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1. INTRODUCTION

The Treasure Island Development Authority ("TIDA") and Treasure Island Community Development, LLC ("TICD") are proposing a Redevelopment Plan for Treasure Island and Yerba Buena Island in the City and County of San Francisco, California. The Redevelopment Plan would be implemented through a Disposition and Development Agreement ("DDA") between TIDA and TICD, a Design for Development ("D4D") that sets forth the development standards and guidelines, and other ancillary documents. The Project would govern redevelopment on most of Treasure Island and portions of Yerba Buena Island. The Proposed Project would replace existing low-density residential, commercial and light industrial development with a new mixed-use, transit-oriented development that includes housing, retail/commercial space, recreational open space, and community facilities. For purposes of this Transportation Impact Study, the "Proposed Project" is the Development Program set forth in the Project Description in the Draft EIR.

1.1 REPORT ORGANIZATION

This report describes the results of a transportation impact analysis conducted to evaluate the transportation-related impacts of the Proposed Project. The report also describes the transportation-related impacts associated with the Proposed Project with an enhanced level of transit service that is described in the Project Description but which lacks a committed funding source. The report also analyzes a reduced project alternative, both with the level of transit service that would be provided as part of the Proposed Project and with the expanded level of transit service. A description of the applicable land use and transportation aspects of the Proposed Project and the analysis methodology used to determine project impacts are in this chapter. The remainder of the report describes the process and results of the analysis and is divided into the following chapters:

- **Chapter 2 – Project Setting** describes the operating conditions of the existing transportation network in the project vicinity, generally including both Treasure Island and Yerba Buena Island and portions of Downtown San Francisco, as appropriate. Generally, the transportation system analyzed includes the surrounding roadway network, weekday AM and PM, as well as Saturday peak hour traffic volumes, intersection performance, and freeway operations. Additionally, this section describes the existing public transit network, pedestrian facilities, and bicycle facilities.

- **Chapter 3 – Travel Demand Analysis** includes the Proposed Project’s trip generation, trip distribution, mode split, and trip assignment forecasts, as well as parking, loading, and construction travel demand. This chapter also describes how congestion pricing, ramp metering, and the varying levels of transit service considered in this analysis would affect the project’s overall trip generation and mode split.

- **Chapter 4 – Transportation Impact Analysis** describes the operating conditions of the transportation network after the addition of travel demand from the Proposed Project and the Reduced Development Project Alternative. This analysis is conducted for (i) a scenario with only transit service improvements for which full funding has been identified and for (ii) a scenario in which more transit service is provided (the Expanded Transit Scenario). For each scenario, the operations of the transportation system are described for existing plus project conditions and cumulative Year 2030 conditions. This section also describes the impacts on parking, loading, the transit network, and the bicycle and pedestrian facilities. Lastly, this section describes potential impacts of project construction on the transportation network.

---

1. The frequencies used in this study for the proposed transit service have changed since the 2006 Transportation Plan, although the general nature of the service is consistent.
1.2  PROJECT DESCRIPTION

Treasure Island and Yerba Buena Islands (the “Islands”) are in San Francisco Bay, about halfway between the San Francisco mainland and the City of Oakland. Treasure Island contains approximately 397 acres of land and Yerba Buena Island includes approximately 152 acres. The Islands are within the City and County of San Francisco, near the boundary with Alameda County. The San Francisco-Oakland Bay Bridge (“SFOBB”) provides direct access to Yerba Buena Island, which is linked to Treasure Island via a causeway.

Treasure Island was originally constructed to host the Golden Gate International Exposition in 1939. It was subsequently used by the United States Navy as Naval Station Treasure Island (“NSTI”) until 1993, when it was de-commissioned. Since the base was officially closed in 1997, the Treasure Island Development Authority (“TIDA”) has been responsible for the operations and maintenance of the base serving as the base caretaker through a Cooperative Agreement with the Navy, pending final disposition of the land from the Navy to TIDA.

Yerba Buena Island is a natural island that has been used by private parties and by the U.S. Army and Navy since the 1840s. The project setting is shown on Figure 1 on page 3.

1.2.1  Land Uses – Existing

The existing land uses on Treasure Island include two-, four-, and eight-unit two-story residential apartment buildings, as well as unoccupied barracks for resident service personnel. Non-residential buildings on Treasure Island include offices, a café, several event venues, a guard shack, warehouse/storage/manufacturing, a childcare center, a fire station and fire training academy, a wastewater treatment plant, a gymnasium, film production facilities, and a yacht club. Other buildings on Treasure Island are unoccupied but available for lease, or are unoccupied because they are in hazardous condition or are within a remediation site. Many of the existing non-residential buildings are used by small businesses. The U.S. Department of Labor maintains a 37-acre campus for a large career training organization, the Treasure Island Job Corps. The Job Corps campus includes group housing for 710 students. Recreation facilities on the island include a marina, ball fields, a gym, theater, bowling alley, fitness center, tennis courts, a picnic area, and open space.

The U.S. Coast Guard occupies approximately 47 acres of land on Yerba Buena Island including a U.S. Coast Guard Station on the southeast side of Yerba Buena Island that includes housing, administrative facilities, open storage and docks, buoy maintenance facilities, and a lighthouse. The California Department of Transportation (“Caltrans”) occupies approximately 20 acres of Yerba Buena Island with portions of the SFOBB and a tunnel that connects the bridge’s east and west spans. In addition, Yerba Buena Island includes about 80 habitable housing units and 10 non-residential buildings.

1.2.2  Land Uses – Proposed

The Proposed Project would remove most of the existing structures in the plan area and replace them with the following new development:

- Up to 8,000 dwelling units, including approximately 7,700 to 7,800 units on Treasure Island and 200 to 300 units on Yerba Buena Island. The residential units would be provided in low-, mid-, and high-rise buildings with a mix of housing types available to a wide range of households and income levels;
- 100,000 square feet of new office uses;
FIGURE 1

PROJECT SETTING


Treasure Island and Yerba Buena Island Redevelopment Plan TIS

LEGEND:

= Treasure Island / Yerba Buena Island Redevelopment Area


Treasure Island and Yerba Buena Island Redevelopment Plan TIS

LEGEND:

= Treasure Island / Yerba Buena Island Redevelopment Area
Chapter 1 – Introduction

- Up to approximately 140,000 square feet of new retail uses, including a mix of neighborhood-serving (grocery store, drug store, dry cleaners, etc.) visitor serving and destination retail (restaurants, specialty shops, etc.);

- Up to approximately 269,000 square feet of adaptive re-use of three existing buildings on the southwest quadrant of Treasure Island. Uses for these three buildings include:
  - 67,000 square feet of additional retail (which, when combined with the 140,000 square feet of new retail yields a total of 207,000 square feet of retail proposed on the Islands);
  - 30,000 square feet of community-serving uses, such as small offices;
  - 22,000 square feet of food production/manufacturing; and
  - 150,000 square feet of entertainment uses.

- Up to approximately 273,500 square feet of institutional uses, including:
  - 105,000 square foot elementary school (rehabilitation and/or expansion of existing school);
  - 30,000 square feet for police/fire services;
  - 13,500 square feet for community facilities, (precise programming to be determined, but could include facilities such as youth/senior centers, a library or reading room, support services, etc.);
  - 35,000 square feet of community center uses;
  - 15,000 square feet for a sailing center; and
  - 75,000 square feet of cultural/museum space.

- Up to approximately 500 hotel rooms, including a 50-room wellness spa, 70 timeshare units, and an approximately 300 to 380 room full-service hotel.

- Up to approximately 300 acres of public recreational parks and open space including a 40-acre regional sports facility. The sports facility would consist of organized ball fields. During weekday AM and PM peak hours, the fields would be open for use with reservations only, and no scheduled events would occur before 6:30 PM (30 minutes after the end of the PM peak hour). All fields would be used for scheduled events on weekends. Although the exact program for the sports facility has not been determined, the following has been assumed as a reasonable allocation of field space:
  - 6 soccer fields;
  - 4 baseball fields;
  - 8 batting cages;
  - 6 softball fields; and
  - 6 volleyball courts.

- Expansion of the existing 100-berth marina near Clipper Cove to provide up to 400 berths. 

---

2. Construction of the additional marina berths has already been approved, as part of the Transfer and Reuse of Naval Air Station Treasure Island FEIR (June 2006, State Clearinghouse #1996092073) and is not technically part of the Proposed Project. Landside services for the marina are part of the Proposed Project and the additional berths are included in the cumulative analysis, but the travel demand associated with the additional berths is not included as part of this project.
The existing residential housing on the Islands would be replaced as part of the project; the existing low-to moderate-income housing on the island would be replaced as part of the approximately 2,400 affordable units included in the project. The existing market-rate housing on Treasure Island would also be replaced as part of the proposed market-rate housing. The existing 37-acre Treasure Island Job Corps campus would remain in operation. On Yerba Buena Island, the existing Coast Guard facilities and approximately 10 acres of Caltrans property would remain. Figure 2 on page 6 presents the Redevelopment Plan area on the Islands. The area has been broken into smaller neighborhoods for the evaluation purposes in this report. Table 1 on page 5 summarizes the land uses proposed for the project. The Proposed Project also includes a new street network, which is described in Section 1.2.4 (on page 10) and is depicted on Figure 5 (page 11).

<table>
<thead>
<tr>
<th>TABLE 1 – LAND USE PROGRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use</strong></td>
</tr>
<tr>
<td>Residential</td>
</tr>
<tr>
<td>New Office</td>
</tr>
<tr>
<td>Neighborhood-Serving Retail¹</td>
</tr>
<tr>
<td>Other Retail³</td>
</tr>
<tr>
<td>Restaurant</td>
</tr>
<tr>
<td>Community-Oriented Services/Offices</td>
</tr>
<tr>
<td>Food Production/Manufacturing</td>
</tr>
<tr>
<td>Recreation/Entertainment</td>
</tr>
<tr>
<td>School</td>
</tr>
<tr>
<td>Police/Fire</td>
</tr>
<tr>
<td>Community Center⁴</td>
</tr>
<tr>
<td>Hotel</td>
</tr>
<tr>
<td>Sailing Center</td>
</tr>
<tr>
<td>Museum/Cultural Use</td>
</tr>
<tr>
<td>General Open Space</td>
</tr>
<tr>
<td>Athletic Fields</td>
</tr>
</tbody>
</table>

Notes:
1. Neighborhood-serving retail includes uses designed to offer services to residents of Treasure Island, including dry cleaners, hardware stores, grocery stores, movie rental store, etc.
2. Plan calls for 25,000 square feet of neighborhood-serving retail in the Cityside and Eastside neighborhoods. For analysis purposes, this study assumes retail split based on proportion of residential units in each of the two neighborhoods.
3. Other retail includes shopping more likely to attract visitors from outside of the Islands, such as formula retail, boutique stores, etc.
4. Includes 13,500 of miscellaneous small community facilities and a 35,000 square foot community center.

Source: TICD & TIDA, 2009
FIGURE 2
REDEVELOPMENT PLAN AREA

LEGEND:

= Areas within the Redevelopment Plan Area boundaries not included in the Proposed Project

Source: Treasure Island Development Authority and Fehr & Peers, 2009

Treasure Island and Yerba Buena Island Redevelopment Plan TIS
1.2.3 SFOBB Access

The SFOBB provides the only vehicular access onto and off of the Islands. The western portion of the SFOBB, which travels between the Islands and mainland San Francisco, has recently been seismically retrofitted. The eastern span, which connects between the Islands and the East Bay, is currently being reconstructed. The existing ramps between Yerba Buena Island and the SFOBB are currently geometrically substandard. To address this, as a separate project, the San Francisco County Transportation Authority (“SFCTA”) and Caltrans are evaluating alternatives for reconstructing some of these ramps. Although those improvements are part of a separate effort and not part of the Proposed Project, they are described here so that the discussion of the project’s proposed vehicular circulation system can be understood in the proper context.

Currently, there are six on- and off-ramps to the SFOBB at Yerba Buena Island. The existing ramp configuration is shown on Figure 3 on page 8. There will continue to be six ramps with the proposed improvements; however, they will be modified as follows (and illustrated in Figure 4 on page 9):

As part of the East Span Seismic Safety Project (“ESSSP”), the following ramp changes will occur (based on the numbering shown on Figures 3 and 4):

1. The eastbound on-ramp on the east side of Yerba Buena Island will be reconstructed entirely as part of the replacement of the SFOBB eastern span. The new ramp will be in a similar location to the existing ramp, but will provide increased acceleration distance. This is the only ramp improvement that has been approved and funded to date and should be completed by 2013.

The SFCTA and Caltrans are currently evaluating alternatives for the following ramps:

2. The westbound on-ramp on the east side of Yerba Buena Island would remain open to all traffic, but would be completely reconstructed to provide greater acceleration distance. The ramp would also be outfitted with ramp metering traffic signals to meter the flow of traffic onto the westbound SFOBB from the Islands. A separate bypass lane would be provided for high-occupancy vehicles, which is assumed for purposes of this analysis to be vehicles with three or more passengers (HOV3+).

3. The westbound off-ramp on the east side of Yerba Buena Island, which is currently a left-hand exit, would be removed and replaced with a new right-hand exit that distributes exiting traffic onto Macalla Road, just west of the proposed reconstructed westbound on-ramp.

4. The westbound on-ramp on the west side of Yerba Buena Island would not be modified geometrically. However, it would be restricted to transit and emergency vehicle-use only, providing exclusive access for transit and emergency vehicles departing the Islands destined for the San Francisco mainland.

The following changes are expected for the remaining two ramps on Yerba Buena Island:

5. The eastbound off-ramp on the west side of Yerba Buena Island would remain unchanged from its current configuration.

6. The eastbound off-ramp on the east side of Yerba Buena Island, which was closed at the time that data was collected for this analysis, has recently been re-opened with no changes to its configuration. Following completion of bridge construction activities, the ramp will have signage and lighting improvements only.

In addition to ramp changes, the SFCTA and Caltrans are also evaluating retrofit of the nine viaduct structures on the west side of Yerba Buena Island. Retrofit of these structures is separate from this project. As the retrofit would be a seismic safety project only and no changes to roadway alignment or capacity are proposed, the transportation impacts described in this report would be the same whether the retrofit project was implemented or not.
Source: Yerba Buena Island Internal Road Network and Connection with Treasure Island Final Report, AECOM, 2009
Note: 1. Eastbound off-ramp reopened in Fall 2009.
FIGURE 4
PROPOSED ACCESS RAMPS WITH EXISTING ROADWAYS

Source: Yerba Buena Island Internal Road Network and Connection with Treasure Island Final Report, AECOM, 2009
Note: 1. Eastbound off-ramp reopened in Fall 2009.
1.2.4 Proposed Street Network

The Proposed Project would include a number of improvements to the roadway network on the Islands.

1.2.4.1 Treasure Island

The Proposed Project would largely reconfigure existing streets on Treasure Island, as illustrated on page 11 in Figure 5. The planned street design for Treasure Island provides a layout to accommodate higher-density development sites, a Transit Hub, and open space. There are four main levels in the hierarchy of streets planned for Treasure Island (Figure 5 illustrates the hierarchy of each street on the Islands).

**Major Arterials** – California Avenue and Avenue C are the main east/west and north/south streets, respectively, on Treasure Island. Major arterials will generally include one 12-foot wide traffic lane in each direction (11-foot lanes when buses travel in only one direction), 8-foot parking bays, and 5-foot Class II bike lanes in each direction. Additional lanes may be added to Major Arterial streets as needed for dedicated left and right turn lanes. Landscaping and sidewalks will be provided on both sides of the street, although their widths will vary. Major arterials would provide primary access to the SFOBB. Their function is consistent with the same-titled street type designation in the Transportation Element of the San Francisco General Plan.

**Secondary Arterials** – Secondary Arterials are roadways with similar characteristics to Major Arterials, but that do not provide primary access to the SFOBB. There are two Secondary Arterials on Treasure Island: 1st Street, between Avenue of the Palms and Avenue D, and Avenue D, between 1st Street and California Avenue. Generally, they include an 11-foot wide traffic lane and a 7-foot wide parking bay. Parking bays will be 8-feet wide when a 5-foot Class II bike lane is provided. To minimize bus conflicts, a 6-foot wide flex lane will be added between parking bays and the travel lane where parking occurs adjacent to the bus routes in the area near the Transit Hub. Similar to Major Arterials, there will be landscaping and sidewalks on both sides of the street. Their function is consistent with the same-titled street type designation in the Transportation Element of the San Francisco General Plan.

**Collector Streets** – These roadways facilitate movement through and around the urban core, developed neighborhoods, and open space. They include a 10-foot wide traffic lane and a 7-foot wide parking bay in each direction. Where a Class II bike lane is present, the parking bay would be 8-feet wide. Collector Streets will also have sidewalks and landscaping on both sides. Their function is consistent with the same-titled street type designation in the Transportation Element of the San Francisco General Plan.

**Shared Public Ways** – These pedestrian- and bicycle-priority public rights-of-way are proposed primarily within the Cityside neighborhood with one shared public way in the Island Core neighborhood (as illustrated on Figure 2 on page 6). These streets prioritize pedestrian and bicycle use of the entire right of way, while allowing occasional slow-moving vehicles to access local land uses and parking to provide necessary services. They may be designed with special paving, a variety of amenities, landscaping and seating, as well as pockets of on-street parking. Their function is consistent with the same-titled street type designation in the Transportation Element of the San Francisco General Plan.

---

3. The street names shown on Figure 5 are for identification purposes only and subject to change.
The street names shown on this figure are for identification purposes only and subject to change.

**LEGEND:**

- **Red** = Major Arterial
- **Dotted Red** = Secondary Arterial
- **Purple** = Collector Street
- **Green** = Shared Public Way/Private Street

Source: Perkins + Will, May 4, 2009; Fehr & Peers, 2009
1.2.4.2 Yerba Buena Island

Unlike the street system on Treasure Island, which would largely be reconstructed, the roadway system on Yerba Buena Island would largely remain in its current configuration, with the exception of improved emergency vehicle access, bicycle and pedestrian circulation improvements, and modifications to serve the revised SFOBB ramp configurations described above, and to allow the additions of bicycle and pedestrian facilities along the existing right of way.

The general vehicular circulation proposed on Yerba Buena Island would convert Macalla Road to one-way operations, such that vehicles could only travel on Macalla Road from the SFOBB ramps to its terminus at the intersection with Treasure Island Road. The other major streets on Yerba Buena Island, which include Treasure Island Road, Hillcrest Road, South Gate Road, and a small section of Macalla Road east of the new westbound ramps, would continue to provide two-way operations. As noted earlier, with reconstruction of the westbound ramps as proposed as part of a separate project, the westbound on-ramp to the SFOBB on the west side of the Islands would allow transit vehicles only.

Similar to the case on Treasure Island, streets on Yerba Buena Island would also have four street classifications, but they would be defined slightly differently than those on Treasure Island, and are described separately below:

**Major Arterials** – Major arterials on Yerba Buena Island would generally provide access between Treasure Island and the SFOBB, and include Treasure Island Road, South Gate Road, Hillcrest Road, and Macalla Road. Treasure Island Road, South Gate Road, and Hillcrest Road would include 12-foot traffic lanes in each direction (11-feet when separated by a median or dedicated turn lane), and a 5-foot wide Class II bike lane.

On Treasure Island Road, the bicycle lane would be provided in the south and east-bound directions only (i.e., from Treasure Island towards the SFOBB only). A short section on Treasure Island Road near the existing SFOBB westbound on-ramp would have a 14-foot wide travel lane and a Class III bicycle route. There would be sidewalks provided on Treasure Island Road between Treasure Island and Macalla Road. No sidewalks will be provided on the section of Treasure Island Road between Macalla Road and the SFOBB.

Macalla Road will be reconfigured to allow one-way vehicular traffic only, from the SFOBB northwesterly towards Treasure Island Road. This street will provide one 11-foot wide traffic lane, a five-foot Class II bicycle lane on the right-hand side, and a six-foot wide contra-flow bike lane on the left-hand side. A five-foot wide sidewalk will also be provided on the left-hand side.

**Secondary Arterials** – The main access road into the central development and open space area would be designated as a Secondary Arterial street. The Secondary Arterial would provide a 15-foot wide travel lane in each direction (a 30-foot curb to curb roadway) and a five-foot wide sidewalk on the north side of the street. The wide travel lanes would be designed to accommodate potential future transit and emergency vehicle access.

**Collector Streets** – The Collector Street on Yerba Buena Island will be a one-way roadway, forming a loop traveling clockwise. It will include a 20-foot wide travel lane with five-foot sidewalks on both sides of the street.

**Private Streets** – The primary access to homes within the main western and eastern residential districts on Yerba Buena Island will be private streets. The private streets would include 11-foot travel lanes in each direction. The streets have been designed to accommodate emergency vehicle access, with turnaround areas and wider curb return radii at intersections.
1.2.5 Proposed Transit Improvements

The Treasure Island Transportation Plan was prepared as an exhibit to the 2006 Development Plan and Term Sheet (2006 Term Sheet) that was endorsed by the TIDA Board and San Francisco Board of Supervisors. The 2006 Transportation Plan includes a number of substantial improvements both to transit infrastructure and service. However, some funding for the transit service would come from local, state, and federal grants, which have not been fully programmed yet. Thus, the transportation impact analysis was conducted for both the Proposed Project with only that portion for which full funding has been identified (also described in this report as the Base Transit Scenario) and the Proposed Project with the addition of the full set of transit improvements proposed by the project’s Transportation Plan and for which full funding is likely, but not certain (described in this report as the Expanded Transit Scenario). The overall transit circulation proposed to and from the Islands, including access to the SFOBB, is illustrated on page 14 in Figure 6 and is common to both the Base Transit and the Expanded Transit Scenarios. The transit improvements contemplated under the Proposed Project and under the Expanded Transit Scenario are described below.

1.2.5.1 Proposed Project with Base Transit Service

The following are the proposed transit service improvements to enhance access and circulation for Island residents and visitors for which a source of full funding has been identified;

1. New ferry service from a new inter-modal bus and ferry terminal (“Transit Hub”) located on the western shore of Treasure Island. Ferries would operate with 50-minute headways to and from Downtown San Francisco between 5:00 AM and 9:00 PM (corresponding to a single ferry operating between Treasure Island and one of the existing docks in San Francisco);

2. Muni Route 108-Treasure Island would operate at its current 15-minute headway, but would no longer circulate around most of Treasure Island. Instead, it would circulate only around the Transit Hub and a portion of the Island Core neighborhood. The 108-Treasure Island would continue to operate 24-hours per day, including overnight owl service;

3. New bus transit service operating between the Islands and Downtown Oakland (operated by AC Transit) at approximately 10-minute headways during peak hours and less frequent service during off-peak hours; generally, bus service to Oakland would be provided between approximately 5:00 AM and 10:00 PM.

4. A fleet of alternative fuel shuttle-buses that circulate throughout the Islands, with timed transfers at the Transit Hub offering free rides to residents and visitors of the Islands.

In addition to the service enhancements described above, the Proposed Project would provide a number of physical infrastructure improvements designed to prioritize transit movements, including bus stops and layover areas, a new Transit Hub, and, as described in Section 1.2.3 on page 7, conversion of the existing westbound on-ramp to the SFOBB on the western side of Yerba Buena Island to transit-only.4

Buses traveling between the Islands and San Francisco would access the SFOBB via the transit-only westbound on-ramp and exit the SFOBB from the existing eastbound off-ramp on the western side of the Island. Buses would travel on Treasure Island Road between Treasure Island and the SFOBB ramps.

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4. The conversion of the existing westbound on-ramp to the SFOBB on the western side of Yerba Buena Island to transit-only would occur with implementation of the SFCTA/Caltrans project (described on page 8). If the SFCTA/Caltrans project is not implemented, this ramp would be accessible by all vehicles.
In the event that the new westbound on- and off-ramp are not approved by the SFCTA and constructed by Caltrans, as described in Section 1.2.3 on page 7, westbound buses would be required to enter mixed-flow traffic on the existing westbound on-ramp on the west side of Yerba Buena Island.

Buses traveling between the Islands and the East Bay would use the new eastbound on-ramp on the east side of Yerba Buena Island to be constructed as part of the ESSSP. To access this on-ramp, buses leaving the Islands would travel along Treasure Island Road and Hillcrest Road to access the eastbound on-ramp. Buses traveling from the East Bay to the Islands would use either the existing westbound off-ramp on the east side of Yerba Buena Island or the proposed reconstructed westbound off-ramp, depending on whether that project is approved and constructed. To access the Islands from the East Bay, buses would exit the SFOBB and travel on Macalla Road to its intersection with Treasure Island Road.

Bus circulation within Treasure Island would be along a one-way, two-block loop in the counter-clockwise direction. AC Transit and Muni buses would travel east on 1st Street, where they would make their first stop. Buses would continue east on 1st Street, then north on Avenue D, where they would make a second stop. After this stop, buses would turn west onto California Avenue, where they would finish their run and layover until beginning their return trip. The return trip back to the SFOBB would involve continuing west on California Avenue and then south on Treasure Island Road, with a stop at the new ferry quay and Transit Hub in front of Building One, between California Avenue and 1st Street. From the Transit Hub, buses would continue across the causeway onto Yerba Buena Island via Treasure Island Road and continue toward the SFOBB. The proposed 108-Treasure Island route would increase the distance some Job Corp commuters and visitors would need to walk to access a Muni bus stop because the 108-Treasure Island would no longer circulate to the interior of Treasure Island; however, the Job Corps commuters and visitors would be able to use the on-island shuttle, as described below.

As noted, in addition to Muni and AC Transit buses, the Proposed Project would include a new, free on-island shuttle system with three routes: two serving the neighborhoods on Treasure Island, and a third serving Yerba Buena Island. Each of the three shuttle routes would provide continuous service from early morning to late evening. The free services would stop at the Transit Hub on Treasure Island, facilitating transfers to ferry and outbound Transbay bus service. In addition to the Transit Hub stop, the shuttles would stop at the two other stops where express bus routes from Downtown San Francisco and Oakland drop off, allowing for convenient connections. The shuttles would operate on a pulse schedule, with departures and arrivals matching the ferry service, the Muni Route 108-Treasure Island, and AC Transit service at the Transit Hub. On-island trips between shuttles would thus be optimized.

1.2.5.2 Expanded Transit Scenario

The 2006 Transportation Plan also identifies an enhanced level of transit service for which a source of funding has been identified but cannot be committed with certainty. A second scenario is evaluated in this report that includes the Proposed Project with the addition of all transit service enhancements proposed in the 2006 Transportation Plan. The expanded transit service would include all of the elements of the Base Transit Scenario plus:

- More frequent ferry service at 15-minute headways during peak periods (corresponding to three ferries operating between Treasure Island and improved docks in San Francisco, dedicated for use by the Treasure Island ferry);
- More frequent bus service on the Muni 108-Treasure Island route, with frequency increased to 7-minute headways in the AM peak period and 5-minute headways in the PM peak period to and from the San Francisco Transbay Terminal. Overnight Owl service would continue, but at lower frequencies than during the peak periods;
• New bus line with service to another location in San Francisco (assumed to be Civic Center for purposes of this analysis) with 12-minute headways during the AM and PM peak periods. Service would be provided between approximately 5:00 AM and 10:00 PM;

The transit infrastructure (ferry quay, Transit Hub, new bus stops and layover areas, and a transit-only on-ramp to the westbound SFOBB) would remain the same as the Proposed Project.

1.2.6 Pedestrian Circulation Improvements

The pedestrian circulation network has been designed to encourage walking within the plan area. Pedestrian facilities would facilitate travel from and to transit facilities, shopping, schools and recreational uses on the Islands. All streets on Treasure Island would include sidewalks as described in the Proposed Street Network in Section 1.2.4 on page 10. Generally, sidewalks would be six feet wide plus four to five feet of landscaping separating the sidewalk from adjacent roadways. However, sidewalk widths would vary depending on the available right of way. Due to topography constraints, sidewalks on Yerba Buena Island would be limited to only one side of the street in many cases, and some streets where there are no pedestrian destinations sidewalks are not proposed. However, several pedestrian trails will be provided through the open spaces and development areas on Yerba Buena Island. The proposed pedestrian circulation plan for Yerba Buena Island is presented in Figure 7 on page 18. No figure is provided for Treasure Island since all streets would have sidewalks.

1.2.7 Bicycle Circulation Improvements

Bicycle facilities consist of bicycle lanes, trails, and paths. Typically, bicycle facilities are grouped into three categories:

- Class I facilities consist of off-road bicycle paths and are generally shared with pedestrians. Class I facilities may be adjacent to an existing roadway, or may be entirely independent of existing vehicular facilities.
- Class II facilities consist of striped bicycle lanes on roadways. These facilities reserve a minimum of four feet of space along each side of the roadway for bicycle traffic.
- Class III facilities consist of signed bicycle routes. Class III facilities do not have striped, reserved right of way for bicycles, but are signed and ideally designed to accommodate and encourage bicycle traffic.

Figure 8 on page 19 illustrates the proposed bicycle circulation network for Treasure Island. On Treasure Island, the Proposed Project would provide a Class I shared bicycle and pedestrian path around the perimeter of the Island and through portions of the open space areas. In addition, the project would include a Class I bicycle-only facility around the perimeter of the residential development. Class II bicycle lanes would be striped on the Major Arterial Roadways (Avenue C and California Avenue), and on 1st Street in the westbound direction only. Other streets on Treasure Island would be designed to be bicycle-friendly by encouraging slow auto speeds and through development of a grid street network to provide direct routes and disperse traffic; however, no exclusive bicycle right of way would be provided and bicycles would share space on those streets with autos.

Figure 9 on page 20 illustrates the proposed bicycle circulation network for Yerba Buena Island. Generally, the bicycle circulation on Yerba Buena Island would consist of a one-way counterclockwise Class II bicycle lane loop around Treasure Island Road, Hillcrest Road, and Macalla Road, with connections to the planned bicycle/pedestrian path on the new SFOBB eastern span. One exception to the continuous Class II facility loop is on a short section of Treasure Island Road, where the westbound on-ramp to the SFOBB diverges from Treasure Island Road, which is on an elevated structure. On this section, the Proposed Project calls for a Class III facility, with special colored pavement and frequent in-
street stencils and signage to alert bicycles, autos, and buses that they must share the roadway at this location.  

In addition, a contra-flow Class II bicycle lane would be provided on Macalla Road. This would provide a shorter, yet steeper, alternative route from Treasure Island to the SFOBB. Other streets on Yerba Buena Island would allow shared bicycle/auto use, but no exclusive bicycle right of way would be provided.

Although Caltrans and the Bay Area Toll Authority are considering alternatives for a shared use Class I bike facility on the west span of the SFOBB, that project is currently in its early planning stages and has not been assumed to be in place for purposes of this analysis. However, a connection between the Islands and the East Bay is currently under construction on the new eastern span of the SFOBB and has been assumed to be in place. Neither of these projects are part of the Proposed Project; however, the Proposed Project would not preclude the implementation of either.

5. Colored pavement treatments would be installed to increase bicycle visibility and safety; however, colored pavement would require SFMTA approval pending amendments to the California Manual on Uniform Traffic Control Devices (MUTCD). The City of San Francisco Bicycle Plan (2009) includes the use of colored bicycle lanes and the Federal Highway Administration (“FHWA”) recently approved a study proposed by the SFMTA of solid and dashed green pavement for bicycles. If the use of colored pavement material is approved by the FHWA and the California Traffic Control Device Committee (“CTCDC”), San Francisco
FIGURE 7

YERBA BUENA ISLAND PEDESTRIAN CIRCULATION PLAN

Source: Treasure Island Community Development LLC, 2009
FIGURE 8

TREASURE ISLAND BICYCLE CIRCULATION PLAN

Source: Treasure Island Community Development LLC, 2009

LEGEND:

CLASS I - TWO WAY
CLASS I - ONE WAY
CLASS I - CONTRA FLOW
CLASS I - MIXED BIKE / PED
CLASS I - 1 WAY
(LOCATION TBD)

T.I SHARED STREET - PED / BIKE / AUTO
SHARED BIKE / AUTO

Treasure Island and Yerba Buena Island Redevelopment Plan TIS

Not to Scale
1.2.8 Parking Supply

Off-street parking would be provided within Treasure Island and Yerba Buena Island to accommodate residents, visitors, and employees. The parking supply would be specified in the D4D standards for the Redevelopment Plan. Additionally, short-term metered on-street parking would be provided. The parking supply for the Proposed Project is summarized in Table 2.

For residential uses, the Proposed Project would include a parking supply of one parking space per residential dwelling unit. Spaces would be “unbundled” from the unit such that residents would have the option of whether or not to purchase or lease a parking space. Parking for non-residential uses would generally be provided in off-street parking garages, on-street parking, and surface parking lots. Parking for non-residential uses would be shared between uses (i.e., parking would not be reserved for specific uses) to provide the maximum flexibility of the proposed parking supply and minimize the amount of parking required.

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Size</th>
<th>Proposed Off-Street Parking Supply</th>
<th>Total</th>
<th>Type (Typical)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>8,000 d.u.</td>
<td>1 space/d.u.²</td>
<td>8,000</td>
<td>Structured/ below-grade</td>
</tr>
<tr>
<td>Hotel (TI)</td>
<td>450 Rooms</td>
<td>0.8 spaces/room³</td>
<td>360</td>
<td>Structured</td>
</tr>
<tr>
<td>Hotel (Yerba Buena Island)</td>
<td>50 Rooms</td>
<td>0.8 spaces/room³</td>
<td>40</td>
<td>Surface Lot</td>
</tr>
<tr>
<td>Retail</td>
<td>207,000 square feet</td>
<td>2/1,000 square feet⁴</td>
<td>414</td>
<td>Structured</td>
</tr>
<tr>
<td>Open Space (Athletic Fields)</td>
<td>40 acres</td>
<td>5.1/acre⁵</td>
<td>204</td>
<td>Surface</td>
</tr>
<tr>
<td>Open Space (Other)</td>
<td>260 acres</td>
<td>1/acre⁵</td>
<td>260</td>
<td>Surface</td>
</tr>
<tr>
<td>Marina</td>
<td>400 slips</td>
<td>0.59/slip⁵</td>
<td>236</td>
<td>Structured</td>
</tr>
<tr>
<td>Flex</td>
<td>202,000 square feet³</td>
<td>2/1,000 square feet⁶</td>
<td>404</td>
<td>Structured</td>
</tr>
<tr>
<td>Office</td>
<td>100,000 square feet</td>
<td>2/1,000 square feet⁶</td>
<td>200</td>
<td>Structured</td>
</tr>
<tr>
<td>Police/Fire</td>
<td>30,000 square feet</td>
<td>None⁷</td>
<td>N/A</td>
<td>TBD</td>
</tr>
<tr>
<td>School</td>
<td>105,000 square feet</td>
<td>None⁷</td>
<td>N/A</td>
<td>TBD</td>
</tr>
<tr>
<td>Community Center</td>
<td>48,500 square feet</td>
<td>Street parking where available</td>
<td>N/A</td>
<td>On-street</td>
</tr>
<tr>
<td>Cultural Park/Museum</td>
<td>75,000 square feet</td>
<td>Street parking where available</td>
<td>N/A</td>
<td>On-street</td>
</tr>
<tr>
<td>General On-Street Parking</td>
<td>N/A</td>
<td>N/A</td>
<td>1,035</td>
<td>On-street</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>11,153</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. Includes 22 ksf food production/industrial/manufacturing, 150 ksf entertainment, and 30 ksf community/office uses.
2. Consistent with San Francisco Planning Code for comparable neighborhoods in San Francisco.
3. Hotel rate is for hotels in Neighborhood Commercial District, San Francisco Planning Code.
4. Lower than required in San Francisco Planning Code, which requires 4 spaces per 1,000 square feet, except for the first 20,000 square feet, which only require 2 spaces per 1,000.
6. Consistent with San Francisco Planning Code rate for Office uses.
7. Parking for police/fire and school facilities expected to be provided separately within the respective sites. Neither parking demand nor supply for these uses is included in this analysis.
8. These uses would share from the available pool of 1,035 on-street parking listed under the general on-street parking.
Source: TICD, 2009
1.2.9 Loading

In addition to general visitor, resident, and employee parking, the Proposed Project would include on-street and off-street facilities for commercial deliveries and loading/unloading associated with moving trucks. The supply of loading facilities would be specified in the D4D standards for the Redevelopment Plan. Some on-street parking spaces would be designated for loading and short-term parking to facilitate passenger loading and unloading near buildings. The D4D standards for loading/unloading facilities which may include a combination of on- and off-street spaces are summarized in Table 3.

<table>
<thead>
<tr>
<th>TABLE 3 – PROPOSED LOADING RATIOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
</tr>
<tr>
<td>Retail</td>
</tr>
<tr>
<td>0 – 10,000 square feet</td>
</tr>
<tr>
<td>10,001 – 60,000 square feet</td>
</tr>
<tr>
<td>60,001 – 100,000 square feet</td>
</tr>
<tr>
<td>Over 100,000 square feet</td>
</tr>
<tr>
<td>Commercial and Residential</td>
</tr>
<tr>
<td>0 – 100,000 square feet</td>
</tr>
<tr>
<td>100,001 – 200,000 square feet</td>
</tr>
<tr>
<td>200,001 – 500,000 square feet</td>
</tr>
<tr>
<td>Over 500,000 square feet</td>
</tr>
</tbody>
</table>

Source: TICD, 2009

1.2.10 Construction

Construction and build out of the Proposed Project would be phased, and is expected to occur over approximately 15 to 20 years; however, the actual timing of construction would depend on market conditions and other factors. Project construction is expected to involve four major phases. The first phase would include infrastructure and portions of the geotechnical stabilization. The subsequent phases would include development of the proposed new land uses and associated infrastructure extensions, as needed. Demolition of existing uses would occur as needed to facilitate construction of new development.

The construction schedule would be coordinated with other land owners on the Island (Department of Labor and the US Coast Guard) and the construction of the SFOBB ESSSP (Caltrans) to minimize conflicts with the existing traffic onto and off of the Island. Construction staging would occur primarily on the Island, though truck traffic would be required to access the Island via the SFOBB.

Construction materials and equipment used on the Islands would be transported by truck and/or barge throughout the construction of the project. Table 4 summarizes the truck and barge traffic that the project sponsor expects to be generated during construction of the project. This activity would occur during non-peak hours. It is important to note that not all of these activities would be generating truck traffic simultaneously, so the total annual truck traffic is not necessarily the sum of each row. As described in Chapter 3 (Travel Demand Analysis), the number of truck trips related to project construction would be considerably less than the amount of new vehicle traffic generated by the Proposed Project upon completion of construction.
### Table 4 – Construction Traffic

<table>
<thead>
<tr>
<th>Construction Use</th>
<th>Trip Frequency¹</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Truck Trips</td>
<td>Barge Trips</td>
<td></td>
</tr>
<tr>
<td><strong>Equipment Transport</strong></td>
<td>200 per year</td>
<td>20 total</td>
<td></td>
</tr>
<tr>
<td><strong>Demolition</strong></td>
<td>100 total</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Construction Materials</strong></td>
<td>100,000 total</td>
<td>1,000 total</td>
<td></td>
</tr>
<tr>
<td><strong>Asphalt</strong></td>
<td>2,500 total</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Aggregate</strong></td>
<td>100 per year</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Concrete</strong></td>
<td>2,000 per year</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Utilities</strong></td>
<td>2,000 total</td>
<td>300 total</td>
<td></td>
</tr>
<tr>
<td><strong>Landscaping</strong></td>
<td>500 total</td>
<td>200 total</td>
<td></td>
</tr>
</tbody>
</table>

Note:
1. The number of truck and barge trips would be determined by the needs of the construction crew. The number listed for truck and barge trips in this table is the maximum number of trips for each (per year or during the entire length of construction); however, since both transport methods would be used, the total number of trips for each trip type would likely be lower than what is listed.

Source: TICD (BKF), 2009

### 1.2.11 Transportation Demand Management (TDM)

In addition to improving transit options serving the Islands, the project proposes several incentives to encourage the use of transit and carpools, as well as promote walking and biking on the Islands. The TDM measures have been developed in consultation with staff from the SFMTA and the Planning Department and are documented and described in detail in the project’s 2006 Transportation Plan. The 2006 Transportation Plan specifically calls for the following:

- **Treasure Island Transportation Management Agency (TITMA)** – The Treasure Island Transportation Management Act of 2008 ("AB 981") authorizes the San Francisco Board of Supervisors to designate a board or agency to serve as the transportation management agency for the Islands. The Treasure Island Transportation Management Agency ("TITMA") was created to, among other things, administer and oversee the collection of revenues from parking, transit passes and congestion pricing, and the disbursement of funds to transit operators. As part of implementing the project, TITMA would administer a variable congestion fee to residents of the Islands for accessing the SFOBB.

- **Congestion Pricing** – Fees would be charged to Island residents for auto access between the SFOBB and the Islands during periods of peak congestion. This "congestion pricing" program is designed to discourage residents from making auto trips during peak travel periods. The amounts and hours that fees would be charged would be controlled by the TITMA; however, as currently envisioned, the fees would be charged between 6:00 AM to 9:00 AM and 4:00 PM to 7:00 PM, in both directions, Monday through Friday. One of the key attributes of this program is that the TITMA would have the authority to adjust the amounts and duration of charges to dynamically respond to changing travel behaviors. The State legislature authorized the use of congestion pricing for Treasure Island/Yerba Buena Island in 2008 (Chapter 317, Stats. of 2008).

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6. The Proposed Project TDM elements have been updated since the 2006 Transportation Plan, although the general nature of the TDM Plan remains the same as in the 2006 Transportation Plan.
• **Parking Program** – There would be no free parking on the Island. Parking for residents, employees, and visitors would occur in off-street facilities and on-street, short-term, metered spaces. In addition, parking would be unbundled from residential units, meaning that housing units would not be sold or leased with a dedicated parking space. A dedicated parking space would need to be purchased or leased at a separate cost and the cost of parking would not be included in the purchase or rent price for housing.

• **Travel Coordinator** – The travel coordinator would be hired by the TITMA, and would be charged with providing travel options to Island users, including assistance with finding the best customized transit options for individuals. The travel coordinator would be responsible for developing and distributing outreach and marketing materials and monitoring the performance of most island TDM measures.

• **Car Share Program** – A car share program would be implemented on the Islands, providing members access to automobiles without having to purchase a car. This would likely be an extension of one or more of the car share services currently provided throughout the rest of San Francisco. The operator of this program on the Islands has not yet been determined, nor has the exact number of car share spaces proposed for the Island. Car share vehicles would be subject to the same on-island parking fees as other vehicles, unless parked in their designated parking space. Although the details have not been finalized, it is likely that car share vehicles would not have to pay the congestion pricing fee. The D4D will require vertical developers to provide car share spaces based on number of dwelling units, similar to the requirements in the San Francisco Planning Code.

• **Transit Hub** – All bus transit serving the Islands would serve the proposed ferry terminal. This would be the single spot on the Islands where all transit lines connect, including the on-island shuttles. This provides the opportunity for centralized ticket sales, schedule and route information, and other transit amenities.

• **Comprehensive Transit Pass** – A comprehensive residential “eco-pass” program would be operated by the TITMA, whereby residents and hotel guests would be required, as part of their rent, homeowner dues, or room rental rate, to purchase a transit voucher (e.g., Translink credit) that could be used on all transit systems serving the project. This reduces the “out-of-pocket” cost for transit use by residents and hotel patrons, and by providing a subsidy to transit, would encourage residents to use transit regularly. The amount of the transit voucher that would be required would vary, but is proposed to be sized similar to a Muni Fast Pass.

• **Bicycle Fleet** – A bicycle rental system would be provided for visitors and residents from a secure central “bike station” at the Transit Hub. The bike station would be attended during daylight hours, offering rentals to the public seven days per week. During unattended hours, access to the bicycle fleet would be available to Island residents with an access card. This program would be funded and administered by TITMA.

• **Carpool and Vanpools** – The Islands’ travel coordinator would provide carpool and vanpool matching services for Island residents. In addition, parking spaces for exclusive vanpool use would be provided in the Island parking facilities.

• **Ramp Metering** – Signals will be installed to limit, or “meter,” the number of vehicles that can enter the SFOBB from the Islands during peak commute periods. Ramp metering would be implemented for all on-ramps on Treasure Island to control the volume of vehicles accessing the bridge and to make entering the freeway a safer maneuver. Ramp meters could be implemented in one of two ways: either on the ramps themselves, as part of the separate YBI ramps project being studied by the SFCTA, or through signals on Island roadways approaching the SFOBB. Any ramp metering on the Treasure Island on-ramps themselves would be operated by Caltrans. Ultimately, Caltrans and the TITMA would coordinate to facilitate effective implementation of this mechanism.
• Guaranteed Ride Home Program – One reason people often cite for not using transit or carpools is a concern about the need to return home in case of an emergency. To alleviate this potential obstacle, all Island residents and employees who are registered as carpool or transit riders would be reimbursed for return travel by taxi in the event of an emergency when an alternative means of travel is unavailable.

1.3 REDUCED DEVELOPMENT ALTERNATIVE

In addition to the Proposed Project, this report describes the transportation impacts associated with a Reduced Development Alternative, which would involve construction of 6,000 new dwelling units. In addition, 100,000 square feet of new office space included in the Proposed Project would not be constructed under the Reduced Development Alternative. All other land uses would be the same as under the Proposed Project.

The Reduced Development Alternative would include the same infrastructure as the Proposed Project, and the developed area would be on the same footprint. It would also be subject to the same parking and loading requirements as the Proposed Project (although the total parking and loading supply would be adjusted based on the reduced amount of development compared to the Proposed Project). The Reduced Development Alternative was also analyzed for the same two transit operating scenarios (Funded and Enhanced) as the Proposed Project.

1.4 ANALYSIS SCENARIOS

Operations of the transportation system were evaluated for potentially significant transportation impacts during the weekday morning, evening, and Saturday peak hours under the following scenarios:

Existing Conditions – Existing volumes obtained from counts representing peak one-hour conditions during the peak travel periods.

Existing Plus Project (Base Transit Service) Conditions – Existing peak hour trip volumes plus net new trips from the Proposed Project, which includes only the level of transit service for which funding has been identified and agreed to by the implementing agencies, as described earlier in this chapter.

Cumulative Year 2030 Plus Project (Base Transit Service) Conditions – Projected Year 2030 traffic volumes as forecasted by the SFCTA travel demand forecasting model plus trips generated by the Proposed Project, which includes only the fully-Base Transit Service.

Existing Plus Project (Expanded Transit Service) Conditions – Existing peak hour trip volumes plus trips from the Proposed Project, assuming a more robust transit service, as described earlier in this chapter.

Cumulative Year 2030 Plus Project (Expanded Transit Service) Conditions – Projected Year 2030 traffic volumes as forecasted by the SFCTA travel demand forecasting model plus traffic generated by the Proposed Project assuming the more robust transit service described above.

Reduced Development Alternative – Impacts of a reduced development alternative that would include only 6,000 residential units and would not include the 100,000 square feet of office proposed as part of the Project. Impacts of this alternative were analyzed under existing and future Year 2030 conditions, and for scenarios involving the Base Transit Service and the Expanded Transit Service as described earlier.

7. Since the proposed reconstruction of the westbound on- and off-ramps on the east side of YBI is currently under study, the analysis in this report examines impacts under conditions with and without the proposed ramp replacement.
2. PROJECT SETTING

This chapter provides a description of the existing transportation and circulation conditions within the vicinity of the Proposed Project site.

2.1 STUDY AREA

As shown in Figure 1 and Figure 2 (pages 3 and 6, respectively), the project area consists of two islands, Treasure Island and Yerba Buena Island, located in the middle of San Francisco Bay and encompasses approximately 400 acres of land on Treasure Island, approximately 150 acres of land on Yerba Buena Island, a natural island to the south of Treasure Island, and about 550 acres of tidal and submerged lands adjacent to the Islands. However, given the magnitude of the Proposed Project, the transportation effects of the development may be felt throughout a larger area. Therefore, the project study area includes freeway approaches to the SFOBB in the East Bay and several intersections on freeway approaches within Downtown San Francisco, as well as areas near the San Francisco Ferry Terminal.

Transportation facilities in these areas were analyzed because they are expected to see the greatest increase in use due to the project. This chapter includes a discussion of the existing operating characteristics of these transportation facilities for purposes of comparing project impacts. Specifically, the existing operating conditions of these facilities will be compared with future conditions with additional demand from the Proposed Project to evaluate project impacts. However, because the Proposed Project would redesign the existing public roadway system on Treasure Island, a comparison between existing conditions with the current configuration and future conditions with the Proposed Project (and a completely different street network) would be meaningless. Therefore, no analysis of the existing conditions of the on-island roadway system was performed.8

2.2 ROADWAY FACILITIES

This section describes the roadway system serving the project site using the classifications from the ‘Transportation Element’ of the San Francisco General Plan. The General Plan classifies roadways within the city as Freeways, Major Arterials, Transit Conflict Streets, Secondary Arterials, Recreational Streets, Collector Streets, and Local Streets. It also identifies Transit Preferential Streets, which include Primary Transit Streets (transit-oriented, non-major arterials), Primary Transit Streets (transit-important, major arterials), and Secondary Transit Streets. Transit Conflict Streets are similar to Primary Transit Streets (transit-oriented). A figure showing roadway classifications in the City, according to the Transportation Element of the San Francisco General Plan, is located in Appendix C.

In addition to the street classification system contained in the General Plan, the City of San Francisco has a Draft Better Streets Policy and has prepared a Draft Better Streets Plan (currently under consideration) that outlines standards, guidelines, and implementation strategies to govern how the City designs, builds, and maintains its street system. Although the Draft Plan contains several strategies to improve the streetscape environment in San Francisco, it does not directly apply to any particular streets within the City. Rather, the concepts are general and applicable to all street facilities.

8. Roadway systems within the two federally-owned parcels to remain after redevelopment, the Job Corps campus on Treasure Island and the Coast Guard on Yerba Buena Island, will not be redesigned.
2.2.1 Regional Access

Three major freeways provide access to the SFOBB from the East Bay and vehicles on these facilities most frequently experience queues at the bridge’s toll plaza during the weekday AM peak period (generally from 7:00 AM to 9:00 AM). Queues associated with insufficient capacity on the SFOBB do not typically form at the toll plaza during the PM peak hour. On occasions when they do, they are typically associated with special events, incidents on the bridge, or other unique circumstances.

**Interstate 80 (I-80)** is a major multi-lane freeway that provides the only vehicular access to the Islands, via the SFOBB. I-80 extends to the East Bay and northeast towards Sacramento and the Sierra Nevada Mountains. To the west, I-80 terminates at the merge with US 101 in San Francisco. Along the SFOBB, I-80 consists of two decks, each with five travel lanes. The upper deck is for westbound travel and the lower deck is for eastbound travel. The eastern span of the SFOBB, between Yerba Buena Island and Emeryville/Oakland is currently being reconstructed with a new structure scheduled to open in 2013. The new span will provide five lanes in each direction with wider shoulders than the existing structure to better accommodate breakdowns and emergencies. The travel lanes will all be on a single level on the new structure and include a mixed-use pedestrian and bicycle path. The western span of the SFOBB has recently been seismically retrofitted and will remain in its current configuration (i.e., two decks with five lanes in each direction). A separate study is underway to evaluate potential alternative configurations for a proposed mixed-use pedestrian and bicycle path on the western portion of the SFOBB, but funding for its construction has not been identified and it is not assumed to be in place in this analysis.

The SFOBB travels through a short tunnel on Yerba Buena Island. On- and off-ramps are provided to Yerba Buena Island, linking to Treasure Island. In the westbound direction, one off-ramp is provided from the SFOBB to Yerba Buena Island on the east side of the tunnel. Two on-ramps are provided to westbound I-80 from Yerba Buena Island, one on each side of the tunnel. Similarly, there are two off-ramps from the eastbound SFOBB, one on each side of the tunnel. There is one eastbound on-ramp on the east side of the tunnel. Figure 3 on page 8 illustrates the existing ramp configuration.

As described in Section 1.2.3, one of the existing ramps, the eastbound on-ramp, is currently being rebuilt as part of the SFOBB ESSSP. Improvement and/or replacement of two other ramps (the westbound on- and off-ramps located on the eastern side of Yerba Buena Island) is currently under study by the SFCTA and Caltrans. Replacement of the eastbound off-ramps was studied by the SFCTA and Caltrans and determined to be infeasible. Improvement or replacement of the westbound on- and off-ramps, if undertaken, would be a separate project from both the SFOBB eastern span replacement currently under construction and the Proposed Project. Figure 4 on page 9 illustrates the proposed ramp configuration.9

At the time existing conditions data were collected for this project (May 2008), both the westbound on-ramp and the east-bound off-ramp on the east side of the tunnel were closed due to construction of the east span of the SFOBB. Although the ramps have since re-opened, the analysis in this report is based on conditions at the time data was collected (i.e., with the ramps closed).

**Interstate 580 (I-580)** is a 10-lane, major freeway that travels southeast from the SFOBB through the City of Oakland towards the Tri-Valley area communities of Livermore, Dublin, and Pleasanton in southeastern Alameda County. I-580 merges with I-80 just east of the bridge toll plaza. I-580 shares the same route as I-80 between Emeryville and Albany. North of Albany, I-580 continues east towards the Richmond-San Rafael Bridge, where it merges with US 101 and terminates in San Rafael.

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9. Impact analysis in this transportation study takes into account conditions resulting from both the existing ramps, including the replacement of the eastbound on-ramp that is currently being rebuilt as part of the SFOBB ESSSP, and the potential improved or replaced ramps as part of the Yerba Buena Island Ramps Improvement Project.
Interstate 880 (I-880) is a six- to eight-lane, major freeway that extends south through the City of Oakland towards the East Bay and South Bay communities of Hayward, San Leandro, and Fremont in Alameda County and Milpitas and San Jose in Santa Clara County. I-880 merges with I-80 and terminates just east of the bridge toll plaza. In the South Bay, I-880 terminates at the I-280/Highway 17 interchange in San Jose.

2.2.2 City of San Francisco Streets

Howard Street is an east-west arterial in the study area. According to the San Francisco General Plan, Howard Street is a Major Arterial. Howard Street has been identified by the SFCTA, San Francisco's Congestion Management Agency, as part of the City's Congestion Management Plan (CMP) network, a series of freeways and Major Arterials serving a citywide function. The street has also been designated by the Metropolitan Transportation Commission (MTC) as part of the nine-county Bay Area's Metropolitan Transportation System (MTS), a network of streets and highways serving regionally-important transportation functions. Between Fremont Street and The Embarcadero, this roadway has two travel lanes in each direction, twelve-foot wide sidewalks and on-street parking on both sides of the street for most of its length. West of its intersection with Fremont Street to 11th Street, the roadway is one-way westbound, with four travel lanes, twelve-foot wide sidewalks and on-street parking. Howard Street serves adjacent commercial, civic, industrial, and residential properties. Between Beale Street and 11th Street, Howard Street has a Class II bike lane designated part of Citywide Bike Route #30. In the Downtown area, Howard Street has extensive transit facilities, with the Muni 30X-Marina Express, 41-Union, and 76-Marin Headlands bus routes running on at least one block of the roadway.

Folsom Street is an east-west arterial in the study area. According to the San Francisco General Plan, Folsom Street is a Major Arterial Street. Folsom is also a CMP and MTS facility. Between 11th Street and The Embarcadero, this roadway is one-way eastbound, with four travel lanes, twelve-foot wide sidewalks and on-street parking on both sides of the street for most of its length. Folsom Street serves adjacent commercial, civic, industrial, and residential properties. There are four bus routes operating on the street. The street also has a Class II bike lane between The Embarcadero and 14th Street, designated part of Citywide Bike Route #30. The Muni 12-Folsom/Pacific, 76-Marin Headlands, and Golden Gate Transit buses use at least a block of Folsom Street in the Study Area.

Harrison Street is an east-west arterial in the study area. According to the San Francisco General Plan, Harrison Street is a Major Arterial. Harrison Street is also designated as a CMP and MTS facility. Between 3rd Street and The Embarcadero, this roadway has two eastbound travel lanes, three westbound travel lanes, twelve-foot wide sidewalks and on-street parking on both sides of the street for most of its length. West of its intersection with 3rd Street, the roadway is one-way westbound, with four travel lanes, twelve-foot wide sidewalks and on-street parking. At 4th Street, Harrison Street has access to the westbound on-ramps to I-80. The off-ramps at 5th Street release westbound I-80 traffic onto Harrison Street. The street serves adjacent commercial, civic, industrial, and residential properties. In the study area, Harrison Street has four bus routes, the Muni 8X/8AX/8BX-Bayshore Express, 12-Folsom/Pacific, 27-Bryany, and 47-Van Ness, running on at least one block of the roadway.

Bryant Street is an east-west arterial in the study area. According to the San Francisco General Plan, Bryant Street is a Major Arterial. Bryant Street is also designated as a CMP and MTS facility. Between 11th Street and 2nd Street, this roadway is one-way eastbound, providing four travel lanes, twelve-foot wide sidewalks and on-street parking on both sides of the street for most of its length. At 4th Street, an off-ramp from eastbound I-80 releases traffic onto Bryant Street. The on-ramps at 5th Street permit access onto eastbound I-80. East of 2nd Street, Bryant Street provides access to HOV on-ramps onto the eastbound Bay Bridge. Bryant Street serves adjacent commercial, civic, industrial, and residential properties. There are four bus routes operating on the street. Bryant Street has four bus routes, the Muni 8X/8AX/8BX-Bayshore Express, 12-Folsom/Pacific, 27-Bryany, and 47-Van Ness, running on at least one block of the roadway.
Fremont Street is a north-south arterial that runs between I-80 and Market Street in the study area. North of Market Street, Fremont Street becomes Front Street. According to the San Francisco General Plan, Fremont Street is a Major Arterial. Fremont is also designated as a CMP and MTS facility. Fremont Street begins at Harrison Street, at the terminus of the Harrison Street Off-Ramp from the SFOBB. The roadway accommodates two-way traffic between Harrison Street and Folsom Street. The roadway is one-way northbound north of Folsom Street, and provides two to three auto travel lanes. North of Mission Street, Fremont Street also has a bus-only lane for buses exiting the Transbay Terminal. The Fremont Street off-ramp from the SFOBB terminates on Fremont Street between Folsom Street and Howard Street. Sidewalks on both sides of the street average twelve feet in width, and are separated from traffic by on-street parking. The Muni 76-Marin Headlands bus line and Golden Gate transit buses use Fremont Street.

1st Street is a north-south arterial that runs between Market Street and I-80 in the study area. According to the San Francisco General Plan, 1st Street is a Major Arterial. 1st Street is also designated as a CMP and MTS facility. 1st Street is one-way southbound between Market Street and Howard Street, where it provides three southbound lanes for mixed-traffic and one southbound transit-only lane. (One of the mixed-flow traffic lanes is only available during peak commute periods. During off-peak periods, parking is allowed and the lane is not used for traffic). South of Howard Street, 1st Street provides four southbound travel lanes for mixed traffic. Sidewalks on both sides of the street average twelve feet in width, and are separated from traffic by on-street parking and street trees. Ending with on-ramps to the eastbound SFOBB, this roadway serves as major link between the Financial District of San Francisco and I-80. The following Muni bus lines use 1st Street: 5-Fulton, 38/38L-Geary, 71/71L-Haight/Noriega, 76 Marin Headlands.

2nd Street is a north-south street extending between Market Street to the north and King Street to the south. According to the San Francisco General Plan, 2nd Street is designated a Secondary Arterial roadway. North of Mission Street, 2nd Street has two southbound travel lanes and one northbound travel lane. South of Mission Street, 2nd Street has two lanes in each direction. On-street parking is provided on both sides of the street. The San Francisco General Plan designates 2nd Street as part of Citywide Bicycle Route #11, and the street serves as a Class III bicycle route. Sidewalks and crosswalks are provided along the corridor. The following Muni bus lines use 1st Street: 10-Townsend, 12-Folsom/Pacific.

5th Street is a north-south arterial that runs between Market Street and I-80 in the study area. According to the San Francisco General Plan, 5th Street is a Major Arterial. 5th Street is part of the CMP network between Market Street and Brannan Street and is part of the MTS network between Howard Street and Brannan Street. This roadway generally has two travel lanes in both directions. At its intersections with Bryant Street and Harrison Street, 5th Street has on- and off-ramp access to and from I-80 and the SFOBB. Sidewalks on both sides of the street average six feet in width, and are separated from traffic by on-street parking. 5th Street is part of Bicycle Route 19 (Class III bicycle facility). The Muni 27-Bryant and 47-Van Ness run along portions of 5th Street.

The Embarcadero is a north-south route that is located along the northeastern waterfront of San Francisco. According to the San Francisco General Plan, The Embarcadero is a Primary Transit Street, Major Arterial, and is designated as part of the CMP and MTS network. The Embarcadero has two lanes of traffic in each direction; however, three lanes are provided in each direction between the Ferry Building and Broadway. One of these lanes (going southbound) is a peak hour tow-away parking lane during the evening commute. The Embarcadero has Class II bicycle lanes in both directions, as part of Citywide Bicycle Route #5. SF Muni operates light rail and streetcar lines on rails located in the median of the Embarcadero. Sidewalks and on-street parking are provided along the street on both sides. The pedestrian path along the east side of the Embarcadero, Herb Caen Way, is designated as part of the San Francisco Bay Trail.

Market Street is a major east-west street that runs from just east of Clipper Street to The Embarcadero. (East of Clipper Street, Market Street becomes Portola Avenue). According to the San Francisco General Plan, Market Street is part of the Citywide Pedestrian Network, and is a Primary Transit Street and Transit Conflict Street. Market Street is also part of the CMP and MTS networks between Franklin Street and
Clipper Street. No on-street parking is provided on Market Street; however, several areas have loading zones that permit temporary parking for service vehicles and taxis. The *San Francisco General Plan* designates Market Street as a Class III bicycle facility as part of Citywide Bicycle Route #50, but many sections of Market Street have Class II bike lanes and/or a shared-use arrow. Muni buses, Muni Metro, the Muni F-Straightline, and BART also operate along or below Market Street. Wide sidewalks and crosswalks are provided along the street.

**Essex Street** is a north-south street extending for only one-block between Folsom Street and Harrison Street/I-80. Although it has historically provided two travel lanes in each direction, the northbound lanes have been closed for several years to serve as a construction staging area. Generally, the southbound lanes provide storage for queues of vehicles accessing the on-ramp to the SFOBB during peak periods at Harrison Street/Essex Street.

**Mission Street** is an east-west street in the study area, extending from the Embarcadero to Van Ness Avenue. At Van Ness Avenue, Mission Street turns to run north-south to the southern City limits and into Daly City. Within the study area, Mission Street is designated as a Transit Conflict Street. In the study area, Mission Street has one auto travel lane in each direction and one transit-only lane in each direction, with on-street parking and sidewalks on both sides of the street. Parking is prohibited during peak periods. Muni (14/14L-Mission), Samtrans, and Golden Gate Transit all operate transit service on Mission Street.

**Treasure Island Road** is a two-lane street extending between Treasure Island and the I-80/SFOBB on- and off-ramps on Yerba Buena Island. Treasure Island Road becomes Avenue of the Palms on Treasure Island. There are no existing pedestrian or bicycle facilities on the roadway. Treasure Island Road connects to the SFOBB westbound on-ramp and the eastbound off-ramp on the west side of Yerba Buena Island. Treasure Island Road also extends south of the SFOBB and intersects with Hillcrest Road near the Coast Guard property on Yerba Buena Island.

### 2.3 ANALYSIS METHODOLOGY

The impacts of the Proposed Project on the surrounding roadway facilities were analyzed using the guidelines set forth in the City of San Francisco Planning Department’s *2002 Transportation Impact Analysis Guidelines for Environmental Review (SF Guidelines)*, modified to account for the unique location and character of the Proposed Project, as explained in more detail below. These guidelines provide direction for analyzing transportation conditions and in identifying the transportation impacts of a proposed project in the City of San Francisco.

The analysis of the Proposed Project was conducted for existing and future year 2030 conditions. “Existing plus Project” conditions assess the near-term impacts of the Proposed Project, while “2030 Cumulative plus Project” conditions assess the long-term impacts of the Proposed Project in combination with other development. Project impacts were assessed by comparing existing conditions with the Proposed Project to existing conditions without the Proposed Project, as well as by comparing the 2030 Cumulative plus Project to 2030 No Project conditions. Year 2030 was selected as the future analysis year because regional travel demand forecasting models used in this analysis developed by the San Francisco County Transportation Authority (“SFCTA”), the Metropolitan Transportation Commission (“MTC”), and the Alameda County Congestion Management Agency (“ACCMA”) develop traffic and transit forecasts for cumulative development and growth through the year 2030. Although the build-out of the Proposed Project would occur over a period of years, the analysis assesses the impacts of the full build-out of the Proposed Project compared to both existing and future year 2030 conditions. Because the actual phasing of development will be market-driven and is unknown, it was determined that comparing the Project at full build-out against the two comparison points would best capture the full range of transportation impacts of the Proposed Project.
2.3.1 **Freeway Analysis**

The impacts of the Proposed Project on the SFOBB were analyzed by determining how the project would increase the existing and forecasted vehicle queues leading to the bridge approaches. Observations were made on the following roadway segments in the East Bay and San Francisco (observation study area and maximum queue lengths are illustrated on Figures 10 and 11 on pages 31 and 34):

- I-80 Westbound from Richmond to the Toll Plaza;
- I-580 Westbound from I-980 to the Toll Plaza;
- I-880 Northbound from I-980 to the Toll Plaza;
- Bryant Street (eastbound) between 2nd Street and 6th Street;
- Harrison Street (eastbound) between 1st Street and 3rd Street;
- Harrison Street (westbound) between 1st Street and the Embarcadero;
- 1st Street (southbound) between SFOBB On-Ramp and Market Street; and
- Folsom Street (eastbound) between Essex Street and 4th Street.

2.3.1.1 **Freeway Analysis Method**

The SFOBB currently operates at or near vehicular capacity in the peak direction most weekdays during the morning and evening peak hours (westbound in the AM and eastbound in the PM). Queues leading to the bridge deck in the peak directions represent unmet demand (i.e., traffic that would like to be on the bridge, but is trapped in congestion leading up to the bridge). The queues forming on these roadways may be exacerbated by additional traffic from the Proposed Project; therefore, the analysis of the project’s impacts to the SFOBB is described in terms of increases to peak direction queuing on approaches to the bridge.

2.3.1.2 **Ramp Analysis Method**

In addition to analyzing the queue lengths on the bridge approaches, the localized impacts to the SFOBB associated with project traffic entering and exiting the SFOBB at the ramps connecting Yerba Buena Island to the SFOBB were analyzed.

For purposes of ramp analysis, speed and gap data were collected at the Yerba Buena Island freeway on-ramps and off-ramps to calculate ramp merge and diverge LOS for the ramps between the Islands and the SFOBB. Unlike most freeway on-ramps, the ramps onto the SFOBB from Yerba Buena Island are stop-controlled, providing drivers with very limited acceleration distance to merge with the freeway travel lanes. Therefore, analysis of the on-ramps as if they were typical “uncontrolled” merges may not provide a complete understanding of the operations of the on-ramps. Instead, the analysis of on-ramps was performed two ways:

- Consistent with methods documented by the Transportation Research Board (TRB) in the 2000 *Highway Capacity Manual* ("HCM") for stop-controlled intersections. For intersections, LOS is based on “control delay.” Control delay is defined as the delay directly associated with the traffic control device (i.e., a stop sign or a traffic signal) and specifically includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. These delay estimates are considered meaningful indicators of driver discomfort and frustration, fuel consumption, and lost travel time. **Table 5** on page 35 presents the relationship between LOS and control delay for unsignalized intersections.
• Consistent with the 2000 HCM Chapter 25 methodology for ramp merge junctions. Off-ramps from the SFOBB to Yerba Buena Island were treated as typical uncontrolled “diverge” sections and analyzed consistent with the methods described in the 2000 HCM Chapter 25. Ramp LOS analysis was conducted for typical weekday AM and PM peak hours and Saturday afternoon peak hour conditions and is described using LOS criteria similar to intersection LOS, as shown in Table 5.

As discussed in Section 1.2.3 (page 7) of Chapter 1, the SFCTA and Caltrans are currently preparing a Project Report and Environmental Document for the Yerba Buena Ramps Improvement Project that would replace the existing westbound on- and off-ramps located on the eastern side of Yerba Buena Island with new ramps that replicate the functional role of current ramps. The Yerba Buena Ramps Improvement Project is needed to address seismic deficiencies, improve traffic safety, and correct design standards so that the improved westbound on- and off-ramps would operate as typical ramps. However, since that project has not been formally approved and/or finalized, the analysis of ramp junctions in this report includes a scenario with and without implementation of the Yerba Buena Ramps Improvement Project. For the scenario in which the ramps are improved, because they would operate as standard ramps, no stop-controlled analysis was completed. For the scenario in which the ramps remain in their current configuration with stop signs near the merge point, the ramps were analyzed the same as existing conditions (stop-controlled and merge/diverge sections).
LEGEND:
- AM Peak Hour Queue Observation Study Area
- Observed AM Peak Hour Queue

Note: Figure illustrates maximum AM peak hour vehicle queues.

Fig 10: East Bay AM Peak Hour Queue Observation Study Area

Source: Fehr & Peers, 2009
SFOBB APPROACHES - SAN FRANCISCO PM PEAK HOUR QUEUE OBSERVATION STUDY AREA

FIGURE 11

Source: Fehr & Peers, 2009
### TABLE 5 – RAMP JUNCTION LEVEL OF SERVICE CRITERIA

<table>
<thead>
<tr>
<th>LOS</th>
<th>Description</th>
<th>Merge/Diverge Analysis Method</th>
<th>Stop-Controlled Intersection Analysis Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Free-flow speeds prevail. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream. Little or no delay.</td>
<td>&lt; 10</td>
<td>≤ 10.0</td>
</tr>
<tr>
<td>B</td>
<td>Free-flow speeds are maintained. The ability to maneuver with the traffic stream is only slightly restricted. Short traffic delays.</td>
<td>&gt; 11 to 20</td>
<td>10.1 to 15.0</td>
</tr>
<tr>
<td>C</td>
<td>Flow with speeds at or near free-flow speeds. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver. Average traffic delays.</td>
<td>&gt; 20 to 28</td>
<td>15.1 to 25.0</td>
</tr>
<tr>
<td>D</td>
<td>Speeds decline slightly with increasing flows. Freedom to maneuver with the traffic stream is more noticeably limited, and the driver experiences reduced physical and psychological comfort. Long traffic delays.</td>
<td>&gt; 28 to 35</td>
<td>25.1 to 35.0</td>
</tr>
<tr>
<td>E</td>
<td>Operation at capacity. There are virtually no usable gaps within the traffic stream, leaving little room to maneuver. Any disruption can be expected to produce a breakdown with queuing. Very long, noticeable traffic delays.</td>
<td>&gt; 35</td>
<td>35.1 to 50.0</td>
</tr>
<tr>
<td>F</td>
<td>Represents a breakdown in flow. Extreme delay with volume exceeding capacity.</td>
<td>Demand exceeds capacity</td>
<td>&gt; 50.0</td>
</tr>
</tbody>
</table>

2.3.2 Intersection Analysis

This transportation analysis examines the following intersections in the City of San Francisco:

1. Fremont Street/Howard Street
2. Fremont Street/Folsom Street/I-80 Westbound Off-Ramp
3. Fremont Street/Harrison Street/I-80 Westbound Off-Ramp
4. 1st Street/Market Street
5. 1st Street/Mission Street
6. 1st Street/Howard Street
7. 1st Street/Folsom Street
8. 1st Street/Harrison Street/I-80 Eastbound On-Ramp
9. Essex Street/Folsom Street
10. Essex Street/Harrison Street/I-80 Eastbound On-Ramp
11. 2nd Street/Folsom Street
12. 2nd Street/Bryant Street
13. Embarcadero/Harrison Street
14. Bryant Street/Sterling Street
15. Bryant Street/5th Street/I-80 Eastbound On-Ramp
16. Harrison Street/5th Street/I-80 Westbound Off-Ramp

The above intersections were selected for analysis because they are typically congested during peak periods due to traffic traveling to and from the SFOBB and downtown San Francisco, and are therefore, most likely to experience increases in peak hour traffic associated with the Proposed Project. Their operational characteristics were analyzed for the typical weekday morning (7:00 AM to 9:00 AM) and evening (4:00 PM to 6:00 PM) peak hours as well as Saturday midday peak hour (1:00 PM to 3:00 PM). The analysis was conducted for the peak hour within each of these two-hour periods. The peak periods are consistent with most transportation analyses conducted in San Francisco and were selected because they represent the times during typical days that routinely experience the highest traffic volumes. A map showing the locations of the study intersections is provided on Figure 12 on page 37.

In addition to the 16 intersections listed above, the intersection of Avenue of the Palms/1st Street on Treasure Island was analyzed under project conditions because it serves as the gateway to the project on the Island, serving all project traffic (except trips destined for Yerba Buena Island). Avenue of the Palms/1st Street does not exist under existing conditions. Volumes for Avenue of the Palms/California Avenue were collected because the intersection serves as the existing gateway intersection to and from Treasure Island.

The intersection analysis did not include intersections in the East Bay because, unlike downtown San Francisco, there is no central place or roadway where a majority of trips would converge. Studying individual intersections would not reflect the way that trips from the Project would disperse throughout the East Bay via the three major freeways (i.e., I-80, I-580, and I-880) and major cities, such as Oakland, Berkeley, Richmond, San Leandro, and Fremont.
2.3.2.1 Intersection Analysis Method

The operation of study intersections was analyzed using the concept of LOS, similar to that discussed under the Freeway Analysis section.

2.3.2.1.1 Signalized Intersections

The analysis of the study intersections was conducted using a method documented by the Transportation Research Board (TRB) in the 2000 *Highway Capacity Manual* (HCM). For intersections, LOS is based on “control delay.” Control delay is defined as the delay directly associated with the traffic control device (i.e., a stop sign or a traffic signal) and specifically includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. These delay estimates are considered meaningful indicators of driver discomfort and frustration, fuel consumption, and lost travel time. Table 6 presents the relationship between LOS and control delay for signalized intersections.

<table>
<thead>
<tr>
<th>LOS</th>
<th>Average Control Delay (seconds/vehicle)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>( \leq 10.0 )</td>
<td>Operations with very slight delay, with no approach phase fully utilized.</td>
</tr>
<tr>
<td>B</td>
<td>10.1 – 20.0</td>
<td>Operations with slight delay and an occasional approach phase are fully utilized.</td>
</tr>
<tr>
<td>D</td>
<td>35.1 – 55.0</td>
<td>Operations with tolerable delay. Many vehicles stop and individual cycle failures are noticeable.</td>
</tr>
<tr>
<td>E</td>
<td>55.1 - 80.0</td>
<td>Operations with high delay, up to several signal cycles. Long queues form upstream of intersection.</td>
</tr>
<tr>
<td>F</td>
<td>( &gt; 80.0 )</td>
<td>Operation with excessive and unacceptable delays. Volumes vary widely depending on downstream queue conditions.</td>
</tr>
</tbody>
</table>


For this analysis, the Synchro 6.0 software analysis tool was used to assess intersection operations. This program has the ability to apply the HCM methodology in the context of turning movement volumes, lane geometries, and traffic control, including signal timing information such as cycle lengths, coordination, and phasing.

2.3.2.1.2 Uncontrolled Intersections

Two of the study intersections included in the analysis (Folsom Street/Essex Street and Bryant Street/Sterling Street) are uncontrolled (i.e., no traffic signal or stop sign). At Folsom Street/Essex Street, traffic on eastbound Folsom Street destined for the eastbound SFOBB on-ramps at Harrison Street turns right from eastbound Folsom to southbound Essex Street. Similarly, Bryant Street/Sterling Street is uncontrolled and allows eastbound left turns and westbound right-turns to access the HOV-only on-ramp to the eastbound SFOBB at Sterling. Because of their unique configuration, delay and level of service cannot be reported. However, these intersections are included in the cumulative discussion and the amount of traffic the project contributes to these intersections is presented as they experience frequent peak period congestion, particularly in the weekday PM peak hour.
2.3.3 Transit Analysis

The impact of additional transit ridership generated by the Proposed Project was assessed by comparing the projected ridership to the available transit capacity. Transit “Capacity Utilization” refers to transit riders as a percentage of the capacity of a transit line, or group of lines combined and analyzed as screenlines across which the transit lines travel. The transit capacity utilization analysis was conducted for two conditions:

- At the point of greatest demand (i.e., the maximum load point) for the existing and proposed transit lines serving the Islands. (e.g., Muni Route 108-Treasure Island, AC Transit service to the East Bay, ferry service between Treasure Island and downtown San Francisco); and,

- At the four standard downtown San Francisco screenlines used to assess impacts on transit service between downtown and the rest of the City. The downtown screenline analysis is conducted at the maximum load point for most transit lines traveling into and out of downtown San Francisco.

The number of existing AM and PM peak hour riders was obtained from Muni monitoring data. Future year 2030 Cumulative No Project conditions transit ridership was forecasted using the SFCTA San Francisco Chained Activity Model Process (“SF-CHAMP”) travel demand model, as prepared for the Transit Center District Plan. The service capacity of each line was estimated by multiplying the passenger capacity of each transit vehicle by the number of actual trips that occurred when the ridership data was collected. For service provided by Muni, the capacity includes seated passengers and an appreciable number of standing passengers per vehicle (the number of standing passengers is between 30 and 80 percent of the seated passengers depending upon the specific transit vehicle configuration). The maximum loads, including both seated and standing passengers, vary by vehicle type and are 45 passengers for a 30-foot bus, 63 passengers for a 40-foot bus, 94 passengers for a 60-foot bus, and 119 passengers for a light-rail vehicle. The Proposed Project intends to operate the 180 Treasure Island service using 60-foot articulated buses; however, the current funding plan is for Muni to operate the Treasure Island service with 40-foot buses. Therefore, under the Base Transit Scenario, the capacity utilization was calculated using capacity of 40-foot buses and the capacity of 60-foot buses was used to in the calculations for the Expanded Transit Scenario.

The percent utilization of capacity was then calculated by comparing the ridership demand to the capacity provided. Muni has established a capacity utilization standard of 85 percent. Analysis of new transit service anticipated to be provided as part of the Proposed Project was conducted by comparing the estimated demand to the proposed capacity (based on proposed vehicle type and service levels). For service provided by AC Transit and Water Emergency Transit Authority (“WETA”), the analysis assumes a capacity utilization standard of 100 percent for the new ferry and AC Transit services, consistent with WETA and AC Transit standards, respectively.

Downtown screenlines examine the overall utilization of Muni transit capacity into and out of downtown San Francisco from the Northeast, Northwest, Southeast, and Southwest of San Francisco. Because transit travel into downtown San Francisco in the AM and out of downtown in the PM tends to be the most congested transit flow in the City, the transit analysis also includes an assessment of the degree to which the Proposed Project would create demand for transit service across four screenlines surrounding downtown San Francisco in the peak directions.

In addition to an evaluation of transit ridership and capacity, the Proposed Project’s impacts on transit were also measured in terms of increases to transit travel times on routes likely to experience Proposed

Project-related increases in traffic congestion. The analysis identified intersection approaches where Proposed Project-generated vehicle trips would substantially increase transit delay.

2.3.4 Bicycle/Pedestrians Analysis

The analysis includes a qualitative assessment of proposed pedestrian and bicycle conditions on the Islands. Analysis of the existing conditions on the Islands was not performed because the Proposed Project would redesign the existing bicycle and pedestrian system on both Islands. The existing bicycle and pedestrian facilities located at the Ferry Building in San Francisco are evaluated since ferry transit service is expected to serve the project, adding pedestrians and bicycles to the circulation system near the Ferry Building in San Francisco.

Bicycle conditions are described as they relate to the project site, including bicycle routes, safety and right of way issues, conflicts with traffic, and grade changes. Existing weekday AM and PM peak hour pedestrian volumes were collected at the five crosswalks near the Ferry Building (across both directions of The Embarcadero), including Washington Street, Ferry Building (North), Market Street, Don Chee Way, and Mission Street. In addition, Saturday peak hour pedestrian volumes were collected at Market Street and Don Chee Way since those crosswalks in particular experience high pedestrian volumes on weekends. The crosswalk study locations are shown in Figure 13 on page 41. Based on projected project-related increases to ferry ridership, the potential impact of these additional ferry passengers on the capacity of existing marked crossings on The Embarcadero was evaluated.

Chapters 11 and 18 of the 2000 HCM provide a framework for analyzing pedestrian facilities, based on facility type. Two measures of pedestrian level of service include pedestrian delay and pedestrian density. Pedestrian delay is a similar measurement to automobile delay and reflects the amount of time that pedestrians must wait for a “Walk” signal plus the amount of time for the pedestrian queue to discharge. It is measured in average seconds of delay per pedestrian. When pedestrians experience more than a 30 second delay, they become more likely to cross the flow of traffic without waiting for a signal.

Pedestrian density can be indicative of crowding and can indicate whether additional sidewalk space or walk time is needed to accommodate crossings. Pedestrian density is measured at crosswalk waiting areas (typically corners) by dividing the number of pedestrians likely to arrive and queue during a “Don’t Walk” phase by the area of waiting area available, and determining the maximum pedestrian density. Table 7 (see page 40) shows the LOS criteria for pedestrians, based on the HCM methodology.

<table>
<thead>
<tr>
<th>LOS</th>
<th>Pedestrian Delay (seconds/pedestrian)</th>
<th>Likelihood of Non-Compliance due to Delay</th>
<th>Density (ft²/pedestrian)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>≤ 10</td>
<td>Low</td>
<td>&gt; 13</td>
</tr>
<tr>
<td>B</td>
<td>10.1 – 20</td>
<td>Low to Moderate</td>
<td>&gt; 10 – 13</td>
</tr>
<tr>
<td>C</td>
<td>20.1 – 30</td>
<td>Moderate</td>
<td>&gt; 6 – 9.9</td>
</tr>
<tr>
<td>D</td>
<td>30.1 – 40</td>
<td>Moderate to High</td>
<td>&gt; 3 – 5.9</td>
</tr>
<tr>
<td>E</td>
<td>40.1 – 60</td>
<td>High</td>
<td>&gt; 2 – 2.9</td>
</tr>
<tr>
<td>F</td>
<td>&gt; 80</td>
<td>Very High</td>
<td>&lt; 2</td>
</tr>
</tbody>
</table>

FIGURE 13

PEDESTRIAN/CROSSWALK STUDY LOCATIONS

Source: Fehr & Peers, 2009
2.3.5 Parking Analysis

Conditions on the Islands are expected to change substantially with the Proposed Project. Detailed quantification or analysis of existing on-street parking supply and occupancy on the Islands would not be relevant to discussion of project impacts because the existing streets on Treasure Island and existing residential parking on Yerba Buena Island are proposed to be reconfigured. Therefore, a quantitative analysis of existing parking conditions was not conducted.

For future conditions, the peak parking demand for each of the proposed uses on the Island was calculated based on the methodology contained in the SF Guidelines and compared to the supply that would be permitted per the D4D. Some of the parking is expected to be available to all land uses and land uses do not experience peak parking demand simultaneously; therefore, a shared parking analysis was conducted. The shared parking analysis was conducted by dividing the development into zones and comparing the temporal changes in demand for each use in the zone over the course of a typical day. The zones used in the parking analysis are consistent with the neighborhoods identified in Figure 2 on page 6.

Temporal changes in demand were estimated using methods described in Shared Parking, 2nd Edition (Urban Land Institute, 2005). The time during which each zone is expected to experience its peak parking demand, and the associated peak parking demand, is then reported and compared with the proposed parking supply and the appropriate parking requirements.

2.3.6 Loading Analysis

Loading analysis for the Proposed Project was conducted by comparing the loading supply that would be required per the D4D to the projected demand that would be generated by the proposed land uses. The loading analysis was conducted for the Proposed Project as a whole and for specific building uses, specifically retail, industrial and commercial spaces. Peak loading demands were determined using methods consistent with the SF Guidelines.

2.3.7 Construction Analysis

Potential short-term construction impacts were addressed using the construction phasing plan for the Proposed Project. The construction impact evaluation addressed the staging and duration of construction activity, truck routings, barge activity, estimated daily truck and vessel volumes, street and/or sidewalk closures and impacts on SFOBB traffic.

2.4 DATA COLLECTION

A large volume of data was collected due to the complex and congested nature of the existing transportation system around the project site and to ensure an accurate evaluation of existing conditions of the transportation system. The data collected for this analysis are included in Appendix B.

2.4.1 Freeway Data

Hourly freeway traffic volumes were obtained from the California Freeway Performance Measurement System (PeMS), a joint venture between the University of California and Caltrans. The PeMS database provided traffic volumes for the Bay Bridge and on freeway approaches to the Bay Bridge Toll Plaza for typical weekday and weekend conditions.

Machine counts were also conducted for seven consecutive days at each on and off ramp connecting the SFOBB and Yerba Buena Island to determine existing vehicular traffic generation levels and existing ramp volumes. Traffic on the SFOBB at the Yerba Buena Island on- and off-ramps during the morning
and evening peak periods was observed on three consecutive weekdays and one Saturday peak period. Average and 85th percentile travel speeds of traffic on the bridge and the gaps in traffic at on-ramp locations in terms of vehicle headways were measured. This data was used to calibrate the analysis models described in the methodology section.

In congested locations, traffic counts only record the number of vehicles that actually travel through a given location, and not necessarily the traffic demand. Additional measures were taken to determine the unserved traffic demand. Peak period queuing was observed at key congested locations to determine the extent of unserved traffic demand (i.e., traffic that is attempting to travel through the transportation system but that is trapped in congestion and does not appear in traffic counts). These observations were conducted on the same days for which traffic counts were obtained on three consecutive weekday peak periods Tuesday, Wednesday, and Thursday, May 6-8, 2008. Specifically, observations of queues were conducted at the Bay Bridge toll plaza from 7:00 to 9:00 AM and 4:00 to 6:00 PM, and on a single Saturday during the 1:00 to 3:00 PM peak period.

During the same days, PM peak period (4:00 PM to 6:00 PM) queuing was also observed on major surface streets in San Francisco that serve as routes to the Bay Bridge, including 1st Street, Folsom Street, Harrison Street, and Bryant Street. Queue lengths were recorded in 10-minute intervals in terms of linear feet from the bridge entrance to identify the variation in queue length over the weekday peak periods and to determine the magnitude of unserved traffic demand. The amount of unserved traffic in queues was added to the traffic counts to estimate the true travel demand for each study facility.11

2.4.2 Intersection Data

In addition to the freeway and ramp volumes, Fehr & Peers collected weekday AM, PM, and Saturday peak period traffic counts at the 16 study intersections in Downtown San Francisco during the May 2008 data collection period. Traffic volumes can vary on a daily basis, particularly in congested areas such as Downtown San Francisco and the SFOBB. To confirm the accuracy of turning movement counts to adequately describe traffic in the area, 24-hour machine counts were also conducted on key roadways leading to and from the Bay Bridge for a seven-day period that include the day(s) that intersection turning movement counts were collected. These 24-hour machine counts were taken at the following locations:

- 1st Street, between Folsom and Harrison Streets
- Fremont Street, between the I-80 Off-Ramp and Howard Street
- Essex Street, between Folsom Street and Harrison Street
- Folsom Street, between 2nd Street and Essex Street
- Folsom Street, between Essex and 1st Street
- Bryant Street, between 2nd Street and the I-80 Eastbound HOV On-Ramp
- Embarcadero, between Harrison Street and Folsom Street

The variability in the daily and peak period traffic volumes on these roadways was assessed to determine whether intersection turning movement counts were conducted on a “typical” day. Peak hour traffic volumes did not exhibit large day-to-day variations; however, to account for queuing that occurs on the roadways leading to the SFOBB, the average amount of traffic in queues was added to the existing traffic counts to estimate the true travel demand for each study intersection, similar to the freeway mainline volumes.

11. The total amount of unserved demand is equal to the total number of vehicles in queue minus the capacity of the facility (i.e., the number of cars that could otherwise occupy the roadway space if the facility was operating at, but not over, capacity).
2.4.3 Pedestrian Data

Pedestrian volumes were collected at all marked crosswalks across The Embarcadero between Washington Street and Mission Street during typical weekday AM and PM periods. Saturday peak hourly volumes were also collected at two of the study crosswalks: Market Street and Don Chee Way.

2.5 EXISTING FREEWAY OPERATIONS & QUEUEING

The SFOBB is a major transportation connection in the Bay Area, providing the most direct route from San Francisco to many points east, including Oakland in the East Bay. Among the eight Bay Area toll bridges, it is the most heavily-used serving approximately 250,000 vehicles per day. There are five (5) lanes in each the eastbound and westbound directions.

The SFOBB currently operates at or near vehicular capacity in the peak direction most weekdays during the morning and evening peak periods. Queues are often observed on the approaches to the bridge from the East Bay during the AM peak period and from San Francisco in the weekday PM peak period. This occurs when the demand for travel onto the bridge in the peak direction (westbound in the morning and eastbound in the evening) is greater than the capacity of the bridge. Queues on the westbound approach are formed due to metering at the toll plaza. Queues on surface streets in San Francisco are formed due to limited capacity of on-ramps to the eastbound SFOBB. Although Saturday conditions can vary substantially depending on weather, season, and special events, this analysis is based on typical conditions in which bridge capacity is adequate to serve peak demands on Saturday.

To understand the magnitude of excess demand, queue lengths were measured on both East Bay and Downtown San Francisco approaches on three consecutive weekdays, May 6-8, 2008. The Saturday peak period was observed; however, no substantial queues were observed during peak period. The following weekday queues were measured.

**AM East Bay approaches** – Video recording equipment attached to a helicopter was used to record where the queues formed in the AM peak period (7:00 – 9:00 AM) on the observation days for the three primary East Bay approaches: Westbound I-80, Westbound I-580, and Northbound I-880. The queue location was recorded every 15 minutes for each approach as a linear distance measured from the toll plaza.

**PM East Bay approaches** – An auto-based GPS system was used to observe the PM peak period (4:00 – 6:00 PM) for the three primary East Bay approaches to the SFOBB. These floating-car surveys were used in the PM (instead of the aerial surveys conducted in the AM peak hour) because there is typically less congestion in the PM and a sufficient number of runs could be performed to obtain meaningful data. This was not the case in the AM, in which case a helicopter was used to allow observation of the much larger queues simultaneously. For the PM floating car surveys, three observers drove in the traffic stream and recorded their speed and position using GPS devices. The speed and location data were used to identify the extent of queuing on each of the three major approaches. The approach was considered to have a queue if vehicle speeds dropped below 40 miles per hour.

**PM San Francisco approaches** – Fehr & Peers conducted field observations of queue lengths for several downtown streets leading to on-ramps of the Bay Bridge. The following streets were observed: 1st Street, Harrison Street, Folsom Street, and Bryant Street. These streets are where queues routinely form in the PM peak hour due to vehicles trying to get on the Bay Bridge. There is no substantial queuing on the San Francisco approaches to the Bay Bridge in the AM peak hour, so no queue observations were conducted during this period.

The results of the queue observations are summarized in Table 8, below. From the table, it is clear that queue lengths can vary substantially from day to day. To account for this, the average of the three days
was used in the analysis. **Figures 10** and **11** on page 31 and page 34 illustrates these average observed queues.

<table>
<thead>
<tr>
<th>Approach</th>
<th>Maximum Observed Queues (miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tuesday May 6, 2008</td>
</tr>
<tr>
<td></td>
<td>AM</td>
</tr>
<tr>
<td><strong>East Bay Approach</strong></td>
<td></td>
</tr>
<tr>
<td>I-80 WB</td>
<td>5.45</td>
</tr>
<tr>
<td>I-580 WB</td>
<td>2.57</td>
</tr>
<tr>
<td>I-880 WB</td>
<td>1.44</td>
</tr>
<tr>
<td><strong>San Francisco Approach</strong></td>
<td></td>
</tr>
<tr>
<td>Harrison WB @ 1st</td>
<td>N/O</td>
</tr>
<tr>
<td>Bryant EB @ 2nd</td>
<td>N/O</td>
</tr>
<tr>
<td>Folsom EB / Essex Street SB</td>
<td>N/O</td>
</tr>
<tr>
<td>1st SB @ Howard</td>
<td>N/O</td>
</tr>
<tr>
<td>Bryant EB @ 5th</td>
<td>N/O</td>
</tr>
</tbody>
</table>

Notes:
1. Most queues observed on westbound approaches in the PM peak period were due to weaving in the I-80/I-580/I-880 interchange and not necessarily due to bridge over-saturation or the service volume of the toll plaza.
2. There was a collision on the eastbound direction of the Bay Bridge on Thursday, May 8, which affected queuing onto the bridge. However, because incidents on the bridge occur with some regularity, data from this day was included in the calculation of the average.
3. No observers were present for the AM peak period because queues do not routinely form on city streets approaching the bridge in the AM peak hour.
4. Vehicle queues on 1st Street were observed between Howard Street and Market Street. During the PM peak hour, vehicle queues typically extend from the 1st Street/Harrison Street On-Ramp of the SFOBB to Howard Street and typically fluctuate in length between Howard Street and Market Street.

Source: Fehr & Peers, 2008
From the queue observations the number of vehicles in the queue for each approach to the SFOBB was estimated. Table 9 shows the average number of queued vehicles based on the average maximum observed vehicle queue for each access location and the number of these queued vehicles that are considered unserved demand.

<table>
<thead>
<tr>
<th>Approach</th>
<th>No. of Lanes</th>
<th>Average Observed Queue (miles)</th>
<th>Queued Volume (vehicles)</th>
<th>Demand at Capacity (vehicles)</th>
<th>Unserved Demand (vehicles)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AM</td>
<td>PM</td>
<td>AM</td>
<td>PM</td>
<td>AM</td>
</tr>
<tr>
<td><strong>East Bay Approach</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-80 WB</td>
<td>3</td>
<td>2.66</td>
<td>1,197</td>
<td>972</td>
<td>360</td>
</tr>
<tr>
<td>I-580 WB</td>
<td>3</td>
<td>1.50</td>
<td>675</td>
<td>41</td>
<td>203</td>
</tr>
<tr>
<td>I-880 WB</td>
<td>3</td>
<td>0.74</td>
<td>333</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td><strong>San Francisco Approach</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harrison WB @ 1st</td>
<td>2</td>
<td>N/O 0.16</td>
<td>N/O 84</td>
<td>N/O 14</td>
<td>N/O 70</td>
</tr>
<tr>
<td>Bryant EB @ 2nd</td>
<td>2</td>
<td>N/O 0.17</td>
<td>N/O 90</td>
<td>N/O 15</td>
<td>N/O 75</td>
</tr>
<tr>
<td>Folsom EB @ Essex</td>
<td>2</td>
<td>N/O 0.32</td>
<td>N/O 169</td>
<td>N/O 29</td>
<td>N/O 140</td>
</tr>
<tr>
<td>1st SB @ Howard</td>
<td>2</td>
<td>N/O 0.35</td>
<td>N/O 185</td>
<td>N/O 32</td>
<td>N/O 153</td>
</tr>
<tr>
<td>Bryant EB @ 5th</td>
<td>3</td>
<td>N/O 0.14</td>
<td>N/O 111</td>
<td>N/O 19</td>
<td>N/O 92</td>
</tr>
</tbody>
</table>

Notes:
1. The number of lanes shown represents the number of lanes of queued traffic serving the Bay Bridge from each facility, as measured at the toll plaza.
2. Assumes queued vehicle density of 150 vehicles per lane per mile for freeway and 264 vehicles per lane per mile for city streets based on aerial photo observations.
3. Represents freeway segment density at capacity of 45 vehicles per mile per lane according to Exhibit A22-5 of Chapter 22 Freeway Facilities of the 2000 Highway Capacity Manual. For surface streets, density at capacity is likely somewhat higher, since travel speeds may be lower. However, since intersections form a large gap in queues, overall density at capacity for surface streets was assumed to be similar to that of freeways.
4. Most queues observed on the westbound approaches during the PM peak hour were due to weaving areas between I-80/I-880/I-580 and not necessarily due to bridge over-saturation or the service volume of the toll plaza.
5. No observations conducted because queues not typically present.

Source: Fehr & Peers, 2009
Table 10 displays the average traffic volumes observed during the peak periods on the same days the queue observations were conducted. Since Saturday peak hour volumes are below the capacity of the bridge (i.e., less than 9,000 vehicles), there was no observed unserved demand.

<table>
<thead>
<tr>
<th>TABLE 10 – EXISTING BAY BRIDGE PEAK HOUR TRAFFIC DEMAND</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average Volume Served (Counts)</strong></td>
</tr>
<tr>
<td>AM</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>I-80WB/I-580WB before SFOBB</td>
</tr>
<tr>
<td>I-880 NB onto SFOBB</td>
</tr>
<tr>
<td>I-80 WB HOV Bypass</td>
</tr>
<tr>
<td><strong>Total WB SFOBB Volume</strong></td>
</tr>
<tr>
<td><strong>Total EB SFOBB Volume</strong></td>
</tr>
</tbody>
</table>

Notes:
1. Unserved demand taken from Table 9, rounded to nearest 50 vehicles.
2. Based on average flow measured when queue exists.
4. Not observed.
5. Although queues were observed on westbound I-80 during the PM peak hour, they are not factored into bridge unserved demand since they were observed near the Berkeley/Emeryville weaving area and the bridge was operating within its capacity. Therefore, the queues observed in the PM peak for westbound I-80 were not due to bridge oversaturation.
6. Capacity of HOV lane based on observed usage during periods when the bridge operates at capacity.

Measurements of traffic flow on the SFOBB during the weekday peak period indicate a capacity of 9,000 vehicles per hour per direction. This corresponds to around 1,800 vehicles per lane per hour, which is less than the ideal saturation flow rate of 2,200 vehicles per lane per hour defined by the 2000 HCM. The average flow, however, is reasonable given minimal shoulder width, grades, and a mix of heavy vehicles, such as buses and trucks that reduce capacity from 2,200 vehicles per hour per lane that can be achieved on facilities under ideal conditions (wide shoulders, level grade, no trucks and buses, etc.).

As noted earlier, the number of vehicles counted on the SFOBB does not necessarily represent all travel demand. The presence of queues approaching the SFOBB indicates that the demand exceeds the capacity of the SFOBB during certain times of day. The observed volume on the SFOBB represents the bridge’s capacity and the number of vehicles in queues approaching the facility represents the excess demand (i.e., the amount of demand that exceeds the capacity of the facility). The full existing demand is estimated by adding unserved demand to the counted traffic volumes. In the AM peak hour, the existing travel demand is 10,450 vehicles per hour in the peak westbound direction. In the PM peak hour, the existing demand is slightly less, at approximately 9,550 vehicles per hour in the peak eastbound direction. Demand in the off-peak directions in the AM and PM peak hours is currently less than the SFOBB capacity, and therefore all demand is represented in counts on the SFOBB. Existing freeway mainline volumes, as well as the amount of unserved demand on all approaches to the SFOBB, are depicted on Figure 14, page 48.
NOTE: This refers to unserved demand on San Francisco city streets approaching the SFOBB. Additional unserved demand exists on northbound US 101/ eastbound I-80 approaching the SFOBB. Unserved demand on US 101/I-80 is not quantified due to the complex nature of the approaching freeway network.

XX [YY] [ZZ] = AM (PM) (SAT) Volume in vehicles/hour

San Francisco Approaches

<table>
<thead>
<tr>
<th></th>
<th>AM</th>
<th>PM</th>
<th>SAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand</td>
<td>7,150</td>
<td>9,550</td>
<td>7,850</td>
</tr>
<tr>
<td>Served</td>
<td>7,150</td>
<td>9,000</td>
<td>7,850</td>
</tr>
<tr>
<td>Unserved (Queue)</td>
<td>0</td>
<td>550</td>
<td>0</td>
</tr>
</tbody>
</table>
2.6 EXISTING YERBA BUENA RAMP OPERATIONS

Although there are six on- and off-ramps connecting the SFOBB to Yerba Buena Island, only four ramps were open at the time this study was conducted. The westbound on-ramp and eastbound off-ramp on the east side of the tunnel were closed as part of the SFOBB ESSSP. Thus, only the four ramps that were open at the time of data collection are analyzed in this report. Existing freeway mainline and on- and off-ramp volumes on Yerba Buena Island are depicted on Figure 14 on page 48.

The method to calculate merge and diverge LOS is based on information developed in the Highway Capacity Manual for both ramp merge and diverge sections, as well as for stop-controlled intersections. Ramp LOS analysis was conducted for typical AM, PM and Saturday conditions. The analysis for this task is included in Appendix G and summarized in Figure 11 below.

As shown in Table 11, the merge and diverge areas of the freeway generally operate at acceptable levels of service, except for the eastbound off-ramp on the west side of Yerba Buena Island in the PM peak hour. On the on-ramps themselves, however, vehicles experience substantial amounts of delay while waiting for gaps in traffic on the bridge, as determined using the stop-controlled intersection method. Given the design of the ramps, these types of operations are not surprising. The ramps have very short acceleration lanes, poor sight distance, and tight curve radii, which, when combined with heavy mainline traffic volumes, cause drivers to pause longer before entering the freeway.

<table>
<thead>
<tr>
<th>Ramp (location on Yerba Buena Island)</th>
<th>AM Peak Hour</th>
<th>PM Peak Hour</th>
<th>Saturday Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Merge/Diverge Section Method</td>
<td>Stop-Controlled Intersection Method</td>
<td>Merge/Diverge Section Method</td>
</tr>
<tr>
<td></td>
<td>Density 1 (LOS)</td>
<td>Delay (LOS)</td>
<td>Density 1 (LOS)</td>
</tr>
<tr>
<td>Eastbound On-Ramp (East)</td>
<td>22.3 (C)</td>
<td>74.2 (F)</td>
<td>27.8 (C)</td>
</tr>
<tr>
<td>Eastbound Off-Ramp (West)</td>
<td>30.1 (D)</td>
<td>36.2 (E)</td>
<td>32.3 (D)</td>
</tr>
<tr>
<td>Eastbound Off-Ramp (East)</td>
<td>Ramp closed during data collection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Westbound On-Ramp (West)</td>
<td>27.9 (C)</td>
<td>&gt; 80 (F)</td>
<td>25.1 (C)</td>
</tr>
<tr>
<td>Westbound On-ramp (East)</td>
<td>Ramp closed during data collection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Westbound Off-Ramp (East)</td>
<td>32.8 (D)</td>
<td>29.4 (D)</td>
<td>28.5 (D)</td>
</tr>
</tbody>
</table>

Notes:
1. Density measured in passenger cars per mile per lane.
2. Eastbound Off-ramp (East) and Westbound On-ramp (East) were closed due to bridge construction at the time existing conditions data was collected.

Source: Fehr & Peers, 2009
2.7 EXISTING INTERSECTION LEVELS OF SERVICE

Weekday morning (7:00 to 9:00 AM) peak hour and evening (4:00 to 6:00 PM) peak hour intersection turning movement counts were collected for the 16 study intersections and analyzed for existing conditions. Turning movement counts were also collected during the afternoon peak period (1:00 to 3:00 PM) on a typical Saturday. Counts used in this report were collected during typical weekday and weekend conditions in May 2008. (Intersection turning movement counts are included in Appendix B of this report).

Figure 15 on page 51 displays the existing traffic control and lane configurations at each study intersection. Figure 16 on page 52 shows the existing AM, PM and Saturday peak hour traffic volumes and critical movements. The volumes shown in Figure 16 (see page 52) have been adjusted upwards to account for the unserved travel demand at the study facilities, as described previously.

Levels of service were calculated at each study intersection for the existing weekday AM, PM and Saturday peak hours (see Appendix E for detailed LOS calculations). Table 12 (see page 53) shows the resulting LOS and corresponding delay (measured in average seconds of delay per vehicle) and volume to capacity ratio (V/C) at each signalized study intersection.

Two study intersections, Folsom Street/Essex Street and Bryant Street/Sterling Street, are uncontrolled. Observations indicate that these two intersections operate relatively well during the AM and Saturday peak periods. On days when congestion leading onto the SFOBB is severe, queues from bridge on-ramps spill back into these intersections. At Folsom Street/Essex Street, this congestion primarily affects the two southern eastbound lanes on Folsom Street that facilitate turns onto southbound Essex Street. At Bryant Street/Sterling Street, this congestion primarily affects the two eastbound lanes on Bryant Street that turn onto the SFOBB on-ramp; the “through” travel lane on eastbound Bryant Street operates relatively free of congestion. The single lane on the westbound approach to this intersection on Bryant Street turns directly onto the on-ramp and is frequently congested during the PM peak hour.

Many of the signalized study intersections operate at LOS D or better, which is considered acceptable, with the following exceptions:

- 1st Street/Market Street operates at LOS E in the PM peak hour;
- 1st Street/Mission Street operates at LOS E in the PM peak hour;
- 1st Street/Howard Street operates at LOS E in the PM peak hour;
- 1st Street/Folsom Street operates at LOS E in the PM peak hour;
- 1st Street/Harrison Street/I-80 Eastbound On-Ramp operates at LOS F in the PM peak hour;
- Essex Street/Harrison Street/I-80 Eastbound On-Ramp operates at LOS F in the PM peak hour;
- 2nd Street/Folsom Street operates at LOS E in the PM peak hour;
- The Embarcadero/Harrison Street operates at LOS E in the AM peak hour; and
- Bryant Street/5th Street/I-80 Eastbound On-Ramp operates at LOS F in the PM peak hour.

Generally, conditions in Downtown San Francisco are more congested in the PM peak hour than the AM peak hour. In the mornings, access to Downtown San Francisco is constrained by the limited capacity of the SFOBB to deliver traffic into the City. In the evening, the opposite occurs, when traffic attempting to leave Downtown is constrained by the limited capacity of the SFOBB ramps onto the bridge, causing queues to form Downtown on surface streets leading to the bridge. Further, congestion in Downtown San Francisco can vary depending on a number of factors, including incidents on the bridge, special events, and seasonal variations in traffic. Thus, LOS may deviate from what is reported in Table 12 (page 53), based on daily variations in travel conditions.
LEGEND:

1 = Study Intersection
1 = Stop Sign
1 = Traffic Signal
1 = Transit-Only Lane

Source: Fehr & Peers, 2009

Treasure Island and Yerba Buena Island Redevelopment Plan TIS
EXISTING LANE GEOMETRIES AND TRAFFIC CONTROLS

FIGURE 15
FIGURE 16
EXISTING CONDITIONS
PEAK HOUR INTERSECTION TURNING MOVEMENT VOLUMES

Source: Fehr & Peers, 2009

LEGEND:

1 = Study Intersection
XX (YY) [ZZ] = AM (PM) [SAT] Peak Hour Volume
### = Critical Movement

Treasure Island and Yerba Buena Island Redevelopment Plan TIS
June 2010
SF07-0340/graphics/TIS/0340-16
Page 52
Table 12 – Existing Intersection Levels of Service

<table>
<thead>
<tr>
<th>Intersection1,3</th>
<th>Traffic Control</th>
<th>Peak Hour</th>
<th>LOS</th>
<th>Delay2</th>
<th>V/C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fremont Street and Howard Street</td>
<td>Signalized</td>
<td>AM</td>
<td>B</td>
<td>17.8</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>D</td>
<td>44.1</td>
<td>0.96</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Saturday</td>
<td>B</td>
<td>13.2</td>
<td>0.51</td>
</tr>
<tr>
<td>2. Fremont Street/Folsom Street/I-80 Westbound Off-Ramp</td>
<td>Signalized</td>
<td>AM</td>
<td>C</td>
<td>28.9</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>C</td>
<td>23.9</td>
<td>0.41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Saturday</td>
<td>C</td>
<td>20.4</td>
<td>0.17</td>
</tr>
<tr>
<td>3. Fremont Street and Harrison Street</td>
<td>Signalized</td>
<td>AM</td>
<td>B</td>
<td>10.9</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>C</td>
<td>25.1</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Saturday</td>
<td>B</td>
<td>10.4</td>
<td>0.20</td>
</tr>
<tr>
<td>4. 1st Street and Market Street</td>
<td>Signalized</td>
<td>AM</td>
<td>C</td>
<td>33.4</td>
<td>0.70</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>E</td>
<td>72.8</td>
<td>0.82</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Saturday</td>
<td>B</td>
<td>18.5</td>
<td>0.58</td>
</tr>
<tr>
<td>5. 1st Street and Mission Street</td>
<td>Signalized</td>
<td>AM</td>
<td>B</td>
<td>14.8</td>
<td>0.77</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>E</td>
<td>67.8</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Saturday</td>
<td>B</td>
<td>16.3</td>
<td>0.55</td>
</tr>
<tr>
<td>6. 1st Street and Howard Street</td>
<td>Signalized</td>
<td>AM</td>
<td>B</td>
<td>14.6</td>
<td>0.79</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>E</td>
<td>73.7</td>
<td>1.12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Saturday</td>
<td>C</td>
<td>22.2</td>
<td>0.42</td>
</tr>
<tr>
<td>7. 1st Street and Folsom Street</td>
<td>Signalized</td>
<td>AM</td>
<td>B</td>
<td>12.1</td>
<td>0.52</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>E</td>
<td>70.6</td>
<td>1.14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Saturday</td>
<td>B</td>
<td>17.3</td>
<td>0.33</td>
</tr>
<tr>
<td>8. 1st Street/Harrison Street/I-80 Eastbound On-Ramp</td>
<td>Signalized</td>
<td>AM</td>
<td>C</td>
<td>29.0</td>
<td>0.63</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>F</td>
<td>&gt;80</td>
<td>1.29</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Saturday</td>
<td>B</td>
<td>10.7</td>
<td>0.55</td>
</tr>
<tr>
<td>10. Essex Street/Harrison Street/I-80 Eastbound On-Ramp</td>
<td>Signalized</td>
<td>AM</td>
<td>A</td>
<td>7.4</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>F</td>
<td>&gt;80</td>
<td>1.22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Saturday</td>
<td>B</td>
<td>15.1</td>
<td>0.36</td>
</tr>
<tr>
<td>11. 2nd Street and Folsom Street</td>
<td>Signalized</td>
<td>AM</td>
<td>B</td>
<td>13.4</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>E</td>
<td>59.4</td>
<td>0.93</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Saturday</td>
<td>B</td>
<td>14.8</td>
<td>0.34</td>
</tr>
<tr>
<td>12. 2nd Street and Bryant Street</td>
<td>Signalized</td>
<td>AM</td>
<td>B</td>
<td>11.1</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>C</td>
<td>32.4</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Saturday</td>
<td>B</td>
<td>11.5</td>
<td>0.38</td>
</tr>
<tr>
<td>13. Embarcadero Street and Harrison Street</td>
<td>Signalized</td>
<td>AM</td>
<td>E</td>
<td>68.6</td>
<td>0.81</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>D</td>
<td>38.5</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Saturday</td>
<td>B</td>
<td>12.0</td>
<td>0.39</td>
</tr>
<tr>
<td>15. Bryant Street/5th Street/I-80 Eastbound On-Ramp</td>
<td>Signalized</td>
<td>AM</td>
<td>C</td>
<td>22.0</td>
<td>0.56</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>F</td>
<td>&gt;80</td>
<td>1.65</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Saturday</td>
<td>D</td>
<td>53.2</td>
<td>0.70</td>
</tr>
<tr>
<td>16. Harrison Street/5th Street/I-80 Westbound Off-Ramp</td>
<td>Signalized</td>
<td>AM</td>
<td>C</td>
<td>25.1</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PM</td>
<td>D</td>
<td>51.0</td>
<td>0.89</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Saturday</td>
<td>C</td>
<td>25.9</td>
<td>0.56</td>
</tr>
</tbody>
</table>
### TABLE 12 – EXISTING INTERSECTION LEVELS OF SERVICE

<table>
<thead>
<tr>
<th>Intersection1,3</th>
<th>Traffic Control</th>
<th>Peak Hour</th>
<th>LOS</th>
<th>Delay2</th>
<th>V/C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notes:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bold indicates an unacceptable level of service (LOS), i.e., LOS E or LOS F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Intersections 9 and 14 not included in table because they are uncontrolled. LOS analysis is intended for controlled intersections only. Qualitative discussion of Intersections 9 and 14 included in text.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Total intersection weighed average control delay expressed in seconds per vehicle for signalized intersections using methods described in the 2000 Highway Control Manual and calculated using the Synchro 6.0 software package.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 2.7.1 Game Day Operations

Traffic operations at a number of intersections in the South of Market area are affected by traffic associated with special events and during baseball season when the San Francisco Giants have home games at AT&T Park (on King Street, between 2nd and 3rd Streets). Transportation impacts associated with game day conditions are most severe prior to games and after the conclusion of games. The greatest impact occurs after weekday afternoon sellout events, during the 3:30 to 4:40 PM period when traffic, transit and pedestrian flows exiting the ballpark (and game-day street closures near the park) coincide with the evening commute traffic already on the transportation network. As a result, on days when San Francisco Giants play home games at AT&T Park, existing service levels at study intersections and the SFOBB, particularly those between the ballpark and the SFOBB, are likely to be worse than reported.

During a typical baseball season there are 81 regular-season home games, including 13 weekday games, 42 weekday evening/night games and 26 weekend games. The San Francisco Giants also play a small number of pre-season games at AT&T Park, and in successful years, host home post-season games. Although these conditions occur with some frequency during the late spring through early fall, they do not represent typical conditions in the area and are only qualitatively discussed here.
2.8 TRANSIT NETWORK

Currently, one transit line serves the Islands from Downtown San Francisco; the Muni Route 108-Treasure Island provides service directly to the Islands from the Transbay Terminal. From the Transbay Terminal, passengers can access other local public transportation services. Muni operates 80 transit routes throughout San Francisco with stops within 2 blocks of 90 percent of all residences in the city. The agency is responsible for operating buses, light rail lines, cable cars, and the historic street cars in the City of San Francisco. In addition to the 108-Treasure Island, Muni lines 5-Fulton, 6-Parnassus, 10-Townsend, 14-Mission, 38-Geary, 38L-Geary Limited, and 76-Marin Headlands have stops at the Transbay Terminal, facilitating direct connections to the 108-Treasure Island. Transbay Terminal passengers can also access regional transit providers including BART, Golden Gate Transit, AC Transit, and SamTrans.

Transportation analyses in San Francisco generally use a ¼ mile radius as a reasonable walking distance for transit access. This section discusses the single Muni Bus Route that has direct service to and from the Islands. Figure 17 on page 56 shows the public transit network in Downtown San Francisco and Treasure Island.

**Route 108-Treasure Island** – This route provides 24-hour service from the Transbay Terminal to the Islands via the SFOBB. On Treasure Island, the route operates on a loop on M Avenue, 13th Street, H Avenue and California Avenue. The 108-Treasure Island has been extended to the 4th & King Caltrain Terminal via 2nd Street, King Street, 4th Street and Townsend Street between 2:00 PM and 10:00 PM. Due to low ridership, SFMTA is planning to eliminate this extension and the route will instead travel exclusively between the Transbay Terminal and Treasure Island. Scheduled service frequency is every 15 minutes during the morning, afternoon and evening weekday peak periods and every 20 minutes during the weekend peak period; however, the actual run time for the route varies depending on congestion on the SFOBB. During the peak periods, the route has a run time of approximately 10 minutes from Treasure Island inbound towards the Transbay Terminal and a run time of approximately 8 minutes outbound from the Transbay Terminal to Treasure Island. The route spends approximately 15 minutes circulating on the Islands. The route is currently operating between 20 and 70 percent capacity during the peak hours. The existing capacity and ridership of this route is described in Table 13 (see page 57). Existing transit ridership across four screenlines surrounding downtown is presented in Table 14 (see page 58).
TABLE 13 – EXISTING TRANSIT OPERATIONS

<table>
<thead>
<tr>
<th>Route</th>
<th>Service Frequency (min) and Capacity Utilization</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency (minutes)</td>
<td>Capacity (Passengers per hour)</td>
<td>Ridership</td>
<td>Utilization</td>
</tr>
<tr>
<td><strong>AM Peak Hour</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muni 108–Treasure Island EB</td>
<td>15</td>
<td>252</td>
<td>51</td>
<td>20%</td>
</tr>
<tr>
<td>Muni 108–Treasure Island WB</td>
<td>15</td>
<td>252</td>
<td>145</td>
<td>58%</td>
</tr>
<tr>
<td><strong>PM Peak Hour</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muni 108–Treasure Island EB</td>
<td>15</td>
<td>252</td>
<td>121</td>
<td>48%</td>
</tr>
<tr>
<td>Muni 108–Treasure Island WB</td>
<td>15</td>
<td>252</td>
<td>153</td>
<td>61%</td>
</tr>
<tr>
<td><strong>Saturday Peak Hour</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muni 108–Treasure Island EB</td>
<td>20</td>
<td>189</td>
<td>86</td>
<td>46%</td>
</tr>
<tr>
<td>Muni 108–Treasure Island WB</td>
<td>20</td>
<td>189</td>
<td>133</td>
<td>70%</td>
</tr>
</tbody>
</table>

Note:
1. Ridership data provided by Muni for planning purposes only.


As illustrated on Table 14, peak direction transit service in the AM and PM peak hours between Downtown and other parts of San Francisco is generally within reasonable utilization percentages. Although specific lines and routes may be overcrowded, when evaluated as a whole, the transit system is currently capable of accommodating its overall peak demand.
### TABLE 14 – EXISTING MUNI TRANSIT SCREENLINES

<table>
<thead>
<tr>
<th></th>
<th>Ridership</th>
<th>Capacity</th>
<th>% Utilization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AM Peak Hour (Inbound)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>1,882</td>
<td>3,781</td>
<td>50%</td>
</tr>
<tr>
<td>Northwest</td>
<td>7,434</td>
<td>11,437</td>
<td>65%</td>
</tr>
<tr>
<td>Southwest</td>
<td>4,248</td>
<td>6,301</td>
<td>67%</td>
</tr>
<tr>
<td>Southeast</td>
<td>6,627</td>
<td>8,699</td>
<td>76%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>20,191</td>
<td>30,218</td>
<td>67%</td>
</tr>
<tr>
<td><strong>PM Peak Hour (Outbound)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>1,886</td>
<td>3,599</td>
<td>33%</td>
</tr>
<tr>
<td>Northwest</td>
<td>6,621</td>
<td>10,123</td>
<td>65%</td>
</tr>
<tr>
<td>Southwest</td>
<td>4,668</td>
<td>7,028</td>
<td>66%</td>
</tr>
<tr>
<td>Southeast</td>
<td>7,434</td>
<td>9,623</td>
<td>77%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>20,609</td>
<td>30,373</td>
<td>68%</td>
</tr>
</tbody>
</table>

**Notes:**
1. AM analysis is for transit service inbound toward Downtown and PM analysis is for transit service outbound from Downtown.

**Source:** Transit Center District Plan – Transit Network Analysis, AECOM, 2009.

### 2.8.1 Regional Transit

At the Transbay Terminal, 108-Treasure Island riders can connect to several regional transit routes operating inside, adjacent to, or within a short walk of the Transbay Terminal, as described below.

**Alameda-Contra Costa County Transit District (AC Transit)**

AC Transit operates bus service in western Alameda and Contra Costa Counties, as well as routes to the City of San Francisco and San Mateo County. AC Transit operates 27 “transbay” bus routes between the East Bay and the Transbay Terminal, many of which operate only during commute periods.

**Golden Gate Bridge, Highway and Transportation District (Golden Gate Transit)**

Golden Gate Transit operates bus and ferry service within Marin, Sonoma and San Francisco counties. Golden Gate Transit bus routes 4, 8, 18, 24, 26, 27, 44, 54, 72, 73, 76, 10, 70, 80, and 101 operate on surface streets, with stops adjacent to the Transbay Terminal offering service to Marin and Sonoma Counties. Golden Gate Transit also operates ferry service between Larkspur and Sausalito Ferry Terminals in Marin County and the San Francisco Ferry Building.

**San Mateo County Transit District (SamTrans)**

SamTrans operates bus and rail service in San Mateo County, with select routes providing transit service outside of the County. SamTrans Routes DX, FX, KX, MX, NX, PX, RX, 292, and 397 serve Downtown San Francisco providing connections to San Mateo County destinations.
BART

Although no direct connections from the Transbay Terminal are available to BART, the Bay Area’s regional rapid transit system, connections can be made at nearby facilities. Passengers can transfer between the Transbay Terminal and BART by walking one block north from Mission Street to the Embarcadero Station on Market Street. Passengers can use BART to reach Pittsburg/Bay Point, Richmond, Fremont, Dublin, Millbrae, SFO, and points in between.

Caltrain

To reach Caltrain, the commuter rail service along the San Francisco Peninsula, with service between 4th Street/King Street in San Francisco and San Jose’s Diridon Station, passengers have a number of options. Currently, passengers can continue on the 108-Treasure Island bus, which continues to the Caltrain Station at 4th Street/King Street after stopping at the Transbay Terminal. However, as noted earlier, the 108-Treasure Island service between the Transbay Terminal and the Caltrain Station is expected to be discontinued in the near future. At that point, the simplest connection will involve walking to the Embarcadero station and either taking BART to Millbrae, where passengers can transfer directly to Caltrain, or board the 10 Townsend bus line or N-Judah or T-Third Street light rail lines, which provide service to the 4th Street/King Street Caltrain station.

San Francisco Bay Area Water Emergency Transportation Authority (WETA)

WETA is responsible for implementing the Ferry Implementation and Operations Plan (the “IOP”) for the Bay Area, with a focus on building and operating a comprehensive public water transit system of ferries, feeder buses and terminals to increase regional mobility in the Bay Area. There is no ferry service currently serving Treasure Island. However the IOP proposes new ferry service between the San Francisco Ferry Building and Treasure Island. Existing ferry berths are located at the Ferry Building in San Francisco and include routes between San Francisco and Oakland, Alameda, and Vallejo; ferry service provided by other operators includes service between San Francisco and Sausalito, Larkspur and Tiburon, as described above.

2.9 BICYCLE FACILITIES

The Citywide Bicycle Routes near the project site, in Downtown San Francisco, and the South of Market area, as designated by the Official San Francisco Bike Route System map are shown on Figure 18 on page 60. Currently on Treasure Island, there is a short bike lane striped on Avenue of the Palms and a pathway around the western side of the island. No bicycle facilities exist on the SFOBB.

Bicycles are allowed on BART trains, except during peak commute hours (generally between 6:00 and 9:00 AM, and between 4:00 and 6:30 PM), or at any time on crowded cars. Caltrain allows a limited number of bikes on all trains, and Muni buses, including the 108 Treasure Island, are outfitted with racks to also carry a limited number of bikes (typically two bikes per bus). Caltrans operates a transbay bicycle shuttle during morning and evening commute periods to transport bicyclists (and their bicycles) between the East Bay and San Francisco. The new eastern span of the SFOBB is expected to provide a bicycle and pedestrian path between Emeryville/Oakland and the Islands. The Bay Area Toll Authority (“BATA”) has recently completed a feasibility study examining the potential for a new bicycle/pedestrian path on the western span of the SFOBB. BATA has subsequently initiated a follow-up study to examine design alternatives. If this project is constructed, there would be a continuous bicycle and pedestrian facility from Emeryville/Oakland to San Francisco, with connections to the Islands.
2.10 PEDESTRIAN FACILITIES

This section describes the pedestrian environment surrounding the Ferry Building in San Francisco. If the project generates substantial ferry ridership between the Islands and the San Francisco Ferry Building, it is important to understand the nature of the pedestrian facilities on either end of that service providing access to the ferry. Existing pedestrian facilities on the Islands are not discussed, since the project will substantially alter the existing street network on the Island.

The San Francisco Ferry Building currently serves ferries arriving and departing from Sausalito, Tiburon, Larkspur, Oakland, Alameda, and Vallejo approximately every half hour (except for the Sausalito ferry, which departs approximately every 60 to 90 minutes). In addition to ferry activity, the Ferry Building is used as an indoor marketplace, houses several offices and restaurants, and provides sidewalk space for a twice weekly farmers’ market. With these uses, and its proximity to Downtown San Francisco, the surrounding area experiences high levels of pedestrian activity.

The Embarcadero separates the Ferry Building from the rest of downtown San Francisco. After the 1989 Loma Prieta earthquake, the Embarcadero waterfront was redesigned after the former Embarcadero freeway structure was damaged. In lieu of reconstructing the freeway decks, the City of San Francisco and Caltrans designed the new roadway as a six-lane, at-grade facility with a light rail line in the center of the median. The design improved connectivity between Downtown and the South of Market area of San Francisco with the Port of San Francisco properties along the waterfront. In addition to the Ferry Building, several other areas along the waterfront were redeveloped as office or restaurant properties. A wide sidewalk and mixed-use path is provided along the Bay (east) side of The Embarcadero and around the Ferry Building. The path is generally 25-feet wide, but does vary. Near the Ferry Building, the path widens to between 30 and 45 feet.

Due to the recent reconstruction of the Embarcadero, most of the pedestrian facilities in the area surrounding the Ferry Building are consistent and generally ADA-compliant. Major pedestrian routes across the Embarcadero occur between Market Street and the Ferry Building, as well as both of the adjacent intersections along Embarcadero at Washington Street and at Mission Street. In front of the Ferry Building, there are three crossing points – a central main (80') crosswalk directly between the Ferry Building and Market Street, and two smaller crosswalks on either end of Justin Hermann Plaza (see Figure 13, page 41). These crossings are controlled by traffic signals that stop traffic on Embarcadero to give pedestrians time to cross the roadway. The intersections of The Embarcadero at Washington Street and Mission Street both have crosswalks across all three legs.

The City of San Francisco provided pedestrian count volumes for crosswalks along The Embarcadero. At Embarcadero and Market Street, pedestrian counts conducted during the weekday AM and PM peak hours recorded approximately 1,964 and 3,452 pedestrians, respectively.

Chapter 18 of the 2000 Highway Capacity Manual includes a methodology for calculating pedestrian level of service at a signalized crossing by assuming that the amount of delay a pedestrian experiences at a crossing is directly related to the level of service. As a pedestrian begins to experience more than 30 seconds of delay, s/he is likely to take more risks when crossing a roadway.

Based on this methodology, the crosswalks at the Ferry Building operate at good levels of service during all peak hours. On a qualitative level, the crossings are also well-designed and easy to use. The waiting areas on either side of Embarcadero are wide and can accommodate a substantial number of waiting pedestrians.

In addition to delay, pedestrian density is another way to measure the performance of pedestrian facilities. Pedestrian density is calculated by dividing the number of pedestrians likely to arrive and queue during a “Don’t Walk” signal phase by the size of the waiting area. Based on observations during the peak hours, platoons of pedestrians form routinely while waiting for a signal to cross the Embarcadero.
Although enough pedestrians are present to cause slight delays for those that walk faster than others, there is sufficient space in the crosswalk for faster pedestrians to navigate around others. According to the 2000 HCM, this type of activity is characteristic of level of service D or E conditions. Table 15 summarizes pedestrian density at the crosswalks near the Ferry Building. As shown in Table 15, most crosswalks operate with relatively little delay or congestion; however, the crosswalk directly in front of the Ferry Building becomes congested, (i.e., LOS D Conditions) during peak periods.

**TABLE 15 – EXISTING PEDESTRIAN LEVELS OF SERVICE CROSSING THE EMBARCADERO**

<table>
<thead>
<tr>
<th>Crosswalk</th>
<th>Existing Hourly Pedestrian Volume&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Existing Pedestrian Density (sq ft/pedestrian)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AM</td>
<td>PM</td>
</tr>
<tr>
<td>Washington Street&lt;sup&gt;1&lt;/sup&gt;</td>
<td>120</td>
<td>261</td>
</tr>
<tr>
<td>Ferry Bldg (North)</td>
<td>400</td>
<td>378</td>
</tr>
<tr>
<td>Market Street</td>
<td>1,964</td>
<td>3,452</td>
</tr>
<tr>
<td>Don Chee</td>
<td>133</td>
<td>184</td>
</tr>
<tr>
<td>Mission Street&lt;sup&gt;1&lt;/sup&gt;</td>
<td>333</td>
<td>345</td>
</tr>
</tbody>
</table>

Notes:
1. Since the intersections of the Embarcadero with Washington Street and Mission Street each have two crosswalks, the north and south legs of each intersection were averaged.
2. Pedestrian counts provided by the City of San Francisco, taken from the Regional Signal Timing Program study conducted by Katz, Okitsu & Associates in 2006 and 2007.
3. Saturday data available for the Market Street and Don Chee crosswalks only. The Ferry Building hosts a farmers market on Saturdays, which affects the peak period pedestrian volumes. Although the Ferry Building also hosts mid-week farmers markets, those are typically during the mid day periods, and do not affect weekday AM and PM peak hour pedestrian volumes.


### 2.11 EMERGENCY ACCESS

This section describes the existing emergency services on the islands, as well as the emergency access routes. The Islands are currently served by both the San Francisco Police Department and Fire Department. The Fire Department operates Fire Station 48 on Avenue D on Treasure Island. The SFOBB is the only existing emergency access route to and from the Islands and San Francisco or the East Bay, and the primary on-island emergency routes include roadways leading to the Bridge. When the SFOBB is congested during the peak periods, emergency vehicles maneuver around vehicles and into other traffic lanes, similar to other congested roadways in San Francisco, and the California Vehicle Code requires drivers to make way for emergency vehicles.
3. TRAVEL DEMAND ANALYSIS

The travel demand, in terms of person trips by mode and vehicle trips associated with the land use proposed as part of the Proposed Project, is described in this chapter. To meet the needs of project-generated transportation demand, the 2006 Transportation Plan proposes substantial improvements to existing transit infrastructure and service to the Islands, including high-frequency ferry service, increased frequency for the 108-Treasure Island bus route to San Francisco, a new Muni bus route to the Civic Center, and new bus service to Downtown Oakland. Generally, the funding for this increased transit service is intended to come from revenues generated by the project (tax revenues, congestion pricing fees, parking fees, etc.) and local, state, and federal grants. However, full funding for this service plan relies on sources which have not yet been formally agreed to (e.g., grants, dedication of project-generated tax revenues). Conversely, funding for some portions of the service costs (e.g., some project-generated revenues) will be available, and can be considered as funding sources for portions of the transit service plan. The level of the transit service for which full funding has been identified and for which the appropriate agency has indicated willingness to implement the service is included as part of the Proposed Project and analyzed in this report as the “Base Transit” scenario. The additional transit service for which a fully committed funding source has not been identified is analyzed as a separate “Expanded Transit” scenario. A more detailed discussion of the two scenarios and their respective travel demand forecasts is provided later in this chapter.

Because of the unique location, mix of land uses, and transportation demand management (“TDM”) measures of the Proposed Project, the overall process used to forecast the travel demands of the Proposed Project is a multi-step process. The steps are outlined below and discussed in more detail in this chapter.

1. The total amount of person-trips generated by the Proposed Project was estimated using vehicle trip generation rates described in the Institute of Transportation Engineers’ (“ITE”) Trip Generation manual (and other sources, as necessary) and average vehicle occupancy survey data from the SF Guidelines and national surveys.\(^\text{12}\)

2. Adjustments were made based on research conducted by Fehr & Peers and others to account for the unique nature of the project, including the mix of uses, the density, and the high quality of pedestrian and bicycle amenities proposed.\(^\text{13}\)

3. The percentage of total trips expected to use transit based on the high level of transit service proposed by the project was forecasted based on survey data from San Francisco for similar locations.

4. The general origins and destinations of person-trips leaving the island were forecasted based on regional travel demand forecasting models and engineering judgment.

5. The person trips by auto, ferry, and bus forecasted to leave the island were assigned to specific routes, based on the mode choice identified in Step 3 and the trip distribution identified in Step 4.

6. The effects of implementing congestion pricing for residents entering and departing the Islands by auto were predicted based on recent studies regarding the sensitivity of drivers to factors such as time delay and cost increases, with the decrease in auto trips re-assigned to transit.\(^\text{14}\)

\(^\text{12}\) Trip generation estimates for land uses in the project description that are not contained in the ITE Trip Generation manual were estimated using survey data taken at facilities for the proposed land use. Appendix F1 contains a list of sources of trip generation estimates for each land use analyzed in this TIS.

\(^\text{13}\) See Appendix F2.

\(^\text{14}\) The transit costs for residents were adjusted to account for the transit passes.
7. The effects of additional delay associated with implementing ramp metering at on-ramps to the SFOBB was predicted using similar methods to the congestion pricing analysis, with the decrease in auto trips re-assigned to transit.

8. Further adjustments to the forecasted transit trips were made to account for the fact that not all transit service proposed by the project is fully funded and cannot be assumed in the analysis. The lower amount of transit service would reduce transit ridership.

The result of Steps 1-8 above is a projected person-trip generation, by land use and by mode, for the weekday AM and PM and Saturday peak hours.

The Proposed Project’s travel demand forecasts were initially developed using the proposed higher-capacity transit service scenario (“Expanded Transit”), since that represents a similar situation to locations in San Francisco from which data regarding typical transit ridership was obtained. The travel demand forecasts for the lower-capacity “Base Transit” scenario are based on adjustments to the forecasts for the higher-capacity Expanded Transit Service. Therefore, the “Expanded Transit” scenario travel demand estimates are presented first, followed by the travel demand estimates for the reduced-scale “Base Transit” scenario. Project impacts, as discussed in Chapter 4, are based on the more conservative “Base Transit” scenario.

3.1 PROPOSED PROJECT WITH EXPANDED TRANSIT

This section presents the travel demand estimates for the Proposed Project with the addition of the Expanded Transit Scenario proposed in the 2006 Transportation Plan (as described in Chapter 2, Section 1.2.5 on page 13). Analysis of the Proposed Project that includes only those transit service elements for which full funding has been identified follows this discussion.

3.1.1 Trip Generation (Proposed Project, Expanded Transit)

Estimating the net new project trip generation involves forecasting the number of trips anticipated by build-out of the Proposed Project, less trips associated with the existing uses on-site that would be replaced by the project. Because of the unique nature of the proposed development on the Islands, both in terms of its features designed to promote transit, bicycle, and pedestrian travel and the relative difficulty of auto access to the site via the SFOBB, traditional methods of forecasting the project’s trip generation are not adequate. Instead, the proposed trip generation forecasts were developed in consultation with the Planning Department using methods developed by Fehr & Peers and others that account not just of the amount of development, but also for the following specific design variables (known as the 4D’s):

- **Development scale** – the amount of trips generated increases as the amount of development increases;
- **Density of the project** – the higher the Proposed Project’s density, the less vehicular traffic generated per unit of development;
- **Diversity of uses** – an appropriate mix of uses can lead to internalization of trips and trip-linking within a project; and
- **Design of project** – a walkable, pedestrian- and bicycle-oriented circulation system can help to reduce automobile dependence within a project site.

These factors were applied to the Proposed Project, as described in Chapter 1. A summary of the methodology, the rationale for its use, and the resulting traffic generation forecasts follows. A detailed discussion is provided in Appendix M1.
3.1.1.1 Trip Generation Methodology

The methods commonly used for forecasting trip generation of projects in San Francisco are based on person-trip generation rates, trip distribution information, and mode split data described in the SF Guidelines. These data are based on a number of detailed travel behavior surveys conducted within San Francisco. The data in the SF Guidelines are generally accepted as more appropriate than conventional methods for use on smaller projects in the complex environs of San Francisco because of the relatively unique mix of uses, density, availability of transit, and cost of parking commonly found in San Francisco. However, the methods described in the SF Guidelines cannot be directly applied at the Islands because of its unique location and because the Proposed Project is expected to fundamentally change the character of the island, limiting the usefulness of any information about existing uses at the island.

Similarly, standard vehicle-traffic generation rates, such as those provided by ITE Trip Generation, 7th Edition, 2003, would not be suitable for the Islands, unless appropriate adjustments were made to account for the project size, mix, and availability of transit. Therefore, a state-of-the-practice trip generation forecasting method, originally developed by Fehr & Peers and others for the US Environmental Protection Agency (“EPA”) that has been endorsed for use in project-specific and planning-level analyses by a number of jurisdictions, including the Caltrans, was used in this analysis. This method is currently being used for other projects in San Francisco (Candlestick Point/Hunters Point Shipyard EIR), Napa County (Napa Pipe Redevelopment EIR), and Brisbane (Brisbane Baylands Redevelopment EIR), among others. This method is commonly referred to as the “4D” method, and generally accounts for trip generation sensitivity to development scale, project density, diversity of uses, and project design.

A detailed description of how these factors can be used to adjust standard traffic generation rates was provided in a letter to the City of San Francisco Planning Department dated August 4, 2008 (see Appendix M1). That letter did not discuss in detail the application of the 4D method to the Proposed Project, but rather described the details of the methodology. In summary, the general concept behind the 4D method is that projects that deviate from a base case (in this case, ITE methods) with respect to the four bulleted variables above, exhibit different traffic generation patterns. Elasticities have been derived from travel behavior surveys from the Bay Area to help estimate how traffic generation changes as a function of changes in the 4D’s. Those elasticities are used to adjust the base case trip generation to account for the Proposed Project’s density, diversity, and pedestrian/bicycle friendliness (i.e., design) compared to typical suburban developments. The product is a percentage reduction in vehicular traffic generation from the base case (i.e., ITE Trip Generation).

Ultimately, application of the 4D method has been demonstrated to forecast trip generation more accurately and precisely than the methods provided in the ITE Trip Generation manual, which are only sensitive to development scale. A detailed discussion related to the application of the 4D trip generation methods for the Proposed Project is included in a letter to the City of San Francisco dated December 8, 2008 (see Appendix M2)15. The results of the analysis are summarized below.

3.1.1.2 Defining the Base Case

The first step in estimating trip generation is to define the base case. In this case, the ITE Trip Generation methodology was selected as the base case. The project’s base case person-trip generation was estimated using the ITE Trip Generation rates (assuming average vehicle occupancy of 1.6 persons per auto, per the 1995 National Personal Transportation Survey). This is the trip generation the project would experience were it located in a typical suburban setting and development pattern. The following

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15. The December 8, 2008 letter is based on a slightly different project description. The same methods described in that letter applied to the current Proposed Project are described in this report.
adjustments were made to the base case trip generation forecasts to ensure that the project’s traffic impact analysis is performed for a worst-case scenario.

First, the surveys used to develop the SF Guidelines methodology indicate that retail uses in San Francisco generate approximately 70 percent more weekday peak hour person-trips than the retail uses that make up the ITE trip generation rates for retail uses. This is likely due to the higher overall level of activity in an urban area like San Francisco and the generally higher land costs, which encourage more efficient use of space. Thus, retail in San Francisco generates more activity per square foot. The Proposed Project would include a mix of neighborhood-serving and regional retail. The neighborhood-serving retail (e.g., grocery store, coffee shop, dry cleaners, etc.) would primarily attract users from within the Islands, and would not likely generate as much activity as similar uses within mainland San Francisco. The more regionally-focused retail proposed for the Islands may behave more like a typical San Francisco retail use. Therefore, the base case trip generation rates for regional retail were increased by 70 percent to match the SF Guidelines rates, and the neighborhood-serving retail rates were not adjusted. The net effect is an approximately 40 percent increase to trip generation rates over the base ITE rates for all retail uses proposed on the Islands.

Further, based on the Transfer and Reuse of Naval Station Treasure Island Final EIR (San Francisco Planning Department, June 2006, State Clearinghouse #1996092073), and data used in other analyses in San Francisco, retail person-trip generation rates are approximately eight percent higher on weekends than on weekdays in San Francisco. Therefore, the base case Saturday trip generation rates for retail uses were increased an additional eight percent.

In addition, some of the land uses proposed by the project are not adequately described in the ITE Trip Generation manual for situations in San Francisco. For those uses, namely the athletic fields and the cultural center/museum, other methods and sources were used, as described below (see Appendix B for a summary of these sources).

3.1.1.2.1 Athletic Fields

Although ITE Trip Generation includes trip generation estimates for sports facilities, such as soccer fields; the rates in ITE do not necessarily reflect the high demand for these types of outdoor facilities in San Francisco. Unlike typical suburban areas, space for athletic fields in San Francisco is at a premium and existing facilities typically experience much higher usage than their suburban counterparts.

As noted in Chapter 1, during weekday AM and PM peak hours, the athletic fields will be open for use with reservations only, but no scheduled events will occur (the proposal calls for scheduled events to occur no earlier than 6:30 PM on weeknights). This is similar to the operation of athletic fields at other large parks and recreation areas. The portion of total open space dedicated to formal sports fields (40 acres out of 300 acres, or 15 percent) is similar to other large open spaces areas. Therefore, activities that would occur before the scheduled events (maintenance, practice, etc.) are within the typical usage of ball fields at other large parks and therefore, included in the trip generation rates for the standard open space.

Scheduled events on weeknights would not begin until 6:30 PM (30 minutes after the end of the PM peak hour). This assumption has been substantiated by data collected by the Office of Economic and Workforce Development with respect to the operational characteristics of four similar facilities in the Bay Area. However, to ensure a conservative analysis, this study assumes some additional traffic associated with organized games that may occur during the PM peak hour. Below is a summary of assumptions developed for similar facilities throughout the Bay Area, by facility type, for their peak hours of use.
Soccer

- 16 players per team (includes coaches and managers)
- 32 players per field, 1 spectator per player
- One game ends and one game begins at each field during its peak hour of usage
- Peak hour person-trip rate per field: 128 total person-trips (64 inbound (arriving at the fields), 64 outbound (leaving the fields))

Baseball/Softball

- 16 players per team (includes coaches and managers)
- 32 players per field, 1 spectator per player
- One game ends and one game begins at each field during its peak hour of usage
- Peak hour person-trip rate per field: 128 total person-trips (64 inbound, 64 outbound)

Volleyball Courts

- 14 players per team (includes coaches and managers)
- 28 players per field, 1 spectator per player
- One game ends and one game begins at each court during its peak hour of usage
- Peak hour person-trip rate per court: 112 total person-trips (56 inbound, 56 outbound)

Batting Cages

- 1 player and 1 spectator/coach per cage
- One user arrives and leaves each cage during its peak hour of usage
- Peak hour person-trip rate per cage: 4 person-trips per cage (2 inbound, 2 outbound)
Table 16 presents the peak hour person-trip generation of each facility type, based on the number of facilities assumed in the analysis.16

<table>
<thead>
<tr>
<th>Facility</th>
<th>Trips per Facility</th>
<th>Number of Facilities</th>
<th>Person-Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Inbound</td>
</tr>
<tr>
<td>Soccer Fields</td>
<td>128</td>
<td>6</td>
<td>384</td>
</tr>
<tr>
<td>Baseball Fields</td>
<td>128</td>
<td>4</td>
<td>256</td>
</tr>
<tr>
<td>Batting Cages</td>
<td>4</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Softball Fields</td>
<td>128</td>
<td>6</td>
<td>384</td>
</tr>
<tr>
<td>Volleyball Courts</td>
<td>112</td>
<td>6</td>
<td>336</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,376</strong></td>
<td></td>
<td><strong>1,376</strong></td>
</tr>
</tbody>
</table>

Source: Fehr & Peers, 2009

According to the San Francisco Department Recreation and Park Department’s website (www.parks.sfgov.org), which describes the San Francisco Recreation League schedules, there are certain months of the year during which all of these sports are played, so as a worst-case scenario, it is feasible that during busy months, all facility types could be in use simultaneously.

As noted earlier, it is not likely that these facilities will have much impact during weekday PM peak hours. However, to be conservative, the analysis assumes that 50 percent of all facilities would have a game that begins at such time as players arrive within the peak hour. This would result in the assumption that the facilities would generate 688 inbound person-trips and no outbound person trips during the weekday PM peak hour. Average vehicle occupancy of two persons per vehicle was assumed for athletic field trips.

For Saturday peak hour conditions, while it may be reasonable that all fields are in use simultaneously, it is not likely that each field would turn over within the peak hour. In order for that to happen, each game would have to last less than one hour, or each game on each field would have to have scheduled start times at approximately the same time, which is unlikely. The Saturday peak hour trip generation forecasts assume that all fields are in use simultaneously, but that only 50 percent of the fields turn over during the peak hour of analysis.

16. The number of each type of field has not been determined; however, the assumptions outlined in Table 14 represent a reasonable estimate of potential allocation of athletic field space.
3.1.1.2.2 Cultural Park

Although the precise description of the cultural park has not been defined, this analysis assumes a 75,000 square foot museum would be constructed on Treasure Island. There are no museum trip generation rates in the SF Guidelines or ITE Trip Generation. Therefore, this analysis uses museum trip generation rates developed by the New York City Department of City Planning for purposes of assessing the impacts of expanding the New York Museum of Modern Art (New York MoMA) in 2000. That study found that the Museum had the following trip generation characteristics:

- **Daily Person Trip Generation Rates:**
  - 27.4 person-trips/1,000 square feet (Weekday)
  - 20.6 person-trips/1,000 square feet (Weekend)\(^{18}\)
- **Percent of Daily Trips Occurring in Peak Hour:**
  - 0.0 % (Weekday AM Peak Hour)
  - 14.4 % (Weekday PM Peak Hour)
  - 16.8 % (Weekend Peak Hour)
- **Inbound/Outbound Split:**
  - 0%/0% (Weekday AM Peak Hour)
  - 52%/48% (Weekday PM Peak Hour)
  - 36%/64% (Weekend Peak Hour)
- **Auto Occupancy:** 2.34

Although the New York MoMA likely generates more trips on a per square foot basis than any museum that may be constructed at Treasure Island, the museum overall generates a relatively small number of peak hour trips compared to the overall project, and therefore, the use of conservatively-high trip generation rates does not have a substantial effect on the outcome of the person-trip generation forecasts. Unique mode share, auto occupancy, and internalization factors were applied to the base person-trip generation rates to reflect the unique features of the Islands.

With these adjustments to the athletic field and cultural uses, the number of peak hour person-trips the Proposed Project would generate was calculated for the weekday daily, and AM and PM peak hours and for the Saturday peak hour. This represents the base case. A summary table of this interim step is provided in **Appendix D**.

17. A number of sources were consulted, including both local and national surveys to identify the most appropriate rate. Local sources reviewed included the deYoung Museum and the Exploratorium. The future Treasure Island museum is likely to have less overall activity than both New York MoMA and the two San Francisco examples because it will be smaller and likely less of a major tourist destination. Based on discussions with the project sponsor regarding likely uses, conversations with the Planning Department, and engineering judgment, the New York MoMA rates were used because, although they are lower than the two local data sources, they still likely represent a conservatively high analysis but are closer to what is expected at Treasure Island.

18. The Sunday trip generation rate identified in the New York City study was applied to the Saturday conditions for this study, as they both likely represent similar conditions.
3.1.1.3 Application of 4D Adjustments

Once the base case is defined, the next step in the 4D process is to define the application area (i.e., the catchment area for trip internalization and reduction). For purposes of this analysis, it was assumed the proposed development would be contained within a single catchment area. This means that trips from anywhere within the development to anywhere else in the development could be internalized and that all uses are within a reasonable walking or cycling distance of other uses.

The third step in the 4D process is to determine the characteristics of the Proposed Project, as they relate to the 4D variables described above. This process was done by comparing the project with typical suburban development patterns. The Proposed Project’s percentage differences from typical suburban developments were applied against elasticities developed from travel behavior surveys conducted by the Contra Costa Transportation Authority (CCTA). The resulting output from the 4D analysis tool is provided in Appendix M1.

As noted earlier, one of the factors affecting traffic generation in the 4D method is the diversity of uses. A mix of uses within a single development can reduce vehicle traffic generation in a number of ways, such as accommodating shopping trips, dining out, and allowing walking or cycling to work within a mixed-use development. However, there is some question as to whether the residents expected to live at the Islands would be a good match for the jobs expected, which are likely to be primarily retail and service jobs.

To determine the effect that the jobs-housing mix has on the final trip reduction predicted by the 4D method, a sensitivity test was conducted. Reducing the elasticity for home-based work trips associated with the jobs/household mix to zero affects the overall trip reduction in both the AM and PM peak hour analyses by seven percentage points. To ensure that the project’s traffic impact analysis is performed for a worst-case scenario, the trip generation analysis was based on the scenario in which the jobs/housing mix has no effect on home-based work trips (i.e., the analysis assumes that nobody who lives on the island would also work on the island).

The internalization percentages were calculated first for the Reduced Development Alternative discussed later in this report, which includes 6,000 dwelling units instead of 8,000 and does not include 100,000 square feet of office space. The resulting analysis showed that the Reduced Development Alternative would experience an external trip generation reduction of 38 percent in the AM peak hour and 41 percent in the PM peak hour, compared to the base case (typical suburban development), due to trip internalization and trip linking. The same internalization percentages developed for the Reduced Development Alternative were applied to the Proposed Project. However, the portion of proposed retail space that was assumed to be local-serving (and therefore not subject to the 70 percent increase above ITE rates described earlier), was assumed to increase in proportion to the residential development. Thus, although the amount of retail space proposed is identical, the number of external (i.e., from off-island) retail trips per square foot was forecasted to be lower under the Proposed Project than under the Reduced Development Alternative.

The internalization forecasts described above were based on information specific to typical weekday travel patterns and traveler responses. To determine how the situation may change on a typical Saturday peak hour, travel surveys contained in the Bay Area Travel Survey (“BATS2000”) were reviewed for

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19. If the 4D model were applied to the Proposed Project (8,000 dwelling units), higher internalization percentages would be predicted than those predicted for the Reduced Development Alternative (6,000 dwelling units). The increase in internal trips projected for the Proposed Project compared to the Reduced Development Alternative would more than offset the increased vehicle traffic generation associated with the additional 2,000 dwelling units in the Proposed Project compared to the Reduced Development Alternative. Thus, there is some evidence that the Proposed Project may actually generate fewer external trips than the Reduced Development Alternative.

20. BATS 2000 was a study conducted by the MTC to evaluate typical travel characteristics in the Bay Area, based on a number of other variables including proximity to transit.
three other San Francisco neighborhoods of similar size to the proposed development. Specifically, the Marina, the Inner Sunset, and South of Market were evaluated. While none of these neighborhoods matches the proposed development perfectly, they do form a cross section of neighborhood types from which meaningful data can be extracted. From this data, the percentage of trips typically internal to neighborhood census tracts on a weekend day versus a typical weekday can be determined.

As shown in Table 17 neighborhood trip internalization tends to increase slightly on the weekends in residential neighborhoods (i.e., jobs/housing mix less than 1.0) but decreases on weekends in SoMa, which has significantly more jobs than residential units.

### TABLE 17 – SAN FRANCISCO NEIGHBORHOOD TRIP-MAKING PATTERNS

<table>
<thead>
<tr>
<th>Neighborhood</th>
<th>Jobs/Housing Mix</th>
<th>Weekday Internal</th>
<th>Weekday External</th>
<th>Weekend Internal</th>
<th>Weekend External</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marina</td>
<td>0.51</td>
<td>33%</td>
<td>67%</td>
<td>36%</td>
<td>64%</td>
</tr>
<tr>
<td>Inner Sunset</td>
<td>0.36</td>
<td>34%</td>
<td>66%</td>
<td>46%</td>
<td>54%</td>
</tr>
<tr>
<td>SoMa</td>
<td>8.34</td>
<td>18%</td>
<td>82%</td>
<td>12%</td>
<td>88%</td>
</tr>
<tr>
<td>Treasure Island</td>
<td>0.26</td>
<td>41%</td>
<td>59%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. Each neighborhood contains between 6,600-8,300 dwelling units and 12,600-14,300 residents, similar to the Proposed Project.
2. Generally south of Lombard and west of Fillmore – Census Tracts 126, 127, & 128.
3. Excludes UCSF Parnassus – Census Tracts 302.01, 302.02, & 303.01.
4. South of Mission Street – Census Tracts 178, 179.01, & 180.
5. Estimated Jobs-to-Housing ratio. PM peak hour trip internalization rates.

There are several reasons why residential neighborhoods in San Francisco might have higher trip internalization on the weekends than during weekdays. Both the Inner Sunset and Marina have strong neighborhood commercial corridors, as well as relatively easy access to recreation areas. The neighborhoods also have good access to transit and regional roadway facilities that make it easier for residents to make external trips from these neighborhoods. The jobs/housing mix on the Islands is expected to be much more similar to the Inner Sunset and Marina than Soma; therefore, the Proposed Project is likely to have trip characteristics similar to these neighborhoods in San Francisco, at least with respect to travel behavior on weekends versus weekdays.

Of the neighborhoods examined, the Marina experienced the smallest change to internalization between weekday and Saturday conditions. The Marina’s internalization rate increases by three percentage points, or nine percent of total trips, on Saturday. This ratio was applied to the project PM peak hour trip reduction factor of 41 percent. This suggests a 45 percent internalization rate for Saturday peak hour trips for the Islands. Therefore, the resulting percentage reduction to external trip generation is:

- 38% reduction of weekday AM peak hour trips;
- 41% reduction of weekday PM peak hour trips; and
- 45% reduction of Saturday peak hour trips.

As a point of comparison, Table 17 also shows that weekday neighborhood trip internalization rates in two similar San Francisco neighborhoods are slightly lower than what was estimated for the Islands. This is not surprising given the Islands’ more geographically isolated location and mix of uses, which are likely to result in higher internalization. Table 18 presents the project’s person-trip generation by land use for
TABLE 18 – NET PERSON-TRIP GENERATION BY LAND USE

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Size</th>
<th>Person-Trip Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AM Peak Hour</td>
<td>PM Peak Hour</td>
</tr>
<tr>
<td>Residential</td>
<td>8,000 d.u.</td>
<td>5,008</td>
</tr>
<tr>
<td>Hotel (TI)</td>
<td>450 Rooms</td>
<td>890</td>
</tr>
<tr>
<td>Hotel (Yerba Buena Island)</td>
<td>50 Rooms</td>
<td>27</td>
</tr>
<tr>
<td>Retail</td>
<td>207,000 sq ft</td>
<td>995</td>
</tr>
<tr>
<td>Open Space (Athletic Fields)</td>
<td>40 acres</td>
<td>0</td>
</tr>
<tr>
<td>Open Space (Other)</td>
<td>260 acres</td>
<td>115</td>
</tr>
<tr>
<td>Marina</td>
<td>400 slips¹</td>
<td>38</td>
</tr>
<tr>
<td>Flex</td>
<td>202,000 sq ft²</td>
<td>113</td>
</tr>
<tr>
<td>Office</td>
<td>100,000 sq ft</td>
<td>285</td>
</tr>
<tr>
<td>Police/Fire</td>
<td>30,000 sq ft</td>
<td>285</td>
</tr>
<tr>
<td>School</td>
<td>105,000 sq ft</td>
<td>789</td>
</tr>
<tr>
<td>Community Center</td>
<td>48,500 sq ft</td>
<td>126</td>
</tr>
<tr>
<td>Cultural Park/Museum</td>
<td>75,000 sq ft</td>
<td>0</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>8,671</strong></td>
<td><strong>12,422</strong></td>
</tr>
<tr>
<td>Internal/Linked Trip Reduction</td>
<td>3,296 (38%)</td>
<td>4,850 (39%)⁵</td>
</tr>
<tr>
<td><strong>Total Net External Person-Trip Generation</strong></td>
<td><strong>5,375</strong></td>
<td><strong>7,572</strong></td>
</tr>
</tbody>
</table>

Notes:
1. The marina use has already been approved and is not part of the Proposed Project (although the construction of landside services associated with the Marina are included). The trip generation associated with the marina is presented for informational purposes because it will be used to assess cumulative conditions.
2. Includes the non-retail portion of the adaptive reuse: 22 ksf food production/industrial/manufacturing, 150 ksf entertainment, and 30 ksf community/office uses.
3. Although a 41% reduction was taken for most of the project in the PM peak hour, the cultural park was removed from the calculation, and only a 10% reduction for internal trips was assumed for that use. The result is an effective 39% reduction. Similarly, for the Saturday peak hour, including the cultural center/museum resulted in an effective 43% reduction.

Source: Fehr & Peers, 2009
3.1.2 Mode Split/Transit Usage (Proposed Project, Expanded Transit)

As envisioned in the 2006 Transportation Plan, the Proposed Project would provide a high level of transit service during peak hours, including:

- New ferry service to San Francisco every 15 minutes;
- New bus service to Downtown Oakland every 10 minutes;
- Modification of the existing bus service to the Transbay Terminal in San Francisco (Muni Route 108-Treasure Island) to increase peak hour frequency from every 15 minutes to every 7 minutes in the AM peak hour and 5 minutes in the PM peak hour. The vehicle type would be switched from the current standard 40-foot coach to a 60-foot articulated bus. Further, the 108-Treasure Island would not circulate around the entirety of Treasure Island as is the case today; rather, the 108-Treasure Island would circulate around the southwest corner, as depicted on Figure 6, page 14; and
- New bus service to another location in San Francisco every 12 minutes (for purposes of this analysis, location assumed to be the San Francisco Civic Center area). To be conservative, this study assumes this new route would operate as a standard 40-foot coach.

Assuming a bus capacity of 63 passengers for a Muni standard 40-foot coach, a capacity of 94 passengers on a 60-foot articulated bus, a capacity of 54 passengers for AC Transit service to Oakland, and a ferry capacity of 699 passengers, the total transit peak hour capacity in a single direction (on or off of the island) would be 4,241 passengers in the AM peak hour, including 2,796 passengers on ferries and 1,445 passengers on buses, and would be 4,563 passengers in the PM peak hour, including 2,796 passengers on ferries and 1,767 passengers on buses. For the purpose of this analysis, Saturday peak hour capacity was assumed to be the same as the PM peak hour (4,563 transit passengers) under the Expanded Transit Scenario.

Transit usage associated with development on the Islands is estimated based on data presented in the BATS2000 study. That report describes a number of characteristics, including residential proximity to transit service that influence transit ridership in the Bay Area.

**Weekday Peak Hours**: According to the BATS2000 study, 34 percent of work trips and 17 percent of all non-work trips made by San Francisco residents living within ½ mile of a rail or ferry terminal during weekday peak hours are via transit. Further, the study notes that of work-related transit trips made by San Francisco residents living within ½ mile of a rail or ferry terminal, approximately 50 percent are made by ferry/rail and the remaining 50 percent are made by bus. Non-work trips are more likely to be made by bus, with 65 percent of transit trips made by bus and 35 percent made by rail/ferry. The transit mode shares for weekday work and non-work trips from the BATS2000 study were applied to the Proposed Project to estimate bus and ferry ridership.

**Saturday Peak Hour**: Unsurprisingly, there is much more robust data regarding weekday AM and PM peak hour transit ridership in San Francisco and the greater San Francisco Bay Area than is available.

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21. The frequencies used in this study for the proposed transit service have changed since the 2006 Transportation Plan, although the general nature of the service is consistent.

22. These observed percentages are of all trips, including walk and bicycle trips which are analogous to the internal trips described earlier for Treasure Island. Thus, although the transit mode shares taken as a percentage of only external trips are higher than 34 and 17 percent for work and non-work trips, respectively, application of these percentages to all trips generated by the Treasure Island project is consistent with the findings of the BATS Study. If taken as a percentage of external trips only, transit is expected to represent approximately 37 percent of all person-trips generated by the Proposed Project.
regarding weekend peak periods. Still, some data is available. According to the BATS2000 study, the overall transit mode share in San Francisco for Saturday work trips drops by 18 percent. For Saturday non-work trips, the transit mode share decreases by 24 percent. An 18 percent and 24 percent reduction was applied to the previously-described transit mode shares for weekday peak hour work and non-work trips, respectively, to estimate Saturday peak hour transit mode shares. The same split was assumed between bus and ferry on Saturday peak hour as the weekday peak hour. The reductions in transit mode share for Saturday conditions were met with corresponding increases in auto mode share.

Given the disincentives to driving and incentives for transit use proposed by the project, it is reasonable to expect the Proposed Project to have a slightly higher transit mode share than the average San Francisco development described in the BATS2000 data. However, to be conservative, and because data on the effectiveness of such disincentives is limited, the Proposed Project was treated as a typical San Francisco project (i.e., no additional transit ridership was assumed associated with the disincentives to driving, with the exception of congestion pricing and ramp metering delays, which is described later in this chapter).

The portion of work vs. non-work trips associated with each land use was estimated from rates included in the SF Guidelines (for weekday peak hour trips) and the Transfer and Reuse of Naval Station Treasure Island Final EIR (for Saturday peak hour trips; San Francisco Planning Department, June 2006, State Clearinghouse #1996092073). The transit mode share percentages were applied to the base case person trip generation forecasts based on the total number of person-trips generated (including both internal and external trips) and the relative portions of work and non-work trips. Since the transit percentages from BATS2000 were percentages of all trips (including internal walk and bike trips) using transit, the application of the transit mode share percentage to the total number of person-trips generated by the project is appropriate.

The resulting person-trip generation by mode for the Expanded Transit Scenario is summarized in Table 19, below. These forecasts do not account for the effects of congestion pricing and/or the effects of ramp metering delays, which are described later.

<table>
<thead>
<tr>
<th>Peak Hour</th>
<th>Person-Trip Generation1</th>
<th>Vehicle-Trips2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ferry</td>
<td>Bus</td>
</tr>
<tr>
<td>AM Peak Hour</td>
<td>930</td>
<td>1,181</td>
</tr>
<tr>
<td>PM Peak Hour</td>
<td>1,210</td>
<td>1,625</td>
</tr>
<tr>
<td>Saturday Peak Hour</td>
<td>718</td>
<td>1,179</td>
</tr>
</tbody>
</table>

Notes:
1. This analysis assumes no external pedestrian or bicycle trips onto or off of the Islands. With construction of the new eastern span bicycle/pedestrian path, it is possible that some bicycle trips may occur. However, this number is expected to be very minor and not likely to affect the overall conclusions of this study. Further, the potential new bicycle facility on the western span is still in the conceptual discussion phases, and is not assumed to be in place in this analysis.
2. Vehicle-trips include passenger vehicles and vans. These estimates do not yet account for ramp metering and/or congestion pricing. Assumes most vehicle trips have auto occupancy of 2.0 persons per vehicle (per SF Guidelines for trips to/from the East Bay). Trips associated with cultural use assumed to be at 2.3 persons per vehicle (per trip surveys from the NY MoMA expansion).
3. Includes internal bicycle and pedestrian trips, and a likely, relatively small number of internal auto trips (e.g., between Yerba Buena Island and Treasure Island).

Source: Fehr & Peers 2009
3.1.3 Trip Distribution (Proposed Project, Expanded Transit)

The next component of this analysis is an estimation of the geographic distribution of project-generated trips. The Proposed Project trip distribution was tested using three different travel demand forecasting models: the San Francisco Chained Activity Modeling Process (“CHAMP”) model, maintained by the SFCTA; the Alameda County Congestion Management Agency (“ACCMA”) model; and the Metropolitan Transportation Commission (“MTC”) 2035 Baycast model.

The SF CHAMP model, which has a concentration of detail within San Francisco, tends to predict a higher amount of traffic from the Islands would be destined for San Francisco than the ACCMA model. Similarly, the ACCMA model, which has a higher amount of detail in the East Bay, tends to predict a higher amount of project-generated traffic would have origins and destinations in the East Bay. Because having a higher amount of detail in a particular geographic region of a model can lead to over-prediction of traffic in that area, it is likely that the SF CHAMP and the ACCMA models each over-predict traffic within their specific focal regions.

Table 20, below, provides a summary of geographic distribution of external project trips, based on an average of the trip distributions predicted by the three models. The average trip distribution between the SF CHAMP, ACCMA, and MTC models corrects for over-prediction of trips to either San Francisco or the East Bay. The percentages shown are the aggregated trip distribution percentages for all trip types (work and non-work) and modes (transit and auto). Figure 19 on page 76 illustrates this information. The percent of traffic distributed to each Superdistrict within San Francisco was based on the SF CHAMP model, since that model would more accurately distribute traffic within the City.

<table>
<thead>
<tr>
<th>Place of Trip Origin/Destination</th>
<th>San Francisco</th>
<th>East Bay</th>
<th>North Bay</th>
<th>South Bay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>64%</td>
<td>35%</td>
<td>9%</td>
<td>18%</td>
</tr>
<tr>
<td>Average Model Trip Distribution</td>
<td></td>
<td></td>
<td>21%</td>
<td>3%</td>
</tr>
</tbody>
</table>

Note: The geographic distribution shown in the table is for external project trips.
Source: Fehr & Peers, SFCTA, ACCMA, and MTC, 2009
LEGEND:

- South Bay
- East Bay
- North Bay
- San Francisco
- Major Freeway


Treasure Island and Yerba Buena Island Redevelopment Plan TIS

EXTERNAL TRIP DISTRIBUTION

FIGURE 19

June 2010
SF07-0340\graphics\TIS\0340-19

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3.1.4 Vehicle Trip Assignment (Proposed Project, Expanded Transit)

The external vehicle trips generated by the project were assigned to the roadway system based on the directions of approach and departure discussed above. However, two additional factors are expected to affect the final peak hour mode share and resulting trip assignment – ramp metering and congestion pricing. As discussed earlier, a newly-created transportation management agency, TITMA, would administer a variable congestion fee to residents of the Islands for accessing the SFOBB. In addition, as part of the proposed Yerba Buena Island ramps improvement project, Caltrans would install operational ramp metering lights. Both ramp metering and congestion pricing on the Yerba Buena Island ramps would reduce the attractiveness of driving to and from the Islands. This section describes the methodology and assumptions used to forecast modal shifts associated with implementing congestion pricing and ramp metering on the Islands.

3.1.4.1 Congestion Pricing (Proposed Project, Expanded Transit)

The Project proposes to impart a variable congestion fee only on residents of the Islands. Visitor trips to the island would be exempt, but charges for visitor parking would serve as a possible further disincentive to travel to the Islands by private automobile. The congestion pricing analysis assumes that the fee would apply to residential vehicle trips to and from the Island during the weekday commute hours of 6:00 to 9:00 AM and from 4:00 to 7:00 PM. It further assumes that the fee would be the same in both directions of travel (i.e., entering and leaving the Island, and for eastbound and westbound travel on the SFOBB). It is possible that a similar or a different fee would be charged during off-peak hours; however, the analysis in this report focuses on the peak hours since those represent the periods with the highest traffic volumes, and therefore, the greatest potential for project-related traffic impacts.

The analysis further assumes that vehicles with three or more persons (HOV 3+) would not be charged the fee. This is similar to the way in which HOVs with three or more persons are currently treated at the Bay Bridge toll plaza and is consistent with the State legislation that authorizes the TITMA to impose and administer congestion pricing. Since all Islands residents would be requested to register their vehicles in order to secure a parking space, the TITMA would be able to identify which vehicles entering and exiting the bridge are associated with island residents. Although the exact enforcement mechanisms have not yet been determined, possible options include outfitting residents’ vehicles with Radio Frequency Identification (RFID) devices or using photo license plate recognition systems.

It is critical to note that the congestion pricing scheme has been designed by the project sponsor to remain flexible with respect to time of day, amount charged, and directionality, among other factors, such that it can dynamically respond to changes in travel patterns over time. Similar facilities exist on corridors in San Diego (I-15) and Minneapolis (I-394), and around the entire downtown cordon in London. The effects on travel behavior of a $3.00, $5.00 and $9.00 congestion charge (levied each way) were analyzed; however, the assumptions used in this analysis represent a likely initial operating scheme of a $5.00 charge each way. For additional information on the sensitivity tests for the other fees, see Appendix D3.

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23. If the ramp reconstruction is not completed, this analysis assumes that some type of traffic signal metering control would be installed by TITMA to provide a similar metering effect limiting the number of vehicles that can leave the Islands and access the SFOBB.

24. Such technologies are currently in use in other cities such as in Stockholm, Sweden, and have been found to be an effective means of collecting fees.
3.1.4.1.1 Travel Demand and Travel Cost

The trip distribution for Proposed Project trips was identified between the Islands and seven geographic zones, as shown in Table 20 (page 75). For purposes of the congestion pricing analysis, the seven zones were subdivided into 19 smaller geographic zones and the Islands. These smaller zones generally coincide with zones developed for the regional travel demand forecasting model, the MTC Baycast model. The resulting person trips by auto between each of the 19 zones and the Islands were assigned to Single Occupant Vehicle (SOV), High-Occupancy Vehicle with 2 Occupants (HOV2), and High-Occupancy Vehicle with 3 or More Occupants (HOV3+) vehicle types based on the relative portion of person-trips via each “mode” projected by the SF CHAMP model. The result of this effort was trip tables for person-trips between the Islands and each of the 19 zones, broken down by work- and non-work trips, trips made by residents and non-residents of the Islands, and by mode, including transit modes and auto mode (SOV, HOV2, or HOV3+). These trip tables reflect conditions prior to implementation of congestion pricing or ramp metering.

Travelers’ mode choice is influenced by a number of factors, including travel times, convenience, out-of-pocket costs, comfort, and other characteristics. A person’s perception of these factors relative to various modal choices is different, depending on the specific origin and destination of the trip. In the context of this analysis, there are two primary types of costs: Direct Costs, or monetary costs, and Indirect Costs, which are other disincentives to travel by a particular mode.

Direct Costs – Each trip between the 19 zones and the Islands has direct costs associated with using one of the modes of travel. Bus riders and ferry riders pay a fare to use the service. The ferry fare between Treasure Island and San Francisco is expected to be $3.50 per one-way trip. This fare is generally lower than existing nearby ferry routes, but the Treasure Island route is shorter and this level of fare was projected by the project sponsor to be adequate given other transit revenue sources such as congestion fees and parking revenues. The bus fares would vary by origin and destination (i.e., by transit provider). Transit fares between each of the 19 zones and Treasure Island were calculated using the 511.org website to identify the quickest transit route and the associated fares. Where new service would be provided by the project (new bus service to Civic Center and the East Bay and new ferry service to San Francisco), travel times were estimated based on auto travel times between the points (for buses) and engineering judgment. The point within each of the 19 zones used to determine transit travel times and fares was chosen to be generally near centrally located activity centers (e.g., commercial districts, etc.) within each zone. Transit fares were considered the only direct costs associated with transit.

Vehicle trips incur a wide range of costs, including gasoline and vehicle maintenance. Further, some trips pay parking costs and tolls for the Bay Bridge or the Golden Gate Bridge. Average parking costs by zone were obtained from the SF CHAMP model, and were included in this analysis only for auto trips between the Islands and San Francisco, Oakland, and Berkeley. Parking costs in other areas were considered negligible. The parking costs included in the analysis were split between the “origin trip” and the “destination trip.” For HOV trips, these costs were divided between the number of persons in the vehicle.

25. Because each of the households within Treasure Island would purchase a monthly prepaid transit voucher (approximately equal to the cost and function of an SF Muni monthly Fast Pass), the analysis estimated the portion of a resident’s monthly transit costs that would be covered by the prepaid voucher. Assuming an approximately $50 subsidy, which was slightly above the cost of a Fast Pass when the analysis was conducted and assuming 2 transit riders per household, the monthly prepaid amount comes to approximately $25/person. Given approximately 21 work days each month and assuming some weekend trips, the net prepaid amount per person would be approximately $1/day. The transit costs for each origin-destination pair were reduced by $1 to account for this. The actual benefit of the prepaid voucher to any individual person will depend on a number of variables, including the number of people per household, the distance of the trip, transit provider used, and others. However, the assumed average of $1/day in prepaid transit costs for people that do use the island’s transit service is a reasonable approximation of the effect the $50 monthly prepaid voucher per household would have on influencing traveler response to congestion pricing and ramp metering delays.
In general, the parking costs that were applied account for typical rates charged by parking operators, average duration of stay, and the percentage of drivers who pay for parking.

Based on empirical studies of drivers’ perceptions of gasoline and vehicle maintenance costs, a travel cost of $0.1943 per mile was used to account for vehicle maintenance costs and a gasoline cost of $3.20 per gallon. This cost was multiplied by the number of miles between the zones and the Islands. For example, the SOV travel cost between southern San Mateo County and the Islands averaged to 32.2 miles so the direct travel cost per person was estimated to be $6.26 (32.2 x $0.1943). For HOV 2, the cost per person-trip made by auto was split in half ($3.13).

**Indirect Costs** – The primary indirect travel cost included in this analysis is travel time. Door-to-door auto and transit travel times between each of the districts and the Islands were estimated for the AM and PM peak hours using the 511.org website. For example, the travel time from the Islands to San Francisco’s Financial District is 22 minutes by auto, 37 minutes by bus and estimated at 30 minutes by ferry during the AM peak hour. Each of the modes has multiple components to travel time. Auto trips include the drive time, parking time and walk time. Bus trips include walk time, time waiting at the bus stop, time spent on the bus and sometimes time spent transferring bus routes. The ferry travel times include on-board time, walk time, and time waiting for the ferry.

To compare the effects of both direct (monetary) and indirect (non-monetary) travel costs on mode choice, the indirect costs (travel times) between each of the 19 zones and the Islands were converted into a dollar value using empirically-derived perceived values of time. The SF CHAMP model contains a full set of value of time matrices that provided the starting point for this analysis. A literature review of recent pricing studies revealed that travelers value time differently depending upon the types of incentives and disincentives to travel and the modal options presented to them. For example, if the trip time is fixed, then the value of time is largely a function of household income and related variables.

Based on the SF CHAMP model and the literature review results, a value of time of $30 per hour for work trips and $20 per hour for non-work trips was derived. This means that non-work trips are more likely to change travel patterns due to congestion pricing because their travel time results in a lower cost and, therefore, the congestion price is a higher percentage of the total trip cost. These non-work vehicle trips are more likely to shift to HOV 3+, bus, or ferry than work vehicle trips.

The result of applying these values of time to the indirect costs of each mode was generalized travel costs (in terms of dollars) for each mode between each origin/destination and the Islands.

### 3.1.4.1.2 Elasticity

Another variable in congestion pricing analysis is elasticity. Price elasticity of demand is defined as the measure of responsiveness in the quantity demanded for a commodity as a result of change in price of the same commodity. In this case, the analysis involved calculating the percentage increase in travel cost for autos for an origin-destination pair when a congestion pricing fee is introduced. The increase in auto cost results in an estimated percent decrease in travel demand by auto. The Islands represent a unique scenario in that vehicle trips coming to or leaving the Islands during the AM and PM peak hours have no alternative routes. Therefore, any reduction in auto travel demand would translate into corresponding

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27. Although there are a number of other indirect travel costs that may influence travel behavior, such as relative comfort and convenience, they were assumed to be accounted for in the initial mode choice calculations, and were omitted from this analysis.
28. Sources included: MTC Model Documentation; *Bay Bridges Toll Sensitivity Analysis (Year 2005)*, MTC Memo from Chuck Purvis, March 26, 2002; *Travel Demand Models for the San Francisco Bay Area (Baycast 90)*, MTC, June 1997; and *Puget Sound Regional Council Regional Travel Demand Forecasting Model, Version 1.0a*, March 2008.
increases in demand for other modes. Thus, the decrease in auto person trips associated with the congestion fee was met with a corresponding increase to transit ridership. For simplicity and to provide a conservative peak hour analysis, it was assumed that trips would not shift between time periods in response to the fees.

Although data related to the specific effects of congestion pricing in the U.S. is limited, recent studies that have calculated the observed change in travel demand related to a percentage change in price (e.g., change in transit fare, parking cost, toll, etc) have indicated an elasticity value of -0.2 would be most appropriate for the analysis. For example, the total cost for an SOV trip to San Francisco could be equivalent to $20.00 based on travel time, travel costs (gas, vehicle maintenance, etc.), and parking costs. A congestion price of $5.00 would increase the total cost by 25%. This increase of 25% would be multiplied by the elasticity value of -0.2 for a 5% reduction in SOV demand.\footnote{The elasticity approach used what is termed a ‘shrinkage ratio’ method. The shrinkage ratio compares the change in demand (i.e., vehicle trips) to a change in price (i.e., traveler cost). The study also examined the use of a ‘log arc elasticity’ method, which was used in several other empirical pricing studies, and found that the two elasticity measures produced similar results for the small origin-destination samples tested (a close-in San Francisco district, an Oakland district, and a farther-out San Mateo District). As such, the shrinkage ratio method was determined adequate for this analysis. Elasticity sources included: Bay Bridges Toll Sensitivity Analysis (Year 2005), MTC Memo from Chuck Purvis, March 26, 2002; TCRP Report 95, Traveler Response to Transportation System Changes, TRB, Chapters 12-14, 2003-2004; Bus Fare Elasticities Dargay and Hanly, Report to the Department of Environment, Transport, and the Regions, United Kingdom, 2005; Online TDM Encyclopedia, Transportation Elasticities, Victoria Transportation Policy Institute, June 2, 2008; BTE Transport Elasticities Database Online (www.dynamic.dotrs.gov.au/bte/edb/index.cfm).}

The other methodology decision involved determining what components of cost to use as the base from which to pivot with the elasticity measures. In order to produce a complete picture of traveler costs, the base included out-of-pocket costs (e.g., vehicle operating cost, tolls, parking costs, and transit fares) and the value of time experienced by travelers. In many situations, the value of time exceeded the out-of-pocket costs, especially for longer trips. As the base cost increases, the percentage change in cost when adding the congestion price is lower; therefore, the change in modal shifts is lower. Initially, it could be speculated that the analysis overstates the base cost by including the value of time, since the elasticity values were largely derived from simple datasets involving changes in transit fares and changes in toll-road rates. If that were true, then the analysis would be understating the vehicle shift due to the congestion pricing.

In order to test this hypothesis, two situations were examined: (1) remove the value of time component from the base cost, and (2) remove value of time and vehicle operating cost from the base cost. As expected, when some cost components are removed from the base, the congestion pricing produces higher percentage reductions in vehicle trips. The largest effects of these changes in assumptions were felt for the origin-destination pairs that are furthest away from the Islands, because the value of time for those trips plays a larger role. However, the demand volumes for these zonal interchanges are very small, so the net effects on the Islands’ trips are small. As a result, all traveler costs were retained as part of the analysis to ensure that the resulting vehicle trip estimates were reasonably conservative.

The reduction in auto travel demand was translated into corresponding increases in demand for other modes based on the initial percentage distribution for HOV 3+, bus and ferry person trips obtained from the travel demand model and BATS2000 survey data. It is possible that instead of shifting from peak hour auto trips to peak hour transit trips, travelers may shift from peak hour auto trips to off-peak auto trips (a phenomenon commonly known as peak period spreading). However, analyzing a scenario in which all trips remain in the peak hour and assuming that trips shift from auto to transit ensures a worst-case analysis of the transit system is conducted and that the transit system is robust enough to handle potential demands.
3.1.4.1.3 Effects of Congestion Pricing

The methodology described above was applied to the initial vehicle trip generation estimates for the proposed development. While the TITMA will have the flexibility to adjust the congestion charge, this travel demand analysis assumes that the congestion fee would be $5.00 for each residential SOV or HOV2 entering or leaving the SFOBB during AM and PM peak hours.

As shown in Appendix D, under the Expanded Transit Scenario, the Proposed Project is expected to generate 914 residential vehicle trips in the AM peak hour (including 196 trips inbound to the Islands and 718 outbound trips from the Islands) and 994 peak hour trips in the PM peak hour (including 635 inbound and 360 outbound trips). The 914 AM peak hour resident vehicle trips will comprise 56 percent of the total of 1,632 vehicle trips traveling to and from the Island during the AM peak hour. The 995 residential trips in the PM peak hour comprise 43 percent of the 2,326 total PM peak hour vehicle trips to and from the Island. Table 21 shows the reduction in peak hour resident vehicle trips to and from the Islands with a $5.00 congestion fee during the weekday AM and PM peak hours.

As shown, the effects of congestion pricing at reducing overall peak hour trip generation are fairly modest, and consistent with other studies of roadway pricing in the Bay Area. A five dollar weekday peak period congestion fee would be expected to result in a reduction of 40 vehicle trips during the AM peak hour and 37 vehicle trips during the PM peak hour. It should be noted that although this represents a reasonable starting point, the TITMA has the authority and may elect to change the price charged and/or alter the plan to charge all Island trips, not just residential trips. However, the assumptions used in this analysis are reasonable projections of initial operating conditions.

<table>
<thead>
<tr>
<th>TABLE 21 – EFFECTS OF A $5.00 CONGESTION FEE (EXPANDED TRANSIT SCENARIO) ON RESIDENTIAL VEHICLE TRIPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Hour</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>AM Peak Hour</td>
</tr>
<tr>
<td>PM Peak Hour</td>
</tr>
</tbody>
</table>

Notes:
- Only Island residents traveling in SOV or HOV 2 subject to congestion pricing.
- A congestion fee was not assumed during the weekend.
Source: Fehr & Peers, 2009

3.1.4.2 Ramp Metering (Proposed Project, Expanded Transit)

As described in Chapter 1, Section 1.2.3, the SFCTA and Caltrans are currently preparing a Project Report and Environmental Document for the Yerba Buena Ramps Improvement Project that would replace the existing westbound on- and off-ramps located on the eastern side of Yerba Buena Island with new ramps that replicate the functional role of current ramps. All on-ramps, including the new westbound on-ramp, if approved and constructed, would provide ramp metering, which would restrict the volume of traffic that could enter the westbound SFOBB from the Islands.

Introduction of ramp metering may affect the Islands’ travel demand because it would increase the travel time (and effective cost) for vehicles leaving the Islands. While it is anticipated that only the residents of the Islands would pay the congestion fee, all SOV and HOV 2 trips would be required to wait for a ramp meter to enter the Bay Bridge during peak travel times. This analysis assumes HOV 3+ trips would be able to bypass the ramp meters, at least for the reconstructed westbound on-ramp.
3.1.4.2.1 Ramp Metering Analysis Methodology

Typically, ramp metering rates in the Bay Area range up to 900 vehicles per hour per lane. This analysis assumes a ramp metering rate of 550 vehicles per hour, based on initial discussions between Caltrans staff, the SFCTA, and the team of consultants working on the analysis and design of the ramps as part of a separate project. Although Caltrans retains the authority to modify ramp metering rates as appropriate, this is a reasonable forecast of a likely operating scenario. A microsimulation model was developed, using the VISSIM software, to estimate the average delay for vehicles entering the eastbound and westbound on-ramps, based on the forecasted travel demand and a ramp metering rate of 550 vehicles per hour. The VISSIM analysis indicated an average delay of less than four minutes per vehicle entering the SFOBB from the Islands in the AM and PM peak hours.

To calculate whether there would be a noticeable change in travel mode associated with meter delay, the same methodology was used as the congestion pricing analysis to forecast shifts from SOV and HOV 2 trips to HOV 3+, bus and ferry. The ramp meter delay was converted to a cost using the same value of time principles previously described. The value of time for a work trip used was $30.00 per hour and the value of time for non-work trips was $20.00 per hour, and the same elasticity value of -0.2 was used to calculate the shift from SOV and HOV 2 trips to alternative modes.

A decrease in trips leaving the Islands would also mean a decrease in trips returning to the Islands. For example, during the AM peak hour, if an SOV trip changes to a bus trip due to the ramp meter delay, when that person returns to the Island in the PM peak hour it would still be via bus and would result in one less vehicle trip inbound to the island, even though inbound traffic is not subject to the ramp metering. To estimate this effect, the “cost” of the ramp meter delay was divided between the trips leaving the Islands and the trips returning to the Islands. For work trips, 60 percent of the delay cost was assigned to the outbound trips and 40 percent to the return trips in the opposite peak hour. Non-work trips are generally of shorter duration and only a few trips would occur during both of the peak hours. Therefore, 90 percent of the delay cost was assigned to the outbound (metered) trip and only 10 percent to the return trip in the opposite peak hour. Using these conservative assumptions, the decrease in vehicle trips traveling to and from the Islands was calculated for AM and PM peak hours.

3.1.4.2.2 Effect of Ramp Metering

Using similar methods to the congestion pricing analysis, the effects of delay caused by ramp meters was evaluated. The analysis showed that under the Expanded Transit Scenario, queues associated with ramp metering would be relatively small. The added delay associated with the ramp metering queues was small in comparison with total trip travel times. Specifically, the implementation of ramp metering would result in a less than 0.5 percent reduction in vehicle trips predicted in the AM and PM peak hours. This small change is considered negligible and therefore, the analysis does not account for any mode shift associated with ramp metering. The detailed calculations are included in Appendix D3. A detailed description of the congestion pricing and ramp metering analysis was provided in a letter to the City of San Francisco Planning Department, dated April 28, 2009, and is included as Appendix D330.

30. The letter attached in Appendix N contains the ramp metering analysis that was conducted for the original project proposal, which is now referred to as the Reduced Development Alternative. Although the project description that was analyzed in the letter has changed slightly, the methodology to determine the effects of ramp metering and congestion pricing on trip making patterns to and from the Islands has been applied to the revised project descriptions for both the Proposed Project and the Reduced Development Alternative.
3.1.5 Net Trip Generation\(^{31}\) (Proposed Project, Expanded Transit)

The Proposed Project would remove some existing uses on the Islands; therefore, the trips associated with these uses were subtracted from the Proposed Project trips to determine the net-new trips traveling to and from the Islands. Table 22 summarizes the net increase in person trips by mode generated by the Proposed Project, accounting for some existing uses to be removed, (including 905 housing units and the majority of 2.5 million square feet of existing buildings on Treasure Island and 105 housing units and 10 non-residential structures on Yerba Buena Island). Table 23 summarizes the net-new vehicle trip generation by inbound and outbound trips and accounts for congestion pricing effects.

<table>
<thead>
<tr>
<th>TABLE 22 – PROPOSED PROJECT PERSON-TRIP GENERATION BY MODE (EXPANDED TRANSIT SCENARIO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak hour</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>AM Peak Hour</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>PM Peak Hour</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Saturday Peak Hour</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. This analysis assumes no external pedestrian or bicycle trips onto or off of the Islands. Although, with construction of the new eastern span bicycle/pedestrian path, it is possible that some bicycle trips may occur. However, this number is expected to be very minor and not likely to affect the overall conclusions of this study. Further, the potential new bicycle facility on the western span is still in the conceptual discussion phases, and is not assumed to be in place in this analysis.
2. Vehicle-trips include passenger vehicles and vans.
3. Includes internal bicycle and pedestrian trips, and a likely, relatively small number of internal auto trips (e.g., between Yerba Buena Island and Treasure Island).
4. Based on counts of peak hour vehicle traffic on the Islands (included in Appendix B) and assumes that the existing trip generation of the Job Corps center would remain the same.
5. Percentages shown are of total external trips.

Source: Fehr & Peers 2009

---

\(^{31}\) The information in this section accounts for reduction in trips due to removal of some of the existing uses as well as implementation of a $5 congestion fee.
TABLE 23 – PROPOSED PROJECT NET NEW VEHICLE TRIP GENERATION (EXPANDED TRANSIT SCENARIO)

<table>
<thead>
<tr>
<th>Use</th>
<th>AM Peak Hour</th>
<th>PM Peak Hour</th>
<th>Saturday Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In</td>
<td>Out</td>
<td>Total</td>
</tr>
<tr>
<td>Project Vehicle Trip Generation¹</td>
<td>650</td>
<td>982</td>
<td>1,632</td>
</tr>
<tr>
<td>Congestion Pricing Reduction²</td>
<td>-10</td>
<td>-30</td>
<td>-40</td>
</tr>
<tr>
<td>Existing Uses to be Removed³</td>
<td>-144</td>
<td>-220</td>
<td>-364</td>
</tr>
<tr>
<td>Net New Vehicle Trips</td>
<td>496</td>
<td>732</td>
<td>1,228</td>
</tr>
</tbody>
</table>

Notes:
1. Based on vehicle trip generation summarized in Table 22, less shifts in traffic associated with congestion pricing, as summarized in Table 21.
2. Assuming a $5.00 weekday peak hour congestion pricing fee, as summarized in Table 21.
3. Based on counts of peak hour vehicle traffic on the Islands (included in Appendix B) and assumes that the existing trip generation of the Job Corps center would remain the same.

Source: Fehr & Peers, 2009

3.1.6 Parking Demand (Proposed Project, Expanded Transit)

The method used for estimating parking demand for projects in San Francisco is based on person-trip generation rates and mode split data described in the SF Guidelines. However, as with the trip generation forecasts, the methods described in the SF Guidelines cannot be directly applied at the Islands because of its unique location and the unique TDM measures proposed by the project. In particular, the development is being planned in such a way that intends to minimize the number of vehicle trips as well as maximize the number of trips made to and from the island on transit. As was presented in previous sections, the design, density, and mix of uses proposed would reduce vehicle traffic generation by approximately 40 percent, and transit use would be over 35 percent during the weekday peak hours. In addition, the project proposes that parking for many of the uses that do not experience peak demands simultaneously could be shared, so that the number of parking spaces on the Islands is not over-supplied.

Since all of the land uses do not experience their peak parking demands simultaneously, it is not necessary to provide a parking supply equivalent to the sum of the individual peak demands for each use to accommodate the combined peak demand. The combined peak demand is developed with a shared parking analysis.

The first step to developing parking demand estimates was to determine the peak parking demand for each land use. Peak parking demands for each use were developed by applying the parking demand methodology contained within Appendix H of the SF Guidelines. The methodology in the SF Guidelines can be applied to commercial and residential projects throughout the City, and is based on the project’s total work and non-work auto-based person trips for both long-term and short-term parking.

The peak parking demand for each land use within each of the neighborhoods depicted on Figure 2 (page 6) was calculated based on the SF Guidelines methodology. For non-residential uses although the SF Guidelines provide generalized employment densities for different land uses (for use in calculating long-term employee parking for commercial uses), Economic & Planning Systems, Inc. has developed employment forecasts specific to the uses in the Proposed Project. Therefore, these project-specific estimates of employment density were used in the parking analysis.

Appendix J presents the estimated breakdown of project land uses by neighborhood, the peak parking demand for each land use type within each neighborhood, and the detailed calculation of the parking demand using SF Guidelines methodology.
Once the peak parking demands for each use are understood, the effects of shared parking can be evaluated. Shared parking analyses estimate the parking required to accommodate a mix of land uses. Shared Parking, published by the Urban Land Institute ("ULI"), provides the industry standard method of estimating the supply-reducing effects of shared parking. It provides the temporal distribution of parking demands (as a percentage of their peak demand) for various land uses for each hour of a typical day. The hourly parking demands for each land use were estimated by multiplying by the corresponding percentages listed in the ULI Shared Parking manual to the peak demand forecasts. The hourly demands of each use are summed together and the highest overall parking demand are identified as the combined peak demand.

Table 24 presents the peak parking demand for each neighborhood on the Islands based on the results of the shared parking analysis described above. The peak demands for residential parking are presented separately since those spaces will not be shared by other uses. The non-residential parking would be shared. Each neighborhood would experience its peak hour of parking demand at a different time. Table 24 also presents the peak parking demand for Treasure Island as a whole and for both Islands combined.

Note that since each neighborhood experiences its peak parking demand at a separate time, the peak parking demand for Treasure Island as a whole and for both Islands combined is not equal to the sum of the peak parking demands for each component neighborhood. For example, the Cityside neighborhood may experience its peak overnight when residential parking is nearly fully-occupied. The Island Core neighborhood may experience its peak in early evening when the retail activity is highest. The total peak parking demand for the two neighborhoods combined is not equal to the sum of the two peaks, since they occur at different times. When the Cityside neighborhood is at its peak, the Island Core neighborhood may have a parking surplus. This is the same general concept behind shared parking, however applied at a larger scale. Generally, though, it is preferable to examine parking demands on a neighborhood scale, rather than a larger scale such as all of Treasure Island or for both Islands combined, in order to better capture the localized effects of parking demand. Information related to Treasure Island as a whole is provided for informational purposes only.

### Table 24 – Shared Parking Analysis (Expanded Transit Scenario)

<table>
<thead>
<tr>
<th>District</th>
<th>Peak Residential Parking Demand</th>
<th>Peak Non-Residential Shared Parking Demand</th>
<th>Total Peak Parking Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cityside</td>
<td>4,134</td>
<td>80</td>
<td>4,214</td>
</tr>
<tr>
<td>Eastside</td>
<td>2,032</td>
<td>42</td>
<td>2,074</td>
</tr>
<tr>
<td>Island Core</td>
<td>3,727</td>
<td>1,376</td>
<td>5,113</td>
</tr>
<tr>
<td>Open Space</td>
<td>0</td>
<td>346</td>
<td>346</td>
</tr>
<tr>
<td><strong>Total Treasure Island</strong></td>
<td><strong>9,893</strong></td>
<td><strong>1,844</strong></td>
<td><strong>11,747</strong></td>
</tr>
<tr>
<td>Yerba Buena Island</td>
<td>259</td>
<td>55</td>
<td>314</td>
</tr>
<tr>
<td><strong>Total Proposed Project</strong></td>
<td><strong>10,152</strong></td>
<td><strong>2,428</strong></td>
<td><strong>12,061</strong></td>
</tr>
</tbody>
</table>

Notes:
1. Shared parking analysis based on peak parking demands calculated using SF Guidelines Parking Demand methodology and ULI Shared Parking methodology for temporal distribution of parking demand by land uses.
2. Excludes Yerba Buena Island. Peak demand for all of Treasure Island is not the same as the total peak parking demand for each neighborhood because the neighborhoods experience their peak demands at different times of the day.
3. Excludes parking demand associated with the Job Corps and Coast Guard.
4. The peak residential parking demand is presented separately because those spaces would not be shared by other uses.

Source: Fehr & Peers, 2010
3.1.7 Loading Demand (Proposed Project, Expanded Transit)

The SF Guidelines methodology for estimating commercial vehicle and freight loading/loading demand was used to calculate the demand associated with each analysis scenario. Daily truck trips generated per 1,000 square feet were calculated based on the rates contained in the SF Guidelines, then converted to hourly demand based on a 9-hour day and a 25-minute average stay. Average hourly demand was converted to a peak hour demand by applying a peaking factor, as specified in the SF Guidelines. Table 25 presents the number of trucks that would be generated by the project land uses on a daily basis, and the demand for loading dock spaces during the peak hour of loading activities. The loading demand calculations are also presented in Appendix K.

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Size</th>
<th>Daily Loading Demand Rates</th>
<th>Daily Truck Generation</th>
<th>Peak Hour Loading Dock Space Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office</td>
<td>130,000 square feet</td>
<td>0.21</td>
<td>27</td>
<td>2</td>
</tr>
<tr>
<td>Retail</td>
<td>320,000 square feet</td>
<td>0.22</td>
<td>70</td>
<td>5</td>
</tr>
<tr>
<td>Restaurant</td>
<td>37,000 square feet</td>
<td>3.60</td>
<td>133</td>
<td>8</td>
</tr>
<tr>
<td>Hotel</td>
<td>450,000 square feet (500 rooms)</td>
<td>0.09</td>
<td>41</td>
<td>2</td>
</tr>
<tr>
<td>Institutional</td>
<td>138,500 square feet</td>
<td>0.10</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>22,000 square feet</td>
<td>0.51</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>Residential</td>
<td>9,577,150 square feet (8,000 dwelling units)</td>
<td>0.03</td>
<td>287</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>583 Trucks</td>
<td>36 Spaces</td>
</tr>
</tbody>
</table>

Notes:
1. Includes 100,000 square feet of new office plus 30,000 square feet of community uses/offices planned in adaptive reuse of Building 1.
2. Includes all non-retail restaurant retail (170,000 square feet) and 150,000 square feet of entertainment uses proposed for adaptive reuse of Building 3.
3. Includes 13,500 square feet of community facilities, 35,000 square feet for Pier 1 Community Center, 15,000 square foot sailing center, and 75,000 square foot museum. Similar to parking analysis, loading demand for elementary school and police/fire facility will be provided separately within their facilities. Neither demand nor supply for elementary school and police/fire facility is included in this analysis.
4. Includes 22,000 square feet of food production space proposed in adaptive reuse of Building 2.
5. Per thousand square feet.
6. Typical peak hour of truck loading space demand occurs between 10 AM to 1 PM. Peak hour generation assumes deliveries occur between 8 AM and 5 PM, average park time of 25 minutes per vehicle, and that the peak hour deliveries occur at a 25 percent higher rate than other hours.

3.2 PROPOSED PROJECT WITH BASE TRANSIT

The previous section set forth analysis methodologies and presented the results of the Proposed Project with the Expanded Transit Scenario. This section analyzes the Proposed Project with only those elements of transit service for which full funding has been identified and assumes that none of the unfunded transit improvements are implemented. The Proposed Project only includes the funded elements of the transit service; therefore, it is also referred to as the “Base Transit Scenario.” The Base Transit Scenario would include the following service:

- Ferry service every 50 minutes (corresponding to a single ferry operating at one of the existing docks in San Francisco);
- Bus service to the Downtown Oakland would be the same as in the Expanded Transit Scenario, with service every 10 minutes;
- Muni Route 108-Treasure Island would operate at its current 15-minute headway, but would no longer circulate around most of Treasure Island. Instead, it would circulate only along the two-block loop described in Chapter 1;
- No new transit route between the Islands and San Francisco Civic Center would be provided; and
- On-island fleet shuttle service would be the same as under the Expanded Transit Scenario, with timed transfers at the Transit Hub.

3.2.1 Trip Generation (Proposed Project, Base Transit)

The number of person-trips expected to be generated by the Proposed Project is assumed to be the same, regardless of the level of transit service provided. The trip generation methodology can be found earlier in this chapter on pages 62 to 70. As shown in Table 18 on page 72, the Proposed Project is expected to generate 5,375 net external trips during the weekday AM peak hour, 7,423 net external trips during the weekday PM peak hour, and 7,562 net external trips during the Saturday peak hour.

3.2.2 Mode Split/Transit Usage (Proposed Project, Base Transit)

Although the person-trip generation remains constant, the percentage of those person-trips that occur by transit is likely to be lower under conditions with lower transit service. As described on page 70, under the Expanded Transit Scenario, the Proposed Project would have a total peak transit capacity of 4,241 passengers per hour in the AM peak hour and 4,563 passengers per hour in the PM peak hour. The transit service that is fully funded would have a capacity of 1,415 passengers per hour during the AM and PM peak periods and a capacity of 1,352 passengers during the Saturday peak period, a reduction from the Enhanced Scenario of 67 percent in the AM peak hour; 69 percent in the PM peak hour, and 70 percent in the Saturday peak hour.

Specifically, the Base Transit Scenario would reduce one-way ferry capacity by 70 percent, from 2,796 to 839 passengers per hour in both the AM and PM peak hours. Bus capacity would be reduced by 60 percent in the AM peak hour, from 1,445 to 576 passengers per hour for a total AM peak hour transit capacity of 1,415 passengers per hour. In the PM peak hour, bus capacity would be reduced by 67 percent, from 1,767 to 576 passengers per hour, for a total PM peak hour transit capacity of 1,415 passengers per hour.
Recent studies summarized by the Victoria Transport Policy Institute (VTPI) have shown a range of transit ridership elasticities with respect to service level of between 0.5 and 0.7.\textsuperscript{32} Using the 0.5 elasticity, a 70 percent reduction in the supply of ferry transit and a 60 percent reduction in the supply of bus transit provided to the Islands in the AM peak hour is expected to yield 35 and 30 percent reductions to ferry and bus ridership, respectively. Therefore, for the Base Transit Scenario, the ferry ridership is reduced by 35 percent and the bus ridership is reduced by 30 percent compared to the AM peak hour ridership projections for the Expanded Transit Scenario. Similarly, in the PM peak hour, a 70 percent reduction in the supply of ferry transit and a 67 percent reduction in the supply of bus transit provided to the Islands is expected to yield a 35 percent reduction to ferry ridership and a 34 percent reduction in bus ridership compared to the PM peak hour ridership projections for the Expanded Transit Scenario. During peak hours, the reduction in transit ridership associated with the Base Transit scenario is assumed to switch to automobile mode.

\subsection*{3.2.3 Trip Distribution (Proposed Project, Base Transit)}

The geographic distribution of project-generated trips would be the same under the Base Transit Scenario as under the Expanded Transit Scenario. The trip distribution for both scenarios is described in Table 20 on page 75 and illustrated on Figure 19 (page 76).

\subsection*{3.2.4 Vehicle Trip Assignment (Proposed Project, Base Transit)}

Similar to the Expanded Transit Scenario, the external vehicle trips generated by the project were assigned to the roadway system based on the directions of approach and departure discussed in the Trip Distribution section. The analysis of traffic impacts for the Base Transit Scenario also examined conditions with and without the proposed reconstruction of the westbound ramps on the east side of Yerba Buena Island.

The initial forecast of vehicle trip assignment does not include the effects of congestion pricing or ramp metering. Those effects are discussed in the next section.

\subsubsection*{3.2.4.1 Congestion Pricing (Proposed Project, Base Transit)}

The methodology used to assess the effects of congestion pricing was described earlier in this chapter, section 3.1.4 on page 73. This methodology was applied to the initial vehicle traffic generation estimates for the Base Transit Scenario. While the TITMA will have the flexibility to adjust the congestion charge, similar to the Expanded Transit scenario, the analysis of the Base Transit Scenario assumes the same $5.00 congestion fee would be applied to each residential vehicle entering or leaving the SFOBB during AM and PM peak hours. The resulting percentage shifts were nearly identical to those identified in Table 21 for the Expanded Transit Scenario. Specifically, under the Base Transit Scenario, implementation of congestion pricing in the manner described earlier would result in a reduction of just over four percent of AM peak hour vehicle trips and just fewer than four percent for PM peak hour vehicle trips.

\subsubsection*{3.2.4.2 Ramp Metering (Proposed Project, Base Transit)}

Similar to the Expanded Transit Scenario, the effects of ramp metering at reducing peak hour automobile traffic generation were determined to be negligible for the Base Transit Scenario.

\textsuperscript{32} http://www.vtpi.org/tranelas.pdf
3.2.5 Travel Demand Summary (Proposed Project, Base Transit)

Table 26, below, summarizes the resulting person-trip generation for the Proposed Project under the Base Transit Scenario by mode. Table 27 summarizes the vehicular traffic generation of the Proposed Project under the Base Transit Scenario, accounting for some existing uses to be removed.

### Table 26 – Proposed Project Person-Trip Generation by Mode (Base Transit Scenario)

<table>
<thead>
<tr>
<th>Peak Hour</th>
<th>Person-Trip Generation</th>
<th>Vehicle-Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>External</td>
<td>Internal</td>
</tr>
<tr>
<td></td>
<td>Ferry</td>
<td>Bus</td>
</tr>
<tr>
<td>AM Peak Hour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposed Project</td>
<td>605</td>
<td>721</td>
</tr>
<tr>
<td>Less Existing Uses to be Removed4</td>
<td>0</td>
<td>-142</td>
</tr>
<tr>
<td>Less Congestion Pricing Reduction</td>
<td>+34</td>
<td>+44</td>
</tr>
<tr>
<td>Net New Trips</td>
<td>641 (14%)5</td>
<td>621 (13%)5</td>
</tr>
<tr>
<td>PM Peak Hour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposed Project</td>
<td>787</td>
<td>952</td>
</tr>
<tr>
<td>Less Existing Uses to be Removed4</td>
<td>0</td>
<td>-92</td>
</tr>
<tr>
<td>Less Congestion Pricing Reduction</td>
<td>+30</td>
<td>+39</td>
</tr>
<tr>
<td>Net New Trips</td>
<td>817 (12%)5</td>
<td>898 (13%)5</td>
</tr>
<tr>
<td>Saturday Peak Hour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposed Project</td>
<td>473</td>
<td>696</td>
</tr>
<tr>
<td>Less Existing Uses to be Removed4</td>
<td>0</td>
<td>-101</td>
</tr>
<tr>
<td>Less Congestion Pricing Reduction</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Net New Trips</td>
<td>473 (7%)5</td>
<td>595 (9%)5</td>
</tr>
</tbody>
</table>

Notes:
1. This analysis assumes no external pedestrian or bicycle trips onto or off of the Islands. Although, with construction of the new eastern span bicycle/pedestrian path, it is possible that some bicycle trips may occur. However, this number is expected to be very minor and not likely to affect the overall conclusions of this study. Further, the potential new bicycle facility on the western span is still in the conceptual discussion phases, and is not assumed to be in place in this analysis.
2. Vehicle-trips include passenger vehicles and vans.
3. Includes internal bicycle and pedestrian trips, and a likely, relatively small number of internal auto trips (e.g., between Yerba Buena Island and Treasure Island).
4. Based on counts of peak hour vehicle traffic on the Islands (included in Appendix B) and assumes that the existing trip generation of the Job Corps center would remain the same.
5. Percentages shown are of total external trips.

Source: Fehr & Peers 2009
### TABLE 27 – PROPOSED PROJECT NET NEW VEHICLE TRIP GENERATION (BASE TRANSIT SCENARIO)

<table>
<thead>
<tr>
<th>Use</th>
<th>AM Peak Hour In</th>
<th>AM Peak Hour Out</th>
<th>AM Peak Hour Total</th>
<th>PM Peak Hour In</th>
<th>PM Peak Hour Out</th>
<th>PM Peak Hour Total</th>
<th>Saturday Peak Hour In</th>
<th>Saturday Peak Hour Out</th>
<th>Saturday Peak Hour Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Vehicle Trip Generation¹</td>
<td>801</td>
<td>1,225</td>
<td>2,026</td>
<td>1,648</td>
<td>1,163</td>
<td>2,811</td>
<td>1,668</td>
<td>1,493</td>
<td>3,161</td>
</tr>
<tr>
<td>Congestion Pricing Reduction²</td>
<td>-12</td>
<td>-37</td>
<td>-49</td>
<td>-30</td>
<td>-17</td>
<td>-47</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Existing Uses to be Removed³</td>
<td>-144</td>
<td>-220</td>
<td>-364</td>
<td>-151</td>
<td>-155</td>
<td>-306</td>
<td>-148</td>
<td>-152</td>
<td>-300</td>
</tr>
<tr>
<td>Net New Vehicle Trips</td>
<td>645</td>
<td>968</td>
<td>1,613</td>
<td>1,467</td>
<td>991</td>
<td>2,458</td>
<td>1,520</td>
<td>1,341</td>
<td>2,861</td>
</tr>
</tbody>
</table>

Notes:
1. Based on vehicle trip generation summarized in Table 26, less shifts in traffic associated with congestion pricing. Trips shifted as a result of congestion pricing were estimated using the percentages presented in Table 21.
2. Assuming a $5.00 weekday peak hour congestion pricing fee.
3. Based on counts of peak hour vehicle traffic on the Islands (included in Appendix B) and assumes that the existing trip generation of the Job Corps center would remain the same.

Source: Fehr & Peers, 2009

### 3.2.6 Parking Demand (Proposed Project, Base Transit)

The parking demand methodology described in Section 3.1.6 on page 84 was applied to the Proposed Project under the Base Transit Scenario. See Appendix J for the full calculation of the parking demand using SF Guidelines and the ULI Shared Parking methodology. A peak parking hour was determined for each neighborhood, for all of Treasure Island, and for the two islands together. The results of this analysis are summarized in Table 28. Generally, parking demands for each neighborhood would be similar to the Expanded Transit Scenario, except for the Island Core neighborhood, which would have a peak demand approximately 200 spaces higher with the Base Transit Scenario, compared to the Expanded Transit Scenario.

### TABLE 28 – SHARED PARKING ANALYSIS (BASE TRANSIT SCENARIO)

<table>
<thead>
<tr>
<th>District</th>
<th>Peak Residential Parking Demand</th>
<th>Peak Shared Non-Residential Parking Demand</th>
<th>Total Peak Parking Demand¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cityside</td>
<td>4,134</td>
<td>92</td>
<td>4,226</td>
</tr>
<tr>
<td>Eastside</td>
<td>2,032</td>
<td>48</td>
<td>2,080</td>
</tr>
<tr>
<td>Island Core</td>
<td>3,737</td>
<td>1,546</td>
<td>5,283</td>
</tr>
<tr>
<td>Open Space</td>
<td>0</td>
<td>395</td>
<td>395</td>
</tr>
<tr>
<td><strong>Total Treasure Island</strong>²</td>
<td><strong>9,903</strong></td>
<td><strong>2,081</strong></td>
<td><strong>11,984</strong></td>
</tr>
<tr>
<td>Yerba Buena Island</td>
<td>259</td>
<td>57</td>
<td>316</td>
</tr>
<tr>
<td><strong>Total Proposed Project</strong>³</td>
<td><strong>10,162</strong></td>
<td><strong>2,138</strong></td>
<td><strong>12,300</strong></td>
</tr>
</tbody>
</table>

Notes:
1. Shared parking analysis based on peak parking demands calculated using SF Guidelines Parking Demand methodology and ULI Shared Parking methodology for temporal distribution of parking demand by land uses.
2. Excludes Yerba Buena Island. Peak demand for all of Treasure Island is not the same as the total peak parking demand for each neighborhood because the neighborhoods experience their peak demands at different times of the day.
3. Excludes parking demand associated with the Job Corps and Coast Guard.

Source: Fehr & Peers, 2010
3.2.7 **Loading Demand (Proposed Project, Base Transit)**

Since loading requirements are independent of the amount of transit service provided, the loading requirements for the Proposed Project are identical under the Base Transit Scenario and the Expanded Transit Scenario, as shown in Table 25 on page 86.

3.3 **REDUCED DEVELOPMENT ALTERNATIVE WITH EXPANDED TRANSIT**

The remainder of this chapter describes the travel demand forecasts associated with a Reduced Development Alternative, which includes 6,000 dwelling units and does not include 100,000 square feet of new office included in the Proposed Project. This section describes the travel demand of the Reduced Development Alternative assuming the Expanded Transit Scenario.

3.3.1 **Trip Generation (Reduced Development Alternative, Expanded Transit)**

The person-trip generation, by mode for the Reduced Development Alternative was calculated using the same methodology described earlier for the Proposed Project. The percent reduction to external trip generation is the same under the Reduced Development Alternative as under the Proposed Project, specifically:

- 38% of weekday AM peak hour trips
- 41% of weekday PM peak hour trips
- 45% of Saturday peak hour trips

There is one primary difference between the analysis of the Reduced Development Alternative and that of the Proposed Project. Although the amount of retail space proposed under the two alternatives is the same, the portion of retail that is forecasted to be “neighborhood-serving” (e.g., coffee shops, banks, hardware stores, dry cleaners, etc.) under the Reduced Development Alternative is less than under the Proposed Project. This is because, under the Reduced Development Alternative, there would be fewer residents to support neighborhood-serving retail, and as a result, the programmed space would be occupied by more regional-serving retail. As noted in Section 3.1.1.2 on page 63, the regional-serving retail was assigned a higher person-trip generation rate than the neighborhood-serving retail. As a result of having a higher portion of regional-serving retail, the retail trip generation would be higher under the Reduced Development Alternative than under the Proposed Project even though the total amount of retail would be identical.

Table 29 presents the resulting net-new person-trips associated with the Reduced Development Alternative.
## TABLE 29 – NET PERSON-TRIP GENERATION BY LAND USE (REDUCED DEVELOPMENT ALTERNATIVE)

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Size</th>
<th>AM Peak Hour</th>
<th>PM Peak Hour</th>
<th>Saturday Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>6,000 d.u.</td>
<td>3,750</td>
<td>4,443</td>
<td>4,309</td>
</tr>
<tr>
<td>Hotel (TI)</td>
<td>450 Rooms</td>
<td>890</td>
<td>427</td>
<td>523</td>
</tr>
<tr>
<td>Hotel (Yerba Buena Island)</td>
<td>50 Rooms</td>
<td>27</td>
<td>35</td>
<td>101</td>
</tr>
<tr>
<td>Retail</td>
<td>207,000 square feet</td>
<td>1,062</td>
<td>3,219</td>
<td>3,477</td>
</tr>
<tr>
<td>Open Space (Athletic Fields)</td>
<td>40 acres</td>
<td>0</td>
<td>688</td>
<td>1,376</td>
</tr>
<tr>
<td>Open Space (Other)</td>
<td>260 acres</td>
<td>115</td>
<td>222</td>
<td>933</td>
</tr>
<tr>
<td>Marina</td>
<td>400 slips(^1)</td>
<td>38</td>
<td>88</td>
<td>126</td>
</tr>
<tr>
<td>Flex</td>
<td>202,000 square feet(^2)</td>
<td>142</td>
<td>795</td>
<td>768</td>
</tr>
<tr>
<td>Police/Fire</td>
<td>30,000 square feet</td>
<td>285</td>
<td>61</td>
<td>61</td>
</tr>
<tr>
<td>School</td>
<td>105,000 square feet</td>
<td>789</td>
<td>528</td>
<td>0</td>
</tr>
<tr>
<td>Community Center</td>
<td>48,500 square feet</td>
<td>126</td>
<td>130</td>
<td>101</td>
</tr>
<tr>
<td>Cultural Park/Museum</td>
<td>75,000 square feet</td>
<td>0</td>
<td>302</td>
<td>260</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td><strong>7,226</strong></td>
<td><strong>10,938</strong></td>
<td><strong>12,035</strong></td>
</tr>
<tr>
<td><strong>Internal/Linked Trip Reduction</strong></td>
<td></td>
<td><strong>2,745 (38%)</strong></td>
<td><strong>4,240 (39%)</strong></td>
<td><strong>5,164 (43%)</strong></td>
</tr>
<tr>
<td><strong>Total Net External Person-Trip Generation</strong></td>
<td></td>
<td><strong>4,481</strong></td>
<td><strong>6,698</strong></td>
<td><strong>6,871</strong></td>
</tr>
</tbody>
</table>

Notes:
1. The marina use has already been approved and is not part of the Proposed Project (although the construction of landside services associated with the Marina are included in the Proposed Project). The trip generation associated with the Marina is presented for informational purposes because it will be used to assess cumulative conditions.
2. Includes the non-retail portion of the adaptive reuse: 22 ksf food production/industrial/manufacturing, 150 ksf entertainment, and 30 ksf community/office uses.
3. Although a 41% reduction was taken for most of the project in the PM peak hour, the cultural park was removed from the calculation, and only a 10% reduction for internal trips was assumed for that use. The result is an effective 39% reduction. Similarly, for the Saturday peak hour, including the cultural center/museum resulted in an effective 43% reduction.

Source: Fehr & Peers, 2009

### 3.3.2 Mode Split/Transit Usage (Reduced Development Alternative, Expanded Transit)

The portion of project-generated person-trips that would take transit under the Reduced Development Alternative with Expanded Transit was calculated using the same assumptions as described on page 62 to 70 for the Proposed Project with Expanded Transit. Specifically, the analysis forecasts that during weekday peak hours with the Expanded Transit Service, 34 percent of work trips and 17 percent of all non-work trips would occur by transit. Of the work-trips made by transit, approximately 50 percent would be made by ferry and 50 percent would be made by bus. Non-work trips are more likely to be made by bus, with 65 percent of trips occurring by bus and 35 percent by ferry. Transit mode share is lower on Saturday peak hours.

### 3.3.3 Trip Distribution (Reduced Development Alternative, Expanded Transit)

The geographic distribution of project-generated trips would be the same under the Reduced Development Alternative as for the Proposed Project. The trip distribution for all scenarios is described in Table 20 on page 75 and illustrated on Figure 19 (page 76).
3.3.4 Vehicle Trip Assignment (Reduced Development Alternative, Expanded Transit)

Similar to the Proposed Project, the external vehicle trips generated by the Reduced Development Alternative were assigned to the roadway system based on the directions of approach and departure discussed in the Trip Distribution section. The analysis of traffic impacts for the Reduced Development Alternative also examined conditions with and without the proposed reconstruction of the westbound ramps on the east side of Yerba Buena Island.

The initial forecast of vehicle trip assignment does not include the effects of congestion pricing or ramp metering. Those effects are discussed in the next section.

3.3.4.1 Congestion Pricing (Reduced Development Alternative, Expanded Transit)

The methodology used to assess the effects of congestion pricing at reducing peak hour automobile trip generation was described earlier in this chapter, Section 3.1.4 on page 77. This methodology was applied to the initial vehicle traffic generation estimates for the Base Transit Scenario. While the TITMA will have the flexibility to adjust the congestion charge, similar to the Expanded Transit scenario, the analysis of the Base Transit Scenario assumes the same $5.00 congestion fee would be applied to each residential vehicle entering or leaving the SFOBB during AM and PM peak hours. The resulting percentage shifts were nearly identical to those identified in Table 21 for the Proposed Project with the Expanded Transit Scenario. Specifically, under the Expanded Transit Scenario, implementation of congestion pricing in the manner described earlier would result in a reduction of just over four percent of AM peak hour vehicle trips and just under four percent for PM peak hour vehicle trips.

3.3.4.2 Ramp Metering (Reduced Development Alternative, Expanded Transit)

Similar to the Proposed Project, the effects of ramp metering at reducing peak hour automobile traffic generation were determined to be negligible for the Reduced Development Alternative with Expanded Transit.

3.3.5 Travel Demand Summary (Reduced Development Alternative, Expanded Transit)

Table 30, below, summarizes the resulting person-trip generation for the Reduced Development Alternative under the Expanded Transit Scenario. Table 31 summarizes the vehicle traffic generation of the Reduced Development Alternative under the Expanded Transit Scenario, accounting for the existing uses to be removed.
### TABLE 30 – PERSON-TRIP GENERATION BY MODE  
(REDUCED DEVELOPMENT ALTERNATIVE, EXPANDED TRANSIT SCENARIO)

<table>
<thead>
<tr>
<th>Peak Hour</th>
<th>Person-Trip Generation¹</th>
<th>Vehicle-Trips ²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>External</td>
<td>Internal</td>
</tr>
<tr>
<td></td>
<td>Ferry</td>
<td>Bus</td>
</tr>
<tr>
<td>AM Peak Hour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposed Project</td>
<td>761</td>
<td>977</td>
</tr>
<tr>
<td>Less Existing Uses to be Removed ⁴</td>
<td>0</td>
<td>-142</td>
</tr>
<tr>
<td>Less Congestion Pricing Reduction</td>
<td>+22</td>
<td>+28</td>
</tr>
<tr>
<td>Net New Trips</td>
<td>783 (21%)</td>
<td>863 (23%)</td>
</tr>
<tr>
<td>PM Peak Hour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposed Project</td>
<td>1,031</td>
<td>1,412</td>
</tr>
<tr>
<td>Less Existing Uses to be Removed ⁴</td>
<td>0</td>
<td>-92</td>
</tr>
<tr>
<td>Less Congestion Pricing Reduction</td>
<td>+19</td>
<td>+26</td>
</tr>
<tr>
<td>Net New Trips</td>
<td>1,050 (17%)</td>
<td>1,346 (22%)</td>
</tr>
<tr>
<td>Saturday Peak Hour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposed Project</td>
<td>646</td>
<td>1,060</td>
</tr>
<tr>
<td>Less Existing Uses to be Removed ⁴</td>
<td>0</td>
<td>-101</td>
</tr>
<tr>
<td>Less Congestion Pricing Reduction</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Net New Trips</td>
<td>646 (11%)</td>
<td>959 (16%)</td>
</tr>
</tbody>
</table>

Notes:
1. This analysis assumes no external pedestrian or bicycle trips onto or off of the Islands. Although, with construction of the new eastern span bicycle/pedestrian path, it is possible that some bicycle trips may occur. However, this number is expected to be very minor and not likely to affect the overall conclusions of this study. Further, the potential new bicycle facility on the western span is still in the conceptual discussion phases, and is not assumed to be in place in this analysis.
2. Vehicle-trips include passenger vehicles and vans.
3. Includes internal bicycle and pedestrian trips, and a likely, relatively small number of internal auto trips (e.g., between Yerba Buena Island and Treasure Island).
4. Based on counts of peak hour vehicle traffic on the Islands (included in Appendix B) and assumes that the existing trip generation of the Job Corps center would remain the same.
5. Percentages shown are of total external trips.

Source: Fehr & Peers 2009
### TABLE 31 – NET NEW VEHICLE TRIP GENERATION
(REDUCTED DEVELOPMENT ALTERNATIVE, EXPANDED TRANSIT SCENARIO)

<table>
<thead>
<tr>
<th>Use</th>
<th>AM Peak Hour</th>
<th>PM Peak Hour</th>
<th>Saturday Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In</td>
<td>Out</td>
<td>Total</td>
</tr>
<tr>
<td>Project Vehicle Trip Generation¹</td>
<td>569</td>
<td>802</td>
<td>1,371</td>
</tr>
<tr>
<td>Congestion Pricing Reduction²</td>
<td>-8</td>
<td>-23</td>
<td>-31</td>
</tr>
<tr>
<td>Existing Uses to be Removed³</td>
<td>-144</td>
<td>-220</td>
<td>-364</td>
</tr>
<tr>
<td>Net New Vehicle Trips</td>
<td>417</td>
<td>559</td>
<td>976</td>
</tr>
</tbody>
</table>

Notes:
1. Based on vehicle trip generation summarized in Table 22, less shifts in traffic associated with congestion pricing. Trips shifted as a result of congestion pricing were estimated using on the percentages presented in Table 21.
2. Assuming a $5.00 weekday peak hour congestion pricing fee, as summarized in Table 21.
3. Based on counts of peak hour vehicle traffic on the Islands (included in Appendix B) and assumes that the existing trip generation of the Job Corps center would remain the same.

Source: Fehr & Peers, 2009

### 3.3.6 Parking Demand (Reduced Development Alternative, Expanded Transit)

The same parking demand methodology used for the Proposed Project was applied to the Reduced Development Alternative. See Appendix J for the full calculation of the parking demand using SF Guidelines and the ULI Shared Parking methodology, as described on Section 3.1.6 on page 84. A peak parking hour was determined for each neighborhood, for all of Treasure Island, and for the two islands together. The results of this analysis are summarized in Table 32.

### TABLE 32 – SHARED PARKING ANALYSIS
(REDUCTED DEVELOPMENT ALTERNATIVE, EXPANDED TRANSIT SCENARIO)

<table>
<thead>
<tr>
<th>District</th>
<th>Peak Residential Parking Demand</th>
<th>Peak Shared Non-Residential Parking Demand</th>
<th>Total Peak Parking Demand¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cityside</td>
<td>3,052</td>
<td>84</td>
<td>3,136</td>
</tr>
<tr>
<td>Eastside</td>
<td>1,975</td>
<td>44</td>
<td>2,019</td>
</tr>
<tr>
<td>Island Core</td>
<td>2,328</td>
<td>1,278</td>
<td>3,606</td>
</tr>
<tr>
<td>Open Space</td>
<td>0</td>
<td>346</td>
<td>346</td>
</tr>
<tr>
<td><strong>Total Treasure Island²</strong></td>
<td><strong>7,355</strong></td>
<td><strong>1,752</strong></td>
<td><strong>9,107</strong></td>
</tr>
<tr>
<td>Yerba Buena Island</td>
<td>259</td>
<td>55</td>
<td>314</td>
</tr>
<tr>
<td><strong>Total Proposed Project³</strong></td>
<td><strong>7,614</strong></td>
<td><strong>1,807</strong></td>
<td><strong>9,421</strong></td>
</tr>
</tbody>
</table>

Notes:
1. Shared parking analysis based on peak parking demands calculated using SF Guidelines Parking Demand methodology and ULI Shared Parking methodology for temporal distribution of parking demand by land uses.
2. Peak demand for all of Treasure Island is not the same as the total peak parking demand for each neighborhood because the neighborhoods experience their peak demands at different times of the day.
3. Excludes parking demand associated with the Job Corps and Coast Guard.

Source: Fehr & Peers, 2009
### 3.3.7 Loading Demand

The Reduced Development Alternative would generate a peak hourly demand for 31 commercial vehicle and freight loading/unloading spaces according to the SF Guidelines’ freight delivery and service demand methodology. Based on this methodology, total daily loading space demand would be approximately 493 vehicles. Table 33 depicts the calculation of project-generated demand for loading spaces based on the SF Guidelines methodology for the Reduced Development Alternative.

![Table 33 - Loading Demand - Reduced Development Alternative](image)

#### Notes:
1. Includes 30,000 square feet of community uses/offices planned in adaptive reuse of Building 1.
2. Includes all non-retail restaurant (170,000 square feet) and 150,000 square feet of entertainment uses proposed for adaptive reuse of Building 3.
3. Includes 13,500 square feet of community facilities, 35,000 square feet for Pier 1 Community Center, and 75,000 square feet for the sailing center, and 75,000 square foot museum. Similar to parking analysis, loading demand for elementary school and police/fire facility will be provided separately within their facilities. Neither demand nor supply for elementary school and police/fire facility is included in this analysis.
4. Includes 22,000 square feet of food production space proposed in adaptive reuse of Building 2.
5. Per thousand square feet
6. Typical peak hour of truck loading space demand occurs between 10 AM to 1 PM. Peak hour generation assumes deliveries occur between 8 AM and 5 PM, average park time of 25 minutes per vehicle, and that the peak hour deliveries occur at a 25 percent higher rate than other hours.


### 3.4 Reduced Development Alternative with Base Transit

Just as the Proposed Project was analyzed under conditions with both the Enhanced and Base Transit Service, the Reduced Development Alternative was also analyzed under both transit scenarios. This section describes the travel demand analysis for the Reduced Development Alternative under the Base Transit Scenario.

#### 3.4.1 Trip Generation (Reduced Development Alternative, Base Transit)

The number of person-trips expected to be generated by the Reduced Development Alternative is assumed to be the same, regardless of the level of transit service provided. The trip generation methodology can be found earlier in this chapter, beginning on page 65. As shown in shown in Table 29
on page 90, the Proposed Project is expected to generate 4,480 net external trips during the weekday AM peak hour, 6,696 net external trips during the weekday PM peak hour, and 6,856 net external trips during the Saturday peak hour.

3.4.2 Mode Split/Transit Usage (Reduced Development Alternative, Base Transit)

The portion of project-generated person-trips that would take transit under the Reduced Development Alternative with Base Transit was calculated using the same assumptions as described in Section 3.2.2 for the Proposed Project with Base Transit. Specifically, based on the reduced amount of transit service, ferry ridership would be 35 percent lower in the AM and PM peak hours than under the Expanded Transit Scenario. Bus ridership would be 30 percent lower in the AM peak hour and 34 percent lower in the PM peak hour under the Base Transit Scenario than under the Expanded Transit Scenario. During peak hours, the reduction in transit ridership associated with the Base Transit Scenario is assumed to switch to the automobile mode.

3.4.3 Trip Distribution (Reduced Development Alternative, Base Transit)

The geographic distribution of project-generated trips would be the same under the Reduced Development Alternative as for the Proposed Project. The trip distribution for all scenarios is described in Table 20 on page 72 and illustrated on Figure 19 (page 73).

3.4.4 Vehicle Trip Assignment (Reduced Development Alternative, Base Transit)

Similar to the Expanded Transit Scenario, the external vehicle trips generated by the Reduced Development Alternative with Base Transit only were assigned to the roadway system based on the directions of approach and departure discussed in the Trip Distribution section. The analysis of traffic impacts for the Reduced Development Alternative with Base Transit only also examined conditions with and without the proposed reconstruction of the westbound ramps on the east side of Yerba Buena Island.

The initial forecast of vehicle trip assignment does not include the effects of congestion pricing or ramp metering. Those effects are discussed in the next section.

3.4.4.1 Congestion Pricing (Reduced Development Alternative, Base Transit)

The methodology used to assess the effects of congestion pricing at reducing peak hour automobile trip generation was described earlier in this Chapter, on pages 62 to 70. This methodology was applied to the initial vehicle traffic generation estimates for the Reduced Development Alternative with Base Transit. While the TITMA will have the flexibility to adjust the congestion charge, similar to the Proposed Project, the analysis of the Reduced Development Alternative with Base Transit assumes the same $5.00 congestion fee would be applied to each residential vehicle entering or leaving the SFOBB during AM and PM peak hours. The resulting percentage shifts were nearly identical to those identified in Table 21 for the Proposed Project with Expanded Transit. Specifically, under the Reduced Development Alternative with Base Transit, implementation of congestion pricing in the manner described earlier would result in a reduction of just over four percent of AM peak hour resident vehicle trips and just fewer than four percent of PM peak hour resident vehicle trips.

3.4.4.2 Ramp Metering (Reduced Development Alternative, Base Transit)

Similar to the Proposed Project, the effects of ramp metering at reducing peak hour automobile traffic generation were determined to be negligible for the Reduced Development Alternative with Base Transit only.
3.4.5 Travel Demand Summary (Reduced Development Alternative, Base Transit)

Table 34, below, summarizes the resulting person-trip generation for the Reduced Development Alternative under the Base Transit Scenario. Table 35 summarizes the vehicle traffic generation of the Reduced Development Alternative under the Base Transit Scenario, accounting for the existing uses to be removed.

<table>
<thead>
<tr>
<th></th>
<th>Person-Trip Generation(^1)</th>
<th>Vehicle-Trips(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>External</td>
<td>Internal</td>
</tr>
<tr>
<td></td>
<td>Ferry</td>
<td>Bus</td>
</tr>
<tr>
<td><strong>AM Peak Hour</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposed Project</td>
<td>495</td>
<td>596</td>
</tr>
<tr>
<td>Less Existing Uses to be Removed(^4)</td>
<td>0</td>
<td>-142</td>
</tr>
<tr>
<td>Less Congestion Pricing Reduction</td>
<td>+27</td>
<td>+32</td>
</tr>
<tr>
<td><strong>Net New Trips</strong></td>
<td><strong>522 (14%)(^5)</strong></td>
<td><strong>486 (13%)(^5)</strong></td>
</tr>
<tr>
<td><strong>PM Peak Hour</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposed Project</td>
<td>671</td>
<td>827</td>
</tr>
<tr>
<td>Less Existing Uses to be Removed(^4)</td>
<td>0</td>
<td>-92</td>
</tr>
<tr>
<td>Less Congestion Pricing Reduction</td>
<td>+25</td>
<td>+31</td>
</tr>
<tr>
<td><strong>Net New Trips</strong></td>
<td><strong>696 (11%)(^5)</strong></td>
<td><strong>766 (13%)(^5)</strong></td>
</tr>
<tr>
<td><strong>Saturday Peak Hour</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposed Project</td>
<td>426</td>
<td>628</td>
</tr>
<tr>
<td>Less Existing Uses to be Removed(^4)</td>
<td>0</td>
<td>-101</td>
</tr>
<tr>
<td>Less Congestion Pricing Reduction</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Net New Trips</strong></td>
<td><strong>426 (7%)(^5)</strong></td>
<td><strong>527 (8%)(^5)</strong></td>
</tr>
</tbody>
</table>

Notes:
1. This analysis assumes no external pedestrian or bicycle trips onto or off of the Islands. Although, with construction of the new eastern span bicycle/pedestrian path, it is possible that some bicycle trips may occur. However, this number is expected to be very minor and not likely to affect the overall conclusions of this study. Further, the potential new bicycle facility on the western span is still in the conceptual discussion phases, and is not assumed to be in place in this analysis.
2. Vehicle-trips include passenger vehicles and vans.
3. Includes internal bicycle and pedestrian trips, and a likely, relatively small number of internal auto trips (e.g., between Yerba Buena Island and Treasure Island).
4. Based on counts of peak hour vehicle traffic on the Islands (included in Appendix B) and assumes that the existing trip generation of the Job Corps center would remain the same.
5. Percentages shown are of total external trips.

Source: Fehr & Peers 2009
### TABLE 35 – NET NEW VEHICLE TRIP GENERATION
(REDUCED DEVELOPMENT ALTERNATIVE, BASE TRANSIT SCENARIO)

<table>
<thead>
<tr>
<th>Use</th>
<th>AM Peak Hour</th>
<th>PM Peak Hour</th>
<th>Saturday Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In</td>
<td>Out</td>
<td>Total</td>
</tr>
<tr>
<td>Project Vehicle Trip Generation</td>
<td>698</td>
<td>996</td>
<td>1,695</td>
</tr>
<tr>
<td>Congestion Pricing Reduction</td>
<td>-9</td>
<td>-28</td>
<td>-37</td>
</tr>
<tr>
<td>Existing Uses to be Removed</td>
<td>-144</td>
<td>-220</td>
<td>-364</td>
</tr>
<tr>
<td>Net New Vehicle Trips</td>
<td>545</td>
<td>748</td>
<td>1,294</td>
</tr>
</tbody>
</table>

Notes:
1. Based on vehicle trip generation summarized in Table 22, less shifts in traffic associated with congestion pricing. Trips shifted as a result of congestion pricing were estimated using on the percentages presented in Table 21.
2. Assuming a $5.00 weekday peak hour congestion pricing fee, as summarized in Table 21.
3. Based on counts of peak hour vehicle traffic on the Islands (included in Appendix B) and assumes that the existing trip generation of the Job Corps center would remain the same.

Source: Fehr & Peers, 2009

### 3.4.6 Parking Demand (Reduced Development Alternative, Base Transit)

The same parking demand methodology used for the Proposed Project was applied to the Reduced Development Alternative. See Appendix J for the full calculation of the parking demand using SF Guidelines and the ULI Shared Parking methodology, as described on Section 3.1.6 on page 84. A peak parking hour was determined for each neighborhood, for all of Treasure Island, and for the two islands together. The results of this analysis are summarized in Table 36.

### TABLE 36 – SHARED PARKING ANALYSIS
(REDUCTED DEVELOPMENT ALTERNATIVE, BASE TRANSIT SCENARIO)

<table>
<thead>
<tr>
<th>District</th>
<th>Peak Residential Parking Demand</th>
<th>Peak Shared Non-Residential Parking Demand</th>
<th>Total Peak Parking Demand¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cityside</td>
<td>3,052</td>
<td>98</td>
<td>3,150</td>
</tr>
<tr>
<td>Eastside</td>
<td>1,975</td>
<td>51</td>
<td>2,026</td>
</tr>
<tr>
<td>Island Core</td>
<td>2,338</td>
<td>1,455</td>
<td>3,793</td>
</tr>
<tr>
<td>Open Space</td>
<td>0</td>
<td>395</td>
<td>395</td>
</tr>
<tr>
<td>Total Treasure Island²</td>
<td>7,365</td>
<td>1,999</td>
<td>9,364</td>
</tr>
<tr>
<td>Yerba Buena</td>
<td>259</td>
<td>57</td>
<td>316</td>
</tr>
<tr>
<td>Total Proposed Project³</td>
<td>7,624</td>
<td>2,056</td>
<td>9,680</td>
</tr>
</tbody>
</table>

Notes:
1. Shared parking analysis based on peak parking demands calculated using SF Guidelines Parking Demand methodology and ULI Shared Parking methodology for temporal distribution of parking demand by land uses.
2. Excludes Yerba Buena Island. Peak demand for all of Treasure Island is not the same as the total peak parking demand for each neighborhood because the neighborhoods experience their peak demands at different times of the day.
3. Excludes parking demand associated with the Job Corps and Coast Guard.

Source: Fehr & Peers, 2010
3.4.7 Loading Demand

Since loading requirements are independent of the amount of transit service provided, the daily truck generation and the peak loading space requirements for the Reduced Development Alternative under the Base Transit Scenario are identical to those for the Expanded Transit Scenario, as shown in Table 33 (page 96).

3.5 TRAVEL DEMAND SUMMARY

For comparison purposes, Table 37 presents the person-trip generation, by mode, for each of the analysis scenarios, including the Proposed Project and the Reduced Development Alternative, each for the Enhanced and Base Transit Scenarios.

<table>
<thead>
<tr>
<th></th>
<th>Person-Trip Generation&lt;sup&gt;3&lt;/sup&gt;</th>
<th>Vehicle-Trips&lt;sup&gt;2&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>External</td>
<td>Internal</td>
</tr>
<tr>
<td>AM Peak Hour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposed Project – Base Transit</td>
<td>641</td>
<td>3,391</td>
</tr>
<tr>
<td>Proposed Project – Expanded Transit</td>
<td>958</td>
<td>2,619</td>
</tr>
<tr>
<td>Reduced Development – Base Transit</td>
<td>522</td>
<td>2,748</td>
</tr>
<tr>
<td>Reduced Development – Expanded Transit</td>
<td>783</td>
<td>2,110</td>
</tr>
<tr>
<td>PM Peak Hour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposed Project – Base Transit</td>
<td>818</td>
<td>5,124</td>
</tr>
<tr>
<td>Proposed Project – Expanded Transit</td>
<td>1,235</td>
<td>4,175</td>
</tr>
<tr>
<td>Reduced Development – Base Transit</td>
<td>696</td>
<td>4,652</td>
</tr>
<tr>
<td>Reduced Development – Expanded Transit</td>
<td>1,050</td>
<td>3,705</td>
</tr>
<tr>
<td>Saturday Peak Hour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposed Project – Base Transit</td>
<td>473</td>
<td>5,913</td>
</tr>
<tr>
<td>Proposed Project – Expanded Transit</td>
<td>718</td>
<td>5,043</td>
</tr>
<tr>
<td>Reduced Development – Base Transit</td>
<td>426</td>
<td>5,321</td>
</tr>
<tr>
<td>Reduced Development – Expanded Transit</td>
<td>646</td>
<td>4,525</td>
</tr>
</tbody>
</table>

Notes:
1. This analysis assumes no external pedestrian or bicycle trips onto or off of the Islands. Although, with construction of the new eastern span bicycle/pedestrian path, it is possible that some bicycle trips may occur. However, this number is expected to be very minor and not likely to affect the overall conclusions of this study. Further, the potential new bicycle facility on the western span is still in the conceptual discussion phases, and is not assumed to be in place in this analysis.
2. Vehicle-trips include passenger vehicles and vans.
3. Includes internal bicycle and pedestrian trips.

Source: Fehr & Peers, 2009
4. TRANSPORTATION IMPACT ANALYSIS

This chapter discusses the potential transportation impacts associated with the Proposed Project and the expected changes to transportation conditions within the study area. Although the 2006 Transportation Plan proposes substantial improvements to existing transit service to the Islands, as discussed in the preceding chapter, only a portion of this additional transit service has been fully funded. The discussion of impacts in this chapter is presented in a slightly different order than in Chapter 3. The impact analysis of the Proposed Project is first analyzed under the Base Transit Scenario and then analyzed with the Expanded Transit Scenario. The impact analysis for the Reduced Development Alternative is presented in a similar fashion, with the impacts under the Base Transit Scenario discussed first followed by the Expanded Transit Scenario.

The impact analysis evaluates the Proposed Project’s traffic, transit, parking, pedestrian, bicycling, loading, and construction impacts resulting from the following conditions:

- Existing plus Proposed Project (analyzed with and without new ramps)
- Year 2030 Cumulative Plus Proposed Project (analyzed with and without new ramps)

As described in Chapter 3, the Expanded Transit Scenario would increase transit use and reduce the number of external vehicle trips to and from the Islands. Although it is has not yet been fully funded, the Expanded Transit Scenario would reduce traffic generated by the project; therefore, implementation of the Expanded Transit Service has been identified as mitigation for the Proposed Project with Base Transit Service.

4.1 SIGNIFICANCE CRITERIA

The City of San Francisco has adopted a set of significance thresholds to be used during environmental review to determine whether a Proposed Project causes project-specific and/or cumulative impacts on each component of the surrounding transportation network.

4.1.1 Traffic

In San Francisco, the threshold for a significant adverse impact on traffic has been established as deterioration in the level of service (LOS) at a signalized intersection from LOS D or better to LOS E or LOS F, or from LOS E to LOS F. The operational impacts on unsignalized intersections are considered potentially significant if project-related traffic causes the level of service at the worst approach to deteriorate from LOS D or better to LOS E or LOS F (or from LOS E to LOS F) and Caltrans peak hour traffic volumes signal warrants would be met. Potentially significant impacts to unsignalized intersections would also occur if a project would cause Caltrans peak hour traffic volume signal warrants to be met when the worst approach is already at LOS E or LOS F.

For an intersection that operates at LOS E or LOS F under existing conditions, there may be a significant adverse impact depending upon the magnitude of the project’s contribution to the worsening of delay. In addition, a project would have a significant adverse effect if it would cause major traffic hazards, or would

33. As described on page 7, the SFCTA and Caltrans are currently conducting a study to determine the feasibility of reconstructing the westbound on- and off-ramps to the SFOBB on the east side of Yerba Buena Island. The reconstructed ramps would likely operate differently from the current configuration. However, the proposed reconstruction has not been formally approved and there is some chance that it may not occur. Therefore, the analysis is conducted both ways – for conditions with and without the proposed reconstruction.
contribute considerably to the cumulative traffic increases that cause the deterioration in LOS to unacceptable levels (i.e., to LOS E or LOS F).

The operational impacts on freeway on-ramp merge and off-ramp diverge sections are considered significant when project-related traffic causes the level of service to deteriorate from LOS D to LOS E or LOS F, or from LOS E to LOS F. In addition, a project would have a significant effect on the environment if it would contribute substantially to traffic volumes at study merge and diverge sections already operating at LOS E or F.

Further, since the project is likely to add trips to a freeway facility (the SFOBB) operating with demands already exceeding capacity, the project would be considered to have a significant impact if it would substantially increase queuing on bridge approaches, either in San Francisco or in the East Bay.

4.1.2 Transit

The project would have a significant effect on the environment if it would cause a substantial increase in transit demand that could not be accommodated by adjacent transit capacity, resulting in unacceptable levels of transit service; or cause a substantial increase in operating costs or delays such that significant adverse impacts in transit service levels could result.

4.1.3 Pedestrians

The project would have a significant effect on the environment if it would result in substantial overcrowding on public sidewalks, create potentially hazardous conditions for pedestrians, or otherwise interfere with pedestrian accessibility to the site and adjoining areas.

4.1.4 Bicycles

The project would have a significant effect on the environment if it would create potentially hazardous conditions for bicyclists or otherwise substantially interfere with bicycle accessibility to the site and adjoining areas.

4.1.5 Parking

San Francisco does not consider parking supply as part of the permanent physical environment. Parking conditions are not static, as parking supply and demand varies from day to day, from day to night, from month to month, etc. Hence, the availability of parking spaces (or lack thereof) is not a permanent physical condition, but changes over time as people change their modes and patterns of travel.

Parking deficits are considered to be social effects, rather than impacts on the physical environment as defined by the California Environmental Quality Act (“CEQA”). Under CEQA, a project’s social impacts need not be treated as significant impacts on the environment. Environmental documents should, however, address the secondary physical impacts that could be triggered by a social impact. (CEQA Guidelines § 15131(a).) The social inconvenience of parking deficits, such as having to hunt for scarce parking spaces, is not an environmental impact, but there may be secondary physical environmental impacts, such as increased traffic congestion at intersections, air quality impacts, safety impacts, or noise impacts caused by congestion. In the experience of San Francisco transportation planners, however, the absence of a ready supply of parking spaces, combined with available alternatives to auto travel (e.g., transit service, taxis, bicycles or travel by foot) and a relatively dense pattern of urban development, induces many drivers to seek and find alternative parking facilities, shift to other modes of travel, or change their overall travel habits. Any such resulting shifts to transit service in particular, would be in keeping with the City’s “Transit First” policy. The City’s Transit First Policy, established in the City’s Charter Section 8A.115 provides that “parking policies for areas well served by public transit shall be designed to encourage travel by public transportation and alternative transportation.”
The transportation analysis accounts for potential secondary effects, such as cars circling and looking for a parking space in areas of limited parking supply, by assuming that all drivers would attempt to find parking at or near the project site and then seek parking farther away if convenient parking is unavailable. Moreover, the secondary effects of drivers searching for parking is typically offset by a reduction in vehicle trips due to others who are aware of constrained parking conditions in a given area. Hence, any secondary environmental impacts which may result from a shortfall in parking in the vicinity of the Proposed Project would be minor, and the traffic assignments used in the transportation analysis, as well as in the associated air quality, noise and pedestrian safety analyses, reasonably addresses potential secondary effects.

4.1.6 Loading

The project would have a significant effect on the environment if it would result in a loading demand during the peak hour of loading activities that could not be accommodated within the proposed on-site loading facilities or within convenient on-street loading zones, or if it would create potentially hazardous traffic conditions or significant delays affecting traffic, transit, bicycles or pedestrians.

4.1.7 Construction

Construction-related impacts generally would not be considered significant due to their temporary and limited duration.

4.1.8 Emergency Access

The project would have a significant impact on the environment if it would result in inadequate emergency access.

4.2 TRAFFIC IMPACTS

Consistent with the traffic significance criteria described above, the Proposed Project and Reduced Development Alternative were evaluated to determine whether they would cause significant traffic-related impacts. The forecasted net increases in traffic associated with the Proposed Project were added to the existing traffic volumes to obtain a forecast of Existing plus Project conditions.

4.2.1 Proposed Project With Base Transit Service

The Proposed Project’s travel demand was presented in Chapter 3. The forecasts reflect the project’s mix of land uses designed to maximize internalization of trips, the associated level of transit service expected, and other Transportation Demand Management (“TDM”) techniques proposed by the project, including unbundled residential parking, extensive pedestrian and bicycle amenities, residential transit passes, and congestion pricing. The forecasts also reflect conditions with reconstructed westbound ramps and ramp metering. The resulting travel demand projected in Chapter 3 represents the unconstrained demand for travel within each mode. However, there are bottlenecks throughout the study area that may restrict the amount of traffic that can reach certain parts of the transportation system during peak periods. Those constraints and their effect on overall travel demand are discussed in the following sections.

4.2.1.1 Freeway and Ramp Operations (Base Transit Scenario)

As noted throughout this report, the analysis was conducted under conditions with and without the proposed reconstruction of the westbound ramps on the east side of Yerba Buena Island. Without reconstruction, the configuration of all three westbound ramps on the east side of Yerba Buena Island. Without reconstruction, the configuration of all three westbound ramps (two on the east side and one on the west side) would remain the same as existing conditions (i.e., there would be two stop-controlled westbound on-ramps). With the reconstruction of the ramps, one of the two westbound on-ramps would be converted
to transit-only, and the other ramp would be open to all traffic and ramp metering would be installed. **Figures A-1 and A-2 in Appendix D4** present the unconstrained trip assignment to individual ramps for the Proposed Project under the Base Transit Scenario assuming the existing westbound ramps and the proposed reconfigured westbound ramps, respectively.

Although the capacity of the westbound on-ramps would be different depending upon whether the ramps were reconstructed, under both configurations the volume of traffic attempting to enter the SFOBB from the Islands in the westbound direction (i.e., the unconstrained demand identified in Chapter 3) would be greater than the overall capacity of the westbound ramps during certain peak hours. Under conditions with the existing stop-controlled westbound ramps, observations have shown a capacity of approximately 375 vehicles per hour per ramp in peak hours when the SFOBB operates at or near capacity. Under conditions with the westbound ramp reconstruction project, ramp metering lights would be installed that would limit the number of vehicles entering the SFOBB from the Islands. The ramp meters were assumed to allow a peak of 550 vehicles per hour plus the volume of HOVs that would use the bypass lane.

As a result of these capacity constraints, queues may form on the Islands’ approaches to the SFOBB ramps and only a portion of the total westbound demand would make it into the SFOBB. Due to the on-ramp capacity constraints, the queues of traffic attempting to enter the westbound SFOBB on-ramp may block traffic destined for the eastbound SFOBB on-ramp. Therefore, the ultimate queues realized on the Islands would consist of both westbound and eastbound traffic. To forecast the magnitude of queues forming on the Islands under various conditions, the VISSIM microsimulation software was used. The effects of queues on Island roadways are discussed later in this chapter.

**Figure 20** on page 105 shows the amount of traffic assigned to each freeway segment under the existing westbound ramp configuration, constrained by the capacity of the stop signs on the westbound ramps. **Figure 21** on page 106 shows the same information for conditions with reconstructed westbound ramps, constrained by the capacity of the ramp meters. The resulting volumes were used to assess freeway impacts in terms of ramp merge and diverge section operations as well as contributions to queuing on freeway mainline segments and approaches.

4.2.1.1.1  Ramp Queuing (Base Transit Scenario)

Due to the complex interaction of vehicle streams that approach the SFOBB from the Islands, the VISSIM microsimulation software was used to evaluate vehicle queuing that results from eastbound, westbound, SOV, HOV2, and HOV3+ vehicles all sharing a common approach to the SFOBB (Treasure Island Road). The maximum queues for each scenario, measured from the intersection of South Gate Drive and Macalla Road, are presented in **Table 38** (page 108). **Table 38** also depicts average vehicular delay associated with the queuing for traffic approaching the SFOBB. (The delay is discussed in a subsequent section.) **Figure 22** on page 107 illustrates the extent of queuing associated with the Proposed Project under the Base Transit Scenario for conditions with and without reconstruction of the westbound ramps.

As depicted in **Table 38** and illustrated on **Figure 22**, under the Base Transit Scenario, the Proposed Project may result in extensive queues on Treasure Island Road that may interfere with traffic circulation. (The queues may also affect transit circulation, which is discussed later in this chapter.) Without reconstruction of the westbound on-ramp to the SFOBB (and the associated HOV3+ bypass), queues would extend back approximately ½-mile from each of the two westbound on-ramps. With reconstruction of the westbound ramps (and the associated consolidation of all traffic to a single westbound on-ramp), queues would reach over one mile, on Treasure Island Road just past the intersection with Macalla Road. However, queues would not extend onto Treasure Island.
EXISTING PLUS PROJECT (BASE TRANSIT SCENARIO)
SFOBB TRAVEL DEMAND AND VEHICLE QUEUES
<<NO NEW WESTBOUND ON-RAMPS>>
Treasure Island and Yerba Buena Island Redevelopment Plan TIS

EXISTING PLUS PROJECT (BASE TRANSIT SCENARIO)
SFOBB TRAVEL DEMAND AND VEHICLE QUEUES

Source: Fehr & Peers, 2009
1. Maximum queues expected to occur during the AM peak hour.
2. The street names shown on this figure are for identification purposes only and subject to change.

Source: Perkins + Will, May 4, 2009; Fehr & Peers, 2009

Treasure Island and Yerba Buena Island Redevelopment Plan TIS

MAXIMUM ON-ISLAND QUEUE
PROPOSED PROJECT (BASE TRANSIT SCENARIO)

FIGURE 22
### TABLE 38 – MAXIMUM ON-RAMP QUEUING (MILES) AND AVERAGE DELAYS (MINUTES:SECONDS) – EXISTING PLUS PROJECT CONDITIONS

<table>
<thead>
<tr>
<th>Peak Hour</th>
<th>Proposed Project (Base Transit Scenario)</th>
<th>Proposed Project (Expanded Transit Scenario)</th>
<th>Reduced Development Alternative (Base Transit Scenario)</th>
<th>Reduced Development Alternative (Expanded Transit Scenario)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Existing Ramps¹</td>
<td>Proposed Ramps</td>
<td>Existing Ramps¹</td>
<td>Proposed Ramps</td>
</tr>
<tr>
<td>AM Peak Hour</td>
<td>0.45 (2:06)</td>
<td>1.23 (5:12)</td>
<td>0.07 (0:30)</td>
<td>0.81 (3:24)</td>
</tr>
<tr>
<td>PM Peak Hour</td>
<td>0.45 (2:06)</td>
<td>1.10 (4:54)</td>
<td>0.07 (0:48)</td>
<td>0.54 (2:36)</td>
</tr>
<tr>
<td>Saturday Peak</td>
<td>0.68 (2:54)</td>
<td>0.00 (0:00)</td>
<td>0.37 (2:24)</td>
<td>0.00 (0:00)</td>
</tr>
<tr>
<td>Hour²</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. Includes planned reconstruction of the eastbound ramps on the east side of Yerba Buena Island as part of the SFOBB ESSSP
2. Ramp metering not assumed to be in operation during the Saturday peak hour. The analysis assumes that under conditions with the reconstructed westbound ramps, the reconstructed on-ramp would provide adequate capacity to serve all demand during the Saturday peak hour.
3. Delays greater than 35 seconds per vehicle (i.e., LOS E or F conditions, as defined by the HCM unsignalized intersection methodology summarized on Table 6) shown in **bold**.
Source: Fehr & Peers, 2009

#### 4.2.1.1.2 Ramp Merge/Diverge (Base Transit Scenario)

The operational characteristics of the Yerba Buena Island ramps were analyzed to determine project impacts. Table 39, Table 40, and Table 41 summarize the ramp merge and diverge levels of service for the AM, PM, and Saturday peak hours, respectively.³⁴ For conditions without reconstruction of the westbound ramps, the tables also present the stop-controlled intersection levels of service for the AM, PM, and Saturday peak hours. The tables also present average vehicular delay associated with the various traffic control devices metering traffic onto the SFOBB. However, this section discusses only the merge/diverge analysis; discussion of vehicular delays and LOS is discussed in the next section.

Based on the merge/diverge analysis, the Proposed Project would contribute traffic to the eastbound off-ramp diverge section on the west side of Yerba Buena Island, which was observed to operate at LOS E in the PM peak hour under existing conditions. Project traffic would comprise a majority of the traffic using the off-ramp during the PM peak hour and the project’s contribution would therefore, be considered substantial. The Proposed Project would also cause this same off-ramp diverge section to deteriorate from LOS D to LOS E in the Saturday peak hour. This means that during the weekday PM and Saturday peak hours, the roadway area on the SFOBB approaching the off-ramp would be operating near its capacity with virtually no usable gaps in the traffic stream and little room to maneuver, with notable congestion and/or queuing extending onto the SFOBB.

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³⁴ Under conditions with the proposed reconstruction of the westbound ramps on the east side of Yerba Buena Island, the westbound on-ramp on the west side of the Island would be converted to transit-only. Under these conditions, no analysis of the bus-only westbound on-ramp was performed because volumes would be very low. Under conditions without the reconstruction of the westbound ramps, both a side-street stop analysis and a ramp merge analysis were conducted.
<table>
<thead>
<tr>
<th>Ramp</th>
<th>Existing</th>
<th>Existing Plus Project (Base Transit Scenario)</th>
<th>Existing Plus Project (Expanded Transit Scenario)</th>
<th>Existing Plus Reduced Development Alternative (Base Transit Scenario)</th>
<th>Existing Plus Reduced Development Alternative (Expanded Transit Scenario)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Density</td>
<td>Delay/LOS</td>
<td>Density</td>
<td>Delay/LOS</td>
<td>Density</td>
</tr>
<tr>
<td></td>
<td>LOS</td>
<td></td>
<td>LOS</td>
<td></td>
<td>LOS</td>
</tr>
<tr>
<td>Eastbound On-Ramp</td>
<td>22.3/C</td>
<td>74.2/F</td>
<td>24.1/C</td>
<td></td>
<td>23.7/C</td>
</tr>
<tr>
<td>Eastbound Off-Ramp (West)</td>
<td>30.1/D</td>
<td></td>
<td>33.4/D</td>
<td></td>
<td>32.6/D</td>
</tr>
<tr>
<td>Westbound On-Ramp (West)</td>
<td>27.9/C</td>
<td>&gt;80/F</td>
<td>26.4/C</td>
<td>&gt;80/F</td>
<td>26.4/C</td>
</tr>
<tr>
<td>Westbound On-Ramp (East)</td>
<td>27.3/C</td>
<td>&gt;80/F</td>
<td>27.3/C</td>
<td>&gt;80/F</td>
<td>27.3/C</td>
</tr>
<tr>
<td>Westbound Off-Ramp</td>
<td>32.8/D</td>
<td></td>
<td>32.5/D</td>
<td></td>
<td>32.1/D</td>
</tr>
<tr>
<td>Westbound On-Ramp (East)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Westbound Off-Ramp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
1. Density measured in passenger cars per mile per lane.
2. Under conditions where the westbound ramps on the east side of Yerba Buena Island are not reconstructed, existing stop-control will remain in place on both westbound on-ramps. Under these conditions, similar to the analysis of existing conditions, both the HCM merge analysis and the HCM stop-controlled intersection analysis were performed.
3. The eastbound off-ramp (east side) and Westbound on-ramp (east) were closed due to construction at the time the existing conditions data were collected, but have since been reopened.
4. Under conditions with reconstruction of the westbound ramps (east), the westbound on-ramp (west) is planned to be transit-only. Thus, under conditions with reconstruction of the westbound ramps (east), ramp junction analysis was only performed for the westbound on-ramp (east) because volumes would be very small on the westbound on-ramp (west).

Source: Fehr & Peers, 2009
### TABLE 40 – RAMP JUNCTION ANALYSIS (PM PEAK HOUR)

<table>
<thead>
<tr>
<th>Ramp Junction LOS without Reconstructed Westbound Ramps</th>
<th>Density 1/LOS</th>
<th>Delay/LOS²</th>
<th>Density 1/LOS</th>
<th>Delay/LOS²</th>
<th>Density 1/LOS</th>
<th>Delay/LOS²</th>
<th>Density 1/LOS</th>
<th>Delay/LOS²</th>
<th>Density 1/LOS</th>
<th>Delay/LOS²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastbound On-Ramp</td>
<td>27.8/C</td>
<td>&gt;80/F</td>
<td>26.3/C</td>
<td></td>
<td>25.9/C</td>
<td></td>
<td>26.1/C</td>
<td></td>
<td>25.8/C</td>
<td></td>
</tr>
<tr>
<td>Eastbound Off-Ramp (East)³</td>
<td></td>
<td></td>
<td>30.4/D</td>
<td></td>
<td>30.4/D</td>
<td></td>
<td>30.5/D</td>
<td></td>
<td>30.2/D</td>
<td></td>
</tr>
<tr>
<td>Westbound On-Ramp (West)</td>
<td>25.1/C</td>
<td>&gt;80/F</td>
<td>25.0/C</td>
<td>&gt;80/F</td>
<td>25.0/C</td>
<td>&gt;80/F</td>
<td>25.0/C</td>
<td>&gt;80/F</td>
<td>25.0/C</td>
<td>&gt;80/F</td>
</tr>
<tr>
<td>Westbound On-Ramp (East)³</td>
<td>26.4/C</td>
<td>&gt;80/F</td>
<td>26.4/C</td>
<td>&gt;80/F</td>
<td>26.4/C</td>
<td>&gt;80/F</td>
<td>26.4/C</td>
<td>&gt;80/F</td>
<td>26.4/C</td>
<td>&gt;80/F</td>
</tr>
<tr>
<td>Westbound Off-Ramp</td>
<td>29.4/D</td>
<td></td>
<td>32.6/D</td>
<td></td>
<td>32.1/D</td>
<td></td>
<td>32.4/D</td>
<td></td>
<td>31.7/D</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ramp Junction LOS on Reconstructed Westbound Ramps</th>
<th>Density 1/LOS</th>
<th>Delay/LOS²</th>
<th>Density 1/LOS</th>
<th>Delay/LOS²</th>
<th>Density 1/LOS</th>
<th>Delay/LOS²</th>
<th>Density 1/LOS</th>
<th>Delay/LOS²</th>
<th>Density 1/LOS</th>
<th>Delay/LOS²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Westbound On-Ramp (East)³</td>
<td></td>
<td></td>
<td>25.2/C</td>
<td></td>
<td>25.1/C</td>
<td></td>
<td>25.1/C</td>
<td></td>
<td>25.0/C</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
1. Density measured in passenger cars per mile per lane.
2. Under conditions where the westbound ramps on the east side of Yerba Buena Island are not reconstructed, existing stop-control will remain in place on both westbound on-ramps. Under these conditions, similar to the analysis of existing conditions, both the HCM merge analysis and the HCM stop-controlled intersection analysis were performed.
3. The eastbound off-ramp (east side) and Westbound on-ramp (east) were closed due to construction at the time the existing conditions data were collected, but have since been reopened.
4. Under conditions with reconstruction of the westbound ramps (east), the westbound on-ramp (west) is planned to be transit-only. Thus, under conditions with reconstruction of the westbound ramps (east), ramp junction analysis was only performed for the westbound on-ramp (east) because volumes would be very small on the westbound on-ramp (west).

**Source:** Fehr & Peers, 2009
<table>
<thead>
<tr>
<th>Ramp Junction LOS without Reconstructed Westbound Ramps</th>
<th>Density(^1)/LOS</th>
<th>Delay/LOS(^2)</th>
<th>Density(^1)/LOS</th>
<th>Delay/LOS(^2)</th>
<th>Density(^1)/LOS</th>
<th>Delay/LOS(^2)</th>
<th>Density(^1)/LOS</th>
<th>Delay/LOS(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastbound Off-Ramp (East)(^3)</td>
<td></td>
<td></td>
<td>30.8/D</td>
<td>29.9/D</td>
<td>31.2/D</td>
<td>29.7/D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Westbound On-Ramp (West)</td>
<td>24.6/C</td>
<td>&gt;80/F</td>
<td>23.8/C</td>
<td>&gt;80/F</td>
<td>23.8/C</td>
<td>&gt;80/F</td>
<td>23.8/C</td>
<td>&gt;80/F</td>
</tr>
<tr>
<td>Westbound On-Ramp (East)(^3)</td>
<td></td>
<td>&gt;80/F</td>
<td>25.1/C</td>
<td>&gt;80/F</td>
<td>25.1/C</td>
<td>&gt;80/F</td>
<td>25.1/C</td>
<td>&gt;80/F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ramp Junction LOS on Reconstructed Westbound Ramps</th>
<th>Density(^1)/LOS</th>
<th>Delay/LOS(^2)</th>
<th>Density(^1)/LOS</th>
<th>Delay/LOS(^2)</th>
<th>Density(^1)/LOS</th>
<th>Delay/LOS(^2)</th>
<th>Density(^1)/LOS</th>
<th>Delay/LOS(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Westbound On-Ramp (East)(^4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>29.6/D</td>
<td>28.4/D</td>
</tr>
<tr>
<td>Westbound Off-Ramp</td>
<td>25.4/C</td>
<td>25.1/C</td>
<td>25.1/C</td>
<td>24.8/C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. Density measured in passenger cars per mile per lane.
2. Under conditions where the westbound ramps on the east side of Yerba Buena Island are not reconstructed, existing stop-control will remain in place on both westbound on-ramps. Under these conditions, similar to the analysis of existing conditions, both the HCM merge analysis and the HCM stop-controlled intersection analysis were performed.
3. The eastbound off-ramp (east side) and Westbound on-ramp (east) were closed due to construction at the time the existing conditions data were collected, but have since been reopened.
4. Under conditions with reconstruction of the westbound ramps (east), the westbound on-ramp (west) is planned to be transit-only. Thus, under conditions with reconstruction of the westbound ramps (east), ramp junction analysis was only performed for the westbound on-ramp (east) because volumes would be very small on the westbound on-ramp (west).

Source: Fehr & Peers, 2009
All other merge and diverge sections would operate at acceptable LOS D or better, with or without reconstruction of the westbound ramps on the east side of Yerba Buena Island. The Project’s impact to congestion on the SFOBB approaching the eastbound off-ramp diverge section on the west side of Yerba Buena Island is considered significant in the weekday PM and Saturday peak hours.

The primary cause for deficient operations at this off-ramp is the short deceleration distance followed by a tight curve. This design causes exiting vehicles to begin deceleration on the bridge mainline. To improve the operations of this diverge section, the off-ramp would need to be reconstructed to provide more deceleration distance and a less-severe curve. Reconstruction of this ramp would require major construction on the SFOBB, Yerba Buena Island, and the Treasure Island Road causeway. These improvements were evaluated in the Project Study Report for the ramps replacement project conducted by Caltrans and the SFCTA in December 2007 and were found to be infeasible.

**Mitigation Measure 1 – Implement the Expanded Transit Scenario**

As a means to reduce vehicular travel to and from the Islands, additional transit capacity shall be provided. The project sponsors shall work with WETA and SFMTA to develop and implement the Proposed Project’s transit operating plan. Elements of the plan include but are not limited to:

- Additional ferry service to reduce peak period headways from 50-minutes to increase frequencies to as much as 15-minute headways during the AM and PM peak periods
- Increased frequency on the Muni Route 108-Treasure Island service to reduce peak period headways from 15 minutes to as low as 7-minute headways in the AM peak period and as low as 5 minutes in the PM peak period.
- New bus service to another location in San Francisco (e.g., to the San Francisco Civic Center area) with frequencies as low as every 12-minutes during the AM and PM peak periods. Service shall be provided between approximately 5 AM and 10 PM.

Changes to the proposed East Bay bus service are not suggested as part of this Mitigation Measure. Although specific headways are suggested as part of this Mitigation Measure, SFMTA and WETA would maintain the authority to modify service levels and routes as part of their ongoing system-wide operations management.

The additional transit capacity (in terms of increased frequencies) and transit accessibility (due to a new route) to San Francisco has been designed to reduce transit travel times and to make transit use a more attractive travel mode. The Expanded Transit service would increase the transit mode share (including bus and ferry) from 27 to 44 percent during the AM peak hour, and from 25 to 40 percent during the PM peak hour. Correspondingly, the number of peak hour vehicle trips would decrease from 1,613 vehicles to 1,228 vehicles during the AM peak hour, and from 2,462 vehicles to 1,983 vehicles during the PM peak hour. During the Saturday peak hour, the transit mode share would increase from 16 percent to 26 percent, and the number of peak hour vehicles would decrease from 2,861 vehicles to 2,437 vehicles per hour.

Implementation of the Expanded Transit Scenario would reduce auto trip generation such that the project’s impacts to the eastbound off-ramp diverge section would be reduced. However, as illustrated in Tables 36 and 37 (pages 99 and 100) for the weekday PM and Saturday peak hours, respectively, this would have only a slight benefit to congestion around the off-ramp diverge section and the project’s impacts to this ramp diverge section would remain **significant and unavoidable.**
4.2.1.1.3 Ramp Delays (Base Transit Scenario)

The preceding two sections have illustrated the way in which the ramp configurations may constrain the amount of traffic that can enter the SFOBB from the Islands, the physical extents of queues caused by this constraint, and the effects of project-generated traffic on freeway merge and diverge sections on the SFOBB. This section describes the vehicular traffic delay associated with congestion leading up to the SFOBB. These delays were described in Tables 38 and 39. This delay affects not only project-generated traffic, but also existing uses on the Islands that would remain under conditions with the Proposed Project, including the Coast Guard. As shown in Figure 22 on page 107, queues and associated delay on the Islands may affect the Coast Guard operations around Yerba Buena Island and their access to the SFOBB. These delays are discussed in this section.

Traffic volumes destined for the westbound SFOBB will exceed the capacity of the westbound on-ramps to the SFOBB, resulting in queues. These queues will increase vehicular travel times and cause traffic delay. Although delays associated with ramp metering are not typically analyzed for purposes of identifying impacts, this analysis includes an analysis of ramp delays. There are two reasons why this analysis was performed for the unique case of the Proposed Project. First, because the existing configuration of the ramps includes stop signs at the ramp merge points, a side-street stop controlled analysis was conducted to better understand the operation of these unique ramps. To compare this stop controlled operation under the current ramp configuration with the proposed ramp reconfiguration that would include ramp meters, an analysis of the delay associated with ramp meters was necessary. The second reason why this analysis was performed for this project is that unlike most development projects, the ramps onto the SFOBB form the only egress from the Islands and there are no alternate vehicular travel routes. Because of this unique condition, this type of analysis is important to understanding the vehicular travel time implications of the Proposed Project and various ramp configurations.

Based on the stop-controlled analysis, which was conducted only for conditions in which the westbound ramps on the east side of Yerba Buena Island are not reconstructed and in which case the two westbound on-ramps would remain stop-controlled, the Proposed Project would contribute substantial traffic to both westbound ramps. As shown in Table 39, Table 40, and Table 41, both westbound ramps would operate at LOS F in the AM, PM, and Saturday peak hours. Delays would be considered a significant impact to both westbound on-ramps ramps in the AM, PM, and Saturday peak hours under conditions in which those ramps remain stop-controlled. If the existing configuration were to remain, it is unlikely that the existing stop signs would be removed or that other physical improvements would be made to the on-ramps.

**Mitigation Measure 1** – Implementation of Mitigation Measure 1 (the Expanded Transit Scenario) would reduce auto trip generation such that the project’s impacts to ramp delays at the two stop controlled westbound on-ramps would be reduced. However, as illustrated in Tables 39, 40 and 41 for the weekday AM and PM and Saturday peak hours, respectively, autos would still experience delay consistent with LOS F and the project’s impacts to delay approaching the on-ramps would remain significant and unavoidable.

If the separate project to reconstruct the westbound ramps on the east side of Yerba Buena Island were constructed and the west side westbound on-ramp was converted to transit-only, stop control devices

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35. Table 38 and Tables 39 through 41 both present estimates of average vehicle delay at the ramps. The two estimates are generally consistent, but were arrived at using different methodologies. Table 38 used VSSIM simulation software, whereas Table 39 uses traditional methods for estimating single-movement intersection delays. The VSSIM simulation takes into account the interaction between traffic streams that is more unique to this situation.

36. Although project-generated traffic would increase the level of congestion on YBI from what Coast Guard personnel currently experience, Coast Guard vehicles would accessing the SFOBB from North Gate Road, which is located adjacent to the existing and proposed on- and off-ramps to the SFOBB. Therefore, most Coast Guard traffic would avoid most of the potential vehicle queues at the on-ramps.

37. The project-generated traffic would constitute over half of the total traffic using the on-ramps.
would be eliminated and all westbound traffic (except transit vehicles destined for San Francisco) would be consolidated to the westbound on-ramp on the east side of Yerba Buena Island. This improvement, consequently, would simply relocate the source of vehicular delay from stop signs at the two ramp merges to a ramp meter upstream of the single remaining merge on the east side of Yerba Buena Island. The delay associated with the ramp meter is shown in Table 38 on page 108. Although the delays are technically caused by a ramp meter signal, the LOS criteria for unsignalized intersections were applied because the ramp meter signal functions more similarly to a stop sign than a traditional traffic signal.

Vehicular traffic delay under conditions with the reconstructed westbound ramps would be just over five minutes in the AM peak hour and just under five minutes in the PM peak hour. This would be a significant impact. Traffic would experience minimal delays in the Saturday peak hour since ramp meters were assumed not to be in operation during that time. Caltrans has indicated that the ramp reconstruction project will require ramp meters and it is unlikely that they would be eliminated from that project.

Mitigation Measure 1 – Implementation of Mitigation Measure 1 (the Expanded Transit Scenario) would reduce auto trip generation such that the project’s impacts to ramp delays at the ramp meter at the reconstructed westbound on-ramp would be reduced by nearly one-half. However, as illustrated in Table 38, autos would still experience delay consistent with LOS F and the project's impacts to delay approaching the on-ramps would remain significant and unavoidable.

4.2.1.1.4 Mainline Operations: Queuing on Approaches (Base Transit Scenario)

In addition to ramp operations, the operations of the SFOBB mainline segments were considered. Volumes on the SFOBB and approaches under conditions with the Proposed Project were shown in Figure 20 on page 105. As shown, the SFOBB currently experiences more demand than its capacity in the westbound direction in the AM peak hour and the eastbound direction in the PM peak hour. With the addition of project traffic, the weekday over-capacity conditions are expected to be exacerbated.

This analysis assumes that with the addition of project traffic (constrained by either ramp meters or stop control at on-ramps to the SFOBB at capacity conditions), some vehicles that would otherwise be on the SFOBB would be displaced, increasing queues at the toll plaza in the East Bay or at the San Francisco approaches. For example, if the SFOBB operates at capacity in the westbound direction during the AM peak hour today, and a project on the Islands adds 50 vehicles to the westbound on-ramp on Yerba Buena Island, those trips would displace 50 vehicles that would otherwise be able to travel westbound on the SFOBB. A similar phenomenon would occur in the PM peak hour, with project-related traffic lengthening queues on the eastbound approaches to the SFOBB, including surface streets in Downtown San Francisco, by the number of vehicles the project adds to those streets.

It should be noted that although Caltrans generally aims to work cooperatively with local jurisdictions regarding ramp metering, Caltrans retains the ultimate control of both the proposed ramp meters on Yerba Buena Island and the SFOBB toll plaza metering lights. It is possible that, in consultation with TITMA, Caltrans would reduce the metering rate for the on-ramps and allow more traffic to enter the SFOBB from the East Bay. This would reduce the project’s impacts to queuing at the East Bay toll plaza, but would increase queues on the Islands. The analysis presented in this report describes the worst case for bridge and queuing conditions in the East Bay.

The Proposed Project would displace traffic on the SFOBB and increase queues on the westbound approach in the AM peak hour by approximately 471 vehicles. The project’s increase to queues approaching the SFOBB from the East Bay in the AM peak hour would be significant.

Mitigation Measure 1 – Implementation of Mitigation Measure 1 (the Expanded Transit Scenario) would reduce auto trip generation using the travel demand management strategies described in Chapter 1, such that the project’s impacts to queues approaching the SFOBB from the East Bay would be reduced. However, as described later in this report the project would continue to
increase queues on the East Bay bridge approaches during the AM peak hour, which would be a significant and unavoidable impact.

Queues approaching the eastbound SFOBB from surface streets in San Francisco in the PM peak hour would increase by approximately 523 vehicles, although this unserved demand would be dispersed among multiple surface streets in San Francisco approaching the bridge. Still, the project’s increase to queues approaching the SFOBB from Downtown San Francisco in the PM peak hour would also be significant.

Mitigation Measure 1 – Implementation of Mitigation Measure 1 (the Expanded Transit Scenario) would reduce auto trip generation using the travel demand management strategies described in Chapter 1, such that the project’s impacts to queues approaching the SFOBB from Downtown San Francisco would be reduced. However, as described later in this report, the project would continue to increase queues on the bridge approaches from Downtown San Francisco during the PM peak hour, which would be a significant and unavoidable impact.

Except near ramp merge and diverge sections, operations on the SFOBB would operate similar to existing conditions (i.e., at capacity in peak directions during peak hours) since additional travel demand would be constrained by the toll plaza in the East Bay and eastbound approaches in San Francisco. Therefore, the project’s impacts to the SFOBB mainline operations are expected to be less than significant, because the bridge’s approaches limit the number of vehicles that can reach the bridge. Impacts to the SFOBB near ramp merge and diverge sections were discussed above. Generally, through-traffic on the SFOBB may experience some increased congestion in the eastbound direction due to project-generated impacts approaching the westbound off-ramp on the west side of Yerba Buena Island.

Project-generated increases to congestion in the westbound direction are not expected to generate substantial increases in congestion, particularly if the westbound ramps are reconstructed since those improvements would increase sight distance and acceleration distance allowing smoother traffic merging than the existing configuration.

4.2.1.2 Intersection Operations (Base Transit Scenario)

Figure 23 on page 116 shows the project-related traffic added to each turning movement at the study intersections in San Francisco. The differences in volumes at intersections in San Francisco associated with the two ramp configurations analyzed were negligible; therefore, Figure 23 represents the traffic assignment under both configurations. Figure 24 on page 117 presents the Existing Plus Project conditions intersection turning movement volumes at study intersections.
LEGEND:

1 = Study Intersection

XX (YY) [ZZ] = AM (PM) [SAT] Peak Hour Volume

Source: Fehr & Peers, 2009

Treasure Island and Yerba Buena Island Redevelopment Plan TIS

PROJECT TRIP ASSIGNMENT (BASE TRANSIT SCENARIO)
Table 42 (page 119) presents intersection operating conditions for Existing plus Project Conditions for all four scenarios evaluated in this study. As shown, under Existing plus Project conditions with the Base Transit Scenario, 10 study intersections would operate at unacceptable LOS E or F during one or more of the three peak hours analyzed. Those intersections, and the Proposed Project’s contribution to those conditions, are discussed below.

1st Street/Market Street (Study Intersection #4) – The Proposed Project would cause this intersection to deteriorate from LOS E to LOS F in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic, which combines with existing traffic destined for the SFOBB in the PM peak hour to deteriorate conditions to unacceptable operations. Traffic signals at this intersection are timed to prioritize transit movements on Market Street. Modifications to signal timing to provide more capacity for southbound traffic would likely impact transit operations on Market Street, which would be inconsistent with the City’s Transit First policy. Further, providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment provided on Market Street. As shown on Table 42, implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate at LOS F in the PM peak hour. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would be **significant and unavoidable**.

1st Street/Mission Street (Study Intersection #5) – The Proposed Project would cause this intersection to deteriorate from LOS E to LOS F in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic, which combines with existing traffic destined for the SFOBB in the PM peak hour to deteriorate conditions to unacceptable operations. Traffic signals at this intersection are timed to prioritize transit movements on Mission Street. As a result, modifications to signal timing to provide more capacity for southbound traffic would likely impact transit operations on Mission Street, which would be inconsistent with the City’s Transit First Policy. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco and proposed as part of the Transit Center District Plan currently under study. As shown on Table 42, implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate at LOS F in the PM peak hour. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would be **significant and unavoidable**.

1st Street/Howard Street (Study Intersection #6) – The Proposed Project would contribute traffic to this intersection that operates at LOS E under existing conditions during the PM peak hour. However, the project would not contribute any vehicles to the critical southbound right-turn movement at this intersection and the project’s impacts to this intersection would be **less than significant**.

1st Street/Folsom Street (Study Intersection #7) – The Proposed Project would cause this intersection to deteriorate from LOS E to LOS F in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic, which combines with existing traffic destined for the SFOBB in the PM peak hour to deteriorate conditions to unacceptable operations. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco and proposed as part of the Transit Center District Plan currently under study. As shown on Table 42, implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate at LOS F in the PM peak hour. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would be **significant and unavoidable**.
### TABLE 42 – INTERSECTION LEVELS OF SERVICE – EXISTING PLUS PROJECT CONDITIONS

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Peak Hour</th>
<th>Existing</th>
<th>Existing + Project: Base Transit Scenario</th>
<th>Existing + Project: Expanded Transit Scenario</th>
<th>Existing + Reduced Development: Base Transit Scenario</th>
<th>Existing + Reduced Development: Expanded Transit Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Delay¹</td>
<td>LOS</td>
<td>v/c</td>
<td>Delay¹</td>
</tr>
<tr>
<td>1. Fremont/Howard</td>
<td>AM</td>
<td>17.8</td>
<td>B</td>
<td>0.78</td>
<td>19.2</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>44.1</td>
<td>D</td>
<td>0.96</td>
<td>46.3</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>Sat</td>
<td>13.2</td>
<td>B</td>
<td>0.51</td>
<td>14.1</td>
<td>B</td>
</tr>
<tr>
<td>2. Fremont/Folsom</td>
<td>AM</td>
<td>28.9</td>
<td>C</td>
<td>0.68</td>
<td>30.4</td>
<td>C</td>
</tr>
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<td></td>
<td>PM</td>
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<td>C</td>
</tr>
<tr>
<td></td>
<td>Sat</td>
<td>20.4</td>
<td>C</td>
<td>0.17</td>
<td>20.8</td>
<td>C</td>
</tr>
<tr>
<td>3. Fremont/I-80 EB Off-Ramp/Harrison</td>
<td>AM</td>
<td>10.9</td>
<td>B</td>
<td>0.36</td>
<td>11.0</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>25.1</td>
<td>C</td>
<td>0.80</td>
<td>29.5</td>
<td>C</td>
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<tr>
<td></td>
<td>Sat</td>
<td>10.4</td>
<td>B</td>
<td>0.20</td>
<td>10.7</td>
<td>B</td>
</tr>
<tr>
<td>4. First/Market</td>
<td>AM</td>
<td>33.4</td>
<td>C</td>
<td>0.70</td>
<td>43.8</td>
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<tr>
<td></td>
<td>PM</td>
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<td>E</td>
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<td>F</td>
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<tr>
<td></td>
<td>Sat</td>
<td>18.5</td>
<td>B</td>
<td>0.58</td>
<td>28.0</td>
<td>C</td>
</tr>
<tr>
<td>5. First/Mission</td>
<td>AM</td>
<td>14.8</td>
<td>B</td>
<td>0.77</td>
<td>15.2</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>67.8</td>
<td>E</td>
<td>0.88</td>
<td>&gt;80</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>Sat</td>
<td>18.3</td>
<td>B</td>
<td>0.55</td>
<td>21.1</td>
<td>C</td>
</tr>
<tr>
<td>6. First/Howard</td>
<td>AM</td>
<td>14.6</td>
<td>B</td>
<td>0.79</td>
<td>15.4</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>73.7</td>
<td>E</td>
<td>1.12</td>
<td>74.5</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>Sat</td>
<td>22.2</td>
<td>C</td>
<td>0.42</td>
<td>19.3</td>
<td>B</td>
</tr>
<tr>
<td>7. First/Folsom</td>
<td>AM</td>
<td>12.1</td>
<td>B</td>
<td>0.52</td>
<td>12.0</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>70.6</td>
<td>E</td>
<td>1.14</td>
<td>&gt;80</td>
<td>F</td>
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<td></td>
<td>Sat</td>
<td>17.3</td>
<td>B</td>
<td>0.33</td>
<td>17.6</td>
<td>B</td>
</tr>
<tr>
<td>8. First/Howard/Folsom/I-80 EB On-Ramp</td>
<td>AM</td>
<td>29.0</td>
<td>C</td>
<td>0.63</td>
<td>28.4</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>&gt;80</td>
<td>E</td>
<td>1.29</td>
<td>&gt;80</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>Sat</td>
<td>10.7</td>
<td>B</td>
<td>0.55</td>
<td>13.3</td>
<td>B</td>
</tr>
</tbody>
</table>

¹ Delay: Delay in seconds.
<table>
<thead>
<tr>
<th>Intersection</th>
<th>Peak Hour</th>
<th>Existing</th>
<th>Existing + Project: Base Transit Scenario</th>
<th>Existing + Project: Expanded Transit Scenario</th>
<th>Existing + Reduced Development: Base Transit Scenario</th>
<th>Existing + Reduced Development: Expanded Transit Scenario</th>
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<tr>
<td></td>
<td></td>
<td>Delay¹</td>
<td>LOS</td>
<td>v/c</td>
<td>Delay¹</td>
<td>Delay</td>
</tr>
<tr>
<td>9. Folsom/Essex⁴</td>
<td>AM</td>
<td>7.4</td>
<td>A</td>
<td>0.37</td>
<td>7.5</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>&gt;80</td>
<td>F</td>
<td>1.22</td>
<td>&gt;80</td>
<td>F</td>
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<tr>
<td></td>
<td>Sat</td>
<td>15.1</td>
<td>B</td>
<td>0.36</td>
<td>15.6</td>
<td>B</td>
</tr>
<tr>
<td>10. Essex/Harrison /I-80 EB On-Ramp</td>
<td>AM</td>
<td>13.4</td>
<td>B</td>
<td>0.50</td>
<td>13.5</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>59.4</td>
<td>E</td>
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<td>68.0</td>
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<td></td>
<td>Sat</td>
<td>14.8</td>
<td>B</td>
<td>0.34</td>
<td>14.9</td>
<td>B</td>
</tr>
<tr>
<td>11. Second/Folsom</td>
<td>AM</td>
<td>11.1</td>
<td>C</td>
<td>0.37</td>
<td>11.6</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>32.4</td>
<td>C</td>
<td>0.90</td>
<td>32.8</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>Sat</td>
<td>11.5</td>
<td>B</td>
<td>0.38</td>
<td>11.6</td>
<td>B</td>
</tr>
<tr>
<td>12. Second/Bryant</td>
<td>AM</td>
<td>68.6</td>
<td>E</td>
<td>0.81</td>
<td>68.5</td>
<td>E</td>
</tr>
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<td>D</td>
<td>0.85</td>
<td>48.6</td>
<td>D</td>
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<td></td>
<td>Sat</td>
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<td>B</td>
<td>0.39</td>
<td>12.2</td>
<td>B</td>
</tr>
<tr>
<td>13. Embarcadero/ Harrison</td>
<td>AM</td>
<td>22.0</td>
<td>C</td>
<td>0.56</td>
<td>23.5</td>
<td>C</td>
</tr>
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<td></td>
<td>PM</td>
<td>&gt;80</td>
<td>F</td>
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<td>F</td>
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<td></td>
<td>Sat</td>
<td>53.2</td>
<td>D</td>
<td>0.70</td>
<td>61.3</td>
<td>E</td>
</tr>
<tr>
<td>14. Bryant /Sterling⁴</td>
<td>AM</td>
<td>25.1</td>
<td>C</td>
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<td>26.7</td>
<td>C</td>
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<td>25.9</td>
<td>C</td>
<td>0.56</td>
<td>25.2</td>
<td>C</td>
</tr>
</tbody>
</table>

¹ Delay in minutes.
### TABLE 42 – INTERSECTION LEVELS OF SERVICE – EXISTING PLUS PROJECT CONDITIONS

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Peak Hour</th>
<th>Existing</th>
<th>Existing + Project: Base Transit Scenario</th>
<th>Existing + Project: Expanded Transit Scenario</th>
<th>Existing + Reduced Development: Base Transit Scenario</th>
<th>Existing + Reduced Development: Expanded Transit Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. Avenue of the Palms/1st Street</td>
<td>AM</td>
<td>18.1 B</td>
<td>13.4 B</td>
<td>13.3 B</td>
<td>12.1 B</td>
<td>0.56</td>
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<td></td>
<td>PM</td>
<td>40.5 D</td>
<td>18.6 B</td>
<td>25.3 C</td>
<td>14.2 B</td>
<td>0.77</td>
</tr>
<tr>
<td></td>
<td>Sat</td>
<td>50.6 D</td>
<td>29.8 C</td>
<td>35.6 D</td>
<td>20.5 C</td>
<td>0.89</td>
</tr>
</tbody>
</table>

**Notes:**

1. Whole intersection weighted average stopped delay expressed in seconds per vehicle calculated using methods described in the 2000 HCM. In rare cases, if the Proposed Project adds traffic to movements with lower average delay than the average delay for the entire intersection, the project could result in lower average delay per vehicle than the “no project” scenario.
2. Since the project will substantially change travel patterns onto and off of the Island, this intersection was not analyzed under Existing Conditions.
3. **Bold** indicates an unacceptable level of service (LOS), i.e., at LOS E or LOS F conditions.
4. Uncontrolled intersections.

1st Street/Harrison Street/I-80 Eastbound On-Ramp (Study Intersection #8) – The Proposed Project would cause this intersection to deteriorate from LOS E to LOS F in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic, which combines with existing traffic destined for the SFOBB in the PM peak hour to deteriorate conditions to unacceptable operations. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco. As shown on Table 42, implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate at LOS F in the PM peak hour. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would be significant and unavoidable.

Folsom Street/Essex Street (Study Intersection #9) – The study intersection of Folsom Street/Essex Street (#9) is not currently controlled by either traffic signals or STOP signs, and both approaches to the intersections are uncontrolled. During the weekday PM peak hour, the intersection is affected by PM peak hour traffic destined to the SFOBB eastbound on-ramps at Harrison Street and Bryant Street. During the PM peak period, queues form on the approaches to the on-ramp that spill back into the intersection, resulting in queued operations within the travel lanes serving the on-ramps. Implementation of the Proposed Project would add vehicles to these existing queues, and contributions to the queued operations would be considered significant. Implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate with vehicle queues during the PM peak hour. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would remain significant and unavoidable.

Essex Street/Harrison Street/I-80 Eastbound On-Ramp (Study Intersection #10) – The Proposed Project would add traffic to this intersection, which operates at LOS F under existing conditions in the PM peak hour. The critical movement in the PM peak hour is the eastbound right turn movement from eastbound Harrison Street onto the I-80 Eastbound On-Ramp. The Proposed Project would contribute less than five percent (2.5 percent) to this critical movement. Therefore, the project’s contribution to poor operating conditions at this intersection would be considered less than significant.

2nd Street/Folsom Street (Study Intersection #11) – The Proposed Project would add traffic to this intersection, which operates at LOS E during the PM peak hour. The critical movements in the PM peak hour are the southbound through and southbound left-turn movements. The Proposed Project would contribute substantially to the critical southbound left-turn movement (22 percent). Therefore, the project’s contribution to poor operating conditions at this intersection would be considered significant. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment that is encouraged by the City of San Francisco and proposed as part of the Transit Center District Plan currently under study. As shown on Table 42, implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate at LOS F in the PM peak hour. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would be significant and unavoidable.

The Embarcadero/Harrison Street (Study Intersection #13) – The Proposed Project would add traffic to this intersection, which operates at LOS E in the AM peak hour. The northbound through and the eastbound left are the critical movements at this intersection. However, the eastbound left operates at acceptable level of service. Therefore, the Proposed Project’s contribution of four vehicles to this movement would not be a significant impact. The northbound through movement is a critical movement at this intersection that operates at LOS F in the AM peak hour. The Proposed Project would not contribute traffic to this movement. Therefore, the project’s contribution to poor operating conditions in the AM peak hour would be considered less than significant.
Because the Proposed Project’s contribution to critical movements at this intersection during the AM and PM peak hours would be small, the project’s impact is considered less than significant.

**Bryant Street/Sterling Street (Study Intersection #14)** – The study intersection of Bryant Street/Sterling Street is not currently controlled by either traffic signals or STOP signs, and both approaches to the intersections are uncontrolled. During the weekday PM peak hour, the intersection is affected by PM peak hour traffic destined to the SFOBB eastbound on-ramps at Harrison Street and Bryant Street. During the PM peak period, queues form on the approaches to the on-ramp that spill back into the intersection, resulting in queued operations within the travel lanes serving the on-ramps. Implementation of the Proposed Project would add vehicles to these existing queues, and contributions to the queued operations would be considered significant. Implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate with vehicle queues during the PM peak hour. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would remain **significant and unavoidable**.

**Bryant Street/5th Street/I-80 Eastbound On-Ramp (Study Intersection #15)** – The Proposed Project would add traffic to this intersection, which operates at LOS F during the PM peak hour under existing conditions. The critical movements in the PM peak hour are the southbound through and northbound right turn movements. The Proposed Project would contribute less than five percent (2.7 percent) to the critical southbound through movement. However, the Proposed Project would contribute more than five percent (5.4 percent) to the northbound right-turn movement. Therefore, the Proposed Project would result in a significant impact during the PM peak hour.

The project would also cause the intersection to deteriorate from LOS D to LOS E during the Saturday peak hour. This would also be a significant impact.

The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic and to northbound traffic on 5th Street turning onto the I-80 Eastbound On-Ramp. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco. As shown on **Table 42** (page 119), implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate at LOS F in the PM peak hour and LOS E in the Saturday peak hour. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would remain **significant and unavoidable**.

**5th Street/Harrison Street/I-80 Westbound Off-Ramp (Study Intersection #16)** – The Proposed Project would cause this intersection to deteriorate from LOS D to LOS E in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic and traffic exiting I-80. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths or right of way acquisition, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco. As shown on **Table 42**, implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate at LOS E in the PM peak hour. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would remain **significant and unavoidable**.

### 4.2.2 Proposed Project With Expanded Transit Service

This section describes the traffic-related impacts associated with the Proposed Project under the Expanded Transit Scenario.
4.2.2.1 Freeway and Ramp Operations (Expanded Transit Scenario)

Figures A-3 and A-4 in Appendix D4 presents the unconstrained trip assignment to individual ramps for the Proposed Project under the Expanded Transit Scenario assuming the existing westbound ramps and the proposed reconfigured westbound ramps, respectively.

Figure 25 on page 125 shows the amount of traffic assigned to each freeway segment under the existing westbound ramp configuration, constrained by the capacity of the stop signs on the westbound ramps. Figure 26 on page 126 shows the same information for conditions with reconstructed westbound ramps, constrained by the capacity of the ramp meters. The resulting volumes were used to assess freeway impacts in terms of ramp merge and diverge section operations as well as contributions to queuing on freeway mainline segments and approaches for the Proposed Project under the Expanded Transit Scenario.
**Figure 25**

**Treasure Island and Yerba Buena Island Redevelopment Plan TIS**

**EXISTING PLUS PROJECT (EXPANDED TRANSIT SCENARIO)**

**SFOBB TRAVEL DEMAND AND VEHICLE QUEUES**

<<NO NEW WESTBOUND ON-RAMPS>>

<table>
<thead>
<tr>
<th>Demand</th>
<th>AM</th>
<th>PM</th>
<th>SAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Served</td>
<td>7,550</td>
<td>9,000</td>
<td>8,850</td>
</tr>
<tr>
<td>Unserved (Queue)</td>
<td>0</td>
<td>1,450</td>
<td>0</td>
</tr>
</tbody>
</table>

**EB ON:**

- 264 (383) [440]

**EB OFF:**

- 575 (1,082) [1,187]

**Total Ramp Demand (Existing & Project):**

- WB ON RAMP (EAST): 384 (409) [563]
- WB ON RAMP (WEST): 384 (410) [564]
- SOV + HOV: 750 (750) [750]
- Unserved Demand: 18 (69) [377]
- WB OFF: 182 (328) [451]

**Demand**

<table>
<thead>
<tr>
<th>AM</th>
<th>PM</th>
<th>SAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Served</td>
<td>8,550</td>
<td>8,250</td>
</tr>
<tr>
<td>Unserved (Queue)</td>
<td>2,050</td>
<td>0</td>
</tr>
</tbody>
</table>

**NOTE:**

This refers to unserved demand on San Francisco city streets approaching the SFOBB. Additional unserved demand exists on northbound US 101/eastbound I-80 approaching the SFOBB. Unserved demand on US 101/I-80 is not quantified due to the complex nature of the approaching freeway network.

Source: Fehr & Peers, 2009
**Treasure Island and Yerba Buena Island Redevelopment Plan TIS**

**EXISTING PLUS PROJECT (EXPANDED TRANSIT SCENARIO)**

**SFOBB TRAVEL DEMAND AND VEHICLE QUEUES**

**FIGURE 26**

Source: Fehr & Peers, 2009
4.2.2.1.1 Ramp Queuing (Expanded Transit Service)

Due to the complex interaction of vehicle streams that approach the SFOBB from the Islands, the VISSIM microsimulation software was used to evaluate vehicle queuing on the ramp approaches that may result from the eastbound, westbound, SOV, HOV2, and HOV3+ all sharing a common approach to the SFOBB. The maximum queues for each scenario, measured from the intersection of South Gate Drive and Macalla Road, as well as the average amount of delay for queued vehicles are presented in Table 38, on page 108. Table 38 also depicts average vehicular delay associated with the queuing for traffic approaching the SFOBB. (The delay is discussed in a subsequent section.) Figure 27 (page 128) illustrates the extent of queuing associated with the Proposed Project under the Expanded Transit Scenario for conditions with and without reconstruction of the westbound ramps.

As depicted in Table 38 and illustrated on Figure 27, under the Expanded Transit Scenario, queues on roadways approaching the SFOBB on-ramps would be notably shorter than under the Base Transit Scenario. This is because the Expanded Transit Service would reduce automobile traffic generation resulting in fewer vehicles attempting to enter the SFOBB during peak hours. Without reconstruction of the westbound on-ramp to the SFOBB (and the associated HOV3+ bypass), queues would extend back approximately 400 feet from each of the two westbound on-ramps during the AM and PM peak hours, and approximately 1/3 mile during the Saturday peak hour. With reconstruction of the westbound ramps (and the associated consolidation of all traffic to a single westbound on-ramp), queues would be somewhat longer, extending to a maximum of less than one mile, approximately to the transit-only westbound on-ramp.

4.2.2.1.2 Ramp Merge/Diverge (Expanded Transit Service)

The operational characteristics of the Yerba Buena Island ramps were analyzed to determine project impacts. Tables 39, 40 and 41, on pages 109 to 111, summarize the ramp merge and diverge levels of service for the AM, PM, and Saturday peak hours, respectively. For conditions without reconstruction of the westbound ramps, the tables also present the stop-controlled intersection levels of service for the AM, PM, and Saturday peak hours. However, this section discusses only the merge/diverge analysis; discussion of vehicular delays and LOS associated with ramp control devices (i.e., stop signs or meters) is discussed in the next section.

Based on the merge/diverge analysis, the Proposed Project would contribute traffic to the eastbound off-ramp diverge section on the west side of Yerba Buena Island, which was observed to operate at LOS E in the PM peak hour under existing conditions. Project traffic would comprise a majority of the traffic using the off-ramp during the PM peak hour and the project’s contribution would therefore, be considered substantial. The Proposed Project would also cause this same off-ramp diverge section to deteriorate from LOS D to LOS E in the Saturday peak hour. This means that during the weekday PM and Saturday peak hours, the roadway area on the SFOBB approaching the off-ramp would be operating near its capacity with virtually no usable gaps in the traffic stream and little room to maneuver, with notable congestion and/or queuing extending onto the SFOBB.

All other merge and diverge sections would operate at acceptable LOS D or better, with or without reconstruction of the westbound ramps on the east side of Yerba Buena Island. The project’s impact to congestion on the SFOBB approaching the eastbound off-ramp diverge section on the west side of Yerba Buena Island is considered significant in the weekday PM and Saturday peak hours.

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38. Under conditions with the proposed reconstruction of the westbound ramps on the east side of Yerba Buena Island, the westbound on-ramp on the west side of the Island would be converted to transit-only. Under these conditions, no analysis of the bus-only westbound on-ramp was performed because volumes would be very low. Under conditions without the reconstruction of the westbound ramps, both a side-street stop analysis and a ramp merge analysis were conducted.
1. Maximum queues expected to occur during the AM peak hour.
2. The street names shown on this figure are for identification purposes only and subject to change.

Source: Perkins + Will, May 4, 2009; Fehr & Peers, 2009
The primary cause for deficient operations at this off-ramp is the short deceleration distance followed by a tight curve. This design causes exiting vehicles to begin deceleration on the bridge mainline. To improve the operations of this diverge section, the off-ramp would need to be reconstructed to provide more deceleration distance and a less-severe curve. Reconstruction of this ramp would require major construction on the SFOBB, Yerba Buena Island, and the Treasure Island Road causeway. These improvements were evaluated in the Project Study Report for the ramps replacement project conducted by Caltrans and the SFCTA in December 2007 and were found to be infeasible. Therefore, the project’s impacts to this ramp diverge section would remain significant and unavoidable.

4.2.2.1.3 Ramp Delays (Expanded Transit Service)

The preceding discussion illustrated the way in which the ramp configurations may constrain the amount of traffic that can enter the SFOBB from the Islands, the physical extents of queues caused by this constraint, and the effects of project-generated traffic on freeway merge and diverge sections on the SFOBB. This section describes the vehicular traffic delay associated with congestion leading up to the SFOBB for the Proposed Project under the Expanded Transit Scenario. This delay affects not only project-generated traffic, but also existing uses on the Islands that would remain under conditions with the Proposed Project, including the Coast Guard and Job Corps. As shown in Figure 27, queues on the Islands and associated delay may affect the Coast Guard operations around Yerba Buena Island and their access to the SFOBB. These delays are discussed in this section.

Even under the Expanded Transit Scenario, traffic volumes destined for the westbound SFOBB will exceed the capacity of the westbound on-ramps to the SFOBB, resulting in queues. These queues will increase vehicular travel times and cause traffic delay. Although delays associated with ramp metering are not typically analyzed for purposes of identifying impacts, due to the unique nature of this project and the SFOBB, this report includes an analysis or ramp delays.

Based on the stop-controlled analysis, which was conducted only for conditions in which the westbound ramps on the east side of Yerba Buena Island are not reconstructed and in which case the two westbound on-ramps would remain stop-controlled, the Proposed Project would contribute substantial traffic to both westbound ramps. As shown in Table 39, Table 40, and Table 41, both westbound ramps would operate at LOS F in the AM, PM, and Saturday peak hours. This would be considered a significant impact to both westbound on-ramps in the AM, PM, and Saturday peak hours under conditions in which those ramps remain stop-controlled. If the existing configuration were to remain, it is unlikely that the existing stop signs would be removed or that other physical improvements would be made to the on-ramps. Therefore, the project’s impacts to delay approaching the on-ramps would remain significant and unavoidable.

If the separate project to reconstruct the westbound ramps on the east side of Yerba Buena Island were constructed and the west side westbound on-ramp were converted to transit-only, stop control devices would be eliminated and all westbound traffic (except transit vehicles destined for San Francisco) would be consolidated to the westbound on-ramp on the east side of Yerba Buena Island. This improvement, consequently, would simply relocate the source of vehicular delay from stop signs at the two ramp merges to a ramp meter upstream of the single remaining merge on the east side of Yerba Buena Island. The delay associated with the ramp meter is shown in Table 38. Although the delays are technically caused by a ramp meter signal, the LOS criteria for unsignalized intersections were applied because the ramp meter signal functions more similarly to a stop sign than a traditional traffic signal.

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39. Although Coast Guard personnel would experience increased congestion getting to and from the SFOBB from what they currently experience today, their primary access point would be from North Gate Road, which is located near the existing and proposed on- and off-ramps on the east side of Yerba Buena Island. Therefore, they would skip most of the queue unless travelling to and from Treasure Island.

40. The project-generated traffic would constitute over half of the total traffic using the on-ramps.
Vehicular traffic delay under conditions with the reconstructed westbound ramps would be approximately 3.5 minutes in the AM peak hour and 2.5 minutes in the PM peak hour. Although this delay is considerably shorter with the Expanded Transit Scenario than under the Base Transit Scenario, this vehicular delay would be a significant impact. Traffic would experience minimal delays in the Saturday peak hour since ramp meters were assumed not to be in operation during that time. Caltrans has indicated that the ramp reconstruction project will require ramp meters and it is unlikely that they would be eliminated from that project. Therefore, the project’s impacts to delay approaching the reconstructed on-ramps would remain **significant and unavoidable**.

4.2.2.1.4 Mainline Operations: Queuing on Approaches (Expanded Transit Service)

In addition to ramp operations, the operations of the SFOBB mainline segments were considered. Volumes on the SFOBB and approaches under conditions with the Proposed Project under the Expanded Transit Scenario are shown in Figures 25 and 26 (pages 125 and 126). As shown, the SFOBB experiences more demand than its capacity in the westbound direction in the AM peak hour and the eastbound direction in the PM peak hour. With the addition of project traffic, the weekday over-capacity conditions are expected to be exacerbated.

This analysis assumes that with the addition of project traffic (constrained by either ramp meters or stop control at on-ramps to the SFOBB at capacity conditions), some vehicles that would otherwise be on the SFOBB would be displaced, increasing queues at the toll plaza in the East Bay or at the San Francisco approaches. For example, if the SFOBB operates at capacity in the westbound direction during the AM peak hour today, and the Proposed Project would displace 50 vehicles that would otherwise be able to travel westbound on the SFOBB. This would increase the westbound queue at the SFOBB toll plaza by 50 vehicles. A similar phenomenon would occur in the PM peak hour, with project-related traffic lengthening queues on the eastbound approaches to the SFOBB, including surface streets in Downtown San Francisco, by the number of vehicles the project adds to those streets.

It should be noted that although Caltrans generally aims to work cooperatively with local jurisdictions regarding ramp metering, Caltrans retains the ultimate control of both the ramp meters on Yerba Buena Island and the SFOBB toll plaza metering lights. It is possible that, in consultation with TITMA, Caltrans would reduce the metering rate for the on-ramps and allow more traffic to enter the SFOBB from the East Bay. This would reduce the project’s impacts to queuing at the East Bay toll plaza, but would increase queues on the Islands. The analysis presented in this report describes the worst case for bridge and queuing conditions in the East Bay.

Under the Expanded Transit Scenario, the Proposed Project would displace traffic on the SFOBB and increase queues on the westbound approach in the AM peak hour by approximately 442 vehicles. The project’s increase to queues approaching the SFOBB from the East Bay in the AM peak hour would be significant. Increasing the ramp metering rate at the East Bay toll plaza may reduce queues in the East Bay somewhat, but would cause other impacts to the bridge operations by increasing congestion on the SFOBB mainline. Therefore, it is unlikely that operational improvements could improve the capacity of the SFOBB and in turn, reduce queues in the East Bay. Therefore, the project’s contribution to increased queues on the East Bay bridge approaches during the AM peak hour would be a **significant and unavoidable** impact.

Queues approaching the eastbound SFOBB from surface streets in San Francisco in the PM peak hour would increase by approximately 412 vehicles under the Expanded Transit Scenario, although this unserved demand would be dispersed among multiple surface streets in San Francisco approaching the bridge. Still, the project’s increase to queues approaching the SFOBB from Downtown San Francisco in the PM peak hour would also be significant. Queues approaching the SFOBB are caused by capacity constraints on the SFOBB mainline. Since increasing the capacity of the SFOBB would require additional lanes, which is not likely feasible, the project’s impacts to queues approaching the SFOBB from Downtown San Francisco would be a **significant and unavoidable** impact.
Except near ramp merge and diverge sections, operations on the SFOBB would operate similar to existing conditions (i.e., at capacity in peak directions during peak hours) since additional travel demand would be constrained by the toll plaza in the East Bay and eastbound approaches in San Francisco. Therefore, the project’s impacts to the SFOBB mainline operations are expected to be less than significant, because the bridge’s approaches limit the number of vehicles that can reach the bridge. Impacts to the SFOBB near ramp merge and diverge sections under the Expanded Transit Scenario were discussed on page 127. Generally, through-traffic on the SFOBB may experience some increased congestion in the eastbound direction due to project-generated impacts approaching the westbound off-ramp on the west side of Yerba Buena Island. Project-generated increases to congestion in the westbound direction are not expected to generate substantial increases in congestion, particularly if the westbound ramps are reconstructed since those improvements would increase sight distance and acceleration distance allowing smoother traffic merging than the existing configuration.

4.2.2.2 Intersection Operations (Expanded Transit Service)

Figure 28 (page 132) shows the project-related traffic added to each turning movement at the study intersections in San Francisco under the Expanded Transit Scenario. The differences in volumes at intersections in San Francisco associated with the two ramp configurations analyzed were negligible; therefore, Figure 28 represents the traffic assignment under both configurations. Figure 29 (page 133) presents the Existing Plus Project conditions intersection turning movement volumes under the Expanded Transit Scenario at study intersections.

The intersection of Avenue of the Palms/1st Street was included in the Plus Project scenario, since it is the first intersection on Treasure Island and would serve most of the traffic associated with the redevelopment project. This intersection was not analyzed under Existing Conditions.

Table 42, on page 119, presents intersection-operating conditions for Existing plus Project Conditions for all four scenarios evaluated in this study, including the Expanded Transit Scenario. As shown, under Existing plus Project conditions with the Expanded Transit Scenario, 10 study intersections would operate at unacceptable LOS E or F during one or more of the three peak hours analyzed. This is similar to Existing plus Project Conditions under the Base Transit Scenario. The 10 intersections operating unacceptably, and the Proposed Project’s contribution to those conditions under the Expanded Transit Scenario, are discussed below.

1st Street/Market Street (Study Intersection #4) – The Proposed Project would cause this intersection to deteriorate from LOS E to LOS F in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic, which combines with existing traffic destined for the SFOBB in the PM peak hour to deteriorate conditions to unacceptable operations. Traffic signals at this intersection are timed to prioritize transit movements on Market Street. Modifications to signal timing to provide more capacity for southbound traffic would likely impact transit operations on Market Street, which would be inconsistent with the City’s Transit First policy. Further, providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment provided on Market Street. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would be significant and unavoidable.
PROJECT TRIP ASSIGNMENT (EXPANDED TRANSIT SCENARIO)

Treasure Island and Yerba Buena Island Redevelopment Plan TIS

June 2010
SF07-0340/graphics/TIS/0340-28

FIGURE 28

Source: Fehr & Peers, 2009

LEGEND:

= Study Intersection
XX (YY) [ZZ] = AM (PM) [SAT] Peak Hour Volume

Not to Scale
Treasure Island and Yerba Buena Island Redevelopment Plan TIS
EXISTING PLUS PROJECT (EXPANDED TRANSIT SCENARIO)
PEAK HOUR INTERSECTION VOLUMES

Source: Fehr & Peers, 2009

FIGURE 29
1st Street/Mission Street (Study Intersection #5) – The Proposed Project would cause this intersection to deteriorate from LOS E to LOS F in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic, which combines with existing traffic destined for the SFOBB in the PM peak hour to deteriorate conditions to unacceptable operations. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco and proposed as part of the Transit Center District Plan currently under study. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would be significant and unavoidable.

1st Street/Howard Street (Study Intersection #6) – The Proposed Project would contribute traffic to this intersection that operates at LOS E under existing conditions during the PM peak hour. However, the project would not contribute any vehicles to the critical southbound right-turn movement at this intersection and the project’s impacts to this intersection would be less than significant.

1st Street/Folsom Street (Study Intersection #7) – The Proposed Project would cause this intersection to deteriorate from LOS E to LOS F in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic, which combines with existing traffic destined for the SFOBB in the PM peak hour to deteriorate conditions to unacceptable operations. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would be significant and unavoidable.

1st Street/Harrison Street/I-80 Eastbound On-Ramp (Study Intersection #8) – The Proposed Project would cause this intersection to deteriorate from LOS E to LOS F in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic, which combines with existing traffic destined for the SFOBB in the PM peak hour to deteriorate conditions to unacceptable operations. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would be significant and unavoidable.

Folsom Street/Essex Street (Study Intersection #9) – The study intersection of Folsom Street/Essex Street is not currently controlled by either traffic signals or STOP signs, and both approaches to the intersections are uncontrolled. During the weekday PM peak hour, the intersection is affected by PM peak hour traffic destined to the SFOBB eastbound on-ramps at Harrison Street and Bryant Street. During the PM peak period, queues form on the approaches to the on-ramp that spill back into the intersection, resulting in queued operations within the travel lanes serving the on-ramps. Implementation of the Proposed Project would add vehicles to these existing queues, and contributions to the queued operations would be considered significant. Implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate with vehicle queues during the PM peak hour. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would remain significant and unavoidable.

Essex Street/Harrison Street/I-80 Eastbound On-Ramp (Study Intersection #10) – The Proposed Project would add traffic to this intersection, which operates at LOS F under existing conditions in the PM peak hour. The critical movement in the PM peak hour is the eastbound right turn movement from eastbound Harrison Street onto the I-80 Eastbound On-Ramp. The Proposed Project would contribute less than five percent (2.2 percent) to this critical movement. Therefore, the project’s contribution to poor operating conditions at this intersection would be considered less than significant.
2nd Street/Folsom Street (Study Intersection #11) – The Proposed Project would add traffic to this intersection, which operates at LOS E during the PM peak hour. The critical movements in the PM peak hour are the southbound through and southbound left-turn movements. These movements operate at acceptable levels of service during all peak hours; therefore, the project’s contribution to poor operating conditions at this intersection would be considered less than significant.

The Embarcadero/Harrison Street (Study Intersection #13) – The Proposed Project would add traffic to this intersection, which operates at LOS E in the AM peak hour. The northbound through movement and the eastbound left are the critical movements; however, the eastbound left operates at acceptable levels of service. The northbound through movement operates at LOS F in the AM peak hour. The Proposed Project would not contribute traffic to this movement. Therefore, the project’s contribution to poor operating conditions in the AM peak hour would be considered less than significant.

Because the Proposed Project would not contribute any vehicles to a critical movement that is failing during the AM peak hour, the project’s impact is considered less than significant.

Bryant Street/Sterling Street (Study Intersection #14) – The study intersection of Bryant Street/Sterling Street is not currently controlled by either traffic signals or STOP signs, and both approaches to the intersections are uncontrolled. During the weekday PM peak hour, the intersection is affected by PM peak hour traffic destined to the SFOBB eastbound on-ramps at Harrison Street and Bryant Street. During the PM peak period, queues form on the approaches to the on-ramp that spill back into the intersection, resulting in queued operations within the travel lanes serving the on-ramps. Implementation of the Proposed Project would add vehicles to these existing queues, and contributions to the queued operations would be considered significant. Implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate with vehicle queues during the PM peak hour. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would remain significant and unavoidable.

Bryant Street/5th Street/I-80 Eastbound On-Ramp (Study Intersection #15) – The Proposed Project would add traffic to this intersection, which operates at LOS F in the PM peak hour under existing conditions. The critical movements in the PM peak hour are the southbound through and northbound right-turn movements. The Proposed Project would contribute less than five percent (2.7 percent) to the critical southbound through movement. The Proposed Project would contribute less than five percent (4.5 percent) to the northbound right-turn movement. Therefore, the Proposed Project’s contribution to critical movements at this intersection would result in a less than significant impact during the PM peak hour. However, the project would cause the intersection to deteriorate from LOS D to LOS E during the Saturday peak hour. This would also be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic and to northbound traffic on 5th Street turning onto the I-80 Eastbound On-Ramp. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection during the Saturday peak hour would remain significant and unavoidable.

5th Street/Harrison Street/I-80 Westbound Off-Ramp (Study Intersection #16) – The Proposed Project would cause this intersection to deteriorate from LOS D to LOS E in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic and traffic exiting I-80. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths or right of way acquisition, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would remain significant and unavoidable.
4.2.3 Reduced Development Alternative With Base Transit Service

This section describes the traffic-related impacts associated with the Reduced Development Alternative under the Base Transit Scenario.

4.2.3.1 Freeway and Ramp Operations (Reduced Development; Base Transit Service)

Freeway facilities were also evaluated for the Reduced Development Alternative. Figures A-5 and A-6 in Appendix D4 present the unconstrained trip assignment to individual ramps for the Reduced Development Alternative under the Base Transit Scenario assuming the existing westbound ramps and the proposed reconfigured westbound ramps, respectively.

Figure 30 on page 94 shows the amount of traffic assigned to each freeway segment under the existing westbound ramp configuration, constrained by the capacity of the stop signs on the westbound ramps. Figure 31 on page 95 shows the same information for conditions with reconstructed westbound ramps, constrained by the capacity of the ramp meters. The resulting volumes were used to assess freeway impacts in terms of ramp merge and diverge section operations as well as contributions to queuing on freeway mainline segments and approaches for the Reduced Development Alternative under the Base Transit Scenario.

4.2.3.1.1 Ramp Queuing (Reduced Development; Base Transit Service)

Due to the complex interaction of vehicle streams that approach the SFOBB from the Islands, the VISSIM microsimulation software was used to evaluate vehicle queuing on the ramp approaches resulting from eastbound, westbound, SOV, HOV2, and HOV3+ all sharing a common approach to the SFOBB. The maximum queues for each scenario, measured from the intersection of South Gate Drive and Macalla Road, as well as the average amount of delay for queued vehicles are presented in Table 38 on page 108. Table 38 also depicts average vehicular delay associated with the queuing for traffic approaching the SFOBB. (The delay is discussed in a subsequent section.) Figure 32 on page 139 illustrates the extent of queuing associated with the Reduced Development Alternative under the Base Transit Scenario for conditions with and without reconstruction of the westbound ramps.

As depicted in Table 38 and illustrated on Figure 32, under the Reduced Development Alternative, queues on roadways approaching the SFOBB on-ramps would be similar to or less than under the Proposed Project. Without reconstruction of the westbound on-ramp to the SFOBB (and the associated HOV3+ bypass), queues would extend back just under ½ mile from each of the two westbound on-ramps during the AM and PM peak hours, and approximately 2/3 mile during the Saturday peak hour. With reconstruction of the westbound ramps (and the associated consolidation of all traffic to a single westbound on-ramp), queues would be somewhat longer, extending to a maximum of approximately 2/3 mile, approximately to the transit-only westbound on-ramp.
**EXISTING PLUS REDUCED DEVELOPMENT ALTERNATIVE (BASE TRANSIT PROJECT)**

SFOBB TRAVEL DEMAND AND VEHICLE QUEUES

**<<NO NEW WESTBOUND ON-RAMPS>>**

### San Francisco Approaches

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### East Bay Toll Plaza/Metering Lights

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<td>Served</td>
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<tr>
<td>Unserved (Queue)</td>
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</table>

### Total Ramp Demand (Existing & Project)

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<th>SAT</th>
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<td>582</td>
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<td>WB ON RAMP (WEST)</td>
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<td>Unserved Demand</td>
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<tr>
<td>WB OFF</td>
<td>193</td>
<td>359</td>
<td>385</td>
</tr>
</tbody>
</table>

*Source: Fehr & Peers, 2009*
1. Maximum queues expected to occur during the AM peak hour.
2. The street names shown on this figure are for identification purposes only and subject to change.

Treasure Island and Yerba Buena Island Redevelopment Plan TIS
MAXIMUM ON-ISLAND QUEUE
REduced DEVELOPMENT PROJECT (BASE TRANSIT SCENARIO)

Source: Perkins + Will, May 4, 2009; Fehr & Peers, 2009

FIGURE 32
4.2.3.1.2 Ramp Merge/Diverge (Reduced Development; Base Transit Service)

The operational characteristics of the Yerba Buena Island ramps were analyzed to determine project impacts. Tables 39, 40 and 41, on pages 109 to 111, summarize the ramp merge and diverge levels of service for the AM, PM, and Saturday peak hours, respectively. For conditions without reconstruction of the westbound ramps, the tables also present the stop-controlled intersection levels of service for the AM, PM, and Saturday peak hours. However, this section discusses only the merge/diverge analysis; discussion of vehicular delays and LOS associated with ramp control devices (i.e., stop signs or meters) is discussed in the next section.

Based on the merge/diverge analysis, the Reduced Development Alternative would contribute traffic to the eastbound off-ramp diverge section on the west side of Yerba Buena Island, which was observed to operate at LOS E in the PM peak hour under existing conditions. Project traffic would comprise a majority of the traffic using the off-ramp during the PM peak hour and the project’s contribution would therefore, be considered substantial. The Reduced Development Alternative would also cause this same off-ramp diverge section to deteriorate form LOS D to LOS E in the Saturday peak hour. This means that during the weekday PM and Saturday peak hours, the roadway area on the SFOBB approaching the off-ramp would be operating near its capacity with virtually no usable gaps in the traffic stream and little room to maneuver, with notable congestion and/or queuing extending onto the SFOBB.

All other merge and diverge sections would operate at acceptable LOS D or better, with or without reconstruction of the westbound ramps on the east side of Yerba Buena Island. The project’s impact to congestion on the SFOBB approaching the eastbound off-ramp diverge section on the west side of Yerba Buena Island is considered significant in the weekday PM and Saturday peak hours.

The primary cause for deficient operations at this off-ramp is the short deceleration distance followed by a tight curve. This design causes exiting vehicles to begin deceleration on the bridge mainline. To improve the operations of this diverge section, the off-ramp would need to be reconstructed to provide more deceleration distance and a less-severe curve. Reconstruction of this ramp would require major construction on the SFOBB, Yerba Buena Island, and the Treasure Island Road causeway. These improvements were evaluated in the Project Study Report for the ramps replacement project conducted by Caltrans and the SFCTA in December 2007 and were found to be infeasible.

Mitigation Measure 1 – Implementation of the Expanded Transit Scenario would reduce auto trip generation of the Reduced Development Alternative such that the project’s impacts to the eastbound off-ramp diverge section would be reduced. However, as illustrated in Tables 40 and 41 (pages 110 and 111) for the weekday PM and Saturday peak hours, respectively, this would have only a slight benefit to congestion around the off-ramp diverge section and the project’s impacts to this ramp diverge section would remain significant and unavoidable.

4.2.3.1.3 Ramp Delays (Reduced Development; Base Transit Service)

The preceding discussion has illustrated the way in which the ramp configurations may constrain the amount of traffic that can enter the SFOBB from the Islands, the physical extents of queues caused by this constraint, and the effects of project-generated traffic on freeway merge and diverge sections on the SFOBB. This section describes the vehicular traffic delay associated with congestion leading up to the SFOBB for the Reduced Development Alternative under the Base Transit Scenario. This delay affects not only project-generated traffic, but also existing uses on the Islands that would remain under conditions

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41. Under conditions with the proposed reconstruction of the westbound ramps on the east side of Yerba Buena Island, the westbound on-ramp on the west side of the Island would be converted to transit-only. Under these conditions, no analysis of the bus-only westbound on-ramp was performed because volumes would be very low. Under conditions without the reconstruction of the westbound ramps, both a side-street stop analysis and a ramp merge analysis were conducted.
with the Reduced Development Alternative, including the Coast Guard and Job Corps. As shown in Figure 32 (page 135), queues on the Islands and associated delay may affect the Coast Guard operations around Yerba Buena Island and their access to the SFOBB. These delays are discussed in this section.

Even under the Reduced Development Alternative, traffic volumes destined for the westbound SFOBB will exceed the capacity of the westbound on-ramps to the SFOBB, resulting in queues. These queues will increase vehicular travel times and cause traffic delay. Although delays associated with ramp metering are not typically analyzed for purposes of identifying impacts, due to the unique nature of this project and the SFOBB, this analysis includes an analysis of ramp delays.

Based on the stop-controlled analysis, which was conducted only for conditions in which the westbound ramps on the east side of Yerba Buena Island are not reconstructed and in which case the two westbound on-ramps would remain stop-controlled, the Reduced Development Alternative would contribute substantial traffic to both westbound ramps. As shown in Tables 39, 40 and 41 (pages 109 - 111), both westbound ramps would operate at LOS F in the AM, PM, and Saturday peak hours. This would be considered a significant impact to both westbound on-ramps in the AM, PM, and Saturday peak hours under conditions in which those ramps remain stop-controlled. If the existing configuration were to remain, it is unlikely that the existing stop signs would be removed or that other physical improvements would be made to the on-ramps.

Mitigation Measure 1 – Implementation of the Expanded Transit Scenario would reduce auto trip generation of the Reduced Development Alternative such that the project’s impacts to delays at the stop controlled westbound on-ramps would be reduced. However, as illustrated in Tables 39, 40 and 41 for the weekday AM and PM and Saturday peak hours, respectively, this would have only a slight benefit to reducing delays, which would still be consistent with LOS F conditions and the project’s impacts to this ramp diverge section would remain significant and unavoidable.

If the separate project to reconstruct the westbound ramps on the east side of Yerba Buena Island were constructed and the west side westbound on-ramp were converted to transit-only, stop control devices would be eliminated and all westbound traffic (except transit vehicles destined for San Francisco) would be consolidated to the westbound on-ramp on the east side of Yerba Buena Island. This improvement, consequently, would simply relocate the source of vehicular delay from stop signs at the two ramp merges to a ramp meter upstream of the single remaining merge on the east side of Yerba Buena Island. The delay associated with the ramp meter is shown in Table 38 (page 108). Although the delays are technically caused by a ramp meter signal, the LOS criteria for unsignalized intersections were applied because the ramp meter signal functions more similarly to a stop sign than a traditional traffic signal.

Vehicular traffic delay under conditions with the reconstructed westbound ramps would be just under three minutes in the AM and PM peak hours. Although this delay is considerably shorter under the Reduced Development Alternative compared to the Proposed Project, this vehicular delay would still be a significant impact. Traffic would experience minimal delays in the Saturday peak hour since ramp meters were assumed not to be in operation during that time. Caltrans has indicated that the ramp reconstruction project will require ramp meters and it is unlikely that they would be eliminated from that project.

Mitigation Measure 1 – Implementation of the Expanded Transit Scenario would reduce auto trip generation of the Reduced Development Alternative such that the project’s impacts to delays at the stop controlled westbound on-ramps would be reduced. In the AM peak hour, volumes approaching the westbound on-ramp would be less than the capacity of the ramp and queues and delays would be eliminated. However, as illustrated in Table 38, this mitigation measure would have only a slight benefit to reducing delays in the PM peak hour, which would still be

42. The project-generated traffic would constitute over half of the total traffic using the on-ramps.
consistent with LOS F conditions. Therefore, the project’s impacts to delays at the reconstructed westbound on-ramp in the PM peak hour would remain significant and unavoidable.

4.2.3.1.4 Mainline Operations: Queuing on Approaches (Reduced Development; Base Transit Service)

In addition to ramp operations, the operations of the SFOBB mainline segments were considered. Volumes on the SFOBB and approaches under conditions with the Reduced Development Alternative under the Base Transit Scenario are shown in Figures 30 and 31. As shown, the SFOBB currently experiences more demand than its capacity in the westbound direction in the AM peak hour and the eastbound direction in the PM peak hour. With the addition of project traffic, the weekday over-capacity conditions are expected to be exacerbated.

This analysis assumes that with the addition of project traffic (constrained by either ramp meters or stop control at on-ramps to the SFOBB at capacity conditions), some vehicles that would otherwise be on the SFOBB would be displaced, increasing queues at the toll plaza in the East Bay or at the San Francisco approaches, as described on page 114. A similar phenomenon would occur in the PM peak hour, with project-related traffic lengthening queues on the eastbound approaches to the SFOBB, including surface streets in Downtown San Francisco, by the number of vehicles the project adds to those streets.

It should be noted that although Caltrans generally aims to work cooperatively with local jurisdictions regarding ramp metering, Caltrans retains the ultimate control of both the ramp meters on Yerba Buena Island and the SFOBB toll plaza metering lights. It is possible that, in consultation with TITMA, Caltrans would reduce the metering rate for the on-ramps and allow more traffic to enter the SFOBB from the East Bay. This would reduce the project’s impacts to queuing at the East Bay toll plaza, but would increase queues on the Islands. The analysis presented in this report describes the worst case for bridge and queuing conditions in the East Bay.

Under the Base Transit Scenario, the Reduced Development Alternative would displace traffic on the SFOBB and increase queues on the westbound approach in the AM peak hour by approximately 467 vehicles. The project’s increase to queues approaching the SFOBB from the East Bay in the AM peak hour would be significant. Increasing the ramp metering rate at the East Bay toll plaza may reduce queues in the East Bay somewhat, but would cause other impacts to the bridge operations by increasing congestion on the SFOBB mainline. Therefore, it is unlikely that operational improvements could improve the capacity of the SFOBB and in turn, reduce queues in the East Bay.

Mitigation Measure 1 – Implementation of the Expanded Transit Scenario would reduce auto trip generation of the Reduced Development Alternative using the travel demand management strategies described in Chapter 1 such that the project’s impacts to queues on SFOBB approaches in the AM peak hour would be reduced. However, as discussed in the following section, the Reduced Development Alternative would continue to contribute substantially to queuing in the East Bay. Therefore, the Reduced Development Alternative’s impacts to queues approaching the SFOBB from the East Bay would remain significant and unavoidable.

Queues approaching the eastbound SFOBB from surface streets in San Francisco in the PM peak hour would increase by approximately 458 vehicles under the Expanded Transit Scenario, although this unserved demand would be dispersed among multiple surface streets in San Francisco approaching the bridge. Still, the project’s increase to queues approaching the SFOBB from Downtown San Francisco in the PM peak hour would also be significant. Queues approaching the SFOBB are caused by capacity constraints on the SFOBB mainline. Increasing the capacity of the SFOBB would require additional lanes, which is not likely feasible.

Mitigation Measure 1 – Implementation of the Expanded Transit Scenario would reduce auto trip generation of the Reduced Development Alternative using the travel demand management strategies described in Chapter 1 such that the project’s impacts to queues on SFOBB
approaches in the PM peak hour would be reduced. However, as discussed in the following section, the Reduced Development Alternative would continue to contribute substantially to queuing in San Francisco approaching the SFOBB during the PM peak hour. Therefore, the Reduced Development Alternative’s impacts to queues approaching the SFOBB from San Francisco would remain **significant and unavoidable**.

Except near ramp merge and diverge sections, operations on the SFOBB would operate similar to existing conditions (i.e., at capacity in peak directions during peak hours) since additional travel demand would be constrained by the toll plaza in the East Bay and eastbound approaches in San Francisco. Therefore, the project’s impacts to the SFOBB mainline operations are expected to be less than significant, because the bridge’s approaches limit the number of vehicles that can reach the bridge. Impacts to the SFOBB near ramp merge and diverge sections under the Expanded Transit Scenario were discussed on pages 140 and 140. Generally, through-traffic on the SFOBB may experience some increased congestion in the eastbound direction due to project-generated impacts approaching the westbound off-ramp on the west side of Yerba Buena Island. Project-generated increases to congestion in the westbound direction are not expected to generate substantial increases in congestion, particularly if the westbound ramps are reconstructed since those improvements would increase sight distance and acceleration distance allowing smoother traffic merging than the existing configuration.

4.2.3.2 Intersection Operations (Reduced Development; Base Transit Service)

Figure 33 (page 144) shows the project-related traffic added to each turning movement at the study intersections in San Francisco for the Reduced Development Alternative under the Base Transit Scenario. The differences in volumes at intersections in San Francisco associated with the two ramp configurations analyzed were negligible; therefore, Figure 33 represents the traffic assignment under both configurations. Figure 34 (page 145) presents the Existing Plus Reduced Development conditions intersection turning movement volumes under the Base Transit Scenario at study intersections.

Table 42, on page 119, presents intersection operating conditions for Existing plus Project conditions for all four scenarios evaluated in this study, including the Reduced Development Alternative with Base Transit Scenario. As shown, under Existing plus Reduced Development Alternative conditions with the Base Transit Scenario, 10 study intersections would operate at unacceptable LOS E or F during one or more of the three peak hours analyzed. This is similar to Existing plus Project Conditions under the Base Transit Scenario. The 10 intersections operating unacceptably, and the Reduced Development Alternative’s contribution to those conditions under the Base Transit Scenario, are discussed below.
LEGEND:

1 = Study Intersection

XX (YY) [ZZ] = AM (PM) [SAT] Peak Hour Volume
1st Street/Market Street (Study Intersection #4) – The Reduced Development Alternative would cause this intersection to deteriorate from LOS E to LOS F in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic, which combines with existing traffic destined for the SFOBB in the PM peak hour to deteriorate conditions to unacceptable operations. Traffic signals at this intersection are timed to prioritize transit movements on Market Street. Modifications to signal timing to provide more capacity for southbound traffic would likely impact transit operations on Market Street, which would be inconsistent with the City’s Transit First policy. Further, providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment provided on Market Street. As shown in Table 42, implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate at LOS F in the PM peak hour. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would be significant and unavoidable.

1st Street/Mission Street (Study Intersection #5) – The Reduced Development Alternative would cause this intersection to deteriorate from LOS E to LOS F in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic, which combines with existing traffic destined for the SFOBB in the PM peak hour to deteriorate conditions to unacceptable operations. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco and proposed as part of the Transit Center District Plan currently under study. As shown in Table 42, implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate at LOS F in the PM peak hour. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would be significant and unavoidable.

1st Street/Howard Street (Study Intersection #6) – The Reduced Development Alternative would contribute traffic to this intersection that operates at LOS E under existing conditions during the PM peak hour. However, it would not contribute any vehicles to the critical southbound right-turn movement at this intersection and the project’s impacts to this intersection would be less than significant.

1st Street/Folsom Street (Study Intersection #7) – The Reduced Development Alternative would cause this intersection to deteriorate from LOS E to LOS F in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic, which combines with existing traffic destined for the SFOBB in the PM peak hour to deteriorate conditions to unacceptable operations. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco and proposed as part of the Transit Center District Plan currently under study. As shown in Table 42, implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate at LOS F in the PM peak hour. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would be significant and unavoidable.

1st Street/Harrison Street/I-80 Eastbound On-Ramp (Study Intersection #8) – The Reduced Development Alternative would cause this intersection to deteriorate from LOS E to LOS F in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic, which combines with existing traffic destined for the SFOBB in the PM peak hour to deteriorate conditions to unacceptable operations. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco. As shown in Table 42, implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate at LOS F in the PM peak hour. Therefore, no feasible
mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would be **significant and unavoidable**.

**Folsom Street/Essex Street (Study Intersection #9)** – The study intersection of Folsom Street/Essex Street is not currently controlled by either traffic signals or STOP signs, and both approaches to the intersections are uncontrolled. During the weekday PM peak hour, the intersection is affected by PM peak hour traffic destined to the SFOBB eastbound on-ramps at Harrison Street and Bryant Street. During the PM peak period, queues form on the approaches to the on-ramp that spill back into the intersection, resulting in queued operations within the travel lanes serving the on-ramps. Implementation of the Proposed Project would add vehicles to these existing queues, and contributions to the queued operations would be considered significant. Implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate with vehicle queues during the PM peak hour. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would remain **significant and unavoidable**.

**Essex Street/Harrison Street/I-80 Eastbound On-Ramp (Study Intersection #10)** – The Reduced Development Alternative would add traffic to this intersection, which operates at LOS F under existing conditions in the PM peak hour. The critical movement in the PM peak hour is the eastbound right turn movement from eastbound Harrison Street onto the I-80 Eastbound On-Ramp. The Proposed Project would contribute less than five percent (2.4 percent) to this critical movement. Therefore, the project’s contribution to poor operating conditions at this intersection would be considered less than significant.

**2nd Street/Folsom Street (Study Intersection #11)** – The Reduced Development Alternative would add traffic to this intersection, which operates at LOS E during the PM peak hour. The critical movements in the PM peak hour are the southbound through and southbound left-turn movements. These movements operate at acceptable levels of service during all peak hours; therefore, the project’s contribution to poor operating conditions at this intersection would be considered less than significant.

**The Embarcadero/Harrison Street (Study Intersection #13)** – The Reduced Development Alternative would add traffic to this intersection, which operates at LOS E in the AM peak hour. The northbound through movement and eastbound left-turn movement are the critical movements at this intersection. The eastbound left is expected to operate at acceptable levels of service; however, the northbound through movement is expected to operate at LOS F during the AM peak hour. The Reduced Development Alternative would not contribute traffic to this movement. Therefore, its contribution to poor operating conditions in the AM peak hour would be considered less than significant.

Because the Reduced Development Alternative’s contribution to critical movements at this intersection during the AM peak hour would be small, its impact is considered **less than significant**.

**Bryant Street/Sterling Street (Study Intersection #14)** – The study intersection of Bryant Street/Sterling Street is not currently controlled by either traffic signals or STOP signs, and both approaches to the intersections are uncontrolled. During the weekday PM peak hour, the intersection is affected by PM peak hour traffic destined to the SFOBB eastbound on-ramps at Harrison Street and Bryant Street. During the PM peak period, queues form on the approaches to the on-ramp that spill back into the intersection, resulting in queued operations within the travel lanes serving the on-ramps. Implementation of the Proposed Project would add vehicles to these existing queues, and contributions to the queued operations would be considered significant. Implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate with vehicle queues during the PM peak hour. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would remain **significant and unavoidable**.
Bryant Street/5th Street/I-80 Eastbound On-Ramp (Study Intersection #15) – The Reduced Development Alternative would add traffic to this intersection, which operates at LOS F in the PM peak hour under existing conditions. The critical movements in the PM peak hour are the southbound through and northbound right turn movements. The Reduced Development Alternative would contribute less than five percent (3.1 percent) to the critical southbound through movement. The Reduced Development Alternative would contribute less than five percent (4.8 percent) to the northbound right-turn movement. Therefore, the Reduced Development Alternative’s contribution to critical movements at this intersection would result in a less than significant impact during the PM peak hour.

However, the Reduced Development Alternative would cause the intersection to deteriorate from LOS D to LOS E during the Saturday peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic and to northbound traffic on 5th Street turning onto the I-80 Eastbound On-Ramp. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco. As shown in Table 42, implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate at LOS E in the Saturday peak hour. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection during the Saturday peak hour would remain significant and unavoidable.

5th Street/Harrison Street/I-80 Westbound Off-Ramp (Study Intersection #16) – The Reduced Development Alternative would cause this intersection to deteriorate from LOS D to LOS E in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic and traffic exiting I-80. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths or right of way acquisition, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco. As shown in Table 42, implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate at LOS E in the PM peak hour. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would remain significant and unavoidable.

4.2.4 Reduced Development Alternative with Expanded Transit Service

This section describes the traffic-related impacts associated with the Reduced Development Alternative under the Expanded Transit Scenario.

4.2.4.1 Freeway and Ramp Operations (Reduced Development; Expanded Transit Service)

Freeway facilities were also evaluated for each of the project scenarios, including the Reduced Development Alternative with Expanded Transit Service. Figures A-7 and A-8 in Appendix D4 present the unconstrained trip assignment to individual ramps for the Reduced Development Alternative under the Expanded Transit Scenario assuming the existing westbound ramps and the proposed reconfigured westbound ramps, respectively.

Figure 35 (page 150) shows the amount of traffic assigned to each freeway segment under the existing westbound ramp configuration, constrained by the capacity of the stop signs on the westbound ramps. Figure 36 (page 151) shows the same information for conditions with reconstructed westbound ramps, constrained by the capacity of the ramp meters. The resulting volumes were used to assess freeway impacts in terms of ramp merge and diverge section operations as well as contributions to queuing on freeway mainline segments and approaches for the Reduced Development Alternative under the Expanded Transit Scenario.
4.2.4.1.1 Ramp Queuing (Reduced Development; Expanded Transit Service)

Due to the complex interaction of vehicle streams that approach the SFOBB from the Islands (eastbound, westbound, SOV, HOV2, and HOV3+ all share a common approach), the VISSIM microsimulation software was used to evaluate vehicle queuing on the ramp approaches. The maximum queues for each scenario, measured from the intersection of South Gate Drive and Macalla Road, as well as the average amount of delay for queued vehicles are presented in Table 38, on page 108. Table 38 also depicts average vehicular delay associated with the queuing for traffic approaching the SFOBB. (The delay is discussed in a subsequent section.) Figure 37 illustrates the extent of queuing associated with the Reduced Development Alternative under the Expanded Transit Scenario for conditions with and without reconstruction of the westbound ramps.

As depicted in Table 38 and illustrated on Figure 37, for the Reduced Development under the Expanded Transit Scenario, queues on roadways approaching the SFOBB on-ramps would be either negligible or notably shorter than under the Base Transit Scenario. This is because the Expanded Transit Service would reduce automobile traffic generation resulting in fewer vehicles attempting to enter the SFOBB during peak hours. Without reconstruction of the westbound on-ramp to the SFOBB (and the associated HOV3+ bypass), queues would be negligible in the AM and PM peak hours and extend less than 1/2 mile in the Saturday peak hour. With reconstruction of the westbound ramps (and the associated consolidation of all traffic to a single westbound on-ramp), queues would remain negligible in the AM peak hour. In the PM peak hour, queues would be just over 1/2-mile, approximately to the transit-only westbound on-ramp. Queues would be negligible in the Saturday peak hour since ramp meters would not be activated.
### East Bay Toll Plaza/Metering Lights

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### San Francisco Approaches

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<tr>
<td>8,750</td>
<td>8,750</td>
<td>0</td>
</tr>
</tbody>
</table>

### Total Ramp Demand (Existing & Project)

- **WB ON RAMP (EAST):** 319 (375) [519]
- **WB ON RAMP (WEST):** 319 (375) [520]
- **Served Demand SOV + HOV:** 638 (750) [750]
- **Unserved Demand:** 0 (0) [289]
- **WB OFF:** 162 (292) [416]

### Existing Plus Reduced Development Alternative (Expanded Transit Scenario)

- **EB ON:** 220 (359) [411]
- **EB OFF:** 516 (977) [1,080]
EXISTING PLUS REDUCED DEVELOPMENT ALTERNATIVE (EXPANDED TRANSIT SCENARIO)
SFOBB TRAVEL DEMAND AND VEHICLE QUEUES

**FIGURE 36**

Source: Fehr & Peers, 2009

June 2010
SF07-0340\graphics\TIS\0340-36
1. Maximum queues expected to occur during the AM peak hour.
2. The street names shown on this figure are for identification purposes only and subject to change.

Source: Perkins + Will, May 4, 2009; Fehr & Peers, 2009

Treasure Island and Yerba Buena Island Redevelopment Plan TIS
MAXIMUM ON-ISLAND QUEUE
REDUCED DEVELOPMENT PROJECT (EXPANDED TRANSIT SCENARIO)

FIGURE 37
4.2.4.1.2 Ramp Merge/Diverge  (Reduced Development; Expanded Transit Service)

The operational characteristics of the Yerba Buena Island ramps were analyzed to determine project impacts. Tables 39, 40, and 41, on page 109 to 111, summarize the ramp merge and diverge levels of service for the AM, PM, and Saturday peak hours, respectively. For conditions without reconstruction of the westbound ramps, the tables also present the stop-controlled intersection levels of service for the AM, PM, and Saturday peak hours. However, this section discusses only the merge/diverge analysis; discussion of vehicular delays and LOS associated with ramp control devices (i.e., stop signs or meters) is discussed in the next section.

Based on the merge/diverge analysis, the Reduced Development Alternative would contribute traffic to the eastbound off-ramp diverge section on the west side of Yerba Buena Island, which was observed to operate at LOS E in the PM peak hour under existing conditions. Project traffic would comprise a majority of the traffic using the off-ramp during the PM peak hour and the project’s contribution would therefore, be considered substantial. The Reduced Development Alternative would also cause this same off-ramp diverge section to deteriorate from LOS D to LOS E in the Saturday peak hour. This means that during the weekday PM and Saturday peak hours, the roadway area on the SFOBB approaching the off-ramp would be operating near its capacity with virtually no usable gaps in the traffic stream and little room to maneuver, with notable congestion and/or queuing extending onto the SFOBB.

All other merge and diverge sections would operate at acceptable LOS D or better, with or without reconstruction of the westbound ramps on the east side of Yerba Buena Island. The project’s impact to congestion on the SFOBB approaching the eastbound off-ramp diverge section on the west side of Yerba Buena Island is considered significant in the weekday PM and Saturday peak hours.

The primary cause for deficient operations at this off-ramp is the short deceleration distance followed by a tight curve. This design causes exiting vehicles to begin deceleration on the bridge mainline. To improve the operations of this diverge section, the off-ramp would need to be reconstructed to provide more deceleration distance and a less-severe curve. Reconstruction of this ramp would require major construction on the SFOBB, Yerba Buena Island, and the Treasure Island Road causeway. These improvements were evaluated in the Project Study Report for the ramps replacement project conducted by Caltrans and the SFCTA in December 2007 and were found to be infeasible. Therefore, the project’s impacts to this ramp diverge section would remain significant and unavoidable.

4.2.4.1.3 Ramp Delays (Reduced Development; Expanded Transit Service)

The preceding discussion illustrated the way in which the ramp configurations may constrain the amount of traffic that can enter the SFOBB from the Islands, the physical extents of queues caused by this constraint, and the effects of project-generated traffic on freeway merge and diverge sections on the SFOBB. This section describes the vehicular traffic delay associated with congestion leading up to the SFOBB for the Reduced Development Alternative under the Expanded Transit Scenario. This delay affects not only project-generated traffic, but also existing uses on the Islands that would remain under conditions with the Reduced Development Alternative, including the Coast Guard. As shown in Figure 37 (page 152), queues on the Islands and associated delay may affect the Coast Guard operations around Yerba Buena Island and their access to the SFOBB. These delays are discussed in this section.

Even under the Expanded Transit Scenario, traffic volumes destined for the westbound SFOBB will exceed the capacity of the westbound on-ramps to the SFOBB, resulting in queues in the Saturday peak

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43. Under conditions with the proposed reconstruction of the westbound ramps on the east side of Yerba Buena Island, the westbound on-ramp on the west side of the Island would be converted to transit-only. Under these conditions, no analysis of the bus-only westbound on-ramp was performed because volumes would be very low. Under conditions without the reconstruction of the westbound ramps, both a side-street stop analysis and a ramp merge analysis were conducted.
treasure island and yerba buena island redevelopment plan transportation impact study
july 2010
chapter 4 – transportation impact analysis

hour under conditions with the existing stop-controlled ramps and during the weekday PM peak hour under conditions with the reconstructed westbound ramps. During these periods, these queues would increase vehicular travel times and cause traffic delay. Although delays associated with ramp metering are not typically analyzed for purposes of identifying impacts, due to the unique nature of this project and the SFOBB, this report includes an analysis or ramp delays.

Based on the stop-controlled analysis, which was conducted only for conditions in which the westbound ramps on the east side of Yerba Buena Island are not reconstructed and in which case the two westbound on-ramps would remain stop-controlled, the Reduced Development Alternative would contribute substantial traffic to both westbound ramps. As shown in Table 39, Table 40, and Table 41, both westbound ramps would operate at LOS F in the AM, PM, and Saturday peak hours, even though significant queuing would not occur during the weekday AM and PM peak hours. This would be considered a significant impact to both westbound on-ramps ramps in the AM, PM, and Saturday peak hours under conditions in which those ramps remain stop-controlled. If the existing configuration were to remain, it is unlikely that the existing stop signs would be removed or that other physical improvements would be made to the on-ramps. Therefore, the project’s impacts to delay approaching the on-ramps would remain significant and unavoidable.

If the separate project to reconstruct the westbound ramps on the east side of Yerba Buena Island were constructed and the west side westbound on-ramp were converted to transit-only, stop control devices would be eliminated and all westbound traffic (except transit vehicles destined for San Francisco) would be consolidated to the westbound on-ramp on the east side of Yerba Buena Island. This improvement, consequently, would simply relocate the source of vehicular delay from stop signs at the two ramp merges to a ramp meter upstream of the single remaining merge on the east side of Yerba Buena Island. The delay associated with the ramp meter is shown in Table 38 (page 108). Although the delays are technically caused by a ramp meter signal, the LOS criteria for unsignalized intersections were applied because the ramp meter signal functions more similarly to a stop sign than a traditional traffic signal.

Unlike the existing configuration, in which significant delays would occur regardless of whether queuing formed, delay associated with ramp metering would be minimal during the weekday AM peak hour and Saturday peak hour. This is because of the improved acceleration distance which allows easier merging compared to the existing stop-controlled configuration. Average vehicular traffic delay under conditions with the reconstructed westbound ramps would be approximately 2.5 minutes in the PM peak hour. Although this delay is slightly shorter with the Expanded Transit Scenario than under the Base Transit Scenario, this vehicular delay would be a significant impact. Traffic would experience minimal delays in the Saturday peak hour since ramp meters were assumed not to be in operation during that time. Caltrans has indicated that the ramp reconstruction project will require ramp meters and it is unlikely that they would be eliminated from that project. Therefore, the project’s impacts to delay approaching the reconstructed on-ramps would remain significant and unavoidable.

4.2.4.1.4 Mainline Operations: Queuing on Approaches (Reduced Development; Expanded Transit Service)

In addition to ramp operations, the operations of the SFOBB mainline segments were considered. Volumes on the SFOBB and approaches under conditions with the Reduced Development Alternative under the Expanded Transit Scenario are shown in Figures 35 and 36 (pages 150 and 151). As shown, the SFOBB currently experiences more demand than its capacity in the westbound direction in the AM peak hour and the eastbound direction in the PM peak hour. With the addition of project traffic, the weekday over-capacity conditions are expected to be exacerbated.

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44. The project-generated traffic would constitute over half of the total traffic using the on-ramps.
This analysis assumes that with the addition of project traffic (constrained by either ramp meters or stop control at on-ramps to the SFOBB at capacity conditions), some vehicles that would otherwise be on the SFOBB would be displaced, increasing queues at the toll plaza in the East Bay or at the San Francisco approaches, as described on page 114.

It should be noted that although Caltrans generally aims to work cooperatively with local jurisdictions regarding ramp metering, Caltrans retains the ultimate control of both the ramp meters on Yerba Buena Island and the SFOBB toll plaza metering lights. It is possible that, in consultation with TITMA, Caltrans would reduce the metering rate for the on-ramps and allow more traffic to enter the SFOBB from the East Bay. This would reduce the project’s impacts to queuing at the East Bay toll plaza, but would increase queues on the Islands. The analysis presented in this report describes the worst case for bridge and queuing conditions in the East Bay.

Under the Expanded Transit Scenario, the Reduced Development Alternative would displace traffic on the SFOBB and increase queues on the westbound approach in the AM peak hour by approximately 431 vehicles. The project’s increase to queues approaching the SFOBB from the East Bay in the AM peak hour would be significant. Increasing the ramp metering rate at the East Bay toll plaza may reduce queues in the East Bay somewhat, but would cause other impacts to the bridge operations by increasing congestion on the SFOBB mainline. Therefore, it is unlikely that operational improvements could improve the capacity of the SFOBB and in turn, reduce queues in the East Bay. Therefore, the project’s contribution to increased queues on the East Bay bridge approaches during the AM peak hour would be a significant and unavoidable impact.

Queues approaching the eastbound SFOBB from surface streets in San Francisco in the PM peak hour would increase by approximately 364 vehicles under the Expanded Transit Scenario, although this unserved demand would be dispersed among multiple surface streets in San Francisco approaching the bridge. Still, the project’s increase to queues approaching the SFOBB from Downtown San Francisco in the PM peak hour would also be significant. Queues approaching the SFOBB are caused by capacity constraints on the SFOBB mainline. Since increasing the capacity of the SFOBB would require additional lanes, which is not likely feasible, the project’s impacts to queues approaching the SFOBB from Downtown San Francisco would be a significant and unavoidable impact.

Except near ramp merge and diverge sections, operations on the SFOBB would operate similar to existing conditions (i.e., at capacity in peak directions during peak hours) since additional travel demand would be constrained by the toll plaza in the East Bay and eastbound approaches in San Francisco. Therefore, the project’s impacts to the SFOBB mainline operations are expected to be less than significant, because the bridge’s approaches limit the number of vehicles that can reach the bridge. Impacts to the SFOBB near ramp merge and diverge sections under the Expanded Transit Scenario were discussed on page 153. Generally, through-traffic on the SFOBB may experience some increased congestion in the eastbound direction due to project-generated impacts approaching the westbound off-ramp on the west side of Yerba Buena Island. Project-generated increases to congestion in the westbound direction are not expected to generate substantial increases in congestion, particularly if the westbound ramps are reconstructed since those improvements would increase sight distance and acceleration distance allowing smoother traffic merging than the existing configuration.

4.2.4.2 Intersection Operations (Reduced Development; Expanded Transit Service)

Figure 38 (page 156) shows the project-related traffic added to each turning movement at the study intersections in San Francisco associated with the Reduced Development Alternative under the Expanded Transit Scenario. The differences in volumes at intersections in San Francisco associated with the two ramp configurations analyzed were negligible; therefore, Figure 38 represents the traffic assignment under both configurations. Figure 39 (page 157) presents the Existing Plus Reduced Development Alternative conditions intersection turning movement volumes under the Expanded Transit Scenario at study intersections.
Source: Fehr & Peers, 2009

Treasure Island and Yerba Buena Island Redevelopment Plan TIS
REDUCED DEVELOPMENT ALTERNATIVE
(EXPANDED TRANSIT SCENARIO) PROJECT TRIP ASSIGNMENT

LEGEND:

1 = Study Intersection

XX (YY) [ZZ] = AM (PM) [SAT] Peak Hour Volume

Not to Scale

Page 156
Table 42, on page 119, presents intersection operating conditions for Existing plus Project conditions for all four scenarios evaluated in this study, including the Reduced Development Alternative with Expanded Transit Scenario. As shown, under Existing plus Reduced Development Alternative conditions with the Expanded Transit Scenario, 10 study intersections would operate at unacceptable LOS E or F during one or more of the three peak hours analyzed. This is similar to Existing plus Project Conditions under both transit scenarios and to the Reduced Development Alternative under the Base Transit Scenario. The 10 intersections operating unacceptably, and the Reduced Development Alternative’s contribution to those conditions under the Expanded Transit Scenario, are discussed below.

1st Street/Market Street (Study Intersection #4) – The Reduced Development Alternative would cause this intersection to deteriorate from LOS E to LOS F in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic, which combines with existing traffic destined for the SFOBB in the PM peak hour to deteriorate conditions to unacceptable operations. Traffic signals at this intersection are timed to prioritize transit movements on Market Street. Modifications to signal timing to provide more capacity for southbound traffic would likely impact transit operations on Market Street, which would be inconsistent with the City’s Transit First policy. Further, providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment provided on Market Street. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would be significant and unavoidable.

1st Street/Mission Street (Study Intersection #5) – The Reduced Development Alternative would cause this intersection to deteriorate from LOS E to LOS F in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic, which combines with existing traffic destined for the SFOBB in the PM peak hour to deteriorate conditions to unacceptable operations. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco and proposed as part of the Transit Center District Plan currently under study. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would be significant and unavoidable.

1st Street/Howard Street (Study Intersection #6) – The Reduced Development Alternative would contribute traffic to this intersection that operates at LOS E under existing conditions during the PM peak hour. However, the project would not contribute any vehicles to the critical southbound right-turn movement at this intersection and the project’s impacts to this intersection would be less than significant.

1st Street/Folsom Street (Study Intersection #7) – The Reduced Development Alternative would cause this intersection to deteriorate from LOS E to LOS F in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic, which combines with existing traffic destined for the SFOBB in the PM peak hour to deteriorate conditions to unacceptable operations. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco and proposed as part of the Transit Center District Plan currently under study. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would be significant and unavoidable.

1st Street/Harrison Street/I-80 Eastbound On-Ramp (Study Intersection #8) – The Reduced Development Alternative would cause this intersection to deteriorate from LOS E to LOS F in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic, which combines with existing traffic destined for the
SFOBB in the PM peak hour to deteriorate conditions to unacceptable operations. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would be significant and unavoidable.

**Folsom Street/Essex Street (Study Intersection #9)** – The study intersection of Folsom Street/Essex Street is not currently controlled by either traffic signals or STOP signs, and both approaches to the intersections are uncontrolled. During the weekday PM peak hour, the intersection is affected by PM peak hour traffic destined to the SFOBB eastbound on-ramps at Harrison Street and Bryant Street. During the PM peak period, queues form on the approaches to the on-ramp that spill back into the intersection, resulting in queued operations within the travel lanes serving the on-ramps. Implementation of the Proposed Project would add vehicles to these existing queues, and contributions to the queued operations would be considered significant. Implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate with vehicle queues during the PM peak hour. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would remain significant and unavoidable.

**Essex Street/Harrison Street/I-80 Eastbound On-Ramp (Study Intersection #10)** – The Reduced Development Alternative would add traffic to this intersection, which operates at LOS F under existing conditions in the PM peak hour. The critical movement in the PM peak hour is the eastbound right turn movement from eastbound Harrison Street onto the I-80 Eastbound On-Ramp. The Reduced Development Alternative would contribute less than five percent (1.9 percent) to this critical movement. Therefore, the project’s contribution to poor operating conditions at this intersection would be considered less than significant.

**2nd Street/Folsom Street (Study Intersection #11)** – The Reduced Development Alternative would add traffic to this intersection, which operates at LOS E during the PM peak hour. The critical movements in the PM peak hour are the southbound through and southbound left-turn movements. These movements operate at acceptable levels of service during all peak hours; therefore, the project’s contribution to poor operating conditions at this intersection would be considered less than significant.

**The Embarcadero/Harrison Street (Study Intersection #13)** – The Reduced Development Alternative would add traffic to this intersection, which operates at LOS E in the AM peak hour. The northbound through movement and eastbound left turn movement are the critical movements at this intersection. The eastbound left turn movement would operate at acceptable levels of service; however, the northbound through movement is expected to operate at LOS F during the AM peak hour. The Reduced Development Alternative would not contribute traffic to this movement. Therefore, the project’s contribution to poor operating conditions in the AM peak hour would be considered less than significant.

Because the Reduced Development Alternative’s contribution to critical movements at this intersection during the AM peak hour would be small, the project’s impact is considered less than significant.

**Bryant Street/Sterling Street (Study Intersection #14)** – The study intersection of Bryant Street/Sterling Street is not currently controlled by either traffic signals or STOP signs, and both approaches to the intersections are uncontrolled. During the weekday PM peak hour, the intersection is affected by PM peak hour traffic destined to the SFOBB eastbound on-ramps at Harrison Street and Bryant Street. During the PM peak period, queues form on the approaches to the on-ramp that spill back into the intersection, resulting in queued operations within the travel lanes serving the on-ramps. Implementation of the Proposed Project would add vehicles to these existing queues, and contributions to the queued operations would be considered significant. Implementation of the Expanded Transit Scenario would improve operations at this intersection, but the intersection would continue to operate with vehicle queues during the PM peak hour. Therefore, no feasible mitigation measures have been identified to reduce
project impacts to less than significant levels. Impacts at this intersection would remain **significant and unavoidable**.

**Bryant Street/5th Street/I-80 Eastbound On-Ramp (Study Intersection #15)** – The Reduced Development Alternative would add traffic to this intersection, which operates at LOS F in the PM peak hour under existing conditions. The critical movements in the PM peak hour are the southbound through and northbound right turn movements. The Reduced Development Alternative would contribute less than five percent (2.5 percent) to the critical southbound through movement. The Reduced Development Alternative would contribute less than five percent (3.9 percent) to the northbound right-turn movement. Therefore, the Reduced Development Alternative’s contribution to critical movements at this intersection would result in a less than significant impact during the PM peak hour.

However, the project would cause the intersection to deteriorate from LOS D to LOS E during the Saturday peak hour. This would also be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic and to northbound traffic on 5th Street turning onto the I-80 Eastbound On-Ramp. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection during the Saturday peak hour would remain **significant and unavoidable**.

**5th Street/Harrison Street/I-80 Westbound Off-Ramp (Study Intersection #16)** – The Reduced Development Alternative would cause this intersection to deteriorate from LOS D to LOS E in the PM peak hour. This would be a significant impact. The degradation in LOS at this intersection is primarily due to increases to the southbound through traffic and traffic exiting I-80. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths or right of way acquisition, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. Impacts at this intersection would remain **significant and unavoidable**.
4.3 TRANSIT IMPACTS

This section presents the impacts associated with the Proposed Project and Reduced Development Alternative to existing and proposed transit service. The evaluation of transit impacts examines three primary issues. First, the study includes a capacity analysis of each route serving the Islands (AC Transit bus service to the East Bay, Muni bus service to San Francisco, and ferry service to San Francisco). Second, the study performs a generalized analysis of transit service to and from Downtown San Francisco using four standard screenlines commonly included in transportation analyses in San Francisco (i.e., between Downtown San Francisco and areas to the northeast, northwest, southeast, and southwest). The screenline analysis is conducted since peak period transit service between Downtown San Francisco and outer residential areas is typically the most congested and heavily used component of the transit system in the area. The screenline analysis generally compares the total ridership between Downtown San Francisco and outer areas crossing four different screenlines with the total amount of available transit capacity crossing those screenlines. Finally, the transit impact analysis examines whether congestion caused by the project is likely to adversely affect transit operations or travel times. In this case, the analysis specifically focuses on whether congestion on the Islands may block transit circulation, and if so, whether changes to the circulation system can be incorporated to improve transit circulation. A summary of this analysis is included in Appendix H.

4.3.1 Proposed Project with Base Transit Scenario

The Base Transit Scenario assumes the following services:

- New ferry service from a new Transit Hub located on the western shore of Treasure Island. Ferries would operate with 50-minute headways to and from Downtown San Francisco between 5:00 AM and 9:00 PM (corresponding to a single ferry operating between Treasure Island and one of the existing docks in San Francisco);

- Route 108-Treasure Island would operate at its current 15-minute headway, but would no longer circulate around most of Treasure Island. Instead, it would circulate only around the Transit Hub and Island Core neighborhood. The 108-Treasure Island would continue to operate 24-hours per day, including overnight owl service;

- New bus transit service operating between the Islands and Downtown Oakland (operated by AC Transit) at approximately 10-minute headways during peak hours and less frequent service during off-peak hours; generally, bus service to Oakland would be provided between approximately 5:00 AM and 10:00 PM;

- A fleet of alternative fuel shuttle-buses that circulate throughout the Islands, with timed transfers at the Transit Hub offering free rides to residents and visitors of the Islands.

This would result in an overall transit capacity of 1,415 passengers per hour per direction. Combined, the improvements would provide an overall transit capacity of 1,415 passengers per hour per direction (eastbound/westbound), including 839 passengers per hour by ferry and 576 passengers per hour by bus (324 passengers on AC Transit and 252 passengers on Muni).

4.3.1.1 Transit Capacity Utilization (Base Transit Scenario)

Table 43 on page 162 summarizes the transit trips to and from the Islands, and compares the projected ridership with the hourly passenger capacity provided by each transit operator for all four scenarios evaluated in this study, including the Proposed Project under the Base Transit Scenario.

The Proposed Project under the Base Transit Scenario would generate 1,262 net new AM peak hour transit trips, 1,716 net new PM peak hour transit trips, and 1,068 net new Saturday peak hour transit trips. The project’s net increase to transit demand was added to existing transit usage (generated by uses that would remain) to determine Existing plus Project transit demand under the Base Transit Scenario.
# TABLE 43 – TRANSIT LINE CAPACITY ANALYSIS – EXISTING PLUS PROJECT CONDITIONS

<table>
<thead>
<tr>
<th>Route</th>
<th>Existing</th>
<th>Existing + Project: Base Transit Scenario</th>
<th>Existing + Project: Expanded Transit Scenario</th>
<th>Existing + Reduced Development: Base Transit Scenario</th>
<th>Existing + Reduced Development: Expanded Transit Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Capacity</td>
<td>Rider-ship</td>
<td>% Utilized</td>
<td>Capacity</td>
<td>Rider-ship</td>
</tr>
<tr>
<td><strong>AM Peak Hour</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC Transit EB</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>324</td>
<td>107</td>
</tr>
<tr>
<td>AC Transit WB</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>324</td>
<td>67</td>
</tr>
<tr>
<td>Muni EB Bus Service from SF¹</td>
<td>252</td>
<td>51</td>
<td>20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muni WB Bus Service to SF¹</td>
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<td>145</td>
<td>58%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ferry EB</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>839</td>
<td>238</td>
</tr>
<tr>
<td>Ferry WB</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>839</td>
<td>403</td>
</tr>
<tr>
<td><strong>PM Peak Hour</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC Transit EB</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>324</td>
<td>96</td>
</tr>
<tr>
<td>AC Transit WB</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>324</td>
<td>134</td>
</tr>
<tr>
<td>Muni EB Bus Service from SF¹</td>
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<td>121</td>
<td>48%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muni WB Bus Service to SF¹</td>
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<td>153</td>
<td>61%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ferry EB</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>839</td>
<td>479</td>
</tr>
<tr>
<td>Ferry WB</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>839</td>
<td>343</td>
</tr>
</tbody>
</table>
## TABLE 43 – TRANSIT LINE CAPACITY ANALYSIS – EXISTING PLUS PROJECT CONDITIONS

<table>
<thead>
<tr>
<th>Route</th>
<th>Existing</th>
<th>Existing + Project: Base Transit Scenario</th>
<th>Existing + Project: Expanded Transit Scenario</th>
<th>Existing + Reduced Development: Base Transit Scenario</th>
<th>Existing + Reduced Development: Expanded Transit Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Capacity</td>
<td>Rider-ship</td>
<td>% Utilized</td>
<td>Capacity</td>
<td>Rider-ship</td>
</tr>
<tr>
<td>Saturday Peak Hour</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC Transit EB</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>324</td>
<td>79</td>
</tr>
<tr>
<td>AC Transit WB</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>324</td>
<td>90</td>
</tr>
<tr>
<td>Muni EB Bus Service from SF¹</td>
<td>189</td>
<td>86</td>
<td>46%</td>
<td>189</td>
<td>328</td>
</tr>
<tr>
<td>Muni WB Bus Service to SF¹</td>
<td>189</td>
<td>133</td>
<td>70%</td>
<td>189</td>
<td>320</td>
</tr>
<tr>
<td>Ferry EB</td>
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<td>N/A</td>
<td>839</td>
<td>221</td>
</tr>
<tr>
<td>Ferry WB</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>839</td>
<td>252</td>
</tr>
</tbody>
</table>

Notes:
1. Includes Route 108-Treasure Island, and for Expanded Transit Scenario, also includes new route to be established based on demand (likely to provide service to Civic Center area).
2. Assumes the following vehicle capacities:
   - Ferry – 699 passengers per vehicle
   - Muni 40-foot Bus Coach – 63 passengers per vehicle
   - Muni 60-foot Articulated Bus Coach – 94 passengers per vehicle
   - AC Transit 40-foot Bus Coach – 54 passengers per vehicle
3. **Bold** indicates demands exceeding capacity utilization standard (85 percent for Muni, 100 percent for ferries and AC Transit).
4. Total transit trips may not equal the number of transit trips presented in Chapter 3 due to rounding.

Source: Fehr & Peers 2009
As shown in Table 43, the proposed project would create a demand for transit service, particularly bus transit service to Downtown San Francisco greater than that provided by the Proposed Project. The proposed project would not exceed AC Transit or WETA capacity utilization standards during any of the peak periods (both transit operators have capacity standards equal to the seated capacity of their vehicles). The Proposed Project would exceed Muni’s capacity standard of 85 percent during the weekday AM and PM peak hours as well as during the Saturday peak hour. Even if the unserved bus demand shifted to ferry, the combined bus and ferry demand would be 72 percent of the combined bus and ferry capacity from the Islands to San Francisco in the AM and 91 percent of total capacity in the PM peak hour from San Francisco to the Islands. During the Saturday peak hour, combined bus and ferry demand would be 53 percent of combined bus and ferry capacity to the Island from San Francisco and would be 56 percent of capacity from the Islands to San Francisco. Since Muni bus service between the Islands and San Francisco would exceed Muni’s standard of 85 percent capacity utilization in the AM and PM peak hours, the project’s impact to transit capacity would be significant.

Mitigation Measure 1 – Implement the Expanded Transit Scenario. With implementation of the Expanded Transit Scenario, the project’s transit demand would be accommodated within Muni’s capacity threshold of 85 percent occupancy, which would reduce the impact on transit to a less than significant level. However, because full funding for this service has not yet been identified, its implementation remains uncertain. In the event this mitigation measure cannot feasibly be implemented, this impact would remain significant and unavoidable.

4.3.1.2 Downtown Screenline Analysis (Base Transit Scenario)

In addition to analysis of specific transit lines with service directly to the Islands, the transit impact analysis includes an assessment as to whether the Proposed Project would be likely to add substantial amounts of transit ridership to transit routes serving Downtown San Francisco during peak commute hours.

Table 44 on page 168 summarizes the impacts to the Muni downtown screenlines from the Proposed Project under the Base Transit Scenario. Although the project is expected to generate a substantial number of transit riders, as they relate to Downtown screenlines, project-generated transit riders are more likely to be traveling in off-peak directions. For example, in the AM peak hour, the peak direction of transit riders generated by the Proposed Project is into Downtown San Francisco from the Islands (which does not affect the screenlines). Those riders continuing on transit to other destinations from Downtown San Francisco will travel in the “outbound” direction, away from Downtown. This is the off-peak direction for the Downtown screenlines, when peak transit flows are in the “inbound” direction in the AM peak hour. The reverse phenomenon occurs during the PM peak hour. This also applies to both Muni and other regional providers, such as BART, ferries, Golden Gate Transit, and SamTrans.

As shown in Table 44, the Proposed Project’s contribution to ridership in the peak direction for any of the Downtown screenlines is relatively small. The Proposed Project would not increase demand for peak direction of travel through any of the four screenlines surrounding Downtown such that they would exceed Muni’s capacity standard of 85 percent utilization. Therefore, the proposed project’s impacts to Muni downtown screenlines would be less than significant.

4.3.1.3 Regional Transit Analysis (Base Transit Scenario)

A portion of the new transit trips generated by the Proposed Project would transfer from the 108-Treasure Island and new ferry route to other regional transit operators including AC Transit, BART, Golden Gate Transit, SamTrans, Caltrain and other ferry routes. Similar to the impact assessment presented for the Muni downtown screenlines, Proposed Project-generated transit riders transferring to other regional operators would more likely be traveling in the off-peak direction, for which there is generally available capacity.
For example, during the AM peak hour, the majority of Proposed Project-generated transit trips would be traveling off of the Islands. Those traveling to the East Bay would take the new AC Transit bus line to downtown Oakland, and then transfer to BART to continue to destinations served by BART. These BART trips would be in the off-peak direction for BART in the AM peak hour. Similarly, trips destined for points served by BART in San Francisco and the Peninsula would take either the Muni 108-Treasure Island bus or the new ferry route into downtown San Francisco. From there they would transfer to BART and travel away from downtown San Francisco, which is also the off-peak direction in the AM peak hour. The reverse would occur during the PM peak hour, when transit riders returning to the Islands would travel in the off-peak direction to access the 108-Treasure Island, the new AC Transit line, or the new ferry service. For example, transit riders returning to the Ferry Building from Peninsula destinations on BART would be traveling in the off-peak direction for BART in the PM peak hour.

Since Proposed Project-generated transit riders transferring to other routes would be dispersed over multiple operators and routes, and since these trips would occur in the off-peak direction of transit demand, the additional trips would not substantially affect the peak direction capacity utilization. Therefore, impacts to regional transit operator capacity, including AC Transit, BART, Golden Gate Transit, SamTrans, Caltrain and other ferry routes would be less than significant, and no mitigation measures would be required.

4.3.1.4 Transit Delay Analysis (Base Transit Scenario)

As described in Section 4.2 (Traffic Impacts), traffic from the Proposed Project would contribute to significant impacts at several intersections in Downtown San Francisco. Increases in intersection vehicle delay may also increase delay for transit lines using those intersections. The Proposed Project would contribute significant contributions to impacts at six intersections in one or more peak hours, five of which serve transit vehicles.

1st Street/Market Street – The Proposed Project would cause this intersection to deteriorate from LOS E to LOS F during the PM peak hour.

A total of 13 Muni bus routes (2-Clement, 3-Jackson, 5-Fulton, 6-Parnassus, 9/9L-San Bruno, 21-Hayes, 30-Stockton, 30X-Marin Express, 31-Balboa, 38/38L/38X-Geary, 71/71L-Haight/Noriega, 76-Marin Headlands, 81X Caltrain Express), one Muni streetcar route (F-Market & Wharves) travel through this intersection during the weekday PM peak hour.

The intersection approaches on Market Street would operate at acceptable levels of service (LOS D or better), so the Proposed Project's contribution of traffic on Market Street approaches would not significantly impact transit routes on the east and west approaches. During the weekday PM peak hour, the southbound movement would operate at LOS F. Transit routes that would be affected (i.e., those that approach the intersection traveling southbound) include the 30X-Stockton Express.

These lines would experience increases in delay due to congestion on Bush Street, Battery Street, and 1st Street. Since the Proposed Project would create a significant contribution to delay on this approach, the Proposed Project would have a significant impact to transit travel times on the 30X-Stockton Express.

1st Street/Mission Street – The Proposed Project would cause this intersection to deteriorate from LOS E to LOS F during the PM peak hour.

A total of six Muni bus (5-Fulton, 6-Parnassus, 10-Townsend, 14/14L-Mission, 38/38L-Geary, 71/71L-Haight-Noriega, 76-Marin Headlands), eight Golden Gate Transit bus lines (10, 54, 70, 72, 73, 76, 80, 101) and three Samtrans buses (292, 391, 397) travel through this intersection. However, all approaches to this intersection include dedicated transit-only lanes; therefore, transit routes serving this intersection would not be affected by Proposed Project-generated increases in cumulative intersection delay, and the Proposed Project’s contribution to cumulative transit travel time impacts at this intersection would be less than significant.
**2nd Street/Folsom Street** – The Proposed Project would contribute a significant amount of traffic to movements at this intersection that would operate at unacceptable levels of service during the PM peak hour.

Three Muni bus lines (10-Townsend, 12-Folsom/Pacific, 76-Marin Headlands) and 19 Golden Gate Transit bus lines (2, 4, 8, 18, 24, 27, 38, 44, 54, 56, 58, 72, 73, 74, 76, 10, 70, 80, 101) travel through this intersection. Transit lines at this intersection share lanes with mixed-flow traffic along both Folsom Street and 2nd Street. During the PM peak hour, the intersection would operate with substantial amounts of vehicle delay, primarily as a result of SFOBB-directed traffic. Folsom Street has four eastbound travel lanes at this intersection. Transit uses the north-most lane, which does not lead to an on-ramp to the SFOBB and would be less congested than the southern lanes; therefore, project contributions to congestion on Folsom Street would have a minimal effect to operations on the 12-Folsom/Pacific, 76-Marin Headlands, and Golden Gate Transit buses, which travel on Folsom Street.

The 10-Townsend would need to maneuver through northbound and southbound mixed-flow traffic destined for the SFOBB; however, these approaches operate at acceptable levels of service. Thus, the Proposed Project’s contribution to travel time impacts to the 10-Townsend at this intersection would be considered less than significant.

**5th Street/Bryant Street/I-80 On-Ramp** – The Proposed Project would contribute a significant amount of traffic to movements at this intersection that would operate at unacceptable levels of service during the PM peak hour and would cause this intersection to deteriorate from LOS D to LOS E during the Saturday peak hour.

Three Muni bus routes travel through this intersection (8X/8AX/8BX-Bayshore Express, 27-Bryant, 47-Van Ness). Transit lines at this intersection share lanes with mixed-flow traffic along both Bryant Street and 5th Street. The 8X/8AX/8BX-Bayshore Express and 27-Bryant travel eastbound on Bryant Street and the 47-Van Ness travels northbound on 5th Street.

During the PM peak hour, the northbound right and eastbound through movements and southbound approaches would operate at unacceptable levels of service, and a majority of the delay would be a result of congestion leading towards the SFOBB. The proposed project would only add traffic to the northbound and southbound approaches and the eastbound left turn movement. The 8-Bayshore lines operate in the southernmost through lane on Bryant Street and the project would not add new trips to the eastbound through movement; therefore, the Proposed Project would only have a significant impact to transit travel times on the 27-Bryant (which turns left from Bryant Street to 5th Street) and 47-Van Ness (which runs northbound on 5th Street) during the PM peak hour.

During the Saturday peak hour, the northbound approach would operate at unacceptable levels of service. The project would add new trips to this approach; therefore, the Proposed Project would have a significant impact on the 47-Van Ness during the Saturday peak hour.

**5th Street/Harrison Street/I-80 Off-Ramp** – The Proposed Project would cause this intersection to deteriorate from LOS D to LOS E during the PM peak hour.

Four Muni bus routes travel through this intersection (8X/8AX/8BX-Bayshore Express, 12-Folsom/Pacific, 27-Bryant, 47-Van Ness). Transit lines at this intersection share lanes with mixed-flow traffic along both Harrison Street and 5th Street. During the PM peak hour, the northbound, southbound, and off-ramp approaches would operate at unacceptable levels of service. The 12-Folsom/Pacific and 8-Bayshore lines run westbound on Harrison Street, and the westbound approach operates acceptably; therefore, no impact to these lines was identified. The Proposed Project’s contribution to increases in delay on the northbound and southbound approaches would be substantial; therefore, the Proposed Project’s impacts to transit travel times of the 27-Bryant and 47-Van Ness would be considered significant.

In summary, the Proposed Project’s contribution to increases in delay at five intersections would result in a cumulative impact to the following transit lines, as discussed above:
• **27-Bryant**: 5th Street/Bryant Street/I-80 On-Ramp, 5th Street/Harrison Street/I-80 Off-Ramp (PM Peak Hour)

• **30X-Stockton Express**: 1st Street/Market Street (PM Peak Hour)

• **47-Van Ness**: 5th Street/Bryant Street/I-80 On-Ramp; 5th Street/Harrison Street/I-80 Off-Ramp (PM and Saturday Peak Hours)

Appropriate mitigation measures for these impacts include transit preferential elements, such as transit-only lanes, transit preferential signal treatments, or other amenities that would improve the ability of transit vehicles to bypass area-wide congestion. The City of San Francisco is currently developing the Transit Center District Plan ("TCDP") transportation planning effort. The TCDP would allow higher-density development in the area surrounding the proposed new Transbay Transit Center in Downtown San Francisco. As part of this work, the City is contemplating changes to the transportation network in the South of Market area designed to accommodate this increased development and improve overall transit circulation. At the time this analysis was conducted, the proposed transit network changes were not defined enough to include in the analysis. As part of the TCDP analysis, the City Planning Department should account for traffic increases associated with the Proposed Project. However, because the Plan is not finalized and its environmental review is not yet complete, implementation of measures to improve transit circulation in the area are uncertain and the Proposed Project’s impacts to transit delay would remain **significant and unavoidable**.

### 4.3.1.4 On-Island Transit Circulation (Base Transit Scenario)

The circulation of transit routes on the Islands was described in the Project Description section and illustrated in **Figure 6** on page 14. In general, the street network has been designed in close coordination with transit operators, as well as MTA’s bicycle and pedestrian group, to accommodate transit vehicle circulation and includes provisions, such as the design of curb radii and roadway widths to ensure that bus, emergency vehicles and truck maneuvers can be accommodated while minimizing conflicts with pedestrians and bicyclists.
## TABLE 44 – EXISTING PLUS PROJECT MUNI TRANSIT SCREENLINES CAPACITY UTILIZATION

<table>
<thead>
<tr>
<th></th>
<th>Existing</th>
<th>Existing + Proposed Project (Base Transit Scenario)</th>
<th>Existing + Proposed Project (Expanded Transit Scenario)</th>
<th>Existing + Reduced Development Alternative (Base Transit Scenario)</th>
<th>Existing + Reduced Development Alternative (Expanded Transit Scenario)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Riders</td>
<td>Capacity</td>
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<td>Project Trips</td>
<td>Total Riders</td>
</tr>
<tr>
<td>AM Peak Hour (inbound)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>1,882</td>
<td>3,781</td>
<td>50%</td>
<td>17</td>
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<tr>
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<td>11,437</td>
<td>65%</td>
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<td>Southwest</td>
<td>4,248</td>
<td>6,301</td>
<td>67%</td>
<td>89</td>
<td>4,337</td>
</tr>
<tr>
<td>Southeast</td>
<td>6,627</td>
<td>8,699</td>
<td>76%</td>
<td>10</td>
<td>6,637</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20,191</strong></td>
<td><strong>30,218</strong></td>
<td><strong>67%</strong></td>
<td><strong>160</strong></td>
<td><strong>20,351</strong></td>
</tr>
<tr>
<td>PM Peak Hour (outbound)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>1,186</td>
<td>3,599</td>
<td>33%</td>
<td>25</td>
<td>1,211</td>
</tr>
<tr>
<td>Northwest</td>
<td>6,621</td>
<td>10,123</td>
<td>65%</td>
<td>65</td>
<td>6,686</td>
</tr>
<tr>
<td>Southwest</td>
<td>4,668</td>
<td>7,028</td>
<td>66%</td>
<td>130</td>
<td>4,798</td>
</tr>
<tr>
<td>Southeast</td>
<td>7,434</td>
<td>9,623</td>
<td>77%</td>
<td>14</td>
<td>7,448</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19,909</strong></td>
<td><strong>30,373</strong></td>
<td><strong>66%</strong></td>
<td><strong>234</strong></td>
<td><strong>20,143</strong></td>
</tr>
</tbody>
</table>

Source: Fehr & Peers, 2009
However, as discussed in the ramp queuing section, vehicle queues on the SFOBB ramp approaches would extend along Treasure Island Road potentially blocking bus circulation from Treasure Island toward the SFOBB, causing delays to bus service. This may result in substantial delays to transit service.

Under conditions without the separately-proposed reconstruction of the westbound ramps on the east side of Yerba Buena Island, the two existing westbound on-ramps would both remain open to mixed traffic. It is likely that Muni would use the westernmost on-ramp. As illustrated on Figure 22 and Table 38, (pages 107 and 108), queues from this ramp may extend as far as approximately ½-mile from the on-ramp during weekday peak hours, causing delays of approximately two minutes per vehicle. During Saturday peak hours, queues would extend just over 2/3 mile, with delays of approximately three minutes per vehicle. This would be considered a significant impact to Muni operations.

Mitigation Measure 1 – Implement the Expanded Transit Scenario. With implementation of the Expanded Transit Scenario, the project’s auto traffic generation would be reduced such that queues would be reduced to much smaller levels (between 0 and 400 feet) at each on-ramp during weekday peak hours, but would remain approximately 1/3 mile during Saturday peak hours. However, because full funding for this service has not yet been identified, its implementation remains uncertain. In the event this mitigation measure cannot feasibly be implemented, and regardless of implementation for Saturday peak hours, this impact to Muni operations would remain significant and unavoidable.

Similarly, although AC Transit vehicles would not be using the westbound on-ramps, queues from both westbound ramps would interfere with AC Transit travel between Treasure Island and the eastbound on-ramp to the SFOBB. This would be considered a significant impact to AC Transit operations.

Mitigation Measure 1 – Implement the Expanded Transit Scenario. With implementation of the Expanded Transit Scenario, the project’s auto traffic generation would be reduced such that queues would be reduced to much smaller levels (between 0 and 400 feet) at each on-ramp during weekday peak hours, but would remain approximately 1/3 mile during Saturday peak hours. However, because full funding for this service has not yet been identified, its implementation remains uncertain. In the event this mitigation measure cannot feasibly be implemented, and regardless of implementation for Saturday peak hours, this impact to AC Transit operations would remain significant and unavoidable.

Under conditions with the separately-proposed westbound ramp reconstruction project, the westbound on-ramp on the west side of Yerba Buena Island would be converted to transit-only and all traffic destined for the westbound SFOBB would be routed to the westbound on-ramp on the east side of Yerba Buena Island. In this case, queues may extend from the westbound on-ramp on the east side of Yerba Buena Island over one mile onto Treasure Island Road, just past Macalla Road. Muni buses leaving the Transit Hub would travel through this queue for approximately ½ mile before reaching the transit-only westbound on-ramp, causing delays of about five minutes in the AM and PM peaks. This would be considered a significant impact to Muni operations.

Mitigation Measures 1 & 2 – Implementing the Expanded Transit Scenario (Mitigation 1) would reduce auto traffic generation such that the delay at the on-ramps would be less than 3.5 minutes; however, the impact to Muni operations would remain significant. As noted earlier, the funding for this expanded service is uncertain. Therefore, to ensure that transit circulation is not adversely affected by queues approaching the SFOBB on-ramps, a continuous southbound transit-only lane shall be provided from the transit center on Treasure Island to the westbound on-ramp to the SFOBB on the west side of Yerba Buena Island (Mitigation Measure 2).

Implementation of Mitigation Measure 2 would only be triggered if the extent of actual vehicle queuing impacts the proposed 108-Treasure Island on Treasure Island Road and creates delays for Muni buses accessing the westbound transit-only on-ramp. As such, throughout the life of the project, the TITMA, in
consultation with SFMTA and using SFMTA’s methodology, shall monitor the length and duration of potential queues on Treasure Island Road and the associated delays to Muni service. If the queues formed between First Street and the westbound on-ramp on the west side of Yerba Buena Island result in an operational delay to Muni service equal to or greater than the prevailing headway during the AM, PM or Saturday peak periods, TITMA shall implement a southbound transit-only lane between First Street on Treasure Island and the transit- and emergency vehicle-only westbound Bay Bridge on-ramp. In addition to providing a transit-only lane, TITMA shall stripe sharrows in the southbound mixed flow lane between First Street and the westbound on-ramp. The implementation of a transit-only lane would be triggered if impacts are observed over the course of six months at least 50 percent of the time during the AM, PM, or Saturday peak periods.

Implementation of Mitigation Measure 2 to provide a transit and emergency vehicle-only lane between First Street on Treasure Island and the westbound Bay Bridge on-ramp would allow Muni vehicles to bypass vehicle queues that may occur and therefore, the impact to Muni operations would be reduced to a less-than-significant level.

Implementation of this mitigation measure would entail the following:

- Elimination or reduction of the proposed median on Treasure Island Road between First Street and just south of Macalla Road; and
- Elimination of the proposed southbound bicycle lane on Treasure Island and Hillcrest Roads after the intersection with Macalla Road. Bicyclists would still be able to use Class I bicycle paths and Class II bicycle lanes proposed on Macalla Road to connect between the Islands and the bicycle path on the new eastern span of the Bay Bridge. Similarly, although AC Transit vehicles would not be using the westbound on-ramps, queues from the westbound on-ramp on the east side of Yerba Buena Island would interfere with AC Transit travel between Treasure Island and the eastbound on-ramp to the SFOBB. AC Transit vehicles would travel in this queue nearly for its entire length, from just north of Macalla Road to the eastbound on-ramp to the SFOBB. This would be considered a significant impact to AC Transit operations.

Providing this transit-only lane would allow transit vehicles to bypass vehicle queues; however, since this improvement would extend only to the transit-only westbound on-ramp because there is not sufficient right-of-way to extend a transit-only lane beyond the transit-only westbound on-ramp, AC Transit vehicles would continue to experience congestion between the transit-only westbound on-ramp and the eastbound on-ramp. Therefore, the impact to AC Transit operations would be significant and unavoidable.

4.3.2 Proposed Project with Expanded Transit Scenario

This section evaluates the Proposed Project’s transit impacts under the Expanded Transit Scenario. The Expanded Transit Scenario would include all of the elements of the Base Transit Scenario plus:

- More frequent ferry service at 15-minute headways during peak periods (corresponding to three ferries operating between Treasure Island and improved docks in San Francisco, dedicated for use by the Treasure Island ferry);
- More frequent bus service on the Muni 108-Treasure Island route, with frequency increased to 7-minute headways in the AM peak period and 5-minute headways in the PM peak period to and from the San Francisco Transbay Terminal. Overnight Owl service would continue at lower frequencies;
- New bus line with service to another location in San Francisco (assumed to be Civic Center for purposes of this analysis) with 12-min headways during the AM and PM peak periods. Service would be provided between approximately 5:00 AM and 10:00 PM;
The transit infrastructure (ferry quay, Transit Hub, new bus stops and layover areas, and a transit-only on-ramp to the westbound SFOBB) would remain the same as the Proposed Project.

This would result in an overall transit capacity of 4,241 passengers per hour per direction in the AM peak hour and 4,563 passengers per hour per direction in the PM peak hour. Specifically, the transit capacity would be 2,796 passengers per hour by ferry in both peak hours and 1,445 passengers per hour by bus in the AM peak hour and 1,767 passengers per hour by bus in the PM Peak hour. The transit capacity during the Saturday peak hour would be 3,680 passengers. Specifically, the transit capacity would be 2,796 passengers per hour by ferry and 2,767 passengers per hour by bus.

4.3.2.1 Transit Capacity Utilization (Expanded Transit Scenario)

Table 43, on page 162, summarizes the transit trips to and from the Islands, and compares the projected ridership with the hourly passenger capacity provided by each transit operator for all four scenarios evaluated in this study, including the Proposed Project under the Expanded Transit Scenario.

The Proposed Project under the Expanded Transit Scenario will generate 2,033 net new AM peak hour transit trips, 2,802 net new PM peak hour transit trips, and 1,796 net new Saturday peak hour transit trips. The project’s net increase to transit demand was added to existing transit usage (generated by uses that would remain) to determine Existing plus Project transit demand under the Expanded Transit Scenario.

The analysis forecasts an increase in transit ridership between the Funded and Expanded Transit Scenarios. With more frequent transit service and additional destinations served, compared to the Base Transit Scenario, travel by transit becomes more desirable under the Expanded Transit Scenario. As a result, transit service experiences higher ridership, although the total travel demand in terms of person-trips generated remains the same between the two scenarios. Further, although transit service between the Islands and the East Bay via AC Transit buses remains the same between the two scenarios, this analysis assumes AC Transit ridership would be higher under the Expanded Transit Scenario since under this scenario, the Proposed Project would generally be more transit-oriented and would attract residents and tenants who are more attracted to use transit.

As shown in Table 43, transit ridership would be less than 70 percent of the total capacity for each service type, which would be well within each provider’s capacity utilization standard. Therefore, under the Expanded Transit Scenario, the Proposed Project’s impacts to transit capacity utilization would be less than significant.

4.3.2.2 Downtown Screenline Analysis (Expanded Transit Scenario)

In addition to analysis of specific transit lines with service directly to the Islands, the transit impact analysis includes an assessment as to whether the Proposed Project would be likely to add substantial amounts of transit ridership to transit routes serving Downtown San Francisco during peak commute hours.

Table 44, on page 168, summarizes the impacts to the Muni downtown screenlines from the Proposed Project under the Expanded Transit Scenario. Although the project is expected to generate a substantial number of transit riders, as they relate to Downtown screenlines, project-generated transit riders are more likely to be traveling in off-peak directions. For example, in the AM peak hour, the peak direction of transit riders generated by the Proposed Project is into Downtown San Francisco from the Islands (which does not affect the screenlines). Those riders continuing on transit to other destinations from Downtown San Francisco will travel in the “outbound” direction, away from Downtown. This is the off-peak direction for the Downtown screenlines, when peak transit flows are in the “inbound” direction in the AM peak hour. The reverse phenomenon occurs during the PM peak hour.
As shown in Table 44, the Proposed Project’s contribution to ridership in the peak direction for any of the Downtown screenlines is relatively small. The Proposed Project would not increase demand for peak direction of travel through any of the four screenlines surrounding Downtown such that they would exceed Muni’s capacity standard of 85 percent utilization. Therefore, under the Expanded Transit Scenario, the proposed project’s impacts to Muni downtown screenlines would be less than significant.

4.3.2.3 Regional Transit Analysis (Expanded Transit Scenario)

A portion of the new transit trips generated by the Proposed Project would transfer from the 108-Treasure Island and new ferry route to other regional transit operators including AC Transit, BART, Golden Gate Transit, SamTrans, Caltrain and other ferry routes. Similar to the impact assessment presented for the Muni downtown screenlines, Proposed Project-generated transit riders transferring to other regional operators would more likely be traveling in the off-peak direction, for which there is generally available capacity.

For example, during the AM peak hour, the majority of Proposed Project-generated transit trips would be traveling off of the Islands. Those traveling to the East Bay would take the new AC Transit bus line to downtown Oakland, and then transfer to BART to continue to destinations served by BART. These BART trips would be in the off-peak direction for BART in the AM peak hour. Similarly, trips destined for points served by BART in San Francisco and the Peninsula would take either the Muni 108-Treasure Island bus or the new ferry route into downtown San Francisco. From there they would transfer to BART and travel away from downtown San Francisco, which is also the off-peak direction in the AM peak hour. The reverse would occur during the PM peak hour, when transit riders returning to the Islands would travel in the off-peak direction to access the 108-Treasure Island, the new AC Transit line, or the new ferry service. For example, transit riders returning to the Ferry Building from Peninsula destinations on BART would be traveling in the off-peak direction for BART in the PM peak hour.

Since Proposed Project-generated transit riders transferring to other routes would be dispersed over multiple operators and routes, and since these trips would occur in the off-peak direction of transit demand, the additional trips would not substantially affect the peak direction capacity utilization. Therefore, impacts to regional transit operator capacity, including AC Transit, BART, Golden Gate Transit, SamTrans, Caltrain and other ferry routes would be less than significant, and no mitigation measures would be required.

4.3.2.4 Transit Delay Analysis (Expanded Transit Scenario)

As described in Section 4.2 (Traffic Impacts), traffic from the Proposed Project would contribute to significant impacts at several intersections in Downtown San Francisco. Increases in intersection vehicle delay may also increase delay for transit lines using those intersections. The Proposed Project would contribute significant contributions to impacts at six intersections in one or more peak hours.

1st Street/Market Street – The Proposed Project would cause this intersection to deteriorate from LOS E to LOS F during the PM peak hour.

A total of 13 Muni bus routes (2-Clement, 3-Jackson, 5-Fulton, 6-Parnassus, 9/9L-San Bruno, 21-Hayes, 30-Stockton, 30X-Marina Express, 31-Balboa, 38/38L/38X-Geary, 71/71L-Haight/Noriega, 76-Marin Headlands, 81X Caltrain Express), one Muni streetcar route (F-Market & Wharves) travel through this intersection during the weekday PM peak hour.

The intersection approaches on Market Street would operate at acceptable levels of service (LOS D or better), so the Proposed Project’s contribution of traffic on Market Street approaches would not significantly impact transit routes on the east and west approaches. During the weekday PM peak hour, the southbound movement would operate at LOS F. Transit routes that would be affected (i.e., those that approach the intersection traveling southbound) include the 30X-Stockton Express.
These lines would experience increases in delay due to congestion on Bush Street, Battery Street, and 1st Street. Since the Proposed Project would create a significant contribution to delay on this approach, the Proposed Project would have a significant impact to transit travel times on the 30X-Stockton Express.

1st Street/Mission Street – The Proposed Project would cause this intersection to deteriorate from LOS E to LOS F during the PM peak hour.

A total of six Muni bus (5-Fulton, 6-Parnassus, 10-Townsend, 14/14L-Mission, 38/38L-Geary, 71/71L-Haight-Noriega, 76-Marin Headlands), eight Golden Gate Transit bus lines (10, 54, 70, 72, 73, 76, 80, 101) and three Samtrans buses (292, 391, 397) travel through this intersection. However, all approaches to this intersection include dedicated transit-only lanes; therefore, transit routes serving this intersection would not be affected by Proposed Project-generated increases in cumulative intersection delay, and the Proposed Project’s contribution to cumulative transit travel time impacts at this intersection would be less than significant.

2nd Street/Folsom Street – The Proposed Project would contribute a significant amount of traffic to movements at this intersection that would operate at unacceptable levels of service during the PM peak hour.

Three Muni bus lines (10-Townsend, 12-Folsom/Pacific, 76-Marin Headlands) and Golden Gate Transit bus lines travel through this intersection. Transit lines at this intersection share lanes with mixed-flow traffic along both Folsom Street and 2nd Street. During the PM peak hour, the intersection would operate with substantial amounts of vehicle delay, primarily as a result of SFOBB-destined traffic. Folsom Street has four eastbound travel lanes at this intersection. Transit uses the north-most lane, which does not lead to an on-ramp to the SFOBB and would be less congested than the southern lanes; therefore, project contributions to congestion on Folsom Street would have a minimal effect to operations on the 12-Folsom/Pacific, 76-Marin Headlands, and Golden Gate Transit buses, which travel on Folsom Street.

The 10-Townsend would need to maneuver though northbound and southbound mixed-flow traffic destined for the SFOBB; however, these approaches operate at acceptable levels of service. Thus, the Proposed Project’s contribution to travel time impacts to the 10-Townsend at this intersection would be considered less than significant.

5th Street/Bryant Street/I-80 On-Ramp – The Proposed Project would contribute a significant amount of traffic to movements at this intersection that would operate at unacceptable levels of service during the PM peak hour and would cause this intersection to deteriorate from LOS D to LOS E during the Saturday peak hour.

Three Muni bus lines travel through this intersection (8X/8AX/8BX-Bayshore Express, 27-Bryant, 47-Van Ness). Transit lines at this intersection share lanes with mixed-flow traffic along both Bryant Street and 5th Street. The 8X/8AX/8BX-Bayshore Express and 27-Bryant travel eastbound on Bryant Street and the 47-Van Ness travels northbound and southbound on 5th Street.

During the PM peak hour, the northbound right and eastbound through movements and southbound approaches would operate at unacceptable levels of service, and a majority of the delay would be a result of congestion leading towards the SFOBB. The proposed project would only add traffic to the northbound and southbound approaches and the eastbound left turn movement. The 8-Bayshore lines operate in the southernmost through lane on Bryant Street and the project would not add new trips to the eastbound through movement; therefore, the Proposed Project would only have a significant impact to transit travel times on the 27-Bryant (which turns left from Bryant Street to 5th Street) and 47-Van Ness (which runs northbound on 5th Street) during the PM peak hour.

During the Saturday peak hour, the northbound approach would operate at unacceptable levels of service. The project would add new trips to this approach; therefore, the Proposed Project would have a significant impact on the 47-Van Ness during the Saturday peak hour.

5th Street/Harrison Street/I-80 Off-Ramp – The Proposed Project would cause this intersection to deteriorate from LOS D to LOS E during the PM peak hour.
Four Muni bus routes travel through this intersection (8X/8AX/8BX-Bayshore Express, 12-Folsom/Pacific, 27-Bryant, 47-Van Ness). Transit lines at this intersection share lanes with mixed-flow traffic along both Harrison Street and 5th Street. During the PM peak hour, the northbound, southbound, and off-ramp approaches would operate at unacceptable levels of service. The 12-Folsom/Pacific and 8-Bayshore lines run westbound on Harrison Street, and the westbound approach operates acceptably; therefore, no impact to these lines was identified. The Proposed Project’s contribution to increases in delay on the northbound and southbound approaches would be substantial; therefore, the Proposed Project’s impacts to transit travel times of the 27-Bryant and 47-Van Ness would be considered significant.

In summary, the Proposed Project’s contribution to increases in delay at five intersections would result in a cumulative impact to the following transit lines, as discussed above:

- **27-Bryant**: 5th Street/Bryant Street/I-80 On-Ramp, 5th Street/Harrison Street/I-80 Off-Ramp (PM Peak Hour)
- **30X-Stockton Express**: 1st Street/Market Street (PM Peak Hour)
- **47-Van Ness**: 5th Street/Bryant Street/I-80 On-Ramp; 5th Street/Harrison Street/I-80 Off-Ramp (PM and Saturday Peak Hours)

Appropriate mitigation measures for these impacts include transit preferential elements, such as transit-only lanes, transit preferential signal treatments, or other amenities that would improve the ability of transit vehicles to bypass area-wide congestion. The City of San Francisco is currently developing the Transit Center District Plan ("TCDP") transportation planning effort. The TCDP would allow higher-density development in the area surrounding the proposed new Transbay Transit Center in Downtown San Francisco. As part of this work, the City is contemplating changes to the transportation network in the South of Market area designed to accommodate this increased development and improve overall transit circulation. At the time this analysis was conducted, the proposed transit network changes were not defined enough to include in the analysis. As part of the TCDP analysis, the City Planning Department should account for traffic increases associated with the Proposed Project. However, because the Plan is not finalized and its environmental review is not yet complete, implementation of measures to improve transit circulation in the area are uncertain and the Proposed Project’s impacts to transit delay would remain significant and unavoidable.

### 4.3.2.4 On-Island Transit Circulation (Expanded Transit Scenario)

The circulation of transit routes on the Islands was described in the Project Description section and illustrated in Figure 6 (page 14). In general, the street network has been designed in close coordination with transit operators, as well as MTA’s bicycle and pedestrian group, to accommodate transit vehicle circulation and includes provisions, such as the design of curb radii and roadway widths to ensure that bus, emergency vehicles and truck maneuvers can be accommodated while minimizing conflicts with pedestrians and bicyclists.

However, as discussed in the ramp queuing section, vehicle queues on the SFOBB ramp approaches would extend along Treasure Island Road potentially blocking bus circulation from Treasure Island toward the SFOBB, causing delays to bus service. This may result in substantial delays to transit service.

Under conditions without the separately-proposed reconstruction of the westbound ramps on the east side of Yerba Buena Island, the two existing westbound on-rams would both remain open to mixed traffic. It is likely that Muni would use the westernmost on-ramp. As illustrated on Figure 27 (page 128) and Table 38 (page 108), queues from this ramp would be minimal during the weekday AM and PM peak hours, extending no longer than 400 feet. However, queues would remain just over 1/3 mile during Saturday peak hours. This would be considered a significant impact to Muni operations. Implementation of the separately-proposed westbound ramps reconstruction project would reduce queues to less than significant levels during the Saturday peak hour, but would result in substantially longer queues during the...
weekday AM and PM peak hours. Therefore, under conditions without the westbound ramp reconstruction project, no feasible mitigation measures were identified to reduce the Proposed Project’s impacts to Muni operations to less than significant levels during the Saturday peak hour and the impact would remain significant and unavoidable.\(^{45}\)

Similarly, the minimal queues would not affect AC Transit vehicles traveling between Treasure Island and the eastbound on-ramp to the SFOBB during the weekday AM and PM peak hour. However, Saturday peak hour queues would remain approximately 1/3 mile, which would cause delays to AC Transit service. As described in Mitigation Measure 2, providing a transit-only lane between the western westbound on-ramp and 1st Street would provide a queue jump lane for transit vehicles accessing the SFOBB. However, since this improvement would extend only to the transit-only westbound on-ramp and there is not room to extend a transit-only lane beyond the transit-only westbound on-ramp to the eastbound on-ramp, AC Transit vehicles would continue to experience congestion between the transit-only westbound on-ramp and the eastbound on-ramp. Therefore, the impact to AC Transit operations would be significant and unavoidable.

Under conditions with the separately-proposed westbound ramp reconstruction project, the westbound on-ramp on the west side of Yerba Buena Island would be converted to transit-only and all traffic destined for the westbound SFOBB would be routed to the westbound on-ramp on the east side of Yerba Buena Island. In this case, queues may extend from the westbound on-ramp on the east side of Yerba Buena Island to nearly one mile onto Treasure Island Road, approximately to the transit-only westbound on-ramp. Muni buses leaving the Transit Hub would not likely experience queues as they approach the westbound on-ramp. Therefore, impacts to Muni operations would be considered less than significant.

Similarly, although AC Transit vehicles would not be using the westbound on-ramps, queues from the westbound on-ramp on the east side of Yerba Buena Island would interfere with AC Transit travel between Treasure Island and the eastbound on-ramp to the SFOBB. AC Transit vehicles would travel in this queue nearly for its entire length, approximately from the transit-only westbound on-ramp to the eastbound on-ramp to the SFOBB. This would be considered a significant impact to AC Transit operations. Since there is not room to extend a transit-only lane beyond the transit-only westbound on-ramp, AC Transit vehicles would continue to experience congestion between the transit-only westbound on-ramp and the eastbound on-ramp. Therefore, the impact to AC Transit operations would be significant and unavoidable.

4.3.3 Reduced Development Alternative with Base Transit Scenario

This section analyzes the transit impacts associated with the Reduced Development Alternative under the Base Transit Scenario.

4.3.3.1 Transit Capacity Utilization (Reduced Development, Base Transit Scenario)

Table 43, on page 159, summarizes the transit trips to and from the Islands, and compares the projected ridership with the hourly passenger capacity provided by each transit operator for all four scenarios evaluated in this study, including the Reduced Development Alternative under the Base Transit Scenario.

The Reduced Development Alternative under the Base Transit Scenario will generate 1,008 net new AM peak hour transit trips, 1,462 net new PM peak hour transit trips, and 953 net new Saturday peak hour transit trips. The project’s net increase to transit demand was added to existing transit usage (generated by uses that would remain) to determine Existing plus Reduced Development Alternative transit demand under the Base Transit Scenario.

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\(^{45}\) Converting the western on-ramp to transit-only without improvements to the westbound on-ramps on the east side of the Islands would substantially affect vehicle queuing and delay and was not evaluated as part of this analysis.
As shown in Table 43, the Reduced Development Alternative would create a demand for transit service, particularly bus transit service to Downtown San Francisco greater than that provided. The Reduced Development Alternative’s transit travel demand would exceed Muni’s capacity standard of 85 percent during the weekday AM and PM peak hours as well as during the Saturday peak hour. The proposed project would not exceed AC Transit or WETA capacity utilization standards during any of the peak periods (both transit operators have capacity standards equal to the seated capacity of their vehicles). If the unserved bus demand shifted to ferry, the combined bus and ferry demand would be less than Muni’s 85 percent capacity utilization standard in all three peak hours, Muni bus service would still likely exceed 85 percent utilization. Since Muni bus service between the Islands and San Francisco would exceed Muni’s standard of 85 percent capacity utilization in the AM, PM, and Saturday peak hours, the project’s impact to transit capacity would be significant.

Mitigation Measure 1 – Implement the Expanded Transit Scenario. With implementation of the Expanded Transit Service, the project’s transit demand would be accommodated within Muni’s capacity threshold of 85 percent occupancy, which would reduce the impact on transit to a less than significant level. However, because full funding for this service has not yet been identified, its implementation remains uncertain. In the event this mitigation measure cannot feasibly be implemented, this impact would remain significant and unavoidable.

4.3.3.2 Downtown Screenline Analysis (Reduced Development, Base Transit Scenario)

In addition to analysis of specific transit lines with service directly to the Islands, the transit impact analysis includes an assessment as to whether the Reduced Development Alternative would be likely to add substantial amounts of transit ridership to transit routes serving Downtown San Francisco during peak commute hours.

Table 44, on page 168, summarizes the impacts to the Muni downtown screenlines from the Reduced Development Alternative under the Base Transit Scenario. Although the project is expected to generate a substantial number of transit riders, as they relate to Downtown screenlines, project-generated transit riders are more likely to be traveling in off-peak directions. For example, in the AM peak hour, the peak direction of transit riders generated by the Reduced Development Alternative is into Downtown San Francisco from the Islands (which does not affect the screenlines). Those riders continuing on transit to other destinations from Downtown San Francisco will travel in the “outbound” direction, away from Downtown. This is the off-peak direction for the Downtown screenlines, when peak transit flows are in the “inbound” direction in the AM peak hour. The reverse phenomenon occurs during the PM peak hour.

As shown in Table 44, the Reduced Development Alternative’s contribution to ridership in the peak direction for any of the Downtown screenlines is relatively small. The Reduced Development Alternative would not increase demand for peak direction of travel through any of the four screenlines surrounding Downtown such that they would exceed Muni’s capacity standard of 85 percent utilization. Therefore, under the Base Transit Scenario, the Reduced Development Alternative’s impacts to Muni downtown screenlines would be less than significant.

4.3.3.3 Regional Transit Analysis (Reduced Development, Base Transit Scenario)

A portion of the new transit trips generated by the Reduced Development Alternative with Base Transit Service would transfer from the 108-Treasure Island and new ferry route to other regional transit operators including AC Transit, BART, Golden Gate Transit, SamTrans, Caltrain and other ferry routes. Similar to the impact assessment presented for the Muni downtown screenlines, Proposed Project-generated transit riders transferring to other regional operators would more likely be traveling in the off-peak direction, for which there is generally available capacity.

For example, during the AM peak hour, the majority of Project-generated transit trips would be traveling off of the Islands. Those traveling to the East Bay would take the new AC Transit bus line to downtown...
Oakland, and then transfer to BART to continue to destinations served by BART. These BART trips would be in the off-peak direction for BART in the AM peak hour. Similarly, trips destined for points served by BART in San Francisco and the Peninsula would take either the Muni 108-Treasure Island bus or the new ferry route into downtown San Francisco. From there they would transfer to BART and travel away from downtown San Francisco, which is also the off-peak direction in the AM peak hour. The reverse would occur during the PM peak hour, when transit riders returning to the Islands would travel in the off-peak direction to access the 108-Treasure Island, the new AC Transit line, or the new ferry service. For example, transit riders returning to the Ferry Building from Peninsula destinations on BART would be traveling in the off-peak direction for BART in the PM peak hour.

Since Reduced Development Alternative with Base Transit Service-generated transit riders transferring to other routes would be dispersed over multiple operators and routes, and since these trips would occur in the off-peak direction of transit demand, the additional trips would not substantially affect the peak direction capacity utilization. Therefore, impacts to regional transit operator capacity, including AC Transit, BART, Golden Gate Transit, SamTrans, Caltrain and other ferry routes would be less than significant, and no mitigation measures would be required.

4.3.3.4 Transit Delay Analysis (Reduced Development, Base Transit Scenario)

As described in Section 4.2 (Traffic Impacts), traffic from the Reduced Development Alternative with Base Transit Service would contribute to significant impacts at several intersections in Downtown San Francisco. Increases in intersection vehicle delay may also increase delay for transit lines using those intersections. The Proposed Project would contribute significant contributions to impacts at six intersections in one or more peak hours.

1st Street/Market Street – The Reduced Development Alternative with Base Transit Service would cause this intersection to deteriorate from LOS E to LOS F during the PM peak hour.

A total of 13 Muni bus routes (2-Clement, 3-Jackson, 5-Fulton, 6-Parnassus, 9/9L-San Bruno, 21-Hayes, 30-Stockton, 30X-Marina Express, 31-Balboa, 38/38L/38X-Geary, 71/71L-Haight/Noriega, 76-Marin Headlands, 81X-Caltrain Express), one Muni streetcar route (F-Market & Wharves) travel through this intersection during the weekday PM peak hour.

The intersection approaches on Market Street would operate at acceptable levels of service (LOS D or better), so the Reduced Development Alternative with Base Transit Service’s contribution of traffic on Market Street approaches would not significantly impact transit routes on the east and west approaches. During the weekday PM peak hour, the southbound movement would operate at LOS F. Transit routes that would be affected (i.e., those that approach the intersection traveling southbound) include the 30X-Stockton Express.

These lines would experience increases in delay due to congestion on Bush Street, Battery Street, and 1st Street. Since the Reduced Development Alternative with Base Transit Service would create a significant contribution to delay on this approach, the Reduced Development Alternative with Base Transit Service would have a significant impact to transit travel times on the 30X-Stockton Express.

1st Street/Mission Street – The Reduced Development Alternative with Base Transit Service would cause this intersection to deteriorate from LOS E to LOS F during the PM peak hour.

A total of six Muni bus routes (5-Fulton, 6-Parnassus, 10-Townsend, 14/14L-Mission, 38/38L-Geary, 71/71L-Haight-Noriega, 76-Marin Headlands), eight Golden Gate Transit bus lines (10, 54, 70, 72, 73, 76, 80, 101) and three Samtrans buses (292, 391, 397) travel through this intersection. However, all approaches to this intersection include dedicated transit-only lanes; therefore, transit routes serving this intersection would not be affected by Reduced Development Alternative with Base Transit Service-generated increases in cumulative intersection delay, and the Proposed Project’s contribution to cumulative transit travel time impacts at this intersection would be less than significant.
2nd Street/Folsom Street – The Reduced Development Alternative with Base Transit Service would contribute a significant amount of traffic to movements at this intersection that would operate at unacceptable levels of service during the PM peak hour.

Three Muni bus lines (10-Townsend, 12-Folsom/Pacific, 76-Marin Headlands) and Golden Gate Transit bus lines travel through this intersection. Transit lines at this intersection share lanes with mixed-flow traffic along both Folsom Street and 2nd Street. During the PM peak hour, the intersection would operate with substantial amounts of vehicle delay, primarily as a result of SFOBB-destined traffic. Folsom Street has four eastbound travel lanes at this intersection. Transit uses the north-most lane, which does not lead to an on-ramp to the SFOBB and would be less congested than the southern lanes; therefore, project contributions to congestion on Folsom Street would have a minimal effect to operations on the 12-Folsom/Pacific, 76-Marin Headlands, and Golden Gate Transit buses, which travel on Folsom Street.

The 10-Townsend would need to maneuver though northbound and southbound mixed-flow traffic destined for the SFOBB; however, these approaches operate at acceptable levels of service. Thus, the Reduced Development Alternative with Base Transit Service’s contribution to travel time impacts to the 10-Townsend at this intersection would be considered less than significant.

5th Street/Bryant Street/I-80 On-Ramp – The Reduced Development Alternative with Base Transit Service would contribute a significant amount of traffic to movements at this intersection that would operate at unacceptable levels of service during the PM peak hour and would cause this intersection to deteriorate from LOS D to LOS E during the Saturday peak hour.

Three Muni bus lines travel through this intersection (8X/8AX/8BX-Bayshore Express, 27-Bryant, 47-Van Ness). Transit lines at this intersection share lanes with mixed-flow traffic along both Bryant Street and 5th Street. The 8X/8AX/8BX-Bayshore Express and 27-Bryant travel eastbound on Bryant Street and the 47-Van Ness travels northbound and southbound on 5th Street.

During the PM peak hour, the northbound right and eastbound through movements and southbound approaches would operate at unacceptable levels of service, and a majority of the delay would be a result of congestion leading towards the SFOBB. The proposed project would only add traffic to the northbound and southbound approaches and the eastbound left turn movement. The 8-Bayshore lines operate in the southernmost through lane on Bryant Street and the project would not add new trips to the eastbound through movement; therefore, the Reduced Development Alternative with Base Transit Service would only have a significant impact to transit travel times on the 27-Bryant (which turns left from Bryant Street to 5th Street) and 47-Van Ness (which runs northbound on 5th Street) during the PM peak hour.

During the Saturday peak hour, the northbound approach would operate at unacceptable levels of service. The project would add new trips to this approach; therefore, the Reduced Development Alternative with Base Transit Service would have a significant impact on the 47-Van Ness during the Saturday peak hour.

5th Street/Harrison Street/I-80 Off-Ramp – The Reduced Development Alternative with Base Transit Service would cause this intersection to deteriorate from LOS D to LOS E during the PM peak hour.

Four Muni bus routes travel through this intersection (8X/8AX/8BX-Bayshore Express, 12-Folsom/Pacific, 27-Bryant, 47-Van Ness). Transit lines at this intersection share lanes with mixed-flow traffic along both Harrison Street and 5th Street. During the PM peak hour, the northbound, southbound, and off-ramp approaches would operate at unacceptable levels of service. The 12-Folsom/Pacific and 8-Bayshore lines run westbound on Harrison Street, and the westbound approach operates acceptably; therefore, no impact to these lines was identified. The Reduced Development Alternative with Base Transit Service’s contribution to increases in delay on the northbound and southbound approaches would be substantial; therefore, the Reduced Development Alternative with Base Transit Service’s impacts to transit travel times of the 27-Bryant and 47-Van Ness would be considered significant.

In summary, the Reduced Development Alternative with Base Transit Service’s contribution to increases in delay at five intersections would result in a cumulative impact to the following transit lines, as discussed above:
• **27-Bryant:** 5th Street/Bryant Street/I-80 On-Ramp, 5th Street/Harrison Street/I-80 Off-Ramp (PM Peak Hour)

• **30X-Stockton Express:** 1st Street/Market Street (PM Peak Hour)

• **47-Van Ness:** 5th Street/Bryant Street/I-80 On-Ramp; 5th Street/Harrison Street/I-80 Off-Ramp (PM and Saturday Peak Hours)

Appropriate mitigation measures for these impacts include transit preferential elements, such as transit-only lanes, transit preferential signal treatments, or other amenities that would improve the ability of transit vehicles to bypass area-wide congestion. The City of San Francisco is currently developing the Transit Center District Plan (“TCDP”) transportation planning effort. The TCDP would allow higher-density development in the area surrounding the proposed new Transbay Transit Center in Downtown San Francisco. As part of this work, the City is contemplating changes to the transportation network in the South of Market area designed to accommodate this increased development and improve overall transit circulation. At the time this analysis was conducted, the proposed transit network changes were not defined enough to include in the analysis. As part of the TCDP analysis, the City Planning Department should account for traffic increases associated with the Proposed Project. However, because the Plan is not finalized and its environmental review is not yet complete, implementation of measures to improve transit circulation in the area are uncertain and the Reduced Development Alternative with Base Transit Service’s impacts to transit delay would remain **significant and unavoidable**.

### 4.3.3.5 On-Island Transit Circulation (Reduced Development, Base Transit Scenario)

The circulation of transit routes on the Islands was described in the Project Description section and illustrated in Figure 6 (page 14). In general, the street network has been designed in close coordination with transit operators, as well as MTA’s bicycle and pedestrian group, to accommodate transit vehicle circulation and includes provisions, such as the design of curb radii and roadway widths to ensure that bus, emergency vehicles and truck maneuvers can be accommodated while minimizing conflicts with pedestrians and bicyclists.

However, as discussed in the ramp queuing section, vehicle queues on the SFOBB ramp approaches would extend along Treasure Island Road potentially blocking bus circulation from Treasure Island toward the SFOBB, causing delays to bus service. This may result in substantial delays to transit service.

Under conditions without the separately-proposed reconstruction of the westbound ramps on the east side of Yerba Buena Island, the two existing westbound on-ramps would both remain open to mixed traffic. It is likely that Muni would use the westernmost on-ramp. As illustrated on Figure 32 and Table 38, (pages 139 and 108), queues from this ramp may extend as far as approximately ½-mile from the on-ramp during the weekday AM and PM peak hours, causing delays of approximately two minutes per vehicle. During the Saturday peak hour, queues may extend to near 2/3 mile, with delays of approximately 2.5 minutes per vehicle. This would be considered a significant impact to Muni operations.

**Mitigation Measure 1 – Implement the Expanded Transit Scenario.** With implementation of the Expanded Transit Scenario, the project’s auto traffic generation would be reduced such that queues would be reduced to negligible levels at each on-ramp during weekday peak hours, but would remain approximately 1/2 mile during the Saturday peak hour. However, because full funding for this service has not yet been identified, its implementation remains uncertain. In the event this mitigation measure cannot feasibly be implemented, and regardless of implementation for Saturday peak hours, this impact to Muni operations would remain **significant and unavoidable**.
Similarly, although AC Transit vehicles would not be using the westbound on-ramps, queues from both westbound ramps would interfere with AC Transit travel between Treasure Island and the eastbound on-ramp to the SFOBB. This would be considered a significant impact to AC Transit operations.

Mitigation Measure 1 – Implement the Expanded Transit Scenario. With implementation of the Expanded Transit Scenario, the project’s auto traffic generation would be reduced such that queues would be reduced to negligible levels at each on-ramp during weekday peak hours, but would remain approximately 1/2 mile during the Saturday peak hour. However, because full funding for this service has not yet been identified, its implementation remains uncertain. In the event this mitigation measure cannot feasibly be implemented, and regardless of implementation for Saturday peak hours, this impact to AC Transit operations would remain significant and unavoidable.

Under conditions with the separately-proposed westbound ramp reconstruction project, the westbound on-ramp on the west side of Yerba Buena Island would be converted to transit-only and all traffic destined for the westbound SFOBB would be routed to the westbound on-ramp on the east side of Yerba Buena Island. In this case, queues may extend from the westbound on-ramp on the east side of Yerba Buena Island to just over ½ mile onto Treasure Island Road, approximately to the transit-only westbound on-ramp. Muni buses leaving the Transit Hub would not likely experience queues as they approach the westbound on-ramp. Therefore, impacts to Muni operations would be considered less than significant.

Similarly, although AC Transit vehicles would not be using the westbound on-ramps, queues from the westbound on-ramp on the east side of Yerba Buena Island would interfere with AC Transit travel between Treasure Island and the eastbound on-ramp to the SFOBB. AC Transit vehicles would travel in this queue nearly for its entire length, approximately from the transit-only westbound on-ramp to the eastbound on-ramp to the SFOBB. This would be considered a significant impact to AC Transit operations. Since there is not room to extend a transit-only lane beyond the transit-only westbound on-ramp, AC Transit vehicles would continue to experience congestion between the transit-only westbound on-ramp and the eastbound on-ramp. Therefore, the impact to AC Transit operations would be significant and unavoidable.

4.3.4 Reduced Development Alternative with Expanded Transit Scenario

This section analyzes the transit impacts associated with the Reduced Development Alternative under the Expanded Transit Scenario.

4.3.4.1 Transit Capacity Utilization (Reduced Development, Expanded Transit Scenario)

Table 43, on page 162, summarizes the transit trips to and from the Islands, and compares the projected ridership with the hourly passenger capacity provided by each transit operator for all four scenarios evaluated in this study, including the Reduced Development Alternative under the Expanded Transit Scenario.

The Reduced Development Alternative under the Expanded Transit Scenario would generate 1,646 net new AM peak hour transit trips, 2,396 net new PM peak hour transit trips, and 1,605 net new Saturday peak hour transit trips. The project’s net increase to transit demand was added to existing transit usage (generated by uses that would remain) to determine Existing plus Reduced Development Alternative transit demand under the Expanded Transit Scenario.

The analysis forecasts an increase in transit ridership between the Funded and Expanded Transit Scenarios. With more frequent transit service and additional destinations served, compared to the Base Transit Scenario, travel by transit becomes more desirable under the Expanded Transit Scenario. As a result, transit service experiences higher ridership, although the total travel demand in terms of person-trips generated remains the same between the two scenarios. Further, although transit service between
the Islands and the East Bay via AC Transit buses remains the same between the two scenarios, this
analysis assumes AC Transit ridership would be higher under the Expanded Transit Scenario since under
this scenario, the Reduced Development Alternative would generally be more transit-oriented and would
attract residents who are more attracted to use transit.

As shown in Table 43, transit ridership would be less than 70 percent of the total capacity for each
service type, which would be well within each provider’s capacity utilization standard. Therefore, under
the Expanded Transit Scenario, the Reduced Development Alternative’s impacts to transit capacity
utilization would be less than significant.

4.3.4.2 Downtown Screenline Analysis (Reduced Development, Expanded Transit Scenario)

In addition to analysis of specific transit lines with service directly to the Islands, the transit impact
analysis includes an assessment as to whether the Reduced Development Alternative would be likely to
add substantial amounts of transit ridership to transit routes serving Downtown San Francisco during
peak commute hours.

Table 44, on page 168, summarizes the impacts to the Muni downtown screenlines from the Reduced
Development Alternative under the Expanded Transit Scenario. Although the project is expected to
generate a substantial number of transit riders, as they relate to Downtown screenlines, project-generated
transit riders are more likely to be traveling in off-peak directions. For example, in the AM peak hour, the
peak direction of transit riders generated by the Reduced Development Alternative is into Downtown San
Francisco from the Islands (which does not affect the screenlines). Those riders continuing on transit to
other destinations from Downtown San Francisco will travel in the “outbound” direction, away from
Downtown. This is the off-peak direction for the Downtown screenlines, when peak transit flows are in the
“inbound” direction in the AM peak hour. The reverse phenomenon occurs during the PM peak hour.

As shown in Table 44, the Reduced Development Alternative’s contribution to ridership in the peak
direction for any of the Downtown screenlines is relatively small. The Reduced Development Alternative
would not increase demand for peak direction of travel through any of the four screenlines surrounding
Downtown such that they would exceed Muni’s capacity standard of 85 percent utilization. Therefore,
under the Expanded Transit Scenario, the Reduced Development Alternative’s impacts to Muni downtown
screenlines would be less than significant.

4.3.4.3 Regional Transit Analysis (Reduced Development, Expanded Transit Scenario)

A portion of the new transit trips generated by the Reduced Development Alternative would transfer from
the 108-Treasure Island and new ferry route to other regional transit operators including AC Transit,
BART, Golden Gate Transit, SamTrans, Caltrain and other ferry routes. Similar to the impact assessment
presented for the Muni downtown screenlines, Reduced Development Alternative-generated transit riders
transferring to other regional operators would more likely be traveling in the off-peak direction, for which
there is generally available capacity.

For example, during the AM peak hour, the majority of Reduced Development Alternative-generated
transit trips would be traveling off of the Islands. Those traveling to the East Bay would take the new AC
Transit bus line to downtown Oakland, and then transfer to BART to continue to destinations served by
BART. These BART trips would be in the off-peak direction for BART in the AM peak hour. Similarly,
trips destined for points served by BART in San Francisco and the Peninsula would take either the Muni
108-Treasure Island bus or the new ferry route into downtown San Francisco. From there they would
transfer to BART and travel away from downtown San Francisco, which is also the off-peak direction in the
AM peak hour. The reverse would occur during the PM peak hour, when transit riders returning to the
Islands would travel in the off-peak direction to access the 108-Treasure Island, the new AC Transit line,
or the new ferry service. For example, transit riders returning to the Ferry Building from Peninsula
destinations on BART would be traveling in the off-peak direction for BART in the PM peak hour.
Since Reduced Development Alternative with Expanded Transit Service-generated transit riders transferring to other routes would be dispersed over multiple operators and routes, and since these trips would occur in the off-peak direction of transit demand, the additional trips would not substantially affect the peak direction capacity utilization. Therefore, impacts to regional transit operator capacity, including AC Transit, BART, Golden Gate Transit, SamTrans, Caltrain and other ferry routes would be less than significant, and no mitigation measures would be required.

4.3.4.4 Transit Delay Analysis (Reduced Development, Expanded Transit Scenario)

As described in Section 4.2 (Traffic Impacts), traffic from the Reduced Development Alternative with Expanded Transit Service would contribute to significant impacts at several intersections in Downtown San Francisco. Increases in intersection vehicle delay may also increase delay for transit lines using those intersections. The Reduced Development Alternative with Expanded Transit Service would contribute significant contributions to impacts at six intersections in one or more peak hours.

1st Street/Market Street – The Reduced Development Alternative would cause this intersection to deteriorate from LOS E to LOS F during the PM peak hour.

A total of 13 Muni bus routes (2-Clement, 3-Jackson, 5-Fulton, 6-Parnassus, 9/9L-San Bruno, 21-Hayes, 30-Stockton, 30X-Marina Express, 31-Balboa, 38/38L/38X-Geary, 71/71L-Haight/Noriega, 76-Marin Headlands, 81X Caltrain Express), one Muni street car route (F-Market & Wharves) travel through this intersection during the weekday PM peak hour.

The intersection approaches on Market Street would operate at acceptable levels of service (LOS D or better), so the Proposed Project’s contribution of traffic on Market Street approaches would not significantly impact transit routes on the east and west approaches. During the weekday PM peak hour, the southbound movement would operate at LOS F. Transit routes that would be affected (i.e., those that approach the intersection traveling southbound) include the 30X-Stockton Express.

These lines would experience increases in delay due to congestion on Bush Street, Battery Street, and 1st Street. Since the Proposed Project would create a significant contribution to delay on this approach, the Reduced Development Alternative with Expanded Transit Service would have a significant impact to transit travel times on the 30X-Stockton Express.

1st Street/Mission Street – The Reduced Development Alternative would cause this intersection to deteriorate from LOS E to LOS F during the PM peak hour.

A total of six Muni bus (5-Fulton, 6-Parnassus, 10-Townsend, 14/14L-Mission, 38/38L-Geary, 71/71L-Haight-Noriega, 76-Marin Headlands), eight Golden Gate Transit bus lines (10, 54, 70, 72, 73, 76, 80, 101) and three Samtrans buses (292, 391, 397) travel through this intersection. However, all approaches to this intersection include dedicated transit-only lanes; therefore, transit routes serving this intersection would not be affected by Reduced Development Alternative with Expanded Transit Service-generated increases in cumulative intersection delay, and the Reduced Development Alternative with Expanded Transit Service’s contribution to cumulative transit travel time impacts at this intersection would be less than significant.

2nd Street/Folsom Street – The Reduced Development Alternative would contribute a significant amount of traffic to movements at this intersection that would operate at unacceptable levels of service during the PM peak hour.

Three Muni bus lines (10-Townsend, 12-Folsom/Pacific, 76-Marin Headlands) and Golden Gate Transit bus lines travel through this intersection. Transit lines at this intersection share lanes with mixed-flow traffic along both Folsom Street and 2nd Street. During the PM peak hour, the intersection would operate with substantial amounts of vehicle delay, primarily as a result of SFOBB-destined traffic. Folsom Street has four eastbound travel lanes at this intersection. Transit uses the north-most lane, which does not lead to an on-ramp to the SFOBB and would be less congested than the southern lanes; therefore, project...
contributions to congestion on Folsom Street would have a minimal effect to operations on the 12-Folsom/Pacific, 76-Marin Headlands, and Golden Gate Transit buses, which travel on Folsom Street.

The 10-Townsend would need to maneuver though northbound and southbound mixed-flow traffic destined for the SFOBB; however, these approaches operate at acceptable levels of service. Thus, the Reduced Development Alternative with Expanded Transit Service’s contribution to travel time impacts to the 10-Townsend at this intersection would be considered less than significant.

**5th Street/Bryant Street/I-80 On-Ramp** – The Reduced Development Alternative would contribute a significant amount of traffic to movements at this intersection that would operate at unacceptable levels of service during the PM peak hour and would cause this intersection to deteriorate from LOS D to LOS E during the Saturday peak hour.

Three Muni bus lines travel through this intersection (8X/8AX/8BX-Bayshore Express, 27-Bryant, 47-Van Ness). Transit lines at this intersection share lanes with mixed-flow traffic along both Bryant Street and 5th Street. The 8X/8AX/8BX-Bayshore Express and 27-Bryant travel eastbound on Bryant Street and the 47-Van Ness travels northbound on 5th Street.

During the PM peak hour, the northbound right and eastbound through movements and southbound approaches would operate at unacceptable levels of service, and a majority of the delay would be a result of congestion leading towards the SFOBB. The Reduced Development Alternative with Expanded Transit Service would only add traffic to the northbound and southbound approaches and the eastbound left turn movement. The 8-Bayshore lines operate in the southernmost through lane on Bryant Street and the project would not add new trips to the eastbound through movement; therefore, the Proposed Project would only have a significant impact to transit travel times on the 27-Bryant (which turns left from Bryant Street to 5th Street) and 47-Van Ness (which runs northbound on 5th Street) during the PM peak hour.

During the Saturday peak hour, the northbound approach would operate at unacceptable levels of service. The project would add new trips to this approach; therefore, the Reduced Development Alternative with Expanded Transit Service would have a significant impact on the 47-Van Ness during the Saturday peak hour.

**5th Street/Harrison Street/I-80 Off-Ramp** – The Reduced Development Alternative with Expanded Transit Service would cause this intersection to deteriorate from LOS D to LOS E during the PM peak hour.

Four Muni bus routes travel through this intersection (8X/8AX/8BX-Bayshore Express, 12-Folsom/Pacific, 27-Bryant, 47-Van Ness). Transit lines at this intersection share lanes with mixed-flow traffic along both Harrison Street and 5th Street. During the PM peak hour, the northbound, southbound, and off-ramp approaches would operate at unacceptable levels of service. The 12-Folsom/Pacific and 8-Bayshore lines run westbound on Harrison Street, and the westbound approach operates acceptably; therefore, no impact to these lines was identified. The Reduced Development Alternative with Expanded Transit Service’s contribution to increases in delay on the northbound and southbound approaches would be substantial; therefore, the Reduced Development Alternative with Expanded Transit Service’s impacts to transit travel times of the 27-Bryant and 47-Van Ness would be considered significant.

In summary, the Reduced Development Alternative’s contribution to increases in delay at five intersections would result in a cumulative impact to the following transit lines, as discussed above:

- **27-Bryant**: 5th Street/Bryant Street/I-80 On-Ramp, 5th Street/Harrison Street/I-80 Off-Ramp (PM Peak Hour)
- **30X-Stockton Express**: 1st Street/Market Street (PM Peak Hour)
- **47-Van Ness**: 5th Street/Bryant Street/I-80 On-Ramp; 5th Street/Harrison Street/I-80 Off-Ramp (PM and Saturday Peak Hours)

Appropriate mitigation measures for these impacts include transit preferential elements, such as transit-only lanes, transit preferential signal treatments, or other amenities that would improve the ability of
transit vehicles to bypass area-wide congestion. The City of San Francisco is currently developing the Transit Center District Plan ("TCDP") transportation planning effort. The TCDP would allow higher-density development in the area surrounding the proposed new Transbay Transit Center in Downtown San Francisco. As part of this work, the City is contemplating changes to the transportation network in the South of Market area designed to accommodate this increased development and improve overall transit circulation. At the time this analysis was conducted, the proposed transit network changes were not defined enough to include in the analysis. As part of the TCDP analysis, the City Planning Department should account for traffic increases associated with the Proposed Project. However, because the Plan is not finalized and its environmental review is not yet complete, implementation of measures to improve transit circulation in the area are uncertain and the Reduced Development Alternative with Expanded Transit Service’s impacts to transit delay would remain significant and unavoidable.

4.3.4.5 On-Island Transit Circulation (Reduced Development, Expanded Transit Scenario)

The circulation of transit routes on the Islands was described in the Project Description section and illustrated in Figure 6 (page 14). In general, the street network has been designed in close coordination with transit operators, as well as MTA’s bicycle and pedestrian group, to accommodate transit vehicle circulation and includes provisions, such as the design of curb radii and roadway widths to ensure that bus, emergency vehicles and truck maneuvers can be accommodated while minimizing conflicts with pedestrians and bicyclists.

However, as discussed in the ramp queuing section, in some circumstances, vehicle queues on the SFOBB ramp approaches would extend along Treasure Island Road potentially blocking bus circulation from Treasure Island toward the SFOBB, causing delays to bus service. This may result in substantial delays to transit service.

Under conditions without the separately-proposed reconstruction of the westbound ramps on the east side of Yerba Buena Island, the two existing westbound on-ramps would both remain open to mixed traffic. It is likely that Muni would use the westernmost on-ramp. As illustrated on Figure 37 and Table 38, (pages 152 and 108), queues from this ramp would be minimal during the weekday AM and PM peak hours. However, queues would remain approximately 1/2 mile long during Saturday peak hours. This would be considered a significant impact to Muni operations. Implementation of the separately-proposed westbound ramps reconstruction project would reduce queues to less than significant levels during the Saturday peak hour, but would result in substantially longer queues during the weekday AM and PM peak hours. Therefore, under conditions without the westbound ramp reconstruction project, no feasible mitigation measures were identified to reduce the Reduced Development Alternative’s impacts to Muni operations to less than significant levels during the Saturday peak hour and the impact would remain significant and unavoidable.46

Similarly, the minimal queues would not affect AC Transit vehicles traveling between Treasure Island and the eastbound on-ramp to the SFOBB during the weekday AM and PM peak hour. However, Saturday peak hour queues would remain approximately 1/2 mile, which would cause delays to AC Transit service. This would be considered a significant and unavoidable impact to AC Transit operations.

Under conditions with the separately-proposed westbound ramp reconstruction project, the westbound on-ramp on the west side of Yerba Buena Island would be converted to transit-only and all traffic destined for the westbound SFOBB would be routed to the westbound on-ramp on the east side of Yerba Buena Island. In this case, queues may extend from the westbound on-ramp on the east side of Yerba Buena

46. Although no scenario described in this report discusses converting the western westbound on-ramp to transit only without reconstructing the eastern westbound on-ramp, westbound transit would likely use the western ramp. Converting this western ramp to a transit-only ramp would benefit Muni operations; however, vehicle queues from the westbound on-ramp on the east side of Yerba Buena Island would remain and affect AC Transit operations.
Island to just over ½ mile onto Treasure Island Road, approximately to the transit-only westbound on-ramp. Muni buses leaving the Transit Hub would not likely experience queues as they approach the westbound on-ramp. Therefore, impacts to Muni operations would be considered less than significant.

Similarly, although AC Transit vehicles would not be using the westbound on-ramps, queues from the westbound on-ramp on the east side of Yerba Buena Island would interfere with AC Transit travel between Treasure Island and the eastbound on-ramp to the SFOBB. AC Transit vehicles would travel in this queue nearly for its entire length, approximately from the transit-only westbound on-ramp to the eastbound on-ramp to the SFOBB. This would be considered a significant impact to AC Transit operations. Since there is not room to extend a transit-only lane beyond the transit-only westbound on-ramp, AC Transit vehicles would continue to experience congestion between the transit-only westbound on-ramp and the eastbound on-ramp. Therefore, the impact to AC Transit operations would be significant and unavoidable.

4.4 PEDESTRIAN IMPACTS

Development on Treasure Island is expected to increase pedestrian demand both on the Islands and around the Ferry Building in San Francisco. The analysis of pedestrian impacts describes the future pedestrian conditions around the Ferry Building in San Francisco with the addition of demand from the Islands and also provides a qualitative analysis of the pedestrian conditions proposed for Treasure Island and Yerba Buena Island.

4.4.1 Proposed Project with Base Transit Service

This section describes the pedestrian impacts associated with the Proposed Project Base Transit Scenario.

4.4.1.1 San Francisco Ferry Building Pedestrian Circulation (Base Transit Scenario)

The project is expected to add new pedestrian trips through the San Francisco Ferry Building associated with ferry service to the Islands. These new pedestrian trips would be accommodated on the sidewalks and crosswalks near the Ferry Building. The additional pedestrians from the Proposed Project would most affect conditions during peak AM and PM commute times, when ferries arrive and depart for other cities in the Bay Area. The proposed project would generate 641 pedestrian trips in the AM peak hour, 818 pedestrian trips in the PM peak hour, and 473 trips during the Saturday peak hour, corresponding to the number of ferry passengers generated by the Proposed Project under the Base Transit Scenario. Assuming that the new pedestrian trips are distributed to crosswalks around the Ferry Building similar to existing pedestrian travel patterns, a majority of pedestrians would cross Embarcadero at Market Street. Table 45 on page 186 summarizes the distribution of pedestrian trips across Market Street at crosswalks near the Ferry Building, and the resulting LOS for each of the four project scenarios, including the Proposed Project under the Base Transit Scenario.47

As shown in Table 45, the Proposed Project is expected to increase densities at each crosswalk.48 However, all crosswalks are expected to operate at acceptable LOS D or better under the Base Transit Scenario, and therefore, the Proposed Project’s impacts to pedestrian facilities in San Francisco would be less than significant.

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47. Table 15, on page 60, described the pedestrian delay under existing conditions. Since the calculation of pedestrian delay is solely a function of traffic signal timing, the addition of new pedestrian trips associated with the Proposed Project is not expected to have an effect on pedestrian delay. The delay information was provided for informational purposes only and no further discussion is provided.

48. Note that in this table, density is measured in square feet per pedestrian; thus, as additional pedestrians are added and densities increase, the amount of square feet per pedestrian decreases.
### TABLE 45 – PEDESTRIAN LEVELS OF SERVICE

<table>
<thead>
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<th>Crosswalk¹</th>
<th>Existing</th>
<th>Existing + Project: Base Transit Scenario</th>
<th>Existing + Project: Expanded Transit Scenario</th>
<th>Existing + Reduced Development: Base Transit Scenario</th>
<th>Existing + Reduced Development: Expanded Transit Scenario</th>
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<td>LOS</td>
<td>Project Trips</td>
<td>Density⁴</td>
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</table>

Notes:
1. Since the intersections of The Embarcadero with Washington Street and Mission Street each have two crosswalks, the north and south legs of each intersection were averaged.
2. Pedestrian counts provided by the City of San Francisco, taken from the Regional Signal Timing Program study conducted by Katz, Okitsu & Associates in 2006 and 2007.
3. The Ferry Building hosts a farmers market on Saturdays.
4. Density measured in square feet per pedestrian.

4.4.1.2 Treasure Island and Yerba Buena Island Pedestrian Circulation (Base Transit Scenario)

As noted earlier, the 2006 Transportation Plan is designed to encourage walking and bicycling as primary on-island travel modes. To accommodate this demand, the street system on the Islands would be designed with special attention to sidewalks, pedestrian paths, and shared public ways. In addition to the general opportunities for walking in the open space areas on Treasure Island, the project would provide the following pedestrian facilities on the Island:

- Sidewalks along all streets on Treasure Island and Yerba Buena Island, except on Treasure Island Road, south of Macalla Road, where grading constrains the width of the right of way along roadways. In addition to sidewalks, several trails through the open spaces and development areas would be constructed on Yerba Buena Island;
- A shared public way in the Cityside neighborhood, linking to the Island Core neighborhood;
- A mixed-use path around the perimeter of the Island;
- A mixed-use promenade along the Marina; and
- An 80-foot pedestrian-only linear park along 3rd Street between California Avenue and Eastside Avenue.

The proposed sidewalk system on Treasure Island would facilitate direct, convenient travel between proposed uses on the Island. The proposed sidewalk and pedestrian path system on Yerba Buena Island would be less direct due to the topography of the Island, but would nonetheless provide adequate pedestrian connections to all uses on the Island.

Intersections would include crosswalks and a number of corner bulbouts to shorten pedestrian crossing distances and improve pedestrian visibility. As described earlier, sidewalk widths would vary throughout the area, but in all cases would adhere to Americans with Disabilities (ADA) requirements. The additional pedestrian trips associated with the proposed project would be accommodated within the proposed sidewalk network.

The shared public ways would be narrow, low-speed facilities without separate pedestrian and auto accommodations. Instead, pedestrians and autos would be permitted to use and share the entire space. While autos would be permitted to use shared public ways, vehicular volumes are expected to be relative low because these streets would be narrow and less direct than the Secondary Arterials and Collector Streets. Generally, vehicles are expected to use shared public ways to access some parking and/or make short trips. Since auto trips on these streets would be at low-speed, conflicts with pedestrians and bicycles sharing the facility are expected to be minimal.

For pedestrians, shared public ways are likely to be used for access to buildings and short walks; the other streets in the neighborhoods that provide more direct routes of travel between key destinations are likely to be used for longer walking trips (i.e., from the residential neighborhoods to the Transit Hub or Island Core retail). Where these streets intersect with Collector Streets, no crosswalks are expected to be marked, although pedestrians may legally cross.

Proposed pedestrian facilities would be adequate to meet pedestrian demand associated with the Proposed Project, and the project’s impacts to pedestrian circulation would be less than significant.

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49. Shared public ways were described in the Project Description section of this report and would be subject to design criteria currently being developed by City agencies and project sponsor.
4.4.2 Proposed Project with Expanded Transit Service

This section describes the pedestrian impacts associated with the Proposed Project under the Expanded Transit Scenario.

4.4.2.1 San Francisco Ferry Building Pedestrian Circulation (Expanded Transit Scenario)

The project is expected to add new pedestrian trips through the San Francisco Ferry Building associated with ferry service to the Islands. These new pedestrian trips would be accommodated on the sidewalks and crosswalks near the Ferry Building. Under the Expanded Transit Scenario, the Proposed Project would generate greater pedestrian volumes in San Francisco than under the Base Transit Scenario because the Expanded Transit Scenario would generate more ferry riders. The pedestrians generated by the Proposed Project would most affect conditions during peak AM and PM commute times, when ferries arrive and depart for other cities in the Bay Area. The Proposed Project would generate 958 pedestrian trips in the AM peak hour, 1,235 pedestrian trips in the PM peak hour, and 718 trips during the Saturday peak hour, corresponding to the number of ferry passengers generated by the Proposed Project under the Expanded Transit Scenario. Assuming that the new pedestrian trips are distributed to crosswalks around the Ferry Building similar to existing pedestrian travel patterns, a majority of pedestrians would cross Embarcadero at Market Street. Table 45 (page 186) summarizes the distribution of pedestrian trips across Market Street at crosswalks near the Ferry Building, and the resulting LOS for each of the four project scenarios, including the Proposed Project under the Expanded Transit Scenario.

As shown in Table 45, the Proposed Project is expected to increase densities at each crosswalk. However, all crosswalks are expected to operate at acceptable LOS D or better under the Expanded Transit Scenario, and therefore, the Proposed Project’s impacts to pedestrian facilities in San Francisco would be less than significant.

4.4.2.2 Treasure Island and Yerba Buena Island Pedestrian Circulation (Expanded Transit Scenario)

The general adequacy of pedestrian facilities on the Islands would be the same under the Expanded Transit Scenario as discussed for the Proposed Project under the Base Transit Scenario beginning on page 175. Proposed pedestrian facilities would be adequate to meet pedestrian demand associated with the Proposed Project, and the project’s impacts to pedestrian circulation would be less than significant.

4.4.3 Reduced Development Alternative with Base Transit Service

This section describes the pedestrian impacts associated with the Reduced Development Alternative under the Base Transit Scenario.

50. Table 15, on page 80, described the pedestrian delay under existing conditions. Since the calculation of pedestrian delay is solely a function of traffic signal timing, the addition of new pedestrian trips associated with the Proposed Project is not expected to have an effect on pedestrian delay. The delay information was provided for informational purposes only and no further discussion is provided.

51. Note that in this table, density is measured in square feet per pedestrian; thus, as additional pedestrians are added and densities increase, the amount of square feet per pedestrian decreases.
4.4.3.1 San Francisco Ferry Building Pedestrian Circulation (Reduced Development; Base Transit Scenario)

The project is expected to add new pedestrian trips through the San Francisco Ferry Building associated with ferry service to the Islands. These new pedestrian trips would be accommodated on the sidewalks and crosswalks near the Ferry Building. The pedestrians generated by the Reduced Development Alternative would most affect conditions during peak AM and PM commute times, when ferries arrive and depart for other cities in the Bay Area. The Reduced Development Alternative would generate 522 pedestrian trips in the AM peak hour, 696 pedestrian trips in the PM peak hour, and 426 trips during the Saturday peak hour, corresponding to the number of ferry passengers generated by the Reduced Development Alternative under the Base Transit Scenario. Assuming that the new pedestrian trips are distributed to crosswalks around the Ferry Building similar to existing pedestrian travel patterns, a majority of pedestrians would cross Embarcadero at Market Street. Table 43 summarizes the distribution of pedestrian trips across Market Street at crosswalks near the Ferry Building, and the resulting LOS for each of the four project scenarios, including the Reduced Development Alternative under the Base Transit Scenario.

As shown in Table 43 on page 162, the Reduced Development Alternative is expected to increase densities at each crosswalk. However, all crosswalks are expected to operate at acceptable LOS D or better under the Base Transit Scenario, and therefore, the Reduced Development Alternative’s impacts to pedestrian facilities in San Francisco would be less than significant.

4.4.3.2 Treasure Island and Yerba Buena Island Pedestrian Circulation (Reduced Development; Base Transit Scenario)

The general adequacy of pedestrian facilities on the Islands would be the same under the Reduced Development Alternative as described for the Proposed Project beginning on page 180. Proposed pedestrian facilities would be adequate to meet pedestrian demand associated with the Proposed Project, and the project’s impacts to pedestrian circulation would be less than significant.

4.4.4 Reduced Development Alternative with Expanded Transit Service

This section describes the pedestrian impacts associated with the Reduced Development Alternative under the Expanded Transit Scenario.

4.4.4.1 San Francisco Ferry Building Pedestrian Circulation (Reduced Development; Expanded Transit Scenario)

The project is expected to add new pedestrian trips through the San Francisco Ferry Building associated with ferry service to the Islands. These new pedestrian trips would be accommodated on the sidewalks and crosswalks near the Ferry Building. Under the Expanded Transit Scenario, the Reduced Development Alternative would generate greater pedestrian volumes in San Francisco than under the Base Transit Scenario because the Expanded Transit Scenario would generate more ferry riders. The pedestrians generated by the Reduced Development Alternative would most affect conditions during peak

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52. Table 15, on page 80, described the pedestrian delay under existing conditions. Since the calculation of pedestrian delay is solely a function of traffic signal timing, the addition of new pedestrian trips associated with the Proposed Project is not expected to have an effect on pedestrian delay. The delay information was provided for informational purposes only and no further discussion is provided.

53. Note that in this table, density is measured in square feet per pedestrian; thus, as additional pedestrians are added and densities increase, the amount of square feet per pedestrian decreases.
AM and PM commute times, when ferries arrive and depart for other cities in the Bay Area. The Reduced Development Alternative would generate 783 pedestrian trips in the AM peak hour, 1,050 pedestrian trips in the PM peak hour, and 646 trips during the Saturday peak hour, corresponding to the number of ferry passengers generated by the Reduced Development Alternative under the Expanded Transit Scenario. Assuming that the new pedestrian trips are distributed to crosswalks around the Ferry Building similar to existing pedestrian travel patterns, a majority of pedestrians would cross Embarcadero at Market Street. Table 45 (page 186) summarizes the distribution of pedestrian trips across Market Street at crosswalks near the Ferry Building, and the resulting LOS for each of the four project scenarios, including the Reduced Development Alternative under the Expanded Transit Scenario.

As shown in Table 45, the Reduced Development Alternative is expected to increase densities at each crosswalk. However, all crosswalks are expected to operate at acceptable LOS D or better under the Expanded Transit Scenario, and therefore, the Reduced Development Alternative’s impacts to pedestrian facilities in San Francisco would be less than significant.

4.4.4.2 Treasure Island and Yerba Buena Island Pedestrian Circulation (Reduced Development; Expanded Transit Scenario)

The general adequacy of pedestrian facilities on the Islands would be the same under the Reduced Development Alternative as described for the Proposed Project beginning on page 180. Proposed pedestrian facilities would be adequate to meet pedestrian demand associated with the Proposed Project, and the project’s impacts to pedestrian circulation would be less than significant.

4.5 BICYCLE IMPACTS

Development of the Islands is expected to increase bicycle demand both on the Islands and around the Ferry Building in San Francisco. This section describes the impacts of development on bicycle circulation.

4.5.1 Proposed Project with Base Transit Service

The first part of the bicycle impact analysis describes the bicycle circulation impacts within San Francisco around the Ferry Building. The second section is a qualitative analysis of the bicycle facilities expected on Treasure Island and Yerba Buena Island. Finally, the project-specific bicycle parking requirements proposed for this project as part of the D4D process are summarized in this section.

4.5.1.1 Bicycle Circulation in San Francisco (Base Transit Scenario)

Primary bicycle access between the Islands and San Francisco would be via ferries traveling between the San Francisco Ferry Building and the proposed new Transit Hub on Treasure Island. Secondary bicycle access would be via buses between the Islands and San Francisco. The SFOBB ESSSP includes a bicycle/pedestrian path that would connect to Yerba Buena Island. The proposed project would provide a connection to this facility with the pedestrian and bicycle facilities on Yerba Buena Island and to the proposed Bay Trail around the perimeter of Treasure Island. The Bay Area Toll Authority (“BATA”) has recently initiated a study to design a new bicycle/pedestrian path on the western span of the SFOBB. If this project is approved, funded and ultimately constructed, there would be a continuous bicycle

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54. Table 15, on page 80, described the pedestrian delay under existing conditions. Since the calculation of pedestrian delay is solely a function of traffic signal timing, the addition of new pedestrian trips associated with the Proposed Project is not expected to have an effect on pedestrian delay. The delay information was provided for informational purposes only and no further discussion is provided.

55. Note that in this table, density is measured in square feet per pedestrian; thus, as additional pedestrians are added and densities increase, the amount of square feet per pedestrian decreases.
connection between the East Bay, the Islands and San Francisco. However, that improvement is not assumed to be in place in this analysis.

The City of San Francisco has recently completed an Environmental Impact Report (“EIR”) of and adopted the San Francisco Bicycle Plan. The Bicycle Plan includes a number of projects in the South of Market area that would improve bicycle circulation. The City plans to stripe new bicycle lanes along 5th Street, Fremont Street, Beale Street and Howard Street. These new bicycle lanes would improve north and south bike circulation in the Downtown area by connecting the existing bicycle lanes on Folsom Street, Howard Street, and King Street, and Market Street. Appendix I includes a map showing the proposed bicycle network changes from the Bike Plan.

The Proposed Project is expected to generate new bicycle trips within San Francisco; however, these new trips would be relatively small in number compared to existing bicycle ridership. Therefore, it is reasonable to conclude that the project’s bicycle trip generation can be accommodated on the existing and planned bicycle network. The project’s impact to the bicycle network in San Francisco is therefore expected to be less than significant.

4.5.1.2 Bicycle Circulation on Treasure Island and Yerba Buena Island (Base Transit Scenario)

As noted earlier, the 2006 Transportation Plan is designed to encourage walking and bicycling as primary on-Island travel modes. To accommodate this demand, the street system on the Islands is being designed to be low-speed to create an environment that is compatible with bicycling. As illustrated on Figure 8 (page 19), Class I bike paths would be placed around the perimeter of Treasure Island and within the open space areas to connect residential areas with open space and retail areas on Treasure Island. Class II bike lanes would be provided on Treasure Island Road and Avenue of the Palms, California Avenue, and Avenue C. A one-way (westbound) Class II bike lane would also be provided on 1st Street, parallel to California Avenue. No designated Class III bike routes would be provided on the island, although all other streets are proposed to be designed to encourage shared use by bicycles and autos through the use of various traffic calming features designed to lower auto travel speeds.

As illustrated on Figure 9 (page 20), on Yerba Buena Island, a one-way Class II bike lane would be provided on Treasure Island Boulevard and Hillcrest Road, which would continue as a loop around South Gate Road and Macalla Road, back to Treasure Island Boulevard. Although Macalla Road is one-way northbound for vehicles, it would also provide a contra-flow Class II bike lane from Treasure Island Road to South Gate Road, separated from traffic by a two-foot buffer with painted chevrons.

There is one primary bicycle route from the SFOBB to Treasure Island, on Macalla Road. There are two primary routes from Treasure Island to the SFOBB. Macalla Road would be the most direct (albeit the steepest, reaching grades between 8.6 percent and 9.8 percent) route to the SFOBB from Treasure Island. Cyclists who opt for a longer, but less steep route from Treasure Island to the SFOBB can use the one-way Class II bicycle lane on Treasure Island Boulevard and Hillcrest Road. At the intersection of Hillcrest Road and South Gate Road, cyclists can enter the SFOBB bicycle/pedestrian path providing access to the East Bay.

Cyclists traveling on Macalla Road to access the SFOBB bicycle path would use the Class II bicycle lanes on Macalla Road between Treasure Island and the SFOBB westbound ramps intersection. Between that intersection and the SFOBB bike path, which begins at the intersection of Hillcrest Road and South Gate

56. The adoption of Mitigation Measure 2 would require the removal of the proposed bike lane on Treasure Island Road between 1st Street and the western transit-only westbound on-ramp on Yerba Buena Island. Bicycle access to and from the SFOBB would be via the proposed contra-flow bike lane on Macalla Road, such that the proposed Mitigation Measure would not preclude bicycle access between the Project and the SFOBB. Although Macalla Road would not preclude bicycle access to the SFOBB, Macalla Road is a steep, two-lane roadway that reaches grades of between eight and ten percent and would be likely be a challenging climb for both experienced bicyclists and less experienced cyclists.
Road, Caltrans’ conceptual design calls for bicycles and pedestrians to use a 10-foot shared pathway on the west side of the street, which would continue along South Gate Road and loop around onto the bridge.

Four intersections on Yerba Buena Island have proposed enhanced bicycle treatments. These locations are discussed in detail below.

4.5.1.2.1 Hillcrest Road at South Gate Road

The proposed bicycle treatments at this intersection are shown on Figure 40 (on page 194). This intersection would be a standard, three-legged side-street stop controlled intersection. Movements on Hillcrest Road and the Eastbound Ramps would be uncontrolled and the South Gate Road approach would be stop-controlled. Cyclists traveling on the Class II bike lane on Hillcrest Road would be uncontrolled, and can cross the intersection to access the SFOBB bicycle path on the north side of this intersection. Adequate bicycle facilities have been provided at this intersection, and designed to accommodate all intersection users.

4.5.1.2.2 Macalla Road at the SFOBB Westbound Ramps

The proposed bicycle treatments at this intersection are shown on Figure 41 (on page 195). As described earlier, if the SFOBB Westbound Ramps are reconstructed as part of the SFCTA’s ongoing study, the shared bicycle/pedestrian path connecting Yerba Buena Island to the SFOBB would continue along the west side of South Gate Road until the intersection with Macalla Road and the SFOBB Westbound Ramps. On the north side of this intersection, the shared path would end, and cyclists destined for Treasure Island would be forced to cross Macalla Road at a new crosswalk. North of this crossing, Macalla Road would provide one travel lane northbound (toward Treasure Island) and would have a Class II bicycle lane in each direction, one being a contra-flow lane. Generally, this facility appears to be designed appropriately to meet the needs of all users.

4.5.1.2.3 Treasure Island Road at Macalla Road

The proposed bicycle treatments at this intersection are shown on Figure 42 (on page 196). Bicyclists using Treasure Island Road to access the contra-flow bicycle lane on Macalla Road from Treasure Island must turn left across the opposing direction of traffic on Treasure Island Road to access Macalla Road. The Proposed Project would provide a new five-foot wide bicycle-only left-turn lane from Treasure Island Road to Macalla Road adjacent to a 12-foot travel lane on Treasure Island Road and separated from oncoming traffic by an 11-foot median. This is the same maneuver that bicyclists make any time they turn left from one road to another, but with enhancements such as a bicycle-only turn lane and wide median to facilitate the maneuver. These enhancements are beneficial to cyclists and would provide a clearer, safer route to access Macalla Road from Treasure Island Road.

4.5.1.2.4 Treasure Island Road at Hillcrest Road/Westbound Bus On-Ramp

The proposed bicycle treatments at this intersection are shown on Figure 43 (on page 197). At this juncture, bicycles traveling southbound on Treasure Island Road must travel through the divergence of the transit-only westbound on-ramp to the SFOBB. Approaching this junction, Treasure Island Road provides a six-foot bike lane with a three-foot chevron buffer, separating the bike lane from a 12-foot traffic lane. Just past the ramp junction, where bicycles cross over Treasure Island Road to merge onto Hillcrest Road, the existing roadway, which is on a bridge structure, narrows to 14 feet, which would not be adequate to provide a travel lane and a Class II bicycle lane. Since the roadway is on a bridge structure at this location, widening the roadway is not a feasible option. Instead, this section would be marked with shared-use arrows stenciled on the pavement reminding drivers and cyclists to share the space. Once sufficient roadway width can be maintained, the roadway would return to having an 11-foot travel lane with a five-foot bike lane.
This merge is less than ideal for cyclists, particularly because it occurs on an uphill grade where cyclists are generally traveling much slower than auto traffic, and requires cyclists to cross over a lane of travel expected to be used exclusively by transit vehicles. However, the Proposed Project would include a number of enhancements, including a 3-foot buffer between the bike lane and travel lane and frequent stencils alerting drivers and cyclists to merge cautiously. The resulting facility would be improved for bicycling compared to the existing condition. The proposed treatment would provide a highly-visible shared roadway, which should be adequate to accommodate all roadway users.

If the proposed Mitigation Measure 2 is adopted (installing a transit-only lane between the westbound on-ramp and 1st Street), the proposed bike lane on Treasure Island Road would be removed. Bicycle access to the SFOBB and the rest of Yerba Buena Island would be via the Macalla Road contra-flow bike lane.
FIGURE 40

SOUTH GATE ROAD AT HILLCREST ROAD INTERSECTION CONFIGURATION

Source: AECOM, 2009

Treasure Island and Yerba Buena Island Redevelopment Plan TIS

June 2010
SF07-0340/graphics/TIS/0340-40
FIGURE 41

MACALLA ROAD AT SFOBB WESTBOUND ON-RAMP INTERSECTION CONFIGURATION

Source: AECOM, 2009

Treasure Island and Yerba Buena Island Redevelopment Plan TIS

June 2010
SF07-0340/graphics/TIS/0340-41

Page 195
SHARED ROAD
WATCH FOR CYCLISTS

END BIKE LANE

BUSES ONLY On-Ramp

AUTOS/BIKES

AUTOS

Eastbound Off-Ramp

BUSES

Eastbound Off-Ramp

SHARED ROAD LANE

TREASURE ISLAND ROAD AT SFOBB WESTBOUND ON-RAMP (WESTSIDE)
INTERSECTION CONFIGURATION

Source: AECOM, 2009
4.5.1.3 Colored Pavement Treatments (Base Transit Scenario)

The Proposed Project has proposed installing colored bicycle lane pavement treatments for purposes of increasing bicycle visibility and safety at the following locations:

- Hillcrest Road approach to South Gate Road and the SFOBB bicycle/pedestrian path;
- Macalla Road contra-flow bicycle lane at intersecting cross-streets; and
- Treasure Island Road/Macalla Road intersection.
- Bicycle-only left-turn lane from Treasure Island Road to the contra-flow bicycle lane on Macalla Road; and
- Bicycle-only section of median on Treasure Island Road at Macalla Road.

Although colored bicycle lane pavement is not approved in the Manual on Uniform Traffic Control Devices (MUTCD), which is published by the Federal Highway Administration (FHWA) and governs traffic control devices used in the United States, the City of San Francisco Bicycle Plan Update: Supplemental Design Guidelines include the use of colored bicycle lanes to further enhance the bicycle environment and safety. The Federal Highway Administration (FHWA) recently approved a study proposed by SFMTA of solid and dashed green pavement for bicycle lanes. If the use of colored pavement materials is approved by the FHWA and the California Traffic Control Device Committee (CTCDC), San Francisco may add colored pavement materials to selected bicycle lanes. The colored treatments proposed by the project could be candidates for implementation of the colored pavement materials treatment.

4.5.1.4 General Bicycle Circulation Provisions (Base Transit Scenario)

Overall, the Proposed Project would provide a roadway network that would encourage cycling. The Proposed Project includes a number of enhancements at intersections that would serve to reduce conflicts and generally provide clearer direction to both drivers and cyclists. As a result, the proposed project would not create potentially hazardous conditions for bicyclists or otherwise substantially interfere with bicycle accessibility to the site and adjoining areas. To the contrary, the proposed bicycle circulation network would allow for greater accessibility than exists today and would encourage residents and visitors alike to use cycling as a safe and convenient mode of transport. Therefore, the project’s bicycle impacts would be less than significant.

4.5.1.5 Bicycle Parking Requirements (Base Transit Scenario)

The project sponsor has proposed bicycle parking requirements through the D4D process, similar to the Proposed Project’s vehicle parking requirements. Table 46 (on page 199) presents the schedule of bicycle parking spaces proposed. The parking requirements would be determined for each building based on the requirements listed in Table 46. The project would provide this amount of bicycle parking for each new building constructed.
### Table 46 – Proposed Bicycle Parking Requirements

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<td>Residential Buildings with fewer than 50 units</td>
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<td>Residential Buildings with greater than 50 units</td>
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</tr>
<tr>
<td>Residential Group Housing</td>
<td>1 space for every 3 bedrooms</td>
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<tr>
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</tr>
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<td>Retail (25,000 sf – 50,000 sf)</td>
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</tr>
<tr>
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<td>6 bicycle parking spaces</td>
</tr>
<tr>
<td>Retail (&gt; 100,000 sf)</td>
<td>12 bicycle parking spaces</td>
</tr>
</tbody>
</table>

Source: TIDA/TIDC, 2009

4.5.2 Proposed Project with Expanded Transit Service

By providing Expanded Transit Service, the number of transit riders between Treasure Island and San Francisco would be expected to increase. It is likely that some of these additional riders would carry bicycles to San Francisco, and increase overall bicycle usage in San Francisco compared to the Proposed Project under the Base Transit Scenario. Increases to bicycle usage associated with the Expanded Transit Scenario compared to the Base Transit Scenario would be relatively small compared to the overall number of bicycles already on San Francisco streets.

The on-island bicycle network and proposed bicycle parking requirements described for the Proposed Project would be the same under both the Funded and Expanded Transit Scenarios. As described above for the Base Transit Scenario, the Proposed Project would include enhanced bicycle treatments in a number of locations. These treatments would serve to reduce the conflict points and generally provide clearer direction to both drivers and cyclists. As a result, the Proposed Project under the Expanded Transit Scenario would not create potentially hazardous conditions for bicyclists or otherwise substantially interfere with bicycle accessibility to the site and adjoining areas. Thus, the Proposed Project with the Expanded Transit Scenario would result in less than significant bicycle impacts.

4.5.3 Reduced Development Alternative with Base Transit Service

The Reduced Development Alternative would generate fewer transit riders between Treasure Island and San Francisco, compared to the Proposed Project. The bicycle network in San Francisco was found to be adequate to accommodate bicycle demand associated with the Proposed Project. Therefore, it would be adequate to accommodate the lower number of bicycles generated by the Reduced Development Alternative.

As described above for the Proposed Project under the Base Transit Scenario, the Proposed Project would include enhanced bicycle treatments in a number of locations. These treatments would serve to reduce the conflict points and generally provide clearer direction to both drivers and cyclists. The on-island bicycle network and proposed bicycle parking requirements described for the Proposed Project would be the same under the Reduced Development Alternative. As a result, the Reduced Development Alternative under the Base Transit Scenario would not create potentially hazardous conditions for bicyclists or otherwise substantially interfere with bicycle accessibility to the site and adjoining areas. Thus, the Reduced Development Alternative under the Base Transit Scenario would result in less than significant bicycle impacts.
4.5.4 Reduced Development Alternative with Expanded Transit Service

By providing Expanded Transit Service, the number of transit riders between Treasure Island and San Francisco would be expected to increase. It is likely that some of these additional riders would carry bicycles to San Francisco, and increase overall bicycle usage in San Francisco compared to the Reduced Development Alternative under the Base Transit Scenario. Increases to bicycle usage associated with the Expanded Transit Scenario compared to the Base Transit Scenario would be relatively small compared to the overall number of bicycles already on San Francisco streets.

As described above for the Proposed Project under the Base Transit Scenario, the Proposed Project would include enhanced bicycle treatments in a number of locations. These treatments would serve to reduce the conflict points and generally provide clearer direction to both drivers and cyclists. The on-island bicycle network and proposed bicycle parking requirements described for the Proposed Project would be the same under the Reduced Development Alternative. As a result, the Reduced Development Alternative under the Expanded Transit Scenario would not create potentially hazardous conditions for bicyclists or otherwise substantially interfere with bicycle accessibility to the site and adjoining areas. Thus, the Reduced Development Alternative under the Expanded Transit Scenario would result in less than significant bicycle impacts.

4.6 PARKING IMPACTS

This section includes a discussion of the Proposed Project’s parking impacts in relation to anticipated demand and anticipated parking supply.

4.6.1 Proposed Project with Base Transit Service

This section describes parking impacts associated with the Proposed Project under the Base Transit Scenario.

4.6.1.1 Parking Supply (Base Transit Scenario)

The parking program for the Proposed Project has been developed to encourage transit use and discourage use of the private automobile. Residential parking is provided at up to one space per dwelling unit. As noted earlier, residential parking spaces will be economically “unbundled” from the dwelling units, such that residents will have the option to purchase or rent a parking space (or not) along with their home. Retail parking is proposed at much lower ratios than the San Francisco Planning Code requirements for retail uses to encourage use of public transit to reach these uses. Spaces will generally be located in off-street facilities, although some on-street parking would be provided. There would be no free parking on the Islands, for either on-street or off-street spaces.

The parking supply rates and total supply proposed by the project sponsor was previously described on page 21 in Table 2. It should be noted that because the Proposed Project is considered a redevelopment area, it is not subject to the Planning Code parking supply requirements. Instead, the parking requirements are subject to final project approvals by the City. However, as shown earlier in Table 2, many of the parking supply rates are nonetheless consistent with the Planning Code. Overall, the project proposes 11,153 parking spaces, including 1,035 on-street spaces.

As noted, the Proposed Project includes maximum permitted parking controls, rather than imposing minimum amounts of parking to be constructed with each use. Since developers would not be required to provide parking, theoretically, these requirements could result in no off-street parking on the Islands, resulting in a substantially greater parking deficit. However, this is not a reasonably likely scenario, as most developments projects in San Francisco develop the maximum permitted supply. Some centralized off-street parking is proposed as part of the Project and is likely to be built even if individual buildings did not provide parking. In addition, parking fees would be a substantial portion of the funding supporting
transit facilities and other features of the Proposed Project’s TDM Plan. With no off-street parking, there would not be sufficient funds to support the entire TDM Plan and transit services, and the Proposed Project would be infeasible.

4.6.1.2 Parking Demand (Base Transit Scenario)

As discussed in Chapter 3, the parking demand was developed according to the SF Guidelines methodology, with adjustments made to account for the project’s mix of land uses and disincentives to vehicle use. A shared parking analysis was conducted to quantify the parking demands of the mix of land uses proposed. Since the shared parking analysis takes into account the unique time distribution and peaking characteristics of each use on the site, the resulting peak shared parking demand typically differs from the parking supply calculated using the parking rates required by the SF Guidelines for the individual land uses. Residential parking demands were not considered shared; all other land uses were considered to be able to share parking.

The Proposed Project’s parking supply was compared to the expected parking demand. The assumed allocation of parking supply by neighborhood was obtained from the Project Sponsor. The results of the parking analysis, accounting for the effects of shared parking, are presented in Table 47 (on page 203). The results of the parking analysis conducted for residential uses is presented in Table 48 (on page 204).

As shown, overall, during the peak hour of parking demand for all of Treasure Island, the Proposed Project would result in a surplus of 1,032 non-residential parking spaces and a deficit of 2,103 residential parking spaces under the Base Transit Scenario. Yerba Buena Island may experience a shortfall of 76 spaces during its peak hour of parking demand (or 59 residential spaces and 17 non-residential spaces). By neighborhood, the Island Core neighborhood may experience a residential parking shortfall of up to 793 residential parking spaces, but a non-residential parking surplus of 228 parking spaces. Similarly, the other neighborhoods have residential parking shortfalls and non-residential parking surpluses. Any residential demand not accommodated in dedicated residential spaces would likely use available on-street parking. Overall, together the Islands have a parking shortfall of 1,147 spaces. Because the City of San Francisco does not consider parking shortfalls to be a significant impact under CEQA, the shortfalls projected in Table 47 and Table 48 are considered less than significant.

If the maximum permitted parking supply is provided, there would be an overall shortfall of parking spaces on the Islands, primarily related to the residential uses. In general, in San Francisco, parking deficits are considered to be social impacts. The social inconvenience of parking deficits, such as having to hunt for scarce parking spaces, is not an environmental impact, but there may be secondary physical environmental impacts, such as increased traffic congestion at intersections, air quality impacts, safety impacts, noise impacts caused by congestion, or transit impacts associated with a shift in mode. The lack of readily available parking supply may result in some drivers seeking and finding alternative parking facilities, shifting to other modes of travel, or changing their overall travel habits. The conditions on the Islands are unique from the rest of San Francisco, in that the isolated nature of the Islands does not allow for drivers to seek alternative parking facilities, and instead drivers would need to shift to other modes of travel or change their travel habits. Unlike the rest of San Francisco where alternate available modes include transit, walking, bicycling and taxis, alternate travel modes for off-Islands travel are limited to transit. Therefore, it is anticipated that the parking shortfall on the Islands could result in a shift from auto to transit modes, resulting in an increase in transit travel demand during the peak hours. Depending on the direction of travel, the shift would affect the Muni 108-Treasure Island bus line, the new AC Transit bus line, and the new ferry service between Treasure Island and downtown San Francisco.

As presented in the transit capacity impact analysis, implementation of the Proposed Project would not exceed the transit capacity of the new AC Transit bus line or the new ferry service. In fact, utilization would be considerably below the relevant capacity utilization standard for those providers. Therefore, an increase in transit demand on these lines due to a mode shift would be accommodated without substantially affecting the lines’ capacity utilization standard.
The transit capacity analysis did identify a significant and unavoidable impact for capacity utilization of the Muni 108-Treasure Island bus line. During the three peak hours of analysis, the total transit demand for the 108-Treasure Island would not be accommodated within the 85 percent capacity utilization standard, and an increase in transit demand due to a mode shift would exacerbate the exceedance of the capacity utilization standard. Therefore, a shift in mode from auto to transit would result in a worsening of the identified significant impact on 108-Trasure Island transit operations.

Implementation of Mitigation Measure 2 (Expanded Transit Service) would reduce the secondary impact on transit to a less than significant level. However, because full funding for the Expanded Transit Service has not yet been identified its implementation remains uncertain and therefore, the secondary parking impacts on transit would remain **significant and unavoidable**.

### 4.6.1.3 Parking for Existing Uses (Coast Guard and Job Corps) (Base Transit Scenario)

The Proposed Project would not eliminate any parking specifically reserved for employees and visitors of the existing uses on Treasure Island (Job Corps) and Yerba Buena Island (U.S. Coast Guard) that would remain in use after implementation of the Proposed Project. However, U.S. Coast Guard employees currently park in the approximately 15 parking spaces near the Yerba Buena Island hilltop parking lot outside of Coast Guard property. The Proposed Project would eliminate these 15 parking spaces. Thus, with construction of the Proposed Project, U.S. Coast Guard employees accustomed to finding relatively easy free parking on the Islands would no longer be able to do so. With implementation of the Proposed Project, U.S. Coast Guard and Job Corps staff would either have to park within their respective campuses or within the paid parking lots constructed as part of the Proposed Project (similar to other visitors and employees on the Islands). Visitors to the Proposed Project would not be able to park in the Job Corps or U.S. Coast Guard areas.

### 4.6.2 Proposed Project with Expanded Transit Service

The Proposed Project's parking supply would be the same under the Expanded Transit Scenario as under the Base Transit Scenario. However, under the Expanded Transit Scenario, the Proposed Project's parking demand would be lower than under the Base Transit Scenario, because there would be fewer vehicular trips.

As shown, overall, during the peak hour of parking demand for all of Treasure Island, the Proposed Project would result in a surplus of 1,269 non-residential parking spaces and a deficit of 2,093 residential parking spaces under the Expanded Transit Scenario. Yerba Buena Island may experience a shortfall of 74 spaces during its peak hour of parking demand (or 59 residential spaces and 15 non-residential spaces). By neighborhood, the Island Core neighborhood may experience a residential parking shortfall of up to 783 residential parking spaces, but a non-residential parking surplus of 398 parking spaces. Generally speaking, the other neighborhoods have residential parking shortfalls and non-residential parking surpluses. Any residential demand not accommodated in dedicated residential spaces would likely use available on-street parking. Overall, together the Islands have a parking shortfall of 898 spaces. Because the City of San Francisco does not consider parking shortfalls to be a significant impact under CEQA, the shortfalls projected in Table 47 and Table 48 are considered **less than significant**.
<table>
<thead>
<tr>
<th>Neighborhood</th>
<th>Proposed Project (Base Transit Scenario)</th>
<th>Proposed Project (Expanded Transit Scenario)</th>
<th>Reduced Development Alternative (Base Transit Scenario)</th>
<th>Reduced Development Alternative (Expanded Transit Scenario)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peak Demand</td>
<td>Parking Supply</td>
<td>Surplus/ (Deficit)</td>
<td>Peak Demand</td>
</tr>
<tr>
<td>Cityside</td>
<td>92</td>
<td>541</td>
<td>449</td>
<td>80</td>
</tr>
<tr>
<td>Eastside</td>
<td>48</td>
<td>334</td>
<td>286</td>
<td>42</td>
</tr>
<tr>
<td>Island Core</td>
<td>1,546</td>
<td>1,774</td>
<td>228</td>
<td>1,376</td>
</tr>
<tr>
<td>Open Space</td>
<td>395</td>
<td>464</td>
<td>69</td>
<td>346</td>
</tr>
<tr>
<td>Total Treasure Island</td>
<td>2,081</td>
<td>3,113</td>
<td>1,032</td>
<td>1,844</td>
</tr>
<tr>
<td>Yerba Buena Island</td>
<td>57</td>
<td>40</td>
<td>(17)</td>
<td>55</td>
</tr>
<tr>
<td>Total Proposed Project</td>
<td>2,138</td>
<td>3,153</td>
<td>1,015</td>
<td>1,899</td>
</tr>
</tbody>
</table>

Note:
1. Supply allocation by neighborhood obtained from the Project Sponsor and includes 495 on-street spaces in the Cityside neighborhood, 310 on-street spaces in the Eastside neighborhood, and 230 on-street spaces in the Island Core neighborhood. Since residential visitor parking demand would be accommodated on-street, rather than in the off-street residential parking supply, the non-residential surplus may be overstated.

### TABLE 48 – RESIDENTIAL PEAK HOUR PARKING SUPPLY AND DEMAND ANALYSIS

<table>
<thead>
<tr>
<th>Neighborhood</th>
<th>Proposed Project (Base Transit Scenario)</th>
<th>Proposed Project (Expanded Transit Scenario)</th>
<th>Reduced Development Alternative (Base Transit Scenario)</th>
<th>Reduced Development Alternative (Expanded Transit Scenario)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Parking Demand</td>
<td>Parking Supply¹</td>
<td>Surplus/ (Deficit)</td>
<td>Parking Demand</td>
</tr>
<tr>
<td>Cityside</td>
<td>4,134</td>
<td>3,255</td>
<td>(879)</td>
<td>4,134</td>
</tr>
<tr>
<td>Eastside</td>
<td>2,032</td>
<td>1,601</td>
<td>(431)</td>
<td>2,032</td>
</tr>
<tr>
<td>Island Core¹</td>
<td>3,737</td>
<td>2,944</td>
<td>(793)</td>
<td>3,727</td>
</tr>
<tr>
<td>Open Space</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total Treasure Island</td>
<td>9,903</td>
<td>7,800</td>
<td>(2,103)</td>
<td>9,893</td>
</tr>
<tr>
<td>Yerba Buena Island</td>
<td>259</td>
<td>200</td>
<td>(59)</td>
<td>259</td>
</tr>
<tr>
<td>Total Proposed Project</td>
<td>10,162</td>
<td>8,000</td>
<td>(2,162)</td>
<td>10,152</td>
</tr>
</tbody>
</table>

Note:
1. Parking demand for the 117-room all-suite hotel is included in the Island Core parking demand estimates. It was analyzed using SF Guidelines methodology for hotels since it would likely generate more short-term trips (e.g., laundry, food service, etc) than a standard residential building. Therefore, there is a slight variation in parking demand between the Base Transit Scenario and the Expanded Transit Scenario.
2. Since residential visitor parking demand would be accommodated on-street, rather than in the off-street residential parking supply, the residential deficient may be overstated. Supply allocation by neighborhood obtained from the Project Sponsor and includes 496 on-street spaces in the Cityside neighborhood, 310 on-street spaces in the Eastside neighborhood, and 230 on-street spaces in the Island Core neighborhood.

4.6.3 Reduced Development Alternative with Base Transit Service

The Reduced Development Alternative’s parking supply would be lower than under the Proposed Project due to less overall development. The proposed parking supply under the Reduced Development Alternative is shown in Table 47 (on page 203).

As shown, overall, during the peak hour of parking demand for all of Treasure Island, the Proposed Project would result in a surplus of 914 non-residential parking spaces and a deficit of 1,565 residential parking spaces under the Reduced Development Alternative with Base Transit Service. Yerba Buena Island may experience a shortfall of 76 spaces during its peak hour of parking demand (or 59 residential spaces and 17 non-residential spaces). By neighborhood, the Island Core neighborhood may experience a residential parking shortfall of up to 495 residential parking spaces, but a non-residential parking surplus of 119 parking spaces. Generally speaking, the other neighborhoods have residential parking shortfalls and non-residential parking surpluses. Any residential demand not accommodated in dedicated residential spaces would likely use available on-street parking. Overall, together the Islands have a parking shortfall of 727 spaces. Because the City of San Francisco does not consider parking shortfalls to be a significant impact under CEQA, the shortfalls projected in Table 47 (on page 203) and Table 48 (on page 204) are considered less than significant.

If the maximum permitted parking supply is provided, there would be an overall shortfall of parking spaces on the Islands, primarily related to the residential uses. In general, in San Francisco, parking deficits are considered to be social impacts. The social inconvenience of parking deficits, such as having to hunt for scarce parking spaces, is not an environmental impact, but there may be secondary physical environmental impacts, such as increased traffic congestion at intersections, air quality impacts, safety impacts, noise impacts caused by congestion, or transit impacts associated with a shift in mode. The lack of readily available parking supply may result in some drivers seeking and finding alternative parking facilities, shifting to other modes of travel, or changing their overall travel habits. The conditions on the Islands are unique from the rest of San Francisco, in that the isolated nature of the Islands does not allow for drivers to seek alternative parking facilities, and instead drivers would need to shift to other modes of travel or change their travel habits. Unlike the rest of San Francisco where alternate available modes include transit, walking, bicycling and taxis, alternate travel modes for off-Islands travel are limited to transit. Therefore, it is anticipated that the parking shortfall on the Islands could result in a shift from auto to transit modes, resulting in an increase in transit travel demand during the peak hours. Depending on the direction of travel, the shift would affect the Muni 108-Treasure Island bus line, the new AC Transit bus line, and the new ferry service between Treasure Island and downtown San Francisco.

As presented in the transit capacity impact analysis, implementation of the Proposed Project would not exceed the transit capacity of the new AC Transit bus line or the new ferry service. In fact, utilization would be considerably below the relevant capacity utilization standard for those providers. Therefore, an increase in transit demand on these lines due to a mode shift would be accommodated without substantially affecting the lines’ capacity utilization standard.

The transit capacity analysis did identify a significant and unavoidable impact for capacity utilization of the Muni 108-Treasure Island bus line. During the three peak hours of analysis, the total transit demand for the 108-Treasure Island would not be accommodated within the 85 percent capacity utilization standard, and an increase in transit demand due to a mode shift would exacerbate the exceedance of the capacity utilization standard. Therefore, a shift in mode from auto to transit would result in a worsening of the identified significant impact on 108-Treasure Island transit operations.

Implementation of Mitigation Measure 2 (Expanded Transit Service) would reduce the secondary impact on transit to a less than significant level. However, because full funding for the Expanded Transit Service has not yet been identified its implementation remains uncertain and therefore, the secondary parking impacts on transit would remain significant and unavoidable.
4.6.4 Reduced Development Alternative with Expanded Transit Service

The Reduced Development Alternative’s parking supply would be the same under the Expanded Transit Scenario as under the Base Transit Scenario. However, under the Expanded Transit Scenario, the Reduced Development Alternative’s parking demand would be lower than under the Base Transit Scenario.

As shown, overall, during the peak hour of parking demand for all of Treasure Island, the Proposed Project would result in a surplus of 1,161 non-residential parking spaces and a deficit of 1,555 residential parking spaces under the Reduced Development Alternative with Expanded Transit Service. Yerba Buena Island may experience a shortfall of 74 spaces during its peak hour of parking demand (or 59 residential spaces and 15 non-residential spaces). By neighborhood, the Island Core neighborhood may experience a residential parking shortfall of up to 485 residential parking spaces, but a non-residential parking surplus of 296 parking spaces. Generally speaking, the other neighborhoods have residential parking shortfalls and non-residential parking surpluses. Any residential demand not accommodated in dedicated residential spaces would likely use available on-street parking. Overall, together the Islands have a parking shortfall of 468 spaces. Because the City of San Francisco does not consider parking shortfalls to be a significant impact under CEQA, the shortfalls projected in Table 47 and Table 48 are considered less than significant.

4.7 SERVICE AND LOADING IMPACTS

The demand for loading spaces generated by the Proposed Project and Reduced Development Alternative was described in Chapter 3, and was calculated based on the methods described in the SF Guidelines. The proposed rates for provision of loading spaces were presented in Table 3.

4.7.1 Proposed Project with Base Transit Scenario

Based on the square footages proposed for each neighborhood, the rates in Table 3 (on page 22) were applied to obtain the minimum number of loading spaces that would be supplied for the project. This information is summarized in Table 49 (on page 207). As shown, the minimum number of loading spaces to be provided by the Proposed Project is 38. The expected peak hour loading demand is 36 loading spaces. Overall, the Proposed Project would provide an adequate number of loading spaces to accommodate peak hour loading demand. Table 49 also indicates that specific uses within the Proposed Project, such as restaurant and office may not have adequate supply. However, this is based on supply calculations that assume the entire square footage as a single use, a conservative assumption, when in reality the individual uses may provide a higher total supply of loading spaces.
### TABLE 49 – PROJECT-GENERATED AND REDUCED DEVELOPMENT ALTERNATIVE-GENERATED LOADING DEMAND AND SUPPLY

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Daily Truck Generation Rates</th>
<th>Proposed Project</th>
<th>Reduced Development Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Size (Square Feet)</td>
<td>Daily Truck Generation</td>
<td>Peak Loading Space Demand</td>
</tr>
<tr>
<td>Office</td>
<td>0.21</td>
<td>130,000¹</td>
<td>27</td>
</tr>
<tr>
<td>Retail</td>
<td>0.22</td>
<td>320,000²</td>
<td>70</td>
</tr>
<tr>
<td>Restaurant</td>
<td>3.60</td>
<td>37,000</td>
<td>133</td>
</tr>
<tr>
<td>Hotel</td>
<td>0.09</td>
<td>450,000³</td>
<td>41</td>
</tr>
<tr>
<td>Institutional</td>
<td>0.10</td>
<td>138,500⁴</td>
<td>14</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>0.51</td>
<td>22,000⁵</td>
<td>11</td>
</tr>
<tr>
<td>Residential</td>
<td>0.03</td>
<td>9,577,150⁶</td>
<td>287</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>583 Trucks</td>
<td>36 Spaces</td>
</tr>
</tbody>
</table>

**Notes:**
1. Proposed Project includes 100,000 square feet of new office plus 30,000 square feet of community uses/offices planned in adaptive reuse of Building 1. Reduced Development Alternative would not provide 100,000 square feet of new office.
2. Includes all non-retail retail (170,000 square feet) and 150,000 square feet of entertainment uses proposed for adaptive reuse of Building 3.
3. Includes 13,500 square feet of community facilities, 35,000 square feet for Pier 1 Community Center, 15,000 square foot sailing center, and 75,000 square foot museum. Similar to parking analysis, loading demand for elementary school and police/fire facility would be provided separately within their facilities. Neither demand nor supply for elementary school and police/fire facility is included in this analysis.
4. Includes 22,000 square feet of food production space proposed in adaptive reuse of Building 2.
5. Proposed Project includes 8,000 dwelling units. Reduced Development Alternative includes 6,000 dwelling units.
6. Typical peak hour of truck loading space demand occurs between 10 AM to 1 PM. Peak hour generation assumes deliveries occur between 8 AM and 5 PM, average park time of 25 minutes per vehicle, and that the peak hour deliveries occur at a 25 percent higher rate than other hours.

**Source:** SF Guidelines, 2002 and Fehr & Peers 2009.
Although the precise location and orientation of development parcels is unknown at this point, which makes it impossible to address the details of each loading space; some standards and guidelines have been proposed by the Project Sponsor to minimize the effects of loading facilities. Specifically:

- The standards for on-street loading require the TIDA Executive Director to review the design of all on-street loading facilities to ensure that they are designed to minimize conflicts with transit, bicycle and pedestrians; possible conditions include requiring a dedicated loading zone located outside of the path of travel of vehicular, bicycle, pedestrian and transit routes, or limiting hours of operation for freight loading zones located within vehicular, bicycle, pedestrian and transit routes to avoid conflicts.
- Loading zones should be located away from major pedestrian routes and intersections and shared with parking entrances, where possible;
- Entrances to loading facilities should be minimized in size and be designed with visual buffers, where feasible;
- Curb cuts where required for off-street parking loading zones should be located to minimize transit, bicycle, and pedestrian conflicts;
- Every loading zone will be located in the same development block as the use served and will have adequate means of ingress/egress to a street or alley;
- Loading can be provided either on-street or off-street; however, on-street freight loading will not be permitted to occur within the designated transit loop shown on Figure 6, unless it can be accommodated outside the travel path of transit vehicles or can be limited to hours of operation that do not conflict with operational transit requirements;
- Adequate reservoir space shall be provided on private property for entrance of vehicles to off-street parking and loading zones, except with respect to spaces independently accessible directly from the street;
- Off-street parking and loading zone requirements and access for the historic Buildings 1, 2, and 3 will be determined in conjunction with requirements to conform with Secretary of the Interior Standards for these buildings; Access to off-street parking and loading spaces will be from a public street or alley by means of a private service driveway. Such a private service driveway will include adequate space to maneuver trucks and service vehicles into and out of all provided spaces, and will be designed so as to facilitate access to the subject property while minimizing interference with street and sidewalk circulation. If an adjacent street or alley is determined to be primarily used for building service, up to four spaces may be allowed to be individually accessible directly from such a street or alley.

Trash/recycling facilities and other utility services would be provided for all buildings in a location that balances residential access, convenient pick-up, maintenance, and screening from the active pedestrian zones of the street.

These guidelines, in addition to the fact that individual buildings would be reviewed by the City prior to construction and approval, would ensure that loading would not create potentially hazardous traffic conditions or significant delays affecting traffic, transit, bicycles and pedestrians, and that it would minimize disruptions to adjacent users. In light of the above, the Proposed Project’s loading impacts are less than significant.

4.7.2 Proposed Project with Expanded Transit Service

The loading supply and demand for the Proposed Project would be the same under the Expanded Transit Scenario as described above for the Base Transit Scenario. The same guidelines described above for the
4.7.3 Reduced Development Alternative with Base Transit Service

The Reduced Development Alternative would generate a peak demand for 31 loading spaces, as shown in Table 49 (on page 207). Based on the loading supply rates proposed by the project summarized in Table 3 (page 22), the Reduced Development Alternative would provide a minimum of 31 truck loading spaces, which would be adequate to meet the peak demands of the Reduced Development Alternative. Table 49 also indicates that specific uses within the Reduced Development Alternative, such as restaurant and office may not have adequate supply. However, this is based on supply calculations that assume the entire square footage as a single use, a conservative assumption, when in reality the individual uses may provide a higher total supply of loading spaces.

The same guidelines described above for the Proposed Project would be required of the Reduced Development Alternative. Therefore, loading impacts associated with the Reduced Development Alternative under the Base Transit Scenario would be less than significant.

4.7.4 Reduced Development Alternative with Expanded Transit Service

The loading supply and demand for the Reduced Development Alternative would be the same under the Expanded Transit Scenario as described above for the Base Transit Scenario. The same guidelines described above for the Proposed Project would be required of the Reduced Development Alternative. Therefore, the Reduced Development Alternative’s loading impacts would be less than significant under the Expanded Transit Scenario.

4.8 EMERGENCY ACCESS

This section describes the potential for the Proposed Project to impact emergency access.

4.8.1 Proposed Project with Base Transit Service

The Proposed Project includes the maintenance or reconstruction of the existing roadway network on Treasure Island and Yerba Buena Island. Existing emergency response routes would be maintained in their existing locations or rerouted as necessary. Further, all development would be designed in accordance with City standards, which include provisions that address emergency access (e.g., minimum street widths, minimum turning radii, etc.).

The Islands would include local police and fire facilities. Further, congestion associated with queuing approaching the SFOBB westbound on-ramps would not interfere with emergency vehicle access to the Islands from either San Francisco or the East Bay. If emergency vehicles were required to exit the Islands during periods when there was congestion approaching the SFOBB, similar to other congested roadway facilities, emergency vehicles would be able to maneuver into opposing traffic lanes and/or take alternate routes, depending on the specific traffic conditions at the time.

The California Vehicle Code requires drivers to make way for emergency vehicles, and drivers would likely pull out of the way of oncoming emergency vehicles by using available roadway shoulders or pulling closer to other vehicles. Avenue of the Palms and Treasure Island Boulevard are both multi-lane roadways, and emergency vehicles could choose to bypass queued vehicles by traveling in the opposing traffic lane, which is allowed when sirens are active.

Under the scenario with the reconstructed westbound on-ramps, after by passing queued vehicles Treasure Island Boulevard, emergency vehicles could use the dedicated transit-only and emergency vehicle-only westbound on-ramp on the west side of Yerba Buena Island to access the SFOBB. If this is
not feasible or a desired route, the emergency vehicle could proceed to the second westbound on-ramp and use the HOV bypass lane or the eastbound on-ramp towards the East Bay. In the scenario in which the Ramps Project does not get constructed, the vehicle queues on the westbound on-ramps are expected to be shorter, and emergency vehicles would only be required to maneuver through a short queue on the westbound on-ramp on the west side of the Island, likely using the shoulder of the roadway. The existing westbound on-ramp on the west side of the Island is approximately 24 feet wide and could accommodate both queued vehicles and an emergency vehicle on the shoulder.

Queues on the Islands and associated delay may affect the U.S. Coast Guard operations around Yerba Buena Island and their access to the Bay Bridge. Primary access between the Coast Guard station and the eastbound on-ramp is via South Gate Road (which connects with North Gate Road). With the Proposed Project, South Gate Road would be two-way between Hillcrest Road and the intersection with Macalla Road and North Gate Road to allow for direct access onto the eastbound Bay Bridge on-ramp and bypass of queued vehicles on Hillcrest Road. The intersection of South Gate Road with Hillcrest Road is located at the eastbound on-ramp to the Bay Bridge, about 150 feet from the Bay Bridge mainline structure. Under conditions when there is a queue at the eastbound on-ramp, vehicles on South Gate Road would access the eastbound queue via forced-flow conditions similar to conditions at a four-way STOP-sign controlled intersection (e.g., queued vehicles on Hillcrest Road would allow vehicles stopped on South Gate Road to access Hillcrest Road under alternate vehicle right-of-way. Since South Gate Road terminates at the intersection with Hillcrest Road and the eastbound on-ramp, the vehicle delays experienced by Coast Guard vehicles when there are queued conditions on Hillcrest Road would be less than if South Gate Road was one-way westbound. If South Gate Road was one-way westbound, Coast Guard vehicles bound for the Bay Bridge would be required to travel around Yerba Buena Island via Macalla Road, Treasure Island Road and Hillcrest Road, and would experience the queued conditions for a longer distance.

Vehicles exiting Coast Guard facility driveways on Hillcrest Road would be required to travel within queued conditions for some period of time. The duration of travel within queued conditions and added delays would depend on the day of week, time of day, and conditions on the Bay Bridge. Based on existing driveway locations, Coast Guard vehicles would be within queued conditions for a distance of between 50 and 550 feet from the eastbound on-ramp, compared with a maximum queue of about 1.2 miles (6,340 feet) on Hillcrest Road.

Coast Guard vehicles are equipped with lights and sirens, and during emergency conditions, would be able to bypass queued vehicles. In addition, the longest potential queue the Coast Guard vehicles would have to wait in would be about one-tenth of a mile, based on the distance between the places such vehicles access the main YBI circulation route and the Bay Bridge. Accordingly, the Proposed Project would not be expected to substantially affect access to the Coast Guard station.

Implementation of Mitigation Measure 1 (Expanded Transit Service) would reduce vehicle trip generation such that the Proposed Project’s impacts on ramp delays at the ramp meter at the reconstructed westbound on-ramp would be reduced. However, even with the proposed reconstructed on-ramps, delay would remain significant and unavoidable in the weekday peak hours.

Therefore, the project would not result in inadequate emergency vehicle access and the Proposed Project’s impacts to emergency access would be considered less than significant.

4.8.2 Proposed Project with Expanded Transit Service

The Proposed Project under the Expanded Transit Scenario would provide similar roadway facilities to the Proposed Project under the Base Transit Scenario, and would generate less overall congestion.

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57 The north leg of the intersection of Hillcrest Road and South Gate Road is the on-ramp onto the Bay Bridge eastbound.
Therefore, the Proposed Project under the Expanded Transit Scenario would have a less than significant impact to emergency access.

4.8.3 Reduced Development Alternative with Base Transit Service

The Reduced Development Alternative under the Base Transit Scenario would provide similar roadway facilities to the Proposed Project under the Base Transit Scenario, and would generate less overall congestion. Therefore, the Reduced Development Alternative under the Base Transit Scenario would have a less than significant impact to emergency access.

4.8.4 Reduced Development Alternative with Expanded Transit Service

The Reduced Development Alternative under the Expanded Transit Scenario would provide similar roadway facilities to the Proposed Project under the Base Transit Scenario, and would generate less overall congestion. Therefore, the Reduced Development Alternative under the Expanded Transit Scenario would have a less than significant impact to emergency access.

4.9 CONSTRUCTION IMPACTS

This section describes the potential impacts associated with construction of the Proposed Project or the Reduced Development Alternative.

4.9.1 Proposed Project with Base Transit Service

Construction and build out of the Proposed Project would be phased, and is expected to occur over approximately to 15 to 20 years; however, the actual timing of construction would depend on market conditions and other factors. Project construction is expected to involve four major phases. The first phase would include demolition of existing uses, horizontal infrastructure and portions of the geotechnical stabilization. The subsequent phases would include development of the proposed new land uses and associated infrastructure extensions, as needed.

The construction schedule would be coordinated with other land owners on the Island (Department of Labor and the US Coast Guard) and the construction of the SFOBB ESSSP (Caltrans) to minimize conflicts with the existing traffic onto and off of the Islands. Construction staging would occur primarily on the Islands, though truck traffic would be required to access the Island via the SFOBB.

Construction activity would be expected to occur on Monday through Saturday, between 7:00 AM and 8:00 PM, and the typical work shift for most construction workers would be from 7:00 AM to approximately 3:30 PM. Construction is not anticipated to typically occur on Sundays or major holidays.

Construction materials and equipment used on the island would be transported by truck and/or barge throughout the construction of the project. Table 50 (on page 212) summarizes the truck and barge traffic that the project sponsor expects to be generated during construction of the project. It is important to note that not all of these activities would be generating truck traffic simultaneously, and some activities are presented as total trips while others as annual figures, so the total annual truck traffic is not necessarily the sum of each row. Further, the number of truck trips would be considerably less than the amount of new vehicle traffic generated by the proposed project.

Traffic-related construction impacts would be concentrated on the SFOBB, primarily in the vicinity of the SFOBB ramps to the Islands, and on local streets on Yerba Buena and Treasure Islands. Trucks using the SFOBB ramps are likely to be slower at accelerating onto the SFOBB than a typical passenger car, which may cause some minor, temporary, and localized delay to traffic on the SFOBB near the ramps.
In addition, the project would involve construction of a new street system, which would require temporary closure of traffic and parking lanes and sidewalks on the Islands. These closures could last the entire duration of construction of particular phases, and it is possible that more than one area could be closed simultaneously. These closures may involve temporary disruptions to the 108-Treasure Island bus route and stops, causing the need for rerouting. Changes to transit routes would be coordinated and approved by SFMTA.

Because existing traffic volumes on the Islands are relatively low, closures of one or more traffic lanes is not expected to cause severe congestion on the Islands. However, the closures may create difficulties for bicycle and pedestrian traffic to circulate during construction. Temporary accommodations for pedestrians and bicyclists would be maintained to minimize these potential disruptions.

### TABLE 50 – CONSTRUCTION TRAFFIC

<table>
<thead>
<tr>
<th>Construction Use</th>
<th>Trip Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Truck Trips</td>
</tr>
<tr>
<td>Equipment Transport¹</td>
<td>200 per year</td>
</tr>
<tr>
<td>Demolition</td>
<td>100 total</td>
</tr>
<tr>
<td>Construction Materials¹</td>
<td>100,000 total</td>
</tr>
<tr>
<td>Asphalt</td>
<td>2,500 total</td>
</tr>
<tr>
<td>Aggregate</td>
<td>100 per year</td>
</tr>
<tr>
<td>Concrete</td>
<td>2,000 per year</td>
</tr>
<tr>
<td>Utilities¹</td>
<td>2,000 total</td>
</tr>
<tr>
<td>Landscaping¹</td>
<td>500 total</td>
</tr>
</tbody>
</table>

Note:
1. The number of truck and barge trips will be determined by the needs of the construction crew. The maximum number of trips is listed for each; however, both transport methods will be used so the total number of trips for each will differ from what is listed.

Source: TICD (BKF), 2009

Construction activities for the early phases of development may overlap with the final phases of construction of the new SFOBB eastern span; however, the new span is expected to be complete and open by late 2013.

Given the magnitude and duration of potential construction activities, and their potential impact on ramp operations on the SFOBB, the project construction activities could result in impacts to the transportation system. Impacts include increased delay and congestion on the SFOBB near the ramps and disruption to transit, pedestrian, bicycle, and vehicular traffic on the Islands due to closures. These impacts could be significant.

Mitigation Measure 3 – The project sponsor shall develop and implement a Construction Transportation Management Plan (“CTMP”) consistent with the standards and objectives stated below and approved by TIDA, designed to anticipate and minimize impacts of various construction activities associated with the Proposed Project.

The Plan shall disseminate appropriate information to contractors and affected agencies with respect to coordinating construction activities to minimize overall disruptions and ensure that overall circulation on the Islands is maintained to the extent possible, with particular focus on ensuring pedestrian, transit, and bicycle connectivity. The CTMP shall supplement and expand,
rather than modify or supersede, any manual, regulations, or provisions set forth by SFMTA, Department of Public Works ("DPW"), or other City departments and agencies.

Specifically, the CTMP shall:

- Identify construction traffic management best practices in San Francisco, as well as others that, although not being implemented in the City, could provide valuable information for a project of the size and characteristics of Treasure Island and Yerba Buena Island. Management practices include, but are not limited to, identifying ways to reduce construction worker vehicle trips through transportation demand management programs and methods to manage construction work parking demands.

- Describe procedures required by different departments and/or agencies in the city for implementation of a Construction Traffic Management Plan, such as reviewing agencies, approval processes, and estimated timelines. For example,
  - The construction contractor will need to coordinate temporary and permanent changes to the transportation network on Treasure Island and Yerba Buena Island with TIDA. Once Treasure Island streets are accepted as City streets, temporary traffic and transportation changes must be coordinated through the SFMTA’s Interdepartmental Staff Committee on Traffic and Transportation (“ISCOTT”) and will be public meetings. As part of this process, the CTMP may be reviewed by SFMTA’s Transportation Advisory Committee (“TASC”) to resolve internal differences between different transportation modes.
  - Caltrans Deputy Directive 60 (DD-60) requires a separate Transportation Management Plan (TMP) and contingency plans for all state highway activities. These plans shall be part of the normal project development process and must be considered during the planning stage to allow for the proper cost, scope and scheduling of the TMP activities on Caltrans right-of-way. These plans should adhere to Caltrans standards and guidelines for stage construction, construction signage, traffic handling, lane and ramp closures and TMP documentation for all work within Caltrans right-of-way. (Caltrans DD-60 and TMP Guidelines are included in Appendix L)
  - Changes to transit routes would be coordinated and approved, as appropriate, by SFMTA, AC Transit, and TITMA. The TMP would set forth the process by which transit route changes would be requested and approved.

- Require consultation with other Island users, including the Job Corps and Coast Guard, to assist coordination of construction traffic management strategies. The project sponsor shall proactively coordinate with these groups prior to developing the CTMP to ensure the needs of the other users on the Islands are addressed within the Construction Traffic Management Plan.

- Identify construction traffic management strategies and other elements for the Proposed Project and present a cohesive program of operational and demand management strategies designed to maintain acceptable levels of traffic flow during periods of construction activities. These include, but are not limited to, construction strategies, demand management activities, alternative route strategies, and public information strategies. For example, the project sponsor may develop a circulation plan for the Island during construction to ensure that existing users can clearly navigate through the construction zones without substantial disruption.

Implementation of Mitigation Measure 3, a Construction Traffic Management Program, would help reduce the Proposed Project’s construction-related traffic impacts. Given the magnitude of the proposed development and the duration of the construction period, some disruptions and
increased delays could still occur even with implementation of Mitigation Measure 3 (including ramp operations on the Bay Bridge), and it is possible that significant construction-related transportation impacts on regional roadways could still occur. Construction-related transportation impacts would therefore, remain **significant and unavoidable**.

4.9.2 *Proposed Project with Expanded Transit Scenario*

The Proposed Project under the Expanded Transit Scenario would generate similar construction activity and impacts compared to the Proposed Project under the Base Transit Scenario. Impacts include increased delay and congestion on the SFOBB near the ramps and potential disruption to transit, pedestrian, bicycle, and vehicular traffic on the Islands due to closures. Implementation of Mitigation Measure 3 would be applicable to the Proposed Project under the Expanded Transit Scenario. However, as with the Proposed Project, given the magnitude of the proposed development and the duration of the construction period, some disruptions and increased delays could still occur even with implementation of Mitigation Measure 3 (including ramp operations on the Bay Bridge), and it is possible that significant construction-related transportation impacts on regional roadways could still occur. Construction-related transportation impacts would therefore, remain **significant and unavoidable**.

4.9.3 *Reduced Development Alternative with Base Transit Service*

Although the overall amount of development would be slightly less under the Reduced Development Alternative, construction would generate similar construction activity and impacts compared to the Proposed Project. Given the magnitude of the proposed development and the duration of the construction period, some disruptions and increased delays could still occur even with implementation of Mitigation Measure 3 (including ramp operations on the Bay Bridge), and it is possible that significant construction-related transportation impacts on regional roadways could still occur. Construction-related transportation impacts would therefore, remain **significant and unavoidable**.

4.9.4 *Reduced Development Alternative with Expanded Transit Service*

The Reduced Development Alternative under the Expanded Transit Scenario would generate similar construction activity and impacts compared to the Reduced Development Alternative under the Base Transit Scenario. Given the magnitude of the proposed development and the duration of the construction period, some disruptions and increased delays could still occur even with implementation of Mitigation Measure 3 (including ramp operations on the Bay Bridge), and it is possible that significant construction-related transportation impacts on regional roadways could still occur. Construction-related transportation impacts would therefore, remain **significant and unavoidable**.

4.10 *Cumulative Conditions*

The preceding discussion of project impacts has been related to the near-term conditions with the Proposed Project and the Reduced Development Alternative. The remainder of this Chapter discusses the long-term cumulative impacts associated with the Proposed Project and Reduced Development Alternative as well as other long-term anticipated development in the area.

4.10.1 *Future Cumulative Growth*

Future conditions traffic forecasts were developed based on a comparison of the SFCTA and ACCMA travel demand forecasting models. While both models predict traffic demand reasonably well at most locations and for most directions, there are some differences between the two and neither model clearly performs better than the other. Future year 2030 baseline (no project) model forecasts from both models are summarized in Table 51 (on page 215).  

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57. A detailed discussion related to the derivation of these volumes and forecasts was provided in a letter to the City of San Francisco Planning Department, dated May 13, 2009. This letter is included in Appendix M.
## TABLE 51 – COMPARISON OF YEAR 2030 BASELINE (NO PROJECT) TRAFFIC FORECASTS

<table>
<thead>
<tr>
<th>Location</th>
<th>ACCMA Model</th>
<th>SFCTA Model</th>
<th>ACCMA Model</th>
<th>SFCTA Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Base Year</td>
<td>Future</td>
<td>Background</td>
<td>Base Year</td>
</tr>
<tr>
<td>AM Peak Hour</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-80 WB Approach to Bay Bridge</td>
<td>4,700</td>
<td>7,100</td>
<td>2,400</td>
<td>4,100</td>
</tr>
<tr>
<td>I-580 WB Approach to Bay Bridge</td>
<td>5,400</td>
<td>6,300</td>
<td>900</td>
<td>5,700</td>
</tr>
<tr>
<td>I-880 WB Approach to Bay Bridge</td>
<td>2,100</td>
<td>4,300</td>
<td>2,200</td>
<td>1,500</td>
</tr>
<tr>
<td>Total WB Bay Bridge Volume</td>
<td>12,200</td>
<td>17,600</td>
<td>5,500</td>
<td>11,200</td>
</tr>
<tr>
<td>(East of Island)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total EB Bay Bridge Volume</td>
<td>6,900</td>
<td>7,400</td>
<td>500</td>
<td>8,700</td>
</tr>
<tr>
<td>(East of Island)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM Peak Hour</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-80 WB Approach to Bay Bridge</td>
<td>2,400</td>
<td>2,700</td>
<td>300</td>
<td>3,000</td>
</tr>
<tr>
<td>I-580 WB Approach to Bay Bridge</td>
<td>2,700</td>
<td>3,200</td>
<td>500</td>
<td>4,400</td>
</tr>
<tr>
<td>I-880 WB Approach to Bay Bridge</td>
<td>1,800</td>
<td>2,200</td>
<td>400</td>
<td>1,600</td>
</tr>
<tr>
<td>Total WB Bay Bridge Volume</td>
<td>7,000</td>
<td>8,200</td>
<td>1,200</td>
<td>9,000</td>
</tr>
<tr>
<td>(East of Island)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total EB Bay Bridge Volume</td>
<td>12,800</td>
<td>17,500</td>
<td>4,700</td>
<td>10,000</td>
</tr>
<tr>
<td>(East of Island)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Fehr & Peers, 2009

The growth in travel demand predicted by each of the two travel demand forecasting models was added to the existing travel demand described earlier in this report. The results are shown in Table 52.

## TABLE 52 – FORECASTED YEAR 2030 BASELINE (NO PROJECT) BAY BRIDGE TRAFFIC DEMAND

<table>
<thead>
<tr>
<th>Direction</th>
<th>ACCMA</th>
<th>SFCTA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AM</td>
<td>PM</td>
</tr>
<tr>
<td>Westbound</td>
<td>15,950</td>
<td>9,150</td>
</tr>
<tr>
<td>Eastbound</td>
<td>7,650</td>
<td>14,250</td>
</tr>
</tbody>
</table>

Fehr & Peers, 2009
As described earlier, each bridge direction has an observed capacity of approximately 9,000 vehicles per hour. Table 53 presents the increase in unserved demand in each direction predicted by both models for year 2030 baseline conditions.

### TABLE 53 – YEAR 2030 BASELINE UNSERVED DEMAND ON BAY BRIDGE

<table>
<thead>
<tr>
<th>Direction</th>
<th>Existing 1</th>
<th>ACCMA Model</th>
<th>SFCTA Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Year 2030 Baseline</td>
<td>Increase</td>
<td>Year 2030 Baseline</td>
</tr>
<tr>
<td>AM Peak Hour</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Westbound</td>
<td>1,550</td>
<td>6,950</td>
<td>5,400</td>
</tr>
<tr>
<td>Eastbound</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PM Peak Hour</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Westbound</td>
<td>0</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Eastbound</td>
<td>550</td>
<td>5,250</td>
<td>4,700</td>
</tr>
</tbody>
</table>

Notes:
1. As shown on Figure 14 on page 48.

Fehr & Peers, 2009

As shown, the ACCMA model predicts relatively large increases in unserved demand in the peak directions, which would add approximately 36 lane-miles to existing queues (based on a density of 150 vehicles per lane-mile). The ACCMA model predicts the SFOBB would be largely able to handle traffic increases in the off-peak directions. The SFCTA model predicts relatively moderate increases to unserved demand in the peak direction in the AM peak hour and relatively small increases to the peak direction in the PM peak hour. Similar to the ACCMA model, the SFCTA model also predicts nearly negligible amounts of unserved demand in the off-peak directions.

Overall, although the range is large, the following conclusions can be drawn about future year 2030 baseline (no project) freeway volumes:

- In the AM peak hour, westbound queues would increase by 1,500 to 5,400 vehicles without the project;
- In the AM peak hour, eastbound queues would either stay unchanged or increase by about 250 vehicles without the project;
- In the PM peak hour, westbound queues would be between 150 to 200 vehicles without the project; and
- In the PM peak hour, eastbound queues would be 300 to 4,700 vehicles without the project

Table 54 and Figure 44 (pages 217 and 224) summarize the expected year 2030 (no project) queuing on Bay Bridge approaches.

Saturday freeway forecasts were developed using a linear growth factor based on the growth observed between the existing and 2030 PM peak hour freeway forecasts. That factor was applied to existing Saturday peak hour forecasts to develop 2030 Saturday peak hour forecasts. That process produced the following Saturday peak hour forecasts for travel on the SFOBB:

- In the Saturday peak hour, westbound volumes would be 8,150 vehicles per hour
In the Saturday peak hour, eastbound volumes would be 8,500 vehicles per hour.

As shown, the forecasted Saturday peak hour volumes would be less than the SFOBB capacity of 9,000 vehicles per hour under 2030 No Project conditions.

The remainder of this analysis is based on the largest volume forecast for each direction and peak hour from the two models. Specifically, the forecasts assume that westbound queues increase by 5,400 vehicles in the AM peak hour and 200 vehicles in the PM peak hour while eastbound queues increase by 250 vehicles in the AM peak hour and 4,700 vehicles in the PM peak hour. There would be no queues during the typical Saturday peak hour. Although this is a compilation of output from two different models, it presents a worst case scenario.

### TABLE 54 – FUTURE YEAR 2030 CUMULATIVE (NO PROJECT) QUEUING ON SFOBB APPROACHES (MILES)

<table>
<thead>
<tr>
<th>Approach</th>
<th>No. of Lanes</th>
<th>Existing Peak Period</th>
<th>Year 2030 Peak Period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AM</td>
<td>PM</td>
<td>Sat</td>
</tr>
<tr>
<td>East Bay Approaches</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I-80 WB</td>
<td>3</td>
<td>2.7</td>
<td>0.00</td>
</tr>
<tr>
<td>I-580 WB</td>
<td>3</td>
<td>1.5</td>
<td>0.00</td>
</tr>
<tr>
<td>I-880 WB</td>
<td>3</td>
<td>0.7</td>
<td>0.00</td>
</tr>
<tr>
<td>San Francisco Approaches*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harrison WB @ 1st</td>
<td>2</td>
<td>0.00</td>
<td>0.2</td>
</tr>
<tr>
<td>Bryant EB @ 2nd</td>
<td>2</td>
<td>0.00</td>
<td>0.2</td>
</tr>
<tr>
<td>Folsom EB @ Essex</td>
<td>2</td>
<td>0.00</td>
<td>0.3</td>
</tr>
<tr>
<td>1st SB @ Howard</td>
<td>2</td>
<td>0.00</td>
<td>0.4</td>
</tr>
<tr>
<td>Bryant EB @ 5th</td>
<td>3</td>
<td>0.00</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Notes:
1. The number of lanes shown represents the number of lanes of queued traffic serving the Bay Bridge from each facility.
2. Assumes queued vehicle density of 150 vehicles per lane per mile for freeway and 264 vehicles per lane per mile for city streets based on aerial photo observations.
3. Most queues observed on westbound approaches in the PM peak period were due to weaving in the I-80/I-580/I-880 interchange and not necessarily due to bridge over-saturation or the service volume of the toll plaza.
4. Queues based on intersection turning movement forecast. Additional unserved demand will be in queues on eastbound I-80 approaching the Bay Bridge.
5. Traffic in downtown San Francisco during the AM and Saturday peak hours is generally uncongested, and queues on San Francisco surface streets are due to signal operation characteristics and not due to bridge over-saturation.

Source: Fehr & Peers, 2009

### 4.10.2 Cumulative Traffic Impacts

The cumulative conditions operations of the freeway system, including ramp merge and diverge operations, and study intersections are discussed in this section.

#### 4.10.2.1 Proposed Project with Base Transit Service

This section describes the cumulative traffic impacts associated with the Proposed Project under the Base Transit Scenario and other anticipated long-term development.

#### 4.10.2.1.1 Ramp Queuing (Base Transit)

Queues on Yerba Buena Island approaching the SFOBB on-ramps would be the same in year 2030 as described earlier under near term conditions with the Proposed Project under the Base Transit Scenario.
As summarized in Table 38 on page 108 and shown on Figure 22 on page 107, with Base Transit Service, the Proposed Project may result in extensive queues on Treasure Island Road that may interfere with traffic circulation. Without reconstruction of the westbound on-ramp to the SFOBB (and the associated HOV3+ bypass), queues would extend back approximated ½-mile from each of the two westbound on-ramps. With reconstruction of the westbound ramps (and the associated consolidation of all traffic to a single westbound on-ramp), queues would reach over one mile on Treasure Island Road to Macalla Road.

4.10.2.1.2 Ramp Merge/Diverge (Base Transit)

Ramp merge/diverge levels of service would change with the addition of other background traffic growth to the mainline traffic volumes on the SFOBB. Tables 55, 56, and 57 (pages 219, 220, and 221) present ramp merge and diverge levels of service under cumulative (year 2030) conditions, including traffic from the Proposed Project under the Base Transit Scenario, for the AM, PM, and Saturday peak hours, respectively. Under year 2030 conditions with the proposed project, (identified on Tables 55, 56, and 57 as "Year 2030 Plus Project (Base Transit Scenario)"), all on- and off-ramps with the exception of the eastbound off-ramp on the west side of the tunnel would operate at acceptable LOS of D or better during all study peak periods. The eastbound off-ramp on the west side of the Islands would operate at LOS E in the PM peak hour. The proposed project would contribute the majority of the off-ramp traffic, and therefore, the Proposed Project’s contribution to these cumulatively-significant impacts would be significant. As noted earlier, there is no feasible mitigation to improve this ramp to acceptable LOS. Therefore, this cumulative impact would be significant and unavoidable.

4.10.2.1.3 Ramp Delays (Base Transit)

Delays associated with queuing on Yerba Buena Island approaching the SFOBB on-ramps would be the same in year 2030 as described earlier under near term conditions with the Proposed Project under the Base Transit Scenario. Under the condition in which the westbound on-ramps on the east side of Yerba Buena Island are not reconstructed and the existing ramps remain stop-controlled, the westbound on-ramps would operate at LOS F during the AM, PM, and Saturday peak hours with the addition of project traffic and delays would be considered significant. If the separate project to reconstruct the westbound on-ramps is constructed and the west side westbound on-ramp is converted to transit-only, vehicle delay would be approximately five minutes during both the AM and PM peak hours.

Under conditions with the existing ramp configuration and with the proposed reconstruction of the westbound ramps, as discussed on page 113, the Proposed Project’s impacts to ramp delays would be significant and unavoidable.
# TABLE 55 – CUMULATIVE CONDITIONS RAMP JUNCTION ANALYSIS (AM PEAK HOUR)

<table>
<thead>
<tr>
<th>Ramp</th>
<th>Existing</th>
<th>Year 2030 Plus Project (Base Transit Scenario)</th>
<th>Year 2030 Plus Project (Expanded Transit Scenario)</th>
<th>Year 2030 Plus Reduced Development Alternative (Base Transit Scenario)</th>
<th>Year 2030 Plus Reduced Development Alternative (Expanded Transit Scenario)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Density(^1)/ LOS</td>
<td>Delay(^1)/ LOS(^2)</td>
<td>Density(^1)/ LOS</td>
<td>Delay(^1)/ LOS(^2)</td>
<td>Density(^1)/ LOS</td>
</tr>
<tr>
<td>Eastbound On-Ramp</td>
<td>22.3/C</td>
<td>74.2/F</td>
<td>27.9/C</td>
<td>27.5/C</td>
<td>27.5/C</td>
</tr>
<tr>
<td>Eastbound Off-Ramp (West)</td>
<td>30.1/D</td>
<td>33.4/D</td>
<td>32.6/D</td>
<td>32.7/D</td>
<td>32.7/D</td>
</tr>
<tr>
<td>Westbound On-Ramp (West)</td>
<td>27.9/C</td>
<td>&gt;80/F</td>
<td>26.8/C</td>
<td>&gt;80/F</td>
<td>27.6/C</td>
</tr>
<tr>
<td>Westbound On-Ramp (East)(^3)</td>
<td></td>
<td></td>
<td>27.1/C</td>
<td>&gt;80/F</td>
<td>27.8/C</td>
</tr>
<tr>
<td>Westbound Off-Ramp</td>
<td>32.8/D</td>
<td>32.6/D</td>
<td>32.1/D</td>
<td>32.4/D</td>
<td>32.4/D</td>
</tr>
</tbody>
</table>

**Notes:**

1. Density measured in passenger cars per mile per lane.
2. Under conditions where the westbound ramps on the east side of Yerba Buena Island are not reconstructed, existing stop-control will remain in place on both westbound on-ramps. Under these conditions, similar to the analysis of existing conditions, both the HCM merge analysis and the HCM stop-controlled intersection analysis were performed.
3. The eastbound off-ramp (east side) and Westbound on-ramp (east) were closed due to construction at the time the existing conditions data were collected, but have since been reopened.
4. Under conditions with reconstruction of the westbound ramps (east), the westbound on-ramp (west) is planned to be transit-only. Thus, under conditions with reconstruction of the westbound ramps (east), ramp junction analysis was only performed for the westbound on-ramp (east) because volumes would be very small on the westbound on-ramp (west). All of the other ramps would continue to operate at the same level of service irrespective of whether or not the westbound ramps (east) are reconstructed.

Source: Fehr & Peers, 2009
### TABLE 56 – CUMULATIVE CONDITIONS RAMP JUNCTION ANALYSIS (PM PEAK HOUR)

<table>
<thead>
<tr>
<th>Ramp Junction LOS without Reconstructed Westbound Ramps</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ramp</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Eastbound On-Ramp</td>
</tr>
<tr>
<td>Eastbound Off-Ramp (East)¹</td>
</tr>
<tr>
<td>Westbound On-Ramp (West)</td>
</tr>
<tr>
<td>Westbound On-Ramp (East)³</td>
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<tr>
<td>Westbound Off-Ramp</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Ramp Junction LOS with Reconstructed Westbound Ramps</th>
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<td><strong>Ramp</strong></td>
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<tr>
<td></td>
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<tr>
<td>Westbound On-Ramp (East)⁴</td>
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</table>

**Notes:**
1. Density measured in passenger cars per mile per lane.
2. Under conditions where the westbound ramps on the east side of Yerba Buena Island are not reconstructed, existing stop-control will remain in place on both westbound on-ramps. Under these conditions, similar to the analysis of existing conditions, both the HCM merge analysis and the HCM stop-controlled intersection analysis were performed.
3. The eastbound off-ramp (east side) and Westbound on-ramp (east) were closed due to construction at the time the existing conditions data were collected, but have since been reopened.
4. Under conditions with reconstruction of the westbound ramps (east), the westbound on-ramp (west) is planned to be transit-only. Thus, under conditions with reconstruction of the westbound ramps (east), ramp junction analysis was only performed for the westbound on-ramp (east) because volumes would be very small on the westbound on-ramp (west). All of the other ramps would continue to operate at the same level of service irrespective of whether or not the westbound ramps (east) are reconstructed.

**Source:** Fehr & Peers, 2009
TABLE 57 – CUMULATIVE CONDITIONS RAMP JUNCTION ANALYSIS (SATURDAY PEAK HOUR)

<table>
<thead>
<tr>
<th>Ramp Junction LOS without Reconstructed Westbound Ramps</th>
<th>Density¹/ Density²</th>
<th>Delay/ Delay²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastbound On-Ramp</td>
<td>24.5/C</td>
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</tr>
<tr>
<td>Eastbound Off-Ramp (West)</td>
<td>32.3/D</td>
<td>39.7/E</td>
</tr>
<tr>
<td>Eastbound Off-Ramp (East)</td>
<td>30.8/D</td>
<td>29.9/D</td>
</tr>
<tr>
<td>Westbound On-Ramp (West)</td>
<td>24.6/C</td>
<td>&gt;80/F</td>
</tr>
<tr>
<td>Westbound On-Ramp (East)</td>
<td>25.9/C</td>
<td>&gt;80/F</td>
</tr>
<tr>
<td>Westbound Off-Ramp</td>
<td>28.5/D</td>
<td>31.8/D</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ramp Junction LOS with Reconstructed Westbound Ramps</th>
<th>Density¹/ Density²</th>
<th>Delay/ Delay²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Westbound On-Ramp (East)</td>
<td>31.6/D</td>
<td>30.4/D</td>
</tr>
<tr>
<td>Westbound Off-Ramp</td>
<td>25.4/C</td>
<td>25.1/C</td>
</tr>
</tbody>
</table>

Notes:
1. Density measured in passenger cars per mile per lane.
2. Under conditions where the westbound ramps on the east side of Yerba Buena Island are not reconstructed, existing stop-control will remain in place on both westbound on-ramps. Under these conditions, similar to the analysis of existing conditions, both the HCM merge analysis and the HCM stop-controlled intersection analysis were performed.
3. The eastbound off-ramp (east side) and Westbound on-ramp (east) were closed due to construction at the time the existing conditions data were collected, but have since been reopened.
4. Under conditions with reconstruction of the westbound ramps (east), the westbound on-ramp (west) is planned to be transit-only. Thus, under conditions with reconstruction of the westbound ramps (east), ramp junction analysis was only performed for the westbound on-ramp (east) because volumes would be very small on the westbound on-ramp (west). All of the other ramps would continue to operate at the same level of service irrespective of whether or not the westbound ramps (east) are reconstructed.

Source: Fehr & Peers, 2009
4.10.2.1.4 Mainline Operations: Queuing on Approaches (Base Transit)

Table 54 (on page 217) presents expected queuing on SFOBB approaches in year 2030 without the proposed project. Although the travel demand forecasting models differ regarding the extent of queuing on bridge approaches in year 2030, they both project queuing on all approaches in the peak hours in year 2030. The extent to which the proposed project would exacerbate westbound queues at the East Bay toll plaza is depicted in Figure 44 Error! Reference source not found.. Generally, since the SFOBB would operate at capacity during both AM and PM peak hours in year 2030 without the Proposed Project, all traffic added by the project would increase queues in Downtown San Francisco and the East Bay by a corresponding amount.

Specifically, the Proposed Project would increase queues in the East Bay by approximately 471 vehicles in the AM peak hour and approximately 465 vehicles in the PM peak hour. Similar to near-term conditions, the Proposed Project's contribution to cumulative increases to queuing on SFOBB approaches in the East Bay would be significant. Although implementing the Expanded Transit Scenario would reduce the Proposed Project's overall contribution, impacts would remain significant and unavoidable.

The Proposed Project would increase queues in Downtown San Francisco by 230 vehicles in the AM peak hour and 523 vehicles in the PM peak hour, and would create queues of 300 vehicles in the Saturday peak hour. Also similar to near-term conditions, the Proposed Project's contribution to cumulative increases to queuing on SFOBB approaches in Downtown San Francisco would be significant. Although implementing the Expanded Transit Scenario would reduce the Proposed Project's overall contribution, impacts would remain significant and unavoidable.

Overall, similar to near term conditions, impacts to the SFOBB mainline would be less than significant, because the traffic on the bridge cannot exceed the capacity of the bridge approaches, which would operate at capacity without the Proposed Project.

Except near ramp merge and diverge sections, operations on the SFOBB would operate similar to existing conditions (i.e., at capacity in peak directions during peak hours) since additional travel demand would be constrained by the toll plaza in the East Bay and eastbound approaches in San Francisco. Therefore, the project's impacts to the SFOBB mainline operations are expected to be less than significant, because the bridge's approaches limit the number of vehicles that can reach the bridge. Impacts to the SFOBB near ramp merge and diverge sections. Generally, through-traffic on the SFOBB may experience some increased congestion in the eastbound direction due to project-generated impacts approaching the westbound off-ramp on the west side of Yerba Buena Island.

Project-generated increases to congestion in the westbound direction are not expected to generate substantial increases in congestion, particularly if the westbound ramps are reconstructed since those improvements would increase sight distance and acceleration distance allowing smoother traffic merging than the existing configuration.
YEAR 2030 PLUS PROJECT (BASE TRANSIT SCENARIO) MAXIMUM EAST BAY QUEUES

LEGEND:
- Queues
  - Existing AM Peak Hour Queue
  - Maximum AM Peak Hour Queue - Year 2030 No Project
  - Project Contribution to Year 2030 Queues

Table: Queue Length Summary

<table>
<thead>
<tr>
<th>Approach</th>
<th>Existing AM Queue</th>
<th>Year 2030 No Project AM Queue</th>
<th>Project Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-80 WB</td>
<td>2.66 miles</td>
<td>5.5 - 8.0 miles</td>
<td>0.8 miles</td>
</tr>
<tr>
<td>I-580 WB</td>
<td>1.5 miles</td>
<td>1.9 - 2.5 miles</td>
<td>0.5 miles</td>
</tr>
<tr>
<td>I-880 WB</td>
<td>0.74 miles</td>
<td>1.0 - 5.6 miles</td>
<td>0.2 miles</td>
</tr>
</tbody>
</table>

Source: Fehr & Peers, 2009

FIGURE 44

June 2010
SF07-0340\graphics\TIS\0340-44
4.10.2.1.5 Intersections (Base Transit)

Future conditions traffic volumes were obtained using the SFCTA travel demand forecasting model as well as information provided by the City of San Francisco related to the ongoing Transit Center District Plan (“TCDP”) transportation planning effort. The TCDP would allow higher-density development in the area surrounding the proposed new Transbay Transit Center in Downtown San Francisco.

Forecasts from that study were adjusted to include additional anticipated growth in San Francisco not already included in the volume forecasts developed for the TCDP. This expected growth included traffic from the TCDP, various development sites around the Transbay Transit Area, as well as some additional development in the western South of Market area along the 4th Street corridor. Traffic assumed to be generated by future development on the Islands by the SFCTA model was then removed. The result is a set of Year 2030 No Project intersection turning movement volumes. These volumes are shown in Figure 45.

Like most travel demand forecasting models, the SFCTA model does not include a Saturday scenario; therefore Year 2030 Saturday peak hour volumes were developed by first calculating the ratio of existing weekday PM peak hour traffic volumes to existing Saturday peak hour traffic volumes for each turning movement at each study intersection. The ratio for each movement at each intersection is based on actual counts collected at the study intersections during typical weekday PM and Saturday peak hours. For each movement, the calculated weekday-to-Saturday ratios were applied to the future weekday PM peak hour forecasts derived from the SFCTA model to predict future Saturday peak hour traffic volumes. These are also shown on Figure 45 on page 225. The overall background growth in traffic between Existing conditions and Year 2030 No Project is shown in Figure 46 on page 226. For additional information on how Year 2030 Cumulative volumes were developed, refer to Cumulative Year 2030 Baseline (No Project) Traffic Forecasts contained in Appendix M3.

Traffic forecast to be generated by the Proposed Project under the Base Transit Scenario, as depicted on Figure 23 on page 116, was added to the Future Year 2030 No Project volumes to determine Year 2030 plus Project intersection turning movement volumes. These volumes are shown in Figure 47 on page 227. Intersection levels of service were calculated for Year 2030 conditions for each scenario, and are presented in Table 58 on page 228.

In Year 2030 with the Proposed Project, 14 study intersections are expected to operate at LOS E or F in at least one peak hour. The project’s contribution to cumulative impacts at each of these intersections is discussed below, to evaluate whether the project’s contribution to the future failing condition is cumulatively considerable.

**Fremont Street/Howard Street (Study Intersection #1)** – The Proposed Project would add traffic to this intersection, which would operate at LOS F during the PM peak hour under Cumulative 2030 No Project conditions. The critical movement in the PM peak hour is the westbound through movement. The Proposed Project would contribute less than five percent to the critical westbound through movement (0.8 percent). Therefore, the project’s contribution to poor operating conditions at this intersection would be considered less than significant.

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58. Fehr & Peers, May 13, 2009
Figure 45

Treasure Island and Yerba Buena Island Redevelopment Plan TIS

Cumulative Year 2030 No Project

Peak Hour Intersection Turning Movement Volumes

Source: Fehr & Peers, 2009
PROJECTED GROWTH BETWEEN EXISTING AND 2030 NO PROJECT
PEAK HOUR INTERSECTION TURNING MOVEMENT VOLUMES

Source: Fehr & Peers, 2009
<table>
<thead>
<tr>
<th>Intersection</th>
<th>Peak Hour</th>
<th>2030 No Project</th>
<th>2030 + Project: Base Transit Scenario</th>
<th>2030 + Project: Expanded Transit Scenario</th>
<th>2030 + Reduced Development: Base Transit Scenario</th>
<th>2030 + Reduced Development: Expanded Transit Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2030 No Project</td>
<td>2030 + Project: Base Transit Scenario</td>
<td>2030 + Project: Expanded Transit Scenario</td>
<td>2030 + Reduced Development: Base Transit Scenario</td>
<td>2030 + Reduced Development: Expanded Transit Scenario</td>
</tr>
<tr>
<td>1. Fremont/Howard</td>
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<td>33.2</td>
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</tr>
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<td>7. 1st/Folsom</td>
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<td>2030 + Project: Expanded Transit Scenario</td>
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<td>10. Essex/Harrison /I-80 EB On-Ramp</td>
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</tbody>
</table>

Notes:
1. Whole intersection weighted average stopped delay expressed in seconds per vehicle calculated using methods described in the 2000 HCM. In rare cases, if the proposed project adds traffic to movements with lower average delay than the average delay for the entire intersection, the project could result in lower average delay per vehicle than the “no project” scenario.
2. **Bold** indicates an unacceptable level of service (LOS).
3. Intersection of Avenue of the Palms/1st Street is expected to operate the same in year 2030 as existing plus project conditions.

Fremont Street/Folsom Street/I-80 Westbound Off-Ramp (Study Intersection #2) – The intersection of Fremont Street/Folsom Street/I-80 Westbound Off-Ramp is expected to operate at LOS F in the AM peak hour. The Proposed Project would contribute less than five percent to the critical southeastbound left movement (2.0 percent) (i.e., the off-ramp approach). Therefore, the project’s contribution to poor operating conditions at this intersection would be considered less than significant.

Fremont Street/Harrison Street/I-80 Westbound Off-Ramp (Study Intersection #3) – The intersection of Fremont Street/Harrison Street/I-80 Westbound Off-Ramp is expected to operate at LOS F in the AM peak hour. The Proposed Project would not contribute traffic to the critical eastbound through movement at this intersection. Therefore, the project’s contribution to poor operating conditions at this intersection would be considered less than significant.

1st Street/Market Street (Study Intersection #4) – The Proposed Project would add traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. The southbound through movement and the eastbound through are the critical movements at this intersection. While the eastbound through operates at an acceptable LOS, the southbound through operates at LOS F during the AM peak hour. The Proposed Project would contribute less than five percent (3.4 percent) to this movement. Therefore, the project’s contribution to poor operating conditions in the AM peak hour would be considered less than significant.

The Proposed Project would add traffic to this intersection, which would operate at LOS F during the PM peak hour under year 2030 No Project conditions. The southbound through movement and the eastbound right are the critical movements at this intersection. While the eastbound right operates at an acceptable LOS, the southbound through operates at LOS F in the PM peak hour. The Proposed Project would contribute more than five percent (13.9 percent) to this movement. Therefore, the project’s contribution to poor operating conditions in the PM peak hour would be considered significant.

The Proposed Project would cause this intersection to deteriorate from LOS C under year 2030 No Project conditions to LOS E under conditions with the Proposed Project during the Saturday peak hour. This would be a significant impact.

Because the Proposed Project’s contribution to critical movements at this intersection during the PM peak hour would be considerable, and because the Proposed Project would cause the intersection to deteriorate from LOS C to LOS E during the Saturday peak hour, the project’s cumulative impact is considered significant. As described under Existing plus Project conditions, there are no feasible mitigations at this intersection to improve automobile LOS. Therefore, the significant cumulative impact in the Saturday peak hour and the project’s cumulatively-considerable contribution to LOS F conditions in the weekday PM peak hour would remain significant and unavoidable.

1st Street/Mission Street (Study Intersection #5) – The Proposed Project would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The southbound through movement and the eastbound right is a critical movement at this intersection. While the eastbound right operates at an acceptable LOS, the southbound through operates at LOS F in the PM peak hour. The Proposed Project would contribute more than five percent (8.6 percent) to this movement. Therefore, the project’s contribution to poor operating conditions in the PM peak hour would be considered significant.

As described under Existing plus Project conditions, there are no feasible mitigations at this intersection to improve automobile LOS. Therefore, the project’s cumulatively-considerable contribution to LOS F conditions in the weekday PM peak hour would remain significant and unavoidable.

1st Street/Howard Street (Study Intersection #6) – The Proposed Project would add traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. The Proposed Project would not contribute traffic to the critical southbound right-turn movement at this
intersection. Therefore, the project’s contribution to poor operating conditions in the AM peak hour would be considered less than significant.

The Proposed Project would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The Proposed Project would not contribute traffic to the critical southbound right-turn movement at this intersection. Therefore, the project’s contribution to poor operating conditions in the PM peak hour would be considered less than significant.

Because the Proposed Project would not contribute to critical movements at this intersection in the AM and PM peak hours, the project’s contribution to cumulative impacts would be considered less than significant.

1st Street/Folsom Street (Study Intersection #7) – The Proposed Project would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. However, the Proposed Project would not contribute to the critical eastbound right-turn movement. Therefore, the project’s contribution to cumulative impacts at this intersection would be considered less than significant.

1st Street/Harrison Street/I-80 Eastbound On-Ramp (Study Intersection #8) – The Proposed Project would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movements at this intersection during the PM peak hour are the southbound through movement and the westbound left turn movement. The Proposed Project would contribute less than five percent (1.6 percent) to the westbound left turn movement during the PM peak hour. The Proposed Project would contribute more than five percent (13.1 percent) to the southbound through movement during the PM peak hour. Therefore, the project’s contribution to cumulative impacts at this intersection would be significant.

As described under Existing plus Project conditions, there are no feasible mitigations at this intersection to improve automobile LOS. Therefore, the project’s cumulatively-considerable contribution to LOS F conditions in the weekday PM peak hour would remain significant and unavoidable.

Essex Street/Harrison Street/I-80 Eastbound On-Ramp (Study Intersection #10) – The Proposed Project would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movement at this intersection is the eastbound right turn movement from Harrison Street onto the I-80 Eastbound On-ramp. The Proposed Project would contribute less than five percent (2.0 percent) to this movement. Therefore the project’s contribution would be considered less than significant in the PM peak hour.

2nd Street/Folsom Street (Study Intersection #11) – The Proposed Project would contribute traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. The critical movements at this intersection are the southbound left turn and the southbound through movements. The Proposed Project would contribute less than five percent (1.5 percent) to the critical southbound through movement. However, the project would contribute more than five percent (6.4 percent) of total traffic volume to the critical southbound left turn movement. Therefore, the project’s contribution to traffic in the AM peak hour would be considered cumulatively considerable.

The Proposed Project would contribute traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movements at this intersection are the southbound left turn and the southbound through movements. The Proposed Project would contribute less than five percent (2.1 percent) to the critical southbound through movement. However, the project would contribute more than five percent (14.2 percent) to the critical southbound left turn movement. Therefore, the project’s contribution to traffic in the PM peak hour would be considered cumulatively considerable.
Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco and proposed as part of the Transit Center District Plan currently under study. As shown in Table 54 (on page 217), implementation of the Expanded Transit Scenario would improve operations at this intersection. However, the project’s contribution would remain cumulatively considerable. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. The Proposed Project’s contribution to cumulative impacts at this intersection would remain significant and unavoidable.

2nd Street/Bryant Street (Study Intersection #12) – The Proposed Project would contribute traffic to this intersection, which would operate at LOS E in the PM peak hour under year 2030 No Project conditions. The critical movements at this intersection during the PM peak hour are the eastbound left turn movement and southbound through movement. The Proposed Project would not contribute to the critical eastbound left-turn movement at this intersection. The Proposed Project would contribute less than five percent (1.5 percent) to the critical southbound through movement. Therefore, the project’s contribution to traffic in the PM peak hour would be considered less than significant.

The Embarcadero/Harrison Street (Study Intersection #13) – The Proposed Project would contribute traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. The northbound through movement and the eastbound left are the critical movements at this intersection. While the eastbound left operates at an acceptable LOS, the northbound through operates at LOS F in the AM peak hour. However, the Proposed Project would not contribute to the critical northbound through movement at this intersection. Therefore, the project’s contribution to traffic in the AM peak hour would be considered less than significant.

The Proposed Project would contribute traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movements at this intersection are the northbound right turn movement and the southbound through movement. The Proposed Project would contribute less than five percent (1.6 percent) to the critical southbound through movement. The eastbound left turn movement is expected to operate at acceptable levels of service during the AM peak hour. Therefore, the project’s contribution to traffic in the PM peak hour would be considered less than significant.

Bryant Street/5th Street/I-80 Eastbound On-ramp (Study Intersection #15) – The Proposed Project would contribute traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. The critical movements at this intersection are the southbound through movement and eastbound left turn movement. The Proposed Project would contribute less than five percent (1.6 percent) to the critical southbound through movement. The eastbound left turn movement is expected to operate at acceptable levels of service during the AM peak hour. Therefore, the project’s contribution to traffic in the AM peak hour would be considered less than significant.

The Proposed Project would contribute traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movements at this intersection are the northbound right turn movement and the southbound through movement. The Proposed Project would contribute less than five percent (3.6 percent) to the critical northbound right turn movement. The Proposed Project would also contribute less than five percent (2.5 percent) to the critical southbound through movement. Therefore, the project’s contribution to traffic in the PM peak hour would be considered less than significant.
During the Saturday peak hour, the Proposed Project would cause the intersection of Bryant Street/5th Street/I-80 Eastbound On-ramp to deteriorate from LOS D under year 2030 No Project conditions to LOS E under year 2030 conditions with the Proposed Project. This would be a significant impact.

As described under Existing plus Project conditions, there are no feasible mitigations at this intersection to improve automobile LOS. Therefore, the project’s impact to Saturday peak hour conditions would remain significant and unavoidable.

Harrison Street/5th Street/I-80 Westbound Off-ramp (Study Intersection #16) – The Proposed Project would contribute traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movements at this intersection are the southbound through movement and the northbound right-turn movement (from the off-ramp onto northbound 5th Street). The Proposed Project would contribute more than five percent (9.9 percent) to the critical southbound through movement. The Proposed Project would also contribute more than five percent (5.4 percent) to the critical northbound off-ramp right turn movement. Therefore, the project’s contribution to cumulative impacts at this intersection would be considered significant.

Implementation of the Expanded Transit Scenario would reduce the Proposed Project’s contribution to the off-ramp to less than five percent, but the contribution to the southbound through movement would remain larger than five percent. Therefore, the project’s contribution to traffic in the PM peak hour would remain significant. As described under Existing plus Project conditions, there are no other feasible mitigations at this intersection to improve automobile LOS. Therefore, the project’s cumulatively-considerable contribution to LOS F conditions in the weekday PM peak hour would remain significant and unavoidable.

4.10.2.1.5 Relationship to Transit Center District Plan (Base Transit)

As discussed earlier, the City is currently conducting a study to evaluate the effects of potential increases to allowable development in the area surrounding the proposed Transbay Transit Center. As part of this work, the City is contemplating changes to the transportation network in a several block area, generally bounded by Market Street, 2nd Street, Harrison Street, and Beale Street. Some of the potential changes to the roadway system include conversion of existing one-way streets to two-way; restricting access on portions of some streets to transit only; and reducing the number of travel lanes on some streets. At the time this analysis was conducted, the proposed roadway network changes were not defined enough to include in the analysis. Just recently, in November 2009, the Planning Department issued a Draft Plan for Public Review for this project. While this Draft for Public Review does propose some concrete changes to the roadway system in the area, these proposals are still likely to evolve, as the planning and environmental review process for that project develops. For these reasons, these proposed changes have not been included in the analysis at this time. Ultimately, the impacts of such roadway changes will be evaluated in the environmental review document for the Transit Center District Plan, which will include the additional traffic associated with the proposed project.

4.10.2.2 Proposed Project (Expanded Transit Scenario)

This section describes the cumulative traffic impacts associated with the Proposed Project under the Expanded Transit Scenario and other anticipated long-term development.

4.10.2.2.1 Ramp Queuing (Expanded Transit)

Queues on Yerba Buena Island approaching the SFOBB on-ramps would be the same in year 2030 as described earlier under near term conditions with the Proposed Project under the Expanded Transit Scenario. As summarized in Table 38 on page 108 and shown on Figure 27 on page 128, with Expanded Transit service, queues on roadways approaching the SFOBB on-ramps would be notably shorter than those under the Base Transit Scenario. Without reconstruction of the westbound on-ramp to the SFOBB
(and the associated HOV3+ bypass), queues would extend back approximately 400 feet from each of the two westbound on-ramps during the AM and PM peak hours, and approximately 1/3 mile during the Saturday peak hour. With reconstruction of the westbound ramps, queues would be somewhat longer, extending to a maximum of less than one mile, approximately to the transit-only westbound on-ramp on the west side of Yerba Buena Island.

4.10.2.2.2 Ramp Merge/Diverge (Expanded Transit)

Ramp merge/diverge levels of service would change with the addition of other background traffic growth to the mainline traffic volumes on the SFOBB. Tables 55, 56, and 57 (pages 219 to 221) present ramp merge and diverge levels of service under cumulative (year 2030) conditions, including traffic from the Proposed Project under the Expanded Transit Scenario, for the AM, PM, and Saturday peak hours, respectively. Under year 2030 conditions with the Proposed Project, identified on Tables 55, 56, and 57 as "Year 2030 Plus Project (Expanded Transit Scenario)", all on- and off-ramps with the exception of the eastbound off-ramp on the west side of the tunnel would operate at acceptable LOS of D or better during all study peak periods. The eastbound off-ramp on the west side of the Islands would operate at LOS E in the PM peak hour. The proposed project would contribute the majority of the off-ramp traffic, and therefore, the Proposed Project's contribution to this cumulatively-significant impact would be significant. As noted earlier, there is no feasible mitigation to improve this ramp to acceptable LOS. Therefore, this cumulative impact would be significant and unavoidable.

4.10.2.2.3 Ramp Delays (Expanded Transit)

Delays associated with queuing on Yerba Buena Island approaching the SFOBB on-ramps would be the same in year 2030 as described earlier under near term conditions with the Proposed Project under the Expanded Transit Scenario. As shown in Tables 39, 40, and 41 (pages 109 to 111), under the condition in which the westbound on-ramps on Yerba Buena Island are not reconstructed and remain stop-controlled, both westbound on-ramps would operate at LOS F during the AM, PM and Saturday peak hours with substantial delay. If the separate project to reconstruct the westbound on-ramps was constructed and the west side westbound on-ramp was converted to a transit-only ramp, vehicular delay would be approximately 3.5 minutes during the AM peak hour and 2.5 minutes during the PM peak hour. Traffic delay during Saturday peak hour would be minimal since ramp meters were assumed to be non-operational on weekends.

Under conditions with the existing ramp configuration and with the proposed reconstruction of the westbound ramps, as discussed on page 108, the Proposed Project's impacts to ramp delays would be significant and unavoidable.

4.10.2.2.4 Mainline Operations: Queuing on Approaches (Expanded Transit)

Table 54 presents expected queuing on SFOBB approaches in year 2030 without the proposed project. Although the travel demand forecasting models differ regarding the extent of queuing on bridge approaches in year 2030, they both project queuing on all approaches in the peak hours in year 2030. The extent to which the Proposed Project, under the Expanded Transit Scenario, would exacerbate westbound queues at the East Bay toll plaza is depicted in Figure 48 (page 236). Generally, since the SFOBB would operate at capacity during both AM and PM peak hours in year 2030 without the Proposed Project, all traffic added by the project would increase queues in Downtown San Francisco and the East Bay by a corresponding amount.

Specifically, the Proposed Project under the Expanded Transit Scenario would increase queues in the East Bay by 443 in the AM peak hour and 442 in the PM peak hour. Similar to near-term conditions, the Proposed Project's contribution to cumulative increases to queuing on SFOBB approaches in the East Bay would be significant and unavoidable.
The Proposed Project under the Expanded Transit Scenario would increase queues in Downtown San Francisco by 173 vehicles during the AM peak hour, 412 vehicles during the PM peak hour, and 455 vehicles during the Saturday peak hour. Also similar to near-term conditions, the Proposed Project’s contribution to cumulative increases to queuing on SFOBB approaches in Downtown San Francisco would be significant and unavoidable.

Overall, similar to near term conditions, impacts to the SFOBB mainline will be less than significant, because the traffic on the bridge cannot exceed the capacity of the bridge approaches, which would operate at capacity without the Proposed Project, effectively metering the amount of traffic that can enter the SFOBB.
LEGEND:
Queues
- Existing AM Peak Hour Queue
- Maximum AM Peak Hour Queue - Year 2030 No Project
- Project Contribution to Year 2030 Queues

Table: Queue Length Summary

<table>
<thead>
<tr>
<th>Approach</th>
<th>Existing AM Queue</th>
<th>Year 2030 No Project AM Queue</th>
<th>Project Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-80 WB</td>
<td>2.66 miles</td>
<td>5.5 - 8.0 miles</td>
<td>0.4 miles</td>
</tr>
<tr>
<td>I-580 WB</td>
<td>1.5 miles</td>
<td>1.9 - 2.5 miles</td>
<td>0.2 miles</td>
</tr>
<tr>
<td>I-880 WB</td>
<td>0.74 miles</td>
<td>1.0 - 5.6 miles</td>
<td>0.1 miles</td>
</tr>
</tbody>
</table>

Source: Fehr & Peers, 2009

FIGURE 48
YEAR 2030 PLUS PROJECT
(EXPANDED TRANSIT SCENARIO) MAXIMUM EAST BAY QUEUE

Treasure Island and Yerba Buena Island Redevelopment Plan TIS

June 2010
SF07-0340/graphics/TIS/0340-48
4.10.2.2.5 Intersections (Expanded Transit)

Intersection peak hour turning movement volumes under Year 2030 No Project conditions were presented in Figure 45 (page 225). Traffic forecast to be generated by the Proposed Project under the Expanded Transit Scenario, as depicted on Figure 28 (page 132), was added to the Future Year 2030 No Project volumes to determine Year 2030 plus Project intersection turning movement volumes. These volumes are shown in Figure 49. Intersection levels of service were calculated for Year 2030 conditions for each scenario, and are presented in Table 58.

In Year 2030 with the Proposed Project under the Expanded Transit Scenario, 14 study intersections are expected to operate at LOS E or F in at least one peak hour. The project’s contribution to cumulative impacts at each of these intersections is discussed below, to evaluate whether the project’s contribution to the future failing condition is cumulatively considerable.

**Fremont Street/Howard Street (Study Intersection #1)** – The Proposed Project would add traffic to this intersection, which would operate at LOS F during the PM peak hour under year 2030 No Project conditions. The critical movement in the PM peak hour is the westbound through movement. The Proposed Project would contribute less than five percent to the critical westbound through movement (0.7 percent). Therefore, the project’s contribution to poor operating conditions at this intersection would be considered less than significant.

**Fremont Street/Folsom Street/I-80 Westbound Off-Ramp (Study Intersection #2)** – The intersection of Fremont Street/Folsom Street/I-80 Westbound Off-Ramp is expected to operate at LOS F in the AM peak hour. The northbound through and the southeastbound left (from the off-ramp to Folsom Street) are the critical movements at the intersection. The Proposed Project would contribute less than five percent to the critical southeastbound left movement (1.3 percent). The Proposed Project would contribute less than five percent to the critical northbound through movement (4.1 percent). Therefore, the project’s contribution to poor operating conditions at this intersection would be considered less than significant.

**Fremont Street/Harrison Street/I-80 Westbound Off-Ramp (Study Intersection #3)** – The intersection of Fremont Street/Harrison Street/I-80 Westbound Off-Ramp is expected to operate at LOS F in the AM peak hour. The northbound through and the eastbound through movements are the critical movements at this intersection; however, only the critical eastbound movement operates unacceptably. The Proposed Project would not contribute traffic to the critical eastbound through movement at this intersection. Therefore, the project’s contribution to poor operating conditions at this intersection would be considered less than significant.

**1st Street/Market Street (Study Intersection #4)** – The Proposed Project would add traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. The southbound through and the eastbound through are the critical movements at this intersection; however, the eastbound through is expected to operate at acceptable levels of service. The southbound through movement and is a critical movement at this intersection that operates at LOS F in the AM peak hour. The Proposed Project would contribute less than five percent (2.7 percent) to this movement. Therefore, the project’s contribution to poor operating conditions in the AM peak hour would be considered less than significant.

The Proposed Project would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The southbound through and the eastbound through are the critical movements at this intersection; however, the eastbound through is expected to operate at acceptable levels of service. The southbound through movement is a critical movement at this intersection that operates at LOS F in the PM peak hour. The Proposed Project would contribute more than five percent (11.7 percent) to this movement. Therefore, the project’s contribution to poor operating conditions in the PM peak hour would be considered significant.
Treasure Island and Yerba Buena Island Redevelopment Plan TIS
CUMULATIVE YEAR 2030 PLUS PROJECT
(EXPANDED TRANSIT SCENARIO) PEAK HOUR INTERSECTION VOLUMES

LEGEND:
= Study Intersection
XX (YY) [ZZ] = AM (PM) [SAT] Peak Hour Volume
## = Critical Movement

Source: Fehr & Peers, 2009

FIGURE 49

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Because the Proposed Project’s contribution to critical movements at this intersection during the PM peak hour would be considerable, the project’s cumulative impact is considered significant. As described under Existing plus Project conditions, there are no feasible mitigations at this intersection to improve automobile LOS. Therefore, the project’s cumulatively-considerable contribution to LOS F conditions in the weekday PM peak hour would remain significant and unavoidable.

1st Street/Mission Street (Study Intersection #5) – The Proposed Project would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The southbound through and eastbound through movements are the critical movement at this intersection; however, the eastbound through movement operates acceptably. The Proposed Project would contribute more than five percent (7.1 percent) to this movement. Therefore, the project’s contribution to poor operating conditions in the PM peak hour would be considered significant.

As described under Existing plus Project conditions, there are no feasible mitigations at this intersection to improve automobile LOS. Therefore, project’s cumulatively-considerable contribution to LOS F conditions in the weekday PM peak hour would remain significant and unavoidable.

1st Street/Howard Street (Study Intersection #6) – The Proposed Project would add traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. The Proposed Project would not contribute traffic to critical movement (southbound right turn) operating at LOS E or LOS F during the AM peak hour. Therefore, the project’s contribution to poor operating conditions in the AM peak hour would be considered less than significant.

1st Street/Folsom Street (Study Intersection #7) – The Proposed Project would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. However, the Proposed Project would not contribute to the critical eastbound right-turn movement. Therefore, the project’s contribution to cumulative impacts at this intersection would be considered less than significant.

1st Street/Harrison Street/I-80 Eastbound On-Ramp (Study Intersection #8) – The Proposed Project would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movement at this intersection during the PM peak hour is the southbound through movement. The Proposed Project would contribute more than five percent (11.1 percent) to this movement during the PM peak hour. Therefore, the project’s contribution to cumulative impacts at this intersection would be significant.

As described under Existing plus Project conditions, there are no feasible mitigations at this intersection to improve automobile LOS. Therefore, the project’s cumulatively-considerable contribution to LOS F conditions in the weekday PM peak hour would remain significant and unavoidable.

Essex Street/Harrison Street/I-80 Eastbound On-Ramp (Study Intersection #10) – The Proposed Project would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movement at this intersection is the eastbound right turn movement from Harrison Street onto the I-80 Eastbound On-ramp. The Proposed Project would contribute less than five percent (1.6 percent) to this movement. Therefore the project’s contribution would be considered less than significant in the PM peak hour.
2nd Street/Folsom Street (Study Intersection #11) – The Proposed Project would contribute traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. The critical movements at this intersection are the southbound left turn and the southbound through movements. The Proposed Project would contribute less than five percent (1.2 percent) to the critical southbound through movement. The project would contribute less than five percent (4.8 percent) to the critical southbound left turn movement. Therefore, the project’s contribution to traffic in the AM peak hour would be considered less than significant.

The Proposed Project would contribute traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movements at this intersection are the southbound left turn and the southbound through movements. The Proposed Project would contribute less than five percent (1.7 percent) to the critical southbound through movement. However, the project would contribute more than five percent (11.9 percent) of total traffic volume to the critical southbound left turn movement. Therefore, the project’s contribution to traffic in the PM peak hour would be considered cumulatively considerable.

Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco and proposed as part of the Transit Center District Plan currently under study. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. The Proposed Project’s contribution to cumulative impacts at this intersection would remain significant and unavoidable.

2nd Street/Bryant Street (Study Intersection #12) – The Proposed Project would add traffic to this intersection, which would operate at LOS E in the PM peak hour under year 2030 No Project conditions. The critical movements at this intersection are the southbound through and eastbound left turn movements. The Proposed Project would not contribute traffic to the eastbound left turn, and the project would contribute less than five percent (1.1 percent) to the southbound through movement. Therefore, the project’s contribution would be considered less than significant in the PM peak hour.

The Embarcadero/Harrison Street (Study Intersection #13) – The Proposed Project would contribute traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. However, the Proposed Project would not contribute to the critical northbound through movement at this intersection. Therefore, the project’s contribution to traffic in the AM peak hour would be considered less than significant.

The Proposed Project would contribute traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. However, the Proposed Project would not contribute to the critical northbound through movement at this intersection. Therefore, the project’s contribution to traffic in the PM peak hour would be considered less than significant.

The Proposed Project would not contribute traffic to critical movements at this intersection during the AM or PM peak hours. Therefore, the project’s contribution to cumulative impacts would be considered less than significant.

Bryant Street/5th Street/I-80 Eastbound On-ramp (Study Intersection #15) – The Proposed Project would contribute traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. The critical movement at this intersection is the southbound through movement. The Proposed Project would contribute less than five percent (1.4 percent) to the critical southbound through movement. Therefore, the project’s contribution to traffic in the AM peak hour would be considered less than significant.

The Proposed Project would contribute traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movements at this intersection are the northbound right turn movement and the southbound through movement. The Proposed Project would
contribute less than five percent (3.0 percent) to the critical northbound right turn movement. The Proposed Project would also contribute less than five percent (2.5 percent) to the critical southbound through movement. Therefore, the project’s contribution to traffic in the PM peak hour would be considered less than significant.

The Proposed Project would cause the intersection of Bryant Street/5th Street/I-80 Eastbound On-ramp to deteriorate from LOS D under year 2030 No Project conditions to LOS E under year 2030 conditions with the Proposed Project. This would be a significant impact.

As described under Existing plus Project conditions, there are no feasible mitigations at this intersection to improve automobile LOS. Therefore, the project’s impact to Saturday peak hour conditions would remain significant and unavoidable.

**Harrison Street/5th Street/I-80 Westbound Off-ramp (Study Intersection #16) –** The Proposed Project would contribute traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movements at this intersection are the southbound through movement and the northbound right-turn movement (from the off-ramp onto northbound 5th Street). The Proposed Project would contribute less than five percent (4.8 percent) to the critical northbound off-ramp right turn movement. However, the Proposed Project would contribute more than five percent (8.4 percent) to the critical southbound through movement. Therefore, the project’s contribution to cumulative impacts at this intersection would be considered significant.

As described under Existing plus Project conditions, there are no other feasible mitigations at this intersection to improve automobile LOS. Therefore, the project’s cumulatively-considerable contribution to LOS F conditions in the weekday PM peak hour would remain significant and unavoidable.

### 4.10.2.3 Reduced Development Alternative (Base Transit Scenario)

This section describes the cumulative traffic impacts associated with the Reduced Development Alternative under the Base Transit Scenario and other anticipated long-term development.

#### 4.10.2.3.1 Ramp Queuing (Reduced Development; Base Transit)

Queues on Yerba Buena Island approaching the SFOBB on-ramps would be the same in year 2030 as described earlier under near term conditions with the Reduced Development Alternative under the Base Transit Scenario.

#### 4.10.2.3.2 Ramp Merge/Diverge (Reduced Development; Base Transit)

Ramp merge/diverge levels of service would change with the addition of other background traffic growth to the mainline traffic volumes on the SFOBB. Tables 55, 56, and 57 (pages 219 to 221) present ramp merge and diverge levels of service under cumulative (year 2030) conditions, including traffic from the Reduced Development Alternative under the Base Transit Scenario, for the AM, PM, and Saturday peak hours, respectively. Under year 2030 conditions with the Reduced Development Alternative, (identified on Tables 55, 56 and 57 as "Year 2030 Plus Reduced Development (Base Transit Scenario)"), all on- and off-ramps with the exception of the eastbound off-ramp on the west side of the tunnel would operate at acceptable LOS of D or better during all study peak periods. The eastbound off-ramp on the west side of the Islands would operate at LOS E in the AM, PM, and Saturday peak hours. The proposed project would contribute the majority of the off-ramp traffic, and therefore, the Proposed Project’s contribution to these cumulatively-significant impacts would be significant. As noted earlier, there is no feasible mitigation to improve this ramp to acceptable LOS. Therefore, this cumulative impact would be significant and unavoidable.
4.10.2.3.3 Freeway and Ramp Operations – Ramp Delays (Reduced Development; Base Transit)

Delays associated with queuing on Yerba Buena Island approaching the SFOBB on-ramps would be the same in year 2030 as described earlier under near term conditions with the Reduced Development Alternative under the Base Transit Scenario.

Under conditions with the existing ramp configuration and with the proposed reconstruction of the westbound ramps, the Reduced Development Alternative’s impacts to ramp delays would be significant and unavoidable.

4.10.2.3.4 Freeway and Ramp Operations – Mainline Operations: Queuing on Approaches (Reduced Development; Base Transit)

Table 54 on page 217 presents expected queuing on SFOBB approaches in year 2030 without the proposed project. Although the travel demand forecasting models differ regarding the extent of queuing on bridge approaches in year 2030, they both project queuing on all approaches in the peak hours in year 2030. The extent to which the Reduced Development Alternative, under the Base Transit Scenario, would exacerbate westbound queues at the East Bay toll plaza is depicted in Figure 51 (page 244). Generally, since the SFOBB would operate at capacity during both AM and PM peak hours in year 2030 without the Reduced Development Alternative, all traffic added by the project would increase queues in Downtown San Francisco and the East Bay by a corresponding amount.

Specifically, the Reduced Development Alternative under the Base Transit Scenario would increase queues in the East Bay by approximately 445 vehicles during the AM peak hour and approximately 467 vehicles during the PM peak hour. Similar to near-term conditions, the Reduced Development Alternative’s contribution to cumulative increases to queuing on SFOBB approaches in the East Bay would be significant and unavoidable.

The Reduced Development Alternative under the Base Transit Scenario would increase queues in Downtown San Francisco by approximately 190 vehicles during the AM peak hour, approximately 458 vehicles during the PM peak hour, and approximately 468 vehicles during the Saturday peak hour. Also similar to near-term conditions, the Reduced Development Alternative’s contribution to cumulative increases to queuing on SFOBB approaches in Downtown San Francisco would be significant and unavoidable.

Overall, similar to near term conditions, impacts to the SFOBB mainline will be less than significant, because the traffic on the bridge cannot exceed the capacity of the bridge approaches, which would operate at capacity without the Reduced Development Alternative, effectively metering the amount of traffic that can enter the SFOBB.

4.10.2.3.5 Intersections (Reduced Development; Base Transit)

Intersection peak hour turning movement volumes under Year 2030 No Project conditions were presented in Figure 45 (page 225). Traffic forecast to be generated by the Reduced Development Alternative under the Base Transit Scenario, as depicted on Figure 33 (page 144), was added to the Future Year 2030 No Project volumes to determine Year 2030 plus Reduced Development Alternative intersection turning movement volumes. These volumes are shown in Figure 52 (page 250). Intersection levels of service were calculated for Year 2030 conditions for each scenario, and are presented in Table 58 (page 228).
### Table: Queue Length Summary

<table>
<thead>
<tr>
<th>Approach</th>
<th>Existing AM Queue</th>
<th>Year 2030 No Project AM Queue</th>
<th>Project Contribution</th>
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<td>I-80 WB</td>
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<tr>
<td>I-580 WB</td>
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<td>I-880 WB</td>
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<td>1.0 - 5.6 miles</td>
<td>0.1 miles</td>
</tr>
</tbody>
</table>

Source: Fehr & Peers, 2009

**FIGURE 50**  
2030 PLUS REDUCED DEVELOPMENT PROJECT  
(BASE TRANSIT SCENARIO) MAXIMUM EAST BAY QUEUE
CUMULATIVE YEAR 2030 PLUS REDUCED DEVELOPMENT ALTERNATIVE
(BASE TRANSIT SCENARIO) PEAK HOUR INTERSECTION VOLUMES

Source: Fehr & Peers, 2009

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FIGURE 51
In Year 2030 with the Reduced Development Alternative under the Base Transit Scenario, 14 study intersections are expected to operate at LOS E or F in at least one peak hour. The project’s contribution to cumulative impacts at each of these intersections is discussed below, to evaluate whether the project’s contribution to the future failing condition is cumulatively considerable.

**Fremont Street/Howard Street (Study Intersection #1)** – The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS F during the PM peak hour under year 2030 No Project conditions. The critical movement in the PM peak hour is the westbound through movement. The Reduced Development Alternative would contribute less than five percent to the critical westbound through movement (0.8 percent). Therefore, the project’s contribution to poor operating conditions at this intersection would be considered **less than significant**.

**Fremont Street/Folsom Street/I-80 Westbound Off-Ramp (Study Intersection #2)** – The intersection of Fremont Street/Folsom Street/I-80 Westbound Off-Ramp is expected to operate at LOS F in the AM peak hour. The critical movements at this intersection are the northbound through and the southeastbound left movements. The Reduced Development Alternative would contribute less than five percent to the critical southeastbound left movement (1.5 percent) and less than five percent to the critical northbound through movement (4.4 percent). Therefore, the project’s contribution to poor operating conditions at this intersection would be considered **less than significant**.

**Fremont Street/Harrison Street/I-80 Westbound Off-Ramp (Study Intersection #3)** – The intersection of Fremont Street/Harrison Street/I-80 Westbound Off-Ramp is expected to operate at LOS F in the AM peak hour. The Reduced Development Alternative would not contribute traffic to the critical eastbound through movement at this intersection. Therefore, the project’s contribution to poor operating conditions at this intersection would be considered **less than significant**.

**1st Street/Market Street (Study Intersection #4)** – The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. The southbound through movement is a critical movement at this intersection that operates at LOS F in the PM peak hour. The Reduced Development Alternative would contribute less than five percent (2.8 percent) to this movement. Therefore, the project’s contribution to poor operating conditions in the AM peak hour would be considered less than significant.

The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The southbound through movement is a critical movement at this intersection that operates at LOS F in the PM peak hour. The Proposed Project would contribute more than five percent (11.5 percent) to this movement. Therefore, the project’s contribution to poor operating conditions in the PM peak hour would be considered significant.

Because the Reduced Development Alternative’s contribution to critical movements at this intersection during the PM peak hour would be considerable, the project’s cumulative impact is considered significant. As described under Existing plus Project conditions, there are no feasible mitigations at this intersection to improve automobile LOS. Therefore, the project’s cumulatively-considerable contribution to LOS F conditions in the weekday PM peak hour would remain **significant and unavoidable**.

**1st Street/Mission Street (Study Intersection #5)** – The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The southbound through movement is the critical movement at this intersection. The Reduced Development Alternative would contribute more than five percent (7.3 percent) to this movement. Therefore, the project’s contribution to poor operating conditions in the PM peak hour would be considered significant.
As described under Existing plus Project conditions, there are no feasible mitigations at this intersection to improve automobile LOS. Therefore, project’s cumulatively-considerable contribution to LOS F conditions in the weekday PM peak hour would remain significant and unavoidable.

1st Street/Howard Street (Study Intersection #6) - The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. The Reduced Development Alternative would not contribute traffic to critical movements operating at LOS E or LOS F during the AM peak hour. Therefore, the project’s contribution to poor operating conditions in the AM peak hour would be considered less than significant.

The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The Reduced Development Alternative would not contribute traffic to the critical southbound right-turn movement at this intersection. Therefore, the project’s contribution to poor operating conditions in the PM peak hour would be considered less than significant.

Because the Reduced Development Alternative would not contribute to critical movements at this intersection in the AM and PM peak hours, the project’s contribution to cumulative impacts would be considered less than significant.

1st Street/Folsom Street (Study Intersection #7) – The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. However, the Reduced Development Alternative would not contribute to the critical eastbound right-turn movement. Therefore, the project’s contribution to cumulative impacts at this intersection would be considered less than significant.

1st Street/Harrison Street/I-80 Eastbound On-Ramp (Study Intersection #8) – The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movements at this intersection during the PM peak hour are the southbound through movement and the westbound left turn movement. The Reduced Development Alternative would contribute more than five percent (10.6 percent) at this movement during the PM peak hour. Therefore, the project’s contribution to cumulative impacts at this intersection would be significant.

As described under Existing plus Project conditions, there are no feasible mitigations at this intersection to improve automobile LOS. Therefore, the project’s cumulatively-considerable contribution to LOS F conditions in the weekday PM peak hour would remain significant and unavoidable.

Essex Street/Harrison Street/I-80 Eastbound On-Ramp (Study Intersection #10) – The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movement at this intersection is the eastbound right turn movement from Harrison Street onto the I-80 Eastbound On-ramp. The Reduced Development Alternative would contribute less than five percent (1.7 percent) to traffic at this movement. Therefore the project’s contribution would be considered less than significant in the PM peak hour.

2nd Street/Folsom Street (Study Intersection #11) – The Reduced Development Alternative would contribute traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. The critical movements at this intersection are the southbound left turn and the southbound through movements. The Reduced Development Alternative would contribute less than five percent (1.3 percent) to the critical southbound through movement. However, the project would contribute more than five percent (5.6 percent) to the critical southbound left turn movement. Therefore, the project’s contribution to traffic in the AM peak hour would be considered significant.

The Reduced Development Alternative would contribute traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movements at this
intersection are the southbound left turn and the southbound through movements. The Reduced Development Alternative would contribute less than five percent (1.9 percent) to the critical southbound through movement. However, the project would contribute more than five percent (12.2 percent) to the critical southbound left turn movement. Therefore, the project’s contribution to traffic in the PM peak hour would be considered cumulatively considerable.

Implementing the Expanded Transit Scenario would reduce the Reduced Development Alternative’s contribution to all critical movements to less than five percent in the AM peak hour. Therefore, the project’s contribution in the AM peak hour would be less than significant. However, the project’s contribution in the PM peak hour would remain above five percent to the critical southbound left turn movement. Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco and proposed as part of the Transit Center District Plan currently under study. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. The Reduced Development Alternative’s contribution to cumulative impacts at this intersection would remain significant and unavoidable.

2nd Street/Bryant Street (Study Intersection #12) – The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS E in the PM peak hour under year 2030 No Project conditions. The critical movement at this intersection is the southbound through movement. The Reduced Development Alternative would contribute less than five percent (1.3 percent) on this movement during the PM peak hour. Therefore, the project’s contribution would be considered less than significant in the PM peak hour.

The Embarcadero/Harrison Street (Study Intersection #13) – The Reduced Development Alternative would contribute traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. However, the Reduced Development Alternative would not contribute to the critical northbound through movement at this intersection. Therefore, the project’s contribution to traffic in the AM peak hour would be considered less than significant.

The Reduced Development Alternative would not contribute traffic to critical movements at this intersection during the AM or PM peak hours. Therefore, the project’s contribution to cumulative impacts would be considered less than significant.

Bryant Street/5th Street/I-80 Eastbound On-ramp (Study Intersection #15) – The Reduced Development Alternative would contribute traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. The critical movement at this intersection is the southbound through movement. The Reduced Development Alternative would contribute less than five percent (1.6 percent) to the critical southbound through movement. Therefore, the project’s contribution to traffic in the AM peak hour would be considered less than significant.

The Reduced Development Alternative would contribute traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movements at this intersection are the northbound right turn movement and the southbound left turn movement. The Reduced Development Alternative would contribute less than five percent (3.2 percent) to the critical northbound right turn movement. The Reduced Development Alternative would not contribute traffic to the critical southbound right turn movement. Therefore, the project’s contribution to traffic in the PM peak hour would be considered less than significant.
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The Reduced Development Alternative would cause the intersection of Bryant Street/5th Street/I-80 Eastbound On-ramp to deteriorate from LOS D under year 2030 No Project conditions to LOS E under year 2030 conditions with the Reduced Development Alternative. This would be a significant impact.

As described under Existing plus Project conditions, there are no feasible mitigations at this intersection to improve automobile LOS. Therefore, the project’s impact to Saturday peak hour conditions would remain significant and unavoidable.

Harrison Street/5th Street/I-80 Westbound Off-ramp (Study Intersection #16) – The Reduced Development Alternative would contribute traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movements at this intersection are the southbound through movement and the northbound right-turn movement (from the off-ramp onto northbound 5th Street). The Reduced Development Alternative would contribute more than five percent (5.2 percent) to the critical northbound off-ramp right turn movement. The Reduced Development Alternative would also contribute more than five percent (8.4 percent) to the critical southbound through movement. Therefore, the project’s contribution to cumulative impacts at this intersection would be considered significant.

As described under Existing plus Project conditions, there are no other feasible mitigations at this intersection to improve automobile LOS. Therefore, the project’s cumulatively-considerable contribution to LOS F conditions in the weekday PM peak hour would remain significant and unavoidable.

4.10.2.4 Reduced Development Alternative with Expanded Transit Service

This section describes the cumulative traffic impacts associated with the Reduced Development Alternative under the Expanded Transit Scenario and other anticipated long-term development.

4.10.2.4.1 Ramp Queuing (Reduced Development; Expanded Transit)

Queues on Yerba Buena Island approaching the SFOBB on-ramps would be the same in year 2030 as described earlier under near term conditions with the Reduced Development Alternative under the Expanded Transit Scenario. As summarized in Table 38 on page 108 and shown in Figure 32 on page 95, under the Reduced Development Alternative, queues on roadways approaching the SFOBB would be similar or less than those under the Proposed Project. Without reconstruction of the westbound on-ramp (and associated HOV3+ bypass), queues would extend back just under ½-mile from each of the two westbound on-ramps during the AM and PM peak hours, and approximately 2/3 mile during the Saturday peak hour. With reconstruction of the westbound ramps, queues would be somewhat longer, extending to a maximum of approximately 2/3 mile, approximately to the transit-only westbound ramp.

4.10.2.4.2 Ramp Merge/Diverge (Reduced Development; Expanded Transit)

Ramp merge/diverge levels of service would change with the addition of other background traffic growth to the mainline traffic volumes on the SFOBB. Tables 55, 56, and 57 present ramp merge and diverge levels of service under cumulative (year 2030) conditions, including traffic from the Reduced Development Alternative under the Expanded Transit Scenario, for the AM, PM, and Saturday peak hours, respectively. Under year 2030 conditions with the Reduced Development Alternative, (identified on Tables 55, 56, and 57 as “Year 2030 Plus Reduced Development (Expanded Transit Scenario)”), all on- and off-ramps with the exception of the eastbound off-ramp on the west side of the tunnel would operate at acceptable LOS of D or better during all study peak periods. The eastbound off-ramp on the west side of the Islands would operate at LOS E in the AM, PM, and Saturday peak hours. The Reduced Development Alternative would contribute the majority of the off-ramp traffic, and therefore, the Reduced Development Alternative’s contribution to these cumulatively-significant impacts would be significant. As noted earlier, there is no feasible mitigation to improve this ramp to acceptable LOS. Therefore, this cumulative impact would be significant and unavoidable.
4.10.2.4.3 Ramp Delays (Reduced Development; Expanded Transit)

Delays associated with queuing on Yerba Buena Island approaching the SFOBB on-ramps would be the same in year 2030 as described earlier under near term conditions with the Reduced Development Alternative under the Expanded Transit Scenario. Under the Reduced Development Alternative, without the reconstructed westbound on-ramp, the existing westbound on-ramps would operate at LOS F during the AM, PM and Saturday peak hours with substantial delay. If the separate project to reconstruct the westbound on-ramps, vehicular delay would be just under three minutes during the AM and PM peak hours. There would be minimal delay during the Saturday peak hour since the ramp meters were assumed to be non-operational on the weekends.

Under conditions with the existing ramp configuration and with the proposed reconstruction of the westbound ramps, the Reduced Development Alternative’s impacts to ramp delays would be significant and unavoidable.

4.10.2.4.4 Mainline Operations: Queuing on Approaches (Reduced Development; Expanded Transit)

Table 54 on page 217 presents expected queuing on SFOBB approaches in year 2030 without the proposed project. Although the travel demand forecasting models differ regarding the extent of queuing on bridge approaches in year 2030, they both project queuing on all approaches in the peak hours in year 2030. The extent to which the Reduced Development Alternative, under the Expanded Transit Scenario, would exacerbate westbound queues at the East Bay toll plaza is depicted in Figure 53 (page 251). Generally, since the SFOBB would operate at capacity during both AM and PM peak hours in year 2030 without the Reduced Development Alternative, all traffic added by the project would increase queues in Downtown San Francisco and the East Bay by a corresponding amount.

Specifically, the Reduced Development Alternative under the Expanded Transit Scenario would increase queues in the East Bay by approximately 422 vehicles during the AM peak hour and 431 vehicles during the PM peak hour. Similar to near-term conditions, the Reduced Development Alternative’s contribution to cumulative increases to queuing on SFOBB approaches in the East Bay would be significant and unavoidable.

The Reduced Development Alternative under the Expanded Transit Scenario would increase queues in Downtown San Francisco by approximately 145 vehicles during the AM peak hour and 364 vehicles during the PM peak hour, and would create queues of approximately 406 vehicles during the Saturday peak hour. Also similar to near-term conditions, the Reduced Development Alternative’s contribution to cumulative increases to queuing on SFOBB approaches in Downtown San Francisco would be significant and unavoidable.

Overall, similar to near term conditions, impacts to the SFOBB mainline will be less than significant, because the traffic on the bridge cannot exceed the capacity of the bridge approaches, which would operate at capacity without the Reduced Development Alternative, effectively metering the amount of traffic that can enter the SFOBB.

4.10.2.4.5 Intersections (Reduced Development; Expanded Transit)

Intersection peak hour turning movement volumes under Year 2030 No Project conditions were presented in Figure 45 (on page 225). Traffic forecast to be generated by the Reduced Development Alternative under the Expanded Transit Scenario, as depicted on Figure 38 (on page 156), was added to the Future Year 2030 No Project volumes to determine Year 2030 plus Reduced Development Alternative intersection turning movement volumes. These volumes are shown in Figure 53 (on page Error! Bookmark not defined.). Intersection levels of service were calculated for Year 2030 conditions for each scenario, and are presented in Table 58 (on page 228).
LEGEND:

Queues
- Existing AM Peak Hour Queue
- Maximum AM Peak Hour Queue - Year 2030 No Project
- Project Contribution to Year 2030 Queues

Table: Queue Length Summary

<table>
<thead>
<tr>
<th>Approach</th>
<th>Existing AM Queue</th>
<th>Year 2030 No Project AM Queue</th>
<th>Project Contribution</th>
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<td>I-80 WB</td>
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<td>I-580 WB</td>
<td>1.5 miles</td>
<td>1.9 - 2.5 miles</td>
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<td>I-880 WB</td>
<td>0.74 miles</td>
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</tr>
</tbody>
</table>

Source: Fehr & Peers, 2009
Source: Fehr & Peers, 2009

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CUMULATIVE YEAR 2030 PLUS REDUCED DEVELOPMENT ALTERNATIVE (EXPANDED TRANSIT SCENARIO) PEAK HOUR INTERSECTION VOLUMES

FIGURE 53
In Year 2030 with the Reduced Development Alternative under the Expanded Transit Scenario, 14 study intersections are expected to operate at LOS E or F in at least one peak hour. The project’s contribution to cumulative impacts at each of these intersections is discussed below, to evaluate whether the project’s contribution to the future failing condition is cumulatively considerable.

Fremont Street/Howard Street (Study Intersection #1) – The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS F during the PM peak hour under year 2030 No Project conditions. The critical movement in the PM peak hour is the westbound through movement. The Reduced Development Alternative would contribute less than five percent to the critical westbound through movement (0.6 percent). Therefore, the project’s contribution to poor operating conditions at this intersection would be considered less than significant.

Fremont Street/Folsom Street/I-80 Westbound Off-Ramp (Study Intersection #2) – The intersection of Fremont Street/Folsom Street/I-80 Westbound Off-Ramp is expected to operate at LOS F in the AM peak hour. The Reduced Development Alternative would contribute less than five percent to the critical southeastbound left movement (1.2 percent) and the critical northbound through movement (3.8 percent). Therefore, the project’s contribution to poor operating conditions at this intersection would be considered less than significant.

Fremont Street/Harrison Street/I-80 Westbound Off-Ramp (Study Intersection #3) – The intersection of Fremont Street/Harrison Street/I-80 Westbound Off-Ramp is expected to operate at LOS F in the AM peak hour. The Reduced Development Alternative would not contribute traffic to the critical eastbound through movement at this intersection. Therefore, the project’s contribution to poor operating conditions at this intersection would be considered less than significant.

1st Street/Market Street (Study Intersection #4) – The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. The southbound through movement and is a critical movement at this intersection that operates at LOS F in the AM peak hour. The Reduced Development Alternative would contribute less than five percent (2.2 percent) to this movement. Therefore, the project’s contribution to poor operating conditions in the AM peak hour would be considered less than significant.

The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The southbound through movement is a critical movement at this intersection that operates at LOS F in the PM peak hour. The Proposed Project would contribute more than five percent (10.5 percent) to this movement. Therefore, the project’s contribution to poor operating conditions in the PM peak hour would be considered significant.

Because the Reduced Development Alternative’s contribution to critical movements at this intersection during the PM peak hour would be considerable, the project’s cumulative impact is considered significant. As described under Existing plus Project conditions, there are no feasible mitigations at this intersection to improve automobile LOS. Therefore, the project’s cumulatively-considerable contribution to LOS F conditions in the weekday PM peak hour would remain significant and unavoidable.

1st Street/Mission Street (Study Intersection #5) – The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The southbound through movement is the critical movement at this intersection. The Reduced Development Alternative would contribute more than five percent (6.4 percent) to this movement. Therefore, the project’s contribution to poor operating conditions in the PM peak hour would be considered significant.

As described under Existing plus Project conditions, there are no feasible mitigations at this intersection to improve automobile LOS. Therefore, project’s cumulatively-considerable contribution to LOS F conditions in the weekday PM peak hour would remain significant and unavoidable.
1st Street/Howard Street (Study Intersection #6) – The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. The Reduced Development Alternative would not contribute traffic to critical movements operating at LOS E or LOS F during the AM peak hour. Therefore, the project’s contribution to poor operating conditions in the AM peak hour would be considered less than significant.

The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The Reduced Development Alternative would not contribute traffic to the critical southbound right-turn movement at this intersection. Therefore, the project’s contribution to poor operating conditions in the PM peak hour would be considered less than significant.

Because the Reduced Development Alternative would not contribute to critical movements at this intersection in the AM and PM peak hours, the project’s contribution to cumulative impacts would be considered less than significant.

1st Street/Folsom Street (Study Intersection #7) – The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. However, the Reduced Development Alternative would not contribute to the critical eastbound right-turn movement. Therefore, the project’s contribution to cumulative impacts at this intersection would be considered less than significant.

1st Street/Harrison Street/I-80 Eastbound On-Ramp (Study Intersection #8) – The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movements at this intersection during the PM peak hour are the southbound through movement and the westbound left movement. The Reduced Development Alternative would contribute more than five percent (9.9 percent) to the southbound through movement during the PM peak hour. Therefore, the project’s contribution to cumulative impacts at this intersection would be significant.

As described under Existing plus Project conditions, there are no feasible mitigations at this intersection to improve automobile LOS. Therefore, the project’s cumulatively-considerable contribution to LOS F conditions in the weekday PM peak hour would remain significant and unavoidable.

Essex Street/Harrison Street/I-80 Eastbound On-Ramp (Study Intersection #10) – The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movement at this intersection is the eastbound right turn movement from Harrison Street onto the I-80 Eastbound On-ramp. The Reduced Development Alternative would contribute less than five percent (1.4 percent) to traffic at this movement. Therefore the project’s contribution would be considered less than significant in the PM peak hour.

2nd Street/Folsom Street (Study Intersection #11) – The Reduced Development Alternative would contribute traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. The critical movements at this intersection are the southbound left turn and the southbound through movements. The Reduced Development Alternative would contribute less than five percent (1.0 percent) to the critical southbound through movement. Therefore, the project’s contribution to traffic in the AM peak hour would be considered less than significant.

The Reduced Development Alternative would contribute traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movements at this intersection are the southbound left turn and the southbound through movements. The Reduced Development Alternative would contribute less than five percent (1.5 percent) to the critical southbound through movement. However, the project would contribute more than five percent (11.2 percent) to the
critical southbound left turn movement. Therefore, the project’s contribution to traffic in the PM peak hour would be considered cumulatively considerable.

Providing additional traffic lanes at this intersection would require substantial reduction in sidewalk widths, which would be inconsistent with the pedestrian environment encouraged by the City of San Francisco and proposed as part of the Transit Center District Plan currently under study. Therefore, no feasible mitigation measures have been identified to reduce project impacts to less than significant levels. The Reduced Development Alternative’s contribution to cumulative impacts at this intersection would remain significant and unavoidable.

2nd Street/Bryant Street (Study Intersection #12) – The Reduced Development Alternative would add traffic to this intersection, which would operate at LOS E in the PM peak hour under year 2030 No Project conditions. The critical movements at this intersection are the eastbound left turn and southbound through movements. The Reduced Development Alternative would not contribute to the eastbound left turn movement and the southbound through movement operates acceptably during the PM peak hour. Therefore, the project’s contribution would be considered less than significant in the PM peak hour.

The Embarcadero/Harrison Street (Study Intersection #13) – The Reduced Development Alternative would contribute traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. However, the Reduced Development Alternative would not contribute to the critical northbound through movement at this intersection. Therefore, the project’s contribution to traffic in the AM peak hour would be considered less than significant.

The Reduced Development Alternative would contribute traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. However, the Reduced Development Alternative would not contribute to the critical northbound through movement at this intersection. Therefore, the project’s contribution to traffic in the PM peak hour would be considered less than significant.

Bryant Street/5th Street/I-80 Eastbound On-ramp (Study Intersection #15) – The Reduced Development Alternative would contribute traffic to this intersection, which would operate at LOS F in the AM peak hour under year 2030 No Project conditions. The critical movement at this intersection is the southbound through movement. The Reduced Development Alternative would contribute less than five percent (1.4 percent) to the critical southbound through movement. Therefore, the project’s contribution to traffic in the AM peak hour would be considered less than significant.

The Reduced Development Alternative would contribute traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movements at this intersection are the northbound right turn movement and the southbound through movement. The Reduced Development Alternative would contribute less than five percent (2.6 percent) to the critical northbound right turn movement. The Reduced Development Alternative would contribute less than five percent (2.3 percent) to the critical southbound right turn movement. Therefore, the project’s contribution to traffic in the PM peak hour would be considered less than significant.

The Reduced Development Alternative would cause the intersection of Bryant Street/5th Street/I-80 Eastbound On-ramp to deteriorate from LOS D under year 2030 No Project conditions to LOS E under year 2030 conditions with the Reduced Development Alternative. This would be a significant impact.

As described under Existing plus Project conditions, there are no feasible mitigations at this intersection to improve automobile LOS. Therefore, the project’s impact to Saturday peak hour conditions would remain significant and unavoidable.
Harrison Street/5th Street/I-80 Westbound Off-ramp (Study Intersection #16) – The Reduced Development Alternative would contribute traffic to this intersection, which would operate at LOS F in the PM peak hour under year 2030 No Project conditions. The critical movements at this intersection are the southbound through movement and the northbound right-turn movement (from the off-ramp onto northbound 5th Street). The Reduced Development Alternative would contribute less than five percent (4.7 percent) to the critical northbound off-ramp right turn movement. However, the Reduced Development Alternative would contribute more than five percent (7.4 percent) to the critical southbound through movement. Therefore, the project’s contribution to cumulative impacts at this intersection would be considered significant.

As described under Existing plus Project conditions, there are no other feasible mitigations at this intersection to improve automobile LOS. Therefore, the project’s cumulatively-considerable contribution to LOS F conditions in the weekday PM peak hour would remain significant and unavoidable.

4.10.3 Cumulative Transit Impacts

This section discusses cumulative transit impacts. Transit delays on the Islands associated with ramp configurations and control devices (stop signs, queues, and/or ramp meters) would not be affected by the addition of cumulative traffic increases. Therefore, the discussion of cumulative transit impacts deals only with impacts associated with long-term growth in transit ridership, particularly as it relates to the Downtown screenlines and with impacts associated with increased congestion in Downtown San Francisco.

4.10.3.1 Proposed Project with Base Transit Service

Cumulative transit impacts were analyzed with respect to both transit capacity utilization and with respect to transit delay in Downtown San Francisco caused by cumulative increases in vehicular traffic.

4.10.3.1.1 Cumulative Transit Capacity Utilization

The screenlines around Downtown San Francisco are expected to experience both growth in demand and in total supply provided. Table 59 presents the expected capacity utilization for each of the four Downtown screenlines for year 2030 conditions with the Proposed Project, under the Base Transit Scenario. As shown, each of the four screenlines is expected to operate within Muni’s standard of 85 percent utilization. Therefore, cumulative impacts to transit associated with the Proposed Project under the Base Transit Scenario are expected to be less than significant.

4.10.3.1.2 Cumulative Transit Delay

As described in Section 4.10.2 (Cumulative Traffic Impacts), traffic from the Proposed Project would contribute to significant cumulative impacts at several intersections in Downtown San Francisco. Increases in intersection vehicle delay may also increase delay for transit lines using those intersections. The Proposed Project would contribute significant contributions to cumulative impacts at six intersections in one or more peak hours.

1st Street/Market Street – The Proposed Project would contribute a significant amount of traffic to this intersection that would operate at LOS F conditions in the PM peak hour under year 2030 Cumulative No Project Conditions. The Proposed Project would also cause operations at this intersection to deteriorate from LOS C under 2030 Cumulative No Project Conditions to LOS E under 2030 Cumulative Plus Project Conditions during the Saturday peak hour.
A total of 13 Muni bus routes (2-Clement, 3-Jackson, 5-Fulton, 6-Parnassus, 9-San Bruno, 21-Hayes, 30-Stockton, 30X-Marina Express, 31-Balboa, 38/38L/38X-Geary, 71/71L-Haight/Noriega, 76-Marin Headlands, and 81X-Caltrain Express), one Muni streetcar route (F-Market & Wharves), travel through this intersection during the weekday PM and Saturday peak hours.

The intersection approaches on Market Street would operate at acceptable levels of service (LOS D or better), so the Proposed Project’s contribution of traffic on Market Street approaches would not significantly impact transit routes on the east and west approaches. During the weekday PM and Saturday peak hours, the southbound movement would operate at LOS F. Transit routes that would be affected (i.e., those that approach the intersection traveling southbound) include the 30X-Stockton Express.

These lines would experience increases in delay due to congestion on Bush Street, Battery Street, and 1st Street. Since the Proposed Project would create a significant contribution to delay on this approach, the Proposed Project would have a significant impact to transit travel times on the 30X-Stockton Express, 81X-Caltrain Express during the PM and Saturday peak periods.

1st Street/Mission Street – The Proposed Project would contribute a significant amount of traffic to critical movements at this intersection that would operate at LOS F conditions in the PM peak hour under year 2030 Cumulative No Project Conditions.

A total of six Muni buses (5-Fulton, 6-Parnassus, 10-Townsend, 14/14L/14X-Mission, 38/38L-Geary, 76-Marin Headlands) and several Golden Gate Transit and Samtrans buses travel through this intersection. However, all approaches to this intersection include dedicated transit-only lanes; therefore, transit routes serving this intersection would not be affected by Proposed Project-generated increases in cumulative intersection delay, and the Proposed Project’s contribution to cumulative transit travel time impacts at this intersection would be less than significant.

2nd Street/Folsom Street – The Proposed Project would contribute a significant amount of traffic to movements at this intersection that would operate at unacceptable levels of service under year 2030 Cumulative No Project Conditions in the AM and PM peak hours.

Three Muni bus lines (10-Townsend, 12-Folsom/Pacific, 76-Marin Headlands) and Golden Gate Transit bus lines travel through this intersection. Transit lines at this intersection share lanes with mixed-flow traffic along both Folsom Street and 2nd Street. During the AM and PM peak hours, the intersection would operate with substantial amounts of vehicle delay, primarily as a result of SFOBB-destined traffic. Folsom Street has four eastbound travel lanes at this intersection. Transit uses the north-most lane, which does not lead to an on-ramp to the SFOBB and would be less congested than the southern lanes; therefore, project contributions to congestion on Folsom Street would have a minimal effect to operations on the 12-Folsom/Pacific, 76-Marin Headlands, and Golden Gate Transit buses, which travel on Folsom Street.

The 10-Townsend would need to maneuver though northbound and southbound mixed-flow traffic destined for the SFOBB, and the Proposed Project has a significant contribution to the southbound movement; therefore, the Proposed Project’s contribution to cumulative travel time impacts to the 10-Townsend at this intersection would be considered significant.

5th Street/Bryant Street/I-80 On-Ramp – The Proposed Project would cause this intersection to deteriorate from LOS D to LOS E under 2030 Cumulative plus Project Conditions during the Saturday peak hour.

Three Muni bus lines travel through this intersection (8X/8AX/8BX-Bayshore Express, 27-Bryant, 47-Van Ness). Transit lines at this intersection share lanes with mixed-flow traffic along both Bryant Street and 5th Street. During the Saturday peak hour, the northbound approach and the southbound left-turn movement would operate at unacceptable levels of service. The 8X/8AX/8BX-Bayshore Express and 27-Bryant travel eastbound on Bryant Street; therefore, the Proposed Project would only have a significant impact to transit travel times on the 47-Van Ness.
5th Street/Harrison Street/I-80 Off-Ramp – The Proposed Project would contribute significant volumes to this intersection that would operate at LOS F under 2030 Cumulative No Project Conditions in the PM peak hour.

Four Muni bus routes travel through this intersection (8X/8AX/8BX-Bayshore Express, 12-Folsom/Pacific, 27-Bryant, 47-Van Ness). Transit lines at this intersection share lanes with mixed-flow traffic along both Harrison Street and 5th Street. During the PM peak hour, the northbound, southbound, and off-ramp approaches would operate at unacceptable levels of service. The 8-Bayshore and 12-Folsom/Pacific run westbound on Harrison Street. The westbound approach is expected to operate at acceptable levels of service; therefore the Proposed Project would not substantially affect these Muni lines. The Proposed Project’s contribution to increases in delay on the northbound and southbound approaches would be significant, and the Proposed Project’s impacts to transit travel times of the 27-Bryant and 47-Van Ness would be considered significant.

In summary, the Proposed Project’s contribution to Cumulative increases in delay at five intersections would result in a cumulative impact to the following transit lines, as discussed above:

- **10-Townsend:** 2nd Street/Folsom Street (AM and PM Peak Hours)
- **27-Bryant:** 5th Street/Harrison Street/I-80 Off-Ramp (PM Peak Hour)
- **30X-Stockton Express:** 1st Street/Market Street (PM Peak Hour)
- **47-Van Ness:** 5th Street/Bryant Street/I-80 On-Ramp; 5th Street/Harrison Street/I-80 Off-Ramp (PM Peak Hour)

Appropriate mitigation measures for these impacts include transit preferential elements, such as transit-only lanes, transit preferential signal treatments, or other amenities that would improve the ability of transit vehicles to bypass area-wide congestion. The City of San Francisco is currently developing the Transit Center District Plan (“TCDP”) transportation planning effort. The TCDP would allow higher-density development in the area surrounding the proposed new Transbay Transit Center in Downtown San Francisco. As part of this work, the City is contemplating changes to the transportation network in the South of Market area designed to accommodate this increased development and improve overall transit circulation. At the time this analysis was conducted, the proposed transit network changes were not defined enough to include in the analysis. As part of the TCDP analysis, the City Planning Department should account for traffic increases associated with the Proposed Project. However, because the Plan is not finalized and its environmental review is not yet complete, implementation of measures to improve transit circulation in the area are uncertain and the Proposed Project’s impacts to transit delay would remain significant and unavoidable.
### TABLE 59 – 2030 PLUS PROJECT MUNI TRANSIT SCREENLINES

<table>
<thead>
<tr>
<th></th>
<th>2030 Baseline</th>
<th>Proposed Project (Base Transit Scenario)</th>
<th>Proposed Project (Expanded Transit Scenario)</th>
<th>Reduced Development Alternative (Base Transit Scenario)</th>
<th>Reduced Development Alternative (Expanded Transit Scenario)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Riders Cap %</td>
<td>Project Trips Total Riders % Utiliz</td>
<td>Project Trips Total Riders % Utiliz</td>
<td>Project Trips Total Riders % Utiliz</td>
<td>Project Trips Total Riders % Utiliz</td>
</tr>
<tr>
<td><strong>AM Peak Hour</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>2,986 3,857 77%</td>
<td>17 3,003 78%</td>
<td>28 3,013 78%</td>
<td>14 2,999 78%</td>
<td>23 3,008 78%</td>
</tr>
<tr>
<td>Northwest</td>
<td>8,891 11,983 74%</td>
<td>44 8,935 75%</td>
<td>71 8,962 75%</td>
<td>35 8,926 74%</td>
<td>58 8,949 75%</td>
</tr>
<tr>
<td>Southwest</td>
<td>7,420 10,197 73%</td>
<td>89 7,509 74%</td>
<td>143 7,563 74%</td>
<td>71 7,491 73%</td>
<td>116 7,536 74%</td>
</tr>
<tr>
<td>Southeast</td>
<td>7,661 10,045 76%</td>
<td>10 7,671 76%</td>
<td>16 7,677 76%</td>
<td>8 7,669 76%</td>
<td>13 7,674 76%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>26,958 36,082 75%</td>
<td>160 27,118 75%</td>
<td>258 27,215 75%</td>
<td>128 27,085 75%</td>
<td>210 27,167 75%</td>
</tr>
<tr>
<td><strong>PM Peak Hour</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>3,105 4,699 66%</td>
<td>25 3,130 67%</td>
<td>41 3,146 67%</td>
<td>22 3,126 67%</td>
<td>35 3,140 67%</td>
</tr>
<tr>
<td>Northwest</td>
<td>8,064 11,612 69%</td>
<td>65 8,129 70%</td>
<td>106 8,170 70%</td>
<td>55 8,119 70%</td>
<td>91 8,155 70%</td>
</tr>
<tr>
<td>Southwest</td>
<td>8,052 9,940 81%</td>
<td>130 8,182 82%</td>
<td>212 8,264 83%</td>
<td>111 8,163 82%</td>
<td>181 8,233 83%</td>
</tr>
<tr>
<td>Southeast</td>
<td>8,809 10,703 82%</td>
<td>14 8,823 82%</td>
<td>24 8,833 83%</td>
<td>12 8,821 82%</td>
<td>20 8,829 82%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>28,030 36,954 76%</td>
<td>234 28,264 76%</td>
<td>383 28,413 77%</td>
<td>200 28,229 76%</td>
<td>327 28,357 76%</td>
</tr>
</tbody>
</table>

*Source: Transit Center District Plan – Transit Network Analysis, AECOM, 2009; and Fehr & Peers, 2009.*
4.10.3.2 Proposed Project with Expanded Transit Service

Cumulative transit impacts were analyzed with respect to both transit capacity utilization and with respect to transit delay in Downtown San Francisco caused by cumulative increases in vehicular traffic.

4.10.3.2.1 Cumulative Transit Capacity Utilization

The screenlines around Downtown San Francisco are expected to experience both growth in demand and in total supply provided. **Table 59** presents the expected capacity utilization for each of the four Downtown screenlines for year 2030 conditions with the Proposed Project, under the Expanded Transit Scenario. As shown, each of the four screenlines is expected to operate within Muni’s standard of 85 percent utilization. Therefore, cumulative impacts to transit associated with the Proposed Project under the Expanded Transit Scenario are expected to be **less than significant**.

4.10.3.2.2 Cumulative Transit Delay

As described in Section 4.10.2 (Cumulative Traffic Impacts), traffic from the Proposed Project would contribute to significant cumulative impacts at several intersections in Downtown San Francisco. Increases in intersection vehicle delay may also increase delay for transit lines using those intersections. The Proposed Project would contribute significant contributions to cumulative impacts at six intersections in one or more peak hours.

**1st Street/Market Street** – The Proposed Project would contribute a significant amount of traffic to this intersection that would operate at LOS F conditions in the PM peak hour under year 2030 Cumulative No Project Conditions.

A total of 13 Muni bus routes (2-Clement, 3-Jackson, 5-Fulton, 6-Parnassus, 9/9L-San Bruno, 21-Hayes, 30-Stockton, 30X-Marina Express, 31-Balboa, 38/38L/38X-Geary, 71/71L-Haight/Noriega, 76-Marin Headlands, 81X Caltrain Express), one Muni streetcar route (F-Market & Wharves) travel through this intersection during the weekday PM peak hour.

The intersection approaches on Market Street would operate at acceptable levels of service (LOS D or better), so the Proposed Project’s contribution of traffic on Market Street approaches would not significantly impact transit routes on the east and west approaches. During the weekday PM and Saturday peak hours, the southbound movement would operate at LOS F. Transit routes that would be affected (i.e., those that approach the intersection traveling southbound) include the 30X-Stockton Express.

These lines would experience increases in delay due to congestion on Bush Street, Battery Street, and 1st Street. Since the Proposed Project would create a significant contribution to delay on this approach, the Proposed Project would have a significant impact to transit travel times on the 30X-Stockton Express during the PM peak hour.

**1st Street/Mission Street** – The Proposed Project would contribute a significant amount of traffic to critical movements at this intersection that would operate at LOS F conditions in the PM peak hour under year 2030 Cumulative No Project Conditions.

A total of six Muni bus (5-Fulton, 6-Parnassus, 10-Townsend, 14/14L-Mission, 38/38L-Geary, 71/71L-Haight-Noriega, 76-Marin Headlands), eight Golden Gate Transit bus lines (10, 54, 70, 72, 73, 76, 80, 101) and three Samtrans buses (292, 391, 397) travel through this intersection. However, all approaches to this intersection include dedicated transit-only lanes; therefore, transit routes serving this intersection would not be affected by Proposed Project-generated increases in cumulative intersection delay, and the Proposed Project’s contribution to cumulative transit travel time impacts at this intersection would be less than significant.
2nd Street/Folsom Street – The Proposed Project would contribute a significant amount of traffic to movements at this intersection that would operate at unacceptable levels of service under year 2030 Cumulative No Project Conditions in the AM and PM peak hours.

Three Muni bus lines (10-Townsend, 12-Folsom/Pacific, 76-Marin Headlands) and 19 Golden Gate Transit bus lines (2, 4, 8, 18, 24, 27, 38, 44, 54, 56, 58, 72, 73, 74, 76, 10, 70, 80, 101) travel through this intersection. Transit lines at this intersection share lanes with mixed-flow traffic along both Folsom Street and 2nd Street. During the AM and PM peak hours, the intersection would operate with substantial amounts of vehicle delay, primarily as a result of SFOBB-destined traffic. Folsom Street has four eastbound travel lanes at this intersection. Transit uses the north-most lane, which does not lead to an on-ramp to the SFOBB and would be less congested than the southern lanes; therefore, project contributions to congestion on Folsom Street would have a minimal effect to operations on the 12-Folsom/Pacific, 76-Marin Headlands, and Golden Gate Transit buses, which travel on Folsom Street.

The 10-Townsend would need to maneuver though northbound and southbound mixed-flow traffic destined for the SFOBB, and the Proposed Project has a significant contribution to the southbound movement; therefore, the Proposed Project’s contribution to cumulative travel time impacts to the 10-Townsend at this intersection would be considered significant.

5th Street/Bryant Street/I-80 On-Ramp – The Proposed Project would cause this intersection to deteriorate from LOS D to LOS E under 2030 Cumulative plus Project Conditions during the Saturday peak hour.

Three Muni bus lines travel through this intersection (8X/8AX/8BX-Bayshore Express, 27-Bryant, 47-Van Ness). Transit lines at this intersection share lanes with mixed-flow traffic along both Bryant Street and 5th Street. During the Saturday peak hour, the northbound approach and the southbound left-turn movement would operate at unacceptable levels of service. The 8X/8AX/8BX-Bayshore Express and 27-Bryant travel eastbound on Bryant Street; therefore, the Proposed Project would only have a significant impact to transit travel times on the 47-Van Ness.

5th Street/Harrison Street/I-80 Off-Ramp – The Proposed Project would contribute significant volumes to this intersection that would operate at LOS F under 2030 Cumulative No Project Conditions in the PM peak hour.

Four Muni bus routes travel through this intersection (8X/8AX/8BX-Bayshore Express, 12-Folsom/Pacific, 27-Bryant, 47-Van Ness). Transit lines at this intersection share lanes with mixed-flow traffic along both Harrison Street and 5th Street. During the PM peak hour, the northbound, southbound, and off-ramp approaches would operate at unacceptable levels of service. The 8-Bayshore and 12-Folsom/Pacific run westbound on Harrison Street. The westbound approach is expected to operate at acceptable levels of service; therefore the Proposed Project would not substantially affect these Muni lines. The Proposed Project’s contribution to increases in delay on the northbound and southbound approaches would be significant, and the Proposed Project’s impacts to transit travel times of the 27-Bryant and 47-Van Ness would be considered significant.

In summary, the Proposed Project’s contribution to Cumulative increases in delay at five intersections would result in a cumulative impact to the following transit lines, as discussed above:

- **10-Townsend**: 2nd Street/Folsom Street (AM and PM Peak Hours)
- **27-Bryant**: 5th Street/Harrison Street/I-80 Off-Ramp (PM Peak Hour)
- **30X-Stockton Express**: 1st Street/Market Street (PM Peak Hour)
- **47-Van Ness**: 5th Street/Bryant Street/I-80 On-Ramp; 5th Street/Harrison Street/I-80 Off-Ramp (PM Peak Hour)
Appropriate mitigation measures for these impacts include transit preferential elements, such as transit-only lanes, transit preferential signal treatments, or other amenities that would improve the ability of transit vehicles to bypass area-wide congestion. The City of San Francisco is currently developing the Transit Center District Plan ("TCDP") transportation planning effort. The TCDP would allow higher-density development in the area surrounding the proposed new Transbay Transit Center in Downtown San Francisco. As part of this work, the City is contemplating changes to the transportation network in the South of Market area designed to accommodate this increased development and improve overall transit circulation. At the time this analysis was conducted, the proposed transit network changes were not defined enough to include in the analysis. As part of the TCDP analysis, the City Planning Department should account for traffic increases associated with the Proposed Project. However, because the Plan is not finalized and its environmental review is not yet complete, implementation of measures to improve transit circulation in the area are uncertain and the Proposed Project's impacts to transit delay would remain significant and unavoidable.

4.10.3.3 Reduced Development Alternative with Base Transit Service

Cumulative transit impacts were analyzed with respect to both transit capacity utilization and with respect to transit delay in Downtown San Francisco caused by cumulative increases in vehicular traffic.

4.10.3.3.1 Cumulative Transit Capacity Utilization

The screenlines around Downtown San Francisco are expected to experience both growth in demand and in total supply provided. Table 59 presents the expected capacity utilization for each of the four Downtown screenlines for year 2030 conditions with the Reduced Development Project, under the Base Transit Scenario. As shown, each of the four screenlines is expected to operate within Muni’s standard of 85 percent utilization. Therefore, cumulative impacts to transit associated with the Reduced Development Project under the Base Transit Scenario are expected to be less than significant.

4.10.3.3.2 Cumulative Transit Delay

As described in Section 4.10.2 (Cumulative Traffic Impacts), traffic from the Reduced Development Alternative would contribute to significant cumulative impacts at several intersections in Downtown San Francisco. Increases in intersection vehicle delay may also increase delay for transit lines using those intersections. The Reduced Development Alternative would contribute significant contributions to cumulative impacts at six intersections in one or more peak hours.

1st Street/Market Street – The Reduced Development Alternative would contribute a significant amount of traffic to this intersection that would operate at LOS F conditions in the PM peak hour under year 2030 Cumulative No Project Conditions.

A total of 13 Muni bus routes (2-Clement, 3-Jackson, 5-Fulton, 6-Parnassus, 9/9L-San Bruno, 21-Hayes, 30-Stockton, 30X-Marina Express, 31-Balboa, 38/38L/38X-Geary, 71/71L-Haight/Noriega, 76-Marin Headlands, 81X Caltrain Express), one Muni streetcar route (F-Market & Wharves) travel through this intersection during the weekday PM peak hour.

The intersection approaches on Market Street would operate at acceptable levels of service (LOS D or better), so the Reduced Development Alternative's contribution of traffic on Market Street approaches would not significantly impact transit routes on the east and west approaches. During the weekday PM and Saturday peak hours, the southbound movement would operate at LOS F. Transit routes that would be affected (i.e., those that approach the intersection traveling southbound) include the 30X-Stockton Express.

These lines would experience increases in delay due to congestion on Bush Street, Battery Street, and 1st Street. Since the Reduced Development Alternative would create a significant contribution to delay on
this approach, the Reduced Development Alternative would have a significant impact to transit travel times on the 30X-Stockton Express during the PM peak hour.

1st Street/Mission Street – The Reduced Development Alternative would contribute a significant amount of traffic to critical movements at this intersection that would operate at LOS F conditions in the PM peak hour under year 2030 Cumulative No Project Conditions.

A total of six Muni bus (5-Fulton, 6-Parnassus, 10-Townsend, 14/14L-Mission, 38/38L-Geary, 71/71L-Haight-Noriega, 76-Marin Headlands), eight Golden Gate Transit bus lines (10, 54, 70, 72, 73, 76, 80, 101) and three Samtrans buses (292, 391, 397) travel through this intersection. However, all approaches to this intersection include dedicated transit-only lanes; therefore, transit routes serving this intersection would not be affected by Reduced Development Alternative -generated increases in cumulative intersection delay, and the Reduced Development Alternative’s contribution to cumulative transit travel time impacts at this intersection would be less than significant.

2nd Street/Folsom Street – The Reduced Development Alternative would contribute a significant amount of traffic to movements at this intersection that would operate at unacceptable levels of service under year 2030 Cumulative No Project Conditions in the AM and PM peak hours.

Three Muni bus lines (10-Townsend, 12-Folsom/Pacific, 76-Marin Headlands) and Golden Gate Transit bus lines travel through this intersection. Transit lines at this intersection share lanes with mixed-flow traffic along both Folsom Street and 2nd Street. During the AM and PM peak hours, the intersection would operate with substantial amounts of vehicle delay, primarily as a result of SFOBB-destined traffic. Folsom Street has four eastbound travel lanes at this intersection. Transit uses the north-most lane, which does not lead to an on-ramp to the SFOBB and would be less congested than the southern lanes; therefore, project contributions to congestion on Folsom Street would have a minimal effect to operations on the 12-Folsom/Pacific, 76-Marin Headlands, and Golden Gate Transit buses, which travel on Folsom Street.

The 10-Townsend would need to maneuver though northbound and southbound mixed-flow traffic destined for the SFOBB, and the Reduced Development Alternative has a significant contribution to the southbound movement; therefore, the Reduced Development Alternative’s contribution to cumulative travel time impacts to the 10-Townsend at this intersection would be considered significant.

5th Street/Bryant Street/I-80 On-Ramp – The Reduced Development Alternative would cause this intersection to deteriorate from LOS D to LOS E under 2030 Cumulative plus Project Conditions during the Saturday peak hour.

Three Muni bus lines travel through this intersection (8X/8AX/8BX-Bayshore Express, 27-Bryant, 47-Van Ness). Transit lines at this intersection share lanes with mixed-flow traffic along both Bryant Street and 5th Street. During the Saturday peak hour, the northbound approach and the southbound left-turn movement would operate at unacceptable levels of service. The 8X/8AX/8BX-Bayshore Express and 27-Bryant travel eastbound on Bryant Street; therefore, the Reduced Development Alternative would only have a significant impact to transit travel times on the 47-Van Ness.

5th Street/Harrison Street/I-80 Off-Ramp – The Reduced Development Alternative would contribute significant volumes to this intersection that would operate at LOS F under 2030 Cumulative No Project Conditions in the PM peak hour.

Four Muni bus routes travel through this intersection (8X/8AX/8BX-Bayshore Express, 12-Folsom/Pacific, 27-Bryant, 47-Van Ness). Transit lines at this intersection share lanes with mixed-flow traffic along both Harrison Street and 5th Street. During the PM peak hour, the northbound, southbound, and off-ramp approaches would operate at unacceptable levels of service. The 8-Bayshore and 12-Folsom/Pacific run westbound on Harrison Street. The westbound approach is expected to operate at acceptable levels of service; therefore the Reduced Development Alternative would not substantially affect these Muni lines. The Reduced Development Alternative’s contribution to increases in delay on the northbound and
southbound approaches would be significant, and the Reduced Development Alternative’s impacts to transit travel times of the 27-Bryant and 47-Van Ness would be considered significant.

In summary, the Reduced Development Alternative’s contribution to Cumulative increases in delay at five intersections would result in a cumulative impact to the following transit lines, as discussed above:

- **10-Townsend**: 2nd Street/Folsom Street (AM and PM Peak Hours)
- **27-Bryant**: 5th Street/Harrison Street/I-80 Off-Ramp (PM Peak Hour)
- **30X-Stockton Express**: 1st Street/Market Street (PM Peak Hour)
- **47-Van Ness**: 5th Street/Bryant Street/I-80 On-Ramp; 5th Street/Harrison Street/I-80 Off-Ramp (PM Peak Hour)

Appropriate mitigation measures for these impacts include transit preferential elements, such as transit-only lanes, transit preferential signal treatments, or other amenities that would improve the ability of transit vehicles to bypass area-wide congestion. The City of San Francisco is currently developing the Transit Center District Plan (“TCDP”) transportation planning effort. The TCDP would allow higher-density development in the area surrounding the proposed new Transbay Transit Center in Downtown San Francisco. As part of this work, the City is contemplating changes to the transportation network in the South of Market area designed to accommodate this increased development and improve overall transit circulation. At the time this analysis was conducted, the proposed transit network changes were not defined enough to include in the analysis. As part of the TCDP analysis, the City Planning Department should account for traffic increases associated with the Reduced Development Alternative. However, because the Plan is not finalized and its environmental review is not yet complete, implementation of measures to improve transit circulation in the area are uncertain and the Reduced Development Alternative’s impacts to transit delay would remain **significant and unavoidable**.

### 4.10.3.4 Reduced Development Alternative with Expanded Transit Service

Cumulative transit impacts were analyzed with respect to both transit capacity utilization and with respect to transit delay in Downtown San Francisco caused by cumulative increases in vehicular traffic.

#### 4.10.3.4.1 Cumulative Transit Capacity Utilization

The screenlines around Downtown San Francisco are expected to experience both growth in demand and in total supply provided. **Table 59** presents the expected capacity utilization for each of the four Downtown screenlines for year 2030 conditions with the Reduced Development Project, under the Expanded Transit Scenario. As shown, each of the four screenlines is expected to operate within Muni’s standard of 85 percent utilization. Therefore, cumulative impacts to transit associated with the Reduced Development Project under the Expanded Transit Scenario are expected to be **less than significant**.

#### 4.10.3.4.2 Cumulative Transit Delay

As described in Section 4.10.2 (Cumulative Traffic Impacts), traffic from the Reduced Development Alternative with Expanded Transit would contribute to significant cumulative impacts at several intersections in Downtown San Francisco. Increases in intersection vehicle delay may also increase delay for transit lines using those intersections. The Reduced Development Alternative with Expanded Transit would contribute significant contributions to cumulative impacts at six intersections in one or more peak hours.
1st Street/Market Street – The Reduced Development Alternative would contribute a significant amount of traffic to this intersection that would operate at LOS F conditions in the PM peak hour under year 2030 Cumulative No Project Conditions.

A total of 13 Muni bus routes (2-Clement, 3-Jackson, 5-Fulton, 6-Parnassus, 9/9L-San Bruno, 21-Hayes, 30-Stockton, 30X-Marina Express, 31-Balboa, 38/38L/38X-Geary, 71/71L-Haight/Noriega, 76-Marin Headlands, 81X Caltrain Express), one Muni streetcar route (F-Market & Wharves) travel through this intersection during the weekday PM peak hour.

The intersection approaches on Market Street would operate at acceptable levels of service (LOS D or better), so the Reduced Development Alternative's contribution of traffic on Market Street approaches would not significantly impact transit routes on the east and west approaches. During the weekday PM and Saturday peak hours, the southbound movement would operate at LOS F. Transit routes that would be affected (i.e., those that approach the intersection traveling southbound) include the 30X-Stockton Express.

These lines would experience increases in delay due to congestion on Bush Street, Battery Street, and 1st Street. Since the Reduced Development Alternative would create a significant contribution to delay on this approach, the Proposed Project would have a significant impact to transit travel times on the 30X-Stockton Express during the PM peak hour.

1st Street/Mission Street – The Reduced Development Alternative would contribute a significant amount of traffic to critical movements at this intersection that would operate at LOS F conditions in the PM peak hour under year 2030 Cumulative No Project Conditions.

A total of six Muni bus (5-Fulton, 6-Parnassus, 10-Townsend, 14/14L-Mission, 38/38L-Geary, 71/71L-Haight-Noriega, 76-Marin Headlands), eight Golden Gate Transit bus lines (10, 54, 70, 72, 73, 76, 80, 101) and three Samtrans buses (292, 391, 397) travel through this intersection. However, all approaches to this intersection include dedicated transit-only lanes; therefore, transit routes serving this intersection would not be affected by Reduced Development Alternative-generated increases in cumulative intersection delay, and the Reduced Development Alternative's contribution to cumulative transit travel time impacts at this intersection would be less than significant.

2nd Street/Folsom Street – The Reduced Development Alternative would contribute a significant amount of traffic to movements at this intersection that would operate at unacceptable levels of service under year 2030 Cumulative No Project Conditions in the AM and PM peak hours.

Three Muni bus lines (10-Townsend, 12-Folsom/Pacific, 76-Marin Headlands) and Golden Gate Transit bus lines travel through this intersection. Transit lines at this intersection share lanes with mixed-flow traffic along both Folsom Street and 2nd Street. During the AM and PM peak hours, the intersection would operate with substantial amounts of vehicle delay, primarily as a result of SFOBB-destined traffic. Folsom Street has four eastbound travel lanes at this intersection. Transit uses the north-most lane, which does not lead to an on-ramp to the SFOBB and would be less congested than the southern lanes; therefore, project contributions to congestion on Folsom Street would have a minimal effect to operations on the 12-Folsom/Pacific, 76-Marin Headlands, and Golden Gate Transit buses, which travel on Folsom Street.

The 10-Townsend would need to maneuver though northbound and southbound mixed-flow traffic destined for the SFOBB, and the Reduced Development Alternative has a significant contribution to the southbound movement; therefore, the Reduced Development Alternative’s contribution to cumulative travel time impacts to the 10-Townsend at this intersection would be considered significant.

5th Street/Bryant Street/I-80 On-Ramp – The Reduced Development Alternative would cause this intersection to deteriorate from LOS D to LOS E under 2030 Cumulative plus Project Conditions during the Saturday peak hour.

Three Muni bus lines travel through this intersection (8X/8AX/8BX-Bayshore Express, 27-Bryant, 47-Van Ness). Transit lines at this intersection share lanes with mixed-flow traffic along both Bryant Street and...
5th Street. During the Saturday peak hour, the northbound approach and the southbound left-turn movement would operate at unacceptable levels of service. The 8X/8AX/8BX-Bayshore Express and 27-Bryant travel eastbound on Bryant Street; therefore, the Reduced Development Alternative would only have a significant impact to transit travel times on the 47-Van Ness.

5th Street/Harrison Street/I-80 Off-Ramp – The Reduced Development Alternative would contribute significant volumes to this intersection that would operate at LOS F under 2030 Cumulative No Project Conditions in the PM peak hour.

Four Muni bus routes travel through this intersection (8X/8AX/8BX-Bayshore Express, 12-Folsom/Pacific, 27-Bryant, 47-Van Ness). Transit lines at this intersection share lanes with mixed-flow traffic along both Harrison Street and 5th Street. During the PM peak hour, the northbound, southbound, and off-ramp approaches would operate at unacceptable levels of service. The 8-Bayshore and 12-Folsom/Pacific run westbound on Harrison Street. The westbound approach is expected to operate at acceptable levels of service; therefore the Reduced Development Alternative would not substantially affect these Muni lines. The Reduced Development Alternative’s contribution to increases in delay on the northbound and southbound approaches would be significant, and the Reduced Development Alternative’s impacts to transit travel times of the 27-Bryant and 47-Van Ness would be considered significant.

In summary, the Reduced Development Alternative’s contribution to Cumulative increases in delay at five intersections would result in a cumulative impact to the following transit lines, as discussed above:

- **10-Townsend**: 2nd Street/Folsom Street (AM and PM Peak Hours)
- **27-Bryant**: 5th Street/Harrison Street/I-80 Off-Ramp (PM Peak Hour)
- **30X-Stockton Express**: 1st Street/Market Street (PM Peak Hour)
- **47-Van Ness**: 5th Street/Bryant Street/I-80 On-Ramp; 5th Street/Harrison Street/I-80 Off-Ramp (PM Peak Hour)

Appropriate mitigation measures for these impacts include transit preferential elements, such as transit-only lanes, transit preferential signal treatments, or other amenities that would improve the ability of transit vehicles to bypass area-wide congestion. The City of San Francisco is currently developing the Transit Center District Plan (“TCDP”) transportation planning effort. The TCDP would allow higher-density development in the area surrounding the proposed new Transbay Transit Center in Downtown San Francisco. As part of this work, the City is contemplating changes to the transportation network in the South of Market area designed to accommodate this increased development and improve overall transit circulation. At the time this analysis was conducted, the proposed transit network changes were not defined enough to include in the analysis. As part of the TCDP analysis, the City Planning Department should account for traffic increases associated with the Reduced Development Alternative. However, because the Plan is not finalized and its environmental review is not yet complete, implementation of measures to improve transit circulation in the area are uncertain and the Reduced Development Alternative’s impacts to transit delay would remain significant and unavoidable.
5. MITIGATION AND IMPROVEMENT MEASURES

This chapter presents the transportation mitigation measures that would be required to reduce the impacts of the Proposed Project and Reduced Development Alternative. Table 60 summarizes significant project impacts identified in this report and Table 61 summarizes significant cumulative impacts to which the Proposed Project or Reduced Development Alternative contribute considerably. In some cases, mitigation measures would reduce the magnitude of the project’s impacts, but not to less-than-significant levels. Therefore, this chapter describes the level of significance following implementation of the recommended mitigation measure.

5.1 TRAFFIC

5.1.1 Proposed Project with Base Transit Service

Mitigation Measure 1 – Implement the Expanded Transit Scenario

As a means to reduce vehicular travel to and from the Islands, additional transit capacity shall be provided. The project sponsors shall work with WETA and SFMTA to develop and implement the Proposed Project’s transit operating plan. Elements of the plan include but are not limited to:

- Additional ferry service to reduce peak period headways from 50-minutes to increase frequencies to as much as 15-minute headways during the AM and PM peak periods

- Increased frequency on the Muni Route 108-Treasure Island service to reduce peak period headways from 15 minutes to as low as 7-minute headways in the AM peak period and as low as 5 minutes in the PM peak period.

- New bus service to another location in San Francisco (e.g., to the San Francisco Civic Center area) with frequencies as low as every 12-minutes during the AM and PM peak periods. Service shall be provided between approximately 5 AM and 10 PM.

Changes to the proposed East Bay bus service are not suggested as part of this Mitigation Measure. Although specific headways are suggested as part of this Mitigation Measure, SFMTA and WETA would maintain the authority to modify service levels and routes as part of their ongoing system-wide operations management.

The additional transit capacity (in terms of increased frequencies) and transit accessibility (due to a new route) to San Francisco has been design to reduce transit travel times and has been design to make transit use a more attractive travel mode.

Implementation of Expanded Transit Service would reduce auto trip generation such that the project’s impacts to the eastbound off-ramp diverge section would be reduced. However, as illustrated in Tables 36 and 37 (pages 99 and 100) for the weekday PM and Saturday peak hours, respectively, this would have only a slight benefit to congestion around the off-ramp diverge section and the project’s impacts to this ramp diverge section would remain significant and unavoidable.

If the existing westbound ramp configuration remains in place, implementation of the Expanded Transit Scenario would reduce auto trip generation such that the project’s impacts to ramp delays at the two stop controlled westbound on-ramps would be reduced. However, as illustrated in Tables 35, 36 and 37 (pages 99 to 100) for the weekday AM and PM and Saturday peak hours, respectively, autos would still experience delay consistent with LOS F and the project’s impacts to delay approaching the on-ramps would remain significant and unavoidable.
<table>
<thead>
<tr>
<th>Impact</th>
<th>Proposed Project (Base Transit Scenario)</th>
<th>Proposed Project (Expanded Transit Scenario)</th>
<th>Reduced Development Alternative (Base Transit Scenario)</th>
<th>Reduced Development Alternative (Expanded Transit Scenario)</th>
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<tr>
<td><strong>Ramp Merge/Diverge</strong></td>
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<td><strong>Ramp Delays</strong></td>
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<td>Westbound On-ramps under Existing Configuration</td>
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<td>East Bay Approaches to SFOBB</td>
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<td>San Francisco Approaches to SFOBB</td>
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<td>AC Transit Demand Exceeding Available Capacity</td>
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### TABLE 60 – SUMMARY OF SIGNIFICANT IMPACTS (EXISTING PLUS PROJECT)

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<th>Impact</th>
<th>Proposed Project (Base Transit Scenario)</th>
<th>Proposed Project (Expanded Transit Scenario)</th>
<th>Reduced Development Alternative (Base Transit Scenario)</th>
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Source: Fehr & Peers, 2009
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## TABLE 61 – SUMMARY OF SIGNIFICANT IMPACTS (CUMULATIVE CONDITIONS)

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<thead>
<tr>
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<td>Construction Management Plan</td>
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</table>

Source: Fehr & Peers, 2009
With reconstruction of the westbound ramps, implementation of the Expanded Transit Scenario would reduce auto trip generation such that the project’s impacts to ramp delays at the ramp meter at the reconstructed westbound on-ramp would be reduced by nearly one-half. However, as illustrated in Table 34 (page 98), autos would still experience delay consistent with LOS F and the project’s impacts to delay approaching the on-ramps would remain significant and unavoidable.

Implementation of the Expanded Transit Scenario would reduce auto trip generation such that the project’s impacts to queues approaching the SFOBB from the East Bay would be reduced. However, the project would continue to increase queues on the East Bay bridge approaches during the AM peak hour, which would be a significant and unavoidable impact.

Implementation of the Expanded Transit Scenario would reduce auto trip generation such that the project’s impacts to queues approaching the SFOBB from Downtown San Francisco would be reduced. However, the project would continue to increase queues on the bridge approaches from Downtown San Francisco during the PM peak hour, which would be a significant and unavoidable impact.

5.1.2 Proposed Project with Expanded Transit Service

No feasible mitigation measures were identified to reduce traffic impacts to less than significant levels under this scenario.

5.1.3 Reduced Development Alternative with Base Transit Service

Mitigation Measure 1 – Implement the Expanded Transit Scenario

As a means to reduce vehicular travel to and from the Islands, additional transit capacity shall be provided. The project sponsors shall work with WETA and SFMTA to develop and implement the Proposed Project’s transit operating plan. Elements of the plan include but are not limited to:

- Additional ferry service to reduce peak period headways from 50-minutes to increase frequencies to as much as 15-minute headways during the AM and PM peak periods
- Increased frequency on the Muni Route 108-Treasure Island service to reduce peak period headways from 15 minutes to as low as 7-minute headways in the AM peak period and as low as 5 minutes in the PM peak period.
- New bus service to another location in San Francisco (e.g., to the San Francisco Civic Center area) with frequencies as low as every 12-minutes during the AM and PM peak periods. Service shall be provided between approximately 5 AM and 10 PM.

Changes to the proposed East Bay bus service are not suggested as part of this Mitigation Measure. Although specific headways are suggested as part of this Mitigation Measure, SFMTA and WETA would maintain the authority to modify service levels and routes as part of their ongoing system-wide operations management.

The additional transit capacity (in terms of increased frequencies) and transit accessibility (due to a new route) to San Francisco has been designed to reduce transit travel times and has been designed to make transit use a more attractive travel mode.

Implementation of the Expanded Transit Scenario would reduce auto trip generation of the Reduced Development Alternative such that the project’s impacts to the eastbound off-ramp diverge section would be reduced. However, as illustrated in Tables 36 and 37 (pages 99 and 100) for the weekday PM and Saturday peak hours, respectively, this would have only a slight benefit to congestion around the off-ramp diverge section and the project’s impacts to this ramp diverge section would remain significant and unavoidable.
Under conditions with the existing westbound ramps, implementation of the Expanded Transit Scenario would reduce auto trip generation of the Reduced Development Alternative such that the project’s impacts to delays at the stop controlled westbound on-ramps would be reduced. However, as illustrated in Tables 35 to 37 (pages 99 to 100) for the weekday AM and PM and Saturday peak hours, respectively, this would have only a slight benefit to reducing delays, which would still be consistent with LOS F conditions and the project’s impacts to this ramp diverge section would remain significant and unavoidable.

Under conditions with the separately-proposed reconstruction of the westbound ramps, implementation of the Expanded Transit Scenario would reduce auto trip generation of the Reduced Development Alternative such that the project’s impacts to delays at the stop controlled westbound on-ramps would be reduced. In the AM peak hour, volumes approaching the westbound on-ramp would be less than the capacity of the ramp and queues and delays would be eliminated. However, as illustrated in Tables 34 (page 98) this mitigation measure would have only a slight benefit to reducing delays in the PM peak hour, which would still be consistent with LOS F conditions. Therefore, the project’s impacts to delays at the reconstructed westbound on-ramp in the PM peak hour would remain significant and unavoidable.

Implementation of the Expanded Transit Scenario would reduce auto trip generation of the Reduced Development Alternative such that the project’s impacts to queues on SFOBB approaches in the AM peak hour would be reduced. However, as discussed in the following section, the Reduced Development Alternative would continue to contribute substantially to queuing in the East Bay. Therefore, the Reduced Development Alternative’s impacts to queues approaching the SFOBB from the East Bay would remain significant and unavoidable.

Implementation of the Expanded Transit Scenario would reduce auto trip generation of the Reduced Development Alternative such that the project’s impacts to queues on SFOBB approaches in the PM peak hour would be reduced. However, as discussed in the following section, the Reduced Development Alternative would continue to contribute substantially to queuing in San Francisco approaching the SFOBB during the PM peak hour. Therefore, the Reduced Development Alternative’s impacts to queues approaching the SFOBB from San Francisco would remain significant and unavoidable.

5.1.4 Reduced Development Alternative with Expanded Transit Service

No feasible mitigation measures were identified to reduce traffic impacts to less than significant levels under this scenario.

5.2 TRANSIT

5.2.1 Proposed Project with Base Transit Service

Mitigation Measure 1 – Implement the Expanded Transit Scenario.

With implementation of the Expanded Transit Service, the project’s transit demand would be accommodated within Muni’s capacity threshold of 85 percent occupancy, which would reduce the impact on transit to a less than significant level. However, because full funding for this service has not yet been identified, its implementation remains uncertain. In the event this mitigation measure cannot feasibly be implemented, this impact would remain significant and unavoidable.

Under conditions with the existing westbound ramps, implement the Expanded Transit Scenario. With implementation of the Expanded Transit Service, the project’s auto traffic generation would be reduced such that queues would be reduced to much smaller levels (between 0 and 400 feet) at each on-ramp during weekday peak hours, reducing their impacts on transit circulation, but would remain approximately 1/3 mile during Saturday peak hours. However, because full funding for this service has not yet been identified, its implementation remains uncertain. In the event this mitigation measure cannot feasibly be implemented, and regardless of implementation for Saturday peak hours, this impact to Muni operations would remain significant and unavoidable.
Under conditions with the existing westbound ramps, with implementation of the Expanded Transit Service, the project’s auto traffic generation would be reduced such that queues would be reduced to much smaller levels (between 0 and 400 feet) at each on-ramp during weekday peak hours, reducing their impacts on transit circulation, but would remain approximately 1/3 mile during Saturday peak hours. However, because full funding for this service has not yet been identified, its implementation remains uncertain. In the event this mitigation measure cannot feasibly be implemented, and regardless of implementation for Saturday peak hours, this impact to Muni operations would remain significant and unavoidable.

**Mitigation Measure 2** – To ensure that transit circulation is not adversely affected by queues approaching the SFOBB on-ramps, a continuous southbound transit-only lane shall be provided from the transit center on Treasure Island to the westbound on-ramp to the SFOBB on the west side of Yerba Buena Island.

Implementation of Mitigation Measure 2 would only be triggered if the extent of actual vehicle queuing impacts the proposed 108-Treasure Island on Treasure Island Road and creates delays for Muni buses accessing the westbound transit-only on-ramp. As such, throughout the life of the project, the TITMA, in consultation with SFMTA and using SFMTA's methodology, shall monitor the length and duration of potential queues on Treasure Island Road and the associated delays to Muni service. If the queues formed between First Street and the westbound on-ramp on the west side of Yerba Buena Island result in an operational delay to Muni service equal to or greater than the prevailing headway during the AM, PM or Saturday peak periods, TITMA shall implement a southbound transit-only lane between First Street on Treasure Island and the transit- and emergency vehicle-only westbound Bay Bridge on-ramp. In addition to providing a transit-only lane, TITMA shall stripe sharrows in the southbound mixed flow lane between First Street and the westbound on-ramp. The implementation of a transit-only lane would be triggered if impacts are observed over the course of six months at least 50 percent of the time during the AM, PM, or Saturday peak periods.

Implementation of Mitigation Measure 2 to provide a transit and emergency vehicle-only lane between First Street on Treasure Island and the westbound Bay Bridge on-ramp would allow Muni vehicles to bypass vehicle queues that may occur and therefore, the impact to Muni operations would be reduced to a less-than-significant level.

Implementation of this mitigation measure would entail the following:

- Elimination or reduction of the proposed median on Treasure Island Road between First Street and just south of Macalla Road; and
- Elimination of the proposed southbound bicycle lane on Treasure Island and Hillcrest Roads after the intersection with Macalla Road. Bicyclists would still be able to use Class I bicycle paths and Class II bicycle lanes proposed on Macalla Road to connect between the Islands and the bicycle path on the new eastern span of the Bay Bridge. Similarly, although AC Transit vehicles would not be using the westbound on-ramps, queues from the westbound on-ramp on the east side of Yerba Buena Island would interfere with AC Transit travel between Treasure Island and the eastbound on-ramp to the SFOBB. AC Transit vehicles would travel in this queue nearly for its entire length, from just north of Macalla Road to the eastbound on-ramp to the SFOBB. This would be considered a significant impact to AC Transit operations.

Under conditions with the reconstructed westbound ramps, implement Mitigation Measure 2. However, since this improvement would extend only to the transit-only westbound on-ramp because there is not sufficient right-of-way to extend a transit-only lane beyond the transit-only westbound on-ramp, AC Transit vehicles would continue to experience congestion between the transit-only westbound on-ramp and the eastbound on-ramp. Therefore, the impact to AC Transit operations would be significant and unavoidable.

**5.2.2 Proposed Project with Expanded Transit Service**

Under conditions with the Expanded Transit Scenario, Muni, AC Transit, and the ferry service would provide adequate capacity to meet demand. Further, queues associated with on-ramp control devices would not interfere with Muni operations. Queues would interfere with AC Transit operations, but no feasible mitigation measures were identified. Therefore, there are no mitigation measures identified under this scenario.
**5.2.3 Reduced Development Alternative with Base Transit Service**

**Mitigation Measure 1 – Implement the Expanded Transit Scenario.**

With implementation of the Expanded Transit Service, the project’s transit demand would be accommodated within Muni’s capacity threshold of 85 percent occupancy, which would reduce the impact on transit to a less than significant level. However, because full funding for this service has not yet been identified, its implementation remains uncertain. In the event this mitigation measure cannot feasibly be implemented, this impact would remain significant and unavoidable.

Under conditions with the existing westbound on-ramps, implement the Expanded Transit Scenario. With implementation of the Expanded Transit Scenario, the project’s auto traffic generation would be reduced such that queues would be reduced to negligible levels at each on-ramp during weekday peak hours, but would remain approximately 1/2 mile during the Saturday peak hour. However, because full funding for this service has not yet been identified, its implementation remains uncertain. In the event this mitigation measure cannot feasibly be implemented, and regardless of implementation for Saturday peak hours, this impact to Muni operations would remain significant and unavoidable.

**5.2.4 Reduced Development Alternative with Expanded Transit Service**

Under conditions with the Expanded Transit Scenario, Muni, AC Transit, and the ferry service would provide adequate capacity to meet demand. Further, queues associated with on-ramp control devices would not interfere with Muni operations. Queues would interfere with AC Transit operations, but no feasible mitigation measures were identified. Therefore, there are no mitigation measures identified under this scenario.

**5.3 PARKING**

No significant environmental impacts have been identified. No mitigation required.

**5.4 PEDESTRIAN**

No significant environmental impacts have been identified. No mitigation required.

**5.5 BICYCLE**

No significant environmental impacts have been identified. No mitigation required.

**5.6 SERVICE AND LOADING**

No significant environmental impacts have been identified. No mitigation required.

**5.7 EMERGENCY ACCESS**

No significant environmental impacts have been identified. No mitigation required.
5.8 CONSTRUCTION

Mitigation Measure 3 – The project sponsor shall develop and implement a Construction Transportation Management Plan (“CTMP”) consistent with the standards and objectives stated below and approved by TIDA, designed to anticipate and minimize impacts of various construction activities associated with the Proposed Project.

The Plan shall disseminate appropriate information to contractors and affected agencies with respect to coordinating construction activities to minimize overall disruptions and ensure that overall circulation on the Islands is maintained to the extent possible, with particular focus on ensuring pedestrian, transit, and bicycle connectivity. The CTMP shall supplement and expand, rather than modify or supersede, any manual, regulations, or provisions set forth by SFMTA, Department of Public Works (“DPW”), or other City departments and agencies.

Specifically, the CTMP shall:

- Identify construction traffic management best practices in San Francisco, as well as others that, although not being implemented in the City, could provide valuable information for a project of the size and characteristics of Treasure Island and Yerba Buena Island. Management practices include, but are not limited to, identifying ways to reduce construction worker vehicle trips through transportation demand management programs and methods to manage construction work parking demands.

- Describe procedures required by different departments and/or agencies in the city for implementation of a Construction Traffic Management Plan, such as reviewing agencies, approval processes, and estimated timelines. For example,
  - The construction contractor will need to coordinate temporary and permanent changes to the transportation network on Treasure Island and Yerba Buena Island with TIDA. Once Treasure Island streets are accepted as City streets, temporary traffic and transportation changes must be coordinated through the SFMTA’s Interdepartmental Staff Committee on Traffic and Transportation (“ISCOTT”) and will a public meeting. As part of this process, the CTMP may be reviewed by SFMTA’s Transportation Advisory Committee (“TASC”) to resolve internal differences between different transportation modes. Caltrans Deputy Directive 60 (DD-60) requires a separate Transportation Management Plan (TMP) and contingency plans for all state highway activities. These plans shall be part of the normal project development process and must be considered during the planning stage to allow for the proper cost, scope and scheduling of the TMP activities on Caltrans right-of-way. These plans should adhere to Caltrans standards and guidelines for stage construction, construction signage, traffic handling, lane and ramp closures and TMP documentation for all work within Caltrans right-of-way. (Caltrans DD-60 and TMP Guidelines are included in Appendix L)
  - Changes to transit routes would be coordinated and approved, as appropriate, by SFMTA, AC Transit, and TITMA. The TMP would set forth the process by which transit route changes would be requested and approved.

- Require consultation with other Island users, including the Job Corps and Coast Guard, to assist coordination of construction traffic management strategies. The project sponsor shall proactively coordinate with these groups prior to developing the CTMP to ensure the needs of the other users on the Islands are addressed within the Construction Traffic Management Plan.

- Identify construction traffic management strategies and other elements for the Proposed Project and present a cohesive program of operational and demand management strategies designed to maintain acceptable levels of traffic flow during periods of construction activities. These include,
but are not limited to, construction strategies, demand management activities, alternative route strategies, and public information strategies. For example, the project sponsor may develop a circulation plan for the Island during construction to ensure that existing users can clearly navigate through the construction zones without substantial disruption.

Implementation of Mitigation Measure 3, a Construction Traffic Management Program, would help reduce the Proposed Project’s construction-related traffic impacts. Given the magnitude of the proposed development and the duration of the construction period, some disruptions and increased delays could still occur even with implementation of Mitigation Measure 3 (including ramp operations on the Bay Bridge), and it is possible that significant construction-related transportation impacts on regional roadways could still occur. Construction-related transportation impacts would therefore, remain significant and unavoidable.