed in approximately 1963 and have been occupied by industrial and warehousing uses to date.[34]

Although the existing buildings on the project site are more than 50 years old, the buildings do not have design features that would make the buildings subject to the Historic Preservation Ordinance, or listing with the NRHP or CRHR. Therefore, implementation of the project would result in a less-than-significant impact to historical resources as defined in Section 15064.5.

b) *Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?*

Potentially Significant Unless Mitigation Incorporation. Although the likelihood of encountering archaeological resources on the project site is low, the project site is in the vicinity of areas with recorded resources. The mitigation measure below reduces the potential impact to a less-than-significant level.

A records search conducted for the General Plan EIR revealed five recorded Native American archaeological sites and 18 historic archaeological sites in the City of Emeryville. All five Native American archaeological sites, including the well-known Emeryville Shellmound site, are shell midden deposits containing artifacts. These Native American sites, listed as CA-ALA-309, -310, -311, -312, and -313, were mostly destroyed by development in the late nineteenth and early twentieth centuries; however, these sites indicate the general archaeological sensitivity of the vicinity and that there is still a high likelihood of encountering previously unrecorded Native American cultural resources throughout Emeryville.

Historic-era archaeological sites have been identified throughout Emeryville and are recorded as sites number P-01-001762 through P-01-010661, as described in the General Plan EIR. The presence of these sites indicates the general archaeological sensitivity of the vicinity, which includes environmental features conducive to habitation and use during prehistory, such as the alluvial plain surrounding the mouth of Temescal Creek and the Bay. However, the project site and vicinity sit on artificial fill material over Bay Mud, which is unlikely to contain archaeological resources. Further, the preliminary geotechnical analysis prepared for the project site did not find any midden in the boring samples.[35]

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[34] PES Environmental, Inc., 2014a. op. cit.

[35] Geosphere Consultants, Inc., 2013. Memorandum: Progress Report, Nady Property Development, 6701 Shellmound Street, Emeryville, California. May 17.

The presence of nearby prehistoric archaeological sites indicates the general archaeological sensitivity of the vicinity. Furthermore, although the project site is underlain by artificial fill over Bay Mud, there is a potential to encounter buried surfaces containing archaeological materials below the artificial fill or archaeological materials that have been redeposited at the project site from nearby archaeological sites for use as fill. Therefore, in order to reduce potential impacts to archaeological resources, **Mitigation Measure CULT-1** shall be implemented.

> <u>Mitigation Measure CULT-1 – Archaeological Deposits and Human Remains</u>: If archaeological materials or human remains are encountered during project activities, work within 25 feet of the discovery shall cease and a qualified archaeologist shall be contacted to assess the find, consult with agencies and Native American tribes as appropriate, and make recommendations for the treatment of the discovery. Such deposits shall be avoided by project activities if feasible. If avoidance of the archaeological deposit is not feasible, the archaeological deposits shall be evaluated for their eligibility for listing on any historic register. If the deposits are not eligible for listing in any historic register, impacts to such deposits would not be considered significant and avoidance or mitigation would not be necessary. If the deposits are found to be eligible, deposits shall be avoided if feasible.
>
> If avoidance is not feasible, adverse effects on the deposits shall be mitigated in accordance with standard archaeological field methods and procedures and CEQA Guidelines §15126.4(b)(3)(C), which require development of a data recovery plan; laboratory and technical analyses of recovered archaeological materials; preparation of a report detailing the methods, findings, and significance of the archaeological site and associated materials; and accessioning of archaeological materials and a technical data recovery report at a curation facility.
>
> Human remains shall be treated in accordance with California Health and Safety Code §7050.5.
>
> Upon completion and approval of the monitoring and any associated studies (i.e., archaeological excavation and laboratory analysis), project construction activity within the area of the find may resume, and the archaeologist shall prepare a report to document the methods and results of these efforts. The report shall be submitted to the City of Emeryville and the Northwest Information Center at Sonoma State University upon completion of the resource assessment.

Implementation of **Mitigation Measure CULT-1** would reduce potential impacts on archaeological deposits and human remains to less-than-significant levels.

c) *Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?*

Less than Significant. The project site is situated on artificial fill over Bay Mud deposits. As noted in the General Plan EIR, a variety of marine invertebrate fossils are likely to be found under Bay Mud deposits, but are not considered significant or unique. Furthermore, no paleontological sites, unique resources, or unique geological features have been recorded on or adjacent to the project site. The closest recorded paleontological site is located approximately 6 miles northeast of the project site.[36] Although unlikely, the potential to encounter unknown paleontological resources on the project site during grading and construction still exists. Therefore, in order to reduce potential impacts to paleontological resources, **Mitigation Measure CULT-2** shall be implemented.

> Mitigation Measure CULT-2 – Paleontological Resources: If paleontological resources are encountered during project construction activities, all soil-disturbing activity within 100 feet of the find shall be temporarily halted until a qualified paleontologist can assess the significance of the find and provide proper management recommendations. The City shall review and incorporate the management recommendations into the project as feasible.

Implementation of **Mitigation Measure CULT-2** would reduce potential impacts on paleontological deposits to a less-than-significant level.

d) *Would the project disturb any human remains, including those interred outside of formal cemeteries?*

Potentially Significant Unless Mitigation Incorporation. No human remains have been recorded on the project site. However, nearby prehistoric archaeological sites discussed above are known to contain Native American remains. Although the site is mostly imported fill over Bay Mud, there is a potential that Native American human remains associated with archaeological deposits could be unearthed during project ground-disturbing activities. Implementation of **Mitigation Measure CULT-3**—which implements **Mitigation Measure CULT-1**—would reduce potential impacts on archaeological deposits and human remains to less-than-significant levels.

> Mitigation Measure CULT-3: Implementation of **Mitigation Measure CULT-1**, which includes procedures if human remains are unearthed on the project site during construction.

[36] Carrasco, M.A., B.P. Kraatz, E.B. Davis, and A.D. Barnosky. 2005. Miocene Mammal Mapping Project (MIOMAP), University of California Museum of Paleontology. Accessed March 12, 2014. http://www.ucmp.berkeley.edu/miomap/.

VI. GEOLOGY AND SOILS	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Expose people or structures to 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 a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	❐	■	❐	❐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	❐	■	❐	❐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	❐	❐	❐	■

Affected Environment

According to a preliminary geotechnical analysis prepared for the project site, the general subsurface conditions consist of approximately 18 feet of non-engineered variable soil (primarily clayey gravel with some sand) and debris fill (placed in the late 1940s) overlying about 3 feet or less of overconsolidated, stiff Bay Mud. Debris materials encountered within the fill included concrete, glass, metal, rubber and wood fragments. The report finds that the thickness of overlying fill indicates the pre-development site elevation was on the order of +0 (at sea level) or slightly lower.[37]

Development on artificial fill placed over Bay Mud often presents unique geotechnical engineering challenges because, unless the fill is properly engineered, structures can be damaged by differential settlement and subsidence. Under the bearing load of a new structure, Bay Mud tends to go through a cycle of consolidation that can lead to settlement.

Emeryville lies within an area that contains many active and potentially active faults and is considered to be an area of high seismic activity. The closest fault, the Hayward fault, approximately 3 miles east of the project site, extends from San Pablo Bay in Richmond, 60 miles southeast to San José. The Hayward fault is designated by the Alquist-Priolo Earthquake Fault Zoning Act as an active fault which is defined as having displacement within the last 11,000 years.

Discussion

a) *Expose people or structures to 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.*

Less than Significant. Surface rupture occurs when the ground surface is broken due to fault movement during an earthquake. Alquist-Priolo Earthquake Fault Zones mapped by the California Geological Survey delineate areas around active faults with potential surface fault rupture hazards that would require specific geological investigations prior to approval of certain kinds of development within the delineated area. The project site is not located within or adjacent to an Earthquake Fault Zone.[38] Therefore the project would have a less-than-significant impact on people or structures related to surface fault rupture.

[37] Geosphere Consultants, Inc., 2013. op. cit.

[38] Department of Conservation, 2014. California Geological Survey. “Oakland East Quadrangle” effective 1982 and “Oakland West Quadrangle” effective 2003. Accessed March 10, 2014. http://www.quake.ca.gov/gmaps/WH/regulatorymaps.htm.

ii. Strong seismic ground shaking?

Potentially Significant Unless Mitigation Incorporation. Seismic ground shaking generally refers to all aspects of motion of the earth's surface resulting from an earthquake, and is normally the major cause of damage in seismic events. Bay Mud is a seismic hazard because it shakes much harder than bedrock and other geological units.[39] With implementation of the mitigation measure below, the potential impact for strong seismic shaking would be reduced to a less-than-significant level.

The extent of ground shaking is controlled by the magnitude and intensity of the earthquake, distance from the epicenter, and local geologic conditions. The magnitude of a seismic event is a measure of the energy released by an earthquake; it is assessed by seismographs that measure the amplitude of seismic waves. The intensity of an earthquake is a subjective measure of the perceptible effects of a seismic event at a given point. The Modified Mercalli Intensity scale (MMI) is the most commonly used scale to measure the subjective effects of earthquake intensity in values ranging from I to XII.

As described in the General Plan EIR, the U. S. Geological Survey (USGS) Working Group on California Earthquake Probabilities evaluated the probability of one or more earthquakes of Richter magnitude 6.7 or higher occurring in the San Francisco Bay Area within the next 30 years (through 2038). Based on seismic shaking hazard maps prepared by the Association of Bay Area Governments (ABAG), there is a 10 percent chance that an earthquake along the Hayward Fault could generate violent ground shaking (IX on the MMI) at the project site within the next 50 years, which could cause damage even to some well-constructed multi-family wood construction buildings.[40]

In accordance with standard City practices and Conditions of Approval, prior to the issuance of a building permit, the Building Official must confirm that the building permit plans, specifications and other related information conform to the California codes in effect at the time, and all other applicable local ordinances. This compliance includes, but is not limited to, seismic and geotechnical requirements for Seismic Zone 4, the zone with the highest earthquake danger. **Mitigation Measure GEO-1**, which requires the project applicant to include analysis of the potential for violent seismic shaking as part of the design-level geotechnical investigation to be prepared for the project, would reduce the potential strong seismic shaking impacts to a less-than-significant level.

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[39] United States Geological Survey, 2014. Earthquake Hazards Program. "Soil Type and Shaking Hazard in the San Francisco Bay Area." Accessed March 10. http://earthquake.usgs.gov/regional/nca/soiltype/.

[40] Association of Bay Area Governments (ABAG), 2013. Alameda County Earthquake Hazard. USGS data effective 2013. Accessed March 10, 2014. http://quake.abag.ca.gov/earthquakes/Alameda/.

Mitigation Measure GEO-1 – Design-Level Geotechnical Investigation: Prior to the issuance of any site-specific grading permits, a design-level geotechnical investigation, in compliance with City of Emeryville requirements, shall be prepared by a licensed professional geotechnical engineer and submitted to the City for review and confirmation that the proposed improvements fully comply with City requirements. The investigation shall determine the project's geotechnical conditions, including seismic shaking and liquefaction hazard, unstable soils hazards, and measures to address these hazards. In addition, the following guidance for the design-level geotechnical investigation shall be addressed:

- Analysis presented in the geotechnical investigation shall conform to the California Geological Survey recommendations presented in the *Guidelines for Evaluating Seismic Hazards in California*. The investigation shall include: a site screening evaluation; evaluation of on- and off-site geologic hazards; quantitative evaluation of hazard potential; detailed field investigation; estimation of ground-motion parameters; evaluation of drainage channel bank stability, liquefaction, expansive soils, lateral-spreading and ground-displacement hazards; and recommendations to reduce identified hazards.
- All design measures, recommendations, design criteria, and specifications set forth in the design-level geotechnical investigation shall be implemented as a condition of project approval.
- Design review for the project shall include evaluation of fixtures, furnishings, and the fasteners with the intent of minimizing collateral injuries to building occupants from falling fixtures or furnishings during the course of a violent seismic event.

It is acknowledged that seismic hazards cannot be completely eliminated even with site-specific geotechnical investigation and advanced building practices (as provided in the mitigation measure above). However, exposure to seismic hazards is a generally accepted part of living in the San Francisco Bay Area and therefore the mitigation measure described above would reduce the potential hazards associated with seismic activity to a less-than-significant level.

iii. Seismic-related ground failure, including liquefaction?

Potentially Significant Unless Mitigation Incorporation. Liquefaction is a transformation of soil from a solid to a liquefied state during which saturated soil temporarily loses strength resulting from the buildup of excess pore water pressure, especially during earthquake-induced cyclic loading. With implementation of the mitigation measure below, the potential impact for seismic-related ground failure, including liquefaction, would be reduced to a less-than-significant level.

The California Geological Survey has developed Seismic Hazard Zone Maps that delineate areas susceptible to liquefaction that require additional investigation to determine the extent and magnitude of potential ground failure prior to development. The entire city of Emeryville is located with a Seismic Hazard Zone for liquefaction.[41] The City's General Plan (Figure 6-4), based on U.S. Geological Survey information, identifies the project site in areas of "very high" to "high" liquefaction susceptibility, which triggers implementation of General Plan policy CSN-P-35:

> Policy CSN -P-35: The City will require geotechnical investigation of all sites proposed for development in areas where geologic conditions or soil types are susceptible to liquefaction (see "very high" and high" level areas on Figure 6-4). The City also requires submission of geotechnical investigation and demonstration that project conforms to all recommended mitigation measures prior to city approval (as required by State law).

The preliminary geotechnical analysis stated that isolated liquefiable zones may be present in portions of the fill layer that are more granular in nature. However, during field work, the geotechnical consultant did not encounter granular layers within the underlying native alluvial soils that would be considered to be significantly susceptible to liquefaction to an extent resulting in significant seismic surface settlement.[42] The combination of sediments with high to very high liquefaction potential combined with the high potential for an earthquake along the Hayward Fault to cause violent ground shaking at the project site (see *Section VI.a.ii*) poses a potential significant risk of seismically-induced ground failure from liquefaction. Implementation of policy CSN-P-35 and **Mitigation Measure GEO-2,** requiring additional analysis, will reduce this impact to a less-than-significant level.

> <u>Mitigation Measure GEO-2</u>: Implement Mitigation Measure GEO-1, which requires the project applicant to include analysis of the potential liquefaction hazard as part of the design-level geotechnical investigation to be prepared for the project.

iv. Landslides?

Less than Significant. Seismically-induced landslides occur as the rapid movement of large masses of soil on unstable slopes during an earthquake. As part of the Seismic Hazard Zone mapping, the California Geological Survey has determined that project site (and the city as whole) is not included in a zone susceptible to earthquake-induced landslides.[43] The General Plan EIR concluded that the likelihood of potential impacts from landslides is very low because of the generally flat topography in the city. Landslides are

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[41] California Geological Survey, 2003. Seismic Hazard Zones: West Oakland Quadrangle. February 14.
[42] Geosphere Consultants, Inc., 2013. op. cit.
[43] California Geological Survey, 2003. op. cit.

not considered to be a risk for the project site and therefore the potential impact is less than significant.

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

Less than Significant. Erosion is the entrainment and movement of soil material by natural processes, such as wind and water. The rate of soil erosion, which is dependent on the local landscape, climate, soil properties, and stormwater runoff, can be accelerated by human activities such as construction grading and excavation.

Construction of the project would involve activities such as site clearing, grading, and excavation. Some earthwork activities associated with construction activities would disturb subsurface soils, causing erosion. To minimize wind or water erosion on the site during construction, developments would adhere to standard engineering practices, the City's standard Conditions of Approval, and prepare a stormwater pollution prevention plan as described in *Section IX: Hydrology and Water Quality*. Compliance with these regulations would ensure that impacts related to soil erosion are less than significant.

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

Potentially Significant Unless Mitigation Incorporation. With implementation of mitigation measure described below, the project location on a site that could result in geological impacts, including liquefaction, would be reduced to a less-than-significant level.

Subsidence is the settlement of organic soils and/or saturated mineral soils of low density following drainage. Soils susceptible to lateral spreading, sloughing, or caving pose a risk when to human health and structures when located near a steep or vertical slope (e.g., basement foundation). Settlement is a common concern for new buildings, because the weight of newly constructed buildings can cause significant compaction of the underlying soils. Since the project site is relatively flat and there would be no subsurface structures, caving would only likely occur during excavation or trenching activities at the project site. Caving is always a potentially significant hazard for excavation or trenching greater than about 5 feet below ground surface. Since the project site is relatively flat, landslides would not likely occur at the project site.

The California Division of Occupational Safety and Health (Cal/OSHA) requires adequate protection from potential caving during all excavation and trenching activities, such as the installation of protective barricades along trench walls.[44] Compliance with Cal/OSHA

[44] Title 29 of the Code of Federal Regulation, Part 1926.650-651.

requirements would reduce project impacts related to caving to a less-than-significant level.

Soil collapse occurs as the result of unstable subsurface structures or geological voids, which are not likely present beneath the project site. Likewise, as discussed in *Section VI.a.iv*, landslide risk is very low.

As discussed in *Section VI.a.iii*, there is a significant risk of seismically-induced ground failure from liquefaction in the project vicinity. **Mitigation Measure GEO-1**, which requires the project applicant to include analysis of the potential liquefaction hazard as part of the design-level geotechnical investigation to be prepared for the project, would reduce the potential liquefaction impacts to a less-than-significant level.

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

Potentially Significant Unless Mitigation Incorporation. Expansive soils are characterized by the potential for shrinking and swelling as the moisture content of the soil decreases and increases, respectively. The shrink-swell capacity of expansive soils can cause damage to foundations and pipelines. The fill on the project site may be subject to these shrinking and swelling characteristics. Implementation of **Mitigation Measure GEO-1**, which requires the project applicant to include analysis of the potential for soil expansion impacts as part of the design-level geotechnical investigation to be prepared for the project, would reduce the potential expansive soils impacts to a less-than-significant level.

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

No Impact. Septic tanks or alternative waste water disposal systems would not be located on the project site, because the project area is serviced by the East Bay Municipal Utilities District wastewater collection system and treatment plant. The project would have no impact related to septic tanks or alternative waste water disposal systems.

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

Affected Environment

The Bay Area Air Quality Management District (BAAQMD) recognizes that greenhouse gases (GHGs) that cause climate change pose a direct threat to air quality and public health in the San Francisco Bay Area Air Basin (SFBAAB). According to the BAAQMD's *Bay Area 2010 Clean Air Plan* (CAP), anticipated climate change impacts include sea level rise (threatening coastal areas, the bay and the delta, as well as key infrastructure), reduced Sierra snowpack (vital to our water supply), increased wildfires, and higher levels of air pollution.[45]

In 2006, State legislation passed the California Global Warming Solutions Act (AB 32), which requires the California Air Resource Board (CARB) to develop and implement regulatory and market mechanisms that will reduce GHG emissions to 1990 levels by 2020. The primary GHGs of concern are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Each GHG has a different global warming potential (GWP); therefore, GHGs are often expressed in terms of carbon dioxide equivalents (CO2e) where each gas is weighted according to its GWP. Carbon dioxide emissions dominate the GHG inventory in the SFBAAB, accounting for more than 90% of the total CO2e emissions reported.[46]

In 2008, the City of Emeryville adopted a *Climate Action Plan* that included a baseline inventory and forecast of all GHG emissions from 2004 to 2020.[47] Consistent with AB 32, the City's *Climate Action Plan* established a goal to reduce communitywide GHG emissions by 25 percent below 2004 levels by 2020. The *Climate Action Plan* outlines policies and

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[45] BAAQMD, 2010a. *Bay Area 2010 Clean Air Plan*. September 15.
[46] Ibid.
[47] City of Emeryville, 2008. Climate Action Plan. November.

measures in the energy efficiency, renewable energy, transportation, and solid waste management sectors that Emeryville will implement and/or is already implementing to achieve its emissions reductions target. This includes a County goal to achieve 75 percent waste diversion through recycling, composting, reuse, and other means.

In 2010, the BAAQMD developed and adopted GHG thresholds of significance (Thresholds) that were incorporated into the 2010 *CEQA Air Quality Guidelines*.[48] The GHG Thresholds are designed to help lead agencies in the SFBAAB assess GHG emissions from new projects and meet GHG emission reduction goals, such as AB 32. As discussed in *Section III: Air Quality* above, the process by which the 2010 Thresholds were adopted was challenged by the Alameda County Superior Court, but the 2010 Thresholds are used in this initial study because the scientific soundness has not been challenged.

Discussion

a) *Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?*

Less than Significant. Potential impacts related to emissions of GHGs from the project would have a less-than-significant impact.

The BAAQMD's GHG Thresholds for the operational phase of the project requires compliance with one of the following:

- Compliance with a qualified GHG Reduction Strategy;
- Annual emissions less than 1,100 metric tons per year (MT/yr) of CO2e; or
- Annual emissions less than 4.6 MT/yr of CO2e per service population. (SP).[49]

GHG emissions during the operational phase of the project would primarily be from mobile sources (i.e., vehicle trips). GHG emissions during project operations were estimated using the CalEEMod default values for a mid-rise residential development, except as noted below.

- The lot acreage (2.27 acres) and building square footage were modified to equal the values in the proposed project description.
- The weekday and Saturday vehicle trip rates were reduced to 5.17 and 5.36 trips/dwelling unit/day, respectively, based on the assumptions of the transportation analysis conducted for the project.[50]

[48] BAAQMD, 2010b. *California Environmental Quality Act Air Quality Guidelines*. May.
[49] SP = residents + employees
[50] Fehr & Peers, 2014. op. cit.

- No woodstoves or fireplaces were included in the building design.
- Wastewater treatment processes were changed to 100% aerobic treatment and 100% anaerobic digestion with cogeneration, based on the design of the East Bay Mud wastewater treatment plant that services the project area.

Based on the 2012 United State Census for the City of Emeryville, there were 1.72 persons per household on average from 2008 to 2012.[51] The project would build 211 units, which would result in an average population of approximately 363 residents according to the Census data. The residential population estimate for the project, which excludes employees, was used to conservatively estimate the project's SP. The average emissions of GHGs calculated in CalEEMod for the operational phase of the project are compared to the GHG Thresholds in Table VII-1. The project's estimated GHG emissions exceeded the annual emissions Threshold, but were below the efficiency-based Threshold in terms of annual emissions per SP. Since annual GHG emissions only need to be below one of the Thresholds, the project's operational GHG emissions would have a less-than-significant impact on global climate change.

TABLE VII-1 SUMMARY OF AVERAGE GHG EMISSIONS DURING PROJECT OPERATION

Pollutant	GHGs	
Units	MT/CO2e/yr	MT/CO2e/yr/SP
Emissions	1,620	4.5
Thresholds	1,100	4.6
Exceedance	Yes	No

Source: CalEEMod (Appendix A)

The BAAQMD has not developed Thresholds for construction-related GHG emissions. Common GHG emissions sources during construction include construction equipment, truck traffic, and associated construction worker traffic. The BAAQMD recommends calculating the GHG emissions to disclose the emissions levels that would occur during construction. Based on the size and type of development, CalEEMod estimated that project construction would likely last 299 days. Over this time period, the total emissions of GHGs calculated in CalEEMod for the construction phase of the project would be about 595 MT of CO2e. This estimate does not account for GHG reductions required under the City's the Construction and Demolition Ordinance, which requires development and implementation of a waste management plan (WMP) as a condition of project approval. The WMP must

[51] United States Census Bureau, 2012. *State and County QuickFacts.* http://quickfacts.census.gov/qfd/index.html. Accessed on 4 June 2014. Last updated 6 December.

indicate 100 percent diversion of Portland cement concrete and asphalt concrete, and at least 50 percent of all remaining construction and demolition debris. By conservatively comparing the GHG emissions estimated during construction without reductions from a WMP to the operational GHG emission Threshold of 1,100 MT/yr of CO2e, the project's construction GHG emissions would also have a less-than-significant impact on global climate change.

The City's *Climate Action Plan* in 2008 is not a qualified GHG Reduction Strategy because the document has not undergone CEQA review. To estimate annual GHG emissions during the operational phase of a project, the BAAQMD recommends using the most current version of the California Emissions Estimator Model (CalEEMod).[52] CalEEMod utilizes widely accepted models for emission estimates combined with appropriate default data that can be used if site-specific information is not available. A copy of the CalEEMod report for the project, which summarizes the input parameters, assumptions, and findings, is included in Appendix A.

The following General Plan policies call for implementation of the City's *Climate Action Plan* and other supporting GHG reduction measures:

> Policy ST-P-1: Implement Climate Action Plan in coordination with all City departments.
>
> Policy T-P-5: The City encourages development that minimizes Vehicle Miles Traveled (VMT).
>
> Policy ST-P-6: Collaborate with residents, businesses, and other members of the community, including architects, builders and contractors, to encourage private development within the City to use green building methods and practices and to achieve standards set by LEED™ for commercial buildings and the Alameda County Residential Green Building Guidelines for residential projects.

The project would be required to comply with community-wide energy and land-use measures proposed in the City's *Climate Action Plan* that have been adopted by the City, such as the Green Building Standards Code.[53] The project's proposed increase in the density of residential development within the City would reduce VMT and thereby reduce GHG emissions from motor vehicles. The project's participation in the Transportation Management Association; provision of electrical vehicle charging stations, bicycle parking, storage and a "bike spa"; and improvements to pedestrian facilities will all further reduce VMT. The project will also result in building-related GHG reductions by achieving LEED Silver or its equivalent designation. Additionally, as part of the City's GHG reduction strategy, the Construction and Demolition Ordinance requires development and implementation of a waste management plan (WMP), as a condition of project approval.

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[52] ENVIRON International Corporation and the California Air Districts, 2013. op.cit.

[53] City of Emeryville Municipal Code, Title 8 Building Regulations, Chapter 5 Green Building Standards Code.

The WMP must indicate 100 percent diversion of portland cement concrete and asphalt concrete, and at least 50 percent of all remaining construction and demolition debris.

By complying with the City's *Climate Action Plan*, the Construction and Demolition Ordinance, and the applicable General Plan policies for GHG reduction, as described above, the emissions of GHGs from the project would have a less-than-significant impact on the environment.

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

Less than Significant. The GHG reductions goals adopted under the City's *Climate Action Plan* are consistent with the Statewide GHG reductions required under AB 32.[54] Since the project would comply with the *Climate Action Plan*, it can be assumed that the project would also comply with AB 32. Therefore, the project's impact on applicable plans, policies, or regulations related to GHG emission reductions in the SFBAAB would be less than significant.

Section XIII.a: Population and Housing discusses the project's consistency with Plan Bay Area, the regional Sustainable Community Strategy prepared pursuant to SB 375, as well as the Bay Conservation and Development Commission's sea level rise maps.

[54] City of Emeryville, 2008. op. cit.

VIII. HAZARDS

Would the project:	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporation	Less Than Significant Impact	No Impact
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 2 miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	❐	❐	❐	■
f) For a project located within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	❐	❐	❐	■
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	❐	❐	■	❐
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	❐	❐	❐	■

Affected Environment

Hazards and hazardous materials[55] related to development of the proposed project that could pose a significant threat to human health or the environment include, but are not limited to, the following: subsurface contamination, hazardous building materials, wildland fires, aviation hazards, and emergency response interference. Based on the project location and type, the predominant environmental concerns are related to hazardous materials, as discussed further below.

Beginning in the 1970s, governments at the federal, State, and local levels became increasingly concerned about the effects of hazardous materials on human health and the environment. Numerous laws and regulations were developed to investigate and mitigate these effects. In California, the State Water Resources Control Board (SWRCB) (in association with the Regional Water Quality Control Boards) and the Department of Toxic Substances Control (DTSC) are responsible for overseeing the remediation of contaminated sites. The provisions of Government Code 65962.5 require the SWRCB, DTSC, the California Department of Health Services, and the California Integrated Waste Management Board to submit information pertaining to sites associated with solid waste disposal, hazardous waste disposal, and/or hazardous materials releases to the Secretary of California Environmental Protection Agency.

State and federal laws require detailed planning to ensure that hazardous materials are properly handled, used, stored, and disposed of, and in the event that such materials are accidentally released, to prevent or to mitigate injury to health or the environment. These laws require hazardous materials users to prepare written plans, such as Hazard Communication Plans and Hazardous Materials Business Plans. Laws and regulations require hazardous materials users to store these materials appropriately and to train employees to manage them safely. A number of agencies participate in enforcing hazardous materials management requirements, including DTSC, the RWQCB and the ACDEH.

Throughout Alameda County, a Hazardous Materials Management Plan must be prepared and submitted to the County by businesses that use or store certain quantities of hazardous materials.

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[55] The California Health and Safety Code defines a hazardous material as "... any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety, or to the environment. Hazardous materials include, but are not limited to, hazardous substances, hazardous waste, radioactive materials, and any material which a handler or the administering agency has a reasonable basis for believing that it would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment." (California Health and Safety Code, Section 25501).

The Federal Resource Conservation and Recovery Act of 1976 (RCRA) established a "cradle-to-grave" regulatory program for governing the generation, transportation, treatment, storage and disposal of hazardous waste. Under RCRA, individual states may implement their own hazardous waste programs in lieu of RCRA as long as the state program is at least as stringent as Federal RCRA requirements. In California, the DTSC regulates the generation, transportation, treatment, storage, and disposal of hazardous material waste. The hazardous waste regulations establish criteria for identifying, packaging, and labeling hazardous wastes; dictate the management of hazardous waste; establish permit requirements for hazardous waste treatment, storage, disposal, and transportation; and identify hazardous wastes that cannot be disposed of in landfills.

The United States Department of Transportation regulates hazardous materials transportation on all interstate roads. Within California, the state agencies with primary responsibility for enforcing federal and state regulations and for responding to transportation emergencies are the California Highway Patrol (CHP) and the California Department of Transportation (Caltrans). Together, federal and state agencies determine driver-training requirements, load labeling procedures, and container specifications. Although special requirements apply to transporting hazardous materials, requirements for transporting hazardous waste are more stringent, and hazardous waste haulers must be licensed to transport hazardous waste on public roads.

Discussion

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

Less than Significant. The project would construct a residential development, where small quantities of commercially-available hazardous materials, such as household cleaning and landscaping supplies, would routinely be handled and used. The General Plan EIR recognizes that the relatively low toxicity and small quantities of hazardous materials used for general commercial/retail and residential land uses do not generally pose a threat to human health or the environment. Therefore, the project would have a less-than-significant impact on the public or the environment related to the routine transport, use, and handling of hazardous materials.

In addition to the hazards materials, potential exposure of future residents to electromagnetic waves from a radio station tower located about 400 feet north of the proposed project site are considered here. The tower is operated by KFRC and KVTO who broadcast amplitude modulation (AM) radio frequencies at 610 kilohertz (kHz) and 1,400 kHz, respectively. The Federal Communications Commission (FCC) has adopted limits for continuous public exposure to electric and magnetic fields from radio frequencies. The applicable FCC limits for the KFRC 610 kHz frequency are 614 volts per meter (V/m) for electric fields and 1.63 amperes per meter (A/m) for magnetic fields. The applicable limits for the KVTO 1,400 kHz frequency are 588 V/m for electric fields and 1.56 A/m for magnetic fields.

For a previous proposal on the project site in 2005, Hammet & Edison, Inc., estimated that maximum electromagnetic fields that would form around the steel-beam structure of the previously proposed project using the Numerical Electromagnetics Code (NEC) developed by Lawrence Livermore National Laboratory. Based on the NEC model, the maximum electric and magnetic fields on the project site due to operation of both stations are 254 V/m and 1.5 A/m, which are both below the FCC exposure limits. It should also be noted that since a steel frame will not be used for project construction, the maximum estimates of localized electromagnetic fields on the project site and the project as currently proposed will likely be less.[56]

Further, the proposed development would not significantly adversely impact reception by the radio station's listeners. The Hammet & Edison, Inc. report considered a previous development proposal. The report evaluated building heights from one to twelve stories. It considered development on the project site (referred to as Area 1) as well as the parcel to the south (referred to as Area 2), currently occupied by Ex'pression College. The report recommended that a residential high rise be "built no higher than nine stories if the building is to be built to encompass either Areas 1 or 2. If the building is to be constructed on both Areas 1 and 2, however, it is recommended that the height be limited to eight stories."

The proposed seven-story, 74-foot building (with projections up to 84 feet), is consistent with this recommendation. While Area 2 has been developed, it consists of a one-story building that would not affect radio interference. Further, the fact that the proposed project would be wood construction, rather than steel construction, as evaluated in the Hammet & Edison report, would further reduce impacts to the radio tower as wood has less of an impact on signal attenuation than metal.

Another report, prepared by Carl T. Jones, reviews the Hammet & Edison report and recommends a lower building height of no more than 60 feet.[57] Both reports refer to graphs in the Hammet & Edison report showing the maximum perturbation of a radio signal that might be caused by structures of different heights, compared to no perturbation in the abstract. However, the existing environment of the area around the radio tower already has perturbation caused by existing buildings and land contours. As a result of existing structures and topography, and the change in building material from

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[56] Hammet & Edison, Inc., 2005. *Trammel Crow – Proposed Emeryville Residential Development*. August 15.

[57] Carl T. Jones Corporation, 2005. *Engineering Assessment of the Impact of the Proposed Trammel Crow Residential Building on Radio Station KVTO.*

steel to wood construction, the project would not be expected to significantly increase the existing perturbation.

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?*

Less than Significant. Potential impacts of construction of the project related to the potential release hazardous materials can be mitigated to a less-than-significant level, through implementation of existing regulations as described below. Operational impacts would be less than significant.

Construction

Project construction activities would include the use of hazardous materials such as motor fuels, oils, solvents, and lubricants. Common construction activities, such as fueling, maintenance, and operation of construction equipment, could result in an accidental release of hazardous materials into the environment. The use of hazardous materials at the project site during construction would be subject to existing hazardous materials laws, regulations, and programs, and adherence to these standards would reduce the potential that an accidental release would occur. In addition, a Stormwater Pollution Prevention Plan (SWPPP) must be prepared for proposed construction activities in accordance with the requirements of the SWRCB. The SWPPP, detailed in *Section IX: Hydrology and Water Quality*, requires implementation of Best Management Practices (BMPs) for hazardous material storage and soil stockpiles, inspections, maintenance, training of employees, and containment of releases to prevent runoff into existing stormwater collection systems or waterways.

The General Plan EIR recognizes that implementation of the required SWPPP BMPs and the following policy would effectively minimize the potential for an accidental release of hazardous materials during construction:

> Policy CSN-P-7: New commercial and industrial activities, as well as construction and demolition practices, shall be regulated to minimize discharge of pollutant and sediment concentrations into San Francisco Bay.

The SWPPP, required by the City and the State Water Resources Control Board, is regulated by the SWRCB and describes the BMPs that must be implemented during project construction to both minimize the risk and contain (if necessary) the release of hazardous materials. Preparation and implementation of the SWPPP would comply with Policy CSN-P-7 and reduce the impact of a hazardous materials release during construction of the project to a less-than-significant level.

Demolition

As detailed in *Section III: Air Quality*, the General Plan EIR recognizes that demolition of buildings containing hazardous building materials could potentially release the hazardous materials into the environment. The primary hazardous building materials of concern include asbestos, lead-based paint, and polychlorinated biphenyls (PCBs). The General Plan EIR requires all renovation and/or demolition projects in the City to mitigate potential releases of hazardous building materials by implementing the following policy:

> Policy CSN-P-40: The City requires abatement of lead-based paint and asbestos prior to structural renovation or demolition, and compliance with all State, Federal, Occupational Safety and Health Administration, Bay Area Air Quality Management District, Alameda County, and local rules and regulations.

Implementation of Policy CSN-P-40 for the project would reduce the risk of a hazardous materials release during demolition to a less-than-significant level.

Operation

As described under criterion "a" above, the project would consist of a residential and development, where small quantities of commercially-available hazardous materials, such as household cleaning and landscaping supplies, would routinely be handled and used. The General Plan EIR recognizes that the relatively low toxicity and small quantities of hazardous materials used for general commercial/retail and residential land uses do not generally pose a threat to human health or the environment, even if minor releases were to occur during project operation.

The remainder of this section considers effects of the surrounding environment on the project. The project site is surrounded by a variety of commercial, office, residential, industrial, open space and transportation infrastructure uses. The Ex'pression College for Digital Arts, an educational institution, lies immediately to the south, along with a self-storage facility and office building south of the college. Several large housing developments are located on the south side of 65th Street.

I-80 runs north-south, west of the project site. The City of Berkeley border lies immediately north of the project site, across the I-80 off-ramp along with Berkeley's Aquatic Park, Several retail uses, including restaurants and cafes, are clustered one block east of the site on Hollis Street. The Union Pacific Railroad along on the east side of Shellmound Street and the site, accommodating both freight and Amtrak passenger trains. A mix of small- and large-lot industrial, technology, and office uses are located east of the railroad tracks. These uses are primarily housed in one- and two-story warehouse-type structures.

Accordingly, the project is surrounded by a variety of commercial, residential, open space and transportation uses, with industrial uses further to the east of the UPP tracks. These industrial users are required to comply with state and federal laws to ensure that hazardous materials are properly handled, used, stored, and disposed of, and in the event that such materials are accidentally released, to prevent or to mitigate injury to health or the environment. These laws require hazardous materials users to prepare written plans, such as Hazard Communication Plans and Hazardous Materials Business Plans. RCRA) establishes a "cradle-to-grave" regulatory program for governing the generation, transportation, treatment, storage and disposal of hazardous waste. Within California, the CHP and Caltrans regulate hazardous materials transportation on interstate roads, including requirements for transporting hazardous waste are more stringent, and hazardous waste haulers must be licensed to transport hazardous waste on public roads. The surrounding industrial users and transporters must comply with these laws. There have not been any spills or fires in the vicinity of the project within the past five years.

Based on the analysis above, potential impacts related to releases of hazardous materials during project operation are less than significant.

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

No Impact. Children are more susceptible to adverse health effects from hazardous materials than adults. Hazardous materials use near schools must consider potential health effects to children. The project construction activities would include the emission and handling of hazardous materials, but not the handling of acutely hazardous materials. Based on a review of mapped school locations, there are no schools located within one-quarter mile of the project.[58] Therefore, the project would have no impact to existing school facilities from the emission or handling of hazardous or acutely hazardous materials.

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?*

Potentially Significant Unless Mitigation Incorporation. Impacts of the project associated with potential hazardous materials in soil, groundwater, and soil vapor at the project site can be mitigated to a less-than-significant level, as described below.

A review of regulatory databases, including listed hazardous material release sites compiled pursuant to Government Code 65962.5, identified a release of solvents from underground storage tank (USTs) at the project site in 1989. The project site is listed on both the SWRCB's Leaking Underground Storage Tank (LUST) database and Spills, Leaks,

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[58] California Department of Education, 2014. *California School Directory*. Accessed March 11. http://www.cde.ca.gov/re/sd/.

Investigations and Cleanup (SLIC) database with State oversight from the San Francisco Regional Water Quality Control Board (SF Bay RWQCB) and local oversight from the Alameda County Department of Environmental Health (ACDEH).[59]

Previous Subsurface Investigations and Remediation

The project site is located on land reclaimed by filling in the San Francisco Bay and has been used for industrial purposes since the early 1960s. The existing warehouse and office on the project site were constructed in 1963. Since 1989, the ACDEH has overseen numerous subsurface investigations and phases of remediation at the project site.[60] Over this time period, 10 monitoring wells and over 25 soil borings have been installed and sampled at the project site.[61] The previous investigations have identified and evaluated the following four sources of subsurface contamination at the project site (Figure VIII-1):

- A waste drum storage area formerly located west of the existing warehouse (and associated drainage ditch);
- A chemical waste sump formerly located west of the existing warehouse;
- Former USTs located northeast of the existing warehouse; and
- Fill material located across the entire project site.

In 1989, contaminated soils along a drainage ditch adjacent to the former drum storage area and soils around the former chemical waste sump were excavated and disposed offsite (Figure VIII-1). The three USTs on the eastern side of the project site were also removed and disposed offsite (Figure VIII-1). The USTs contained the solvents methyl ethyl ketone and methyl isobutyl ketone (MIBK). Soil removed during excavation of the USTs reportedly contained elevated concentrations of MIBK. These contaminated soils were placed back in the excavation pit after removing the USTs. Groundwater samples collected from monitoring wells at the project site indicated that the groundwater was impacted with MIBK from the leaking USTs, as well as petroleum hydrocarbons from an unknown source at the time (that has since been identified as contaminated fill materials).[62]

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[59] State Water Resources Control Board (SWRCB), 2014. GeoTracker Environmental Database. Accessed February 26. http://geotracker.swrcb.ca.gov/.
[60] PES Environmental, Inc., 2014a. op. cit.
[61] PES Environmental, Inc., 2014b. *Supplemental Subsurface Investigation Report, 6701, 6705, and 6707 Shellmound Street, Emeryville, California*. January 13.
[62] PES Environmental, Inc., 2014a. op. cit.

FIGURE VIII-1 CONTAMINANT SOURCE AREAS OF CONCERN

Note: Contaminated fill material is present across the entire site.

Sources: Google Maps
PES Environmental, Inc., 2014a

Legend

Approximate Project Boundary

Approximate Location of Contaminant Sources and Excavations

0 75 Feet N

In 1990, a groundwater and soil vapor extraction and treatment system was installed on the project site. The soil vapor extraction wells were located in the former UST area and the groundwater extraction wells were located in the former UST area and in the former waste drum storage area. The treatment system was operated for approximately 2 months and was then shutdown because remediation appeared to be complete. The treatment system was decommissioned in 1993.[63]

In 1994, a supplemental site investigation reported that residual MIBK concentrations were present in soil and groundwater samples collected near the former USTs, but that the concentrations had been significantly reduced by the remediation system. On 25 January 1995, a deed restriction was recorded at the project site that imposed the following land use restrictions:[64]

1. If soil is excavated, it may be considered hazardous waste under State and federal law;
2. Groundwater from the site is not usable for domestic, irrigation or industrial purposes;
3. If future construction includes structures extending below the ground level (that being approximately 7 to 10 feet), groundwater generated during dewatering operations will require treatment prior to discharge;
4. An approved Health and Safety Plan will be required by the Alameda County Health Care Services Agency (ACHCSA) prior to any work requiring significant subsurface excavations; and
5. An environmental risk assessment may be required by the ACHCSA if any significant change in land use is proposed.

On 16 December 1996, the ACDEH (a division of the ACHCSA) issued a conditional site closure letter stating that further remediation and/or monitoring related to the former USTs is not required, but the recorded deed notice must be modified to the following conditions:[65]

1. If soil is excavated, it may be considered hazardous waste under State and federal law;
2. The shallow groundwater beneath the site shall not be used;

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[63] Ibid.

[64] Pettit & Martin, Attorneys at Law, 1995. *Recorded Deed Notice Pursuant to Work Plan and Revised Request for "No Further Action", Alternative Compliance Points Monitoring Program, 6707 Bay Street, Emeryville, California*. February 1.

[65] Alameda County Department of Environmental Health (ACDEH), 1996. Letter to MRCP Realty and Nady Systems, Inc. Regarding Deed Notice, Nady's Systems, Inc. (Former MRCP) – 6707 Bay Street, Emeryville, CA 94608. December 16.

3. If future construction includes structures extending below the ground level (that being approximately 7 to 10 feet), groundwater generated during dewatering operations will require treatment prior to discharge;
4. Appropriate Health and Safety plans shall be prepared prior to and followed during any activities involving exposure to pollution in soil or groundwater;
5. A health risk assessment shall be required if a change in land use, structural configuration or site activities are proposed such that more conservative scenarios should be evaluated; and
6. Potential vertical conduits between the shallow and deep aquifers shall not be created.

The status of the ACDEH's requested deed modification has not been reported. While the project site was conditionally closed under the SWRCB's LUST database, the project site remains active under the SWRCB's SLIC database. The ACDEH has not overseen any additional groundwater monitoring and investigation activities at the project site since 1996. Groundwater monitoring wells remaining on the project site have not been properly abandoned.[66]

In 2013 and 2014, additional subsurface investigations were performed in support of the proposed project. The investigations characterized the extent and magnitude of potential contamination from fill materials at the project site. The depth of fill materials reportedly ranges from about 14 to 19 feet below the ground surface across the entire site. Debris observed in the fill materials includes brick, metal debris, concrete, asphalt, glass, wood, fabric, and rubber. The investigations identified the following contaminants of concern in fill materials above the ELSs for residential land uses:

- Total petroleum hydrocarbons as diesel (TPHd) and motor oil (TPHmo), semi-volatile organic compounds, PCBs, and metals in soil;
- TPHd, TPHmo, volatile organic compounds, and metals in groundwater; and
- Benzene in soil vapor.

Environmental Impacts

The project site is listed as an active case on the SWRCB's SLIC database and is a closed case on the SWRCB's LUST database under the conditions of a modified deed restriction. Soil, groundwater, and soil vapor at the project site appear to be impacted by various contaminants, including MIBK, TPH, PCBs, volatile organic compounds, semi-volatile organic compounds, and metals from past land uses.

Direct contact, inhalation, or ingestion of hazardous materials in soil, groundwater, and/or soil vapor at the project site could potentially cause adverse health effects to

[66] PES Environmental, Inc., 2014a. op. cit.

construction workers and future site users. The severity of health effects would depend on the contaminant, concentrations, exposure pathways, and duration of exposure. The disturbance of hazardous materials in soil and/or groundwater during earthwork activities could pose a hazard to construction workers, nearby receptors, and the environment. Future residents, patrons, and trench workers who come into contact with contaminated soils could also experience adverse health effects.

The General Plan EIR requires implementation of the following policies to ensure people are adequately protected from hazardous materials in the subsurface:

> Policy CSN-P-38: Prior to reuse, development sites will be remediated, according to relevant State and federal regulations.
>
> Policy CSN-P-41: Development on sites with known contamination of soil and groundwater shall be regulated to ensure that construction workers, future occupants, and the environment as a whole, are adequately protected from hazards associated with contamination.

Implementation of **Mitigation Measure HAZ-1** would satisfy these policies and would require a new deed restriction to be recorded for the project. Given that the required modified deed restriction has not been recorded and the current deed does not permit residential development on site, the applicant is engaging in a an encompassing plan to address all known and potentially unknown recognized environmental conditions (RECs) on site and provide for future monitoring to address the site's environmental condition based on current standards. Implementation of Mitigation Measure HAZ-1 would thus reduce impacts associated with potential hazardous materials in soil, groundwater, and soil vapor at the project site to a less-than-significant level.

> <u>Mitigation Measure HAZ-1</u>: Under the oversight of the ACDEH and/or SF Bay RWQCB or an agency of applicable jurisdiction designated under Health and Safety Code Chapter 6.65 section 25260, as applicable (Applicable Agency), the project shall receive case closure and record a new deed restriction to the satisfaction of the Applicable Agency.

e) *For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?*

No Impact. The Alameda County Airport Land Use Commission (ALUC) has adopted Airport Land Use Compatibility Plans for areas surrounding public-use airports within the County. The project site is not located within any protected airspace zones for public-use airports defined by the ALUC.[67] The project would have no impact on public safety related to aviation hazards around public-use airports.

f) *For a project located within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?*

No Impact. Based on a review of mapped airport locations, there are no private airstrips in the vicinity of the project site. The project would have no impact on public safety related to aviation hazards around private airstrips.

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

Less than Significant. The Alameda County Fire Department is responsible for responding to and preparing for natural, manmade, and accidental disasters in the City of Emeryville. In the event of an emergency response or evacuation, nearby access routes to or from the project site would include Interstate 80 and State Route 13 (Ashby Avenue). Development of the project would not be expected to interfere with emergency response or evacuation plans, because development would not restrict access to the nearby access routes. Therefore, the project would have a less-than-significant impact on emergency response and evacuation plans.

[67] Alameda County Community Development Agency, 2014. *General Plans, Ordinances & Policies; Airport Land Use Compatibility Plans*. Accessed February 27. https://www.acgov.org/cda/planning/generalplans/airportlandplans.htm.

h) *Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?*

No Impact. The California Department of Forestry and Fire Protection (CAL FIRE) has mapped areas in Alameda County with significant fire hazards based on fuels, terrain, weather, and other relevant factors. These zones, referred to as Very High Fire Hazard Severity Zones, are classified by the CAL FIRE Director in accordance with Government Code Sections 51175-51189 to assist responsible local agencies, such as the Alameda County Fire Department, identify measures to reduce the potential for losses of life, property, and resources from wildland fire. CAL FIRE has determined that there are no Very High Fire Hazard Severity Zones in the project vicinity.[68] Therefore, the project would have no impact on people or structures related to wildland fire hazards.

[68] California Department of Forestry and Fire Protection (CAL FIRE), 2009. *Very High Fire Hazard Severity Zones in LRA; Alameda County*. Recommended by CAL FIRE on September 8.

IX. HYDROLOGY AND WATER QUALITY

Would the project:

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements?	❒	■	❒	❒
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	❒	❒	■	❒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	❒	❒	■	❒
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	❒	❒	■	❒
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	❒	❒	■	❒
f) Otherwise substantially degrade water quality?	❒	❒	■	❒
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	❒	❒	❒	■
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	❒	❒	❒	■
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding of as a result of the failure of a levee or dam?	❒	❒	❒	■
j) Inundation by seiche, tsunami, or mudflow?	❒	❒	■	❒

Affected Environment

The nearest surface water bodies to the project site are the San Francisco Bay, located approximately 0.2 miles to the west, and the Berkeley Aquatic Park, located approximately 350 feet north. Federal Emergency Management Agency (FEMA) Flood Map data show that the project site is not within the mapped 100- or 500-year flood zone. Water-bearing zones beneath Emeryville include a shallow aquifer (less than 60 feet below surface grade) and a deep aquifer (200 to 300 feet below surface grade).[69] Groundwater has been encountered at a range of approximately 8 to 11 feet below the ground surface of the project site.[70] Groundwater flows from the project site to the south, southwest and west. No wetlands are present on the project site.[71]

Discussion

a) *Violate any water quality standards or waste discharge requirements?*

Potentially Significant Unless Mitigation Incorporation. Impacts of the project associated with potential violation of water quality standards or waste discharge requirements can be mitigated to a less-than-significant level, as described below.

Construction

The State Board and nine Regional Water Quality Control Boards regulate water quality of surface water and groundwater bodies throughout California. In the Bay Area, including the project site, the San Francisco Bay Regional Water Quality Control Board (SF Bay RWQCB) is responsible for implementation of the Water Quality Control Plan (Basin Plan). The Basin Plan establishes beneficial water uses for waterways and water bodies within the region.

Runoff water quality is regulated by the National Pollutant Discharge Elimination System (NPDES) Program (established through the federal Clean Water Act). The NPDES program objective is to control and reduce pollutant discharges to surface water bodies. Compliance with NPDES permits is mandated by State and federal statutes and regulations. Locally, the NPDES Program is administered by the SF Bay RWQCB. According to the water quality control plans of the SF Bay RWQCB, any construction activity, including grading, that would result in the disturbance of one acre or more would require compliance with the NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activity (Construction General Permit). The project site

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[69] PES Environmental, Inc., 2014a. op. cit.
[70] Geosphere Consultants, Inc., 2013. op. cit.
[71] PES Environmental, Inc., 2014a. op. cit.

is approximately 2.27 acres in area, and would therefore be subject to the Construction General Permit.

The City of Emeryville participates in the Alameda Countywide Clean Water Program (ACCWP), which complies with the municipal stormwater permit issued by the SF Bay RWQCB. The ACCWP NPDES permit includes permit requirements for stormwater management and discharges for construction activities. The ACCWP NPDES permit also incorporates State and federal requirements for post-construction stormwater discharges from new development and redevelopment projects.

Under the Construction General Permit and City requirements, preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP) would be required. The SWPPP would be required to include Best Management Practices (BMPs) for erosion and sediment control, site management/housekeeping/waste management, management of non-stormwater discharges, runon and runoff controls, and BMP inspection/maintenance/repair activities, as consistent with the most recent version of the California Stormwater Quality Association Stormwater Best Management Handbook-Construction.

As described in *Section VIII: Hazards,* soil erosion or discharge of pollutants from the construction area could result in the potential release of hazardous material into the environment and degrade surface water quality. The project contractor would be required to comply with the City of Emeryville Municipal Code relating to grading projects and erosion control (Section 6-13.302):

> *Any person engaged in construction or grading work in the City shall install, maintain, and replace controls and best management practices in order to prevent non-stormwater discharges such as pollution, erosion and sediment runoff onto roadways or into the City storm drain system. The City Engineer shall require and approve a Construction Stormwater Pollution Prevention Plan for any works of construction and/or grading for which such a plan is deemed necessary by the City Engineer. The City Engineer and his or her designee shall have the authority to stop construction and/or grading work on a site where adequate controls and/or best management practices are not in place.*

The General Plan EIR recognizes that implementation of the required SWPPP BMPs and the following policy would effectively minimize the potential for an accidental release of hazardous materials during construction:

> Policy CSN-P-7: New commercial and industrial activities, as well as construction and demolition practices, shall be regulated to minimize discharge of pollutant and sediment concentrations into San Francisco Bay.

Implementation of these existing policies and plans would reduce potential impacts to hydrology and water quality during the construction of the project a less-than-significant level.

Operation

Operation of the project would be subject to the SF Bay RWQCB's NPDES permit, implemented in February 1997 by Order 97-030, and modified by Order 99-049 in July 1999. Provision C.3 of the SF Bay RWQCB's NPDES permit and the City's standard conditions of approval require that new development and redevelopment projects implement treatment measures and appropriate source control and site design features on the project site. As described in *Section VIII: Hazards*, the SWPPP would also include BMPs for hazardous material storage and soil stockpiles, inspections, maintenance, training of employees, and containment of releases to prevent runoff into existing stormwater collection systems or waterways. As project construction would replace more than 10,000 square feet and more than 50 percent of the existing impervious surface at the project site, the applicant must also implement stormwater pollutant load reducing site design/landscape features as feasible. Site design/landscape characteristics shall maximize infiltration (where appropriate), provide retention or detention, slow runoff, and minimize impervious land coverage, so that post-development pollutant loads from the site are reduced to the maximum extent possible, as described in the General Plan EIR.

The City of Emeryville has adopted several ordinances that regulate hydrological resources: Municipal Code Chapter 13.6, Chapter 2.7, Chapter 5.7, Chapter 7.7, and Chapter 8.7. The City's standard Conditions of Approval require compliance with Stormwater Measures, in particular with the requirements of provision C.3 of the NPDES permit, prior to issuance of a building permit. Project plans, hydraulic sizing and on-site stormwater treatment calculations must be submitted as part of this standard Condition of Approval. The proposed project design incorporates stormwater infiltration and drainage features, including a permeable driveway entry to the garage, decomposed granite along the walking path, lined stormwater infiltration planting areas, vegetation on the third and seventh floor courtyards, and other landscaping. The proposed project would be required to comply with the City's NPDES permit, relevant Ordinances, and Conditions of Approval.

Conclusion

Groundwater at the project site has been observed at approximately 8 to 11 feet below the ground surface; however, the groundwater level would likely fluctuate with the season, and possibly with the tide in the Bay. The proposed development would necessitate excavation to a depth of approximately 5 feet below ground surface (bgs) for footings and utilities. Therefore, groundwater may be encountered during excavation and trenching. If groundwater is encountered on-site, dewatering of contaminated or potentially contaminated groundwater would be necessary and would be subject to the SF Bay RWQCB construction dewatering permit requirements.

As described in *Section VIII: Hazards*, regulatory databases and previous subsurface investigations have identified and evaluated sources of subsurface contamination at the project site, including a former underground storage tank, a former waste drum storage area, a former chemical waste sump, and fill material. The direct discharge of dewatering effluent from the site to the storm drainage system could result in water quality impacts to the Bay. Implementation of **Mitigation Measure HYD-1** would reduce these impacts to a less-than-significant level.

> Mitigation Measure HYD-1 - Dewatering: If dewatering is necessary, the SWPPP shall include provisions for the proper management of construction-period dewatering effluent. Dewatering operations shall comply with appropriate provisions in the NPDES permit. Discharge of the dewatering effluent shall comply with the required permit(s) from the SF Bay RWQCB for discharge to surface creeks and groundwater or from East Bay Municipal Utility District (EBMUD) and/or the City of Emeryville Public Works Department, as applicable, for discharge to storm or sanitary sewers. These measures would ensure protection of water quality during construction of the proposed project.

Implementation of **Mitigation Measure HYD-1** would reduce potential violations of water quality standards or waste discharge requirements to a less-than-significant level.

b) *Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?*

Less Than Significant. Groundwater would not be used during construction or operation of the project. Groundwater is not used as a drinking water supply in the City of Emeryville. Water supply is provided to the project area by EBMUD. Although groundwater elevation at the project site is relatively shallow, recently measured at 8 to 11 feet bgs, no significant below-grade construction is proposed. The proposed development would necessitate excavation to a depth of approximately 5 feet bgs. If groundwater is encountered on-site, dewatering activities would be necessary (see **Mitigation Measure HYD-1**). The project design incorporates stormwater infiltration and drainage features that would reduce the amount of impervious surface at the site and increase stormwater retention and treatment (see discussion above). With these features, additional water from precipitation would have the potential to recharge groundwater underlying the project site, a small but positive benefit to groundwater resources. The SWPPP (described above in *Section IX.a*) will require implementation of Low Impact Development design measures, which will reduce the potential impact of the project on groundwater recharge to a less-than-significant level.

c) *Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?*

Less Than Significant. Although drainage patterns would change slightly after completion of the proposed project, implementation of existing stormwater requirements and proposed stormwater treatments (described above in *Section IX.a*) would prevent any significant impacts from erosion or siltation. The project would not alter the course of a stream or river.

d) *Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?*

Less Than Significant. Groundwater currently flows from the project site to the south, southwest, and west. Although the drainage patterns would change slightly after completion of the proposed project, the slight west/southwest slope of the site would remain. Furthermore, implementation of stormwater treatments (described above in *Section IX.a*) would reduce the rate and amount of surface water runoff from the project site. No significant impact would occur.

e) *Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?*

Less Than Significant. As discussed above (under *Section IX.a*), compliance with existing stormwater requirements will necessitate treatment of stormwater and result in a reduction in the volume of stormwater discharge to the City of Emeryville storm drainage system. Existing pervious surfaces on the project site are minimal and would be increased with implementation of the project through incorporation of stormwater infiltration and drainage features, thereby reducing stormwater runoff. No significant impact would occur.

f) *Otherwise substantially degrade water quality*

Less Than Significant. The nearest surface water bodies to the project site are the San Francisco Bay, located approximately 0.2 miles to the west, and Aquatic Park, located approximately 350-feet to the north. Implementation of existing stormwater requirements (discussed above under *Section IX.a*) would reduce any potential impacts to these water bodies to a less-than-significant level.

g) *Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?*

No Impact. As described in the General Plan EIR, the project site is located in Zone X, which is not within a 100- or 500-year flood zone; therefore, no impact would occur.

h) *Place within a 100-year flood hazard area structures which would impede or redirect flood flows?*

No Impact. The project site is located in Zone X, which is not within a 100- or 500-year flood zone; therefore, no impact would occur.

i) *Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding of as a result of the failure of a levee or dam?*

No Impact. As described in the General Plan EIR, the project site is located in Zone X, which is determined to be outside of the area subject to a 0.2 annual chance of flood. The project site is also outside of both the Coastal Flood Zone and the Temescal Dam Failure Inundation Area. The site is also outside of areas vulnerable to a 16-inch sea level rise or 55-inch sea level rise.[72] No impact would occur.

j) *Inundation by seiche, tsunami, or mudflow?*

Less Than Significant. Tsunamis and seiches are waves generated in the ocean and enclosed water bodies, respectively, that may create flooding impacts during a seismic effect. Areas inside the San Francisco Bay have not been mapped for tsunami hazards by the California Office of Emergency Management. Inside the San Francisco Bay, wave impacts from a tsunami are unlikely; however, water inundation from a 20 foot tsunami (200 year likely event) in areas with ground elevations less than 10 feet above mean sea level could occur. The project site is on a relatively flat area approximately 18 feet above mean sea level. Impacts of inundation by seiche, tsunami, or mudflow on the project site are unlikely and the potential impact is less than significant.

[72] City of Emeryville, 2009a. General Plan, Chapter 6: Conservation, Safety, and Noise, Figure 6-8.

X. LAND USE AND PLANNING

Would the project:	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Physically divide an established community?	❒	❒	■	❒
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	❒	❒	■	❒
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	❒	❒	❒	■

Affected Environment

The project site is located within an urbanized area in the northwestern corner of the City of Emeryville. The land on each side of the project site has been disturbed and all surrounding parcels are developed with industrial, commercial, parkland, or transportation (i.e., I-80, and Union Pacific and Amtrak rail lines) uses. Specific surrounding uses include:

- North: Located across the I-80 on- and off-ramps and Ashby Avenue, is the Berkeley Aquatic Park. Aquatic Park includes approximately 33 acres of land and 68 acres of water, providing habitat for bird and aquatic life as well as a variety of recreational features. A former radio station building and a radio tower are located on the opposite side of the Ashby on- and off-ramps.
- East: Immediately east of the project site, across Shellmound Street and the Union Pacific and Amtrak rail lines, are industrial and light industrial uses. Industries in the immediate vicinity include light manufacturing and warehousing.
- South: Ex'pression College is a digital arts college occupying the buildings to the immediate south of the project site. Residential, mixed-use, and office uses are located further south and southeast of the project site.
- West: The I-80/Ashby Avenue off-ramp is located immediately west/northwest of the project site. The main artery of I-80 is located along the Bay shore west of the project site. The Eastshore State Park is also located west of the project site, between I-80 and the Bay.

Discussion

a) *Would the project physically divide an established community?*

Less Than Significant. The division of an established community usually refers to the construction of a physical boundary or element (such as a freeway) that hampers movement between or within existing communities. The proposed project would change the current office use to multi-family residential use and increase the intensity of the use. The project site is surrounded by light industrial and industrial uses in the immediate vicinity. Other residential and mixed-use developments are located in the neighborhood along Shellmound Street between 66th Street and 64th Street.

The project applicant proposes to develop all residential frontages with architectural elements that would enhance the current property. The multi-family residential use proposed for the site would generate additional residents. The project would improve sidewalks along Shellmound Avenue with added landscaping and hardscaping, preserve all pedestrian and bicycle access in the site's vicinity, but would not alter any established roadways. Therefore, the project would not physically divide an existing community, resulting in a less-than-significant impact.

b) *Would the project conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?*

Less Than Significant. The project is proposed as residential development with a height, density, and floor area ratio (FAR) within the base zoning district allowance, but without the mix of uses designated in the General Plan. The City of Emeryville's planning and zoning regulations require developments on 1 to 5 acres designated Mixed-Use with Residential to have a more than one use; however, a single use may be granted through a discretionary conditional use permit.

General Plan Consistency

The City of Emeryville General Plan land use designation and the zoning for the project site are Mixed Use with Residential. The policies and strategies of the Emeryville General Plan, in addition to those of the 2010 Housing Element, support the redevelopment of underutilized properties with mixed-use and residential developments. Specifically, the project addresses the following goals, policies, and actions from the General Plan:

> Goal LU-G-4: A mix of housing types—A diversity of housing types to accommodate a variety of household sizes and incomes.
>
> Goal LU-G-9 Appropriately scaled buildings—heights and massing that do not appear monolithic.

The residential use of the proposed project is consistent with the Mixed-Use with Residential designation. The project site is identified in the General Plan as an area of potential change with opportunity for intensification.[73] The proposed development would intensify the use of the existing office/warehouse through higher occupancy, height, and bulk. The project is proposed to be 93 units per acre, and have a height of 84 feet and an FAR of 2.77, which is within the density and height regulations (100 dwelling units per acre, up to 100 feet in height, and up to 4.0 FAR) for the Emeryville General Plan designation. The project would not require bonus concessions for density or height.

The proposed project would be compatible with the two nearby multi-family residential developments located at 66th Street and Shellmound. On the other hand, proposed residential use would contrast with the digital arts college and light industrial uses in the immediately vicinity. However, the college and industrial uses are likely to be active during daytime weekday hours when residents are less likely to be home.

Zoning Consistency

Permitted Use

The proposed project would be required to comply with the planning and zoning regulations included in the City of Emeryville Municipal Code Title 9, Planning Regulations.[74] The project site's zoning reflects the City of Emeryville's intention to encourage higher-density uses. The proposed multi-family residential use is permitted in Emeryville's Mixed Use with Residential base zone. Developments on sites of at least 1 acre but less than 5 acres in the Mixed Use zone must obtain a Conditional Use Permit (Section 9-3.303(b)(2)b). The project does not propose a mix of uses as required by Emeryville's Mixed Use Zone regulation (Section 9-3.303(b)(2)b) for a development on 1 to 5 acres. The proposed development would therefore require Planning Commission approval of a conditional use permit for a single use development in a Mixed Use with Residential zone.

Setback, Courtyard, and Open Space

The project site is located on a corner lot and abuts only an institutional use, therefore no minimum setbacks are required (Section 9-4.301). Courtyards on the third to seventh floors would be provided to allow adequate light and air to the adjacent residential units in accordance with Section 9-4.302 of the Planning Regulations. The proposed landscaping around the perimeter of the building would provide more than half an acre of

[73] City of Emeryville, 2009. General Plan, Chapter 2: Land Use, pp. 2-4 -5.

[74] City of Emeryville, 2013. Planning Regulations, Emeryville Municipal Code Title 9. Ordinance No. 13-001. Adopted February 5, 2013. Effective March 7, 2013. Accessed February 5, 2014. http://www.codepublishing.com/ca/emeryville/.

open space, which is well over the 60 square feet per dwelling unit of open space required for multi-family residential developments (Section 9-4.303).

Parking

The site development plans dated March 20, 2014 include 211 long-term bicycle parking spaces and 14 short-term bicycle parking spaces, which is in conformance with the required spaces outlined in Section 9-4.408 of the Planning Regulations. Two 10 by 25-foot loading spaces would be provided and would be screened from the public sidewalk and roadway view, as required by the City for the size of development proposed. Based on the number and size of proposed units, the City would require a minimum of 316 parking spaces for residents and guests for the proposed development. The site development plans include a total of 264 parking spaces, and would therefore require Planning Commission approval of a conditional use permit. The City allows applications for conditional use permits for reduced parking under Section 9-4.404(g). Furthermore, implementation of parking demand reduction measures described in Recommendation TRANS-E would reduce parking demand.

Landscaping and Open Space

The proposed site design includes landscaping along the frontage of Shellmound Street, on both sides of the walkway surrounding development, and within the interior courtyards totaling approximately 18,550 square feet. Although the final site design plans are still in development, the proposed landscaping would be well over the required 10 percent of the site area.

Regional Land Use Plans, Policies, and Regulation

In addition to Planning Code regulations, the proposed project would be subject to the requirements of several regional plans and policies. These plans and policies include, but are not limited to, the BAAQMD 2010 Clean Air Plan; the Association of Bay Area Government and Metropolitan Transportation Commission's Plan Bay Area; the SF Bay RWQCB's San Francisco Basin Plan and applicable National Pollutant Discharge Elimination System permits; and the San Francisco Bay Conservation and Development Commission's San Francisco Bay Plan.[75]

Compliance with applicable plans, policies, and regulations are evaluated in their respective impact sections. As described throughout this document, the project would not result in any significant environmental impacts.

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[75] Because the Proposed Project is more than 100 feet inland from the shoreline, and because it is not situated on a marsh, tributary, or wetland area, it is not subject to Bay Conservation Development Commission jurisdiction.

c) *Would the project conflict with any applicable habitat conservation plan or natural community conservation plan?*

No Impact. Neither Emeryville nor neighboring Berkeley have approved a habitat conservation plan or natural community conservation plan. The site is not within an area that is subject to a habitat or natural community conservation plan. Therefore, the project would not result in an impact.

XI. MINERAL RESOURCES

Would the project:	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporation	Less Than Significant Impact	No Impact
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?	❒	❒	❒	■

No Impact. The General Plan EIR does not identify any impacts related to mineral resources, since the city is within a developed area and includes no mineral resources. Consistent with this finding, the project would have no impact on mineral resources, as no mineral resources exist on the project site or its vicinity.

XII. NOISE	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	❒	■	❒	❒
b) Exposure of persons to or generation of excessive ground borne vibration or ground borne noise levels?	❒	■	❒	❒
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	❒	■	❒	❒
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	❒	■	❒	❒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	❒	❒	❒	■
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	❒	❒	❒	■

Affected Environment

General Information on Noise

Noise is commonly defined as unwanted sound that annoys or disturbs people and can have an adverse psychological or physiological effect on human health. Sound is measured in decibels (dB), which is a logarithmic scale. Decibels describe the purely physical intensity of sound based on changes in air pressure, but they cannot accurately describe sound as perceived by the human ear since the human ear is only capable of hearing sound within a limited frequency range. For this reason, a frequency-dependent weighting system is used and monitoring results are reported in A-weighted decibels (dBA). Technical terms used to describe noise are defined in Table XII-1.

TABLE XII-1 DEFINITION OF ACOUSTICAL TERMS

Term	Definition
Decibel (dB)	A unit describing the amplitude of sound on a logarithmic scale. Sound described in decibels is usually referred to as sound or noise "level." This unit is not used in this analysis because it includes frequencies that the human ear cannot detect.
Vibration Decibel (VdB)	A unit describing the amplitude of vibration on a logarithmic scale.
Frequency (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level (dBA)	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted.
Equivalent Noise Level (Leq)	The average A-weighted noise level during the measurement period. For this CEQA evaluation, Leq refers to a one-hour period unless otherwise stated.
Community Noise Equivalent Level (CNEL)	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7 to 10 PM and after addition of 10 decibels to sound levels during the night between 10 PM and 7 AM.
Day/Night Noise Level (Ldn)	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured during the night between 10 PM and 7 AM.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Vibration Decibel (VdB)	A unit describing the amplitude of vibration on a logarithmic scale.
Peak Particle Velocity (PPV)	The maximum instantaneous peak of a vibration signal.
Root Mean Square (RMS) Velocity	The average of the squared amplitude of a vibration signal.

It should be noted that because decibels are based on a logarithmic scale, they cannot be added or subtracted in the usual arithmetical way. For instance, if one noise source emits a sound level of 90 dBA, and a second source is placed beside the first and also emits a sound level of 90 dBA, the combined sound level is 93 dBA, not 180 dBA. When the difference between two co-located sources of noise is 10 dBA or more, the higher noise source dominates and the lower noise source makes no perceptible difference in what people can hear or measure. For example if the noise level is 95 dBA and another noise source is added that produces 80 dBA noise, the noise level will still be 95 dBA.

In an unconfined space, such as outdoors, noise attenuates with distance according to the inverse square law. Noise levels at a known distance from point sources are reduced by at least 6 dBA for every doubling of that distance over hard surfaces, such as asphalt, and 7.5 dBA for every doubling of that distance over soft surfaces, such as undeveloped land.

Noise levels at a known distance from line sources, such as the noise from high-volume roadways, decrease at a rate of at least 3 dBA for every doubling of the distance over hard surfaces and 3.5 dBA over soft surfaces. A greater decrease in noise levels can result from the presence of intervening structures or buffers.

An important method for determining a person's subjective reaction to a new noise is by comparing it to existing conditions. The following describes the general effects of noise on people:[76]

- A change of 1 dBA cannot typically be perceived, except in carefully controlled laboratory experiments;
- A 3-dBA change is considered a just-perceivable difference;
- A minimum of a 5-dBA change is required before any noticeable change in community response is expected; and
- A 10-dBA change is subjectively perceived as approximately a doubling (or halving) in loudness.

General Information on Vibration

Vibration is an oscillatory motion through a solid medium (versus noise which is an oscillatory motion through air) in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Several different methods are used to quantify vibration. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receptors to vibration include structures (especially older masonry structures), people (especially residents, the elderly, and sick), and vibration-sensitive equipment. Vibration amplitudes are usually expressed as either peak particle velocity (PPV) or the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous peak of the vibration signal. PPV is appropriate for evaluating potential damage to buildings, but it is not suitable for evaluating human response to vibration because it takes the human body time to respond to vibration signals. The response of the human body to vibration is dependent on the average amplitude of a vibration. The RMS of a signal is the average of the squared amplitude of the signal and is more appropriate for evaluating human response to vibration. PPV and RMS are normally described in units of inches per second (in/sec), and RMS is also often described in vibration decibels (VdB).

[76] Salter, Charles M., 1998. Acoustics – Architecture, Engineering, the Environment, William Stout Publishers.

Regulatory Framework

State

Part 11 of the 2013 California Building Code specifies that buildings containing non-residential uses (e.g., retail spaces and offices) that are exposed to exterior noise levels at or above 65 dB Leq shall maintain interior noise level below 50 dBA Leq in occupied areas during any hour of operation. An acoustical analysis documenting compliance with this interior sound level is required. Although the 2013 California Building Code does not specify an interior noise standard for multi-family residences, the 2010 California Building Code restricted interior noise levels attributable to exterior noise sources to 45 dBA Ldn or CNEL for dwellings other than detached single-family dwellings, and this restriction was detailed in the City of Emeryville General Plan EIR.

City

The Conservation, Safety, and Noise Element of the City of Emeryville General Plan establishes community noise exposure guidelines that are used to evaluate land use decisions.[77] The guidelines for land use types located at and near the project site are summarized in Table XII-2, below.

The goals and policies of the Conservation, Safety, and Noise Element[78], Land Use Element[79], and Transportation Element[80] that are applicable to the project are presented below:

> Policy LU-P-25: If new residential buildings are proposed adjacent to freeways and railroad tracks impacts of these corridors, including noise, vibration, and air pollution, should be considered during site planning. Noise, vibration, and air pollution shall be mitigated to the extent possible.
>
> Policy T-P-44: The City supports grade-separated crossings and other appropriate measures to mitigate the impacts of increased rail traffic on Emeryville, including noise, air pollution, and traffic disruption.
>
> Goal CSN-G-9: Protection from noise – protection of life, natural environment, and property from manmade hazards due to excessive noise exposure.
>
> Goal CSN-G-10: Ambient noise reduction – strive to minimize increases in ambient noise levels.
>
> Policy CSN-P-50: The community noise compatibility standards (Figure 6-11) shall be used as review criteria for new land uses.

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[77] City of Emeryville, 2009a. General Plan, Chapter 6: Conservation, Safety, and Noise.
[78] Ibid.
[79] City of Emeryville, 2009b. General Plan, Chapter 2: Land Use.
[80] City of Emeryville, 2009c. General Plan, Chapter 3: Transportation.

TABLE XII-2 COMMUNITY NOISE EXPOSURE (LDN OR CNEL, DB) LEVELS

Compatibility	Mixed Use, Multi-Family Residential Land Use	Schools, Libraries, Churches, Hospitals, Nursing Homes	Office Buildings, Business Commercial and Professional	Industrial, Manufacturing Utilities, Agriculture
Normally acceptable	<65	<65	<70	<75
Conditionally acceptable	65-70	65-70	70-75	75-80
Normally unacceptable	70-75	70-80	>75	>80
Clearly unacceptable	>75	>80	--	--

Note: "--" = no community noise exposure level specified.
"Normally acceptable" = Specified land use is satisfactory, based upon the assumption that any building involved is of normal conventional construction, without any special noise insulation requirements.
"Conditionally Acceptable" = New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.
"Normally unacceptable" = New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.
"Clearly unacceptable" = New construction or development should generally not be undertaken.

Source: City of Emeryville, 2009. General Plan, Chapter 6: Conservation, Safety, and Noise

Policy CSN-P-51: Noise impacts should be controlled at the noise source where feasible, as opposed to at receptor end. This includes measures to buffer, dampen or actively cancel noise sources.

Policy CSN-P-52: Occupants of existing and new buildings should be protected from exposure to excessive noise, particularly adjacent to Interstate-80 and the railroad.

Policy CSN-P-53: A noise study and mitigation measures shall be required for all projects that have noise exposure levels greater than "normally acceptable" levels.

Policy CSN-P-54: Developers shall reduce the noise impacts of new development through appropriate means (e.g. double-paned or soundproof windows, setbacks, berming, and screening). This noise attenuation method should avoid the use of visible sound walls.

Policy CSN-P-56: The City will work with the California Public Utilities Commission, other pertinent agencies and stakeholders to determine the feasibility of developing a railroad quiet zone in Emeryville.

Policy CSN-P-57: The City shall require noise buffering, dampening, or active cancellation, on roof-top or other outdoor mechanical equipment located near residences, parks, and other noise sensitive land uses.

Policy CSN-P-58: The City shall limit the potential noise impacts of construction activities on surrounding land uses through Noise Ordinance regulations that address allowed days and hours of construction, types of work, construction equipment, notification of neighbors, and sound attenuation devices.

The City of Emeryville Noise Ordinance (Chapter 13 of the Municipal Code) regulates excessive and annoying noise that contributes to the unnecessary and unreasonable discomfort of individuals. Section 5-13.05 of the Noise Ordinance specifically regulates construction noise. General construction noise and preconstruction noise is limited to weekdays from 7:00 a.m. to 6:00 p.m. Pile driving and similarly loud activities are limited to weekdays from 8:00 a.m. to 5:00 p.m. A developer, owner or contractor must request a waiver for construction work to extend beyond these hours. The Municipal Code does not specify any quantitative standards for construction noise.

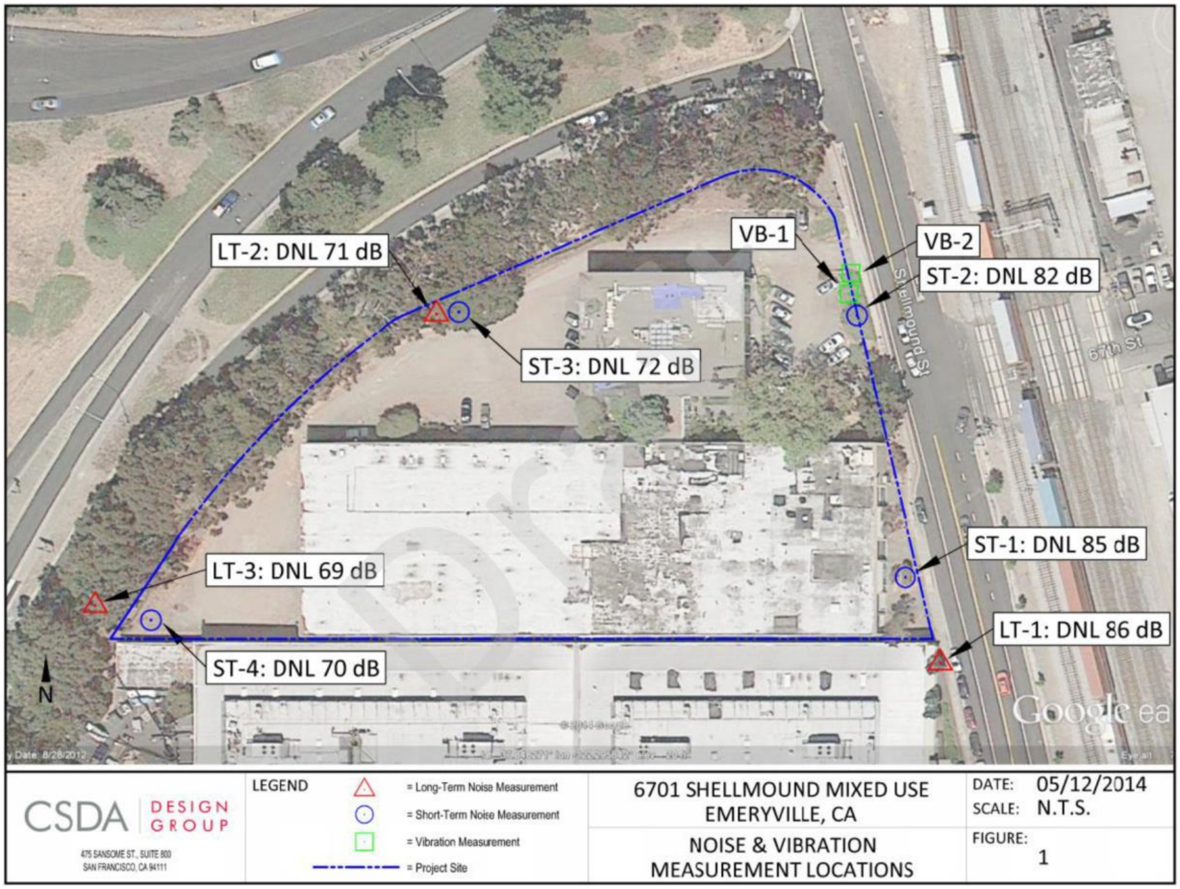
Ambient Noise and Vibration Environment

The primary noise sources in the vicinity of the project site are: (1) traffic on the Interstate-80 (I-80) highway, which runs north to south and is located approximately 420 feet west of the project site; (2) the two I-80 off ramps, the closest of which is located approximately 60 feet north of the project site; and (3) the Union Pacific Railroad (UPRR), which runs north to south and is located approximately 50 feet east of the project site. To quantify the existing ambient noise environment in the vicinity of the project site, CSDA Design Group (CSDA) conducted both long-term (48-hour) and short-term (10 to 60 minute) noise monitoring at several locations at the project site (Figure XII-1). These findings are provided in Appendix B. The long-term noise measurements were collected at three locations from April 29 to May 2, 2014.[81] The short-term noise measurements were collected at four locations and were used to supplement the long-term noise measurements.[82] Noise levels throughout the project site were found to range from 69 to 86 dBA LDN (Table XII-3). The highest noise levels were measured along Shellmound Street and were generated by trains along the UPRR tracks (Table XII-3). Diesel engines, the movement of steel wheels over rails, train air horns, and crossing bells gates all contribute to noise levels associated with the UPRR tracks.

The UPRR tracks are utilized by both freight trains and Amtrak trains. The freight trains on the UPRR tracks operate at relatively lower speeds of 15 to 20 miles per hours.[83] Train noise, although intermittent, can generate major noise events. Diesel trains typically generate noise levels of 88 dBA at 50 feet, while train horns can generate noise levels of 105 dBA at 50 feet.[84] The sounding of train horns is a safety requirement at surface crossings, and there is a surface crossing located approximately 50 feet east of the project site.

[81] CSDA Design Group, 2014. 6701 Shellmound – Environmental Noise and Vibration Study. June 3.
[82] Ibid.
[83] City of Emeryville, 2009a. op. cit.
[84] Salter, 1998. op. cit.

FIGURE XII-1 NOISE MEASUREMENT LOCATIONS



Source: CSDA Design Group, 2014. 6701 Shellmound – Environmental Noise and Vibration Study. June 3.

TABLE XII-3 NOISE MEASUREMENT RESULTS

Location	Description	Height (feet)	Noise Level (dBA Ldn)
LT-1	Shellmound Street, dominated by UPRR noise	12	86
ST-1	Shellmound Street, at project setback	25	85
ST-2	Shellmound Street, at project setback	6	82
LT-2	I-80 off ramps, north portion of the site	12	71
ST-3	I-80 off ramps, north portion of the site	25	72
LT-3	West end of site facing I-80	6	69
ST-4	West end of site facing I-80	25	70

Source: CSDA Design Group, 2014. 6701 Shellmound – Environmental Noise and Vibration Study. May 13.

The project site is not subject to vibration from the I-80 because highways do not generate perceptible levels of vibration.[85] However, the project site is subject to vibration from trains along the UPRR tracks. Vibration monitoring was conducted by CSDA at two locations located approximately 90 feet west of the UPRR tracks, along Shellmound Street (Figure XII-1).[86] Train generated vibration levels were found to range from 63 inches per second (in/sec) VdB to 76 in/sec VdB (Table XII-4).[87]

TABLE XII-4 TRAIN VIBRATION MEASUREMENT RESULTS (IN/SEC VDB)

Event	Measurement Location	Measured Vibration Level
Freight train locomotive	VB-1	76
Freight train locomotive	VB-2	75
Freight train cars	VB-1	69
Freight train cars	VB-2	68
Passenger trains	VB-1	63
Passenger trains	VB-2	63

Source: CSDA Design Group, 2014. 6701 Shellmound – Environmental Noise and Vibration Study. June 3.

Discussion

d) *Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?*

Potentially Significant Unless Mitigation Incorporation. Potential impacts of construction and operation of the project associated with exposure of sensitive receptors to noise levels in excess of standards can be mitigated to a less-than-significant level, as described below.

Noise Generated During Construction

The primary noise impacts from construction would occur from noise generated by the operation of heavy equipment on the project site. Noise impacts would also result from trucks arriving to and departing from the site, which would be an intermittent source of noise. Construction activities associated with the project would potentially include

[85] Federal Transit Administration, 2006. Transit Noise and Vibration Impact Assessment (DTA-VA-90-1003-06).
[86] CSDA Design Group, 2014. op. cit.
[87] Ibid.

demolition, pile driving, grading, installation of utilities, landscaping, and erection of the building. Equipment typically used in these activities includes drill rigs, pile drivers, bulldozers, excavators, graders, backhoes, compactors, rollers, concrete trucks, loaders, and heavy-duty trucks. Table XII-5 shows typical noise levels associated with various types of construction-related machinery.

Construction is performed in distinct phases, each with its own mix of equipment, workers, and activities. Consequently, each phase of construction has its own noise characteristics. Table XII-6 shows typical exterior noise levels at various phases of commercial construction.

The closest sensitive receptor to the project site is Ex'Pression College, a technical college located adjacent to the southern boundary of the project site. Based on the noise level estimates presented in Tables XII-3 and XII-4, and due to its close proximity to the project site, the technical college could be subject to noise levels in excess of the "normally acceptable" community noise exposure level of 65 dBA Ldn for schools as a result of construction activities.

In addition, although the project would be required to comply with the limitations on construction hours included in the City of Emeryville Noise Ordinance, some phases of construction could still generate noise levels that would result in an increase in the ambient noise environment by 5 dBA Leq, which is the change required before any noticeable change in community response is expected. The General Plan EIR acknowledges that development under the General Plan could expose sensitive receptors to excessive construction noise. In order to address this issue, the General Plan requires the City to implement the following policies:

> Policy CSN-P-51: Noise impacts should be controlled at the noise source where feasible, as opposed to at receptor end. This includes measures to buffer, dampen or actively cancel noise sources.
>
> Policy CSN-P-54: Developers shall reduce the noise impacts of new development through appropriate means (e.g. double-paned or soundproof windows, setbacks, berming, and screening). This noise attenuation method should avoid the use of visible sound walls.
>
> Policy CSN-P-57: The City shall require noise buffering, dampening, or active cancellation, on roof-top or other outdoor mechanical equipment located near residences, parks, and other noise sensitive land uses.
>
> Policy CSN-P-58: The City shall limit the potential noise impacts of construction activities on surrounding land uses through Noise Ordinance regulations that address allowed days and hours of construction, types of work, construction equipment, notification of neighbors, and sound attenuation devices.

TABLE XII-5 TYPICAL NOISE LEVELS FROM CONSTRUCTION EQUIPMENT (dBA)

Equipment	Noise Level at 50 Ft
Backhoe	80
Compactor	82
Concrete Mixer	85
Crane, Mobile	83
Dozer	85
Generator	81
Grader	85
Jack Hammer	88
Paver	89
Pile-driver (Impact)	101
Pile-driver (Sonic)	96
Roller	74
Saw	76
Scraper	89
Truck	88

Source: Federal Transit Administration, 2006. Transit Noise and Vibration Impact Assessment (DTA-VA-90-1003-06).

TABLE XII-6 ESTIMATED NOISE LEVELS FROM CONSTRUCTION ACTIVITIES (dBA)

Noise Source	Noise Level at 50 Ft	Noise Level at 100 Ft	Noise Level at 150 Ft	Noise Level at 200 Ft	Noise Level at 300 Ft
Ground Clearing	83	75	71	68	64
Excavation	88	80	76	73	69
Foundations	81	73	69	66	62
Erection	81	73	69	66	62
Finishing	88	80	76	73	69

Note: The following propagation adjustment was applied to estimate noise levels at 100, 200, 300, and 600 feet assuming: $dBA2 = dBA1 + 10 \times Log\ 10 \times (D1/D2)^{2.5}$ Where:

dBA1 reference noise level at a specified distance.

dBA1 is the calculated noise level.

D2 is the perpendicular distance from receiver.

D1 is the reference distance.

Source of noise levels at 50 feet: U.S. EPA, Legal Compilation, 1973.

The potential short-term noise impacts of construction activities would be mitigated in part by the project's compliance with the Noise Ordinance. Compliance with General Plan policies would be achieved by the implementation of **Mitigation Measure NS-1**, below, which would reduce the adverse impacts associated with construction noise to a less-than-significant level.

Mitigation Measure NS-1: During construction, the project contractor shall comply with the following measures:

- As recommended in the project geotechnical report[88], use drill displacement piles instead of pile driving.
- Maintain all heavy construction equipment used on-site in good operating condition. All internal combustion engine-driven equipment shall be fitted with intake and exhaust mufflers that are in good condition. Mufflers shall result in non-impact equipment generating a maximum noise level of 80 dB when measured at a distance of 50 feet.
- Locate all stationary noise-generating equipment, such as air compressors and portable power generators, and on-site equipment staging areas so as to maximize the distance between the equipment and the nearest sensitive receptor to the project site.
- Designate a "disturbance coordinator" who would be responsible for responding to any local complaints about construction noise. The name and telephone number of the disturbance coordinator shall be provided to the City prior to the issuance of the building permit. The disturbance coordinator will determine the cause of the noise complaint (e.g., starting too early, bad muffler, etc.) and will require that reasonable measures to correct the problem be implemented. The disturbance coordinator shall record all noise complaints received and actions taken in response, and submit this record to the project planner upon request.
- Conspicuously post the name, telephone number, and responsibility for noise management of the disturbance coordinator at the construction site.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes.

Noise Generated During Project Operation

The primary noise generation from the long-term operation of the project would occur as a result of the use of mechanical heating, ventilation, and air conditioning (HVAC) systems

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[88] Geosphere Consultants, Inc., 2013. Memorandum: Progress Report, Nady Property Development, 6701 Shellmound Street, Emeryville, California. May 17.

and from increased vehicular traffic on area roads. Given the existing high ambient noise levels at the project site, HVAC systems would not be a significant source of noise. However, the General Plan requires the mitigation of noise generated by outdoor mechanical equipment located near noise sensitive land uses:

> Policy CSN-P-57: The City shall require noise buffering, dampening, or active cancellation, on roof-top or other outdoor mechanical equipment located near residences, parks, and other noise sensitive land uses.

As previously stated, the nearest sensitive receptor is a technical college located adjacent to the project site. Additionally, the City of Emeryville land use plan identified a park opportunity just south of the project site[89] and has also zoned several areas adjacent to the project site for residential use.[90] Compliance with the General Plan policy above would be achieved by the implementation of **Mitigation Measure NS-2**, below, which would reduce the potential of noise generated by HVAC systems to conflict with standards. Consequently, the proposed project would result in a less-than-significant impact.

> Mitigation Measure NS-2: Consistent with General Plan Policy CSN-P-57, noise buffering, dampening, and/or active cancellation shall be used to reduce noise generated by HVAC systems. A detailed description of the noise control measures selected shall be submitted to the City of Emeryville along with the building plans and approved prior to issuance of a building permit.

The General Plan EIR identified that new development within the City could result in an increase in traffic noise levels as a result of increased traffic volumes. Implementation of the project would result in increased traffic volumes on some area roadways. However, due to the additive properties of noise, discussed above, traffic volumes would have to nearly double for a perceptible increase in noise levels to occur. A preliminary assessment of traffic volumes at nine intersections in the project vicinity indicates that traffic volume increases at these intersections from the project would range from less than 1 percent to 14 percent, well below the near 100 percent increase required for a perceptible change in noise levels to occur.[91] Consequently, the implementation of the project would result in a less-than-significant traffic noise impact.

Noise Exposure During Project Operation

While the City uses the community noise compatibility standards to review land use projects and determine the need for detailed noise analysis, the relevant threshold is whether the project meets an interior standard of Ldn of 45 dBA due to exterior noise sources. Although acceptable interior noise levels for multi-family residences are not

[89] City of Emeryville, 2009b. op. cit.
[90] City of Emeryville, 2009b. op. cit.
[91] Fehr & Peers, 2014. op. cit.

defined in the current California Building Code, or in the City of Emeryville General Plan or Municipal Code, the 2010 California Building Code required that noise levels in multi-family residences not exceed an interior noise level of 45 dBA Ldn. The City of Emeryville General Plan EIR describes the 2010 California Building Code standard and states that it is enforced through the building permit application process. Because the standard is widely used and has been used in the past by the City of Emeryville, 45 dBA Ldn is considered the acceptable interior noise level standard for multi-family residences in this analysis. The non-residential spaces (e.g., bike spa, dog spa, lobby) in the building would be subject to the interior noise level standard of 50 dBA Leq, as specified in the 2013 California Building Code.

Vehicular traffic on the I-80 and the I-80 off ramps, and trains on the UPRR tracks, currently generate noise levels ranging from 69 to 86 dBA Ldn throughout most of the project site (Table XII-3).[92] This noise environment encompasses the “conditionally unacceptable”, “normally unacceptable”, and “clearly unacceptable” community noise exposure levels (Table XII-2). As a result of these elevated exterior noise levels, the noise level reduction of 25 dBA provided by a typical building façade with windows[93], would not reduce the interior noise levels of residential units to below 45 dBA Ldn and would not reduce the interior noise levels of non-residential spaces to below 50 dBA Leq. Consequently, future occupants could be exposed to excessive interior noise levels.

Based on the ambient noise environment measurements and the March 7, 2014 Planning Study Session drawings (as updated March 19, 2014), CSDA determined the noise reduction techniques required to reduce noise levels of residential units and non-residential spaces to below their respective thresholds (i.e. 45 dBA or 50 dBA Ldn, respectively) (Table XII-7).[94] The noise reduction techniques include the use of sound rated windows, balcony doors, and exterior walls. HVAC systems are required for units where sound-rated windows are used. CSDA noted that the techniques may have to be refined, depending on the final building design.[95]

The project also includes three exterior courtyards on the third floor and a roof deck on the western side of the building on the top (seventh) floor. The courtyards would be surrounded on three sides by the surrounding dwelling units that would extend five stories above the courtyard level. The results of noise modeling performed by CSDA indicates that the average exterior noise levels at the courtyards and roof deck would

[92] CSDA Design Group, 2014. op. cit.
[93] Salter, 1998. op. cit.
[94] CSDA Design Group, 2014. op. cit.
[95] Ibid.

range from 67 to 70 dBA Ldn[96](not shown in table), which is considered a “conditionally acceptable” community noise exposure level.

TABLE XII-7 SUMMARY OF EXTERIOR NOISE LEVELS AND PRELIMINARY FAÇADE STC RATINGS

Facade	Future Exterior Noise Level (dB Ldn)	Windows	Balcony Doors	Exterior Walls
East	82-84	STC 50	STC 42	STC 60
Southeast/Northeast	82	STC 45	STC 42	STC 55
South	80	STC 45	STC 42	STC 50
South/North	74-79	STC 40	STC 35	STC 45
West/Courtyards	66-73	STC 35	STC 32	STC 40
Non-Residential Spaces	Leq 82	STC 41	NA	NA

Note: CSDA assumed the standard exterior wall assembly meets STC 40 unless otherwise noted in the March 7, 2014 Planning Study Session drawings. This will need to be confirmed during detailed design. Exterior wall ratings above STC 50 will require additional layers of gypsum board, resilient channels, and/or double-stud construction. Where sound-sound rated windows are required to meet the interior noise requirement, fresh air ventilation should be provided. The ventilation system should meet applicable California Building Code requirements and should not compromise the noise reduction provided by the exterior façade assembly.

Source: CSDA Design Group, 2014. 6701 Shellmound – Environmental Noise and Vibration Study. June 3.

The General Plan EIR acknowledges that development under the General Plan could expose sensitive receptors to excessive highway and train generated noise. In order to address this issue, the General Plan requires the City to implement the following policies:

> Policy LU-P-25: If new residential buildings are proposed adjacent to freeways and railroad tracks impacts of these corridors, including noise, vibration, and air pollution, should be considered during site planning. Noise, vibration, and air pollution shall be mitigated to the extent possible.
>
> Policy T-P-44: The City supports grade-separated crossings and other appropriate measures to mitigate the impacts of increased rail traffic on Emeryville, including noise, air pollution, and traffic disruption.
>
> Policy CSN-P-52: Occupants of existing and new buildings should be protected from exposure to excessive noise, particularly adjacent to Interstate-80 and the railroad.
>
> Policy CSN-P-53: A noise study and mitigation measures shall be required for all projects that have noise exposure levels greater than “normally acceptable” levels.

[96] Ibid.

Policy CSN-P-54: Developers shall reduce the noise impacts of new development through appropriate means (e.g. double-paned or soundproof windows, setbacks, berming, and screening). This noise attenuation method should avoid the use of visible sound walls.

The implementation of **Mitigation Measure NS-3** below, which requires that the proposed development comply with interior noise standards and General Plan noise policies, would reduce the potential of occupants of the project site to be exposed to noise levels in excess of standards to a less-than-significant level.

Mitigation Measure NS-3: The project applicant shall ensure that noise levels in residential units do not exceed 45 dBA Ldn and that noise levels in non-residential spaces (e.g., dog spa, bike spa) do not exceed 50 dBA Leq in occupied areas during any hour of operation.

- In order to meet these standards, the project shall meet or exceed the special building construction techniques detailed in the CSDA Design Group (CSDA) noise and vibration study (summarized in Table XII-7).[97] These techniques include sound-rated windows, doors and exterior wall assemblies. The techniques shall be refined, as necessary, based on the final building design.
- Additionally, because noise levels from trains along the UPRR tracks will still be perceived by occupants of the proposed residential units, a disclosure statement shall be provided to prospective occupants that notifies them of noise from train activity. A copy of the disclosure statement and the proposed project design, including a detailed description of all necessary noise abatement measures, shall be submitted to the City of Emeryville along with the building plans and approved prior to issuance of a building permit.

e) *Exposure of persons to or generation of excessive ground borne vibration or ground borne noise levels?*

Potentially Significant Unless Mitigation Incorporation. Potential impacts of construction of the project associated with exposure of sensitive receptors to excessive vibration levels can be mitigated to a less-than-significant level, as described below. The General Plan EIR identified that new development located in close proximity to vibration generating sources such as railroads or construction could expose people to excessive vibration. The General Plan EIR acknowledged that the vibration exposure levels of individual projects proposed in the future would require review and the development of mitigation measures, as needed. In order to reinforce the need for project-level vibration impact analysis, the following General Plan policies were developed:

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[97] Ibid.

> Policy LU-P-25: If new residential buildings are proposed adjacent to freeways and railroad tracks impacts of these corridors, including noise, vibration, and air pollution, should be considered during site planning. Noise, vibration, and air pollution shall be mitigated to the extent possible.

Tables XII-8 and XII-9 summarize the vibration criteria to prevent disturbance of occupants and to prevent damage to structures. In assessing freight train vibration, the FTA recommends a dual approach with separate consideration of the freight train locomotive and freight train car vibration. Because locomotive vibration only lasts for a very short time, the “Infrequent Events” criterion (80 VdB for residential uses) is appropriate for fewer than 30 events per day. However, the “Frequent Events” criterion (72 VdB) should be applied to rail car vibration because rail car vibration can last several minutes.[98] In this analysis, the “Frequent Event” criterion (72 VdB) is also conservatively applied to passenger trains.

Vibration Generated During Construction

Construction activities can result in varying degrees of ground vibration, depending on the equipment, activity, and relative proximity to sensitive receptors. The vibration levels for construction equipment that could be used at the project site are summarized in Table XII-10. Although the table provides one vibration level for each piece of equipment, it should be noted that there is considerable variation in reported ground vibration levels from construction activities, primarily due to variation in soil characteristics.

The nearest sensitive receptor is a technical college located adjacent to the project site. The vibration generated when construction equipment is operated in close proximity to the technical college could exceed the 75 VdB threshold of daytime use disturbance, and could exceed 0.5 PPV in/sec threshold to prevent damage to structures if a pile driver is used (the use of drill displacement piles required in **Mitigation Measure NS-1** would generate vibration levels similar to caisson drilling (Table XII-10) and therefore would not have the potential to damage structures). The vibration would be temporary because the locations of demolition, grading, soil compaction, and pile installation activities would vary over time across the site. The implementation of **Mitigation Measure NS-1** would reduce the potential of construction generated vibration to disturb occupants of adjacent buildings and cause damage to adjacent buildings to a less-than-significant level.

[98] Federal Transit Administration, 2006. Transit Noise and Vibration Impact Assessment (DTA-VA-90-1003-06).

TABLE XII-8 VIBRATION CRITERIA TO PREVENT DISTURBANCE – RMS (VDB)

Land Use Category	Frequent Events [1]	Occasional Events [2]	Infrequent Events [3]
Residences and buildings where people normally sleep	72	75	80
Institutional Land uses with primarily daytime use	75	78	83

Notes:

1 = More than 70 vibration events of the same kind per day or vibration generated by a long freight train.

2 = Between 30 and 70 vibration events of the same kind per day.

3 = Fewer than 30 vibration events of the same kind per day.

Source: Federal Transit Administration, 2006. Transit Noise and Vibration Impact Assessment (DTA-VA-90-1003-06).

TABLE XII-9 VIBRATION CRITERIA TO PREVENT DAMAGE TO STRUCTURES

Building Category	PPV (in/sec)	RMS (VdB)
Reinforced-concrete, steel or timber (no plaster)	0.5	102
Engineered concrete and masonry (no plaster)	0.3	98
Non-engineered timber and masonry buildings	0.2	94
Buildings extremely susceptible to vibration damage	0.12	90

Source: Federal Transit Administration, 2006. Transit Noise and Vibration Impact Assessment (DTA-VA-90-1003-06).

TABLE XII-10 VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	PPV at 25 Ft (in/sec)	RMS at 25 Ft (VdB)
Pile Driver (Impact) – upper range	1.518	112
Pile Driver (Impact) – typical	0.644	104
Pile Driver (Sonic) – upper range	0.734	105
Pile Driver (Sonic) – typical	0.170	93
Large bulldozer	0.089	87
Caisson drilling	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

Source: Federal Transit Administration, 2006. Transit Noise and Vibration Impact Assessment (DTA-VA-90-1003-06).

Vibration Generation and Exposure During Project Operation

The long-term operation of the project would not involve the use of any equipment or processes that would generate excessive vibration. Exposure to vibration would result primarily from passenger trains, freight train locomotives, and freight train cars traveling on the adjacent UPRR tracks. Vibration measurements collected by CSDA (Table XII-4) indicate that passenger trains, freight train locomotives, or freight train cars do not generate vibration levels that exceed the FTA criteria to prevent damage to buildings (Table XII-9).

The maximum number of trains measured at the project site was 63 during the weekdays and 45 during the weekend.[99] Based on measurements made previously (i.e., not specifically for this project) 39 weekday and 33 weekend Amtrak passenger trains travel past the project site along the UPRR tracks.[100] As a result, this analysis assumes that approximately 24 freight trains travel past the site on weekdays and 12 freight trains pass the site on weekends.[101] Potential vibrant impacts from passengers trains and freight train cars and locomotive are analyzed below.

As discussed above, although a frequent event is defined as more than 70 vibration events of the same kind per day, the “Frequent Event” criterion of 72 VdB is conservatively applied to passenger trains in this analysis even though less than 70 events are expected per day (Table XII-8). The measured vibration level from passenger trains was 63 VdB (Table XII-4). Therefore passenger trains do not generate vibration levels that exceed the FTA criteria of 72 VdB to prevent disturbance to occupants.

Freight trains also travel on the adjacent UPRR tracks. As discussed above, in assessing freight train vibration, the FTA recommends a dual approach with separate consideration of the freight train locomotive and freight train car vibration and applies the “Frequent Events” criterion of 72 VdB to rail car vibration because rail car vibration can last several minutes (Table XII-8). The measured vibration levels from freight train cars were 68 and 69 VdB (Table XII-4). Therefore freight train cars do not generate vibration levels that exceed the FTA criteria of 72 VdB to prevent disturbance to occupant.

As described above, because freight train locomotive vibration only lasts for a very short time, the “Infrequent Events” criterion of 80 VdB is appropriate for fewer than 30 freight train locomotives per day (Table XII-8). The measured vibration levels from freight train

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[99] Fehr & Peers, 2014. Op. cit.

[100] Charles M. Salter Associates, Inc. (CSA), 2005. Third Street Condominiums, Berkeley, CA. Letter from Eric A Yee, Principal Consultant (CSA) to Chris Hudson, Hudson McDonald LLC.

[101] Based on these values, the maximum number of freight trains traveling past the project site is therefore approximately 24 on weekdays (63 total - 39 passenger) and 12 on weekends (45 total - 33 passenger).

locomotives were 75 and 76 VdB (Table XII-4) and do not exceed the FTA criterion of 80 VdB to prevent disturbance to occupants.

f) *A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?*

Less Than Significant. The proposed long-term use of this project site would be multi-family residential. Currently, the project site is surrounded by industrial and office land uses, and areas surrounding the project site are zoned for industrial, high density residential, and mixed-use with non-residential land uses.[102] Consequently, the development of the project site would not introduce a land use that would substantially alter the surrounding noise environment.

Additionally, the primary noise generation from the project would occur from HVAC systems and from vehicular traffic. As discussed above, the increase in vehicular traffic would not be sufficient to result in increased traffic noise levels and the noise generated by HVAC systems would not be significant relative to the existing noise environment. Therefore, the implementation of the project would not substantially increase long-term ambient noise levels and would result in a less-than-significant impact.

g) *A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?*

Potentially Significant Unless Mitigation Incorporated. The use of construction equipment on the project site could result in a substantial temporary and periodic increase in ambient noise levels (Tables XII-3 and XII-4). Implementation of **Mitigation Measure NS-1** would decrease noise generated by construction activities to a less-than-significant level.

h) *For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?*

No Impact. The General Plan EIR found that the City of Emeryville is not located within the vicinity of a public airport or within an airport land use plan and that the City is not located within the 65 dBA CNEL noise contours of either the San Francisco or Oakland International Airports. Consequently, people residing or working in the project area would not be exposed to excessive aircraft noise levels.

[102] City of Emeryville, 2009b. op. cit.

i) *For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?*

No Impact. The General Plan EIR found that the City of Emeryville is not located within the vicinity of a private airstrip. Consequently, people residing or working in the project area would not be exposed to excessive aircraft noise levels.

XIII. POPULATION AND HOUSING

Would the project:

a) Induce substantial 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 housing, necessitating the construction of replacement housing elsewhere?	❐	❐	❐	■
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	❐	❐	❐	■

Affected Environment

The proposed project would add 211 units to the housing stock in the City of Emeryville. This section analyzes the potential impact of the project on existing uses in the vicinity due to the potential displacement of housing or people.

Discussion

a) Would the project induce substantial 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)?

Less Than Significant. The project would have a have a less-than-significant impact on housing and population growth. As discussed throughout, the project is consistent with the General Plan designations for the project site.

Further, Plan Bay Area, a Sustainable Community Strategy, jointly adopted by the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG) Executive Board in July 2013, is the regional framework for coordinating local and regional land use and transportation planning pursuant to SB 375. The Plan identifies Priority Development Areas (PDAs) as the implementing framework for where new housing and job development should be located. The City of Emeryville PDA includes the project site. The PDA is envisioned as an urban, diverse and inclusive city that offers distinctive districts and livable neighborhoods; an enhanced and connected open space network and green streets; a walkable, fine-grained street network that emphasizes pedestrians; a diversity of transportation modes and choices; and sustainability and innovation, with respect for the past.[103]

[103] ABAG and MTC, 2012. *Visions for Priority Development Areas: The Jobs-Housing Connection Strategy*. May.

Following the Draft Plan Bay Area process, much of Emeryville, including the project site, was identified as a "community of concern" meaning a location within a PDA where existing lower-income neighborhoods could be displaced by new growth and investment. The addition of multi-family rental housing units provides an opportunity to increase the housing stock and prevent potential displacement.[104] The proposed project addresses the following goals and objectives from the Housing Element:

> Goal IV. Ensure that the City has a variety of housing types to meet the diverse needs of its residents as well as attract new residents.
>
> Goal VII. Promote environmental responsibility and long-term sustainability of City's housing development through remediation of brownfields and promotion of "green" and "healthy" housing development.
>
> Objective VII-C: Encourage site and building design that includes social spaces, stormwater treatment, transit access, bicycle parking, and strong interface with the street.[105]

The project would replace an underutilized office and warehouse space with 211 residential units, adding approximately 370 residents[106] at an infill development site located within a PDA, and proximate to transit facilities and neighborhood-oriented uses, as well as other citywide and regional amenities. According to the 2008-2012 American Community Survey 5-Year Estimates, the average household size for rental units in the City of Emeryville is 1.75 persons per household.[107] With 211 units proposed, the project could result in approximately 370 residents. However, the project's unit mix contains units targeted for families: 42 percent two-bedroom units and 5 percent three-bedroom units. Thus, the average persons per household rate will likely be higher. The site's development would thus contribute toward regional and City goals of increasing the supply of housing in appropriate locations and would therefore have a less-than-significant impact on housing and population growth.

b) Would the project displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?

No Impact. The project site is currently occupied by an office building and warehouse. There are no residential units on the site. As a result, development of the project would not result in the displacement of residential units nor necessitate construction of replacement housing elsewhere.

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[104] ABAG and MTC, 2013. *Plan Bay Area*, pp. 122. July.
[105] City of Emeryville, 2010. Housing Element 2009-2014, June.
[106] United States Census Bureau, *American Community Survey 2012*, Accessed March 21, 2014. http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml.
[107] Ibid.

c) Would the project displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?

No Impact. The project site is currently occupied by an office building and warehouse. As a result, development of the project would not result in the displacement of people nor necessitate construction of replacement housing elsewhere.

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

Affected Environment

The project site is in an urban area served by existing infrastructure and public services. This section evaluates the potential impact of the project, which includes 211 residential units, on the provision of services. The following sections describe the existing services and facilities for police and fire protection, schools, parks, and other public facilities within the City of Emeryville.

Discussion

Fire Protection – Less Than Significant. Fire protection to the project site is provided by the Alameda County Fire Department (ACFD)[108] under contract with the City of Emeryville. In addition, AFCD has subcontracted with the City of Oakland to provide additional fire protection and fire dispatch services to the City of Emeryville.[109] There are two fire stations in Emeryville which employ approximately six personnel. The nearest station is about one-

[108] City of Emeryville. 2014. Fire Services. Accessed March 21. http://www.ci.emeryville.ca.us/index.aspx?NID=120.

[109] Alameda County Fire Department (ACFD), 2012. Memorandum "Approve an Agreement with City of Emeryville and an Agreement with City of Oakland Fire Department for The Provision of Fire and Emergency Medical Response to the Residents of Emeryville and Addition of FTES To The Alameda County Fire Department." June 5.

half mile away from the project site, Alameda County Fire Station 35 (6303 Hollis Street). Alameda County Fire Station 34 is located 1.3 miles away from the project site at 2333 Powell Street.

The AFCD manages 30 fire stations throughout Alameda County; serving unincorporated communities; the cities of Emeryville, Dublin, Newark, Livermore, and Union City; and the Lawrence Berkeley and Lawrence Livermore National laboratories. In the 2012 to 2013 fiscal year, ACFD responded to 1,765 calls in Emeryville; of which more than 75 percent were related to emergency medical and rescue services.[110] According to the agreement with the City of Emeryville, AFCD's goal is to arrive at the scene of an emergency incident within 7 minutes of 90 percent of all code 3 emergency incidents.[111]

Implementation of the project may result in an incremental increased demand for fire protection services. However, the project is located on an urban site in a highly-developed area, in close proximity to existing fire protection services. The project would not require the provision of or need for new or physically altered facilities to continue to serve the project site. As a result, the project would not result in a substantial adverse physical impact nor would it substantially affect response times for fire services. The project's impact related to the provision of fire services would be less than significant.

Police Protection – Less Than Significant. Law enforcement services in Emeryville are provided by the Emeryville Police Department. Emeryville has one police station (2449 Powell Street), adjacent to Alameda County Fire Station 34. The Police Department has 38 sworn officer positions and is authorized for 17 non-sworn personnel.[112] The result is a ratio of 3.68 sworn officers for every 1,000 residents (based on an estimated 10,335 residents in 2012[113]). The Records and Communication Section of the Police Department is the public safety answering point for all emergency and non-emergency calls for service. As stated in the General Plan EIR, the Police Department does not have service ratios or formal response standards.

Implementation of the project may result in an incremental increased demand for police services. However this increase would not be substantially greater than the existing demand for police services in the area, and thus meeting this additional demand would not require the provision of or need for new or physically altered facilities to continue to

[110] Alameda County Fire Department (ACFD), 2014. Response and Activity Statistics. Accessed March 21. http://www.co.alameda.ca.us/fire/about/statistics.htm.
[111] Alameda County Fire Department (ACFD), 2012, op.cit.
[112] Dauer, Fred, Seargant, Emeryville Police Department, 2014. Personal communication with Urban Planning Partners. March 25.
[113] United States Census Bureau, 2014. QuickFacts from the US Census Bureau. Accessed March 25. http://quickfacts.census.gov/qfd/states/06/0622594.html.

serve the project site. The project would therefore have a less-than-significant impact on police protection services.

Schools – Less Than Significant. The project could generate students, as some of the residents of the 211 new units may be families with school-age children. It is anticipated that existing schools in the area could accommodate these new students.

The city contains two public schools and three higher education institutions. Emeryville also includes one private school, the Pacific Rim International School, which serves 90 students from preschool through 6th grade.

Emery Unified School District

The city boundaries are aligned with a single public school district, Emery Unified School District (Emery USD), which runs two schools: Anna Yates Elementary School (Kindergarten– Grade 6) and Emery Secondary School (Grades 7–12). Emery USD owns an additional property at 1275 61st Street, previously called the Ralph Hawley School and prior to that, the Emery Middle School Academy. It ceased regular school operations in 2003. In March 2013, the School District relocated to the Ralph Hawley School site as part of interim changes due to the Emeryville Center of Community Life Project.

Emery USD and the City of Emeryville are working together to build a combined school and community use site at the location of the Emery Secondary School. Uses formerly located at the site have been relocated in the interim. Emery USD leased space from Oakland Unified School District for the Emery Secondary School at the formerly vacant Santa Fe Elementary School, located at 54th and Adeline streets in Oakland. The Emeryville Center of Community Life is anticipated to accommodate up to 1,120 students from K-12th grade, as well as some community uses. Construction of the Emeryville Center of Community Life is anticipated to be complete in 2015.[114]

Approximately 40 percent of the district's students live outside the school district boundaries. Of those, 85 percent reside within the 94608 zip code. Students who live outside of Emeryville must apply for an inter-district transfer each academic year. Priority is given to returning students, their siblings, and to students whose parents or guardians are employed in Emeryville. As enrollment of Emeryville residents either increases or decreases, the percentage of students accepted through the inter-district transfer process is adjusted. This flexibility has aided the City's small public school district in maintaining stable class sizes across all grade levels.

[114] Emery Unified School District. 2013. Emeryville Center of Community Life Initial Study Mitigated Negative Declaration. Accessed March 26, 2014. http://emeryvillecenter.org/ECCL_Public_IS-MND.pdf.

Anna Yates Elementary School was partially renovated and expanded in 2008, increasing its capacity to serve students and programs. Although the existing school facilities throughout the district have been adequately maintained over many years of use, they have exceeded their “useful life” period and are now in need of major repair and updating or replacement. Additionally, the existing facilities present challenges to operating current programs in spaces designed fifty or more years ago. Finally, the existing building systems are outdated and present obstacles to owning and maintaining a safe, efficient, energy-conscious set of facilities. As stated previously, Emery USD and the City are in process of developing a new school at the old Emery Secondary School site. Although the project may result in some increased demand, Emery USD is already in process of expanding their ability to serve a growing population. The project would not result in a substantially increased demand for school facilities, and would not require new or expanded school facilities. The applicant will pay applicable school impact fees that will be used to pay for the Emery USD's capital facility needs. The project would thus result in a less-than-significant impact on school facilities.

Parks – Less Than Significant. Parks in the vicinity of the project area include Aquatic Park (City of Berkeley) to the north and Point Emery across the freeway to the west of the site. The project does not include new public open space, but does include a substantial amount of common open space, over and above the City’s requirements.

As described in the General Plan, the City has standard of providing 3 acres of parkland per 1,000 residents and locating at least one park within a five-minute walk of all residences. Currently, the City has 22.82 acres of parks and open space areas (not including recreation facilities). With a population of 10,335 according to the U.S. Census 2012 population estimates, the resulting in a ratio of 2.21 parks/1,000 residents is somewhat lower than the standard. The project would add approximately 370 residents, as described in *Section XIII: Population and Housing* and As a result, the ratio would decrease slightly to 2.13 parks per 1,000 persons.

Residents of the project would not be expected to increase the use of existing neighborhood parks and recreation facilities to such extent that these facilities would be physically degraded or their substantial physical deterioration would be accelerated. The incremental residential growth that would result from the project would not require the construction of new recreational facilities or the expansion of existing facilities. The impact on parks would therefore be less than significant.

Other Public Facilities – Less Than Significant. Residents in the City of Emeryville are served by the Oakland Public Library. The closest branch of the Oakland Public is the Golden Gate Branch, located at 5606 San Pablo Avenue, about 1.3 miles from the Project site. The increase in population that would be caused by the project is not anticipated to create adverse physical impacts on the library or any other public facilities.

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

Affected Environment

The City of Emeryville is served by a network of 22 City-owned parks, recreation, and open space areas totaling 26.27 acres, ranging from large State parks to mini-parks, according to the City's *Parks and Recreation Strategic Plan*. In addition, the City owns and operates a range of open space and recreation facilities including: three greenway sites, two community centers; a child development center; a senior center; a recreation center; and two community gardens. In addition to publicly-owned and operated recreational facilities, privately-owned public facilities are located in Emeryville including the 41st Street Park, the Emeryville Marina, the Hollis Green Park, and the Watergate Shore Access.[115]

Aquatic Park is nearest the park, located approximately 350 feet north of the project site in southwest Berkeley. Aquatic Park consists of a tidal lake surrounded by various recreational uses including a multi-use field, a play area, picnic and barbeque facilities, boating, and hiking and biking trails.

The General Plan acknowledges the deficiency in existing parks and open space in Emeryville, compared to the park space per resident ratio in surrounding communities, and establishes policies to increase park space:

> Policy PP-P-1: Increase park acreage to serve the needs of the growing population and address current-deficiencies in park and open space standards. Maintain a standard of three new acres of parkland per 1,000 new residents, and 0.25 acres per 1,000 new employees.
>
> Policy PP-P-11: All large new residential developments shall include a combination of private and common open space.

[115] City of Emeryville, 2011. Parks and Recreation Strategic Plan, pp 22-25. January 18.

As recommended in the City of Emeryville's *Parks and Recreation Strategic Plan,*[116] the City is in the process of adopting a Park and Recreation Facilities fee that would be tied to building permits for new development. The Park and Recreation Facilities fee would help the City reach and maintain its standard of new parkland described in Policy PP-P-1.

The *Parks and Recreation Strategic Plan* includes two recommended sites for new parks in the vicinity of the project site, Site B and Site C. Although specific sites for these recommended parks have not been identified, the Site B is recommended to be in the general area of Shellmound at 65th Street and Site C would be in the general area north of 65th Street and east of the railroad. A minimum of one-half-acre parks are recommended at both locations in order to provide adequate park services for residents and workers in the area. Recommended parks at Site B and C are considered conditional projects, which would be triggered by events such as redevelopment in the area.[117]

Discussion

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

Less Than Significant. The General Plan proposes increases in parkland that would adequately accommodate the City's population growth, including population growth from the proposed project. The project would be subject to any impact fees for expansion of park and recreational facilities that have been adopted by the City at the time building permits are issued. As described in the preceding Public Services section, residents of the project would not be expected to significantly increase the use of existing neighborhood parks and recreation facilities to such extent that these facilities would be physically degraded or their substantial physical deterioration would be accelerated. The incremental residential growth that would result from the project would not result in substantial or accelerated physical deterioration. Furthermore, the project includes ample on-site private open space. The impact on recreational facilities would therefore be less than significant.

b) *Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?*

Less Than Significant. The project does not propose the construction or expansion of any new recreational facilities which might have an adverse physical effect on the environment, although the project does include on-site open space and recreation facilities including a community garden and a fitness room. As described above, the

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[116] Ibid, pp 107-108.
[117] Ibid, pp 77-78, 99.

general plan includes policies to incrementally increase the City's parkland based on new residents. Two conditional park projects are recommended in the near vicinity of the project site, which could be triggered by redevelopment of the project site. Such development of potential new recreational facilities would require project level environmental review and would be expected to have a less-than-significant impact. The impact on recreational facilities would therefore be less than significant.

XVI. TRANSPORTATION/TRAFFIC	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporation	Less Than Significant Impact	No Impact
Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	❒	❒	■	❒
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	❒	❒	■	❒
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	❒	❒	❒	■
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	❒	❒	■	❒
e) Result in inadequate emergency access?	❒	❒	■	❒
f) Conflict with adopted polices, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	❒	■	❒	❒

Affected Environment

The section below provides background information and presents the methodology for the traffic analysis, based on the *6701 Shellmound (City of Emeryville) Transportation Analysis* prepared by Fehr & Peers, dated March 28, 2014, and attached as Appendix C.

The City is currently updating its Transportation Impact Fee in combination with establishing new fees. Improvements to transportation facilities included in the fees are designed to improve the efficiency of the street network, reduce vehicle trips and enhance the transportation system for driving, walking, bicycling, and using transit.

Methodology

Study Area and Analysis Scenarios

In addition to the morning peak period, the transportation assessment includes weekday evening (4 to 6 PM) and Saturday afternoon (3 to 5 PM) peak period analyses to coincide with the time periods when adjacent street traffic demands are greatest and the project generates the most traffic. The study addresses existing and near-term traffic conditions at the following intersections:

1. Potter Street/Bay Street
2. I-80 Off-Ramp/Shellmound Street
3. 67th Street/Shellmound Street
4. 67th Street/Hollis Street
5. 66th Street/Shellmound Street
6. 66th Street/Hollis Street
7. 65th Street/Shellmound Street
8. 65th Street/Hollis Street
9. Project Driveway/Shellmound Street

Intersection operations are evaluated for the following scenarios:

- Existing
- Existing Plus Project
- Existing Plus Project and Pending Developments, including planned development at the Public Market and a Hotel at Bay Street (near-term conditions, representing the cumulative condition)[118]

Significance Criteria

The determination of significance for project impacts is based on applicable policies, regulations, goals, and guidelines defined by the City of Emeryville. The impacts of the project were evaluated by comparing the results of the level of service calculations under

[118] Note that the General Plan EIR evaluates the impacts associated with long-term buildout under the General Plan. As discussed throughout, the project is consistent with the General Plan designation. Further, as discussed below, the trip generating potential of the proposed project is similar to or less than what was included in the General Plan EIR analysis for the critical analysis time periods (weekday PM and Saturday peak hour). Accordingly, the project is not expected to result in new or substantially more severe transportation impacts than described in the General Plan EIR.

"Existing with Project" conditions to the results under existing conditions. For this study, significance thresholds were based on guidance contained in the City of Emeryville General Plan and recently prepared environmental documents for other projects in the City. The detailed impact criteria for this study are presented within each significance criterion below.

Existing Conditions

This section describes transportation facilities in the study area, including the surrounding roadway network, and transit, pedestrian, and bicycle facilities in the site vicinity.

The project site is located at 6701 Shellmound Street, between Shellmound Street and Interstate 80 (I-80), south of Ashby Avenue and north of Ex'pression College, in Emeryville. Access from I-80 to Emeryville is provided via full interchanges at Powell Street and Ashby Avenue. Access to/from northbound I-80 is provided from Shellmound Street with an off-ramp forming the northern boundary of the site, and access to the on-ramp from Potter Street. Along the project frontage, Shellmound Street provides a single travel lane in each direction and on-street Class II bicycle lanes. On-street parking is permitted along a portion of the west side of Shellmound Street in proximity to the project.

Sidewalks are provided on the west side of Shellmound Street to Ashby Avenue; sidewalks on the east side of the street terminate at 67th Street. Pedestrian facilities are not provided across the railroad crossings at 67th and 66th Streets. At the 65th Street railroad crossing, pedestrians are directed to cross on the south side of the tracks. Sidewalks are not provided on 66th and 67th Street between Shellmound Street and Hollis Street due to the provision of perpendicular parking along building frontages.

The project site is located approximately 1,000 feet from an Emery-Go-Round stop on 65th Street, and approximately 1,000 feet from an Emery-Go-Round stop on Hollis Street. The Emery-Go-Round routes provide access to points in Emeryville and the MacArthur BART station. AC Transit Transbay Routes J and Z, as well as local route 26, are within walking distance of the project site. Several other AC Transit Routes serve the area, with stops at the intersections of Ashby Avenue at 7th Street, Christie Avenue at 64th Street, and Shellmound Street at Powell Street. Amtrak provides passenger rail service approximately 1/2 mile to the southeast of the project site, running through the City of Emeryville. Service from the Emeryville Amtrak station provides inter-regional travel to Sacramento, the Central Valley, Southern California, and Northern California. The transit stop at 65th and Shellmound Street is identified as a "Primary Stop" in the City's Pedestrian and Bicycle Master Plan, signifying a stop with the very highest transit ridership that connects key destinations, and with the highest priority for new amenities.

The site is located in close proximity to three at-grade rail crossings at 67th, 66th and 65th Streets, with three tracks serving northbound and southbound Amtrak passenger trains and freight trains.

The discussion below includes mitigation measures that reduce potential significant impacts to a less-than-significant level, as well as project recommendations. Although these recommendations are not required in response to CEQA, the preparers of this Initial Study prepared these recommendations to further minimize already less-than-significant impacts.

Discussion

a) *Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?*

The City of Emeryville does not have a level of service policy for vehicles, but strives to achieve a Quality of Service. Quality of Service recognizes that people travel by a variety of modes, not just in vehicles, and the use of an auto-focused level of service (LOS) standard does not address the mobility needs for non-auto roadway users. This is documented in the following General Plan policy:

> T-P-3: A "Quality of Service" standard that seeks to optimize travel by all transportation modes shall be developed and used to measure transportation performance. The City does not recognize "Level of Service" (LOS) as a valid measure of overall transportation operations, and sets no maximum or minimum acceptable LOS levels, with the exception of streets that are part of the regional Congestion Management Agency network. (These streets may change, but as of 2008 include San Pablo Avenue, Frontage Road, and Powell and Adeline streets). LOS shall not be used to measure transportation performance in environmental review documents or for any other purpose unless it is mandated by another agency over which the City has no jurisdiction (such as Caltrans, Berkeley, Oakland, and the Congestion Management Agency), and then it shall only be used for the purposes mandated by that agency.

Still, LOS is evaluated for vehicles for comparison purposes between traffic flow under existing conditions and in future conditions with implementation of the project for the benefit of the county congestion management agency. This analysis can be viewed below, for informational purposes, and in Appendix C. For this CEQA analysis, trip generation, volumes and overall quality of service are presented below.

A significant traffic-related impact could occur if the operation of an unsignalized study intersection is projected to decline with the addition of project traffic, and if the installation of a traffic signal based on the Manual on Uniform Traffic Control Devices

Peak Hour Signal Warrant (Warrant 3) would be warranted. For intersections that meet the above criteria, capacity enhancing measures that do not degrade other modes of travel should be considered, including upgrading or installing signal equipment, extending left-turn pocket storage, providing non-motorized facilities to reduce vehicular demand, enhancing capacity on a parallel route or enhancing transit access to a site.

Less Than Significant. The project does not conflict with policies establishing measures of effectiveness for performance of the circulation system, nor does it warrant the installation of a traffic signal, and therefore has a less-than-significant impact.

Vehicles

Trip generation refers to the process of estimating the amount of vehicular traffic a project might add to the local roadway network. In addition to estimates of daily traffic, estimates are also created for the peak one-hour periods during the morning (AM) and evening (PM) commute hours, when traffic volumes on adjacent streets are typically at their highest. For this project, estimates for peak Saturday conditions were also prepared since traffic volumes in the area are higher on Saturdays than weekdays due to the retail centers on Shellmound Street, including IKEA, Bay Street and the Public Market. Although there are active uses on the site that would be removed with the project, the observed trip generation of these uses during the analysis periods is minimal.

To project trip generation Fehr & Peers used an MXD+ methodology, a combined approach utilizing the standard Institute of Transportation Engineers (ITE) *Trip Generation Manual* (9th Edition) with adjustments for urban areas that account for density and scale, location efficiency, land use mix in close proximity to the site, urban design and transit orientation.

Table XVI-1 shows the estimated trip generation for the project. In terms of ITE trip generation, which represents the total trip generation of the project for all travel modes, the project is expected to generate approximately 1,400 weekday daily trips, including about 108 morning peak hour and 131 evening peak hour trips. On a typical Saturday, the project would generate approximately 1,350 trips, including 110 during the peak hour. However, there are a number of factors that would reduce the overall number of trips made by a vehicle to/from this site, as a number of trips are expected to be walk/bike trips or transit trips.

Based on the MXD+ model, approximately 15 percent of trips would arrive at/depart the site by walking or biking as the primary model of travel. During peak periods, approximately 20 percent of trips would be primarily transit trips, with 5 percent of daily trips made by transit. Application of the vehicle trip reduction factors results in approximately 25 percent fewer vehicle trips on a daily basis, 35 percent fewer trips during the morning and evening peak hours. On a Saturday, the overall reduction is expected to be approximately 20 percent on a daily basis and 25 percent during the peak hour as compared to standard ITE rates is expected.

When considering the MXD+ reductions described above, the project is expected to add up to 1,050 daily vehicle trips, including approximately 71 morning peak hour and 85 evening peak hour trips to the regional roadway network. On a Saturday, the project could generate up to 1,080 vehicle trips, including 72 peak hour trips.

TABLE XVI-1 TRIP GENERATION ESTIMATES

Use	Weekday							Saturday			
	Daily	AM Peak Hour			PM Peak Hour			Daily	Peak Hour		
		In	Out	Total	In	Out	Total		In	Out	Total
Proposed Project[1]	1,400	22	86	108	85	46	131	1,350	56	54	110
Less Trip Reductions											
Walk/Bike Trips[2]	-210	-3	-13	-16	-13	-7	-20	-200	-8	-8	-16
Transit Trips[3]	-140	-4	-17	-21	-18	-10	-28	-70	-11	-11	-22
Net New Vehicle Trips to Transportation Network[4](A)	**1,050**	**15**	**56**	**71**	**55**	**30**	**85**	**1,080**	**37**	**35**	**72**
Net New Site Trip Generation Assumed in General Plan EIR Transportation Analysis [5] (B)	--	17	21	38	44	33	77	--	90	68	158
Difference between Current Proposal and General Plan EIR Assumptions(C = B-A)	--	-2	35	33	11	-3	8	--	-53	-33	-86

1. Based on *Trip Generation* (9th Edition) trip generation rates for 211 residential units, land use code:220, Apartment
2. 15 percent of trips are expected to be external walk/bike trips.
3. 10 percent of weekday daily trips and 15 percent of weekday peak hour trips are expected to be transit trips to/from the site. On a Saturday, 5 percent of daily and 10 percent of peak hour trips would be transit trips. During peak periods, approximately 20 percent of trips would be primarily transit trips.
4. The net driveway vehicle trip estimates presented above represent a 20-35% reduction compared to using the ITE methodology alone.
5. These numbers represent the trip generation for the hypothetical development analyzed in the General Plan EIR: a 200-room hotel and 40,000 square feet of retail, in conjunction with the removal of existing site uses.

Source: Fehr & Peers, May 2014

The General Plan EIR transportation analysis considered development of a 200-room hotel and 40,000 square feet of retail on the site—not a residential development as currently proposed. The net-new trip generation from site development assumed in the General Plan EIR analysis is also shown in Table XVI-1. The currently proposed project would generate more traffic than assumed in the General Plan EIR analysis during the weekday morning peak hour, similar levels during the weekday evening peak hour, and significantly less traffic during the Saturday peak hour. As the trip generating potential of the proposed project is similar to or less than what was included in the General Plan EIR analysis for the critical analysis time periods (weekday PM and Saturday peak hour), the project is not expected to result in new or substantially more severe transportation impacts than described in the General Plan EIR.

The traffic signal warrant analysis indicates that 66th Street/Hollis Street intersection currently satisfies the peak hour volume warrant during the weekday PM peak hour. Peak hour signal warrants would not be triggered at additional intersections with the addition of project traffic, although they would continue to be met at the Hollis Street/66th Street intersection.

Fehr & Peers considered signalization of this intersection, but rejected it because it would degrade other modes for several reasons, including proximity to the signalized 65th Street/Hollis Street intersection, vehicle queue spillback from Ashby Avenue, and potential to increase vehicle traffic at the unsignalized mid-block Emeryville Greenway Crossings on 67th, 66th and 65th Streets. In the cumulative condition, the project, along with other developments in the area, is projected to increase traffic volumes at these crossings, potentially increasing pedestrian and bicycle conflicts with vehicles. Signalizing the Hollis Street/66th Street intersection could encourage additional vehicle traffic along these corridors further increasing pedestrian and bicycle conflicts with vehicles. With the addition of vehicle traffic from the project, delay at intersections is expected to increase for vehicles and transit vehicles. Additional traffic through the area would also exacerbate existing vehicle queue spillback through the study area that originates outside Emeryville, such as from congested conditions on I-80 or the Ashby Avenue corridor. However, the delay does not exceed the thresholds identified above and displayed in Table XVI-2, below. Level of service is shown here for informational purposes only.[119] Accordingly, since the project does not cause any intersections to operate over capacity; the project's delays do not exceed the thresholds identified above and displayed in Table XVI-2.

[119] As shown in Table XVI-2, the project does not cause any intersections currently operating at less-than-capacity conditions (e.g., LOS D) to operate over capacity at a LOS E or F. Additionally, the project would not increase the delay at an intersection operating over capacity (LOS E or F) by more than 5 seconds.

TABLE XVI-2 INTERSECTION LEVEL OF SERVICE RESULTS

Intersection[1]	Peak Hour	Existing		Existing Plus Project[4]		Near-Term With Project[4]	
		Delay[2]	LOS[3]	Delay[2]	LOS[3]	Delay[2]	LOS[3]
Potter Street/Bay Street (SSSC)	PM SAT	12 (12) 13 (16)	B (B) B (C)	12 (12) 13 (16)	B (B) B (C)	13 (13) 16 (16)	B (B) C (C)
I-80 Off-Ramp/ Shellmound Street (SSSC)	PM SAT	1 (9) 3 (11)	A (A) A (B)	1 (9) 3 (11)	A (A) A (B)	1 (9) 3 (11)	A (A) A (B)
67th Street/ Shellmound Street (SSSC)	PM SAT	2 (13) 2 (13)	A (B) A (B)	3 (13) 2 (14)	A (B) A (B)	3 (16) 2 (16)	A (C) A (C)
67th Street/Hollis Street (SSSC)	PM SAT	6 (95) 2 (19)	A (F) A (C)	8 (<120) 3 (20)	A (F) A (C)	23 (<120) 4 (26)	C (F) A (D)
66th Street/ Shellmound Street (SSSC)	PM SAT	3 (14) 2 (13)	A (B) A (B)	3 (14) 2 (14)	A (B) A (B)	3 (17) 3 (18)	A (C) A (C)
66th Street/Hollis Street (SSSC)	PM SAT	36 (<120) 3 (18)	E (F) A (C)	41 (<120) 3 (18)	E (F) A (C)	63 (<120) 3 (19)	F (F) A (C)
65th Street/Shellmound Street (Signal)	PM SAT	10 14	A B	11 14	B B	11 14	B B
65th Street/Hollis Street (Signal)	PM SAT	36 12	D B	38 12	D B	51 13	D B
Project Driveway/ Shellmound Street (SSSC)	PM SAT	1 (10) 0 (0)	A (B) A (A)	1 (11) 1 (12)	A (B) A (B)	1 (11) 1 (12)	A (B) A (B)

Notes:

1. Signal = Signalized Intersection; SSSC = Side-street stop-controlled intersections, traffic from the major roadway does not stop.
2. Delay presented in seconds per vehicle; for side-street stop-controlled intersections, delay presented as intersection average (worst approach). Actual delay may be worse than shown above during a rail crossing event or when congested conditions occur on I-80 or the Ashby Avenue corridor and vehicle queues spillback through the area.
3. LOS = Level of Service.
4. Results reflect 220 apartment units, which was the level of development proposed at the time the analysis was conducted. Overall conclusions would not change with the currently proposed 211 units.

Source: Fehr & Peers, May 2014.

On a cumulative basis, with the addition of vehicle traffic from the project, delay at intersections is expected to increase for vehicles and transit vehicles. Additional traffic through the area would also exacerbate existing vehicle queue spillback through the study area that originates outside Emeryville, such as from congested conditions on I-80 or the Ashby Avenue corridor. Although the project would contribute to traffic on I-80, it would not have a cumulatively considerable contribution. The peak hour trip generation from the project falls below the Metropolitan Transportation System threshold for evaluating project impacts on regional roadways. This is documented in Appendix C.

Other Modes

According to the General Plan, Shellmound Street is a designated connector street, green street, and Class II bikeway. It is currently striped with marked lanes and bicycle signage. The project does not propose to alter or affect these designations, except that street trees are proposed on Shellmound Street as part of the project, contributing to the green street designation. Additionally, the following project recommendations from the Fehr & Peers Transportation Analysis further minimize the already less-than-significant impact of the project on alternate modes of travel.

> <u>Recommendation TRANS-A</u>: The City of Emeryville has plans to create a railroad quiet zone for the at-grade railroad crossings of the Union Pacific Railroad located just east of Shellmound Street at 65th, 66th, and 67th Streets. A quiet zone will cease the routine sounding of train horns by improving the safety of the at-grade crossing for both vehicles and pedestrians. This project is included in the preliminary update of the Traffic Impact Fee, to which the project applicant would contribute their fair share of the cost through their payment of the fee.

b) *Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?*

A significant traffic-related impact could occur if the contribution of the project would:

- Exceed, either individually or cumulatively, an LOS standard established by the Alameda County Transportation Commission (ACTC) for designated roads or highways;
- For a roadway segment of the ACTC Congestion Management Program (CMP) Network, would cause (a) the LOS to degrade from LOS E or better to LOS F or (b) the V/C ratio to increase 0.03 or more for a roadway segment that would operate at LOS F without the project; or
- Cause congestion of regional significance on a roadway segment on the Metropolitan Transportation System (MTS) evaluated per the requirements of the Land Use Analysis Program of the CMP.

Less Than Significant. ACTC requires the assessment of development-driven impacts to regional roadways. However, because the project would not generate more than 100 "net new" PM peak-hour trips—the threshold for analysis—no further assessment is required. The project would not conflict with ACTC LOS standards or cause congestion of regional significant on a roadway segment on the MTS. As a result, the project would have a less-than-significant impact on consistency with ACTC standards.

c) *Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?*

No Impact. As described in *Section XIII.e*, the project site is not located any airports nor would it change air traffic patterns that would result in safety risks.

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

Less Than Significant. The project would not increase hazards due to a design feature or incompatible uses. A discussion of potential hazards is described below, along with recommended design features. However, potential hazards are not deemed significant and the impact is determined to be less than significant.

Two off-street loading areas are currently shown on the site plan with access from the driveway connecting to the parking garage. An AutoTURN assessment was conducted to demonstrate how trucks (approximately 24 feet in total length) would access the loading area. This analysis shows that moving trucks that would typically be used to accommodate the contents of a two bedroom dwelling unit would be accommodated by the proposed loading area. However, inexperienced drivers may require assistance to back into the loading area.

If vehicles pull forward into the loading area, the active loading/unloading of household goods could occur into the main driveway area, resulting in conflicts between loading/unloading activities and driveway operations. Trucks longer than 24-feet in length would have difficultly accessing the loading area unless driven by a professional mover/driver, and would need to park on Shellmound Street. Given the size of the proposed units, frequent use of trucks longer than 24-feet is not anticipated.

Two trash collection rooms are shown on the site plan on the first floor of the garage, one on the western end and one on the eastern end of the parking garage. Two trash chute locations appear to be provided on each floor of the building. The loading area is also designated as the trash staging area. However, it is not clear from the project site plans how refuse containers would be staged in the area.

The following recommendations will further minimize the already less-than-significant impact of the project on increasing hazards due to a design feature:

> <u>Recommendation TRANS-B:</u> All vehicles should be required to back into the loading area.
>
> <u>Recommendation TRANS-C:</u> Refuse collection procedures should be reviewed by City and WMAC staff. Staging of trash receptacle in the loading area should not permanently reduce the effective depth of the loading area.

e) *Result in inadequate emergency access?*

Less Than Significant. Vehicular access to the site would be provided from a driveway on Shellmound Street between 67th and 66th Streets. Emergency vehicle access would also be provided on the northern side of the building, which accesses a 20-foot clear path that encircles the building. Separate gated access for pedestrians and emergency site and also connects to the main driveway. A meandering pedestrian path would be provided in this area, which would provide pedestrian access to the ground floor townhomes. The route will normally serve as a multi-use landscape space, but would satisfy the Fire Department's requirement for a 20-foot wide emergency vehicle access lane around the entire building. As a result, the project would have a less-than-significant impact on emergency access.

f) *Conflict with adopted polices, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?*

Potentially Significant Unless Mitigation Incorporation. The project would not conflict with adopted plans or programs. With implementation of the mitigation measure identified below regarding bicycle parking access safety, the project would result in a less-than-significant impact related to transit, bicycle, and pedestrian facilities' performance and safety.

Pedestrian Facilities

A pedestrian or bicycle impact is considered significant if it would: (1) Disrupt existing pedestrian facilities; (2) Interfere with planned pedestrian facilities; or (3) Create inconsistencies with adopted pedestrian system plans, guidelines, policies, or standards.

The following General Plan policies support pedestrian safety and circulation:

> Policy T-P-11: Sidewalks shall be provided on both sides of all streets; pedestrian connections between new and existing development is required.
>
> Policy T-P-17: The City will require new development to minimize the number and width of curb-cuts for vehicle traffic to reduce vehicle conflicts with pedestrians.
>
> Policy T-P-20 Safe and direct pedestrian access to Aquatic Park and the peninsula will be provided and maintained.

Pedestrian access to the site would be provided from Shellmound Street. Eight-foot clear sidewalks would be constructed along the Shellmound Street project frontage, in addition to a planted area for street trees and utilities, improving the condition of the sidewalk over existing conditions.

Along the southern boundary of the site, five-foot sidewalks would be provided along the northern side of the access road. Curb cuts are limited to the two entrances/exits on either side of the building. Although there is a sidewalk currently provided on the north side of the I-80 off-ramp, providing access to Aquatic Park, the sidewalk ends within the City of Berkeley. The project would not disrupt existing pedestrian facilities, nor interfere with planned facilities. It would provide sidewalks consistent with the facilities identified in the Citywide Design Guidelines and Pedestrian and Bicycle Master Plan of at least a 7.5 feet clear pedestrian zone.

The project would also increase the potential for pedestrian activity across Shellmound Street at 67th Street, and the potential for pedestrian crossings of the at-grade railroad crossing. There are currently no pedestrian accommodations across Shellmound Street or the railroad crossing at 67th Street although pedestrian activity was observed during a site visit. Given that the project will add pedestrians to the street grid, the following improvement is recommended:

> <u>Recommendation TRANS-D</u>: Install a high visibility crosswalk with advance signage across the south side of Shellmound Street at 67th Street and provide an ADA compliant pedestrian crossing of the railroad tracks, similar to what is provided on 65th Street.

Sidewalks are not provided on 66th and 67th Street between Shellmound Street and Hollis Street due to the provision of perpendicular parking along building frontages. However, these streets are slated for improvement according to the Pedestrian and Bicycle Master Plan, priorities S.8 and S.9 to close the gaps in the provision of sidewalks through the City. The project would not create inconsistencies with the City's adopted plans, but can help contribute to the implementation of these plans through upgrades to existing facilities in front of the project site. The potential impact of the project on pedestrian access, safety, and performance would be less than significant.

Bicycle Facilities

A bicycle impact is considered significant if it would: (1) Disrupt existing bicycle facilities; (2) Interfere with planned bicycle facilities; (3) Create inconsistencies with adopted bicycle system plans, guidelines, policies, or standards; or (4) Not provide secure and safe bicycle parking in adequate proportion to anticipated demand.

Shellmound Street has Class II bicycle facilities (striped bike lanes) that connect to other existing and planned bicycle facilities in the area. The project would not disrupt existing bicycle facilities, nor interfere with planned facilities, or create inconsistencies with the City's Class II designation.

Three bicycle storage rooms are provided within the first level of the parking garage, and two bicycle storage rooms are provided on the second level. Access to the northernmost bicycle storage room on the second floor of the garage would be from an elevator from the first floor of the parking garage, presumably with entry to the garage from the exterior path. Access to the southern bicycle storage room would be from stairs connecting to an entrance on the first level, accessed from the sidewalk connecting to the main garage entry, requiring bicyclists to cross the main garage entry and climb a set of stairs with their bike. However, most bicyclists will likely take their bike in the elevator from the exterior path or ride their bikes through the parking garage and use the vehicle ramping system, creating the potential for bicycle/vehicle conflicts. In order to reduce this potential conflict, the following mitigation measure shall be implemented.

> Mitigation Measure TRANS-1 – Access to Bicycle Parking: The applicant shall provide access improvements and signage to enable a safe path of travel for bicyclists through the garage. A revised plan showing the path of travel from street to each long-term storage room shall be reviewed and approved by the Director of Planning and Building prior to issuance of any building permit.

1. The pathway connecting Shellmound Street to the bicycle storage rooms on the northern side of the site should be well lit and signage directing bicyclist to this area should be provided.
2. Curb ramps shall be provided within the parking garage where bicyclists need to traverse a curb area to access the bicycle storage facilities.
3. Access to the bicycle storage rooms on the second floor of the garage shall be provided via elevator with appropriate signing and striping within the garage. This may require elimination of a guest parking stall to provide a clear path from the elevator to the bicycle room.
4. Doors leading to bicycle storage rooms shall have a push button mechanism such that bicyclists can enter/exit the building without having to prop open doors while wheeling their bicycle. These doors shall also have a mechanism to close behind the user for security. All bicycle storage rooms shall be access-restricted with locking mechanism.

With implementation of **Mitigation Measure TRANS-1**, the potential impact on bicycle parking access would be less than significant.

Transit Facilities

A transit impact is considered significant if it would result in development that is inaccessible to transit riders. This is further supported by the following General Plan policy:

Policy T-P-16: Safe pedestrian walkways that link to streets and adjacent bus stops will be required of new development.

The project site is located approximately 1,000 feet from an Emery-Go-Round stop on Shellmound and 65th Streets, and approximately 1,000 feet from an Emery-Go-Round stop on Hollis and 65th Streets. It is always within walking distance of several AC Transit lines as described in the Affected Environment section above. This is not expected to change with implementation of the project. Eight-foot sidewalks proposed on the west side of Shellmound Street will link with existing sidewalks and provide access to the Emery-Go-Round stops. Given the lack of pedestrian facilities on 67th Street, residents should access the Hollis Street stop via 65th Street. Additional measures to improve pedestrian safety were discussed in the Pedestrian Facilities section above.

As a standard condition of approval, the project will be subject to annual assessment to fund the operations of the Emery Go-Round service, which is required of all commercial entities including for-rent residential projects of more than three units. Although the project is expected to increase transit ridership in the area, these annual contributions would be made to fund transit service in the area. The project would not disrupt existing transit facilities, nor interfere with planned facilities. As a result, the potential impact on transit access and performance would be less than significant.

Other Non-CEQA Topic: Parking Capacity

Although not currently included in CEQA Guidelines Appendix G Checklist as a significance criterion, parking capacity at the project site is evaluated for informational purposes.

As proposed, the project's parking demand is expected to exceed supply, which could result in inadequate parking capacity. However, with implementation of the recommendations identified below regarding parking demand management, the parking capacity would be adequate. The following General Plan policies relate to the provision of vehicle and bicycle parking:

Policy T-P-24: Safe, secure, and convenient short- and long-term bicycle parking shall be provided near destinations for all users, including commuters, residents, shoppers, students, and other bicycle travelers. Retail businesses in regional retail areas are encouraged to provide valet bicycle parking.

Policy T-P-51: The City supports parking supply and pricing as a strategy to encourage use of transit, carpools, bicycles, and walking.

Policy T-P-52: Flexible parking standards are encouraged that reflect calculated parking demand for proposed land uses and that allow for appropriate offsets to reduce parking demand and encourage walking, bicycling, carpooling, and transit use.

Policy T-P-57: The land area devoted to parking shall be reduced by supporting innovative technologies such as parking lifts and automated parking.

Policy T-P-58: The City supports the expansion of the Residential Permit Parking (RPP) program to ensure adequate parking availability in residential areas, recognizing the need for adequate parking to support neighborhood businesses.

Policy T-P-59: Development will be required to "unbundle" parking spaces from lease payments and condominium purchases, so that property lessees and buyers can choose whether to pay for parking spaces.

The project proposes to provide 264 parking spaces, including 131 standard parking spaces with independent utility, 70 parking stalls that would be used in conjunction with the proposed puzzle parking system (for a total of 201 stalls), and an additional 63 parking spaces that would be gained through the use of a parking lift system.

The parking required under the City Zoning Ordinance is presented in Table XVI-3 which shows a minimum parking requirement of 314 spaces for the project, which is 50 more than currently proposed for inclusion in the project considering the parking lift system. The code required parking for the site results in the provision of 1.5 parking spaces per unit, while the proposed parking supply results in approximately 1.25 parking spaces per unit. Although up to 10 percent more parking can be provided than required by code, a conditional use permit would need to be issued to provide less than the code-required parking.

The project applicant retained W-Trans to prepare a parking demand study of similar developments in the study area. Fehr & Peers peer reviewed their memorandum dated March 3, 2014 which documents parking surveys at two similar projects in Emeryville, Archstone and Avenue 64, as well as published data from the Institute of Transportation Engineers (ITE) in the *Parking Generation Manual*. As part of the parking surveys, on-site and on-street parking demand was documented for a weekend night and a weekday night to represent the time periods when residential parking demand is typically the highest.

TABLE XVI-3 PROPOSED PROJECT AND CITY CODE AUTOMOBILE PARKING REQUIREMENTS

Type	# Units	Base Requirement	Base Off Street Parking Required for Project
Studio	11	1 per unit	11
1-bed	101	1 per unit	101
2-bed	88	1.5 per unit	132
3+ -bed	11	1.5 per unit	17
Guest	211	0.25 per unit	53
Total			**314**
Proposed Supply			**264**
Surplus/(Deficit)			**(50)**

Source: City of Emeryville Planning Regulations, Fehr & Peers, May 2014.

Results of the parking demand surveys indicate an average observed parking demand of 1.33 spaces per dwelling unit for similar projects in the surrounding area (ranging between 1.27 to 1.39 spaces per unit), including on-street parking that captures potential guest parking demand (and may potentially overstate demand). The parking assessment also notes that ITE documents an average parking demand of 1.20 spaces per apartment unit in urban areas and 1.23 spaces per apartment unit in suburban areas. W-Trans concludes that considering on-street parking in the vicinity of the project site, sufficient parking would be provided for the project to accommodate expected typical peak parking demand.

The parking survey estimates that the total parking demand for the project would be 1.33 spaces per unit (the average of the maximum observed parking demand at the two sites) or 281 parking spaces. Based on Fehr & Peers' review of the parking demand assessment, published data from ITE, and census data reflective of the City of Emeryville, the proposed parking supply of approximately 1.25 spaces per unit would likely be insufficient to accommodate peak resident and guest parking demand with onsite supplies, unless parking demand strategies are implemented, monitored and adjusted to reflect the actual tenant profiles of the project.

> <u>Recommendation TRANS-E</u>: The applicant should increase the on-site vehicle parking supply to the average observed demand from the parking demand assessment plus five percent to account for typical daily fluctuations in parking demand. The resulting parking supply would be 1.40 spaces per unit, or 295 spaces.
>
> OR
>
> If increasing the on-site parking supply is not feasible, parking demand strategies should be implemented, monitored and adjusted to reflect the actual tenant profiles of the project, to reduce parking demand to a level that could be accommodated with the proposed on-site supply. To manage the proposed parking demand and supply, the project applicant should develop and implement a parking management plan and monitoring program prior to issuance of temporary certificate of occupancy.
>
> The plan should identify provisions for monitoring parking demand as the residential units become occupied to assess the effectiveness of the strategies detailed below and to work with the City of Emeryville to implement additional strategies, if necessary. The parking monitoring should be performed by an independent firm, to be approved by the Director of Planning and Building, and should consist of a survey of typical weekday (a least two observations between 9 PM and 6 AM) and weekend (a least two observations between 9 PM and 6 AM) parking demand. The survey should be conducted when the project is approximately 75 percent occupied, and at between three and six months after full occupancy (at least 95 percent occupancy). On-street

parking demand should also be included in the assessment on Shellmound Street between 65th Street and 67th Street.

The monitoring report should document the observed parking demand in the guest and resident spaces, as well as on-street parking supplies, provide a comparison of the parking demand to the supply, the status of parking demand management strategies being employed, and recommendations for additional parking demand management strategies that could be employed, if needed.

The parking management plan should include items 1-6 below and the plan should consider items 7-10, or similar measures, subject to review and approval by the Director of Planning and Building:

1. Provide AC transit passes to residents for the first year of their tenancy, or other specified time period (5 to 15 percent parking demand reduction expected).
2. Provide information to new residents about the availability of transit in the area (parking demand reduction negligible, supporting measure to provision of AC transit passes).
3. Provide a carshare pod within the building or other location in close proximity to the project (within 800 feet) (up to 5 percent parking demand reduction expected).
4. Assign specific parking spaces to tenants (parking demand reduction negligible, but would manage supplies) who opt to lease a parking space and provide flexible parking space lease terms that allow for termination of the parking space lease during the residential lease term.
5. Implement variable parking pricing such that each subsequent parking space leased by a unit costs more than the previous space (i.e., the second parking space is more expensive than the first; the third is more expensive than the second, etc.), and if the percentage of leased parking spaces is higher than the percentage of leased units, the parking price is adjusted until equilibrium is reached. (For example, if 90 percent of parking spaces are leased but only 85 percent of units are leased, the monthly cost of parking should be increased such that new tenants opt to lease parking at a lower rate—higher cost—than existing tenants.) (The effectiveness of this strategy ranges from 3 to 20 percent, depending on the pricing of the parking.)
6. Provide long-term bicycle parking above the code-required amount at a ratio of 1.5 bicycle parking spaces for each vehicle parking space provided below the expected demand.
7. Implement restrictions on the use of guest parking spaces, such as requiring guest vehicles to be registered with the building management; limiting the

number of times the same guest vehicle can park overnight within the garage; and limiting the number of guest permits a resident can request per month (strategy could increase on-street demand and would need to be monitored for effectiveness).

8. Implement time restrictions on guest parking during daytime hours.
9. Evaluate use of guest parking spaces and potentially assign to residents.
10. Review the parking garage layout to evaluate potential to increase parking supplies through the use of tandem parking stalls.

Implementation of the above measures are expected to reduce parking demand by at least 38 spaces, resulting in an estimated on-site demand of 257 parking spaces (295, less 38 spaces), which would be accommodated by the proposed on-site parking supplies.

Although there is some on-street parking in the vicinity of the site (approximately 20 spaces on Shellmound Street from the project site south to 65th Street), it is limited along the project frontage. Parking is also available on 67th and 66th Streets, but railroad crossing and lack of pedestrian facilities connecting the project site to the east side of the railroad tracks makes it undesirable to encourage on-street parking by site residents and guests. Therefore, parking demand management strategies should aim to reduce actual parking demand, not shift the demand from off-street parking supplies to on-street supplies. Additional parking supply may be feasible within the existing building footprint and program, and should be reviewed as part of the following recommendation. Some site planning and parking-related recommendations are provided below that may help further minimize the parking capacity deficiency.

Recommendation TRANS-F: The applicant should provide details regarding proposed access restrictions and guest access to the parking garage, for City Planning and Public Works Department staff review.

Recommendation TRANS-G: Building Division and Public Works Department staff should review the design and operations of the parking lift system when selected, considering items such as vertical clearances, vehicle access, ease of operation, speed to disperse vehicles and pedestrian access to/from the vehicle once in the lift system.

Recommendation TRANS-H: The applicant should consider eliminating parking stalls on the southeast corner of the second floor garage which may be difficult to access or convert to motorcycle parking. Each of the four motorcycle spaces is equivalent to a vehicle stall per Emeryville Planning Regulations.

Based on the Emeryville Planning Regulations, the project would be required to equip at least three percent of the residential parking supplies with electric vehicle (EV) charging infrastructure, resulting in 8 electric vehicle charging stations based on the current proposed supply. No EV charging infrastructure is shown on the site plan and as a result the following recommendation is provided:

> Recommendation TRANS-I: The applicant should update the site plan to identify the location of EV charging stations. Charging stations can be clustered together. At least one charging station should be reserved for guests.

The total long-term supply indicated on the site plan is 211 bicycle parking spaces. Based on a review of the bicycle storage rooms compared with the size of a typical bicycle and the needed space for maneuvering and storage, some of the storage rooms may not be able to adequately accommodate the capacities indicated on the plans. (This assessment is described in more detail in Appendix C.) The following recommendations will help to better accommodate the required bicycle parking and facilitate movement in and out of the storage rooms, further minimizing the less-than-significant parking impact.

> Recommendation TRANS-J: Provide additional details regarding the proposed bicycle rack systems within each of the bicycle storage rooms to confirm the proposed supply. Depending on the final vehicle parking supply (see Recommendation TRANS-E), indicate where additional bicycle parking will be provided. If modifications to the parking garage design are infeasible or impracticable to provide additional bicycle storage, consider providing bicycle storage on each floor of the building for residents of that floor. Additionally, consider providing a variety of bicycle storage options, including bicycle lockers that could be rented for an additional fee, double decked systems that maximize capacity, and more traditional bicycle racks.

XVII. UTILITIES AND SERVICE SYSTEMS

Would the project:	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	❒	❒	■	❒
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	❒	❒	■	❒
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	❒	❒	■	❒
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	❒	❒	■	❒
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	❒	❒	■	❒
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	❒	❒	■	❒
g) Comply with federal, State, and local statutes and regulations related to solid waste?	❒	❒	■	❒

Affected Environment

The General Plan EIR details the City's existing conditions related to wastewater, water supply, stormwater runoff, and solid waste. An overview of these utility and service systems are provided below within the responses to the checklist questions.

Discussion

a) *Would the project exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?*

Less Than Significant. The City of Emeryville is located within the jurisdiction boundaries of the San Francisco Bay Regional Water Quality Control Board (SF Bay RWQCB). The SF Bay RWQCB provides groundwater protection, wastewater discharge regulation, site cleanups, brownfields cleanups, stormwater basin planning, water quality information, enforcement, and stream and waterway protection. Under the SF Bay RWQCB National Pollutant Discharge Elimination System (NPDES) permit system, all existing and future municipal and industrial discharges to surface waters within the City would be subject to regulation.

In 2009, the SF Bay RWQCB reissued an NPDES permit to EBMUD to operate its wastewater treatment facilities. However, the permit prohibited any discharge from its three wet weather sanitary sewage treatment facilities, which would require further reduction in wet weather flows from local communities including Emeryville. As a result, in November 2009, the RWQCB renewed the City's NPDES permit for operation of the City's sanitary sewer collection system, but similarly stated that the discharger (i.e., the City of Emeryville) not cause or contribute to discharges from the EBMUD wet weather facilities.[120]

To control sanitary sewer overflows, the regional and State water boards have developed detailed requirements for sewer collection agencies, including preparation of sewer system management plans. The City initiated a Sanitary Sewer Overflow program in 2011 to remediate overflow during incidents and adopted a Sewer System Management Plan in 2012 to safely and effectively manage and operate the sewer system. Additionally, the General Plan states the following policies:

> Policy PP-P-27: The City will continue to cooperate with EBMUD, the Regional Water Quality Control Board, and other relevant agencies to adopt and implement programs and policies to further reduce inflow and infiltration (I&I) of storm water in the City's wastewater collection system and private sewer laterals during wet weather events.
>
> Policy PP-P-28: The City will continue to require development projects to replace or upgrade as needed, sanitary sewer systems serving the development site to reduce inflow and infiltration (I&I) of stormwater in the City's wastewater collection system and private sewer laterals during wet weather events.
>
> Policy CSN-P-7: New commercial and industrial activities, as well as construction and demolition practices, shall be regulated to minimize discharge of pollutant and sediment concentrations into San Francisco Bay.

Wastewater from the project would be directed to existing facilities, which would continue to comply with all provisions of the NPDES program, as enforced by the SF Bay RWQCB. Therefore, the project would not result in an exceedance of wastewater treatment requirements and the impact is less than significant.

The project is also not expected to have a significant impact on wastewater collection system facilities or capacity on a cumulative basis, when considering other General Plan projects anticipated in the General Plan EIR.

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[120] City of Emeryville, 2012. Sewer System Management Plan. Adopted February 21.

b) *Would the project require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?*

Less Than Significant. EBMUD's wastewater service district (known as Special District No. 1, or SD-1) treats domestic, commercial and industrial wastewater in Emeryville and several surrounding communities. The City of Emeryville operates a municipal sanitary sewer collection system that conveys wastewater from Emeryville to EBMUD's Main Wastewater Treatment Plant in the City of Oakland. The General Plan includes the following related policy:

> Policy PP-P-26: The City will continue to operate and maintain the City-owned wastewater collection conveyance system and coordinate with EBMUD on the transfer and treatment of wastewater.

The project would generate wastewater that would be treated by EBMUD facilities. The increase in residents that would result from the project would incrementally increase the amount of wastewater associated with the project site compared to the current office and warehouse use. The General Plan EIR determined that no expansions of wastewater treatment facilities would be expected given that growth in Emeryville was only expected to require an additional 1 percent of EBMUD's remaining wastewater treatment system capacity. Given that the project is consistent with the City's General Plan, the project would not require or result in the construction of new wastewater treatment facilities or expansion of existing facilities.

Moreover, new development is required to pay a sewer connection fee as a condition of the issuance of a building permit to fund future capital improvements (and based on a single-family dwelling unit equivalent). Sewer user fees collected by EBMUD users (e.g., Emeryville residents) also support operation and maintenance of the City's sanitary sewer collection system.[121] The project would have a less-than-significant impact related to wastewater treatment facilities.

c) *Would the project require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?*

Less Than Significant. Surface runoff in Emeryville flows through Temescal Creek or is collected in local storm drains and is discharged directly into the Bay. The General Plan includes the following policies related to storm drains and runoff:

[121] Ibid.

Policy UD-P-47: Streetscape landscaping shall follow Bay-Friendly Landscaping guidelines and serve the dual purpose of treating stormwater runoff and providing shade and beauty to the urban realm.

Policy CSN-P-10: New development is required to incorporate source control, site design, and storm water treatment to reduce pollutants in stormwater runoff.

Policy CSN-P-45: Storm drains shall be maintained, and replaced or upgraded as needed to reduce potential flooding.

Currently, the majority of the project site is paved. The existing 98,775 square-foot site includes two buildings, an asphalt driveway and parking area, and a broken asphalt and gravel surface in the rear of the buildings. A field visit by the author confirmed that the site currently has limited areas for infiltration. Trees are located in the front parking lot area and along the perimeter of the property.

According to project plans provided by the applicant, the project proposes to reduce stormwater runoff associated with the site through incorporation of stormwater infiltration and drainage features: a pervious 20-foot wide fire road encircling the site, and stormwater planters on the ground level, third floor above the podium garage, and the roof. Additionally, a raised bed garden and planting areas are located on the ground-level. The plans identify 63,000 square feet of impervious area, suggesting that 35,000 square feet on the ground-level will be pervious surfaces, in addition to stormwater management features on the upper floors and on the Shellmound Street, where a 6-foot planter strip is proposed.[122] According to the project plans, the project would result in a net decrease in the impervious surface area compared with existing conditions. Therefore, the project would not require or result in construction of new or expansion of existing stormwater drainage facilities and the impact on stormwater drainage would be less than significant.

d) *Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?*

Less Than Significant. EBMUD owns, operates and maintains the water distribution system in the city. Approximately 90 percent of the water used by EBMUD comes from the Mokelumne River watershed. EBMUD has water rights that generally allow for delivery of up to a maximum of 325 million gallons per day (mgd) from the Mokelumne River.[123] EBMUD's 1.3 million customers used an average of 161 mgd of water in 2011 and a similar amount in 2012.[124] EBMUD forecasts an unadjusted customer demand of 312 mgd for the year 2040; assuming existing and future conservation estimates, EBMUD estimates adjusted customer demand of 230 mgd.

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[122] Anton Development Company, LLC, 2014. Project Plans. Submitted November 7.
[123] East Bay Municipal Utility District (EBMUD), 2010. Urban Water Management Plan.
[124] EBMUD, 2012. East Bay Water: A Status Report on Local Water Use & Water Supplies.

Both supply and demand vary seasonally and become critical during drought periods which can last several years. For planning purposes and looking to the year 2040, EBMUD's current water supply is sufficient to meet customer needs during normal years, but insufficient to meet demand during single- and multi-year droughts. EBMUD is pursuing a range of strategies to reduce demand and increase supply, including through public outreach, leak fixes, water storage, infrastructure improvements and water conservation measures. In 2012, EBMUD completed a Water Supply Management Program to address these challenges. At the customer level, EBMUD reports historic water use (between 1995 and 2004) of 165 gallons per capita per day (gcpd), but projects this rate to drop to 151 gcpd in 2015 and 144 gpd in 2020 with the implementation of water conservation and other programs.[125]

The General Plan EIR estimated a total of 7.4 mgd in average daily water demand for the City of Emeryville with buildout of the General Plan. As with all General Plan projections in EBMUD's service area, Emeryville's General Plan population and land use projections are assumed as part of EBMUD's water demand projections.[126] The General Plan EIR did not foresee any adverse impacts on water supply given that new development in the General Plan makes up a small fraction of EBMUD's existing and future demand. The General Plan also identified the following goals and policies:

> Goal CSN-G-3: Water quality and conservation—High-quality groundwater and surface water resources. Improved water conservation, increased use of recycled water, and reduced per capita water consumption.
>
> Goal CSN-G-4: Reduced per capita water consumption—By 2030, per capita water consumption will be reduced by 30 percent over 2008 levels.
>
> Policy CSN-P-12: The City promotes use of recycled water on landscaping and other nonfood source plantings.
>
> Policy CSN-P-13: The City promotes construction and incorporation of cisterns, green roofs and other rainwater harvesting methods in existing, new and rehabilitation projects.

Given the small portion of water demand that the project adds to EBMUD's total demand and the fact that the project is already served by the current EBMUD infrastructure, it is expected that water will be supplied to the project via existing and planned entitlements. Although the project would have an incremental increase on water demand, this level of increase was contemplated in the General Plan. Therefore, EBMUD would have sufficient water supplies to serve the project based on existing entitlements and planned resources and the project's impact on water supply is less than significant.

[125] EBMUD, 2010. op. cit.
[126] Ibid.

Recycled water use is a critical element of EBMUD's water supply management policies and stretches EBMUD's limited, high-quality drinking water supply, as any demand met with recycled or non-potable water reduces the demand for potable water supply. In 2008, EDMUD completed the East Bayshore Recycled Water Project, directly west of the project site, which supplies recycled water for landscape irrigation in areas of Oakland and Emeryville where recycled water pipelines have been installed. In 2012, the project delivered recycled water to offset the need for a total of more than 25 million gallons of EBMUD drinking water.[127]

The City of Emeryville requires use of recycled water for projects involving subdivision, projects with more than 100,000 square feet of non-residential development, and projects located within the recycled water project area. According to the City's standard conditions of approval, the project site is located in the recycled water project area and will be required to provide recycled water plumbing as determined by EBMUD (or must provide written explanation as to why the applicant is not complying with EBMUD requirements).

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

Less Than Significant. As described in *Section XVII.b,* the City of Emeryville operates a municipal sewer system that conveys wastewater to EBMUD's Main Wastewater Treatment Plant. Wastewater capacity is sufficient during normal conditions, but can become inundated during prolonged wet weather conditions.

The General Plan EIR assumed that total projected wastewater generation for the General Plan would be approximately 90 percent of total water usage, indicating daily wastewater generation of 6.7 mgd. The General Plan EIR concluded that the General Plan would not exceed the remaining secondary or primary treatment capacity at the EBMUD plant. The General Plan increase is expected to be managed by EBMUD water treatment facilities.

Regarding the City's facilities, the City completed a Sewer System Capacity Analysis and Master Plan in 2010 following the General Plan update process. The Master Plan estimated that under design storm conditions, the design wet weather flow is 20.4 million gallons per day (mgd)—7.9 mgd from Emeryville and the remaining from Oakland.[128] The Master Plan also identified 18 reaches of pipe within Emeryville with deficient capacity. The City replaced 14 of these pipes in 2011 and will address the four others—segments near Powell Street and the City's border that flow into the City of Oakland. These segments are expected to be addressed through the next (2011-2016) Capital Improvement Program.

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[127] EBMUD, 2013. East Bayshore Recycled Water Project, June.

[128] City of Emeryville, 2012. Sewer System Management Plan. Adopted February 21.

The increase in residents that would result from the project would incrementally increase the amount of wastewater generated on the project site. Considering the small increase in capacity, the fact that this usage was contemplated in the General Plan, the existing infrastructure provided at the site, and the improvements and ongoing planning by the City, this analysis determines that EBMUD and the City have adequate capacity to serve the project's projected wastewater demand. As a result, the project would have a less-than-significant impact on wastewater capacity.

f) *Would the project be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?*

Less Than Significant. According to the General Plan EIR, Emeryville's trash is sent to several landfills, but primarily to the Altamont landfill in Livermore. The Altamont Landfill facility has a total estimated capacity of 62 million cubic yards. As of 2005, the landfill's total estimated used capacity was approximately 16.3 million cubic yards, or 26 percent of the landfill's total capacity. The landfill has a permitted throughput of 11,500 tons per day[129] and is anticipated to have sufficient capacity until 2025, its expected closure date as of 2005.[130] According to the General Plan EIR, Alameda County Waste Management Authority (StopWaste) estimates that the capacity at the Altamont facility will actually last through the year 2050, much longer than the original estimate date.

In 2012, the City of Emeryville disposed of approximately 18,052 tons of solid waste at various disposal facilities[131] and diverted approximately 70 percent of its solid waste from landfills through recycling and/or composting efforts.[132] The City of Emeryville has adopted a number of policies and programs through its Climate Action Plan and the General Plan to further reduce solid waste generation. General Plan policies are identified below:

> Policy CSN -P-42 The City supports public awareness and participation in household waste management, control, and recycling.

Additionally, the applicant would be required to comply with the City of Emeryville's Construction and Demolition Ordinance and prepare a Construction and Demolition Waste Management Plan prior to building or demolition of the project, which will help increase

[129] Permitted throughput is the maximum permitted amount of waste a landfill can handle and dispose of in one day. This figure is established in the current solid waste facilities permit issued by CalRecycle.
[130] CalRecycle, 2014b. Solid Waste Information System Facility/Site Listing. Accessed March 26. www.calrecycle.ca.gov/SWFacilities/Directory/search.aspx.
[131] CalRecycle, 2014a, Jurisdiction Review Reports. Accessed March 26. www.calrecycle.ca.gov/LGCentral/Reports/. Jurisdiction/ReviewReports.aspx.
[132] StopWaste, 2014. 1995 to 2012 Diversion Rates by Jurisdiction. Accessed March 26. http://www.stopwaste.org/docs/diversion.pdf.

the solid waste diversion rate. The General Plan EIR determined that existing landfills currently used by the City—most notably, the Altamont landfill—have adequate capacity to accommodate waste generated by the General Plan. The EIR concluded that Emeryville's waste generation in 2030 would represent 0.1 percent of the daily permitted waste intake. The increase in residents that would result from the project would incrementally increase the amount of solid waste on the project site, but this increase was contemplated in the General Plan. Additionally, the applicant would be required to comply with the City of Emeryville's Construction and Demolition Ordinance and prepare a Construction and Demolition Waste Management Plan prior to building or demolition of the project, which will help increase the solid waste diversion rate. The project would have sufficient capacity in existing landfills and as a result, the potential impact on solid waste disposal is less than significant.

g) *Would the project comply with federal, State, and local statutes and regulations related to solid waste?*

Less Than Significant. State law requires a 50 percent diversion of solid waste from landfills. Alameda County has a more aggressive goal of 75 percent through the Source Reduction and Recycling Initiative ("Measure D") and range of programs to help achieve the diversion goal. In July 2010 the Recycling Board and Authority approved a year 2020 objective to reduce the amount of readily recyclable and compostable materials deposited in landfills to no more than 10% of total materials. As described in *Section XVII.f* above, in 2012 the City of Emeryville had achieved a 70 percent diversion rate (though the City peaked at 77 percent in 2010).[133]

Alameda County Ordinance 2012-01 requires multi-family residential buildings with five or more units, such as the project, to provide recycling services beginning no later than July 1, 2014.[134] Property owners and managers are also encouraged to post prominent signs on or near the recycling and garbage containers clearly indicating which are for garbage and which are for recycling. The project would comply with all federal, State, and local regulations regarding solid waste and, as a result, would have a less-than-significant impact regarding compliance with solid waste requirements.

[133] Ibid.

[134] StopWaste, 2012. Ordinance 2012-11. Adopted January 25.

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

Discussion

a) *Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?*

Potentially Significant Unless Mitigation Incorporation. The above analysis identifies potentially significant impacts to air quality, biological resources, cultural resources, geology, hazards, hydrology, noise, and transportation, which could degrade the quality of the natural environment. However, each potential impact would all be mitigated to a less-than-significant level through implementation of mitigation measures identified within in each section.

As described in *Section IV: Biological Resources*, no special status wildlife or plant species have the potential to occur within the project site and there are no sensitive habitats within or adjacent to the project site. The project site has no natural vegetation, habitat for special-status species, wetlands, or riparian habitats. Therefore, the project would not substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal.

Trees and shrubs within the project site could be suitable for nesting birds, but Mitigation Measure BIO-1 reduces this potential impact to a less-than-significant level by avoiding and/or surveying for any nesting birds during construction and responding accordingly.

There are no buildings or structures on the project site; thus the project would not eliminate important examples of major periods of California history or prehistory.

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

Less Than Significant. Cumulative impacts are discussed below for the project and as documented in the General Plan EIR.

Cumulatively, the project combined with other past, present, and reasonably foreseeable future projects, as projected in the General Plan, would result in a physical change to the neighborhood by increasing the number of residential units in the surrounding area and adding population density. For example, the increase in the residential population, as discussed in *Section XIV: Public Services*, will result in increased pressure on existing police, fire, and park services when combined with other foreseeable projects.

The General Plan EIR identified potentially cumulative impacts to the increase in energy consumption and the increase in greenhouse gas emissions, but determined that the General Plan's contribution would not be cumulatively considerable as a result of a range of policies and programs in the General Plan and the Climate Action Plan. The General Plan EIR also described potential cumulative effects on public services and utilities, and the transport of hazardous materials, though these effects were not considered significant, but did determine significant cumulative effects related to air quality and traffic impacts. The General Plan EIR identified a beneficial cumulative impact for visual resources as a result of new development improving the City's skyline.

However, General Plan policies and mitigation measures identified in this Initial Study reduce potential cumulative impacts to less-than-significant levels. Although the project may have a cumulative contribution to the potential cumulative impacts identified in the General Plan, the project would not result in significant cumulative impacts.

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

Less Than Significant. The project would be generally consistent with local land use and zoning requirements, as well as State and federal requirements, as described in the preceding sections. Although the project would add residents and population density to the neighborhood, these changes would not create adverse neighborhood impacts, as the land uses of the project and other proposed projects are compatible with the land use designations and zoning of the neighborhood and do not exceed the level of development compatible with the neighborhood and community.

The following mitigation measures have been incorporated into the project to reduce direct and indirect adverse effects on human beings:

- Mitigation Measure AQ-1 reduces air quality impacts through dust abatement measures and construction exhaust and Mitigation Measure AQ-2 requires high efficiency air filtration within the project to reduce cancer risks and PM exposure for sensitive receptors and other residents.
- Mitigation Measure CULT-1 provides a process if human remains were to be discovered during construction on the project site.
- Mitigation Measure GEO-1 requires a design-level geotechnical assessment to design the project to protect residents during seismic events or due related geotechnical hazards.
- Mitigation Measure HAZ-1 would record a new deed restriction and implement its conditions to reduce impacts associated with potential hazardous materials in soil, groundwater, and soil vapor at the project site.
- Mitigation Measure HYD-1 ensures protection of the water quality if dewatering is required during construction.
- Mitigation Measure NS-1 includes measures to reduce noise impacts during construction.
- Mitigation Measure NS-2 requires buffering, dampening, and/or active cancellation of HVAC noise and Mitigation Measure NS-3 requires building construction techniques and architectural materials to reduce noise to levels that meet the City's standards.
- Mitigation Measure TRANS-1 encourages safety when parking bicycles within the parking garage.

These mitigation measures reduce the environmental effects which could cause substantial adverse effects on human beings, either directly or indirectly, to a less-than-significant level.

4. NON-CEQA ENVIRONMENTAL TOPICS

The CEQA Guidelines do not address effects of development projects on wind or shadow, and the State of California has not established criteria for evaluating a project's wind or shadow effects. The City of Emeryville's General Plan and Zoning Regulations do not regulate wind or shadow conditions in public areas. However, wind studies for buildings of similar heights as the project's show that such buildings can redirect and accelerate winds that would otherwise pass overhead and bring those winds down to ground level. Additionally, buildings of similar heights could overshadow public areas and existing development. The CEQA Guidelines similarly do not address the effects of development projects on transmission signals from proximate radio antennae. As the project site is located 500 feet south of the antenna of Medium Wave (AM - Amplitude Modulated) radio stations KEAR and KTVO, the project could potentially affect antenna patterns.

Although not required by CEQA, this section is included to provide an assessment of the potential impacts of the proposed project on ground-level wind currents in public areas surrounding the project site, the potential impact of the building in creating shadows on public areas, and the potential impact of the building on the antenna patterns of KEAR and KTVO radio stations.

The City of Emeryville's General Plan Urban Design Element discusses the importance of building design and the public realm on pedestrian comfort. In particular, the Urban Design Element advocates height limitations, building massing, fine-grained development, and landscaping to maximize pedestrian comfort and includes the following policies.[135]

> Policy UD-P-39: New development should not cast significant shadow over existing development.
>
> Policy UD-P-42: Sidewalks shall be safe, comfortable, and accessible for pedestrians.

Wind Evaluation

The project has the potential to alter the wind conditions in public areas due to the height of the building and proximity to the San Francisco Bay, thereby reducing pedestrian comfort and safety. If approaching strong winds strike a broad face of a building head-on, strong and turbulent winds can be generated at ground level.

The discussion in this section is based on a wind study prepared by Environmental Science Associates.[136] Because the City of Emeryville does not regulate potential changes in wind

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[135] City of Emeryville, 2009. General Plan, Chapter 5: Urban Design.
[136] Charles Bennett, Environmental Science Associates, 2014. Technical Memorandum. March 24.

conditions, criterion established by the neighboring cities of Oakland and San Francisco for determining the acceptability of wind conditions were considered for this analysis. In both Oakland and San Francisco, a project resulting in wind exceeding 36 miles per hour (mph) for a total of more than one hour during the year is considered hazardous. The wind study therefore considered the project to have a wind impact if it would result in winds that exceed 36 mph for a total of more than one hour per year and that would occur in public areas, such as sidewalks. Potential wind impacts on private open spaces, including the project's common areas, were not studied.

Wind measurements taken at the old U.S. Naval Air Station at Alameda, located approximately four miles south-southwest from the project site, and results from wind tunnel testing on the Emeryville Bay Site B project, located approximately one-half mile south of the project site, were used for this analysis.

The proposed 84-foot high structure would be fully exposed to strong winds from the west. However, the project is generally a triangular shape in plan view, and presents its narrowest face to the west, which would allow the wind to flow around to the north of the building, along its highly articulated northwest façade, and to the south, between the building and its southern neighbor. The articulation of the northwest façade presents a narrow face to the wind and limits the ability of the west façade to redirect wind down to the ground level. Furthermore, the solid two-story podium beneath the articulated residential floors would break winds flowing down the building façade before reaching the ground level.

Although an architectural analysis of wind conditions in private open spaces was not conducted as part of the wind evaluation, wind flowing from the upper portion of the seven-story building down to the third-floor courtyard decks would not travel a distance of four stories such that it would be unlikely to cause wind hazards. If wind on rooftop or courtyard decks became a comfort issue post occupancy, the builder may consider installing glass panes or other wind reduction features.

The wind study found that wind speeds in open spaces (such as parking lots) in the greater project vicinity are highly variable and at times come relatively close to the wind hazard criterion, but typically do not meet or exceed it. The study concluded that the existing wind conditions at the project site do not exceed the wind hazard criterion. The strongest winds approach the project site from the west over the open waters of the Bay. The project site has some wind protection from the eucalyptus trees in the Caltrans I-80 right-of-way, including the landscaped area between the Ashby Avenue exit off-ramp at the north and west edges of the project site and the project site. Although these trees cannot reduce wind speeds substantially, they do provide a small but real reduction in wind speeds at ground level and up to the height of the tree canopies.

The shape and orientation of the proposed structure, coupled with the existing eucalyptus trees surrounding the north and west perimeter of the project site, reduce the overall risk of hazardous wind conditions in public areas around the building and on sidewalks along Shellmound Street. The proposed project would not result in substantial hazardous wind conditions.

Shadow Evaluation

The shadow discussion is based on a shadow study prepared by MBH Architects on behalf of the applicant and peer reviewed by Andrew McNichol on behalf of the City of Emeryville.

The shadow study prepared for this project concluded that the development would not cast shadows upon the neighboring Ex'pression College at any time of the day throughout the year. Shadows from the project would be cast upon the western portions of the two industrial buildings immediately east of the railroad tracks in the early evening during the spring and fall months, and in the late afternoon during the winter months, but would not substantially affect public spaces or existing development. The existing industrial buildings east of the railroad tracks from the project site do not contain outdoor spaces that would be adversely impacted by shadows. Throughout the year, morning shadows stretch toward the I-80/Ashby Avenue off-ramps, and afternoon shadows stretch to the east over Shellmound Street. Public sidewalks along Shellmound Street, where afternoon shadows would occur, are not heavily used and would therefore not have high sensitivity to new shadows. For these reasons, shadows caused by the project would not substantially affect existing development or public areas.

Radio Tower Analysis

This discussion is based on a radio tower analysis prepared by Hatfield & Dawson Consulting Electrical Engineers on behalf of the City to explore the effect of the proposed project on the operation of the antenna of Medium Wave (AM - Amplitude Modulated) radio stations KEAR & KVTO, located approximately 500 feet north of the project site.

The analysis found that the proposed project—which includes a building approximately 366,000 gross square feet in area and 84 feet in height—will have no discernable impact on the operations of KEAR & KVTO. When the worst case (zero Ohm loss) effects of the building are included in a model of the antenna, the pattern distortion in KEAR & KVTO omni-directional antenna pattern show a variance for KEAR of +0.4 dB and -0.4 dB and for KVTO this variance is +0.7 dB and -1.0 dB. These variances are well within the ±2 dB allowed by the Federal Communications Commission (FCC) per *§1.30002 Tower construction or modification near AM stations* of MM Docket No. 93-177 adopted in 2009. It is important to note that this is a "worst case" zero loss analysis, and that the effect of finite ground conductivity and I^2R losses in the building structure will reduce these values substantially. The proposed project would therefore have no discernable impact on the operations of KEAR & KVTO. A copy of the radio tower analysis prepared by Hatfield & Dawson for the project, which summarizes modeling background, criteria, and findings, is included as Appendix D.

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APPENDIX A:

CalEEMod Report

6701 Shellmound Street

Alameda County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	211.00	Dwelling Unit	2.27	235,025.00	603
User Defined Retail	1.00	User Defined Unit	2.27	10,849.00	0

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.2 **Precipitation Freq (Days)** 63

Climate Zone 5 **Operational Year** 2014

Utility Company Pacific Gas & Electric Company

CO2 Intensity (lb/MWhr) 641.35 **CH4 Intensity (lb/MWhr)** 0.029 **N2O Intensity (lb/MWhr)** 0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Lot acreage and square footage from Project description
"Retail" land use = dog spa + bike spa + fitness area + lobby/leasing area/mail + MEP + maintenance + trash

Demolition - Square footage of existing buildings included in project description

Architectural Coating -

Woodstoves - No woodstoves or fireplaces

Water And Wastewater - EBMUD services at the project site and applies 100 percent aerobic process and 100 percent cogeneration

Vehicle Trips - Refrence: Fehr and Peers, 2014. Memorandum regarding 6701 Shellmound (City of Emeryville) Transportation Analysis Assumptions. 19 February

Table Name	Column Name	Default Value	New Value
tblFireplaces	FireplaceWoodMass	92.40	0.00
tblLandUse	LandUseSquareFeet	211,000.00	235,025.00
tblLandUse	LandUseSquareFeet	0.00	10,849.00
tblLandUse	LotAcreage	5.55	2.27
tblLandUse	LotAcreage	0.00	2.27
tblVehicleTrips	ST_TR	7.16	5.36
tblVehicleTrips	WD_TR	6.59	5.17
tblWater	AerobicPercent	87.46	100.00
tblWater	AnaDigestCogenCombDigestGasPercent	0.00	100.00
tblWater	AnaDigestCombDigestGasPercent	100.00	0.00
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	0.00
tblWater	SepticTankPercent	10.33	0.00
tblWoodstoves	WoodstoveWoodMass	954.80	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2015	0.6112	4.7267	4.2960	6.4600e-003	0.3081	0.2908	0.5989	0.0957	0.2727	0.3684	0.0000	566.7378	566.7378	0.0960	0.0000	568.7539
2016	1.7365	0.2208	0.1855	2.9000e-004	5.7300e-003	0.0138	0.0195	1.5300e-003	0.0129	0.0144	0.0000	25.8429	25.8429	5.7300e-003	0.0000	25.9631
Total	**2.3478**	**4.9476**	**4.4815**	**6.7500e-003**	**0.3139**	**0.3046**	**0.6184**	**0.0972**	**0.2856**	**0.3828**	**0.0000**	**592.5807**	**592.5807**	**0.1017**	**0.0000**	**594.7171**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2015	0.6112	4.7267	4.2960	6.4600e-003	0.3081	0.2908	0.5989	0.0957	0.2727	0.3684	0.0000	566.7374	566.7374	0.0960	0.0000	568.7535
2016	1.7365	0.2208	0.1855	2.9000e-004	5.7300e-003	0.0138	0.0195	1.5300e-003	0.0129	0.0144	0.0000	25.8429	25.8429	5.7300e-003	0.0000	25.9631
Total	**2.3478**	**4.9476**	**4.4815**	**6.7500e-003**	**0.3139**	**0.3046**	**0.6184**	**0.0972**	**0.2856**	**0.3828**	**0.0000**	**592.5803**	**592.5803**	**0.1017**	**0.0000**	**594.7166**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.1843	0.0190	1.6050	8.0000e-005		8.9100e-003	8.9100e-003		8.9100e-003	8.9100e-003	0.0000	8.1384	8.1384	2.8400e-003	1.0000e-004	8.2296
Energy	0.0101	0.0861	0.0366	5.5000e-004		6.9600e-003	6.9600e-003		6.9600e-003	6.9600e-003	0.0000	321.6088	321.6088	0.0120	3.9000e-003	323.0698
Mobile	0.9410	2.7463	9.8416	0.0143	0.9375	0.0417	0.9792	0.2519	0.0383	0.2902	0.0000	1,206.0143	1,206.0143	0.0577	0.0000	1,207.2254
Waste						0.0000	0.0000		0.0000	0.0000	19.7023	0.0000	19.7023	1.1644	0.0000	44.1541
Water						0.0000	0.0000		0.0000	0.0000	4.8639	28.4491	33.3130	0.0180	0.0108	37.0531
Total	**2.1353**	**2.8514**	**11.4833**	**0.0149**	**0.9375**	**0.0576**	**0.9951**	**0.2519**	**0.0541**	**0.3061**	**24.5662**	**1,564.2105**	**1,588.7767**	**1.2549**	**0.0148**	**1,619.7321**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.1843	0.0190	1.6050	8.0000e-005		8.9100e-003	8.9100e-003		8.9100e-003	8.9100e-003	0.0000	8.1384	8.1384	2.8400e-003	1.0000e-004	8.2296
Energy	0.0101	0.0861	0.0366	5.5000e-004		6.9600e-003	6.9600e-003		6.9600e-003	6.9600e-003	0.0000	321.6088	321.6088	0.0120	3.9000e-003	323.0698
Mobile	0.9410	2.7463	9.8416	0.0143	0.9375	0.0417	0.9792	0.2519	0.0383	0.2902	0.0000	1,206.0143	1,206.0143	0.0577	0.0000	1,207.2254
Waste						0.0000	0.0000		0.0000	0.0000	19.7023	0.0000	19.7023	1.1644	0.0000	44.1541
Water						0.0000	0.0000		0.0000	0.0000	4.8639	28.4491	33.3130	0.0181	0.0109	37.0609
Total	**2.1353**	**2.8514**	**11.4833**	**0.0149**	**0.9375**	**0.0576**	**0.9951**	**0.2519**	**0.0541**	**0.3061**	**24.5662**	**1,564.2105**	**1,588.7767**	**1.2550**	**0.0149**	**1,619.7399**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**-0.01**	**-0.13**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2015	1/28/2015	5	20	
2	Site Preparation	Site Preparation	1/29/2015	2/4/2015	5	5	
3	Grading	Grading	2/5/2015	2/16/2015	5	8	
4	Building Construction	Building Construction	2/17/2015	1/4/2016	5	230	
5	Paving	Paving	1/5/2016	1/28/2016	5	18	
6	Architectural Coating	Architectural Coating	1/29/2016	2/23/2016	5	18	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 0

Residential Indoor: 475,926; Residential Outdoor: 158,642; Non-Residential Indoor: 16,274; Non-Residential Outdoor: 5,425 (Architectural Coating – sqft)

<u>OffRoad Equipment</u>

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	162	0.38
Demolition	Rubber Tired Dozers	2	8.00	255	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	255	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	1	8.00	162	0.38
Grading	Graders	1	8.00	174	0.41
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Cranes	1	7.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Cement and Mortar Mixers	2	6.00	9	0.56
Paving	Pavers	1	8.00	125	0.42
Paving	Paving Equipment	2	6.00	130	0.36
Paving	Rollers	2	6.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	483.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	155.00	24.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	31.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0523	0.0000	0.0523	7.9200e-003	0.0000	7.9200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0451	0.4836	0.3607	4.0000e-004		0.0245	0.0245		0.0229	0.0229	0.0000	37.4413	37.4413	0.0102	0.0000	37.6544
Total	**0.0451**	**0.4836**	**0.3607**	**4.0000e-004**	**0.0523**	**0.0245**	**0.0768**	**7.9200e-003**	**0.0229**	**0.0308**	**0.0000**	**37.4413**	**37.4413**	**0.0102**	**0.0000**	**37.6544**

3.2 Demolition - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	6.2100e-003	0.0842	0.0641	1.8000e-004	4.0700e-003	1.2600e-003	5.3400e-003	1.1200e-003	1.1600e-003	2.2800e-003	0.0000	16.8673	16.8673	1.4000e-004	0.0000	16.8703
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.4000e-004	9.5000e-004	9.2000e-003	2.0000e-005	1.3600e-003	1.0000e-005	1.3700e-003	3.6000e-004	1.0000e-005	3.7000e-004	0.0000	1.2825	1.2825	8.0000e-005	0.0000	1.2841
Total	**6.8500e-003**	**0.0851**	**0.0733**	**2.0000e-004**	**5.4300e-003**	**1.2700e-003**	**6.7100e-003**	**1.4800e-003**	**1.1700e-003**	**2.6500e-003**	**0.0000**	**18.1498**	**18.1498**	**2.2000e-004**	**0.0000**	**18.1545**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0523	0.0000	0.0523	7.9200e-003	0.0000	7.9200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0451	0.4836	0.3607	4.0000e-004		0.0245	0.0245		0.0229	0.0229	0.0000	37.4412	37.4412	0.0102	0.0000	37.6544
Total	**0.0451**	**0.4836**	**0.3607**	**4.0000e-004**	**0.0523**	**0.0245**	**0.0768**	**7.9200e-003**	**0.0229**	**0.0308**	**0.0000**	**37.4412**	**37.4412**	**0.0102**	**0.0000**	**37.6544**

3.2 Demolition - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	6.2100e-003	0.0842	0.0641	1.8000e-004	4.0700e-003	1.2600e-003	5.3400e-003	1.1200e-003	1.1600e-003	2.2800e-003	0.0000	16.8673	16.8673	1.4000e-004	0.0000	16.8703
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.4000e-004	9.5000e-004	9.2000e-003	2.0000e-005	1.3600e-003	1.0000e-005	1.3700e-003	3.6000e-004	1.0000e-005	3.7000e-004	0.0000	1.2825	1.2825	8.0000e-005	0.0000	1.2841
Total	**6.8500e-003**	**0.0851**	**0.0733**	**2.0000e-004**	**5.4300e-003**	**1.2700e-003**	**6.7100e-003**	**1.4800e-003**	**1.1700e-003**	**2.6500e-003**	**0.0000**	**18.1498**	**18.1498**	**2.2000e-004**	**0.0000**	**18.1545**

3.3 Site Preparation - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0452	0.0000	0.0452	0.0248	0.0000	0.0248	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0132	0.1422	0.1066	1.0000e-004		7.7200e-003	7.7200e-003		7.1000e-003	7.1000e-003	0.0000	9.3253	9.3253	2.7800e-003	0.0000	9.3837
Total	**0.0132**	**0.1422**	**0.1066**	**1.0000e-004**	**0.0452**	**7.7200e-003**	**0.0529**	**0.0248**	**7.1000e-003**	**0.0319**	**0.0000**	**9.3253**	**9.3253**	**2.7800e-003**	**0.0000**	**9.3837**

3.3 Site Preparation - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9000e-004	2.8000e-004	2.7600e-003	0.0000	4.1000e-004	0.0000	4.1000e-004	1.1000e-004	0.0000	1.1000e-004	0.0000	0.3848	0.3848	2.0000e-005	0.0000	0.3852
Total	**1.9000e-004**	**2.8000e-004**	**2.7600e-003**	**0.0000**	**4.1000e-004**	**0.0000**	**4.1000e-004**	**1.1000e-004**	**0.0000**	**1.1000e-004**	**0.0000**	**0.3848**	**0.3848**	**2.0000e-005**	**0.0000**	**0.3852**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0452	0.0000	0.0452	0.0248	0.0000	0.0248	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0132	0.1422	0.1066	1.0000e-004		7.7200e-003	7.7200e-003		7.1000e-003	7.1000e-003	0.0000	9.3253	9.3253	2.7800e-003	0.0000	9.3837
Total	**0.0132**	**0.1422**	**0.1066**	**1.0000e-004**	**0.0452**	**7.7200e-003**	**0.0529**	**0.0248**	**7.1000e-003**	**0.0319**	**0.0000**	**9.3253**	**9.3253**	**2.7800e-003**	**0.0000**	**9.3837**

3.3 Site Preparation - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9000e-004	2.8000e-004	2.7600e-003	0.0000	4.1000e-004	0.0000	4.1000e-004	1.1000e-004	0.0000	1.1000e-004	0.0000	0.3848	0.3848	2.0000e-005	0.0000	0.3852
Total	**1.9000e-004**	**2.8000e-004**	**2.7600e-003**	**0.0000**	**4.1000e-004**	**0.0000**	**4.1000e-004**	**1.1000e-004**	**0.0000**	**1.1000e-004**	**0.0000**	**0.3848**	**0.3848**	**2.0000e-005**	**0.0000**	**0.3852**

3.4 Grading - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0262	0.0000	0.0262	0.0135	0.0000	0.0135	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0153	0.1617	0.1067	1.2000e-004		9.3100e-003	9.3100e-003		8.5700e-003	8.5700e-003	0.0000	11.3544	11.3544	3.3900e-003	0.0000	11.4256
Total	**0.0153**	**0.1617**	**0.1067**	**1.2000e-004**	**0.0262**	**9.3100e-003**	**0.0355**	**0.0135**	**8.5700e-003**	**0.0220**	**0.0000**	**11.3544**	**11.3544**	**3.3900e-003**	**0.0000**	**11.4256**

3.4 Grading - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.6000e-004	3.8000e-004	3.6800e-003	1.0000e-005	5.4000e-004	0.0000	5.5000e-004	1.4000e-004	0.0000	1.5000e-004	0.0000	0.5130	0.5130	3.0000e-005	0.0000	0.5137
Total	**2.6000e-004**	**3.8000e-004**	**3.6800e-003**	**1.0000e-005**	**5.4000e-004**	**0.0000**	**5.5000e-004**	**1.4000e-004**	**0.0000**	**1.5000e-004**	**0.0000**	**0.5130**	**0.5130**	**3.0000e-005**	**0.0000**	**0.5137**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0262	0.0000	0.0262	0.0135	0.0000	0.0135	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0153	0.1617	0.1067	1.2000e-004		9.3100e-003	9.3100e-003		8.5700e-003	8.5700e-003	0.0000	11.3544	11.3544	3.3900e-003	0.0000	11.4256
Total	**0.0153**	**0.1617**	**0.1067**	**1.2000e-004**	**0.0262**	**9.3100e-003**	**0.0355**	**0.0135**	**8.5700e-003**	**0.0220**	**0.0000**	**11.3544**	**11.3544**	**3.3900e-003**	**0.0000**	**11.4256**

3.4 Grading - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.6000e-004	3.8000e-004	3.6800e-003	1.0000e-005	5.4000e-004	0.0000	5.5000e-004	1.4000e-004	0.0000	1.5000e-004	0.0000	0.5130	0.5130	3.0000e-005	0.0000	0.5137
Total	**2.6000e-004**	**3.8000e-004**	**3.6800e-003**	**1.0000e-005**	**5.4000e-004**	**0.0000**	**5.5000e-004**	**1.4000e-004**	**0.0000**	**1.5000e-004**	**0.0000**	**0.5130**	**0.5130**	**3.0000e-005**	**0.0000**	**0.5137**

3.5 Building Construction - 2015

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4171	3.4234	2.1369	3.0600e-003		0.2413	0.2413		0.2269	0.2269	0.0000	278.1535	278.1535	0.0698	0.0000	279.6191
Total	**0.4171**	**3.4234**	**2.1369**	**3.0600e-003**		**0.2413**	**0.2413**		**0.2269**	**0.2269**	**0.0000**	**278.1535**	**278.1535**	**0.0698**	**0.0000**	**279.6191**

3.5 Building Construction - 2015

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0373	0.3182	0.4221	6.6000e-004	0.0177	5.2000e-003	0.0229	5.0800e-003	4.7800e-003	9.8600e-003	0.0000	60.3363	60.3363	5.5000e-004	0.0000	60.3478
Worker	0.0759	0.1118	1.0833	1.9200e-003	0.1604	1.4600e-003	0.1618	0.0427	1.3300e-003	0.0440	0.0000	151.0795	151.0795	9.0700e-003	0.0000	151.2700
Total	**0.1132**	**0.4300**	**1.5054**	**2.5800e-003**	**0.1781**	**6.6600e-003**	**0.1847**	**0.0477**	**6.1100e-003**	**0.0539**	**0.0000**	**211.4158**	**211.4158**	**9.6200e-003**	**0.0000**	**211.6178**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.4171	3.4234	2.1369	3.0600e-003		0.2413	0.2413		0.2269	0.2269	0.0000	278.1532	278.1532	0.0698	0.0000	279.6188
Total	**0.4171**	**3.4234**	**2.1369**	**3.0600e-003**		**0.2413**	**0.2413**		**0.2269**	**0.2269**	**0.0000**	**278.1532**	**278.1532**	**0.0698**	**0.0000**	**279.6188**

3.5 Building Construction - 2015

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0373	0.3182	0.4221	6.6000e-004	0.0177	5.2000e-003	0.0229	5.0800e-003	4.7800e-003	9.8600e-003	0.0000	60.3363	60.3363	5.5000e-004	0.0000	60.3478
Worker	0.0759	0.1118	1.0833	1.9200e-003	0.1604	1.4600e-003	0.1618	0.0427	1.3300e-003	0.0440	0.0000	151.0795	151.0795	9.0700e-003	0.0000	151.2700
Total	**0.1132**	**0.4300**	**1.5054**	**2.5800e-003**	**0.1781**	**6.6600e-003**	**0.1847**	**0.0477**	**6.1100e-003**	**0.0539**	**0.0000**	**211.4158**	**211.4158**	**9.6200e-003**	**0.0000**	**211.6178**

3.5 Building Construction - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	3.4100e-003	0.0285	0.0185	3.0000e-005		1.9700e-003	1.9700e-003		1.8500e-003	1.8500e-003	0.0000	2.4215	2.4215	6.0000e-004	0.0000	2.4342
Total	**3.4100e-003**	**0.0285**	**0.0185**	**3.0000e-005**		**1.9700e-003**	**1.9700e-003**		**1.8500e-003**	**1.8500e-003**	**0.0000**	**2.4215**	**2.4215**	**6.0000e-004**	**0.0000**	**2.4342**

3.5 Building Construction - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.9000e-004	2.4300e-003	3.4400e-003	1.0000e-005	1.6000e-004	4.0000e-005	1.9000e-004	4.0000e-005	3.0000e-005	8.0000e-005	0.0000	0.5230	0.5230	0.0000	0.0000	0.5231
Worker	5.9000e-004	8.8000e-004	8.4700e-003	2.0000e-005	1.4100e-003	1.0000e-005	1.4200e-003	3.7000e-004	1.0000e-005	3.9000e-004	0.0000	1.2797	1.2797	7.0000e-005	0.0000	1.2813
Total	**8.8000e-004**	**3.3100e-003**	**0.0119**	**3.0000e-005**	**1.5700e-003**	**5.0000e-005**	**1.6100e-003**	**4.1000e-004**	**4.0000e-005**	**4.7000e-004**	**0.0000**	**1.8028**	**1.8028**	**7.0000e-005**	**0.0000**	**1.8044**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	3.4100e-003	0.0285	0.0185	3.0000e-005		1.9700e-003	1.9700e-003		1.8500e-003	1.8500e-003	0.0000	2.4215	2.4215	6.0000e-004	0.0000	2.4342
Total	**3.4100e-003**	**0.0285**	**0.0185**	**3.0000e-005**		**1.9700e-003**	**1.9700e-003**		**1.8500e-003**	**1.8500e-003**	**0.0000**	**2.4215**	**2.4215**	**6.0000e-004**	**0.0000**	**2.4342**

3.5 Building Construction - 2016

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.9000e-004	2.4300e-003	3.4400e-003	1.0000e-005	1.6000e-004	4.0000e-005	1.9000e-004	4.0000e-005	3.0000e-005	8.0000e-005	0.0000	0.5230	0.5230	0.0000	0.0000	0.5231
Worker	5.9000e-004	8.8000e-004	8.4700e-003	2.0000e-005	1.4100e-003	1.0000e-005	1.4200e-003	3.7000e-004	1.0000e-005	3.9000e-004	0.0000	1.2797	1.2797	7.0000e-005	0.0000	1.2813
Total	**8.8000e-004**	**3.3100e-003**	**0.0119**	**3.0000e-005**	**1.5700e-003**	**5.0000e-005**	**1.6100e-003**	**4.1000e-004**	**4.0000e-005**	**4.7000e-004**	**0.0000**	**1.8028**	**1.8028**	**7.0000e-005**	**0.0000**	**1.8044**

3.6 Paving - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0162	0.1651	0.1131	1.7000e-004		9.9600e-003	9.9600e-003		9.1800e-003	9.1800e-003	0.0000	15.5310	15.5310	4.5600e-003	0.0000	15.6268
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0162**	**0.1651**	**0.1131**	**1.7000e-004**		**9.9600e-003**	**9.9600e-003**		**9.1800e-003**	**9.1800e-003**	**0.0000**	**15.5310**	**15.5310**	**4.5600e-003**	**0.0000**	**15.6268**

3.6 Paving - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.9000e-004	1.0200e-003	9.8300e-003	2.0000e-005	1.6300e-003	1.0000e-005	1.6500e-003	4.3000e-004	1.0000e-005	4.5000e-004	0.0000	1.4861	1.4861	8.0000e-005	0.0000	1.4879
Total	**6.9000e-004**	**1.0200e-003**	**9.8300e-003**	**2.0000e-005**	**1.6300e-003**	**1.0000e-005**	**1.6500e-003**	**4.3000e-004**	**1.0000e-005**	**4.5000e-004**	**0.0000**	**1.4861**	**1.4861**	**8.0000e-005**	**0.0000**	**1.4879**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0162	0.1651	0.1131	1.7000e-004		9.9600e-003	9.9600e-003		9.1800e-003	9.1800e-003	0.0000	15.5310	15.5310	4.5600e-003	0.0000	15.6268
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0162**	**0.1651**	**0.1131**	**1.7000e-004**		**9.9600e-003**	**9.9600e-003**		**9.1800e-003**	**9.1800e-003**	**0.0000**	**15.5310**	**15.5310**	**4.5600e-003**	**0.0000**	**15.6268**

3.6 Paving - 2016

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.9000e-004	1.0200e-003	9.8300e-003	2.0000e-005	1.6300e-003	1.0000e-005	1.6500e-003	4.3000e-004	1.0000e-005	4.5000e-004	0.0000	1.4861	1.4861	8.0000e-005	0.0000	1.4879
Total	**6.9000e-004**	**1.0200e-003**	**9.8300e-003**	**2.0000e-005**	**1.6300e-003**	**1.0000e-005**	**1.6500e-003**	**4.3000e-004**	**1.0000e-005**	**4.5000e-004**	**0.0000**	**1.4861**	**1.4861**	**8.0000e-005**	**0.0000**	**1.4879**

3.7 Architectural Coating - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.7110					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.3200e-003	0.0214	0.0170	3.0000e-005		1.7700e-003	1.7700e-003		1.7700e-003	1.7700e-003	0.0000	2.2979	2.2979	2.7000e-004	0.0000	2.3036
Total	**1.7143**	**0.0214**	**0.0170**	**3.0000e-005**		**1.7700e-003**	**1.7700e-003**		**1.7700e-003**	**1.7700e-003**	**0.0000**	**2.2979**	**2.2979**	**2.7000e-004**	**0.0000**	**2.3036**

3.7 Architectural Coating - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0700e-003	1.5800e-003	0.0152	3.0000e-005	2.5300e-003	2.0000e-005	2.5500e-003	6.7000e-004	2.0000e-005	6.9000e-004	0.0000	2.3035	2.3035	1.3000e-004	0.0000	2.3063
Total	**1.0700e-003**	**1.5800e-003**	**0.0152**	**3.0000e-005**	**2.5300e-003**	**2.0000e-005**	**2.5500e-003**	**6.7000e-004**	**2.0000e-005**	**6.9000e-004**	**0.0000**	**2.3035**	**2.3035**	**1.3000e-004**	**0.0000**	**2.3063**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.7110					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.3200e-003	0.0214	0.0170	3.0000e-005		1.7700e-003	1.7700e-003		1.7700e-003	1.7700e-003	0.0000	2.2979	2.2979	2.7000e-004	0.0000	2.3036
Total	**1.7143**	**0.0214**	**0.0170**	**3.0000e-005**		**1.7700e-003**	**1.7700e-003**		**1.7700e-003**	**1.7700e-003**	**0.0000**	**2.2979**	**2.2979**	**2.7000e-004**	**0.0000**	**2.3036**

3.7 Architectural Coating - 2016

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0700e-003	1.5800e-003	0.0152	3.0000e-005	2.5300e-003	2.0000e-005	2.5500e-003	6.7000e-004	2.0000e-005	6.9000e-004	0.0000	2.3035	2.3035	1.3000e-004	0.0000	2.3063
Total	**1.0700e-003**	**1.5800e-003**	**0.0152**	**3.0000e-005**	**2.5300e-003**	**2.0000e-005**	**2.5500e-003**	**6.7000e-004**	**2.0000e-005**	**6.9000e-004**	**0.0000**	**2.3035**	**2.3035**	**1.3000e-004**	**0.0000**	**2.3063**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.9410	2.7463	9.8416	0.0143	0.9375	0.0417	0.9792	0.2519	0.0383	0.2902	0.0000	1,206.0143	1,206.0143	0.0577	0.0000	1,207.2254
Unmitigated	0.9410	2.7463	9.8416	0.0143	0.9375	0.0417	0.9792	0.2519	0.0383	0.2902	0.0000	1,206.0143	1,206.0143	0.0577	0.0000	1,207.2254

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	1,090.87	1,130.96	1280.77	2,508,567	2,508,567
User Defined Retail	0.00	0.00	0.00		
Total	1,090.87	1,130.96	1,280.77	2,508,567	2,508,567

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	12.40	4.30	5.40	26.10	29.10	44.80	86	11	3
User Defined Retail	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.542757	0.062006	0.168650	0.114572	0.031552	0.004717	0.018583	0.044562	0.001747	0.003723	0.005493	0.000211	0.001428

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	221.9186	221.9186	0.0100	2.0800e-003	222.7729
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	221.9186	221.9186	0.0100	2.0800e-003	222.7729
NaturalGas Mitigated	0.0101	0.0861	0.0366	5.5000e-004		6.9600e-003	6.9600e-003		6.9600e-003	6.9600e-003	0.0000	99.6902	99.6902	1.9100e-003	1.8300e-003	100.2969
NaturalGas Unmitigated	0.0101	0.0861	0.0366	5.5000e-004		6.9600e-003	6.9600e-003		6.9600e-003	6.9600e-003	0.0000	99.6902	99.6902	1.9100e-003	1.8300e-003	100.2969

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Retail	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Apartments Mid Rise	1.86812e+006	0.0101	0.0861	0.0366	5.5000e-004		6.9600e-003	6.9600e-003		6.9600e-003	6.9600e-003	0.0000	99.6902	99.6902	1.9100e-003	1.8300e-003	100.2969
Total		**0.0101**	**0.0861**	**0.0366**	**5.5000e-004**		**6.9600e-003**	**6.9600e-003**		**6.9600e-003**	**6.9600e-003**	**0.0000**	**99.6902**	**99.6902**	**1.9100e-003**	**1.8300e-003**	**100.2969**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	1.86812e+006	0.0101	0.0861	0.0366	5.5000e-004		6.9600e-003	6.9600e-003		6.9600e-003	6.9600e-003	0.0000	99.6902	99.6902	1.9100e-003	1.8300e-003	100.2969
User Defined Retail	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0101**	**0.0861**	**0.0366**	**5.5000e-004**		**6.9600e-003**	**6.9600e-003**		**6.9600e-003**	**6.9600e-003**	**0.0000**	**99.6902**	**99.6902**	**1.9100e-003**	**1.8300e-003**	**100.2969**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	762839	221.9186	0.0100	2.0800e-003	222.7729
User Defined Retail	0	0.0000	0.0000	0.0000	0.0000
Total		**221.9186**	**0.0100**	**2.0800e-003**	**222.7729**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	762839	221.9186	0.0100	2.0800e-003	222.7729
User Defined Retail	0	0.0000	0.0000	0.0000	0.0000
Total		**221.9186**	**0.0100**	**2.0800e-003**	**222.7729**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1.1843	0.0190	1.6050	8.0000e-005		8.9100e-003	8.9100e-003		8.9100e-003	8.9100e-003	0.0000	8.1384	8.1384	2.8400e-003	1.0000e-004	8.2296
Unmitigated	1.1843	0.0190	1.6050	8.0000e-005		8.9100e-003	8.9100e-003		8.9100e-003	8.9100e-003	0.0000	8.1384	8.1384	2.8400e-003	1.0000e-004	8.2296

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1711					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.9603					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	5.6000e-004	0.0000	3.0000e-005	0.0000		3.9000e-004	3.9000e-004		3.9000e-004	3.9000e-004	0.0000	5.5792	5.5792	1.1000e-004	1.0000e-004	5.6131
Landscaping	0.0523	0.0190	1.6050	8.0000e-005		8.5200e-003	8.5200e-003		8.5200e-003	8.5200e-003	0.0000	2.5592	2.5592	2.7300e-003	0.0000	2.6165
Total	**1.1843**	**0.0190**	**1.6050**	**8.0000e-005**		**8.9100e-003**	**8.9100e-003**		**8.9100e-003**	**8.9100e-003**	**0.0000**	**8.1384**	**8.1384**	**2.8400e-003**	**1.0000e-004**	**8.2296**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1711					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.9603					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	5.6000e-004	0.0000	3.0000e-005	0.0000		3.9000e-004	3.9000e-004		3.9000e-004	3.9000e-004	0.0000	5.5792	5.5792	1.1000e-004	1.0000e-004	5.6131
Landscaping	0.0523	0.0190	1.6050	8.0000e-005		8.5200e-003	8.5200e-003		8.5200e-003	8.5200e-003	0.0000	2.5592	2.5592	2.7300e-003	0.0000	2.6165
Total	**1.1843**	**0.0190**	**1.6050**	**8.0000e-005**		**8.9100e-003**	**8.9100e-003**		**8.9100e-003**	**8.9100e-003**	**0.0000**	**8.1384**	**8.1384**	**2.8400e-003**	**1.0000e-004**	**8.2296**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	33.3130	0.0181	0.0109	37.0609
Unmitigated	33.3130	0.0180	0.0108	37.0531

7.2 Water by Land Use

Unmitigated

	Indoor/ Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	13.7475 / 8.6669	33.3130	0.0180	0.0108	37.0531
User Defined Retail	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**33.3130**	**0.0180**	**0.0108**	**37.0531**

Mitigated

	Indoor/ Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	13.7475 / 8.6669	33.3130	0.0181	0.0109	37.0609
User Defined Retail	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**33.3130**	**0.0181**	**0.0109**	**37.0609**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	19.7023	1.1644	0.0000	44.1541
Unmitigated	19.7023	1.1644	0.0000	44.1541

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	97.06	19.7023	1.1644	0.0000	44.1541
User Defined Retail	0	0.0000	0.0000	0.0000	0.0000
Total		**19.7023**	**1.1644**	**0.0000**	**44.1541**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	97.06	19.7023	1.1644	0.0000	44.1541
User Defined Retail	0	0.0000	0.0000	0.0000	0.0000
Total		**19.7023**	**1.1644**	**0.0000**	**44.1541**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

APPENDIX B:

Noise and Vibration Study

6701 SHELLMOUND STREET MIXED-USE ENVIRONMENTAL NOISE AND VIBRATION STUDY

Urban Planning Partners

June 3, 2014

CSDA | DESIGN GROUP

6701 Shellmound Street Mixed-Use Environmental Noise and Vibration Study

June 3, 2014

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1.0 Executive Summary

- Environmental noise measurements were conducted at the project site. The noise environment is dominated by trains on the Union Pacific Railroad (UPRR) line and traffic on Shellmound Street, the I-80 offramps, and I-80. Measured noise levels range from DNL[1] 69 to 86 dB which is considered "Conditionally Acceptable" to "Clearly Unacceptable" per the City's noise and land-use compatibility guidelines.

- Measurements of ground-borne vibration were conducted at the closest project setbacks to the UPRR rail line. Vibration levels were within the Federal Transit Administration (FTA) guidelines; however, we recommend that a disclosure to future residents be made notifying them of vibration from train passbys.

- In order to meet the interior noise criterion of DNL 45 dB in the residences, sound-rated windows, exterior (patio) doors, and upgraded exterior walls are necessary. The following summarizes the required STC[2] ratings:
  - Windows: STC 35 to 50
  - Exterior Doors: STC 32 to 42
  - Exterior Walls: STC 40 to 60

2.0 Project Description

The project consists of a mixed-use, seven-story building with residences, retail, and amenity spaces. A total of 211 residential units are planned. The project site is located in Emeryville, east of Interstate 80, south of the Ashby/Shellmound offramps, and west of Shellmound Street. There is an active rail line east of the site, just past Shellmound Street; the rail line consists of three active tracks and one siding and is used by both freight and passenger trains.

CSDA conducted an environmental noise and vibration study to quantify the existing environmental noise and vibration levels at the site and provide mitigation recommendations to meet the applicable project criteria. This report summarizes our findings and recommendations.

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[1] Day/Night Average Sound Level (L_{dn} or DNL): A descriptor established by the U.S. Environmental Protection Agency to describe the average day-night level with a 10 dB penalty applied to noise occurring during the nighttime hours (10 pm to 7 am) to account for the increased sensitivity of people during sleeping hours. A 10 dB increase in sound level is perceived by people to be twice as loud.

[2] Sound Transmission Class (STC): A single number used to rate how well a building partition (wall, floor/ceiling assembly, door) attenuates airborne sound.

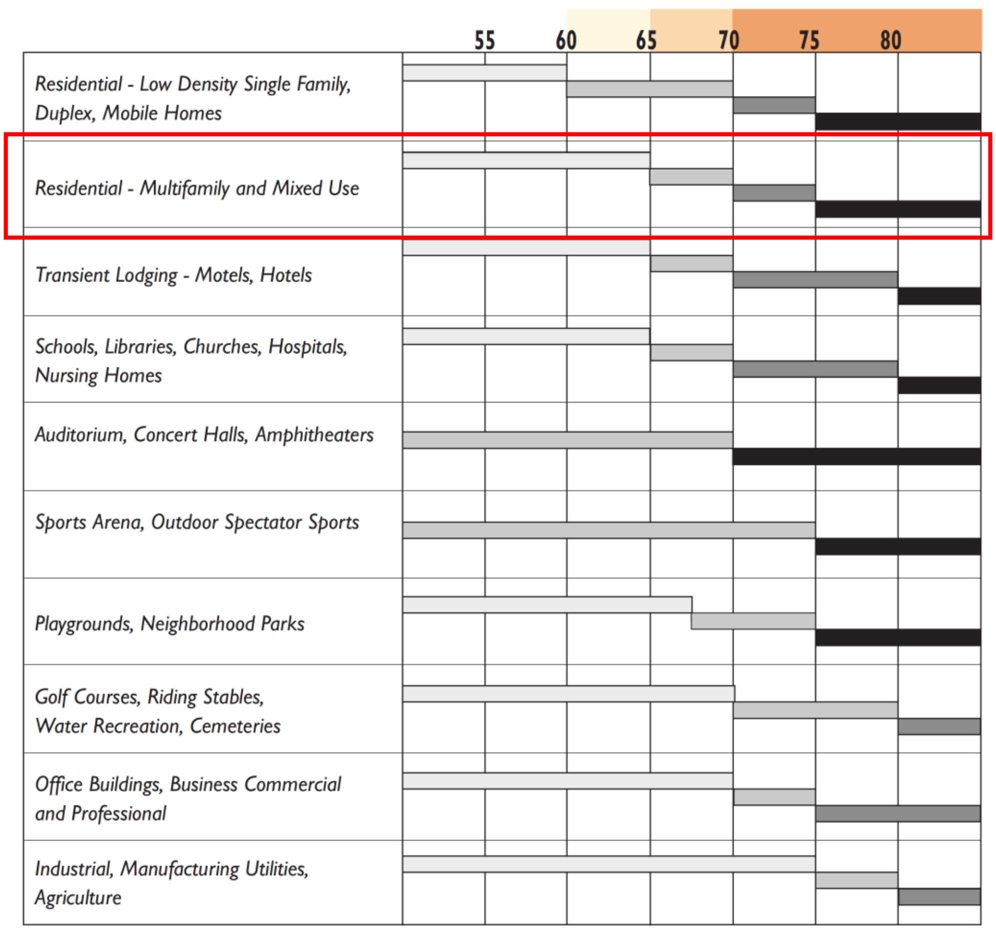
3.0 Acoustical Criteria

The project is located in Emeryville and is subject to the City's General Plan Noise Element acoustical criteria and the acoustical criteria contained in the State Building Code. In addition, the Federal Transit Administration stipulates rail vibration criteria. The following summarizes the relevant project criteria:

3.1 Emeryville General Plan

The Land Use and Conservation, Safety, and Noise Elements from the City's 2009 General Plan stipulates the following:

- Policy CSN-P-50: The community noise compatibility standards (reproduced below) shall be used as review criteria for new land uses.



NORMALLY ACCEPTABLE
Specified land use is satisfactory, based upon the assumption that any building involved is of normal conventional construction, without any special noise insulation requirements.

CONDITIONALLY ACCEPTABLE
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

NORMALLY UNACCEPTABLE
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

CLEARLY UNACCEPTABLE
New construction or development should generally not be undertaken.

Source: *California Governor's Office of Planning and Research, 1990; Environmental Science Associates, 2008.*

- Policy LU-P-25: If new residential buildings are proposed adjacent to freeways and railroad tracks impacts of these corridors, including noise, vibration, and air pollution, should be considered during site planning. Noise, vibration, and air pollution shall be mitigated to the extent possible.

- Policy CSN-P-52: Occupants of existing and new buildings should be protected from exposure to excessive noise, particularly adjacent to Interstate-80 and the railroad.

- Policy CSN-P-53: A noise study and mitigation measures shall be required for all projects that have noise exposure levels greater than "normally acceptable" levels.

- Policy CSN-P-54: Developers shall reduce the noise impacts of new development through appropriate means (e.g., double-paned or soundproof windows, setbacks, berming, and screening). This noise attenuation method should avoid the use of visible sound walls.

3.2 California Building Code

The 2010 California Building Code (CBC), Section 1207, stipulated an interior noise level requirement of DNL 45 dB for multi-family residences; however, the new 2013 California Building Code no longer stipulates this criterion. However, we understand Emeryville's General Plan EIR stipulates the DNL 45 dB criterion, and, regardless, we recommend that noise levels in the multi-family residences be DNL 45 dB or less.

The 2013 California Green Building Code, Section 5.507, stipulates an hourly L_{eq} limit of 50 dB in occupied, non-residential spaces (e.g., the retail spaces, leasing office) for projects with noise exposure above DNL 65 dB.

3.3 Federal Transit Administration

The Federal Transit Administration stipulates vibration criteria for rail activity.[3] Table 1 summarizes the criteria:

Table 1 – FTA Rail Vibration Criteria, RMS (VdB re 1 micro-inch/sec)

Land Use Category	Frequent Events [1]	Occasional Events [2]	Infrequent Events [3]
Residences and buildings where people normally sleep	72	75	80
Institutional Land uses with primarily daytime use	75	78	83

[1] "Frequent Events" is defined as more than 70 vibration events of the same source per day.
[2] "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day.
[3] "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day.

Per the Fehr and Peers Transportation Assessment dated March 28, 2014, there are up to 63 train passbys per day. Since the guidelines above were designed for light rail rather than freight, we are applying the "Frequent Events" criteria to all train passbys since there is a mixture of freight and passenger trains. However, per the FTA, we are applying the criteria for "infrequent events" to freight locomotive vibration levels since the duration of the actual locomotive passby is short.[4]

[3] Federal Transit Administration, 2006. Transit Noise and Vibration Impact Assessment (DTA-VA-90-1003-06).
[4] Ibid. Section 8.1.3, Page 8-5.

4.0 Noise Measurement Results

In order to quantify the noise environment at the site, long-term (i.e., 48 hour) noise measurements were conducted at three locations from April 29 to May 2, 2014. Short-term (i.e., 10 to 60 minute) measurements were conducted at four locations to supplement the long-term measurements and quantify noise levels at the upper floors of the project.

The noise environment at the project site is dominated by noise from the UPRR line, especially train horns as they approach the grade crossings from the south. We measured train horn noise levels between 100 and 110 dB. Noise from traffic on Shellmound Street, the I-80 off ramps, and I-80 also contribute to the noise environment.

Figure 1 shows the noise measurement locations; Table 2 summarizes the noise measurement results.

Table 2 – Noise Measurement Results

Location	Description	Height (feet)	Measured DNL (dB)
LT-1	Shellmound Street, dominated by UPRR noise	12	86
ST-1	Shellmound Street, at project setback	25	85
ST-2	Shellmound Street, at project setback	6	82
LT-2	I-80 off ramps, north portion of site	12	71
ST-3	I-80 off ramps, north portion of site	25	72
LT-3	West end of site facing I-80	6	69
ST-4	West end of site facing I-80	25	70

In order to calculate the noise level at the outdoor-use areas and interior (courtyard) facades, we created a three-dimensional computer model. The results of our noise modeling are shown in Figures 2 through 5.

Noise levels at the facade facing Shellmound Street and the UPRR lines are considered “Clearly Unacceptable” for residential uses per the City’s noise and land-use compatibility standards. However, we understand this incompatibility was addressed in the General Plan EIR. The noise level at the other building facades is considered “Conditionally Acceptable” to “Normally Unacceptable.” Noise levels at the courtyards and roof deck (DNL 67 to 70 dB) are considered “Conditionally Acceptable.”

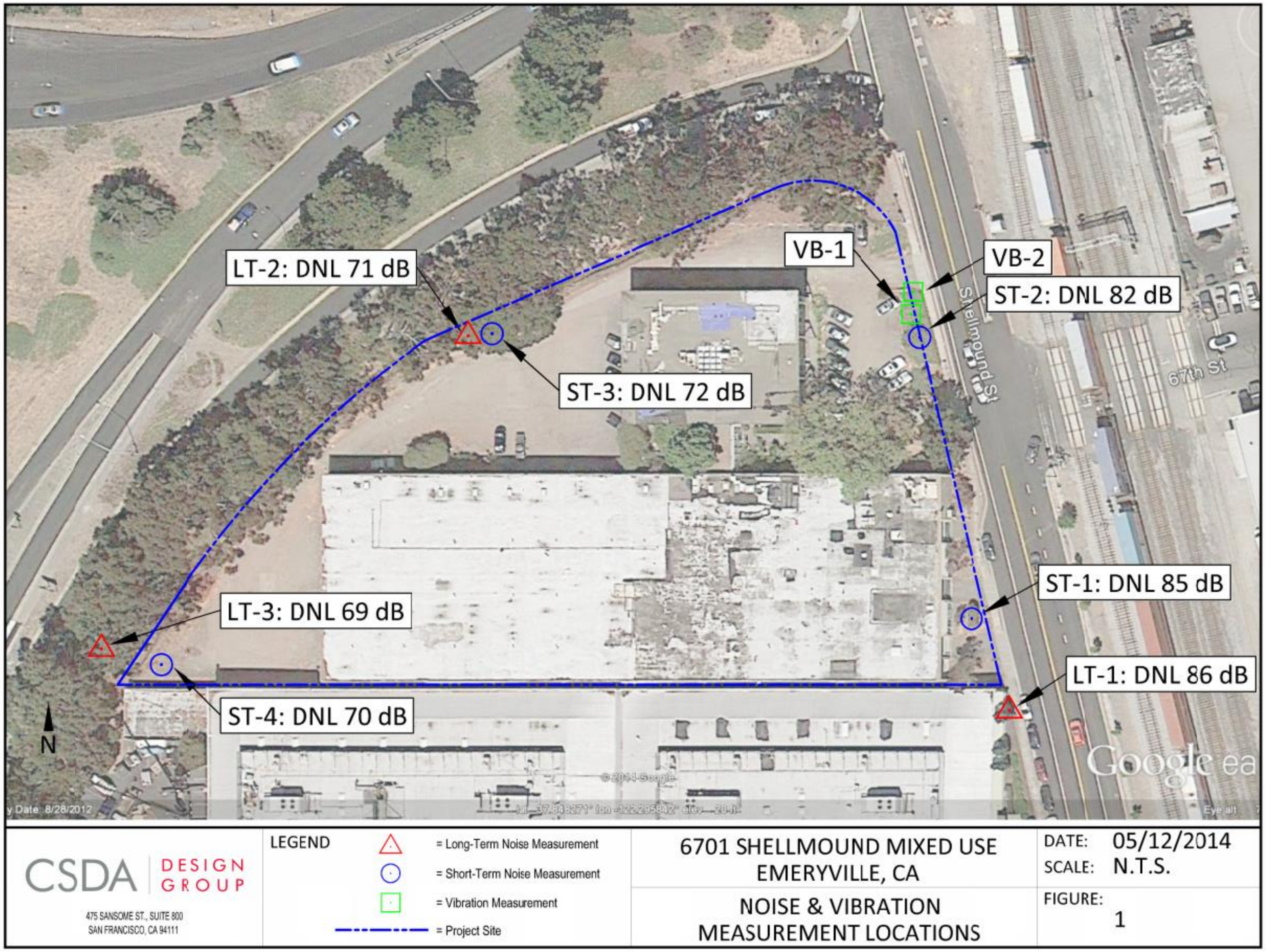


Figure 1 – Measurement Locations and Measured DNL

Figure 2 – DNL Noise Levels, Plan View

Figure 3 – DNL Noise Levels, View from Northeast

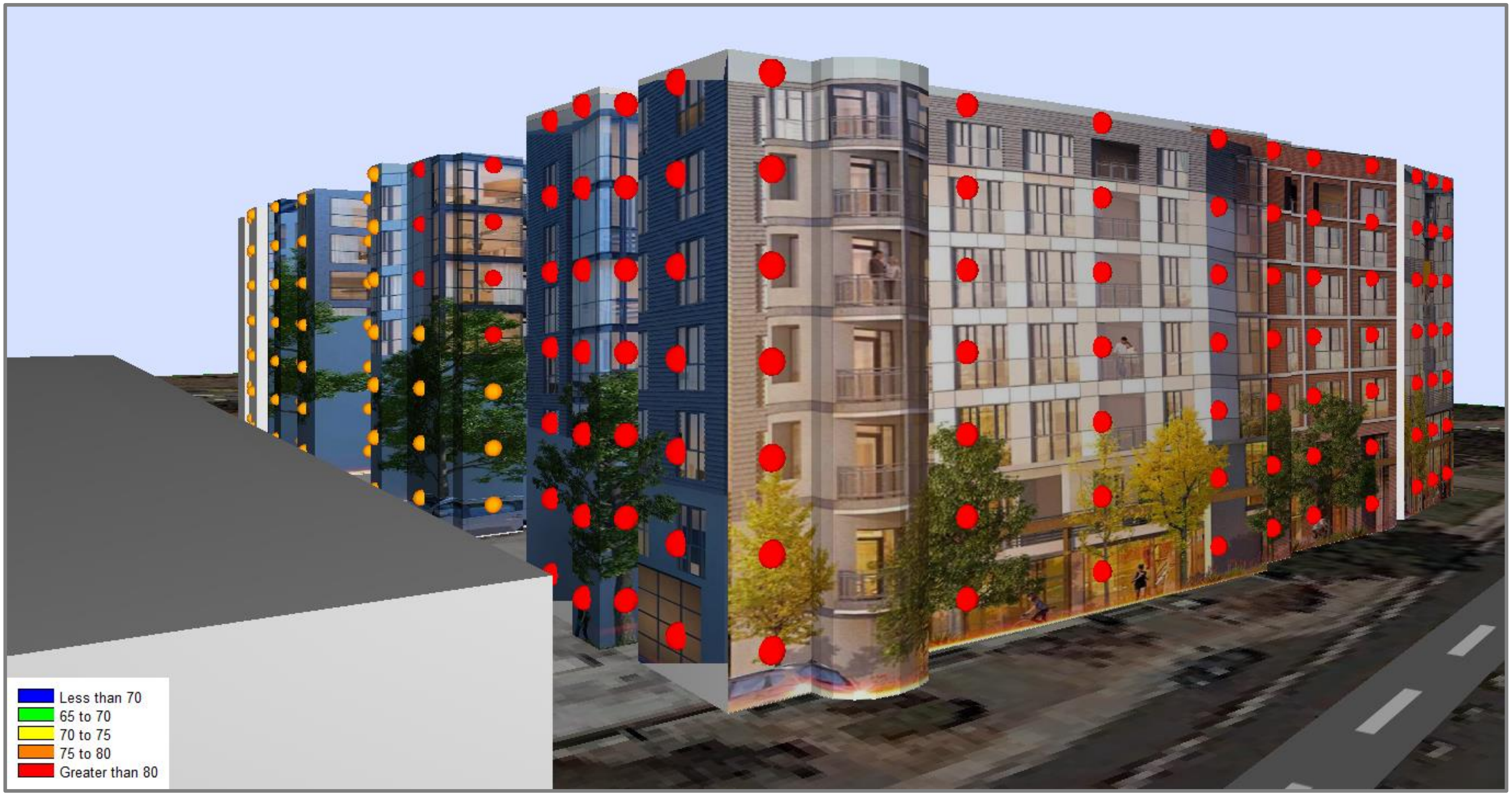


Figure 4 – DNL Noise Levels, View from Southeast

5.0 Rail Vibration

We measured ground-borne train vibration levels at two locations along the future west facade of the project building; see Figure 1 for the measurement locations. Both measurement locations were approximately 90 feet from the closest active rail line. We measured multiple freight and passenger train passbys at varying speeds on all three active tracks. Table 4 presents the results of our train vibration measurements.

Table 3 – Measured Train Vibration Levels, (VdB re 1 micro-inch/sec)

Event	Measurement Location	Measured Vibration Level	FTA Criteria
Freight Train Locomotive	VB-1	76	80 (Infrequent)
Freight Train Locomotive	VB-2	75	80 (Infrequent)
Freight Train Cars	VB-1	69	72 (Frequent)
Freight Train Cars	VB-2	68	72 (Frequent)
Passenger Trains	VB-1	63	72 (Frequent)
Passenger Trains	VB-2	63	72 (Frequent)

The measured train vibration levels meet the FTA criteria.

6.0 Recommendations

6.1 Interior Noise Calculation

In order to meet the DNL 45 dB criterion inside of the residences and the L_{eq} 50 dB criterion in the non-residential spaces, sound-rated windows and exterior doors are required. Our calculations are based upon the March 7, 2014 Planning Study Session drawings and, where information was not shown on the drawings, we used typical window sizes. These calculations will need to be refined as the project design progresses. We incorporated future increases in traffic noise levels into our calculations; these were based upon traffic volume increases contained in the Fehr and Peers traffic study and a 2% increase in traffic volume per year on I-80.[5]

Where sound-rated windows are required to meet the interior noise requirement, fresh air ventilation should be provided. The ventilation system should meet applicable Code requirements and should not compromise the noise reduction provided by the exterior facade assembly.

The STC ratings provided are for the entire window assembly, including frame and seals. Table 4 summarizes the required STC ratings; we have organized the ratings by building zone. Figure 5 shows the zones and required ratings on the project plan.

Table 4 – Summary of Exterior Noise Levels and Preliminary Facade STC Ratings

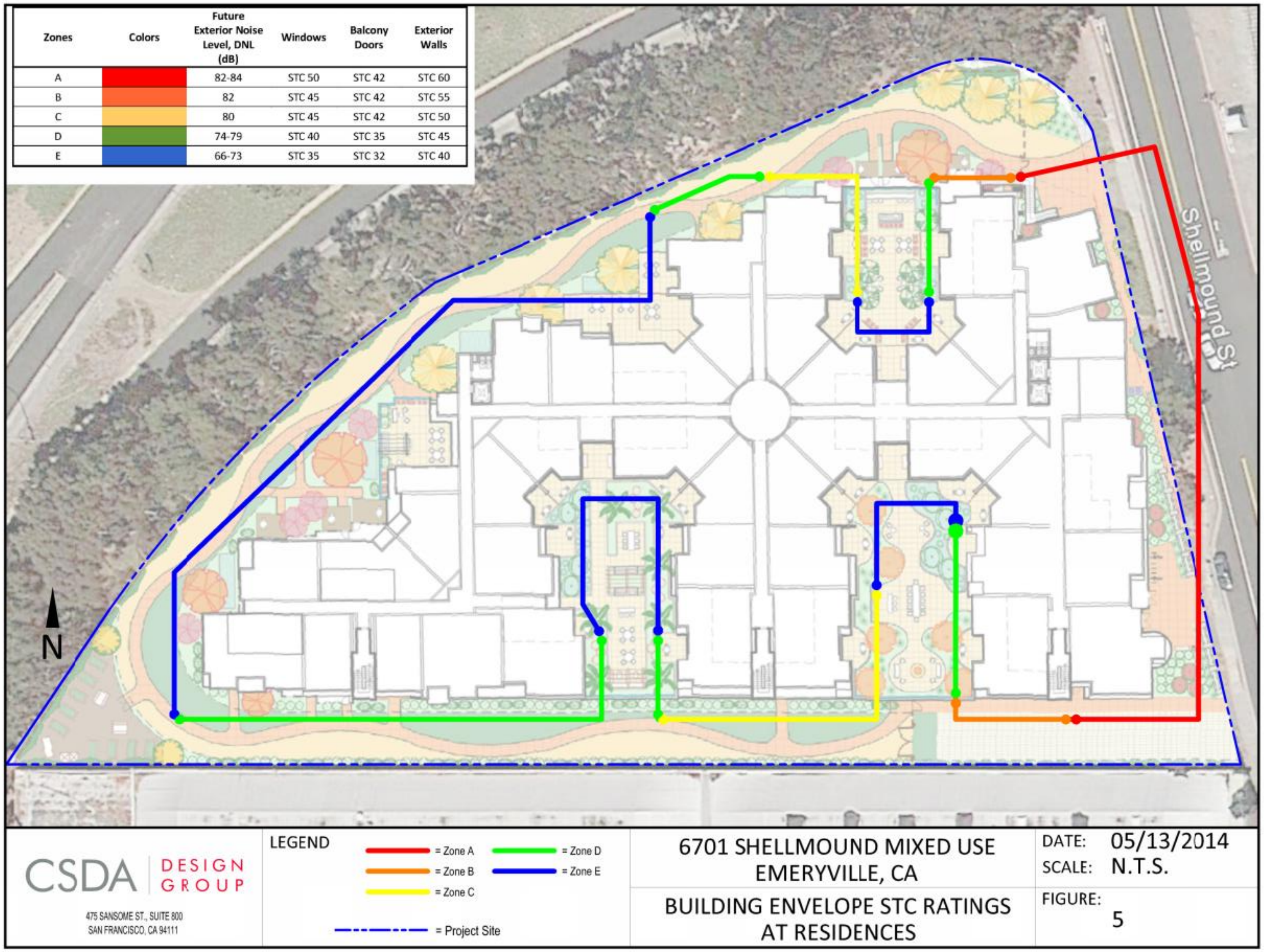
Zone/Facade	Future Exterior Noise Level, DNL (dB)	Windows	Balcony Doors	Exterior Walls*	Interior Noise Level, DNL (dB)	Meets Criteria?
A - East	82-84	STC 50	STC 42	STC 60	45	Yes
B – Southeast/Northeast	82	STC 45	STC 42	STC 55	45	Yes
C – South	80	STC 45	STC 42	STC 50	45	Yes
D – South/North	74-79	STC 40	STC 35	STC 45	45	Yes
E – West/Courtyards	66-73	STC 35	STC 32	STC 40	45	Yes
Non-Residential Spaces	L_{eq} 82	STC 41	NA	NA	L_{eq} 50	Yes

Note: We assumed the standard exterior wall assembly meets STC 40 unless otherwise noted; this will need to be confirmed during detailed design. Exterior wall ratings above STC 40 will require additional layers of gypsum board, resilient channels, and/or double-stud construction.

6.2 Vibration

Although the train vibration levels meet the FTA criteria, we recommend a disclosure be made to residents advising them of vibration from train passbys.

[5] The 2% traffic volume growth is based upon the 2007-2012 average traffic volume growth summarized in the 2012 Traffic Volumes on the California State Highway System book published by Caltrans.



Zones	Colors	Future Exterior Noise Level, DNL (dB)	Windows	Balcony Doors	Exterior Walls
A		82-84	STC 50	STC 42	STC 60
B		82	STC 45	STC 42	STC 55
C		80	STC 45	STC 42	STC 50
D		74-79	STC 40	STC 35	STC 45
E		66-73	STC 35	STC 32	STC 40

Figure 5 – Building Envelope STC Ratings at Residences

APPENDIX C:

Transportation Analysis

MEMORANDUM

Date: May 30, 2014

To: City of Emeryville

From: Kathrin Tellez, Fehr & Peers

Subject: 6701 Shellmound (City of Emeryville) Transportation Analysis

WC13-3096

This memorandum presents the results of our transportation assessment for the 6701 Shellmound Street development (project), including project description, analysis parameters, existing conditions, project conditions, and site plan review. A peer review of a parking study prepared for the project was also conducted and an assessment of near-term conditions including redevelopment at Marketplace and a hotel north of Bay Street is provided.

PROJECT DESCRIPTION

The project site is located at 6701 Shellmound Street, between Shellmound Street and Interstate 80 (I-80), south of Ashby Avenue and north of Ex'pressions College, in Emeryville. The approximately 2.27 acre site, as shown on **Figure 1** (all figures are attached at the end of this memorandum), is currently occupied by approximately 100,000 square feet of warehouse and a 10,000 square foot office. The site is zoned for Mixed-Use with Residential; the current proposal includes 211 multi-family rental units plus amenities, including a fitness center, storage, and common areas (project). A parking garage would also be constructed to support the site, providing 201 parking stalls plus 63 spaces contained within a parking lift system. Approximately 211 long-term bicycle parking spaces and 14 short-term bicycle parking would be provided. As part of the project, the existing buildings would be removed. A conceptual project site plan is shown on **Figure 2**.

Vehicular access to the site would be provided from a driveway on Shellmound Street between 67th and 66th Streets, connecting to the parking garage and loading zone. Emergency vehicle access would also be provided north of 67th Street, accessing a fire/access lane that encircles the site and also connects to the main driveway. It is expected that the main driveway would allow for all turning movements to and from Shellmound Street.

ANALYSIS PARAMETERS

Study Area and Analysis Scenarios

The transportation assessment includes weekday evening (4 to 6 PM) and Saturday afternoon (3 to 5 PM) peak period analyses to coincide with the time periods when adjacent street traffic demands are greatest and the project generates the most traffic. The study addresses existing and near-term traffic conditions at the following intersections:

1. Potter Street/Bay Street
2. I-80 Off-Ramp/Shellmound Street
3. 67th Street/Shellmound Street
4. 67th Street/Hollis Street
5. 66th Street/Shellmound Street
6. 66th Street/Hollis Street
7. 65th Street/Shellmound Street
8. 65th Street/Hollis Street
9. Project Driveway/Shellmound Street

Intersection operations are evaluated for the following scenarios:

- Existing
- Existing Plus Project
- Existing Plus Project and Pending Developments, including planned development at the Public Market and a Hotel at Bay Street (near-term conditions)

Significance Criteria

The determination of significance for project impacts is based on applicable policies, regulations, goals, and guidelines defined by the City of Emeryville. The impacts of the project were evaluated by comparing the results of the level of service calculations under Existing With Project conditions to the results under Existing conditions. The detailed impact criteria for this study are presented below.

For this study, based on guidance contained in the City of Emeryville General Plan and recently prepared environmental documents for other projects in the City, a significant transportation-related impact would occur if:

- The project would conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit. A significant impact ***could*** be identified:
  - If a signalized intersection is projected to operate within delay ranges associated with less-than-capacity conditions (i.e., LOS D or better with an average control delay of equal to or less than 55 seconds per vehicle) without the project and the project is expected to cause the facility to operate at a LOS E or F);
  - If an intersection is projected to operate at or over capacity (i.e., LOS E or F) without the project, and the project is expected to increase the average control delay by more than 5 seconds; or
  - If the operations of an unsignalized study intersection is projected to decline with the addition of project traffic, and if the installation of a traffic signal based on the Manual on Uniform Traffic Control Devices (MUTCD) Peak Hour Signal Warrant (Warrant 3) would be warranted.

  For intersections that meet the above criteria, capacity enhancing measures that do not degrade other modes of travel should be considered, including upgrading or installing signal equipment, extending left-turn pocket storage, providing non-motorized facilities to reduce vehicular demand, enhancing capacity on a parallel route and/or enhancing transit access to a site.

- The project would conflict with an applicable congestion management program, including but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads and highways:
  - Exceed, either individually or cumulatively, a LOS standard established by the Alameda County Transportation Commission (ACTC) for designated roads or highways;
  - For a roadway segment of the ACTC Congestion Management Program (CMP) Network, the project would cause (a) the LOS to degrade from LOS E or better to LOS

F or (b) the V/C ratio to increase 0.03 or more for a roadway segment that would operate at LOS F without the project; or

- o Cause congestion of regional significance on a roadway segment on the Metropolitan Transportation System (MTS) evaluated per the requirements of the Land Use Analysis Program of the CMP[1].

- The project substantially increases traffic hazards due to a design feature (e.g. sharp curves or dangerous intersections) or incompatible uses;
- The project results in inadequate emergency access;
- The project conflicts with adopted policies, plans, or programs regarding public transit, bicycle or pedestrian facilities, or otherwise decrease the performance or safety of such facilities;
- A pedestrian or bicycle impact is considered significant if it would:
    - o Disrupt existing pedestrian facilities;
    - o Interfere with planned pedestrian facilities; or
    - o Create inconsistencies with adopted pedestrian system plans, guidelines, policies, or standards.
- A bicycle impact is considered significant if it would:
    - o Disrupt existing bicycle facilities;
    - o Interfere with planned bicycle facilities;
    - o Create inconsistencies with adopted bicycle system plans, guidelines, policies, or standards; or
    - o Not provide secure and safe bicycle parking in adequate proportion to anticipated demand.
- A transit impact is considered significant if it would result in development that is inaccessible to transit riders.

[1] The Alameda County Transportation Commission (ACTC) requires the assessment of development-driven impacts to regional roadways. Because the project would not generate more than 100 "net new" PM peak-hour trips, no further assessment is required of the MTS or CMP network.

EXISTING CONDITIONS

This section describes transportation facilities in the study area, including the surrounding roadway network, and transit, pedestrian, and bicycle facilities in the site vicinity.

Roadway System

Interstate 80 (I-80) connects the San Francisco Bay Area with the Sacramento region and continues east across the United States. In Emeryville, I-80 has a north/south orientation and provides four mixed-flow lanes and a high occupancy vehicle (HOV) lane in each direction at the Ashby Avenue/Shellmound Street interchange (Emeryville/Berkeley border). Access from I-80 to Emeryville is provided via full interchanges at Powell Street and Ashby Avenue. Access to/from northbound I-80 is provided from Shellmound Street with an off-ramp forming the northern boundary of the site, and access to the on-ramp from Potter Street. This segment of I-80 through Emeryville is also known as I-580.

Shellmound Street is a two- to four-lane north/south road with on-street parking at select locations. Shellmound Street becomes 40th Street to the south of the railroad overcrossing, continuing east beyond the MacArthur BART station. North of Ashby Avenue, Shellmound Street becomes Bay Street, where access to northbound I-80 is provided. Along the project frontage, Shellmound Street provides a single travel lane in each direction and on-street bicycle lanes. On-street parking is permitted along a portion of the west side of Shellmound Street in proximity to the project. Sidewalks are provided on the west side of Shellmound Street to Ashby Avenue; sidewalks on the east side of the street terminate at 67th Street. Shellmound Street is a designated connector street and Class II bikeway in the City's General Plan.

Hollis Street is a two-lane, north/south road approximately 1/8-mile from the project site, parallel to Shellmound Street, with on-street parking that begins in Oakland at Peralta Street and ends in Berkeley at Folger Avenue. North of Folger Avenue, Hollis Street becomes 7th Street extending northward through Berkeley. Hollis Street is a designated Transit Street in the City's General Plan.

65th Street is a two-lane, east/west road that extends east from Lacoste Street, and connects with San Pablo Avenue. Land uses along 65th Street include residential, commercial, and office, and on-street parking is generally available. An at-grade railroad crossing is located just east of Shellmound Street. (Rail activity in the area is described in further detail in a subsequent section.) Based on the General Plan designation, 65th Street between Christie Avenue and Hollis Street is a

Transit Street; east of Hollis Street it is a Connector Street. Bicycle lanes are also provided on 65th Street in the study area.

66th Street is a two-lane, east/west road that extends east from Shellmound Street and connects with San Pablo Avenue where it forms an off-set intersection. Land uses along 66th Street include residential, commercial, and office, and on-street parking is generally available. An at-grade railroad crossing is located just east of Shellmound Street. 66th Street between Shellmound Street and the City limits, just east of Vallejo Street, is a designated bicycle boulevard in the City's General Plan. Sidewalks are not provided along this roadway between Shellmound Street and Hollis Street.

67th Street is a two-lane, east/west local roadway that extends east from Shellmound Street and connects with San Pablo Avenue where it forms an off-set intersection. Land uses along 67th Street are primarily industrial/commercial, and on-street parking is generally available. An at-grade railroad crossing is located just east of Shellmound Street. Sidewalks are not provided along this roadway between Shellmound Street and Hollis Street.

Existing Pedestrian and Bicycle Facilities

Pedestrian facilities include sidewalks, crosswalks, and pedestrian signals. Pedestrian facilities are provided on some roadways adjacent to the site. In the study area, pedestrian crosswalks, push buttons and signals are provided at the signalized intersections on 65th Street. Along the Shellmound Street project frontage, a sidewalk is provided along the western side of the street, but terminates where Shellmound Street becomes Bay Street north of the I-80 off-ramp.

Pedestrian facilities are not provided across the railroad crossings at 67th and 66th Streets. At the 65th Street railroad crossing, pedestrians are directed to cross on the south side of the tracks where there are tactile domes that alert visually impaired pedestrians that they are approaching a crossing.

Sidewalks are not provided on 66th and 67th Street between Shellmound Street and Hollis Street due to the provision of perpendicular parking along building frontages. If these parcels are redeveloped, sidewalks would be constructed along these roadways.

Bicycle facilities in Emeryville include the following:

- *Bike paths (Class I)* – Paved trails that are separated from roadways. These facilities are typically shared with pedestrians, although bicycles must yield to pedestrians.
- *Bike lanes (Class II)* – Lanes on roadways designated for use by bicycles through striping, pavement legends, and signs. There may or may not be parking allowed on the roadway.
- *Bike routes (Class III)* – Designated roadways for bicycle use by signs only; may or may not include additional pavement width for cyclists.
- *Bicycle Boulevard* – A street classification on which bicycles have priority, and which may or may not have bike lanes.

Shellmound Street and 65th Street are Class II bicycle facilities with marked lanes and signage. Overland Street, located on the east side of the railroad tracks, is a marked bicycle boulevard that connects 65th Street to 62nd Street. 66th Street is a designated bicycle boulevard, but there are no current plans to install pavement markings or signage along the corridor. The Emeryville Greenway, east of Hollis Street, is a Class I facility with mid-block crossings at 67th, 66th and 65th Streets.

Existing Transit Service

The project site is located approximately 1,000 feet from an Emery Go-Round stop on 65th Street, west of Shellmound Street and approximately 1,000 feet from an Emery Go-Round stop on Hollis Street at 65th Street. Several AC Transit Routes serve the area, with stops at the intersections of Ashby Avenue at 7th Street, Christie Avenue at 65th Street, and Shellmound Street at Powell Street; the closest AC Transit stop is an approximately 5-minute walk from the project site. AC Transit and Emery Go-Round connect the study area to neighboring cities in the East Bay as well as the MacArthur BART Station and Downtown Oakland.

Buses on the Emery Go-Round Hollis Route, which stop at the intersection of Hollis Street/65th Street, operate on 10 minute headways during the peak hours and 15 to 20 minute headways during off-peak hours. Travel time from the Hollis Street/65th Street stop to/from the MacArthur BART station is approximately 12 minutes. Buses on the Emery Go-Round Shellmound/Powell Route, which stop on 65th Street just west of Shellmound Street, operate on 15 minute headways throughout the day. Travel time from the 65th Street/Shellmound Street stop to the MacArthur BART station is approximately 16 minutes, and travel time from the MacArthur BART station to the 65th Street/Shellmound Street stop is approximately 11 minutes.

AC Transit Transbay Routes J and Z, as well as local route 26, are within walking distance of the project site. Route 26 operates on 20 minute headways, and connects the study area to the West Oakland BART station as well as Downtown Oakland. Route J provides seven morning trips to downtown San Francisco between 5:45 AM and 8:50 AM, and seven evening trips from downtown San Francisco between 4:45 PM and 7:30 PM, on approximately 30 minute headways. Route Z provides two inbound trips to San Francisco departing Emeryville at approximately 7:30 and 8:30 AM and two return trips in the evening departing San Francisco at 4:45 and 5:45 PM.

The Bay Area Rapid Transit (BART) system provides regional rail transit service connecting San Francisco, Alameda County, Contra Costa County, and parts of San Mateo County. From the MacArthur BART station, direct connections to destinations on the Richmond/Millbrae, Richmond/Fremont line, and Pittsburgh/Bay Point/Millbrae line are provided. During peak periods, trains operate on less than 10 minute headways to/from San Francisco. Trains run to/from San Francisco with 15 to 20 minute headways during off-peak periods.

Amtrak provides passenger rail service approximately 1/2 mile to the southeast of the project site, running through the City of Emeryville. Service from the Emeryville Amtrak station provides inter-regional travel to Sacramento, the Central Valley, Southern California, and Northern California.

Several carshaing companies have locations in Emeryville, including City CarShare and Zipcar. City CarShare has one car sharing pod on 66th Street, west of Hollis Street. Zipcar has seven car sharing pods in Emeryville, with the closest pods located at the Public Market on Shellmound Street (approximately 1/2-mile from the site) and at the Courtyards on 65th Street (approximately 1/4-mile from the site). Zipcar and City CarShare are membership-based car sharing companies whose members can reserve a vehicle for a specified amount of time, i.e. hourly or daily. Gas, parking, insurance and maintenance are included in the reservation fee. The availability of car sharing has been shown to lower vehicle ownership rates per household, particularly in urban areas with access to transit and other modes of travel, as it provides a vehicle when needed without the costs of vehicle ownership.

Existing Roadway Operations

Weekday evening (4:00 to 6:00 PM) and Saturday afternoon (3:00 to 5:00 PM) peak period intersection vehicle turning movement counts were conducted in December 2013 at the intersections identified for inclusion in the study. Separate counts of pedestrian and bicycle activity were also collected. For the study intersections, the single hour with the highest traffic volumes during the count periods was identified. For this study, the weekday evening and Saturday peak hours are the periods with the most traffic flow on area roadways. These time periods also coincide with the periods when the project is expected to generate the most vehicle traffic (See Table 4). The peak hour volumes for weekday evening and Saturday afternoon are presented on **Figure 3** along with the existing lane configuration and traffic control. Existing pedestrian and bicycle volumes at the study intersections are shown on **Figure 4.** Truck counts were also collected, which shows large trucks constitute about 1 percent of total traffic through the area, except at the 67th and 66th Street intersections with Hollis Street, where large trucks comprise about 2 percent of total traffic volumes. The traffic count data are provided in the Appendix.

The operations of roadway facilities for vehicles are typically described with the term level of service (LOS). LOS is a qualitative description of traffic flow based on such factors as speed, travel time, delay, and freedom to maneuver. Six levels are defined from LOS A, representing free flow conditions with minimal delay, to LOS F, representing over-capacity conditions. LOS E represents "at-capacity" operations. Operations are designated as LOS F when volumes exceed capacity, resulting in stop-and-go conditions. The City of Emeryville does not have a level of service policy for vehicles, but strives to achieve a Quality of Service. Quality of Service recognizes that people travel by a variety of modes, not just in vehicles, and the use of an auto-focused level of service standard does not address the mobility needs for non-auto roadway users. **Appendix A** describes the LOS analysis method for vehicles.

Results of the existing conditions analysis are presented in **Table 1**, which shows the intersections that provide access to the project site generally operate at an overall LOS D or better during both peak hours for vehicles, including transit vehicles, when considered as isolated intersections. Bicyclists also experience similar levels of delay as vehicles, but since bicyclists can typically maneuver to the front of the intersection on a red light, they can bypass queued vehicles.

A signal warrant analysis was also conducted for the unsignalized study intersections[2] to assess the need to install additional traffic control at the unsignalized study locations in either the

[2] Unsignalized intersection warrant analysis is intended to examine the general correlation between existing conditions and the need to install new traffic signals. Existing peak-hour volumes are compared against a subset of the standard traffic signal warrants recommended in the MUTCD and associated State guidelines. This analysis should not serve as the only basis for deciding whether and when to install a signal. To reach such a decision, the full set of warrants should be investigated based on field-measured traffic data and a thorough study of traffic and roadway conditions by an experienced engineer. Furthermore, the decision to install a signal should not be based solely on the warrants because the

existing or forecast scenarios. Results of the traffic signal warrant assessment are presented in **Table 2,** which indicates the 66th Street/Hollis Street intersection currently satisfies the peak hour volume warrant during the weekday PM peak hour. Pedestrian warrants were also reviewed at the unsignalized crossings: no unsignalized crossing location evaluated as part of this study satisfies the peak period pedestrian volume warrants.

There are unique conditions in the study area that contribute to worse intersection operations, for periods of time, than presented in Table 1, including at-grade rail crossing activity, and vehicle queue spillback from regional facilities, including I-80 and the Ashby Road corridor. These conditions are discussed in more detail below.

The site is located in close proximity to three at-grade rail crossings at 67th, 66th and 65th Streets, with three tracks serving northbound and southbound Amtrak passenger trains and freight trains. During the first week of December 2013, the amount of rail activity was observed to document the range of rail activity, including the number of trains per day, the average length of trains, trains per peak hour, average duration of gate closures, total duration of gate closures during peak hours, and other data. Results of the data collection effort are summarized in **Table 3**, which indicates about 50 to 65 daily railroad crossings on a typical weekday with access to 67th, 66th and 65th Streets blocked for about 10 minutes during the PM peak hour.

When the rail crossing gate arms are activated, traffic backups occur through the Shellmound Street corridor as well as on 67th, 66th and 65th Streets, increasing delays for vehicles, including transit vehicles. For brief periods at the beginning of rail crossing activity, northbound and southbound traffic on Shellmound Street is able to continue. A few minutes into the rail crossing activity, vehicle queues for turning movements to 65th, 66th or 67th Streets block the ability of through traffic to proceed along the route. When there are back-to-back trains during periods with high travel demand, vehicle queues that form from one gate closure period may not have an opportunity to clear before the next gate crossing is activated.

At the Shellmound Street/65th Street intersection, vehicle queues are further exacerbated by the close proximity of the Overland Street/65th Street intersection.

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installation of signals can lead to certain types of collisions. The responsible State or local agency should undertake regular monitoring of actual traffic conditions and accident data and conduct a timely re-evaluation of the full set of warrants in order to prioritize and program intersections for signalization.

Along the Hollis Street corridor, vehicle queues from the Ashby Avenue/7th Street intersection periodically queue through the corridor extending south beyond 65th Street, affecting operations at the 67th and 66th Street unsignalized intersections. Vehicles attempting to turn onto Hollis street from these side streets may experience long delays while waiting for a gap in traffic. The queue periodically subsides, allowing for vehicles from the side street to either turn onto Hollis Street or continue along the travel way.

Along the Shellmound Street corridor, vehicle queues extend from the Potter Street/Bay Street intersection due to congestion on I-80 and the northbound I-80 on-ramp. Vehicles entering the freeway from Potter Street form queues along Shellmound Street past 65th Street, delaying vehicles turning onto Shellmound Street from 67th, 66th and 65th Streets as well as driveways to the Ex'pressions campus and the project driveway.

Pedestrian volumes are low near the project site, with the majority of pedestrian activity occurring to the south of the study area near the Emeryville Public Market site. Pedestrians can access the area through sidewalks on the east and west sides of Shellmound Street. There are currently no sidewalks along 66th or 67th street due to on-street parking. Additionally, pedestrian crossing at the railroad crossings and sidewalks are not provided at 66th and 67th Streets, although count data indicates that pedestrians are crossing at these locations. There is a sidewalk along 65th Street and pedestrian crossing is allowed at the railroad on the south side only. The pedestrian crossing is paved but has no barrier or gate during train crossings.

PROJECT CONDITIONS

Project Trip Generation

Trip generation refers to the process of estimating the amount of vehicular traffic a project might add to the local roadway network. In addition to estimates of daily traffic, estimates are also created for the peak one-hour periods during the morning (AM) and evening (PM) commute hours, when traffic volumes on adjacent streets are typically at their highest. For this project, estimates for peak Saturday conditions were also prepared since traffic volumes in the area are higher on Saturdays than weekdays due to the retail centers on Shellmound Street, including IKEA, Bay Street and the Public Market. Although there are active uses on the site that would be removed with the project, the observed trip generation of these uses during the analysis periods is minimal (three weekday PM peak hour trips and zero Saturday peak hour trips).

The traditional methods commonly used by traffic engineers to calculate the trip generating potential of developments in urban areas with a variety of travel options can overestimate their traffic impacts because the methods do not accurately reflect the amount of trips made by transit, biking, and/or walking. This results in increased development costs due to oversized infrastructure, and skewed public perception of the likely impacts of development.

The most common method used by traffic engineers is outlined in the Institute of Transportation Engineers (ITE) *Trip Generation Manual* (9th Edition). This method contains data primarily collected at suburban, single-use, freestanding sites. This limits the applicability of the data to urban areas, such as the project, which is located in a dense, walkable, urban setting with a mix of land uses, and with nearby local and regional transit service. This method does not adequately account for key variables that influence travel such as development density and scale, location efficiency, land use mix in close proximity to the site, urban design and transit orientation.

Two significant new research studies provide the opportunity to improve the state of practice. One study sponsored by the US EPA[3] and another by the Transportation Research Board[4] have developed means to improve trip generation estimation for mixed-use developments (MXDs) and those located in urban areas. The two studies examined over 260 MXD sites throughout the U.S. and, using different approaches, developed new quantification methods. Fehr & Peers has reviewed the two methods, including the basis, capabilities, and appropriate uses of each, to produce a new method (MXD+) that combines the strengths of the two individual methods. MXD+ recognizes that traffic generation by mixed-use and other forms of sustainable development relate closely to the density, diversity, design, destination accessibility, transit proximity, and scale of development. MXD+ improves the accuracy of vehicle trip estimation and gives planners a tool to balance land use mix and to incorporate urban design, context compatibility, and transit orientation to create lower impact development.

The MXD+ methodology starts with ITE trip generation estimates but then adjusts those estimates to account for the mixed-use and environment characteristics. Use of the MXD+ methodology requires more input data than a traditional trip generation application. Data detailing the geographic layout of the site, land use in the surrounding area, and socioeconomic

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[3] *Traffic Generated by Mixed-Use Developments—A Six-Region Study Using Consistent Built Environmental Measures* (Ewing et al, ASCE UP0146, Sept 2011).

[4] National Cooperative Highway Research Program (NCHRP) Report 684 *Enhancing Internal Trip Capture Estimation for Mixed-Use Developments* (Bochner et al, March 2011).

data of both the site and the surrounding area were collected to inform the MXD+ methodology. Sources used to collect this data include the Metropolitan Transportation Commission (MTC) travel demand model, Census and American Community Survey (ACS), the Bay Area Travel Survey (BATS), and the project site plan.

The MXD+ model has been approved for use by the EPA[5]. It has also been peer-reviewed in the ASCE Journal of Urban Planning and Development[6], peer-reviewed in a 2012 TRB paper evaluating various smart growth trip generation methodologies[7], recommended by SANDAG for use on mixed-use smart growth developments[8], and has been used successfully in multiple certified EIRs (Environmental Impact Reports) in California.

For 27 mixed-use sites that were surveyed in California and across the country, the ITE method overestimated daily traffic generation by 24 percent and peak hour traffic by 35 percent to 37 percent. The MXD+ method explains 97 percent of the variation in trip generation among MXDs, compared to 65 percent for the methods previously recommended by ITE. While remaining slightly (2 percent to 4 percent) conservative to avoid systematically understating impacts, MXD+ substantially reduces the 35 percent - 37 percent average overestimate of traffic generation produced by conventional ITE methods. The MXD+ method has been locally validated to dozens of transit oriented development (TOD) sites in the Bay Area and across the country. Outputs of this tool include external vehicle trip generation, internal trips, and external walking/bicycling/transit trips. This tool has been used to refine trip generation estimates for recently approved projects in Emeryville, including the MAZ project.

Table 4 shows the estimated trip generation for the project. In terms of ITE trip generation, which represents the total trip generation of the project for all travel modes, the project is expected to generate approximately 1,400 weekday daily trips, including about 110 morning peak hour and 130 evening peak hour trips. On a typical Saturday, the project would generate approximately 1,350 trips, including 110 during the peak hour. However, there are a number of factors that

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[5] Trip Generation Tool for Mixed-Use Developments (2012). www.epa.gov/dced/mxd_tripgeneration.html

[6] "Traffic Generated by Mixed-Use Developments—Six-Region Study Using Consistent Built Environmental Measures." Journal of Urban Planning and Development, 137(3), 248–261.

[7] Shafizadeh, Kevan, Richard Lee et al. "Evaluation of the Operation and Accuracy of Available Smart Growth Trip Generation Methodologies for Use in California". Presented at 91st Annual Meeting of the Transportation Research Board, Washington, D.C., 2012.

[8] SANDAG Smart Growth Trip Generation and Parking Study.
http://www.sandag.org/index.asp?projectid=378&fuseaction=projects.detail

would reduce the overall number of trips made by a vehicle to/from this site, as a number of trips are expected to be walk/bike trips or transit trips.

Based on the MXD+ model, approximately 15 percent of trips would arrive at/depart the site by walking or biking as the primary model of travel. During peak periods, approximately 20 percent of trips would be primarily transit trips, with 5 percent of daily trips made by transit. Application of the vehicle trip reduction factors results in approximately 25 percent fewer vehicle trips on a daily basis, 35 percent fewer trips during the morning and evening peak hours. On a Saturday, the overall reduction is expected to be approximately 20 percent on a daily basis and 25 percent during the peak hour as compared to standard ITE rates.

When considering the MXD+ reductions described above, the project is expected to add up to 1,050 daily vehicle trips, including approximately 70 morning peak hour and 90 evening peak hour trips to the regional roadway network. On a Saturday, the project could generate up to 1,080 vehicle trips, including 70 peak hour trips.

Project Trip Distribution and Assignment

Project trip distribution refers to the directions of approach and departure that vehicles would take to access and leave the site. Estimates of regional project trip distribution were developed based on existing travel patterns in the area, as presented on **Figure 5**. The net new vehicle traffic expected to be generated by the project was then assigned to streets in the local roadway system for the PM and Saturday peak hours considering the access limitations at intersections in the vicinity of the site. The resulting trip assignment through each study intersection is shown on **Figure 6**[9].

Project intersection volumes were added to existing traffic counts, to show Existing Plus Project traffic conditions. The resulting traffic volumes are shown on **Figure 7**.

Traffic Forecasts

Approved developments have the potential to increase activity within the study area. These developments include:

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[9] The volumes on Figures 6, 7 and 8 reflect development of 220 units at the site, as this was the proposed project at the time of analysis.

- Marketplace Redevelopment
- Hyatt Place Hotel at Christie Avenue/Bay Street

A full-service hotel with approximately 170 rooms is proposed at Site A, located at the north end of Bay Street, east of Shellmound Street at Christie Avenue. The Marketplace Redevelopment project proposes to construct approximately 71,300 square feet of additional restaurant/retail space and 735 residential units. 190 residential units are currently under construction at the 64th/Christie site.

Vehicle traffic expected to be generated by each of these projects was assigned to the roadway network to develop Near-term Without Project forecasts. The potential trip generation was estimated using a similar method as for project trips. Vehicle trips expected to be generated by the project were then added to estimate Near-term With Project forecasts, which are presented on **Figure 8**.

Future Intersection Operations

Future intersection operations were evaluated using the same methods as for Existing conditions for the weekday PM and Saturday afternoon peak hours based on the volumes presented on Figures 7 and 8, as presented in Table 1.

With the addition of vehicle traffic from the project, delay at intersections is expected to increase for vehicles and transit vehicles. Additional traffic through the area would also exacerbate existing vehicle queue spillback through the study area that originates outside Emeryville, such as from congested conditions on I-80 or the Ashby Avenue corridor.

The provision of an exclusive left-turn pocket from Shellmound Street to the project driveway was reviewed. Traffic volumes entering the driveway and the opposing through volumes do not warrant the provision of an exclusive left-turn lane into the site. When vehicle queues occur on Shellmound Street, either from a train event or congestion on I-80 spilling back along the Shellmound Street corridor, a left-turn pocket into the site would not appreciably change the delay either for someone waiting to turn into the site, or traveling on Shellmound. There are also constructability issues, as the provision of a left-turn pocket into the site driveway would eliminate a portion of the lane for vehicles to queue out of the through lane (from northbound Shellmound Street turning right to 67th Street) when the rail crossing gates are activated, and reduce the width the northbound bike lane. Widening on the west side of the roadway is not feasible due to the location of the adjacent building. Removing on-street parking is an option, but that would result in the loss of about 6-8 on-street parking spaces and would also result realignment of the bike lane in the southbound direction. Based on the above considerations, an exclusive left-turn lane into the site is not warranted nor recommended.

Peak hour signal warrants would not be triggered at additional intersections with the addition of project traffic, although they would continue to be met at the Hollis Street/66th Street intersection. Signalization of this intersection was considered, but was rejected for a number of reasons, including proximity to the signalized 65th Street/Hollis Street intersection, vehicle queue spillback from Ashby Avenue that would affect the future operation of this intersection regardless of traffic control, and potential to increase vehicle traffic at the unsignalized mid-block Emeryville Greenway Crossings on 67th, 66th and 65th Streets. The project, as well as other developments in the area, is projected to increase traffic volumes at these crossings, potentially increasing pedestrian and bicycle conflicts with vehicles and contributing to the need to provide a multi-modal street network within the City of Emeryville to maintain mobility. Signalizing the Hollis Street/66th Street intersection could encourage additional vehicle traffic along these corridors further increasing pedestrian and bicycle conflicts with vehicles.

The City of Emeryville is updating their Transportation Impact Fee (TIF) in combination with establishing new fees. Improvements to transportation facilities included in the fee are designed to improve the efficiency of the street network, reduce vehicle trips, and enhance the transportation system for walking, bicycling, and using transit. Shifting existing and new trips that would otherwise be made by a private auto to pedestrian, bicycle and transit trips improves the efficiency of the transportation system for all users and achieve General Plan goals such as avoiding pavement additions to the street network and minimizing adverse environmental impacts associated with vehicle use.

When there is rail activity in the area, roadway network operations are significantly worse than shown in Table 1, which would be worsened with new vehicle traffic from the project as well as other pending developments in the area.

> ***Recommendation 1:*** The City of Emeryville has plans to create a railroad quiet zone for the at-grade railroad crossings of the Union Pacific Railroad located just east of Shellmound Street at 65th, 66th, and 67th Streets. A quiet zone will cease the routine sounding of train horns by improving the safety of the at-grade crossing for both vehicles and pedestrians. This project is included in the preliminary update of the Transportation

Impact Fee, to which the project applicant would contribute their fair share of the cost through their payment of the fee.

General Plan Comparison

The City of Emeryville General Plan land use designation and the zoning for the site are Mixed-Use with Residential. The General Plan EIR transportation analysis considered development of a 200-room hotel and 40,000 square feet of retail on the site, in conjunction with the removal of existing site uses. The net-new trip generation from site development assumed in the General Plan EIR analysis is also shown in **Table 4**. The currently proposed project would generate more traffic than assumed in the General Plan EIR analysis during the weekday morning peak hour, similar levels during the weekday evening peak hour, and significantly less traffic during the Saturday peak hour. As the trip generating potential of the proposed project is similar to or less than what was included in the General Plan EIR analysis for the critical analysis time periods (weekday PM and Saturday peak hour), the project is not expected to result in new or substantially more severe transportation impacts than described in the General Plan EIR.

Prior studies in the area have included evaluation of weekday morning peak hour operations of intersections along the Shellmound Street and Hollis Street corridor, as documented in the Marketplace Redevelopment EIR, June 2007. Results of that assessment indicate that traffic volumes and associated levels of delay for travel along the corridors are less during the morning peak hour than at other times of day. Recent traffic counts collected in January 2013 by the City for the purposes of retiming traffic signals on a City-wide basis were reviewed for the Shellmound Street/Shellmound Way, Shellmound Way/Christie Avenue and Hollis Street/65th Street intersections. This review indicates that traffic volumes are 40 to 50 percent higher during the weekday PM peak hour than the weekday AM peak hour. Based on these considerations, evaluation of morning peak hour operations would not provide additional information to aid in the decision making process.

TABLE 1
INTERSECTION LEVEL OF SERVICE RESULTS

Intersection[1]	Peak Hour	Existing		Existing Plus Project[4]		Near-Term With Project[4]	
		Delay[2+5]	LOS[3]	Delay[2+5]	LOS[3]	Delay[2+5]	LOS[3]
1. Potter Street/Bay Street (SSSC)	PM SAT	12 (12) 13 (16)	B (B) B (C)	12 (12) 13 (16)	B (B) B (C)	13 (13) 16 (16)	B (B) C (C)
2. I-80 Off-Ramp/ Shellmound Street (SSSC)	PM SAT	1 (9) 3 (11)	A (A) A (B)	1 (9) 3 (11)	A (A) A (B)	1 (9) 3 (11)	A (A) A (B)
3. 67th Street/Shellmound Street (SSSC)	PM SAT	2 (13) 2 (13)	A (B) A (B)	3 (13) 2 (14)	A (B) A (B)	3 (16) 2 (16)	A (C) A (C)
4. 67th Street/Hollis Street (SSSC)	PM SAT	6 (95) 2 (19)	A (F) A (C)	8 (<120) 3 (20)	A (F) A (C)	23 (<120) 4 (26)	C (F) A (D)
5. 66th Street/Shellmound Street (SSSC)	PM SAT	3 (14) 2 (13)	A (B) A (B)	3 (14) 2 (14)	A (B) A (B)	3 (17) 3 (18)	A (C) A (C)
6. 66th Street/Hollis Street (SSSC)	PM SAT	36 (<120) 3 (18)	E (F) A (C)	41 (<120) 3 (18)	E (F) A (C)	63 (<120) 3 (19)	F (F) A (C)
7. 65th Street/Shellmound Street (Signal)	PM SAT	10 14	A B	11 14	B B	11 14	B B
8. 65th Street/Hollis Street (Signal)	PM SAT	36 12	D B	38 12	D B	51 13	D B
9. Project Driveway/ Shellmound Street (SSSC)	PM SAT	1 (10) 0 (0)	A (B) A (A)	1 (11) 1 (12)	A (B) A (B)	1 (11) 1 (12)	A (B) A (B)

Notes:
1. Signal = Signalized Intersection; SSSC = Side-street stop-controlled intersections, traffic from the major roadway does not stop
2. Delay presented in seconds per vehicle; for side-street stop-controlled intersections, delay presented as intersection average (worst approach)
3. LOS = Level of Service.
4. Results reflect 220 apartment units, which was the level of development proposed at the time the analysis was conducted. Overall conclusions would not change with the currently proposed 211 unit project.
5. Actual delay may be worse than shown above during a rail crossing event or when congested conditions occur on I-80 or the Ashby Avenue corridor and vehicle queues spillback through the area.

Source: Fehr & Peers, May 2014.

TABLE 2
PEAK HOUR VOLUME SIGNAL WARRANT ASSESSMENT SUMMARY

Intersection[1]	Peak Hour	Existing	Existing Plus Project	Near-Term With Project
1. Potter Street/Bay Street (SSSC)	PM SAT	No No	No No	No No
2. I-80 Off-Ramp/ Shellmound Street (SSSC)	PM SAT	No No	No No	No No
3. 67th Street/Shellmound Street (SSSC)	PM SAT	No No	No No	No No
4. 67th Street/Hollis Street (SSSC)	PM SAT	No No	No No	No No
5. 66th Street/Shellmound Street (SSSC)	PM SAT	No No	No No	No No
6. 66th Street/Hollis Street (SSSC)	PM SAT	Yes No	Yes No	Yes No
9. Project Driveway/ Shellmound Street (SSSC)	PM SAT	No No	No No	No No

Source: Fehr & Peers, May 2014.

TABLE 3
67TH, 66TH AND 65TH STREETS RAILROAD CROSSINGS
DECEMBER 2013 OBSERVED ACTIVITY[1]

	Weekday	Weekend
Average Trains Per Day	57.17	44.5
Range of Trains Per Day	50-63	44-45
Average Total Durations of Gate Closure Time During Peak Hour	00:09:02	00:20:36
Average Trains during Peak Hour	6.17	9
Average Rail Cars Per Train Per Day	19	17
Max Individual Gate Closure	00:31:54	00:10:53
Max Individual Gate Closure During Peak Hour	00:10:35	00:07:07
Total Number of Gate Closures Observed during Data Collection Period[1]	347	91
% of Crossings with Duration > 5 Min	8.65%	6.59%
% of Crossings with Duration > 30 Min	1.44%	0.00%
Max Crossing Period	9-10 AM	9-10 AM

Notes: 1. Data collection period from December 2, 2013 to December 9, 2013.
Source: Fehr & Peers, 2014.

TABLE 4

TRIP GENERATION ESTIMATES

Use	Size	Weekday							Saturday			
		Daily	AM Peak Hour			PM Peak Hour			Daily	Peak Hour		
			In	Out	Total	In	Out	Total		In	Out	Total
Residential[1]	211 Units	1,400	22	86	108	85	46	131	1,350	56	54	110
	Less Trip Reductions											
	External Walk/Bike Trips[2]	-210	-3	-13	-16	-13	-7	-20	-200	-8	-8	-16
	External Transit Trips[3]	-140	-4	-17	-21	-18	-10	-28	-70	-11	-11	-22
Net New Vehicle Trips to Transportation Network[4](A)		**1,050**	**15**	**56**	**71**	**55**	**30**	**85**	**1,080**	**37**	**35**	**72**
Net New Site Trip Generation Assumed in General Plan Transportation Analysis (B)		--	17	21	38	44	33	77	--	90	68	158
Difference between Current Proposal and General Plan Assumptions(C = B-A)		--	-2	35	33	11	-3	8	--	-53	-33	-86

1. Based on *Trip Generation* (9th Edition) trip generation rates for land use 220, Apartment
2. 15 percent of trips are expected to be external walk/bike trips.
3. 10 percent of weekday daily trips and 15 percent of weekday peak hour trips are expected to be transit trips to/from the site. On a Saturday, 5 percent of daily and 10 percent of peak hour trips would be transit trips.
4. The net driveway vehicle trip estimates presented above represent a 20-35% reduction compared to using the ITE methodology alone.

Source: Fehr & Peers, May 2014

SITE ACCESS, CIRCULATION AND PARKING

This section discusses site access and internal circulation for vehicles, pedestrians, bicycles, and emergency vehicles based on the site plan presented previously on Figure 2. A parking assessment was also conducted. Site recommendations are presented on **Figure 9**.

Vehicle Access and Circulation

The analysis results shown in the previous section indicate that the single vehicular access point would operate acceptably for vehicles with no northbound left-turn pocket into the site from Shellmound Street. The driveway is proposed to be 20-feet wide, which accommodates two-way vehicular travel, with a three foot buffer on the south side between the roadway and the adjacent building. A five-foot sidewalk would be provided on the north side of the access roadway. It appears that garage access would be gate restricted. It is unclear how guests would be able to access the garage.

> ***Recommendation 2:*** Provide details regarding proposed access restrictions and guest access to the parking garage.

Emergency access is also provided on the northern side of the building, which accesses a 20-foot clear path that encircles the building. Separate gated access for pedestrians and emergency vehicles would be provided. A meandering pedestrian path would be provided in this area, which would provide pedestrian access to the ground floor townhomes.

Access to the loading zone and design of the parking garage circulation are discussed in subsequent sections.

Delivery Vehicle Access

The City of Emeryville Planning Regulations outlines loading zone requirements for a variety of uses, as detailed in Table 9-4.409 of the regulations. For multi-family projects with between 150 and 300 units, two small loading zones are required, resulting in a loading zone requirement of two spaces. Two small loading zones should be designed with a width of no less than ten-feet, a length of no less than 25-feet and a vertical clearance of no less than eight-feet. The Planning Director and Planning Commission are provided discretion to modify the number and size of loading areas.

Two off-street loading areas are currently shown on the site plan with access from the driveway connecting to the parking garage. An AutoTURN assessment was conducted to demonstrate how trucks (approximately 24-feet in total length) would access the loading area, as shown on **Figure 10**. This analysis shows that moving trucks that would typically be used to accommodate the contents of a two bedroom dwelling unit would be accommodated by the proposed loading area. However, inexperienced drivers may require assistance to back into the loading area. If vehicles pull forward into the loading area, the active loading/unloading of household goods could occur into the main driveway area, resulting in conflicts between loading/unloading activities and driveway operations. Trucks longer than 24-feet in length would have difficultly accessing the loading area unless driven by a professional mover/driver, and would need to park on Shellmound Street. Given the size of the proposed units, frequent use of trucks longer than 24-feet is not anticipated.

> ***Recommendation 3:*** All vehicles should be required to back into the loading area.

Two trash collection rooms are shown on the site plan on the first floor of the garage, one on the western end and one on the eastern end of the parking garage. Two trash chute locations appear to be provided on each floor of the building. The loading area is also designated as the trash staging area. However, it is not clear from the project site plans how refuse containers would be staged in the area.

> ***Recommendation 4:*** Refuse collection procedures should be reviewed by City and WMAC staff. Staging of trash receptacles in the loading area should not permanently reduce the effective depth of the loading area.

Pedestrian

Pedestrian access to the site would be provided from Shellmound Street. Eight-foot sidewalks would be constructed along the Shellmound Street project frontage within a wider pedestrian zone. Along the southern boundary of the site, five-foot sidewalks would be provided along the northern side of the access road. A pedestrian gate just west of the garage entry would provide pedestrian access to a path that encircles the site and also serves as an emergency access road.

The project would also increase the potential for pedestrian activity across Shellmound Street at 67th Street, and the potential for pedestrian crossings of the at-grade railroad crossing. There are currently no pedestrian accommodations across Shellmound Street or the railroad crossing at 67th Street although pedestrian activity was observed.

> ***Recommendation 5:*** Install a high visibility crosswalk with advance signage across the south side of Shellmound Street at 67th Street and provide an ADA compliant pedestrian crossing of the railroad tracks, similar to what is provided on 65th Street.

Bicycle

Shellmound Street has Class II bicycle facilities (striped bike lanes) that connect to other existing and planned bicycle facilities in the area. The project would not disrupt existing bicycle facilities, nor interfere with planned facilities. Bicycle parking and internal circulation is discussed in a subsequent section.

Transit

Several transit routes are within walking distance to the project site, although access to the Hollis Route of the Emery Go-Round system could encourage pedestrian activity across at-grade railroad crossings. Measures to address this were discussed in a prior section. The project would not disrupt existing transit facilities, nor interfere with planned facilities. The project would be subject to annual assessment to fund the operations of the Emery Go-Round service, which is required of all commercial entities including for-rent residential projects of more than three units. Although the project is expected to increase transit ridership in the area, annual contributions would also be made to fund transit service in the area.

Parking

The project proposes to provide capacity to park approximately 264 vehicles, including 131 standard parking spaces with independent utility, 70 parking stalls that would be used in conjunction with the proposed puzzle parking system, and an additional 63 parking spaces that would be gained through the use of a parking lift system. The actual system that would be employed for this project is still under consideration, but the first level of the garage is being designed to provide 14-foot clearance to accommodate vertically stacked vehicles.

> ***Recommendation 6:*** Review the design and operations of the parking lift system when selected, considering items such as vertical clearances, vehicle access, ease of operation,

speed to disperse vehicles and pedestrian access to/from the vehicle once in the lift system.

The parking required under the Emeryville Planning Regulations is presented in **Table 5** which shows a minimum parking requirement of 314 spaces for the project as currently contemplated, which is more than currently proposed for inclusion in the project considering the parking lift system. The code required parking for the site results in the provision of 1.5 parking spaces per unit, while the proposed parking supply results in approximately 1.25 parking spaces per unit. Although up to 10 percent more parking can be provided than required by code, a conditional use permit would need to be issued to provide less than the code-required parking.

TABLE 5
PROPOSED PROJECT AND CITY CODE AUTOMOBILE PARKING REQUIREMENTS

Bedrooms/	# Units	Base Requirement	Reductions Applied Per Code	Base Off Street Parking Requirement
Studio	11	1 per unit	None	11
1-bed	101	1 per unit	None	101
2-bed	88	1.5 per unit	None	132
3-bed	11	1.5 per unit	None	17
Guest	211	0.25 per unit	None	53
			Total	**314**
			Proposed Supply	**264**
			Surplus/(Deficit)	**(50)**

Source: City of Emeryville Planning Regulations, Fehr & Peers, 2014.

The Project Applicant retained W-Trans to prepare a parking demand study of similar developments in the study area. We have peer reviewed their memorandum dated March 3, 2014 which documents parking surveys at two similar projects in Emeryville, Archstone and Avenue 64, as well as published data from the Institute of Transportation Engineers (ITE) in the *Parking Generation Manual*. As part of the parking surveys, on-site and on-street parking demand was documented for a weekend night and a weekday night to represent the time periods when residential parking demand is typically the highest.

Results of the parking demand surveys indicate an average observed parking demand of 1.33 spaces per dwelling unit for similar projects in the surrounding area (ranging between 1.27 to 1.39 spaces per unit), including on-street parking that captures potential guest parking demand (and may potentially overstate demand). The parking assessment also notes that ITE documents an average parking demand of 1.20 spaces per apartment unit in urban areas and 1.23 spaces per apartment unit in suburban areas. W-Trans concludes that considering on-street parking in the vicinity of the project site, sufficient parking would be provided for the project to accommodate expected typical peak parking demand.

The two apartment complexes included in the survey are in close proximity to the project site and it is expected that the residents of the proposed project would be similar to the surveyed sites. Although the W-Trans parking assessment correctly references the observed average peak parking demand for urban apartments, the observed range of parking demand documented by ITE for urban apartments is 0.66 to 2.50 on a weekday and 0.80 to 1.43 on a Saturday. The observed parking demand for both surveyed sites falls within the observed demand documented by ITE. However, it should be noted that limited details are provided about the locations included in the ITE survey data and use of local survey data is recommended over national averages.

As part of our assessment, Fehr & Peers reviewed auto-ownership per household as documented by the American Community Survey (ACS), 2008-2012 for Emeryville. For rental units in Emeryville, vehicle ownership rates are approximately 1.10 vehicles per household, with vehicle ownership rates increasing to approximately 1.40 for owner-occupied units in Emeryville. Approximately 70 percent of rental households have one vehicle, with 10 percent having none. The remaining households have two or more vehicles available.

W-Trans estimates that the total parking demand for the project would be 1.33 spaces per unit (the average of the maximum observed parking demand at the two sites) or 281 parking spaces. W-Trans concludes that on-site parking may be insufficient to accommodate the expected peak parking demand, but assuming use of on-street parking along Shellmound Street in combination with the on-site supplies, sufficient parking would be provided. It should be noted that on-street parking cannot be used to satisfy the off-street parking requirement unless the project is adding on-street parking where there currently is none.

Based on our review of the parking demand assessment, published data from ITE, and census data reflective of the City of Emeryville, ***the proposed on-site parking supply of 1.25 spaces per***

unit is expected to be insufficient to accommodate peak resident and guest parking demand.

> ***Recommendation 7*****:** Increase the on-site vehicle parking supply to the average observed demand from the parking demand assessment plus five percent to account for typical daily fluctuations in parking demand. The resulting parking supply would be **1.40 spaces per unit, or 295 spaces**. The current parking supply results in a 31 space deficit from the expected parking demand.

If increasing the on-site parking supply is not feasible, parking demand strategies would need to be implemented, monitored and adjusted to reflect the actual tenant profiles of the project, to reduce parking demand to a level that could be accommodated with the proposed on-site supply.

> ***Recommendation 8:*** To manage the proposed parking demand and supply, the project applicant shall develop and implement a parking management plan and monitoring program prior to issuance of temporary certificate of occupancy. The plan should identify provisions for monitoring parking demand as the residential units become occupied to assess the effectiveness of the strategies detailed below and to work with the City of Emeryville to implement additional strategies, if necessary. The parking monitoring shall be performed by an independent firm to be approved by the Director of Planning and Building and shall consist of a survey of typical weekday (at least two observations between 9 PM and 6 AM) and weekend (at least two observations between 9 PM and 6 AM) parking demand when the project is approximately 75 percent occupied and well as three to six months after full occupancy (at least 95 percent occupancy). On-street parking demand should also be included in the assessment on Shellmound Street between 65th Street and 67th Street.
>
> The monitoring report shall document the observed parking demand in the guest and resident spaces, as well as on-street parking supplies, provide a comparison of the parking demand to the supply, the status of parking demand management strategies being employed, and recommendations for additional parking demand management strategies that could be employed, if needed.
>
> Unbundling of parking cost from the rent is a requirement of all multi-family residential projects, and results in residents paying one price for the residential unit and a separate

price for parking, should they opt for a space. The cost of parking can be adjusted such that resident parking demand and supply are in equilibrium (see item 5 below).

Elements of the parking management plan should include (items 1-6 are required elements of the plan, items 7-10 are suggestions for consideration):

1. Provide AC transit passes to residents for the first year of their tenancy, or other specified time period (5 to 15 percent parking demand reduction expected)

2. Provide information to new residents about the availability of transit in the area (parking demand reduction negligible, supporting measure to provision of AC transit passes)

3. Provide a carshare pod within the building or other location in close proximity to the project (within 800 feet) (up to 5 percent parking demand reduction expected)

4. Assign specific parking spaces to tenants (parking demand reduction negligible, but would manage supplies) who opt to lease a parking space and provide flexible parking space lease terms that allow for termination of the parking space lease during the residential lease term

5. Implement variable parking pricing such that each subsequent parking space leased by a unit costs more than the previous space, (i.e., the second parking space is more expensive than the first; the third is more expensive than the second, etc.), and if the percentage of leased parking spaces is higher than the percentage of leased units, the parking price is adjusted until equilibrium is reached. For example, if 90 percent of parking spaces are leased but only 85 percent of units are leased, the monthly cost of parking should be increased such that new tenants opt to lease parking at a lower rate—higher cost—than existing tenants. The effectiveness of this strategy ranges from 3 to 20 percent, depending on the pricing of the parking.

6. Provide long-term bicycle parking above the code-required amount at a ratio of 1.5 bicycle parking spaces for each vehicle parking space provided below the expected demand

7. Implement restrictions on the use of guest parking spaces, such as: requiring guest vehicles to be registered with the building management; limiting the number of times the same guest vehicle can park overnight within the garage; limiting the number of guest permits a resident can request per

month (strategy could increase on-street demand and would need to be monitored for effectiveness).

8. Implement time restrictions on guest parking during daytime hours
9. Evaluate use of guest parking spaces and potentially assign to residents
   Review the parking garage layout to evaluate potential to increase parking supplies through the use of tandem parking stalls

Implementation of the above measures are expected to reduce parking demand by at least 38 spaces, resulting in an estimated on-site demand of 257 parking spaces (295 spaces - 38 spaces), which would be accommodated by the proposed on-site parking supplies.

Although there is some on-street parking in the vicinity of the site (approximately 20 spaces on Shellmound Street from the project site south to 65th Street), it is limited along the project frontage. Parking is also available on 67th and 66th Streets, but the railroad crossings and lack of pedestrian facilities connecting the project site to the east side of the railroad tracks makes it undesirable to encourage on-street parking by site residents and guests. Therefore, parking demand management strategies should aim to reduce actual parking demand, not shift the demand from off-street parking supplies to on-street supplies.

Parking Area Design

Layout of the parking areas was reviewed based on the plan shown on Figure 2. The review was based on design guidelines provided in Section 9-4.406 of the City's Planning Regulations. Parking aisle widths generally conform to the City requirement of 24-feet wide for perpendicular parking. Most of the parking stall lengths generally conform to the City's minimum requirement of 18-feet, with a width of 8.5-feet. City of Emeryville Parking Code requires parking stalls adjacent to a wall be one foot wider than a standard stall, which appears to be satisfied throughout the garage.

Although the stalls appear to meet standards, some would be difficult to access as indicated on Figure 9.

> ***Recommendation 9:*** Consider eliminating these parking stalls or convert to motorcycle parking. Each of the four motorcycle spaces is equivalent to a vehicle stall per Emeryville Planning Regulations.

Other Parking Considerations

Based on the Emeryville Planning Regulations, the project would be required to equip at least three percent of the residential parking supplies with electric vehicle (EV) charging infrastructure, resulting in 8 electric vehicle charging stations based on the current proposed supply. No EV charging infrastructure is shown on the site plan.

> ***Recommendation 10:*** Update the site plan to show the location of EV charging stations. Charging stations can be clustered together. At least one charging station should be reserved for guests.

Short term and long term bicycle parking is also required for the project. For the residential portion of the project, one short-term space is required for every four visitor vehicle spaces and one long-term space is required for each unit. This results in a requirement of 14 short-term and 211 long-term bicycle parking spaces for the residential portion of the project. Three bicycle storage rooms are provided within the first level of the parking garage, and two bicycle storage rooms are provided on the second floor of the parking garage. The total long-term supply indicated on the site plan is 211 spaces.

MBH Architects provided information related to the access routes from Shellmound Street to each bicycle storage room, as shown on **Figure 11**. Access to the first floor bicycle storage room adjacent to the bicycle spa is located in close proximity to the building entrances/exits from Shellmound Street. Access to the westernmost bicycle storage rooms on the first level of the garage would be from the path that encircles the site. One of the access routes requires travel through three sets of doors – two to enter the building and a third to enter the bicycle room. Access to the northernmost bicycle storage room on the second floor of the garage is shown from an elevator from the first floor of the parking garage, presumably with entry to the garage from the exterior path. Access to the southern bicycle storage room is shown from stairs connecting to an entrance on the first level, accessed from the sidewalk connecting to the main garage entry, requiring bicyclists to cross the main garage entry and climb a set of stairs with their bike. Most bicyclists would likely ride their bikes through the parking garage and use the vehicle ramping system, creating the potential for bicycle/vehicle conflicts, or take their bike in the elevator from the exterior path.

> ***Recommendation 11:*** The applicant shall provide access improvements and signage to enable a safe path of travel for bicyclists through the garage. A revised plan showing the

path of travel from street to each long-term storage room shall be reviewed and approved by the Director of Planning and Building prior to issuance of any building permit.

1. The pathway connecting Shellmound Street to the bicycle storage rooms on the northern side of the site should be well lit and signage directing bicyclists to this area should be provided.
2. Curb ramps shall be provided within the parking garage where bicyclists need to traverse a curb area to access the bicycle storage facilities.
3. Access to the bicycle storage rooms on the second floor of the garage shall be provided via elevator with appropriate signing and striping within the garage. This may require elimination of a guest parking stall to provide a clear path from the elevator to the bicycle room.
4. Doors leading to bicycle storage rooms shall have a push button mechanism such that bicyclists can enter/exit the building without having to prop open doors while wheeling their bicycle. These doors shall also have a mechanism to close behind the user for security. All bicycle storage rooms shall be access-restricted with locking mechanism.

Dimensions of the proposed bicycle storage room were also reviewed and compared to best practices for bicycle parking layout as described in *Bicycle Parking Guidelines, 2nd Edition,* A set of Recommendations from the Association of Pedestrian and Bicycle Professionals as well as guidance provided in the Emeryville Planning Regulations. This review is based on the dimension of a typical bicycle and the area needed to store and circulate bicycles within a storage room. As the type of rack proposed is not indicated, this review was based on the use of traditional racks and the dimensions of typical bicycles[10].

Based on our review and lack of specification regarding the type of bicycle rack mechanism, it is difficult to ascertain if the bicycle parking supply indicated on the site plan is feasible to be provided within the proposed bicycle storage rooms, as use of traditional racks would not yield the storage capacity shown on Figure 11. For example, based on the size of a typical bicycle and the needed space for maneuvering and storage, the primary bicycle storage room on the first

[10] Typical bicycles are 72 inches (6 feet) long, with a span of 24 inches (2 feet) at widest point (handlebars), and a height of 48 inches (4 feet). A bicycle storage room using traditional racks should provide 96 inches (72 inch minimum) of distance between the wall and a circulation aisle, in which the rack would be placed. The circulation aisle should be 60 inches wide (48 inch minimum). The distance between each rack should be 48 inches (30 inch minimum).

level is not wide enough to accommodate two rows of bicycle parking as the room is 11 feet, 8 inches wide, and 57 feet long. Assuming minimum required widths, approximately 46 bicycles could be accommodated in this room on a single level with two bicycles per rack, as opposed to the 74 spaces shown on the plan. Although wall mounted racks or two-tiered system could yield some additional capacity, it is not clear how those racks would be accommodated in this space.

> ***Recommendation 12:*** Provide additional details regarding the proposed bicycle rack systems within each of the bicycle storage rooms to confirm the proposed supply. Depending on the final vehicle parking supply, indicate where additional bicycle parking will be provided (see Recommendation 8). If modifications to the parking garage design are infeasible or impracticable to provide additional bicycle storage, consider providing bicycle storage on each floor of the building for residents of that floor.
>
> Consider providing a variety of bicycle storage options, including bicycle lockers that could be rented for an additional fee, double decked systems that maximize capacity, and traditional bicycle racks.

Bicycle lockers provide the most security and could be appealing to those who have invested heavily into their bicycle, and have bicycle accessories that are at risk for theft. Double decked systems increase capacity, but some users can have difficulties using the rack system. These systems also tend to require more maintenance as they have moving parts. Traditional system are less space efficient, but are more cost efficient, require less maintenance, and are generally easiest for bicyclist to use.

Accessible parking spaces, as required by the Americans with Disabilities Act (ADA), would also need to be provided within the project site, with the requirement based on the total number of parking spaces. For parking areas with between 201 and 301 parking spaces, seven ADA accessible stalls are required with a least one stall designed to be van accessible. For parking areas with 301 to 400 parking spaces, eight ADA accessible stalls are required with a least one stall designed to be van accessible. Eight accessible stalls are shown on the current site plan, which meets the requirement based on the required parking supply.

This completes our transportation assessment of 6701 Shellmound Street. Please call Kathrin with questions or comments.

Attachments:

Figure 1	Site Vicinity
Figure 2	Conceptual Project Site Plan
Figure 3	Existing Weekday PM Peak Hour and Saturday Peak Hour Intersection Turning Movement Volumes and Intersection Lane Configurations/Traffic Control
Figure 4	Existing Weekday PM Peak Hour and Saturday Peak Hour Pedestrian and Bicycle Volumes
Figure 5	Preliminary Project Trip Distribution
Figure 6	Preliminary Project Trip Assignment
Figure 7	Existing With Project Weekday PM Peak Hour and Saturday Peak Hour Intersection Turning Movement Volumes
Figure 8	Near-Term With Project Weekday PM Peak Hour and Saturday Peak Hour Intersection Turning Movement Volumes
Figure 9	Consultant Site Plan Recommendations
Figure 10	Loading Zone Access
Figure 11	Bicycle Access Routes

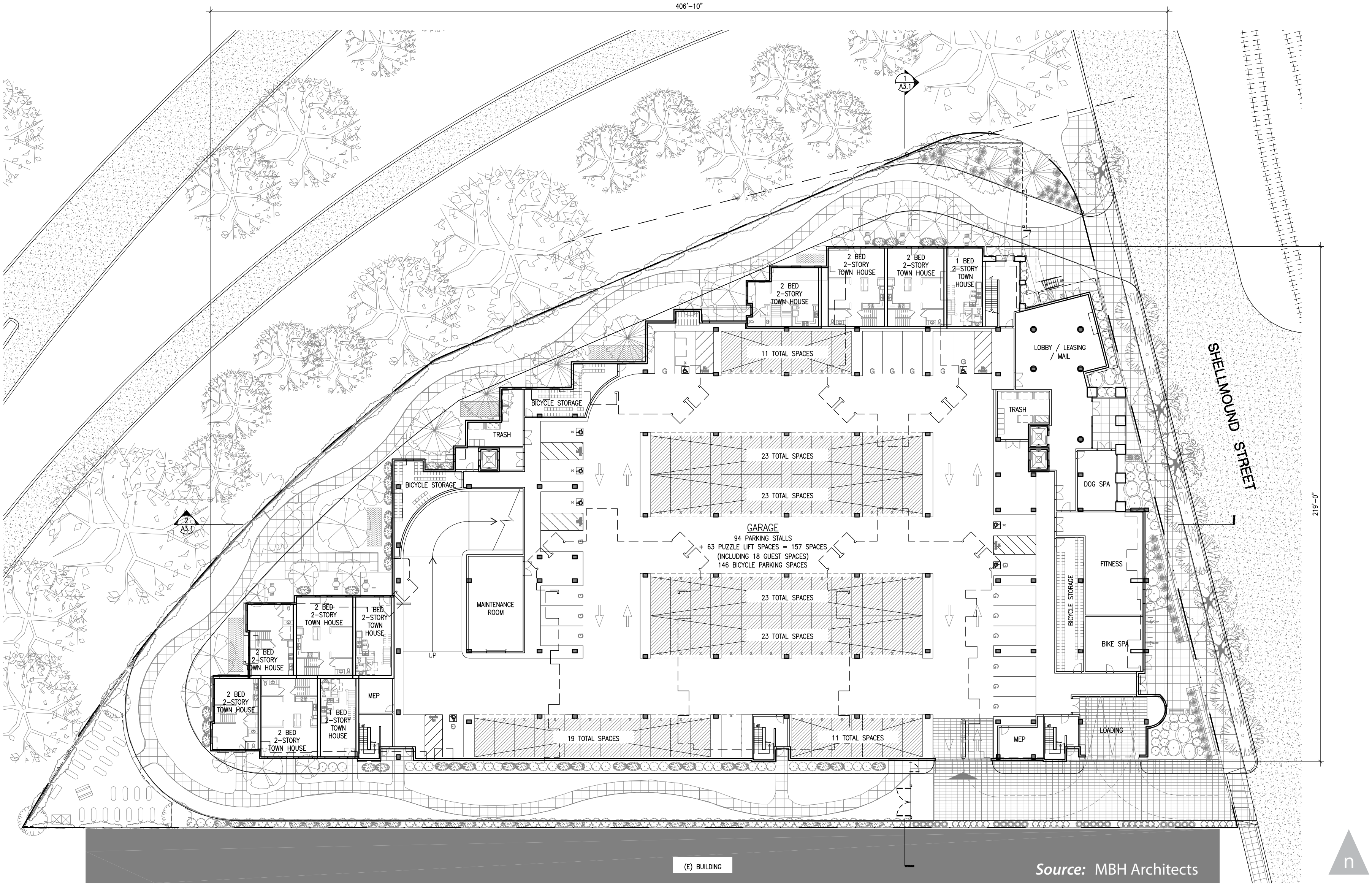
Attachment A	Level of Service Analysis Methods
Attachment B	Traffic Count Worksheets
Attachment C	Level of Service Worksheets

LEGEND

\# Study Intersection

Figure 1

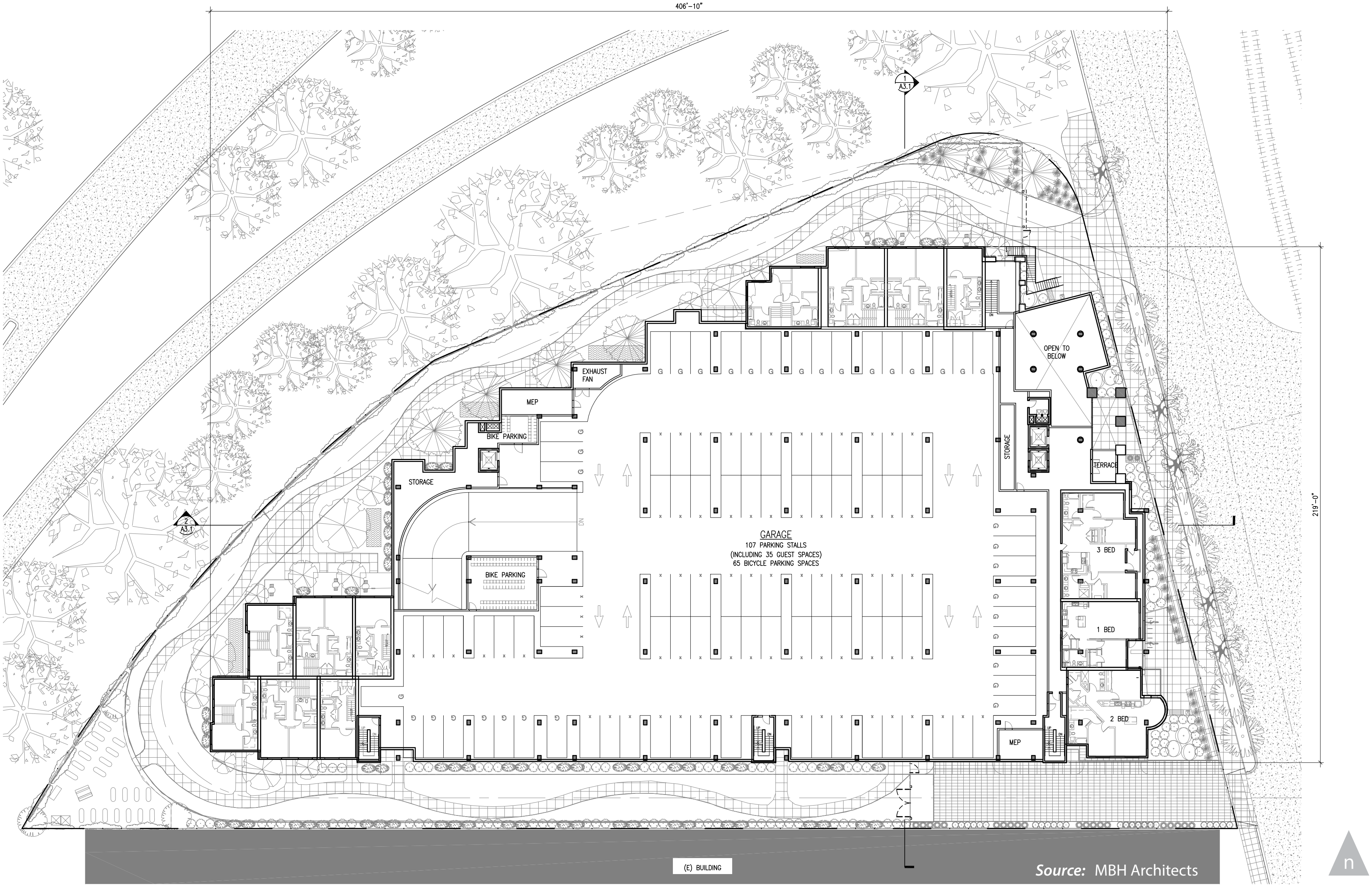
Project Site Vicinity Map and Intersection Analysis Locations



WC13-3096_2A_SitePlan

Figure 2A

Conceptual Project Site Plan – First Floor Plan



WC13-3096_2B_SitePlan

Figure 2B

Conceptual Project Site Plan – Second Floor Plan

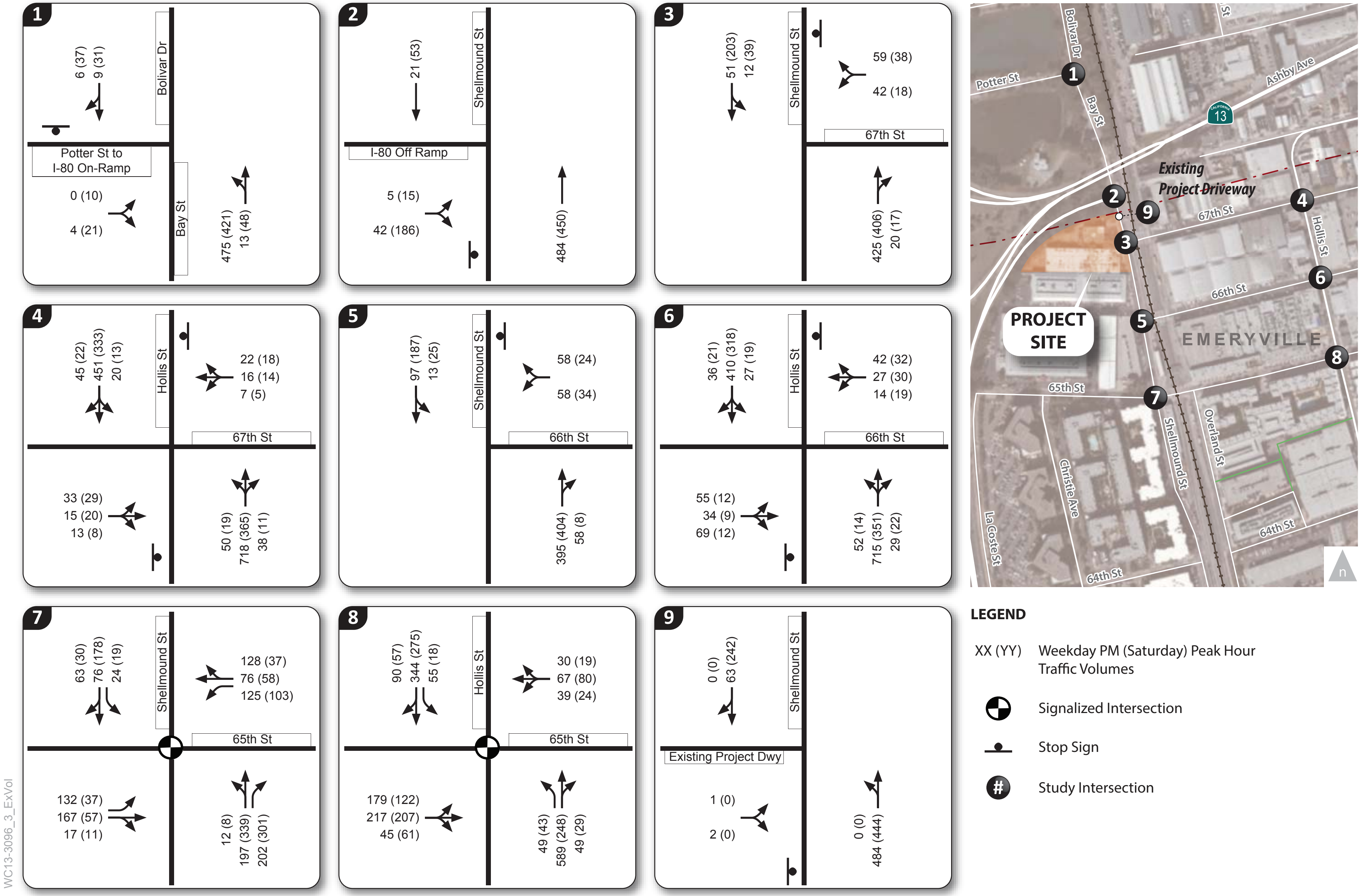
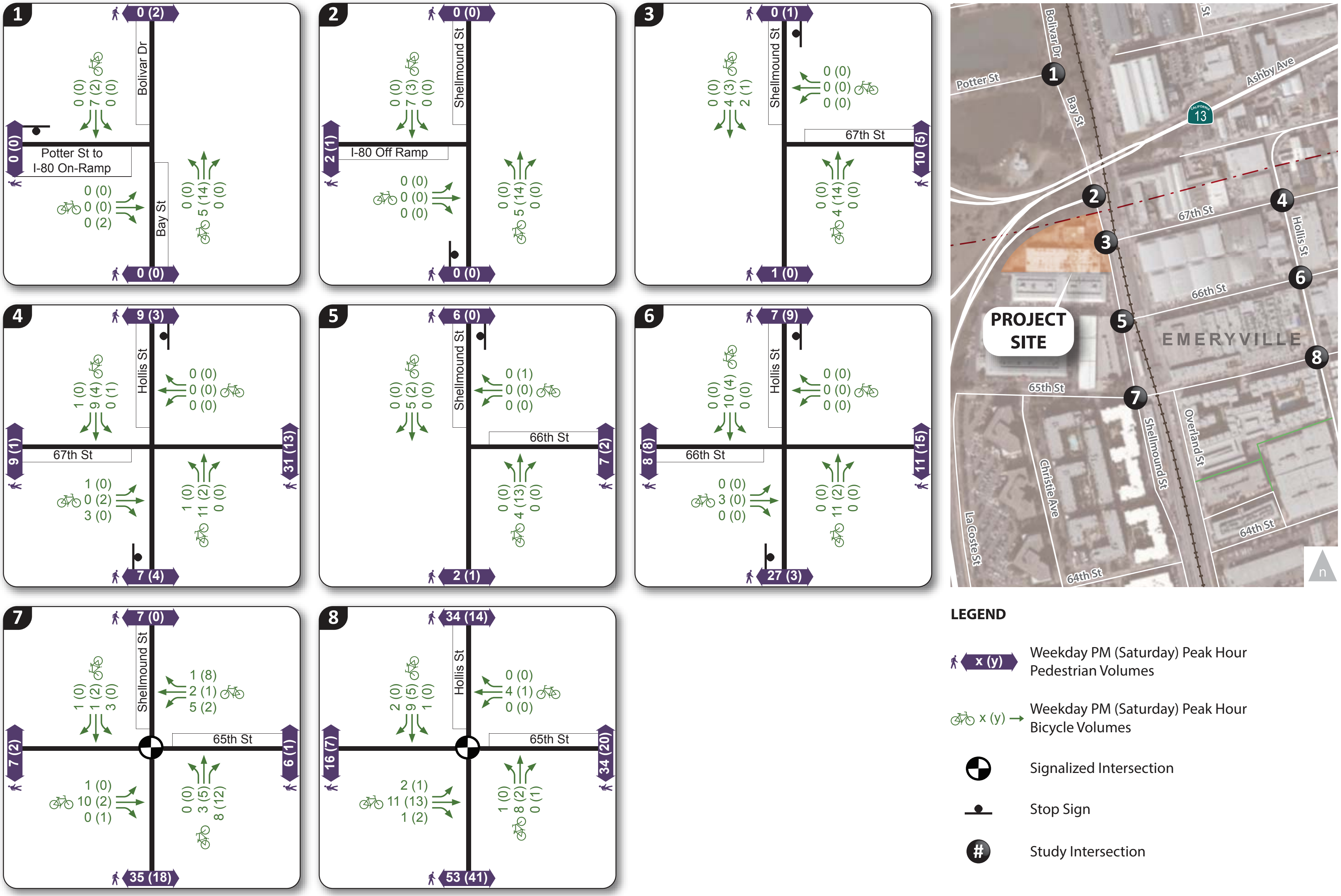


Figure 3
Existing Weekday PM Peak Hour and Saturday Peak Hour Intersection Turning Movement Volumes, Lane Configurations and Traffic Control



WC13-3096_4_PedBikeVol

Figure 4
Existing Peak Hour
Pedestrian and Bicycle Volumes

LEGEND

# Study Intersection	Project Site	A% (B%) | C% (D%)	Inbound (Outbound) Weekday PM Peak Hour *Inbound (Outbound) Saturday Peak Hour*

Figure 5

Preliminary Project Trip Distribution

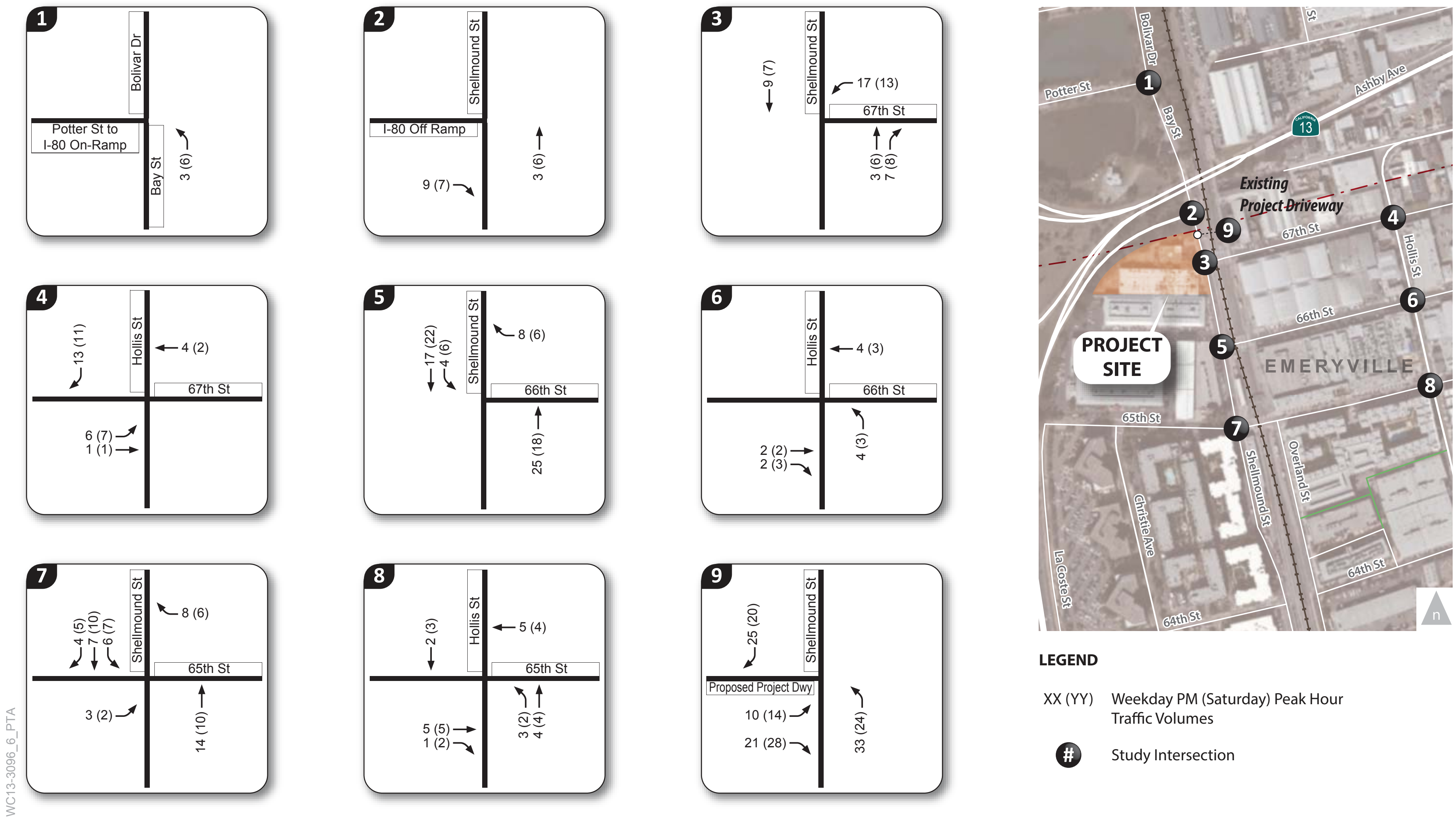


Figure 6

Project Trip Assignment

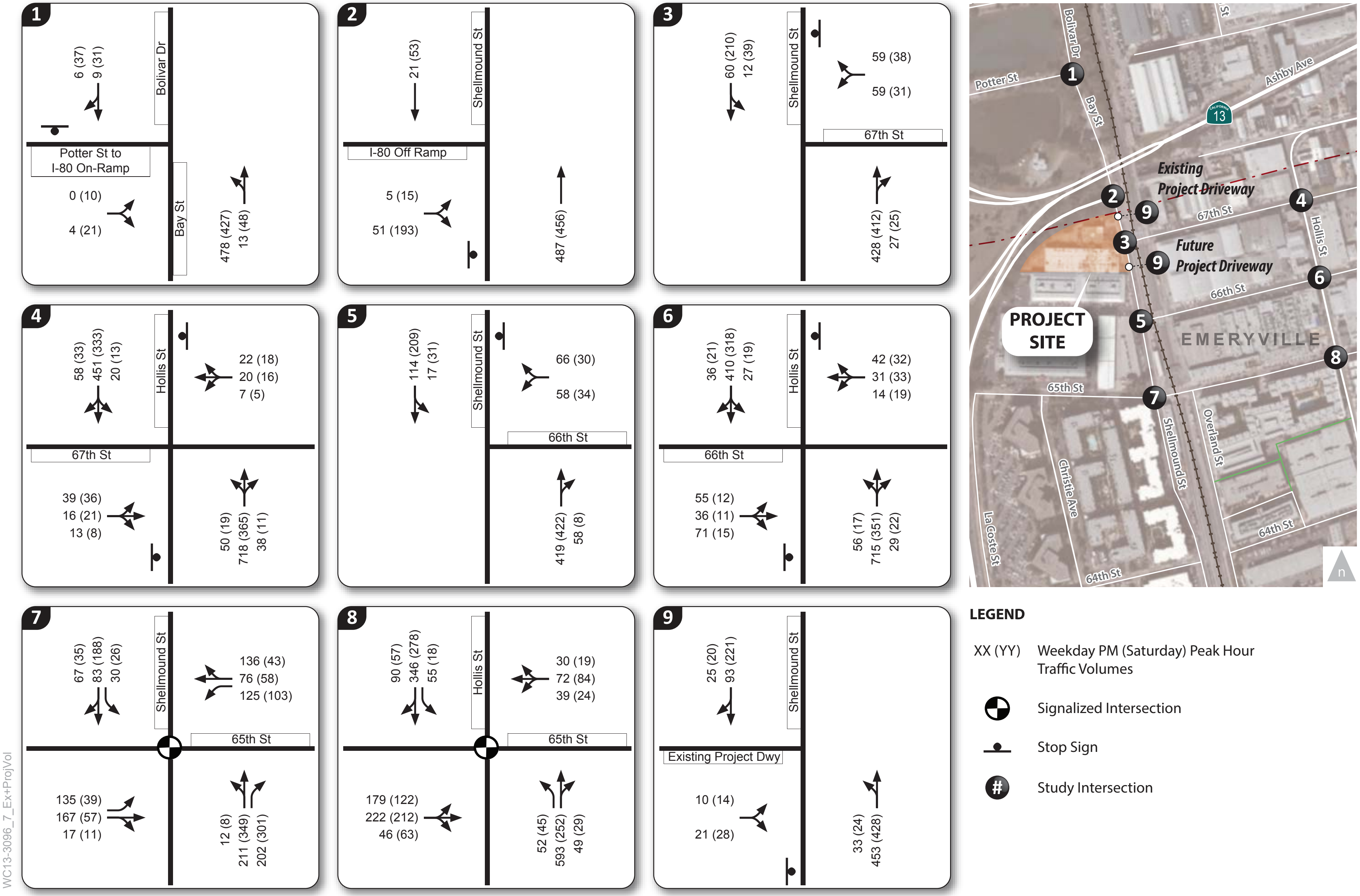


Figure 7
Existing Plus Project Weekday PM Peak Hour and Saturday Peak Hour Intersection Turning Movement Volumes, Lane Configurations and Traffic Control

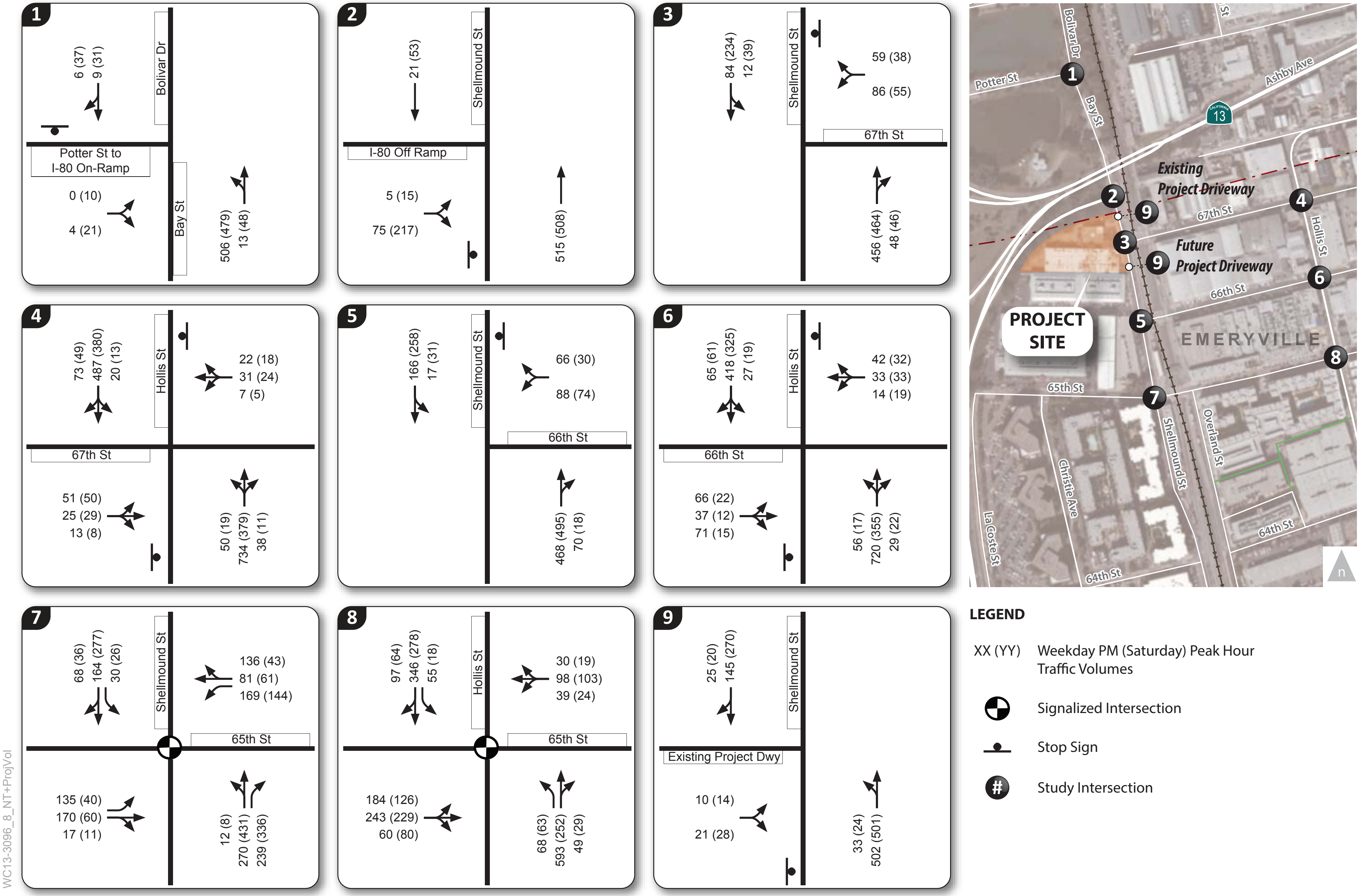
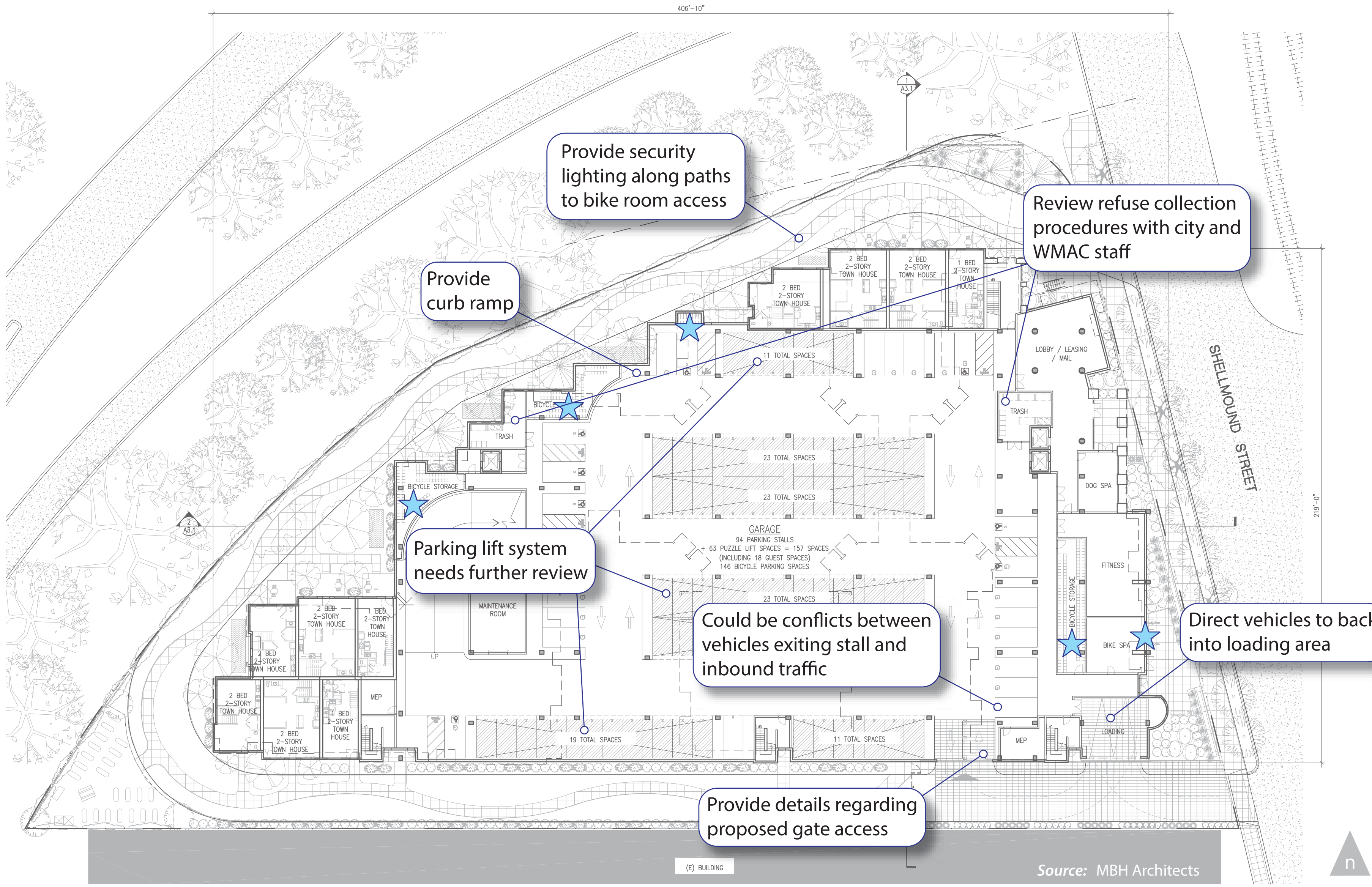


Figure 8

Near-Term With Project Weekday PM Peak Hour and Saturday Peak Hour Intersection Turning Movement Volumes, Lane Configurations and Traffic Control



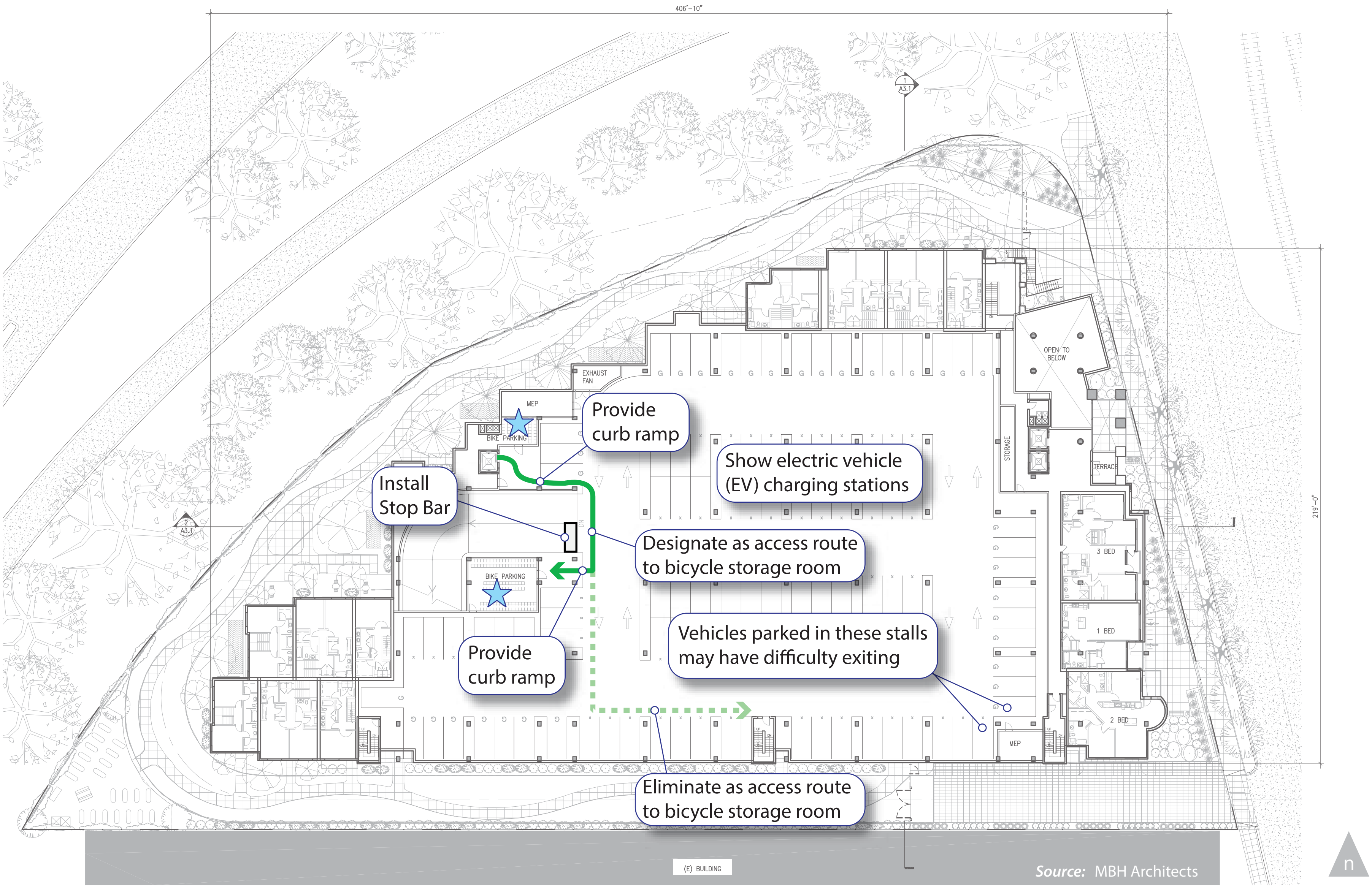
Source: MBH Architects

LEGEND

★ Provide Details on Bike Storage Racks to Confirm Total Supply

Figure 9A

Consultant Site Plan Recommendations – First Floor Plan



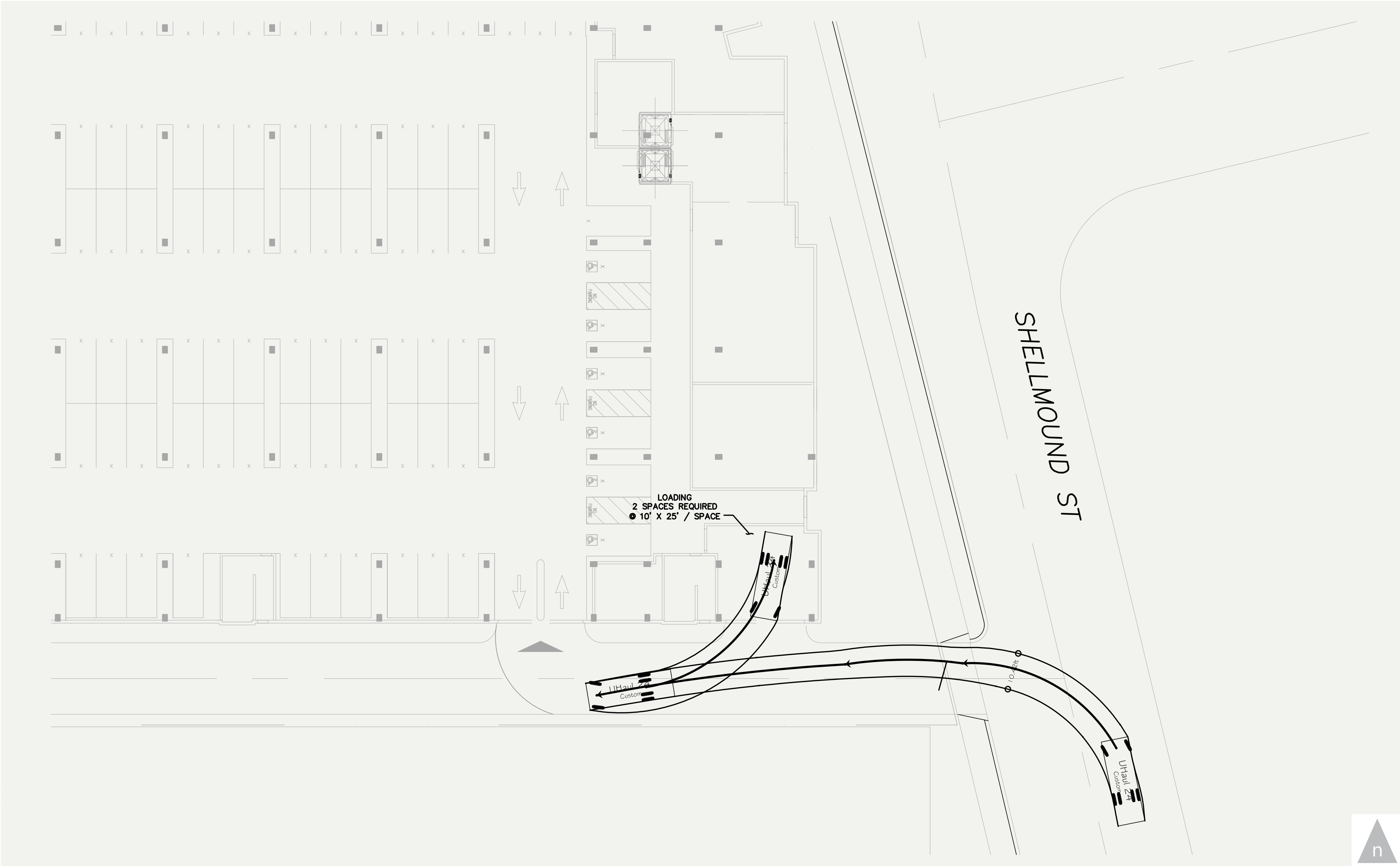
LEGEND

Provide Details on Bike Storage Racks to Confirm Total Supply

WC13-3096_9B_SitePlanRec2

Figure 9B

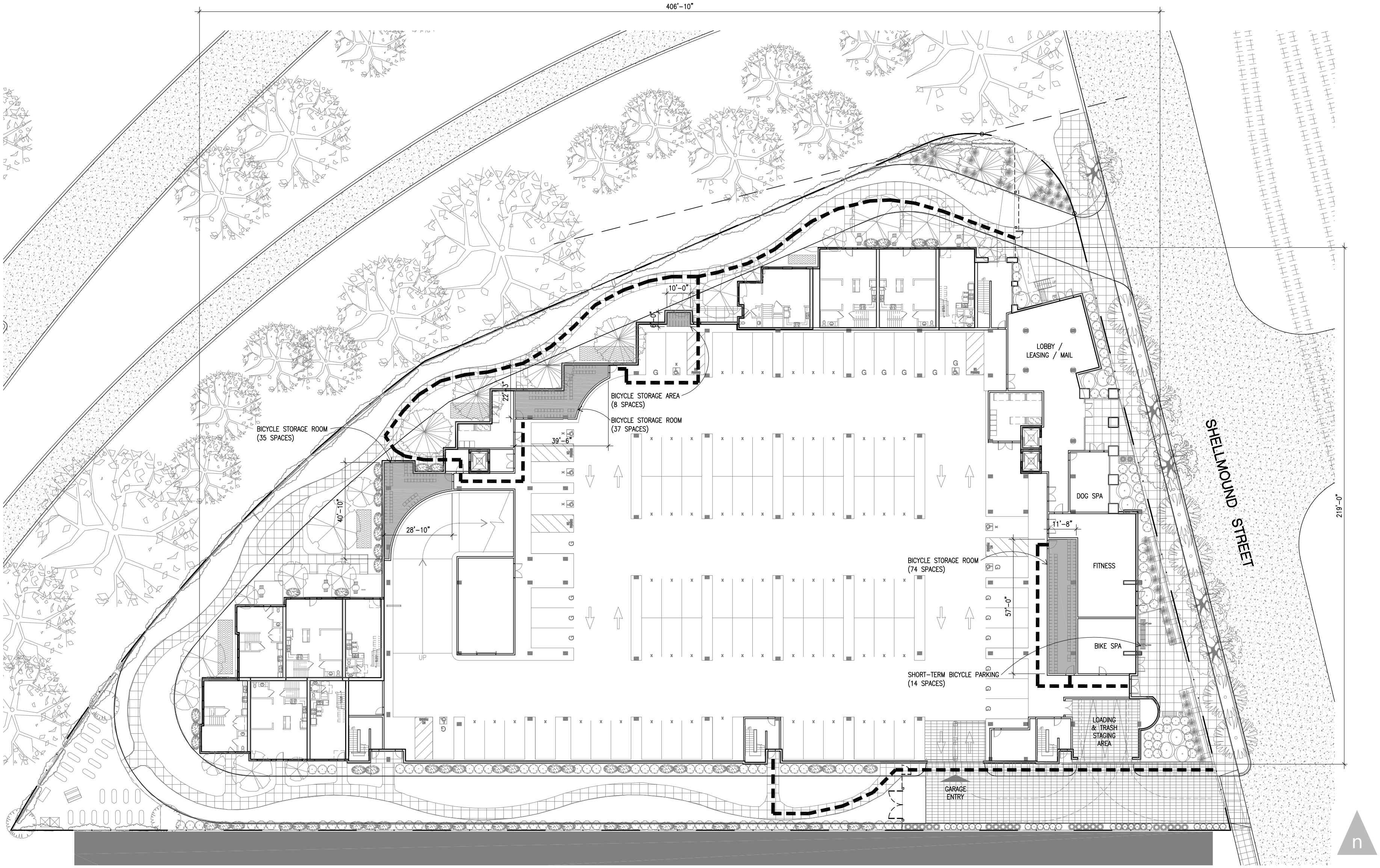
Consultant Site Plan Recommendations – Second Floor Plan



WC13-3096_10_AutoTurn

Figure 10

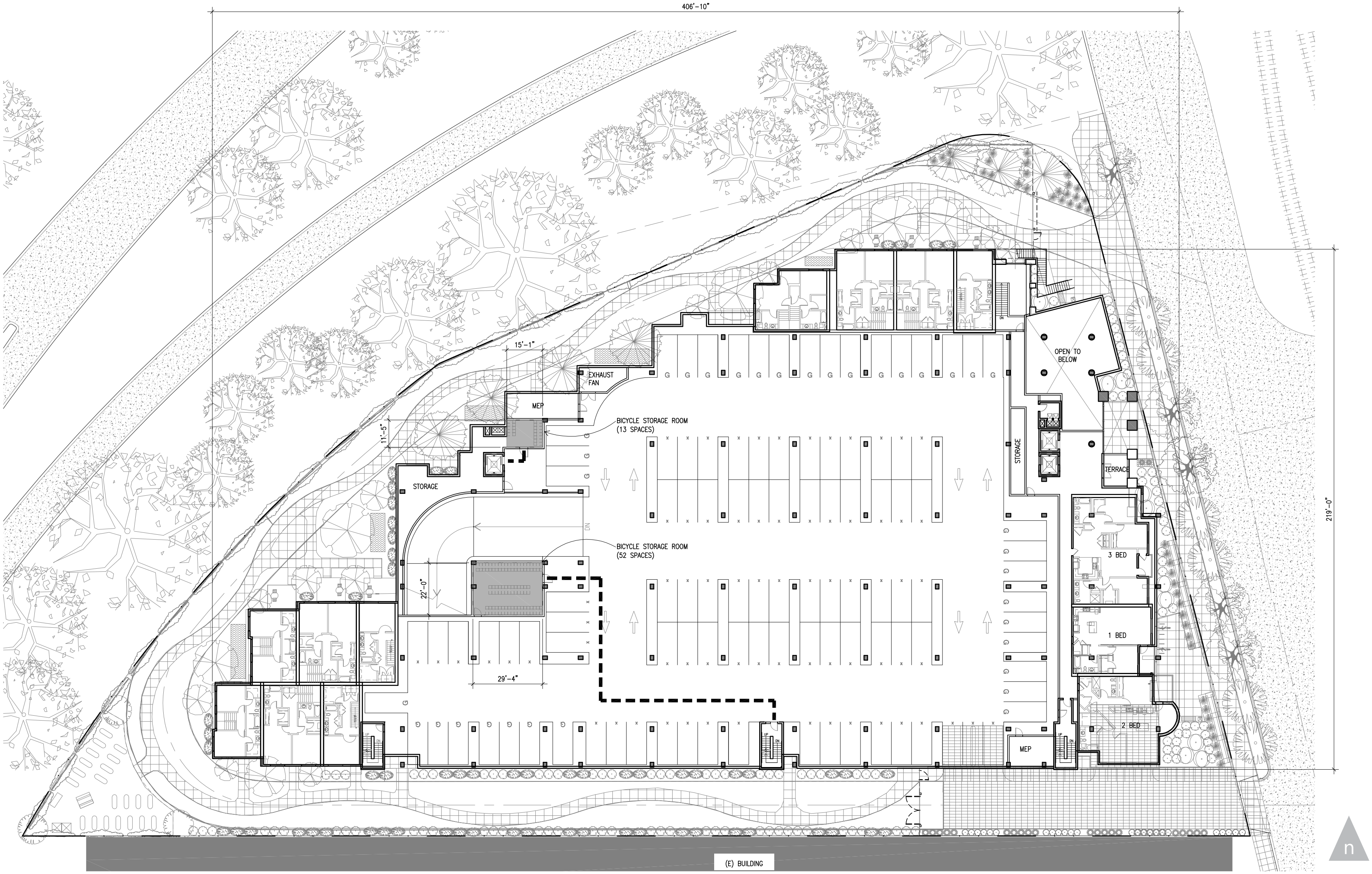
Loading Zone Access



WC13-3096_11A_BikeStorageAcc

Figure 11A

Bicycle Storage Room Access Routes – Level 1



WC13-3096_11B_BikeStorageAcc

Figure 11B

Bicycle Storage Room Access Routes – Level 2

ATTACHMENT A – INTERSECTION ANALYSIS METHODS

The operations of roadway facilities are for vehicles described with the term "level of service" (LOS). LOS is a qualitative description of traffic flow based on factors such as speed, travel time, delay, and freedom to maneuver. Six levels of service are defined ranging from LOS A (i.e., free-flow operating conditions) to LOS F (over capacity operating conditions). LOS E corresponds to operations "at capacity." When volumes exceed capacity, stop-and-go conditions result and operations are designated as LOS F. The City of Emeryville does not have a level of service policy for vehicles, but strives to achieve a Quality of Service for all modes of travel.

Signalized Intersections

Traffic conditions at signalized intersections were evaluated using the method from Chapter 16 of the Transportation Research Board's 2000 *Highway Capacity Manual*. This operations analysis method uses various intersection characteristics (such as traffic volumes, lane geometry, and signal phasing) to estimate the average control delay experienced by motorists traveling through an intersection. Control delay incorporates delay associated with deceleration, acceleration, stopping, and moving up in the queue. **Table A-1** summarizes the relationship between average delay per vehicle and LOS for signalized intersections.

Unsignalized Intersections

Traffic conditions at unsignalized intersections were evaluated using the method from Chapter 17 of the 2000 *Highway Capacity Manual*. With this method, operations are defined by the average control delay per vehicle (measured in seconds) for each movement that must yield the right-of-way. At two-way or side street-controlled intersections, the control delay (and LOS) is calculated for each controlled movement, as well as the left-turn movement from the major street, and the entire intersection. For controlled approaches composed of a single lane, the control delay is computed as the average of all movements in that lane. The delays for the entire intersection and for the movement or approach with the highest delay are reported. **Table A-2** summarizes the relationship between delay and LOS for unsignalized intersections.

TABLE A-1
SIGNALIZED INTERSECTION LOS CRITERIA

Level of Service	Description	Average Control Delay Per Vehicle (Seconds)
A	Operations with very low delay occurring with favorable progression and/or short cycle lengths.	$\leq$ 10. 0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	> 10. 0 to 20. 0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	> 20. 0 to 35. 0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, and/or high volume-to-capacity (V/C) ratios. Many vehicles stop and individual cycle failures are noticeable.	> 35. 0 to 55. 0
E	Operations with long delays indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.	> 55. 0 to 80. 0
F	Operations with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	> 80. 0

Source: *Highway Capacity Manual (*Transportation Research Board, 2000).

TABLE A-2
UNSIGNALIZED INTERSECTION LOS CRITERIA

Level of Service	Description	Average Control Delay Per Vehicle (Seconds)
A	Little or no delays	$\leq$ 10. 0
B	Short traffic delays	> 10. 0 to 15. 0
C	Average traffic delays	> 15. 0 to 25. 0
D	Long traffic delays	> 25. 0 to 35. 0
E	Very long traffic delays	> 35. 0 to 50. 0
F	Extreme traffic delays with intersection capacity exceeded	> 50. 0

Source: *Highway Capacity Manual* (Transportation Research Board, 2000)

ATTACHMENT B – TRAFFIC COUNT WORKSHEETS

6701 Shellmound

PM Peak Hour Traffic Counts

DATE	TIME	N/S Street	E/W Street	INTID
12/4/2013	1700	Bay St	Potter St	13-7711-001
12/4/2013	1700	Shellmound St	I-80 Off Ramps	13-7711-002
12/4/2013	1700	Shellmound St	67th St	13-7711-003
12/4/2013	1700	Hollis St	67th St	13-7711-004
12/4/2013	1700	Shellmound St	66th St	13-7711-005
12/4/2013	1700	Hollis St	66th St	13-7711-006
12/4/2013	1700	Shellmound St	65th St	13-7711-007
12/4/2013	1700	Hollis St	65th St	13-7711-008

INTID	NBL	NBT	NBR	NBU	EBL	EBT	EBR	EBU	SBL	SBT	SBR	SBU	WBL	WBT	WBR	WBU
13-7711-001	475	13	0	0	0	0	4	0	0	9	6	0	0	0	0	0
13-7711-002	0	484	0	0	5	0	42	0	0	21	0	0	0	0	0	0
13-7711-003	0	425	20	0	1	1	2	0	12	51	0	0	42	0	59	0
13-7711-004	50	718	38	0	33	15	13	0	20	451	45	0	7	16	22	0
13-7711-005	0	395	58	0	0	0	0	0	13	97	0	0	58	0	58	0
13-7711-006	52	715	29	0	55	34	69	0	27	410	36	0	14	27	42	0
13-7711-007	12	197	202	0	132	167	17	0	24	76	63	0	125	76	128	0
13-7711-008	49	589	49	0	179	217	45	0	55	344	90	0	39	67	30	0

6701 Shellmound

Saturday Peak Hour Traffic Counts

DATE	TIME	N/S Street	E/W Street	INTID
12/7/2013	1500	Bay St	Potter St	13-7711-001
12/7/2013	1500	Shellmound St	I-80 Off Ramps	13-7711-002
12/7/2013	1500	Shellmound St	67th St	13-7711-003
12/7/2013	1500	Hollis St	67th St	13-7711-004
12/7/2013	1500	Shellmound St	66th St	13-7711-005
12/7/2013	1500	Hollis St	66th St	13-7711-006
12/7/2013	1500	Shellmound St	65th St	13-7711-007
12/7/2013	1500	Hollis St	65th St	13-7711-008

INTID	NBL	NBT	NBR	NBU	EBL	EBT	EBR	EBU	SBL	SBT	SBR	SBU	WBL	WBT	WBR	WBU
13-7711-001	421	48	0	0	10	0	21	0	0	31	37	0	0	0	0	0
13-7711-002	0	450	0	0	15	0	186	0	0	53	0	0	0	0	0	0
13-7711-003	0	406	17	0	0	0	0	0	39	203	0	0	18	0	38	0
13-7711-004	19	365	11	0	29	20	8	0	13	333	22	0	5	14	18	0
13-7711-005	0	404	8	0	0	0	0	0	25	187	0	0	34	0	24	0
13-7711-006	14	351	22	0	12	9	12	0	19	318	21	0	19	30	32	0
13-7711-007	8	339	301	0	37	57	11	0	19	178	30	0	103	58	37	0
13-7711-008	43	248	29	0	122	207	61	0	18	275	57	0	24	80	19	0

ATTACHMENT C – LEVEL OF SERVICE WORKSHEETS

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	4	475	13	9	6
Sign Control	Free			Yield	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	4	475	13	9	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0		12	2	4	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		12	2	4	0
tC, single (s)	4.1		7.1	6.5	6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2		3.5	4.0	4.0	3.3
p0 queue free %	100		52	99	99	99
cM capacity (veh/h)	1623		991	894	891	1085

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	4	488	15
Volume Left	0	475	0
Volume Right	4	0	6
cSH	1623	988	960
Volume to Capacity	0.00	0.49	0.02
Queue Length 95th (ft)	0	70	1
Control Delay (s)	0.0	12.1	8.8
Lane LOS		B	A
Approach Delay (s)	0.0	12.1	8.8
Approach LOS		B	A

Intersection Summary			
Average Delay	11.9		
Intersection Capacity Utilization	45.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	5	42	0	484	21	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	42	0	484	21	0
Pedestrians	2					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				970		
pX, platoon unblocked						
vC, conflicting volume	507	23	23			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	507	23	23			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	96	100			
cM capacity (veh/h)	525	1052	1589			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	47	484	21
Volume Left	5	0	0
Volume Right	42	0	0
cSH	950	1700	1700
Volume to Capacity	0.05	0.28	0.01
Queue Length 95th (ft)	4	0	0
Control Delay (s)	9.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	36.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	42	59	425	20	12	53
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	42	59	425	20	12	53
Pedestrians	10		1			
Lane Width (ft)	12.0		12.0			
Walking Speed (ft/s)	4.0		4.0			
Percent Blockage	1		0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			682			
pX, platoon unblocked						
vC, conflicting volume	513	435			455	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	513	435			455	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	90			99	
cM capacity (veh/h)	511	616			1097	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total	101	425	20	65
Volume Left	42	0	0	12
Volume Right	59	0	20	0
cSH	567	1700	1700	1097
Volume to Capacity	0.18	0.25	0.01	0.01
Queue Length 95th (ft)	16	0	0	1
Control Delay (s)	12.7	0.0	0.0	1.6
Lane LOS	B			A
Approach Delay (s)	12.7	0.0		1.6
Approach LOS	B			

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	33	15	13	7	16	22	50	718	38	20	451	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	33	15	13	7	16	22	50	718	38	20	451	45
Pedestrians		9			31			7			9	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			3			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								710			1055	
pX, platoon unblocked	0.76	0.76		0.76	0.76	0.76				0.76		
vC, conflicting volume	1398	1410	490	1409	1413	777	505			787		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1366	1380	490	1380	1385	545	505			558		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	53	85	98	90	84	94	95			97		
cM capacity (veh/h)	71	98	571	71	97	394	1052			747		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	61	45	806	516
Volume Left	33	7	50	20
Volume Right	13	22	38	45
cSH	95	141	1052	747
Volume to Capacity	0.64	0.32	0.05	0.03
Queue Length 95th (ft)	78	32	4	2
Control Delay (s)	94.9	42.1	1.2	0.7
Lane LOS	F	E	A	A
Approach Delay (s)	94.9	42.1	1.2	0.7
Approach LOS	F	E		

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	80.5%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	58	58	395	58	13	97
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	58	58	395	58	13	97
Pedestrians	7		2			6
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	1		0			1
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			356			
pX, platoon unblocked						
vC, conflicting volume	556	437			460	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	556	437			460	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	88	91			99	
cM capacity (veh/h)	483	613			1095	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	116	453	110
Volume Left	58	0	13
Volume Right	58	58	0
cSH	540	1700	1095
Volume to Capacity	0.21	0.27	0.01
Queue Length 95th (ft)	20	0	1
Control Delay (s)	13.5	0.0	1.1
Lane LOS	B		A
Approach Delay (s)	13.5	0.0	1.1
Approach LOS	B		

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	40.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	55	34	69	14	27	42	52	715	29	27	410	36
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	55	34	69	14	27	42	52	715	29	27	410	36
Pedestrians		8			11			27			7	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			2			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								369				
pX, platoon unblocked	0.69	0.69		0.69	0.69	0.69				0.69		
vC, conflicting volume	1386	1349	463	1440	1352	748	454			755		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1334	1280	463	1412	1285	403	454			414		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	7	67	88	70	74	90	95			97		
cM capacity (veh/h)	59	103	582	47	102	437	1099			778		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	158	83	796	473
Volume Left	55	14	52	27
Volume Right	69	42	29	36
cSH	115	126	1099	778
Volume to Capacity	1.37	0.66	0.05	0.03
Queue Length 95th (ft)	271	88	4	3
Control Delay (s)	283.3	76.6	1.2	1.0
Lane LOS	F	F	A	A
Approach Delay (s)	283.3	76.6	1.2	1.0
Approach LOS	F	F		

Intersection Summary			
Average Delay	34.8		
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	132	167	17	125	76	128	12	197	202	24	76	63
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00	0.97	1.00	0.99	
Flpb, ped/bikes	1.00	1.00		0.98	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.91			1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1671	1731		1648	1563			1759	1449	1673	1625	
Flt Permitted	0.63	1.00		0.64	1.00			0.98	1.00	0.95	1.00	
Satd. Flow (perm)	1108	1731		1113	1563			1734	1449	1673	1625	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	132	167	17	125	76	128	12	197	202	24	76	63
RTOR Reduction (vph)	0	5	0	0	84	0	0	0	128	0	31	0
Lane Group Flow (vph)	132	179	0	125	120	0	0	209	74	24	108	0
Confl. Peds. (#/hr)	7		35	35		7	7		6	6		7
Confl. Bikes (#/hr)			11			8			11			5
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Prot	NA	
Protected Phases		2			5			8		7	4	
Permitted Phases	2			5			8		8			
Actuated Green, G (s)	8.5	8.5		8.5	8.5			12.4	12.4	0.8	17.2	
Effective Green, g (s)	8.5	8.5		8.5	8.5			12.4	12.4	0.8	17.2	
Actuated g/C Ratio	0.25	0.25		0.25	0.25			0.37	0.37	0.02	0.51	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	279	436		280	394			638	533	39	829	
v/s Ratio Prot		0.10			0.08					c0.01	0.07	
v/s Ratio Perm	c0.12			0.11				c0.12	0.05			
v/c Ratio	0.47	0.41		0.45	0.31			0.33	0.14	0.62	0.13	
Uniform Delay, d1	10.7	10.5		10.6	10.2			7.7	7.1	16.3	4.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.3	0.6		1.1	0.4			0.3	0.1	25.5	0.1	
Delay (s)	12.0	11.1		11.8	10.6			8.0	7.2	41.8	4.4	
Level of Service	B	B		B	B			A	A	D	A	
Approach Delay (s)		11.5			11.1			7.6			9.9	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	33.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	179	217	45	39	67	30	49	589	49	55	344	90
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.2			4.2		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			0.98		1.00	0.99		1.00	0.99	
Flpb, ped/bikes		0.98			0.99		1.00	1.00		1.00	1.00	
Frt		0.99			0.97		1.00	0.99		1.00	0.97	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1653			1642		1676	1733		1676	1690	
Flt Permitted		0.82			0.83		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1385			1379		1676	1733		1676	1690	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	179	217	45	39	67	30	49	589	49	55	344	90
RTOR Reduction (vph)	0	6	0	0	16	0	0	4	0	0	13	0
Lane Group Flow (vph)	0	435	0	0	120	0	49	634	0	55	421	0
Confl. Peds. (#/hr)	34		53	53		34	16		34	34		16
Confl. Bikes (#/hr)			14			4			9			12
Parking (#/hr)						2						
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4								
Actuated Green, G (s)		19.3			19.3		5.1	28.8		5.2	28.9	
Effective Green, g (s)		18.8			18.8		4.6	29.3		4.7	29.4	
Actuated g/C Ratio		0.29			0.29		0.07	0.45		0.07	0.45	
Clearance Time (s)		3.7			3.7		3.5	4.5		3.5	4.5	
Vehicle Extension (s)		2.5			2.5		2.5	3.0		2.5	2.0	
Lane Grp Cap (vph)		400			398		118	781		121	764	
v/s Ratio Prot							0.03	c0.37		c0.03	0.25	
v/s Ratio Perm		c0.31			0.09							
v/c Ratio		1.09			0.30		0.42	0.81		0.45	0.55	
Uniform Delay, d1		23.1			18.0		28.9	15.5		28.9	13.0	
Progression Factor		1.00			1.00		1.16	0.66		1.00	1.00	
Incremental Delay, d2		70.2			0.3		0.9	4.9		2.0	2.9	
Delay (s)		93.3			18.3		34.4	15.1		30.9	15.8	
Level of Service		F			B		C	B		C	B	
Approach Delay (s)		93.3			18.3			16.5			17.5	
Approach LOS		F			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	36.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	1	2	0	484	63	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	2	0	484	63	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				764		
pX, platoon unblocked						
vC, conflicting volume	547	63	63			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	547	63	63			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	498	1002	1540			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	3	484	63
Volume Left	1	0	0
Volume Right	2	0	0
cSH	749	1540	1700
Volume to Capacity	0.00	0.00	0.04
Queue Length 95th (ft)	0	0	0
Control Delay (s)	9.8	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.8	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	36.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	10	21	421	48	31	37
Sign Control	Free			Yield	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	21	421	48	31	37
Pedestrians					2	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2		83	32	43	2
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2		83	32	43	2
tC, single (s)	4.1		7.1	6.5	6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2		3.5	4.0	4.0	3.3
p0 queue free %	99		50	94	96	97
cM capacity (veh/h)	1618		844	853	842	1080

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	31	469	68
Volume Left	10	421	0
Volume Right	21	0	37
cSH	1618	845	957
Volume to Capacity	0.01	0.56	0.07
Queue Length 95th (ft)	0	87	6
Control Delay (s)	2.4	14.5	9.0
Lane LOS	A	B	A
Approach Delay (s)	2.4	14.5	9.0
Approach LOS		B	A

Intersection Summary			
Average Delay	13.1		
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	15	186	0	450	53	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	15	186	0	450	53	0
Pedestrians	1					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				918		
pX, platoon unblocked						
vC, conflicting volume	504	54	54			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	504	54	54			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	82	100			
cM capacity (veh/h)	527	1012	1550			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	201	450	53
Volume Left	15	0	0
Volume Right	186	0	0
cSH	947	1700	1700
Volume to Capacity	0.21	0.26	0.03
Queue Length 95th (ft)	20	0	0
Control Delay (s)	9.8	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.8	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	18	38	406	17	39	203
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	38	406	17	39	203
Pedestrians	5					1
Lane Width (ft)	12.0					12.0
Walking Speed (ft/s)	4.0					4.0
Percent Blockage	0					0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			725			
pX, platoon unblocked						
vC, conflicting volume	700	420			428	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	700	420			428	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	94			97	
cM capacity (veh/h)	390	630			1127	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	56	423	242
Volume Left	18	0	39
Volume Right	38	17	0
cSH	526	1700	1127
Volume to Capacity	0.11	0.25	0.03
Queue Length 95th (ft)	9	0	3
Control Delay (s)	12.7	0.0	1.6
Lane LOS	B		A
Approach Delay (s)	12.7	0.0	1.6
Approach LOS	B		

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	29	20	8	5	14	18	19	365	11	13	333	22
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	29	20	8	5	14	18	19	365	11	13	333	22
Pedestrians		1			13			4			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								718			1023	
pX, platoon unblocked												
vC, conflicting volume	808	798	349	814	804	386	356			389		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	808	798	349	814	804	386	356			389		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	89	93	99	98	95	97	98			99		
cM capacity (veh/h)	272	307	691	267	305	653	1202			1157		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	57	37	395	368
Volume Left	29	5	19	13
Volume Right	8	18	11	22
cSH	311	401	1202	1157
Volume to Capacity	0.18	0.09	0.02	0.01
Queue Length 95th (ft)	16	8	1	1
Control Delay (s)	19.2	14.9	0.5	0.4
Lane LOS	C	B	A	A
Approach Delay (s)	19.2	14.9	0.5	0.4
Approach LOS	C	B		

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	34	24	404	8	25	187
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	34	24	404	8	25	187
Pedestrians	2		1			
Lane Width (ft)	12.0		12.0			
Walking Speed (ft/s)	4.0		4.0			
Percent Blockage	0		0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			348			
pX, platoon unblocked	0.94	0.94			0.94	
vC, conflicting volume	648	410			414	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	593	339			344	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	96			98	
cM capacity (veh/h)	429	659			1140	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	58	412	212
Volume Left	34	0	25
Volume Right	24	8	0
cSH	502	1700	1140
Volume to Capacity	0.12	0.24	0.02
Queue Length 95th (ft)	10	0	2
Control Delay (s)	13.1	0.0	1.1
Lane LOS	B		A
Approach Delay (s)	13.1	0.0	1.1
Approach LOS	B		

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	12	9	12	19	30	32	14	351	22	19	318	21
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	12	9	12	20	31	33	15	366	23	20	331	22
Pedestrians		8			15			3			9	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			0			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								352				
pX, platoon unblocked	0.96	0.96		0.96	0.96	0.96				0.96		
vC, conflicting volume	854	822	353	823	822	401	361			404		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	824	791	353	792	791	350	361			353		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	97	98	93	89	95	99			98		
cM capacity (veh/h)	231	293	684	267	293	649	1190			1138		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	34	84	403	373
Volume Left	12	20	15	20
Volume Right	12	33	23	22
cSH	329	363	1190	1138
Volume to Capacity	0.10	0.23	0.01	0.02
Queue Length 95th (ft)	9	22	1	1
Control Delay (s)	17.2	17.9	0.4	0.6
Lane LOS	C	C	A	A
Approach Delay (s)	17.2	17.9	0.4	0.6
Approach LOS	C	C		

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	57	11	103	58	37	8	339	301	19	178	30
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00	0.97	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.98	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	0.94			1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1676	1708		1643	1630			1763	1454	1676	1721	
Flt Permitted	0.70	1.00		0.71	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (perm)	1227	1708		1232	1630			1756	1454	1676	1721	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	37	57	11	103	58	37	8	339	301	19	178	30
RTOR Reduction (vph)	0	9	0	0	32	0	0	0	100	0	4	0
Lane Group Flow (vph)	37	59	0	103	63	0	0	347	201	19	204	0
Confl. Peds. (#/hr)			18	18			2		1	1		2
Confl. Bikes (#/hr)			3			11			17			2
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Prot	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2			
Actuated Green, G (s)	9.2	9.2		9.2	9.2			44.4	44.4	0.8	49.2	
Effective Green, g (s)	9.2	9.2		9.2	9.2			44.4	44.4	0.8	49.2	
Actuated g/C Ratio	0.14	0.14		0.14	0.14			0.67	0.67	0.01	0.74	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	170	236		170	225			1174	972	20	1275	
v/s Ratio Prot		0.03			0.04					c0.01	0.12	
v/s Ratio Perm	0.03			c0.08				c0.20	0.14			
v/c Ratio	0.22	0.25		0.61	0.28			0.30	0.21	0.95	0.16	
Uniform Delay, d1	25.4	25.5		26.9	25.6			4.5	4.2	32.8	2.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.6		6.0	0.7			0.6	0.5	175.6	0.3	
Delay (s)	26.1	26.1		32.9	26.3			5.2	4.7	208.4	2.8	
Level of Service	C	C		C	C			A	A	F	A	
Approach Delay (s)		26.1			29.7			5.0			20.0	
Approach LOS		C			C			A			C	

Intersection Summary			
HCM 2000 Control Delay	13.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	66.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	122	207	61	24	80	19	43	248	29	18	275	57
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		0.98	1.00	
Frt		0.98			0.98		1.00	0.98		1.00	0.97	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1671			1693		1671	1728		1648	1713	
Flt Permitted		0.86			0.90		0.51	1.00		0.58	1.00	
Satd. Flow (perm)		1467			1544		898	1728		999	1713	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	122	207	61	24	80	19	43	248	29	18	275	57
RTOR Reduction (vph)	0	17	0	0	11	0	0	11	0	0	19	0
Lane Group Flow (vph)	0	373	0	0	112	0	43	266	0	18	313	0
Confl. Peds. (#/hr)	14		41	41		14	7		20	20		7
Confl. Bikes (#/hr)			16			1			3			5
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		16.0			16.0		16.0	16.0		16.0	16.0	
Effective Green, g (s)		16.0			16.0		16.0	16.0		16.0	16.0	
Actuated g/C Ratio		0.40			0.40		0.40	0.40		0.40	0.40	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		586			617		359	691		399	685	
v/s Ratio Prot								0.15			c0.18	
v/s Ratio Perm		c0.25			0.07		0.05			0.02		
v/c Ratio		0.64			0.18		0.12	0.39		0.05	0.46	
Uniform Delay, d1		9.7			7.8		7.6	8.5		7.3	8.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		5.2			0.6		0.7	1.6		0.2	2.2	
Delay (s)		14.9			8.4		8.2	10.1		7.5	11.0	
Level of Service		B			A		A	B		A	B	
Approach Delay (s)		14.9			8.4			9.9			10.8	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	444	242	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	0	444	242	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				808		
pX, platoon unblocked						
vC, conflicting volume	686	242	242			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	686	242	242			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	413	797	1324			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	444	242
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1324	1700
Volume to Capacity	0.00	0.00	0.14
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	28.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	4	478	13	9	6
Sign Control	Free			Yield	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	4	478	13	9	6
Pedestrians	7					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0		20	2	4	7
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		20	2	4	7
tC, single (s)	4.1		7.1	6.5	6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2		3.5	4.0	4.0	3.3
p0 queue free %	100		51	99	99	99
cM capacity (veh/h)	1623		975	894	891	1069

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	4	491	15
Volume Left	0	478	0
Volume Right	4	0	6
cSH	1623	973	955
Volume to Capacity	0.00	0.50	0.02
Queue Length 95th (ft)	0	73	1
Control Delay (s)	0.0	12.4	8.8
Lane LOS		B	A
Approach Delay (s)	0.0	12.4	8.8
Approach LOS		B	A

Intersection Summary			
Average Delay	12.2		
Intersection Capacity Utilization	45.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	5	51	0	487	21	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	51	0	487	21	0
Pedestrians	2					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				970		
pX, platoon unblocked						
vC, conflicting volume	510	23	23			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	510	23	23			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	95	100			
cM capacity (veh/h)	522	1052	1589			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	56	487	21
Volume Left	5	0	0
Volume Right	51	0	0
cSH	965	1700	1700
Volume to Capacity	0.06	0.29	0.01
Queue Length 95th (ft)	5	0	0
Control Delay (s)	9.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	37.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	59	59	428	27	12	60
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	59	59	428	27	12	60
Pedestrians	10		1			
Lane Width (ft)	12.0		12.0			
Walking Speed (ft/s)	4.0		4.0			
Percent Blockage	1		0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			682			
pX, platoon unblocked						
vC, conflicting volume	536	452			465	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	536	452			465	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	88	90			99	
cM capacity (veh/h)	495	603			1087	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	118	455	72
Volume Left	59	0	12
Volume Right	59	27	0
cSH	544	1700	1087
Volume to Capacity	0.22	0.27	0.01
Queue Length 95th (ft)	20	0	1
Control Delay (s)	13.4	0.0	1.5
Lane LOS	B		A
Approach Delay (s)	13.4	0.0	1.5
Approach LOS	B		

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	39.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	39	16	13	7	20	22	50	718	38	20	451	58
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	39	16	13	7	20	22	50	718	38	20	451	58
Pedestrians		9			31			7			9	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			3			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								710			1055	
pX, platoon unblocked	0.76	0.76		0.76	0.76	0.76				0.76		
vC, conflicting volume	1407	1416	496	1416	1426	777	518			787		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1377	1389	496	1389	1402	543	518			556		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	41	83	98	90	79	94	95			97		
cM capacity (veh/h)	66	96	566	69	95	394	1040			747		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	68	49	806	529
Volume Left	39	7	50	20
Volume Right	13	22	38	58
cSH	88	133	1040	747
Volume to Capacity	0.78	0.37	0.05	0.03
Queue Length 95th (ft)	99	38	4	2
Control Delay (s)	125.7	47.1	1.2	0.7
Lane LOS	F	E	A	A
Approach Delay (s)	125.7	47.1	1.2	0.7
Approach LOS	F	E		

Intersection Summary			
Average Delay	8.4		
Intersection Capacity Utilization	81.6%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	58	66	419	58	17	114
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	58	66	419	58	17	114
Pedestrians	7		2			6
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	1		0			1
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			356			
pX, platoon unblocked	0.98	0.98			0.98	
vC, conflicting volume	605	461			484	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	587	441			464	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	87	89			98	
cM capacity (veh/h)	452	598			1070	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	124	477	131
Volume Left	58	0	17
Volume Right	66	58	0
cSH	520	1700	1070
Volume to Capacity	0.24	0.28	0.02
Queue Length 95th (ft)	23	0	1
Control Delay (s)	14.1	0.0	1.2
Lane LOS	B		A
Approach Delay (s)	14.1	0.0	1.2
Approach LOS	B		

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	55	36	71	14	31	42	56	715	29	27	410	36
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	55	36	71	14	31	42	56	715	29	27	410	36
Pedestrians		8			11			27			7	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			2			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								369				
pX, platoon unblocked	0.68	0.68		0.68	0.68	0.68				0.68		
vC, conflicting volume	1396	1357	463	1450	1360	748	454			755		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1348	1291	463	1428	1296	399	454			410		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	64	88	68	69	90	95			97		
cM capacity (veh/h)	55	101	582	44	100	438	1099			778		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	162	87	800	473
Volume Left	55	14	56	27
Volume Right	71	42	29	36
cSH	110	120	1099	778
Volume to Capacity	1.48	0.72	0.05	0.03
Queue Length 95th (ft)	293	100	4	3
Control Delay (s)	327.8	89.7	1.3	1.0
Lane LOS	F	F	A	A
Approach Delay (s)	327.8	89.7	1.3	1.0
Approach LOS	F	F		

Intersection Summary			
Average Delay	41.0		
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	135	167	17	125	76	136	12	211	202	30	83	67
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00	0.96	1.00	0.99	
Flpb, ped/bikes	1.00	1.00		0.98	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.90			1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1671	1731		1646	1560			1760	1446	1673	1626	
Flt Permitted	0.63	1.00		0.64	1.00			0.98	1.00	0.95	1.00	
Satd. Flow (perm)	1100	1731		1112	1560			1734	1446	1673	1626	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	135	167	17	125	76	136	12	211	202	30	83	67
RTOR Reduction (vph)	0	5	0	0	81	0	0	0	134	0	35	0
Lane Group Flow (vph)	135	179	0	125	131	0	0	223	68	30	115	0
Confl. Peds. (#/hr)	7		35	35		7	7		6	6		7
Confl. Bikes (#/hr)			11			8			11			5
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Prot	NA	
Protected Phases		2			5			8		7	4	
Permitted Phases	2			5			8		8			
Actuated Green, G (s)	11.5	11.5		11.5	11.5			11.6	11.6	0.8	16.4	
Effective Green, g (s)	11.5	11.5		11.5	11.5			11.6	11.6	0.8	16.4	
Actuated g/C Ratio	0.32	0.32		0.32	0.32			0.32	0.32	0.02	0.46	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	352	554		356	499			560	467	37	742	
v/s Ratio Prot		0.10			0.08					c0.02	0.07	
v/s Ratio Perm	c0.12			0.11				c0.13	0.05			
v/c Ratio	0.38	0.32		0.35	0.26			0.40	0.15	0.81	0.15	
Uniform Delay, d1	9.5	9.3		9.3	9.1			9.4	8.6	17.5	5.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	0.3		0.6	0.3			0.5	0.1	76.5	0.1	
Delay (s)	10.2	9.6		9.9	9.3			9.9	8.8	93.9	5.8	
Level of Service	B	A		A	A			A	A	F	A	
Approach Delay (s)		9.8			9.6			9.4			20.5	
Approach LOS		A			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	11.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	35.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	179	222	46	39	72	30	52	593	49	55	346	90
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.2			4.2		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		0.98			0.99		1.00	1.00		1.00	1.00	
Frt		0.99			0.97		1.00	0.99		1.00	0.97	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1654			1644		1676	1738		1676	1690	
Flt Permitted		0.82			0.83		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1382			1384		1676	1738		1676	1690	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	179	222	46	39	72	30	52	593	49	55	346	90
RTOR Reduction (vph)	0	6	0	0	15	0	0	4	0	0	13	0
Lane Group Flow (vph)	0	441	0	0	126	0	52	638	0	55	423	0
Confl. Peds. (#/hr)	34		53	53		34	34		16	34		16
Confl. Bikes (#/hr)			14			9			5			12
Parking (#/hr)						2						
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4								
Actuated Green, G (s)		19.3			19.3		5.1	28.8		5.2	28.9	
Effective Green, g (s)		18.8			18.8		4.6	29.3		4.7	29.4	
Actuated g/C Ratio		0.29			0.29		0.07	0.45		0.07	0.45	
Clearance Time (s)		3.7			3.7		3.5	4.5		3.5	4.5	
Vehicle Extension (s)		2.5			2.5		2.5	3.0		2.5	2.0	
Lane Grp Cap (vph)		399			400		118	783		121	764	
v/s Ratio Prot							0.03	c0.37		c0.03	0.25	
v/s Ratio Perm		c0.32			0.09							
v/c Ratio		1.10			0.32		0.44	0.82		0.45	0.55	
Uniform Delay, d1		23.1			18.1		29.0	15.5		28.9	13.0	
Progression Factor		1.00			1.00		1.16	0.66		1.00	1.00	
Incremental Delay, d2		76.3			0.3		1.0	5.0		2.0	2.9	
Delay (s)		99.4			18.4		34.5	15.2		30.9	15.9	
Level of Service		F			B		C	B		C	B	
Approach Delay (s)		99.4			18.4			16.7			17.6	
Approach LOS		F			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	37.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	10	21	33	453	93	25
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	21	33	453	93	25
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				578		
pX, platoon unblocked						
vC, conflicting volume	624	106	118			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	624	106	118			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	98	98			
cM capacity (veh/h)	439	949	1470			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	31	486	118
Volume Left	10	33	0
Volume Right	21	0	25
cSH	690	1470	1700
Volume to Capacity	0.04	0.02	0.07
Queue Length 95th (ft)	4	2	0
Control Delay (s)	10.5	0.7	0.0
Lane LOS	B	A	
Approach Delay (s)	10.5	0.7	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	10	21	427	48	31	37
Sign Control	Free			Yield	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	21	427	48	31	37
Pedestrians					2	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2		83	32	43	2
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2		83	32	43	2
tC, single (s)	4.1		7.1	6.5	6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2		3.5	4.0	4.0	3.3
p0 queue free %	99		49	94	96	97
cM capacity (veh/h)	1618		844	853	842	1080

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	31	475	68
Volume Left	10	427	0
Volume Right	21	0	37
cSH	1618	845	957
Volume to Capacity	0.01	0.56	0.07
Queue Length 95th (ft)	0	89	6
Control Delay (s)	2.4	14.6	9.0
Lane LOS	A	B	A
Approach Delay (s)	2.4	14.6	9.0
Approach LOS		B	A

Intersection Summary			
Average Delay	13.3		
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	15	193	0	456	53	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	15	193	0	456	53	0
Pedestrians	1					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				918		
pX, platoon unblocked						
vC, conflicting volume	510	54	54			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	510	54	54			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	81	100			
cM capacity (veh/h)	523	1012	1550			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	208	456	53
Volume Left	15	0	0
Volume Right	193	0	0
cSH	948	1700	1700
Volume to Capacity	0.22	0.27	0.03
Queue Length 95th (ft)	21	0	0
Control Delay (s)	9.9	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.9	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	31	38	412	25	39	210
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	31	38	412	25	39	210
Pedestrians	5					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			725			
pX, platoon unblocked						
vC, conflicting volume	718	430			442	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	718	430			442	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	94			96	
cM capacity (veh/h)	381	623			1113	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	69	437	249
Volume Left	31	0	39
Volume Right	38	25	0
cSH	484	1700	1113
Volume to Capacity	0.14	0.26	0.04
Queue Length 95th (ft)	12	0	3
Control Delay (s)	13.7	0.0	1.6
Lane LOS	B		A
Approach Delay (s)	13.7	0.0	1.6
Approach LOS	B		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	36	21	8	5	16	18	19	365	11	13	333	33
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	36	21	8	5	16	18	19	365	11	13	333	33
Pedestrians		1			13			4			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								718			1023	
pX, platoon unblocked												
vC, conflicting volume	814	804	354	820	814	386	367			389		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	814	804	354	820	814	386	367			389		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	87	93	99	98	95	97	98			99		
cM capacity (veh/h)	268	305	686	264	300	653	1191			1157		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	65	39	395	379
Volume Left	36	5	19	13
Volume Right	8	18	11	33
cSH	302	390	1191	1157
Volume to Capacity	0.22	0.10	0.02	0.01
Queue Length 95th (ft)	20	8	1	1
Control Delay (s)	20.1	15.2	0.5	0.4
Lane LOS	C	C	A	A
Approach Delay (s)	20.1	15.2	0.5	0.4
Approach LOS	C	C		

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	34	30	422	8	31	209
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	34	30	422	8	31	209
Pedestrians	2		1			
Lane Width (ft)	12.0		12.0			
Walking Speed (ft/s)	4.0		4.0			
Percent Blockage	0		0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			348			
pX, platoon unblocked	0.93	0.93			0.93	
vC, conflicting volume	700	428			432	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	640	347			352	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	91	95			97	
cM capacity (veh/h)	397	646			1121	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	64	430	240
Volume Left	34	0	31
Volume Right	30	8	0
cSH	484	1700	1121
Volume to Capacity	0.13	0.25	0.03
Queue Length 95th (ft)	11	0	2
Control Delay (s)	13.6	0.0	1.3
Lane LOS	B		A
Approach Delay (s)	13.6	0.0	1.3
Approach LOS	B		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	12	11	15	19	33	32	17	351	22	19	318	21
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	12	11	15	19	33	32	17	351	22	19	318	21
Pedestrians		8			15			3			9	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			0			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								352				
pX, platoon unblocked	0.95	0.95		0.95	0.95	0.95				0.95		
vC, conflicting volume	828	796	340	801	796	386	347			388		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	796	763	340	768	762	333	347			335		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	96	98	93	89	95	99			98		
cM capacity (veh/h)	241	303	696	275	304	663	1204			1154		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	38	84	390	358
Volume Left	12	19	17	19
Volume Right	15	32	22	21
cSH	353	371	1204	1154
Volume to Capacity	0.11	0.23	0.01	0.02
Queue Length 95th (ft)	9	21	1	1
Control Delay (s)	16.4	17.5	0.5	0.6
Lane LOS	C	C	A	A
Approach Delay (s)	16.4	17.5	0.5	0.6
Approach LOS	C	C		

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	57	11	103	58	43	8	349	301	26	188	35
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00	0.97	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.98	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	0.94			1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1676	1708		1643	1618			1763	1454	1676	1717	
Flt Permitted	0.69	1.00		0.71	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (perm)	1221	1708		1233	1618			1755	1454	1676	1717	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	39	57	11	103	58	43	8	349	301	26	188	35
RTOR Reduction (vph)	0	9	0	0	37	0	0	0	105	0	5	0
Lane Group Flow (vph)	39	59	0	103	64	0	0	357	196	26	218	0
Confl. Peds. (#/hr)			18	18			2		1	1		2
Confl. Bikes (#/hr)			3			11			17			2
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Prot	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2			
Actuated Green, G (s)	9.2	9.2		9.2	9.2			42.6	42.6	1.6	48.2	
Effective Green, g (s)	9.2	9.2		9.2	9.2			42.6	42.6	1.6	48.2	
Actuated g/C Ratio	0.14	0.14		0.14	0.14			0.65	0.65	0.02	0.74	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	171	240		173	227			1143	947	41	1265	
v/s Ratio Prot		0.03			0.04					c0.02	0.13	
v/s Ratio Perm	0.03			c0.08				c0.20	0.13			
v/c Ratio	0.23	0.24		0.60	0.28			0.31	0.21	0.63	0.17	
Uniform Delay, d1	24.9	25.0		26.4	25.1			5.0	4.6	31.6	2.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	0.5		5.4	0.7			0.7	0.5	27.9	0.3	
Delay (s)	25.6	25.5		31.8	25.8			5.7	5.1	59.5	2.9	
Level of Service	C	C		C	C			A	A	E	A	
Approach Delay (s)		25.6			28.8			5.4			8.8	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	65.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	122	212	63	24	84	19	45	252	29	18	278	57
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		0.98	1.00	
Frt		0.98			0.98		1.00	0.98		1.00	0.97	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1670			1695		1671	1729		1648	1714	
Flt Permitted		0.87			0.91		0.51	1.00		0.57	1.00	
Satd. Flow (perm)		1468			1549		892	1729		991	1714	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	122	212	63	24	84	19	45	252	29	18	278	57
RTOR Reduction (vph)	0	17	0	0	11	0	0	10	0	0	19	0
Lane Group Flow (vph)	0	380	0	0	116	0	45	271	0	18	316	0
Confl. Peds. (#/hr)	14		41	41		14	7		20	20		7
Confl. Bikes (#/hr)			16			1			3			5
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		16.0			16.0		16.0	16.0		16.0	16.0	
Effective Green, g (s)		16.0			16.0		16.0	16.0		16.0	16.0	
Actuated g/C Ratio		0.40			0.40		0.40	0.40		0.40	0.40	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		587			619		356	691		396	685	
v/s Ratio Prot								0.16			c0.18	
v/s Ratio Perm		c0.26			0.07		0.05			0.02		
v/c Ratio		0.65			0.19		0.13	0.39		0.05	0.46	
Uniform Delay, d1		9.7			7.8		7.6	8.5		7.3	8.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		5.5			0.7		0.7	1.7		0.2	2.2	
Delay (s)		15.2			8.4		8.3	10.2		7.5	11.1	
Level of Service		B			A		A	B		A	B	
Approach Delay (s)		15.2			8.4			9.9			10.9	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	14	28	24	428	221	20
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	14	28	24	428	221	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				598		
pX, platoon unblocked	0.97					
vC, conflicting volume	707	231	241			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	683	231	241			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	97	98			
cM capacity (veh/h)	395	808	1326			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	42	452	241
Volume Left	14	24	0
Volume Right	28	0	20
cSH	600	1326	1700
Volume to Capacity	0.07	0.02	0.14
Queue Length 95th (ft)	6	1	0
Control Delay (s)	11.5	0.6	0.0
Lane LOS	B	A	
Approach Delay (s)	11.5	0.6	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	4	506	13	9	6
Sign Control	Free			Yield	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	4	506	13	9	6
Pedestrians	7					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0		20	2	4	7
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		20	2	4	7
tC, single (s)	4.1		7.1	6.5	6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2		3.5	4.0	4.0	3.3
p0 queue free %	100		48	99	99	99
cM capacity (veh/h)	1623		975	894	891	1069

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	4	519	15
Volume Left	0	506	0
Volume Right	4	0	6
cSH	1623	973	955
Volume to Capacity	0.00	0.53	0.02
Queue Length 95th (ft)	0	81	1
Control Delay (s)	0.0	12.8	8.8
Lane LOS		B	A
Approach Delay (s)	0.0	12.8	8.8
Approach LOS		B	A

Intersection Summary			
Average Delay	12.6		
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	5	75	0	515	21	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	75	0	515	21	0
Pedestrians	2					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				970		
pX, platoon unblocked						
vC, conflicting volume	538	23	23			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	538	23	23			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	93	100			
cM capacity (veh/h)	503	1052	1589			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	80	515	21
Volume Left	5	0	0
Volume Right	75	0	0
cSH	985	1700	1700
Volume to Capacity	0.08	0.30	0.01
Queue Length 95th (ft)	7	0	0
Control Delay (s)	9.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	86	59	456	48	12	84
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	86	59	456	48	12	84
Pedestrians	10		1			
Lane Width (ft)	12.0		12.0			
Walking Speed (ft/s)	4.0		4.0			
Percent Blockage	1		0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			682			
pX, platoon unblocked						
vC, conflicting volume	599	490			514	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	599	490			514	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	81	90			99	
cM capacity (veh/h)	455	573			1043	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	145	504	96
Volume Left	86	0	12
Volume Right	59	48	0
cSH	497	1700	1043
Volume to Capacity	0.29	0.30	0.01
Queue Length 95th (ft)	30	0	1
Control Delay (s)	15.2	0.0	1.2
Lane LOS	C		A
Approach Delay (s)	15.2	0.0	1.2
Approach LOS	C		

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	51	25	13	7	31	22	50	734	38	20	487	73
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	51	25	13	7	31	22	50	734	38	20	487	73
Pedestrians		9			31			7			9	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			3			1			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								710			1055	
pX, platoon unblocked	0.76	0.76		0.76	0.76	0.76				0.76		
vC, conflicting volume	1472	1476	540	1480	1493	793	569			803		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1463	1468	540	1474	1491	564	569			577		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	71	98	87	63	94	95			97		
cM capacity (veh/h)	49	86	535	53	83	384	996			733		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	89	60	822	580
Volume Left	51	7	50	20
Volume Right	13	22	38	73
cSH	66	107	996	733
Volume to Capacity	1.35	0.56	0.05	0.03
Queue Length 95th (ft)	185	66	4	2
Control Delay (s)	339.0	74.8	1.3	0.7
Lane LOS	F	F	A	A
Approach Delay (s)	339.0	74.8	1.3	0.7
Approach LOS	F	F		

Intersection Summary			
Average Delay	23.3		
Intersection Capacity Utilization	84.4%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	88	66	468	70	17	166
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	88	66	468	70	17	166
Pedestrians	7		2			6
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	1		0			1
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			356			
pX, platoon unblocked	0.92	0.92			0.92	
vC, conflicting volume	712	516			545	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	640	426			457	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	78	88			98	
cM capacity (veh/h)	393	570			1005	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	154	538	183
Volume Left	88	0	17
Volume Right	66	70	0
cSH	453	1700	1005
Volume to Capacity	0.34	0.32	0.02
Queue Length 95th (ft)	37	0	1
Control Delay (s)	17.0	0.0	1.0
Lane LOS	C		A
Approach Delay (s)	17.0	0.0	1.0
Approach LOS	C		

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	47.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	66	37	71	14	33	42	56	720	29	27	418	65
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	66	37	71	14	33	42	56	720	29	27	418	65
Pedestrians		8			11			27			7	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			2			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								369				
pX, platoon unblocked	0.68	0.68		0.68	0.68	0.68				0.68		
vC, conflicting volume	1424	1384	486	1478	1402	752	491			760		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1390	1331	486	1469	1357	406	491			417		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	61	87	65	64	90	95			97		
cM capacity (veh/h)	49	95	565	40	92	434	1065			773		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	174	89	805	510
Volume Left	66	14	56	27
Volume Right	71	42	29	65
cSH	93	110	1065	773
Volume to Capacity	1.87	0.81	0.05	0.03
Queue Length 95th (ft)	364	116	4	3
Control Delay (s)	504.3	112.7	1.3	1.0
Lane LOS	F	F	A	A
Approach Delay (s)	504.3	112.7	1.3	1.0
Approach LOS	F	F		

Intersection Summary			
Average Delay	63.0		
Intersection Capacity Utilization	86.5%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	135	170	17	169	81	136	12	270	239	30	164	68
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00	0.96	1.00	0.99	
Flpb, ped/bikes	1.00	1.00		0.98	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.91			1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1670	1731		1641	1564			1761	1447	1676	1673	
Flt Permitted	0.62	1.00		0.64	1.00			0.98	1.00	0.95	1.00	
Satd. Flow (perm)	1094	1731		1105	1564			1737	1447	1676	1673	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	135	170	17	169	81	136	12	270	239	30	164	68
RTOR Reduction (vph)	0	5	0	0	75	0	0	0	122	0	17	0
Lane Group Flow (vph)	135	182	0	169	142	0	0	282	117	30	215	0
Confl. Peds. (#/hr)	7		35	35		7	7		6	6		7
Confl. Bikes (#/hr)			11			8			11			5
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Prot	NA	
Protected Phases		2			5			8		7	4	
Permitted Phases	2			5			8		8			
Actuated Green, G (s)	14.1	14.1		14.1	14.1			14.4	14.4	1.9	20.3	
Effective Green, g (s)	14.1	14.1		14.1	14.1			14.4	14.4	1.9	20.3	
Actuated g/C Ratio	0.33	0.33		0.33	0.33			0.34	0.34	0.04	0.48	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	363	575		367	520			589	491	75	800	
v/s Ratio Prot		0.11			0.09					0.02	c0.13	
v/s Ratio Perm	0.12			c0.15				c0.16	0.08			
v/c Ratio	0.37	0.32		0.46	0.27			0.48	0.24	0.40	0.27	
Uniform Delay, d1	10.8	10.6		11.2	10.4			11.0	10.1	19.7	6.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.3		0.9	0.3			0.6	0.3	3.5	0.2	
Delay (s)	11.4	10.9		12.1	10.7			11.7	10.3	23.2	6.8	
Level of Service	B	B		B	B			B	B	C	A	
Approach Delay (s)		11.1			11.3			11.0			8.7	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	42.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	184	243	60	39	98	30	68	593	49	55	346	97
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.2			4.2		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.98			0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		0.98			0.99		1.00	1.00		1.00	1.00	
Frt		0.98			0.98		1.00	0.99		1.00	0.97	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1651			1664		1676	1738		1676	1686	
Flt Permitted		0.80			0.84		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1350			1409		1676	1738		1676	1686	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	184	243	60	39	98	30	68	593	49	55	346	97
RTOR Reduction (vph)	0	8	0	0	12	0	0	4	0	0	14	0
Lane Group Flow (vph)	0	479	0	0	155	0	68	638	0	55	429	0
Confl. Peds. (#/hr)	34		53	53		34	34		16	34		16
Confl. Bikes (#/hr)			14			9			5			12
Parking (#/hr)						2						
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4								
Actuated Green, G (s)		19.3			19.3		5.4	28.8		5.2	28.6	
Effective Green, g (s)		18.8			18.8		4.9	29.3		4.7	29.1	
Actuated g/C Ratio		0.29			0.29		0.08	0.45		0.07	0.45	
Clearance Time (s)		3.7			3.7		3.5	4.5		3.5	4.5	
Vehicle Extension (s)		2.5			2.5		2.5	3.0		2.5	2.0	
Lane Grp Cap (vph)		390			407		126	783		121	754	
v/s Ratio Prot							c0.04	c0.37		0.03	0.25	
v/s Ratio Perm		c0.36			0.11							
v/c Ratio		1.23			0.38		0.54	0.82		0.45	0.57	
Uniform Delay, d1		23.1			18.4		29.0	15.5		28.9	13.3	
Progression Factor		1.00			1.00		1.14	0.66		1.00	1.00	
Incremental Delay, d2		123.6			0.4		1.8	5.0		2.0	3.1	
Delay (s)		146.7			18.9		34.8	15.2		30.9	16.4	
Level of Service		F			B		C	B		C	B	
Approach Delay (s)		146.7			18.9			17.1			18.0	
Approach LOS		F			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	51.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	99.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	10	21	33	502	145	25
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	21	33	502	145	25
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				578		
pX, platoon unblocked						
vC, conflicting volume	726	158	170			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	726	158	170			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	98	98			
cM capacity (veh/h)	383	888	1407			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	31	535	170
Volume Left	10	33	0
Volume Right	21	0	25
cSH	623	1407	1700
Volume to Capacity	0.05	0.02	0.10
Queue Length 95th (ft)	4	2	0
Control Delay (s)	11.1	0.7	0.0
Lane LOS	B	A	
Approach Delay (s)	11.1	0.7	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	10	21	479	48	31	37
Sign Control	Free			Yield	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	10	21	479	48	31	37
Pedestrians					2	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2		83	32	43	2
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2		83	32	43	2
tC, single (s)	4.1		7.1	6.5	6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2		3.5	4.0	4.0	3.3
p0 queue free %	99		43	94	96	97
cM capacity (veh/h)	1618		844	853	842	1080

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	31	527	68
Volume Left	10	479	0
Volume Right	21	0	37
cSH	1618	844	957
Volume to Capacity	0.01	0.62	0.07
Queue Length 95th (ft)	0	112	6
Control Delay (s)	2.4	16.1	9.0
Lane LOS	A	C	A
Approach Delay (s)	2.4	16.1	9.0
Approach LOS		C	A

Intersection Summary			
Average Delay	14.6		
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	15	217	0	508	53	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	15	217	0	508	53	0
Pedestrians	1					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				918		
pX, platoon unblocked						
vC, conflicting volume	562	54	54			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	562	54	54			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	79	100			
cM capacity (veh/h)	488	1012	1550			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	232	508	53
Volume Left	15	0	0
Volume Right	217	0	0
cSH	946	1700	1700
Volume to Capacity	0.25	0.30	0.03
Queue Length 95th (ft)	24	0	0
Control Delay (s)	10.0	0.0	0.0
Lane LOS	B		
Approach Delay (s)	10.0	0.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	49.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	55	38	464	46	39	234
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	55	38	464	46	39	234
Pedestrians	5					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			725			
pX, platoon unblocked	0.94	0.94			0.94	
vC, conflicting volume	804	492			515	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	760	429			453	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	84	94			96	
cM capacity (veh/h)	337	587			1038	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	93	510	273
Volume Left	55	0	39
Volume Right	38	46	0
cSH	408	1700	1038
Volume to Capacity	0.23	0.30	0.04
Queue Length 95th (ft)	22	0	3
Control Delay (s)	16.4	0.0	1.6
Lane LOS	C		A
Approach Delay (s)	16.4	0.0	1.6
Approach LOS	C		

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	50	29	8	5	24	18	19	379	11	13	380	49
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	50	29	8	5	24	18	19	379	11	13	380	49
Pedestrians		1			13			4			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								718			1023	
pX, platoon unblocked												
vC, conflicting volume	887	872	410	892	892	400	430			403		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	887	872	410	892	892	400	430			403		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	78	90	99	98	91	97	98			99		
cM capacity (veh/h)	232	277	639	228	270	641	1129			1143		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	87	47	409	442
Volume Left	50	5	19	13
Volume Right	8	18	11	49
cSH	262	339	1129	1143
Volume to Capacity	0.33	0.14	0.02	0.01
Queue Length 95th (ft)	35	12	1	1
Control Delay (s)	25.5	17.3	0.6	0.4
Lane LOS	D	C	A	A
Approach Delay (s)	25.5	17.3	0.6	0.4
Approach LOS	D	C		

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	74	30	495	18	31	258
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	74	30	495	18	31	258
Pedestrians	2		1			
Lane Width (ft)	12.0		12.0			
Walking Speed (ft/s)	4.0		4.0			
Percent Blockage	0		0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			348			
pX, platoon unblocked	0.88	0.88			0.88	
vC, conflicting volume	827	506			515	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	734	368			379	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	78	95			97	
cM capacity (veh/h)	329	594			1035	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	104	513	289
Volume Left	74	0	31
Volume Right	30	18	0
cSH	378	1700	1035
Volume to Capacity	0.28	0.30	0.03
Queue Length 95th (ft)	28	0	2
Control Delay (s)	18.1	0.0	1.2
Lane LOS	C		A
Approach Delay (s)	18.1	0.0	1.2
Approach LOS	C		

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	22	12	15	19	33	32	17	355	22	19	325	61
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	22	12	15	19	33	32	17	355	22	19	325	61
Pedestrians		8			15			3			9	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		1			1			0			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								352				
pX, platoon unblocked	0.95	0.95		0.95	0.95	0.95				0.95		
vC, conflicting volume	859	828	366	832	847	390	394			392		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	828	795	366	801	816	337	394			339		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	90	96	98	93	88	95	99			98		
cM capacity (veh/h)	228	290	673	259	283	660	1157			1150		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	49	84	394	405
Volume Left	22	19	17	19
Volume Right	15	32	22	61
cSH	306	352	1157	1150
Volume to Capacity	0.16	0.24	0.01	0.02
Queue Length 95th (ft)	14	23	1	1
Control Delay (s)	19.0	18.4	0.5	0.6
Lane LOS	C	C	A	A
Approach Delay (s)	19.0	18.4	0.5	0.6
Approach LOS	C	C		

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	60	11	144	61	43	8	431	336	26	277	36
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00	0.97	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.98	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	0.94			1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1676	1711		1642	1627			1763	1453	1676	1730	
Flt Permitted	0.69	1.00		0.71	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (perm)	1217	1711		1228	1627			1755	1453	1676	1730	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	40	60	11	144	61	43	8	431	336	26	277	36
RTOR Reduction (vph)	0	9	0	0	35	0	0	0	130	0	4	0
Lane Group Flow (vph)	40	62	0	144	69	0	0	439	206	26	309	0
Confl. Peds. (#/hr)			18	18			2		1	1		2
Confl. Bikes (#/hr)			3			11			17			2
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Prot	NA	
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2		2			
Actuated Green, G (s)	12.9	12.9		12.9	12.9			42.0	42.0	1.6	47.6	
Effective Green, g (s)	12.9	12.9		12.9	12.9			42.0	42.0	1.6	47.6	
Actuated g/C Ratio	0.19	0.19		0.19	0.19			0.61	0.61	0.02	0.69	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	229	322		231	306			1076	890	39	1202	
v/s Ratio Prot		0.04			0.04					c0.02	0.18	
v/s Ratio Perm	0.03			c0.12				c0.25	0.14			
v/c Ratio	0.17	0.19		0.62	0.23			0.41	0.23	0.67	0.26	
Uniform Delay, d1	23.3	23.4		25.6	23.6			6.8	6.0	33.2	3.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.3		5.2	0.4			1.1	0.6	35.5	0.5	
Delay (s)	23.7	23.7		30.7	23.9			8.0	6.6	68.7	4.4	
Level of Service	C	C		C	C			A	A	E	A	
Approach Delay (s)		23.7			27.9			7.4			9.3	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	68.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	126	229	80	24	103	19	63	252	29	18	278	64
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.98			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		0.98	1.00	
Frt		0.98			0.98		1.00	0.98		1.00	0.97	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1663			1705		1671	1729		1648	1709	
Flt Permitted		0.87			0.91		0.50	1.00		0.57	1.00	
Satd. Flow (perm)		1460			1564		877	1729		991	1709	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	126	229	80	24	103	19	63	252	29	18	278	64
RTOR Reduction (vph)	0	20	0	0	11	0	0	10	0	0	21	0
Lane Group Flow (vph)	0	415	0	0	135	0	63	271	0	18	321	0
Confl. Peds. (#/hr)	14		41	41		14	7		20	20		7
Confl. Bikes (#/hr)			16			1			3			5
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		16.0			16.0		16.0	16.0		16.0	16.0	
Effective Green, g (s)		16.0			16.0		16.0	16.0		16.0	16.0	
Actuated g/C Ratio		0.40			0.40		0.40	0.40		0.40	0.40	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)		584			625		350	691		396	683	
v/s Ratio Prot								0.16			c0.19	
v/s Ratio Perm		c0.28			0.09		0.07			0.02		
v/c Ratio		0.71			0.22		0.18	0.39		0.05	0.47	
Uniform Delay, d1		10.1			7.9		7.8	8.5		7.3	8.9	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		7.2			0.8		1.1	1.7		0.2	2.3	
Delay (s)		17.2			8.7		8.9	10.2		7.5	11.2	
Level of Service		B			A		A	B		A	B	
Approach Delay (s)		17.2			8.7			10.0			11.0	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	75.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	14	28	24	501	270	20
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	14	28	24	501	270	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				598		
pX, platoon unblocked	0.91					
vC, conflicting volume	829	280	290			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	760	280	290			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	96	98			
cM capacity (veh/h)	333	759	1272			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	42	525	290
Volume Left	14	24	0
Volume Right	28	0	20
cSH	532	1272	1700
Volume to Capacity	0.08	0.02	0.17
Queue Length 95th (ft)	6	1	0
Control Delay (s)	12.4	0.6	0.0
Lane LOS	B	A	
Approach Delay (s)	12.4	0.6	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		

APPENDIX D:

Radio Tower Analysis

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(1925-2011)

ENGINEERING REPORT:

ANALYSIS OF PROPOSED ANTON DEVELOPMENT COMPANY, LLC HOUSING DEVELOPMENT ON THE ANTENNA PATTERNS OF KEAR & KVTO

6701 SHELLMOND, EMERYVILLE, CA

PREPARED FOR
URBAN PLANNING PARTNERS, INC
ON BEHALF OF THE CITY OF EMERYVILLE

DECEMBER 2014

INTRODUCTION

Anton Development Company, LLC has proposed construction of a high density housing facility at 6701 Shellmond, Emeryville, CA. This housing development will be constructed 500 feet south of the antenna of Medium Wave (AM - Amplitude Modulated) radio stations KEAR & KVTO. The proposed construction includes a total gross area of around 366,000 square feet at a heights of up to 84 feet above ground. This facility could be a potential source of re-radiation of the transmitted signals of KEAR & KVTO and could distort the circularity of the antenna patterns for the AM stations. This report will examine the effect of this proposed construction on the operation of KEAR & KVTO .

DESCRIPTION OF NEARBY AM BROADCAST STATIONS

KEAR is operated by Family Stations, Inc. and KVTO is operated by Pham Radio Communications. The signals broadcast from this antenna system are omni-directional - that is they radiate in all horizontal directions with the same magnitude. These stations operate with the following facilities:

Call Sign	Frequency	Power
KEAR Daytime & Nighttime	610 kHz	5 kW
KVTO Daytime & Nighttime	1400 kHz	1 kW

The transmitter site is located on a parcel bounded by Bay Street, Potter Street, Highway 13 and the entrance ramp to I-80 in Berkeley, California. The antenna system consists of a single tower about 450 feet tall.

Structures that are constructed close to AM radio antenna systems are often energized by the AM signal and can become an inadvertent parasitic part of the antenna system. This can cause serious distortion to the omni-directional antenna pattern and not evenly project the signal in all directions.

MODELING BACKGROUND AND CRITERIA AS IMPLEMENTED

A mathematical model of the antenna and electrically conducting objects in its vicinity can be used to determine the "real world" condition which may affect the antenna's performance. Models of this type have been developed with use a mathematical analysis technique called "the method of moments." Computer programs using these techniques were developed by U.S. Navy contractors and staff in the 1970s. Two of the commonly used implementations are "NEC" ("Numerical Electromagnetic Code") and MININEC.

Expert MININEC is an advanced engineering tool for the design and analysis of wire antennas. Special options for analysis of commercial broadcast antennas have been added. Because of the similarity in names, it has often been stated that MININEC is but a personal computer (PC) version of its big brother, NEC [Burke and Poggio, 1981]. Some of this confusion is described in Murray and Austin [Murry and Austin, 1994]. There are significant differences between these two codes. Both codes use the Method of Moments to solve for currents on electrically thin wires and properly used will produced essentially the same results. However, each code starts with a different version of the integral formulation for the currents and fields for wires. Expert MININEC was used to model the antenna arrays, and to synthesize the antenna patterns. It was authored by J.W. Rockway and J.C. Logan. (EM Scientific). It is the most commonly used software implementation for both performance verification and re-radiation analysis of medium frequency antennas. The far-field patterns generated by MININEC replicate the FCC licensed directional antenna patterns.

MODELING BACKGROUND

We have developed a model of the KEAR & KVTO antenna system that replicates the FCC licensed omni-directional antenna pattern. The proposed building structures have been added to the model as a simplified wire model to determine their impact on the omni-directional antenna patterns.

MODELING CRITERIA

Moment Method modeling programs commonly in use in the Medium Frequency (MF) band utilize numerical approximations to model the effects of cylindrical wires and surface patches in the presence of external electromagnetic fields or applied voltage sources. In order for the approximations used in these programs to produce accurate results, certain criteria on the geometry and electrical characteristics of the elements used in the model must be maintained. Some of these criteria are derived directly from the numerical methods used to model real world effects, and others have been determined through empirical testing and have been widely accepted as best practices in the modeling community. A summary of the criteria that should be employed when modeling the antenna arrays and the proposed structures is outlined below.

1. The system models of the antennas, and scattering structures must not violate any of the constraints of the computer program being used.

2. All modeled structures, the ground plane, and all connections between the modeled structures and the ground plane will be assumed to be lossless; with the exception that antenna base resistance may be employed when modeling the antenna systems to achieve a modeled pattern efficiency that is equivalent to the FCC specified pattern efficiency.

3. Structures that are not cylinders but that otherwise have uniform cross section, may be modeled as a cylinder with a radius equivalent to the radius of a circle having the same circumference as the physical structure being modeled.

4. For vertical structures whose cross section significantly tapers with height, the structure may be modeled using multiple wires having stepped radii that simulate the taper of the physical structure being modeled.

5. No wire segment in the model may exceed 10 electrical degrees in length at the operating frequency of 1400 kHz (5.9 meters - 19.5 feet).

6. For complex structures such as the buildings, it may be necessary to create a detailed model consisting of the primary vertical legs of the structure, horizontal support bars and some interconnecting structural members to simulate a building structure.

7. The model of each structure should include the vertical support structure and any conducting elements such as grounded lightning protection cables or rods.

FCC PROOF-OF-PERFORMANCE

AM antenna systems operate at medium wave radio frequencies which have wavelengths of several hundred feet. The wavelength for KEAR & KVTO are:

KEAR	610 kHz	491.5 meters - 1612.4 feet
KVTO	1400 kHz	214.1 meters - 702.6 feet

The interaction of vertical conductors can have a dramatic effect on the omni-directional antenna pattern of an AM radio station.

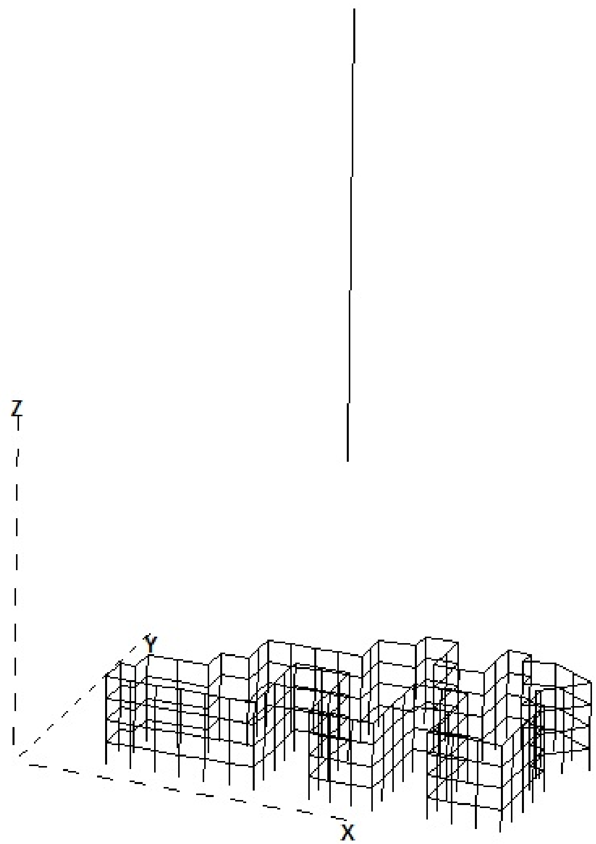
In MM Docket No. 93-177 adopted in 2009 the FCC adopted a change in proof of performance rules that no longer rely on field strength measurements but instead use internal impedance measurements and moment method analysis of the antenna system. These types of proofs are referred to as Moment Method Proofs and are the preferred method. One of the major benefits of the Moment Method proofs over the previous field strength proof is that proof of FCC compliance is no longer dependant on development nearby the antenna site.

As part of this same Docket the FCC also codified the standard of what is significant distortion to an AM antenna pattern. This section of the rules *(47 CFR §1.30000 Disturbance of AM Broadcast Station Antenna Patterns*) defines this level as ±2 dB. Under this rule the threshold for study is for structures that are greater than 60 electrical degrees (1/6 - 16.7% of a wavelength) in height. The height of the proposed building is 19 electrical degrees at 610 kHz and 43 electrical degrees at 1400 kHz and is well below this threshold.

CONCLUSION AND RECOMMENDATIONS

When the worst case (zero Ohm loss) effects of the building are included in a model of the antenna, the pattern distortion in KEAR & KVTO omni-directional antenna pattern show a variance for KEAR of +0.4 dB and -0.4 dB and for KVTO this variance is +0.7 dB and - 1.0 dB. These variances are well within the ±2 dB allowed in *§1.30002 Tower construction or modification near AM stations*. It is important to note that this is a "worst case" zero loss analysis, and that the effect of finite ground conductivity and I^2R losses in the building structure will reduce these values substantially. The proposed building will have no discernable impact on the operations of KEAR & KVTO.

C:\am\Emeryville\Model\Emeryville - KVTO 11-29-2014   11:43:04
orthographic view, ground plane



ERROR   WARNING

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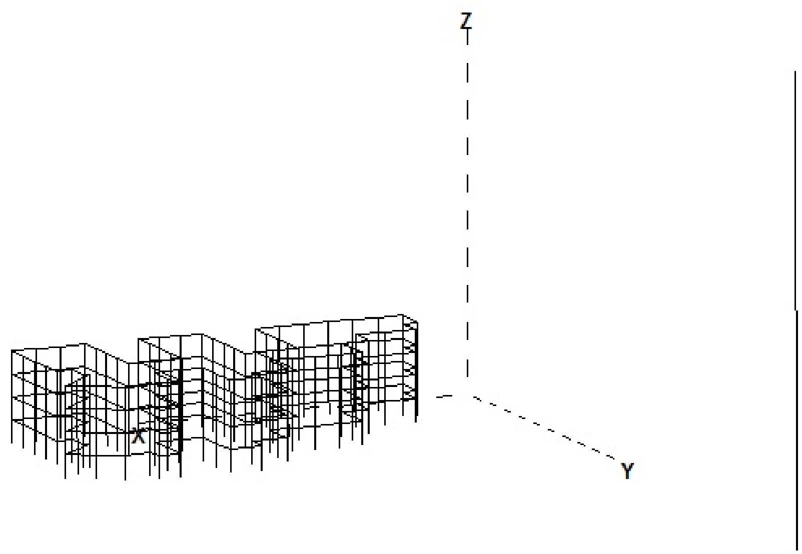
orthographic view, ground plane



ERROR WARNING

KEAR

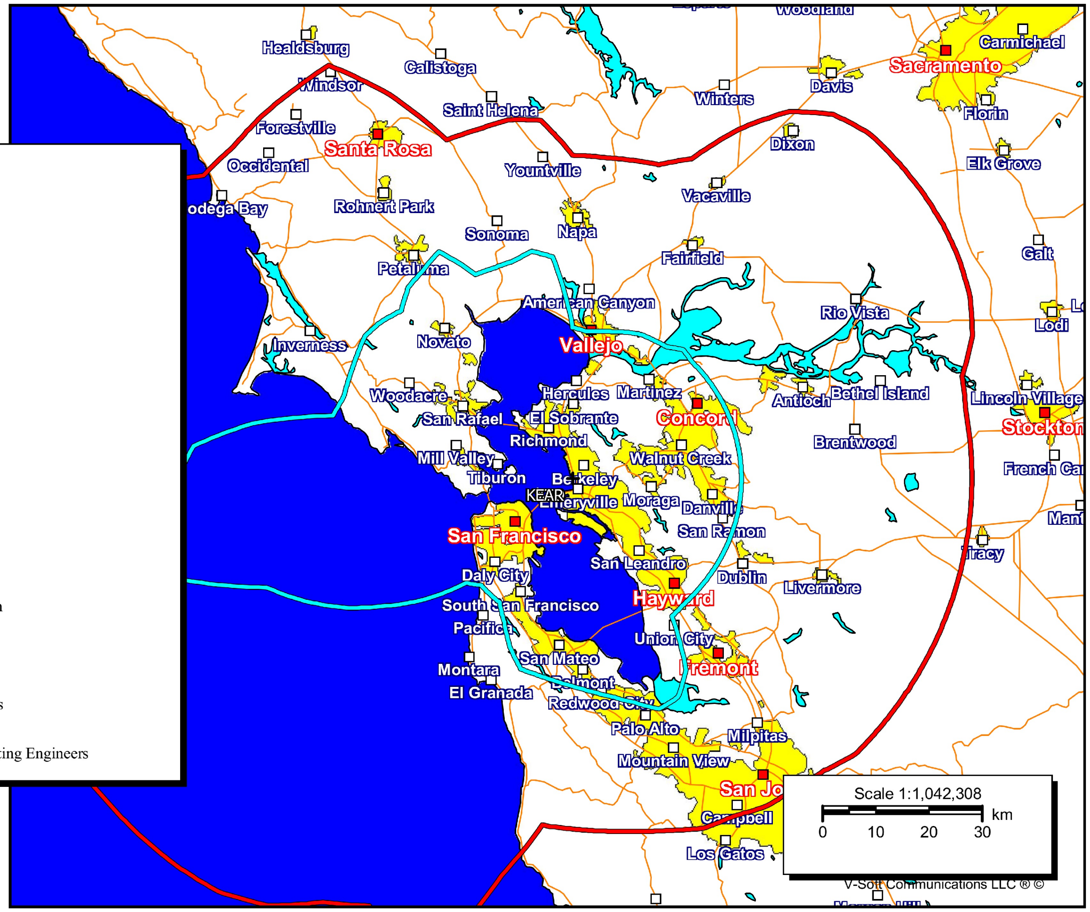
Freq: 610 kHz
Class: B
Latitude: 37-50-58 N
Longitude: 122-17-44 W
Power: 5 kW
RMS: 282 mV/m @1km
Light Blue Contour

KVTO

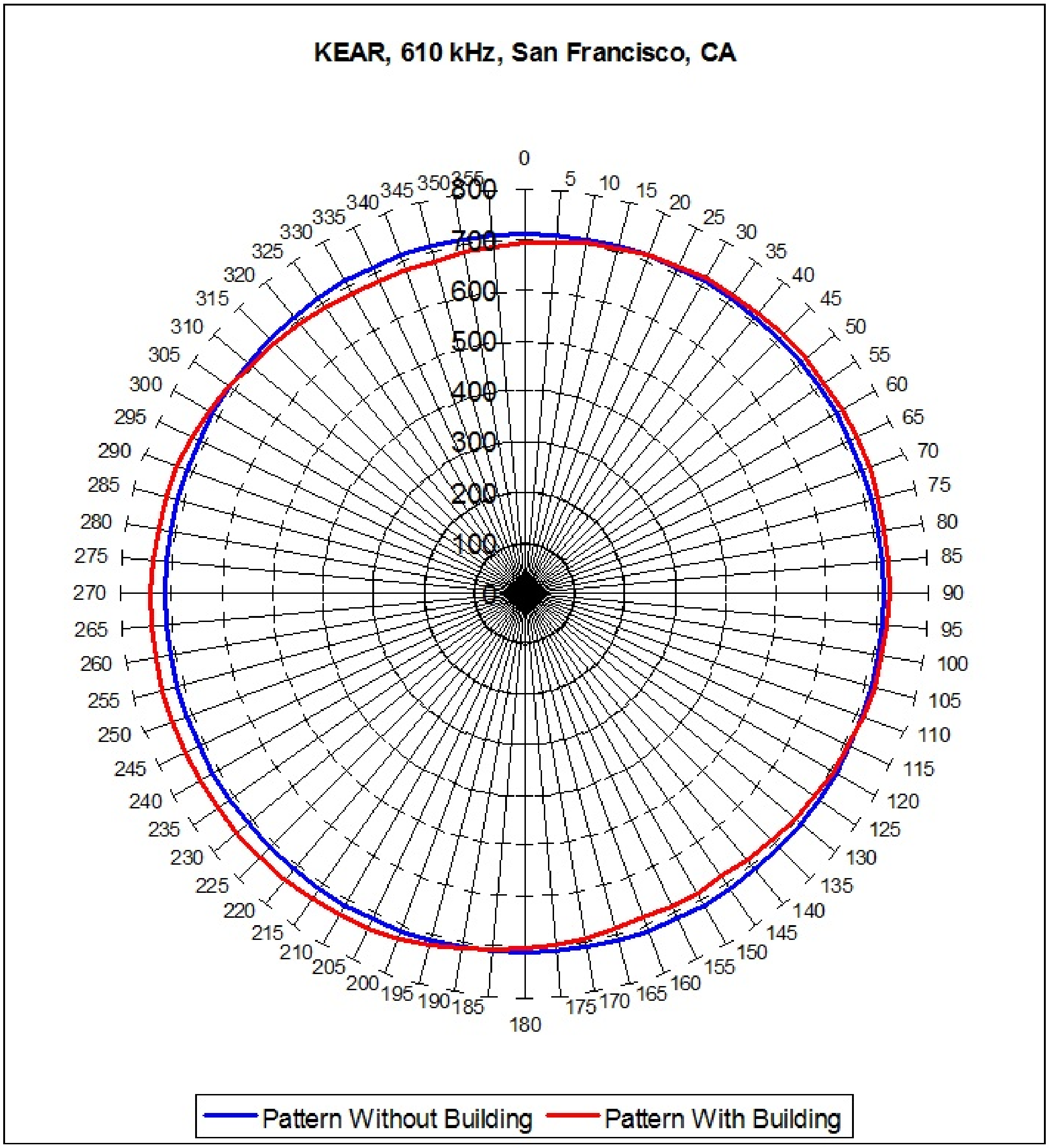
Freq: 1400 kHz
Class: C
Latitude: 37-50-58 N
Longitude: 122-17-44 W
Power: 1 kW
RMS: 440.96 mV/m @1km
Red Contour

5 mV/m Coverage Contours

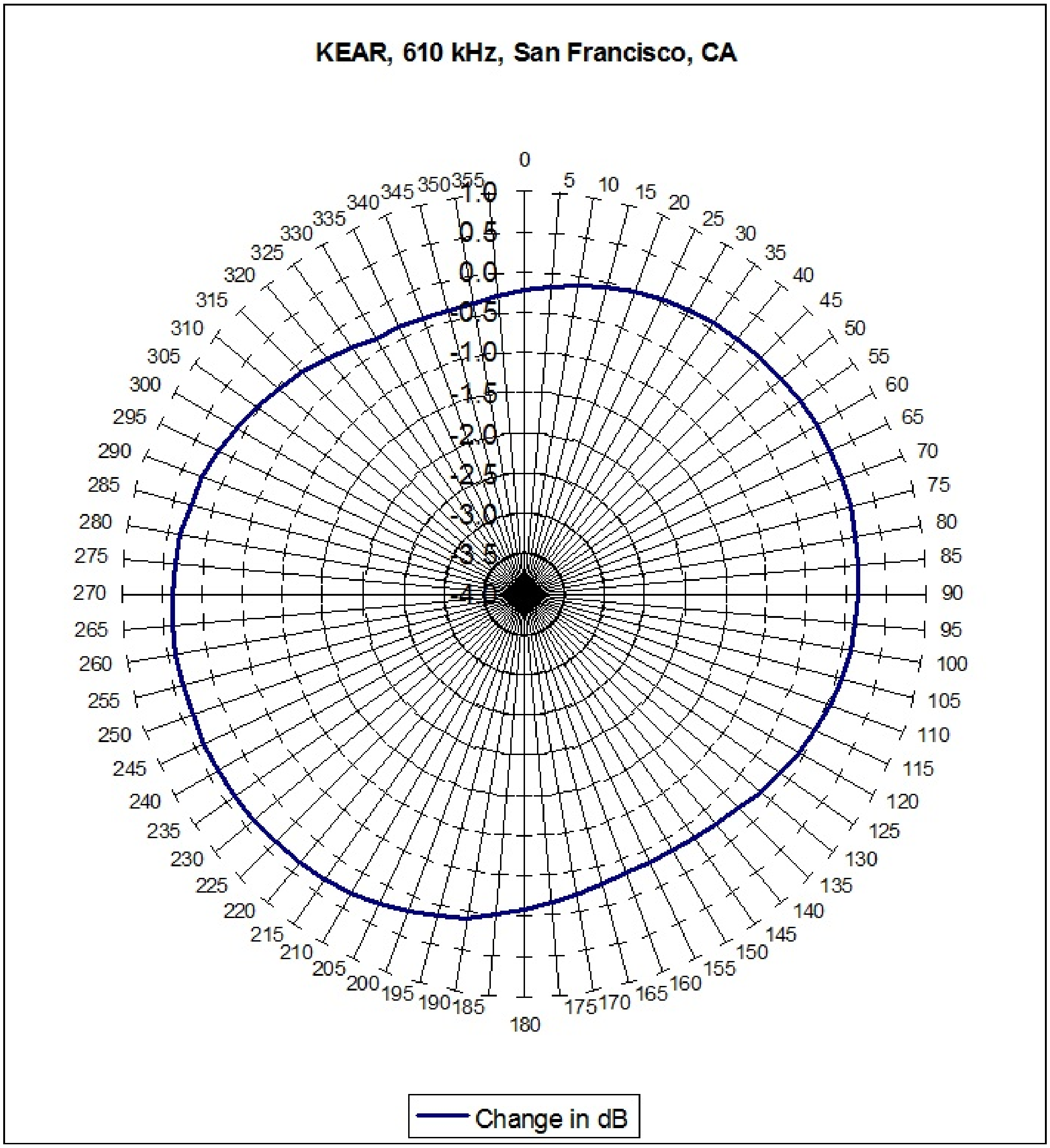
Hatfield & Dawson Consulting Engineers



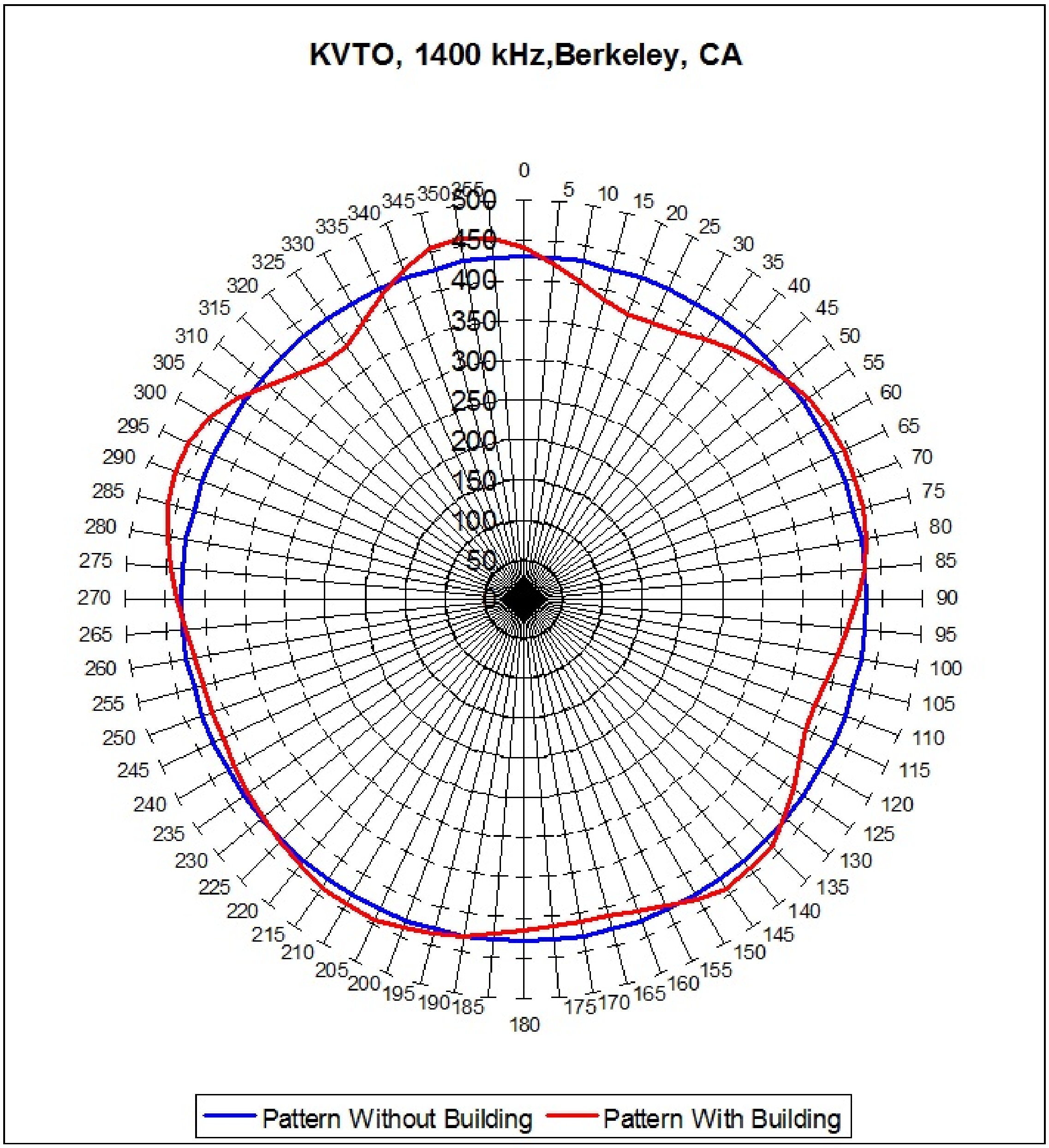
Degrees True	Pattern Without Building mV/m at 1 km	Pattern With Building mV/m at 1 km	Change dB
0	710.9	691.8	-0.2
5	710.9	696.5	-0.2
10	710.9	701.2	-0.1
15	710.9	705.8	-0.1
20	710.9	710.0	0.0
25	710.9	713.7	0.0
30	710.9	716.9	0.1
35	710.9	719.4	0.1
40	710.9	721.4	0.1
45	710.9	722.9	0.1
50	710.9	724.0	0.2
55	710.9	724.8	0.2
60	710.9	725.2	0.2
65	710.9	725.4	0.2
70	710.9	725.4	0.2
75	710.9	725.2	0.2
80	710.9	724.7	0.2
85	710.9	723.9	0.2
90	710.9	722.7	0.1
95	710.9	721.1	0.1
100	710.9	719.0	0.1
105	710.9	716.3	0.1
110	710.9	713.1	0.0
115	710.9	709.2	0.0
120	710.9	704.9	-0.1
125	710.9	700.3	-0.1
130	710.9	695.6	-0.2
135	710.9	691.2	-0.2
140	710.9	687.5	-0.3
145	710.9	684.7	-0.3
150	710.9	683.3	-0.3
155	710.9	683.3	-0.3
160	710.9	684.9	-0.3
165	710.9	688.0	-0.3
170	710.9	692.4	-0.2
175	710.9	697.7	-0.2
180	710.9	703.6	-0.1
185	710.9	709.8	0.0
190	710.9	715.7	0.1
195	710.9	721.3	0.1
200	710.9	726.2	0.2
205	710.9	730.3	0.2
210	710.9	733.7	0.3
215	710.9	736.3	0.3
220	710.9	738.3	0.3
225	710.9	739.7	0.3
230	710.9	740.7	0.4
235	710.9	741.3	0.4
240	710.9	741.8	0.4
245	710.9	742.1	0.4
250	710.9	742.3	0.4
255	710.9	742.3	0.4
260	710.9	742.1	0.4
265	710.9	741.7	0.4
270	710.9	740.8	0.4
275	710.9	739.3	0.3
280	710.9	737.2	0.3
285	710.9	734.1	0.3
290	710.9	730.2	0.2
295	710.9	725.4	0.2
300	710.9	719.7	0.1
305	710.9	713.4	0.0
310	710.9	706.7	-0.1
315	710.9	700.1	-0.1
320	710.9	693.9	-0.2
325	710.9	688.7	-0.3
330	710.9	684.6	-0.3
335	710.9	682.1	-0.4
340	710.9	681.3	-0.4
345	710.9	682.1	-0.4
350	710.9	684.3	-0.3
355	710.9	687.6	-0.3



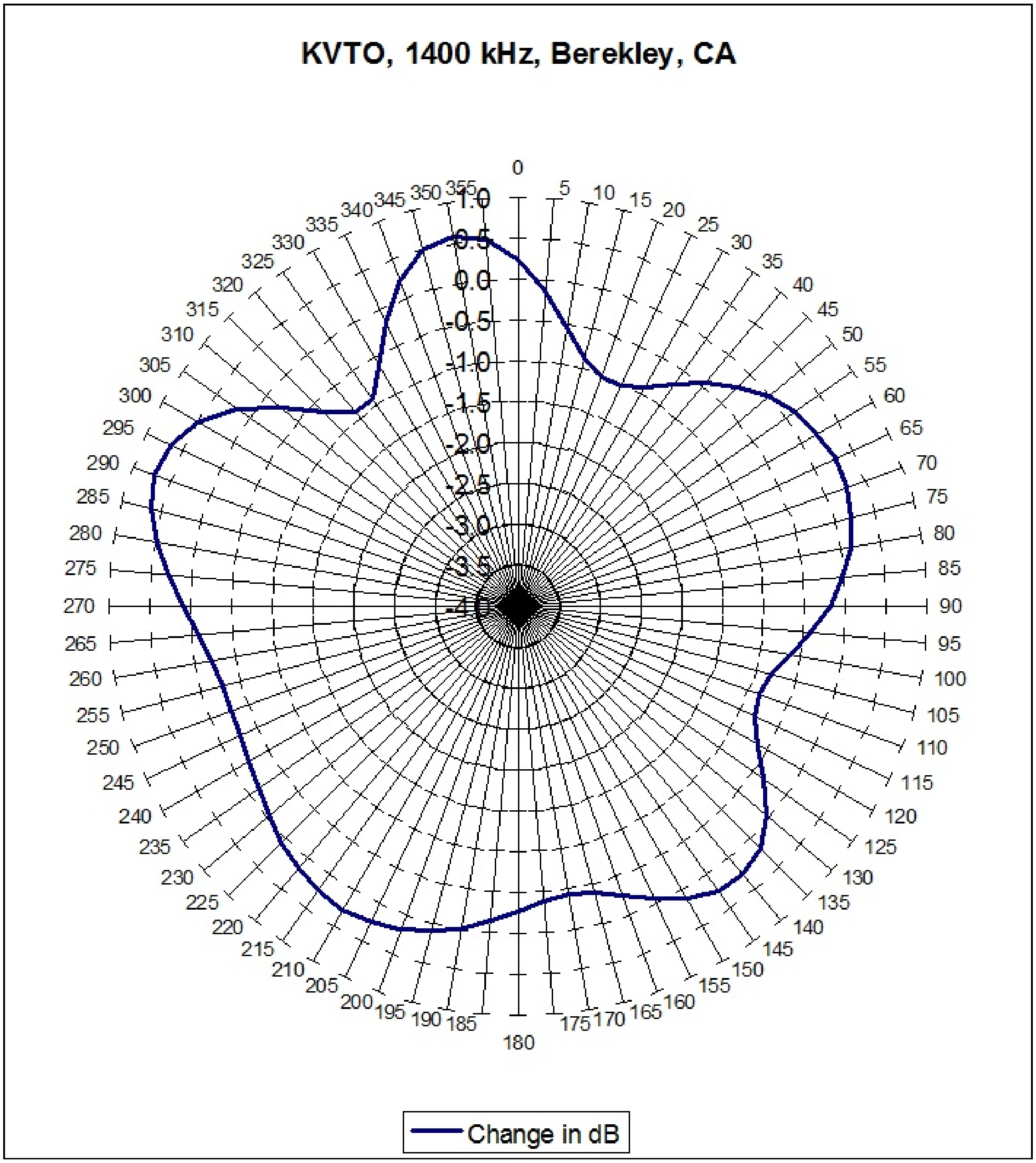
Field Strength in mV/m at 1 km


KEAR, 610 kHz, San Francisco, CA
Change in dB

Degrees True	Pattern Without Building mV/m at 1 km	Pattern With Building mV/m at 1 km	Change dB
0	428.5	440.2	0.2
5	428.5	421.8	-0.1
10	428.5	403.2	-0.5
15	428.5	388.7	-0.8
20	428.5	381.0	-1.0
25	428.5	380.8	-1.0
30	428.5	386.8	-0.9
35	428.5	396.7	-0.7
40	428.5	408.1	-0.4
45	428.5	419.0	-0.2
50	428.5	428.3	0.0
55	428.5	435.4	0.1
60	428.5	440.0	0.2
65	428.5	442.3	0.3
70	428.5	442.2	0.3
75	428.5	439.8	0.2
80	428.5	435.0	0.1
85	428.5	428.1	0.0
90	428.5	419.1	-0.2
95	428.5	409.0	-0.4
100	428.5	399.0	-0.6
105	428.5	391.2	-0.8
110	428.5	387.8	-0.9
115	428.5	390.5	-0.8
120	428.5	399.3	-0.6
125	428.5	412.4	-0.3
130	428.5	426.3	0.0
135	428.5	437.3	0.2
140	428.5	442.7	0.3
145	428.5	441.5	0.3
150	428.5	434.8	0.1
155	428.5	425.4	-0.1
160	428.5	416.4	-0.2
165	428.5	410.3	-0.4
170	428.5	408.4	-0.4
175	428.5	410.4	-0.4
180	428.5	415.1	-0.3
185	428.5	421.5	-0.1
190	428.5	428.2	0.0
195	428.5	434.3	0.1
200	428.5	439.1	0.2
205	428.5	441.9	0.3
210	428.5	442.3	0.3
215	428.5	440.5	0.2
220	428.5	436.9	0.2
225	428.5	432.1	0.1
230	428.5	427.0	0.0
235	428.5	422.1	-0.1
240	428.5	418.2	-0.2
245	428.5	415.6	-0.3
250	428.5	414.7	-0.3
255	428.5	415.9	-0.3
260	428.5	419.4	-0.2
265	428.5	425.3	-0.1
270	428.5	433.4	0.1
275	428.5	443.1	0.3
280	428.5	453.0	0.5
285	428.5	461.2	0.6
290	428.5	465.5	0.7
295	428.5	463.7	0.7
300	428.5	454.5	0.5
305	428.5	438.3	0.2
310	428.5	417.7	-0.2
315	428.5	398.1	-0.6
320	428.5	386.0	-0.9
325	428.5	386.3	-0.9
330	428.5	399.1	-0.6
335	428.5	419.3	-0.2
340	428.5	439.8	0.2
345	428.5	454.3	0.5
350	428.5	459.2	0.6
355	428.5	453.8	0.5



Field Strength in mV/m at 1 km



Hatfield & Dawson Consulting Engineers

STATEMENT OF ENGINEER

This Engineering Report *Analysis of Proposed Anton Development Company, LLC Housing Development on the Antenna Patterns of KEAR & KVTO* has been prepared by the undersigned or under our direct supervision. All representations contained herein are true to the best of our knowledge.

Stephen S. Lockwood, P.E.

Benjamin F. Dawson, III, P.E.

1 December 2014

URBAN
PLANNING
PARTNERS
INC.