SFMTA | Municipal Transportation Agency

ENTRIPS

Eastern Neighborhoods Transportation Implementation Planning Study

FUTURE CONDITIONS

NOVEMBER 2010

This project is funded in part through the Metropolitan Transportation Commission's Station Area Planning Program.

The preparation of this report has been financed in part by grants from the U.S. Department of Transportation. The contents of this report do not necessarily reflect the official views or policy of the US. Department of Transportation.

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Executive Summary

This report presents the Future Conditions projections for the Eastern Neighborhoods Transportation Implementation Planning Study (EN TRIPS). EN TRIPS will develop transportation infrastructure improvements to serve the existing and projected needs of San Francisco's Eastern Neighborhoods, as envisioned by the Eastern Neighborhoods Area Plans, which were adopted by the San Francisco Board of Supervisors in 2009. The study area of EN TRIPS includes not only the Eastern Neighborhoods themselves (the Mission District, Eastern South of Market, Potrero Hill/Showplace Square, and the Central Waterfront), but also surrounding planning districts (Mission Bay, the Transbay District, and Western South of Market) that share key transportation corridors with the Eastern Neighborhoods.

As the second major work product for EN TRIPS, this Future Conditions Report provides an assessment of the likely impacts of growth and change over the next 20 years on the transportation system in the Eastern Neighborhoods. It assesses potential changes in land use patterns and travel behavior and draws conclusions about the impact on the transportation system in light of the key existing issues and opportunities already documented. The horizon year for the purposes of identifying future needs is 2035, when the land use changes envisioned for the Eastern Neighborhoods and surrounding planning districts may be fully realized. While future conditions cannot be known with certainty, this report relies on the best tools available to present potential transportation system conditions in that future horizon year. Based on these projections, this report presents an assessment of the major transportation corridors in the study area for each mode of transportation, and for the system as a whole.

It is important to note that the travel demand projections described in this report are uncertain and are not pre-determined. New infrastructure investment and/or changes in City policy could influence the number of new vehicle trips, help to reduce congestion, or lessen the impact of increased vehicle volumes on other modes of transportation

Following publication of this report, in collaboration with community stakeholders, the EN TRIPS project team will then recommend, design, and develop implementation plans for priority transportation improvements. It should be noted that the current recession has slowed projected growth in the Eastern Neighborhoods and it is not clear that 2035 represents a "build out" target for development in the study area. However, by using 2035 as the build out year, it is possible to project future needs assuming full development in the Eastern Neighborhoods along with robust development in other areas of the city that will contribute to transportation issues within the study area.

Figure ES-1 EN TRIPS Study Area

Land Use Change and Travel Demand Growth

A number of planning efforts have recently changed zoning in the study area, permitting new businesses and households that might not otherwise have located in San Francisco. The Eastern Neighborhoods Area Plans (including the Eastern South of Market District, the Mission District, Showplace Square/Potrero Hill, and the Central Waterfront), adopted in 2009, made zoning changes to some but not all of the EN TRIPS study area. In addition, several major land use development plans for areas within the study area (but separate from the Eastern Neighborhoods land use plans themselves) will result in growth. These include the Western South of Market community planning area, the Transbay Transit Center District, the Mission Bay Redevelopment Area, and Rincon Hill. This section summarizes recent changes in land use regulation and projected changes in population and employment in the study area by 2035. Population and employment projections are based on the allocations from the Association of Bay Area Governments (ABAG), and are modified by the San Francisco Planning Department to reflect the City's best current understanding of expected land use change.

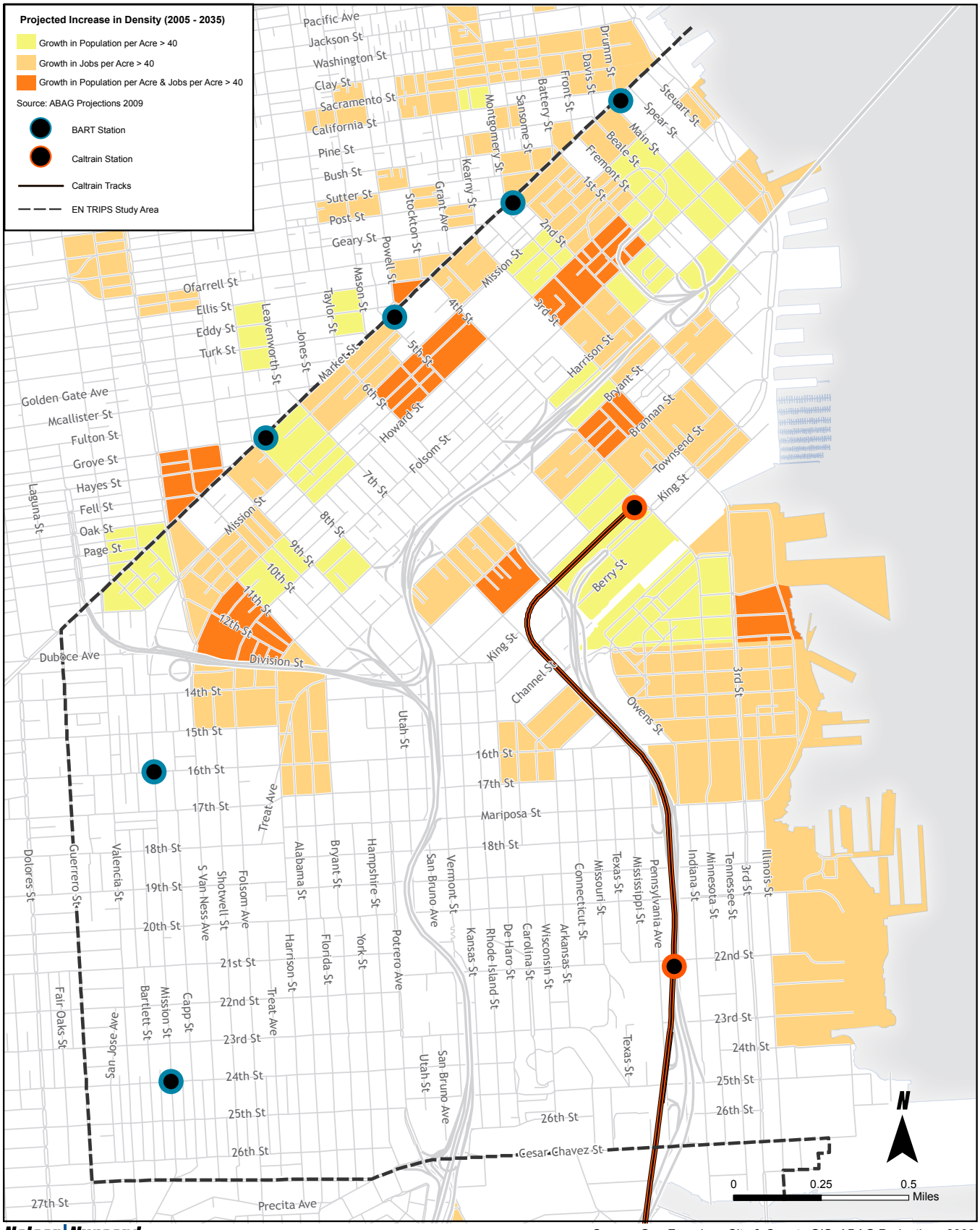
As a result of land use regulation changes and overall regional growth, very large increases in population, employment, and total travel demand are projected for the Eastern Neighborhoods study area by 2035. The study area's population is expected to increase by about a third, and employment is projected to increase by nearly half. As a result of this growth, the model predicts an additional 320,000 daily trips to and from the Eastern Neighborhoods by 2035, an increase of about 70 percent over the 2005 level.

The majority of population, employment, and travel demand growth is expected to occur in the South of Market area. The model projects that demand for travel to and from the South of Market area will roughly double. Within the South of Market, important new areas of growth include the following: the easternmost portions of the South of Market, including the Transbay District; the mid-market area, adjacent to Market Street between Seventh and Fifth street; the western end of the South of Market area, particularly the area west of Seventh Street between Market and Harrison; and the area along Bryant, Brannan, and Townsend streets, between I-80 and the Caltrain tracks. As a result of this growth, the South of Market area will see travel demand increase within the neighborhood, between the South of Market and downtown, and between the South of Market and each of the Eastern Neighborhoods Areas.

While the South of Market area will see the majority of population growth, several areas of growth are projected in the rest of the study area. The largest center of new population is Mission Bay, which is projected to add 25,000 jobs. Large increases in employment density are also projected along the Waterfront south of Mission Bay, with the Central Waterfront neighborhood plan area contributing 15,000 new jobs. Extending west from Mission Bay along the 16th Street corridor, employment growth is also foreseen in the southern part of Showplace Square and in the northern portion of the Mission District. With much smaller changes to existing land use patterns expected, the model projects that the Mission District will have modest growth in trips. Showplace Square/Potrero Hill Districts will have small but still substantial increases in travel demand.

As a result of this growth, travel by all modes of transportation will expand. The model projects that mode share will remain mostly consistent between 2005 and 2035, with just a 3 percent shift from private motor vehicles to transit. It is important to note that the model projections described in this report are uncertain and are not pre-determined. New infrastructure investment and/or changes in City policy could influence the number of new vehicle trips, help to reduce congestion, or lessen the impact of increased vehicle volumes on other modes of transportation. One consequence of expanded travel may be large increases in motor vehicle volumes on arterials throughout the study area. Vehicle drivers will face some delays, and buses, cyclists, and pedestrians will also have to contend with growing vehicle traffic.

Figure ES-2 Projected Increases in Employment Density and Population Density (2005-2035)



Nelson|Nygaard consulting associates

Source: San Francisco City & County GIS, ABAG Projections 2009

Motor Vehicle Circulation

As a result of large increases in employment and population density in the study area, the travel demand model projects that there will be a large increase in motor vehicle travel in the Eastern Neighborhoods: a 58 percent increase in daily auto person-trips originating in the Eastern Neighborhoods, and a 52 percent increase in PM period trips (3 PM – 6:30 PM). Combined with a large increase in pass-through trips resulting from regional growth outside of the Eastern Neighborhood, vehicle volumes in Eastern Neighborhoods streets could increase substantially.

The model projects a 15 percent to 35 percent increase in PM peak hour vehicle volumes on South of Market arterial corridors, as well as major increases in vehicle volumes on segments of Third Street, 16th Street, and Cesar Chavez Street outside of the South of Market. Many neighborhood streets could also see large increases in vehicle volumes. Vehicle volume increases on this scale could have negative impacts on traffic operations. Notable projected delays include:

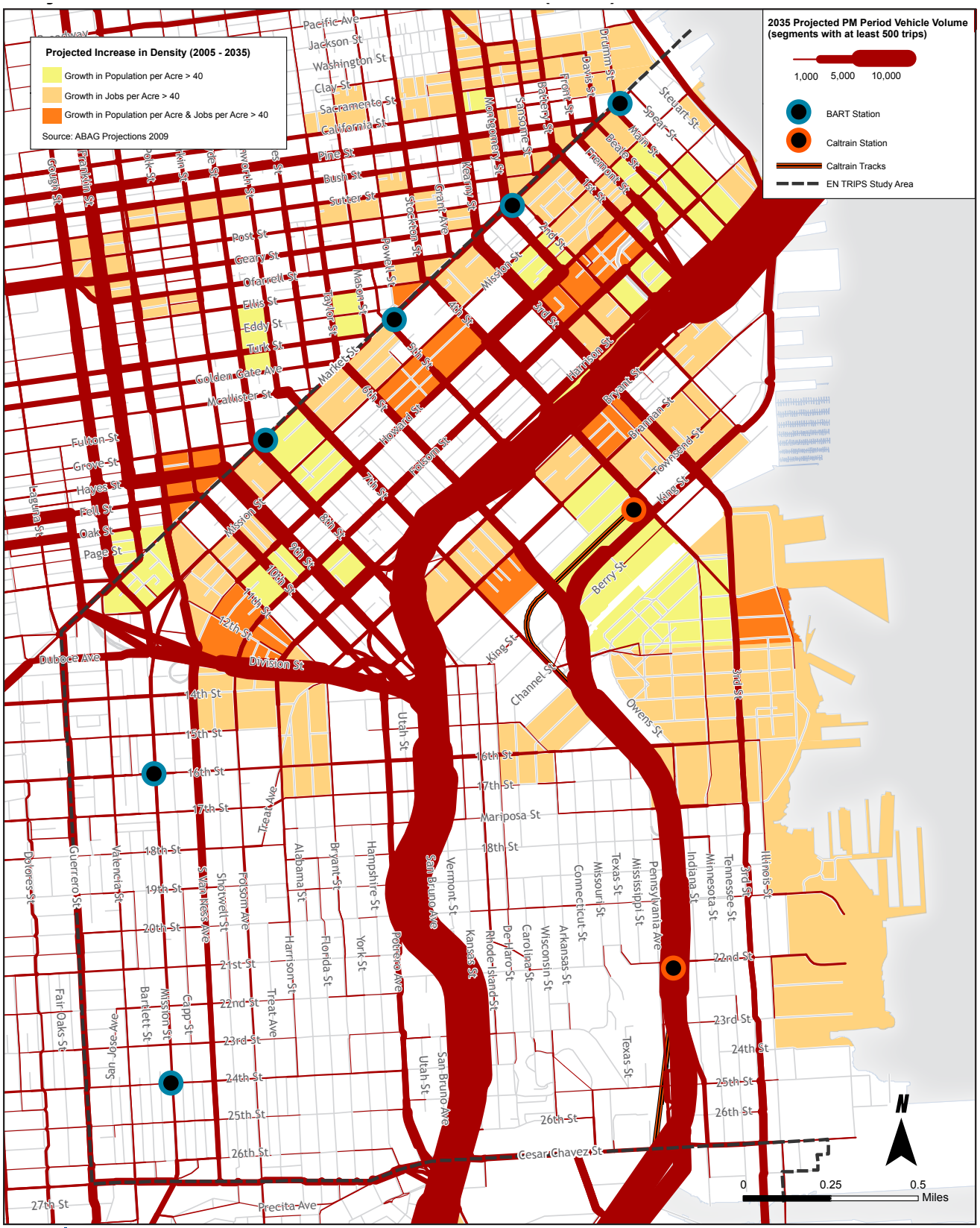
- During the PM peak hour, the projected volume increases would lead to notable new delays in the South of Market, particularly on Third Street at Mission and Fourth Street at Folsom. Harrison Street and Bryant Streets (home to the I-80 freeway approaches) will also have delays, particularly at Harrison and Fifth, Harrison at Seventh, and Bryant at Fifth.
- Expanded travel through Showplace Square, as well as to and from Mission Bay could have major impacts on traffic operations. The intersection of Division/Eighth/Townsend, where there is now a traffic circle, is projected to have major delays (LOS F). The intersection of 11th Street and Division is also projected to have substantial delays (LOS E).
- Two intersections on 16th are projected to have major delays during the PM peak hour (LOS F): 16th and Potrero Avenue, and 16th and 3rd Street. While the circulation study didn't examine any other Third Street intersections in detail, much higher projected vehicle volumes on Third Street suggest that there may be more intersections along this corridor that could have delays.

Some of the areas with the highest projected increases in vehicle volumes and traffic delays (in the South of Market and along Third Street) are the parts of the study area with the largest projected increases in population and employment density. Increased traffic would present challenges to residents, workers, and users of other transportation modes in these areas. Challenges including increased exposure to vehicle emissions and noise, increased travel delay, and increased collision risk

It is important to note that these outcomes are not pre-determined. New infrastructure investment and/or changes in City policy could influence the number of new vehicle trips, help to reduce congestion, or lessen the impact of increased vehicle volumes on other modes of transportation.

Both the physical constraints of the study area and the City's Transit First Policy preclude major expansions of roadway capacity as a strategy for dealing with projected vehicle volumes. Instead, the city has already begun exploring a variety of policy approaches to managing congestion. In addition to strategies for managing or reducing vehicle congestion, maintaining and improving quality of life in the parts of the Eastern Neighborhoods that are poised for substantial growth will require the city to maintain and expand alternatives to travel by private vehicle. Doing so will include further development of safe and comfortable pedestrian networks, completing and refining the bicycle network, and implementing transit priority treatments to speed key surface transit routes.

Figure ES-3 Projected Vehicle Volumes by Street Segment, PM Period (3 PM – 6:30 PM)



Nelson\Nygaard consulting associates

Source: SF-CHAMP 4.2, ABAG Projections 2009

Transit Operations

Transit service in the Eastern Neighborhoods faces a number of challenges in the future condition. First, in many cases, the projected demand exceeds available capacity. Even with assumed headways much more frequent than are currently operated (in the model, the T–Third Street operates every three minutes during peak periods in its northernmost segments), the travel demand model finds peak-period overcrowding in four of the six primary transit corridors: Third Street (the T–Third), Mission Street (the 49–Van Ness/Mission in the Mission District), 16th Street (the 22–Fillmore), as well as Potrero Avenue (the 9–San Bruno).

In some cases, it may not be possible to meet the projected demand given physical constraints. On Third Street, for example a major investment in additional capacity will already have been made (indeed, much of the increased demand projected for that corridor can no doubt be attributed to the increased capacity and quality of service the Central Subway investment would provide). In another of the corridors, Mission Street, a subway already exists, and the model projects substantial additional demand for bus service. Under current plans, *all* of the increased demand for transit on 16th and Potrero would have to be accommodated using buses operating on surface streets.

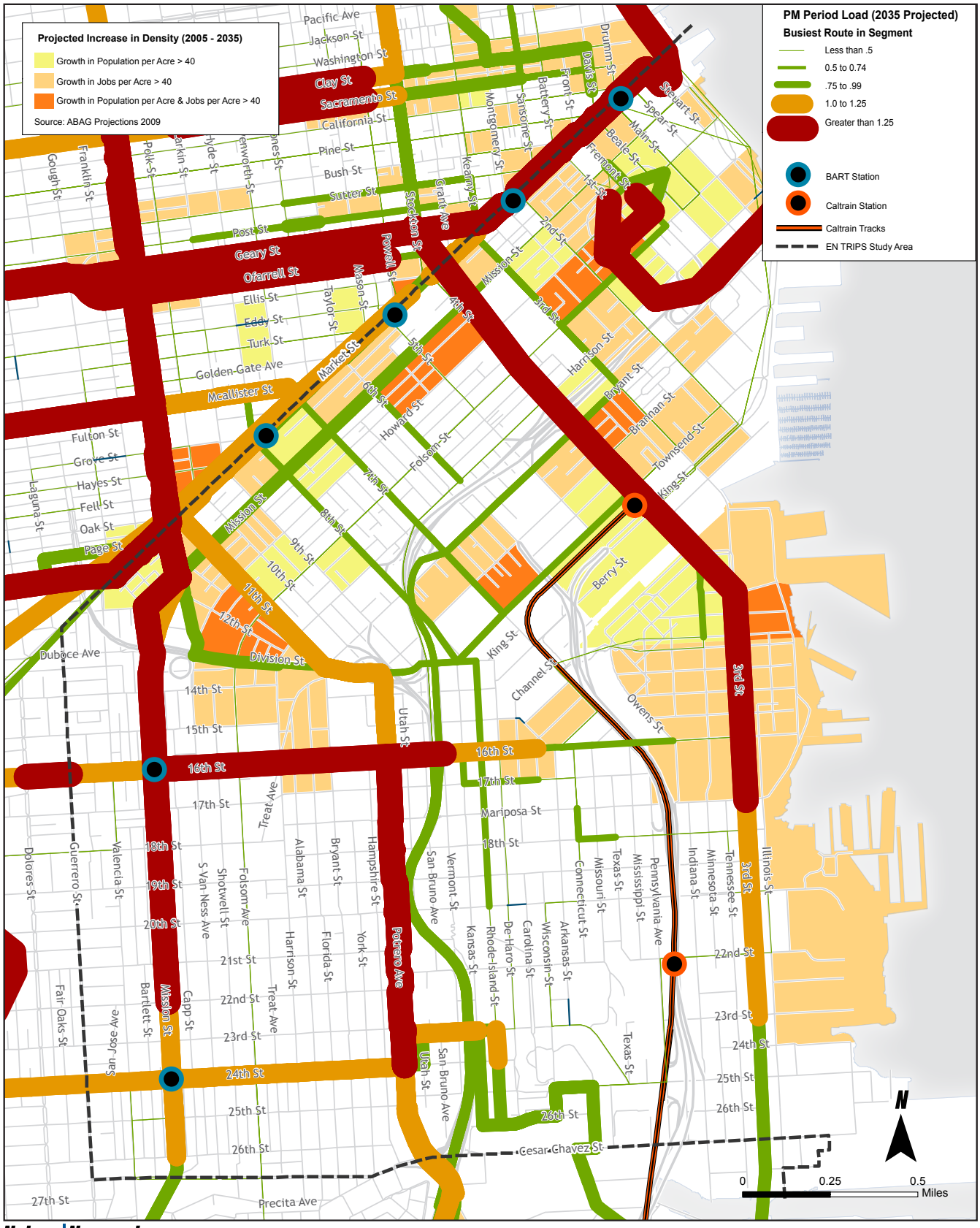
There are limits to the capacity that a bus line operating in congested traffic can provide. Buses, of course, are smaller vehicles than railcars; but there is also a limit to the number of vehicles that can be operated in traffic, as delay not only reduces speed and reliability but limits capacity by lengthening headways, or reducing the number of vehicles able to pass any given point over a period of time. Furthermore, overcrowding itself causes additional delay by lengthening dwell times, resulting in a vicious cycle as more passengers have time to arrive at each remaining stop.

Surface transit options will also have to contend with growing traffic. Already, major transit surface routes operate relatively slowly through the denser parts of the study area. In the future condition, major new traffic delays are projected Third and Fourth Streets (affecting the 45 and the 30), on Division (affecting the 47 and the 9) and on 16th Street (affecting the 22 and the 9). Transit Priority Streets (TPS) and Bus Rapid Transit (BRT) improvements to stops including prepaid and level boarding could be used to reduce delay. However, to provide the level of capacity necessary to meet demand, it might ultimately be necessary to provide exclusively transit lanes.

Transit on 16th Street faces unique challenges. An important issue that must be addressed as part of extending this line to Mission Bay is the crossing of the existing Caltrain right-of-way at Highway 280. If 16th Street is moved to an underpass at this location as planned, it may constrain the city's ability to provide transit priority treatments for the 22–Fillmore.

In the 2035 projected condition, there will be greater use of the BART and Caltrain stations, and the opportunity exists to provide enhanced pedestrian and bicycle connectivity to these stations.

Figure ES-4 Line Load by Segment in Key Transit Corridors



Source: San Francisco City & County GIS

Pedestrian Conditions

The most urgent pedestrian issues that emerge from this future conditions analysis are in the South of Market area. There, very large projected increases in residential and employment densities will lead to a greatly expanded potential demand for pedestrian travel. A projected 30,000 new daily trips will occur entirely within the South of Market area, and a further 20,000 trips will occur between the South of Market area and downtown San Francisco. At the same time, thousands of daily trips will occur between the neighborhood's growing residential and employment centers and its transit hubs: the three BART stations on Market Street; the Fourth and King Rail station; the new Central Subway stations; and the Transbay Terminal. By improving pedestrian conditions, the city has the opportunity to steer a majority of these trips toward walk trips, diverting them from some of its most constrained roadway and transit corridors.

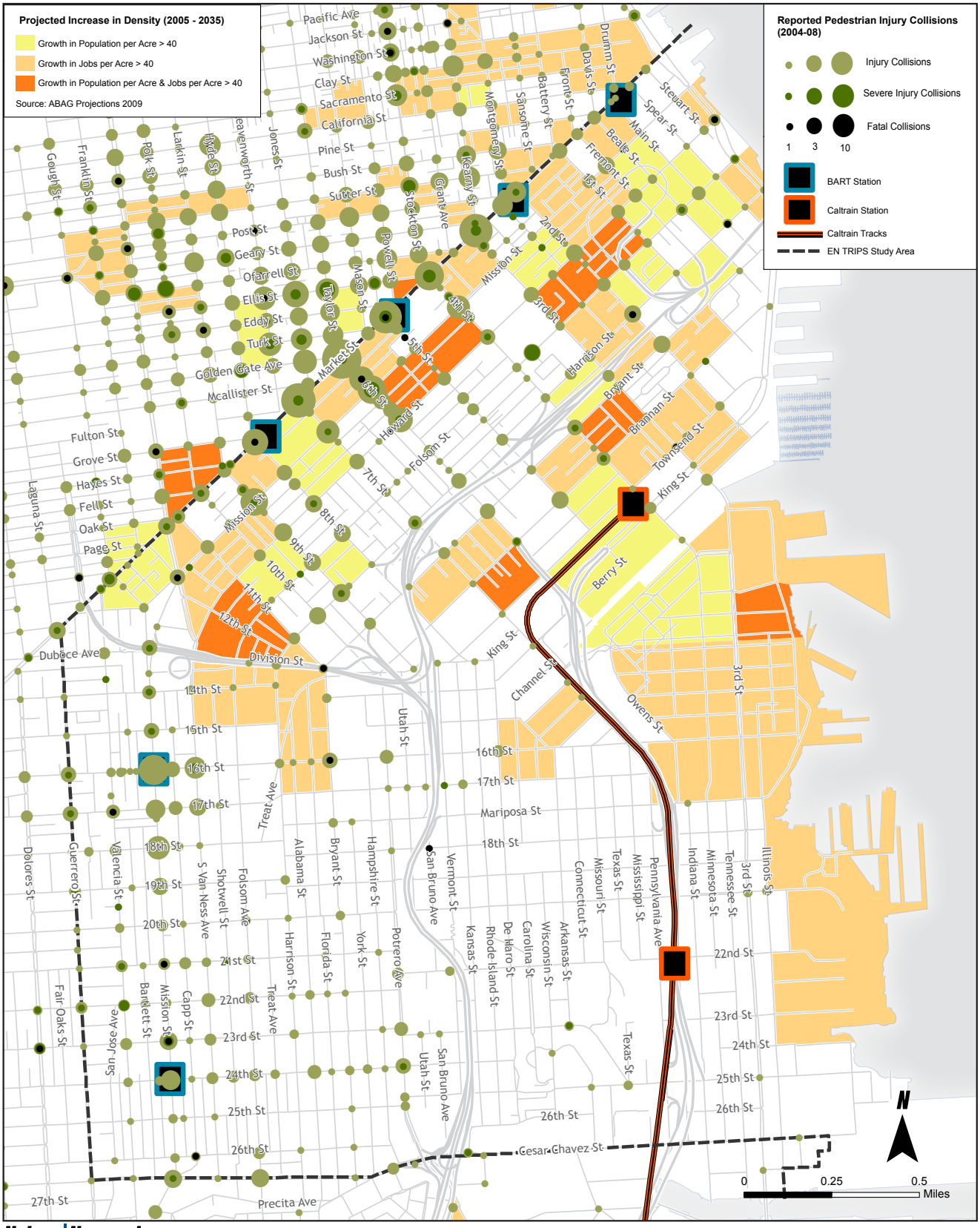
At the same time, very large increases in vehicle volumes are projected for most South of Market area arterials. More vehicles on the roads may aggravate the challenges that pedestrians already face on these streets, which include long blocks, long crossing distances, narrow sidewalks, multiple vehicle turn lanes, and closed crosswalks. Some streets also lack pedestrian design treatments such as landscaping or pedestrian-scale lighting.

On some arterials, the City may have the opportunity to improve on these conditions by widening sidewalks, adding mid-block crossings to improve pedestrian paths of travel, adding curb bulb-outs, and adding pedestrian-scale design treatments. More ambitious designs could even convert one or more South of Market arterials to two-way operations. In other cases, investments in the South of Market's system of alleyways may be the best way to provide public open space that is separate from high traffic volumes. At the same time, changes to the South of Market arterial network must also take into account the needs of other modes, including vehicles, bicycles, and transit.

In order to prioritize proposed pedestrian improvement projects and appropriately balance the needs of different modes, the EN TRIPS study team will develop a set of street design guidelines for South of Market arterials. These guidelines will be based on the Better Street Plan street typology, but will be tailored carefully to the particularities of the South of Market.

The other neighborhoods in the study area also have pedestrian and public realm improvement needs, although many of these have been studied in detail recently through other ongoing planning efforts. The Mission Streetscape Plan and the Potrero Hill traffic calming plan have developed and prioritized key street improvements for those neighborhoods. In the Central Waterfront/Mission Bay Area, the Mission Bay redevelopment plan, the Pier 70 Plan, and the Blue Greenway project would serve to reconnect the City with its waterfront. However, deficiencies in the Central Waterfront sidewalk network would remain. In Showplace Square, key pedestrian considerations include an incomplete sidewalk network, as well as a lack of signalized crossings at 16th Street. For these other neighborhood-scale pedestrian improvement projects, the EN TRIPS project team will work to develop a prioritized list of needs.

Figure ES-5 Eastern Neighborhoods Pedestrian Collisions Hot-Spots and Projected Land Use Change



Nelson\Nygaard consulting associates

Source: San Francisco City & County GIS, San Francisco Department of Public Health

Bicycling Conditions

Bicycling has the opportunity to attract a substantial share of the new trips projected in the Eastern Neighborhoods. Once it is fully implemented, the adopted San Francisco Bicycle Plan will complete a grid linking neighborhoods and major nodes in the Eastern Neighborhoods study area. A notable exception is Potrero Hill, where no bicycle facilities are planned due to steep topography. Bicycle facilities of particular importance given the expected increases in population and employment density include:

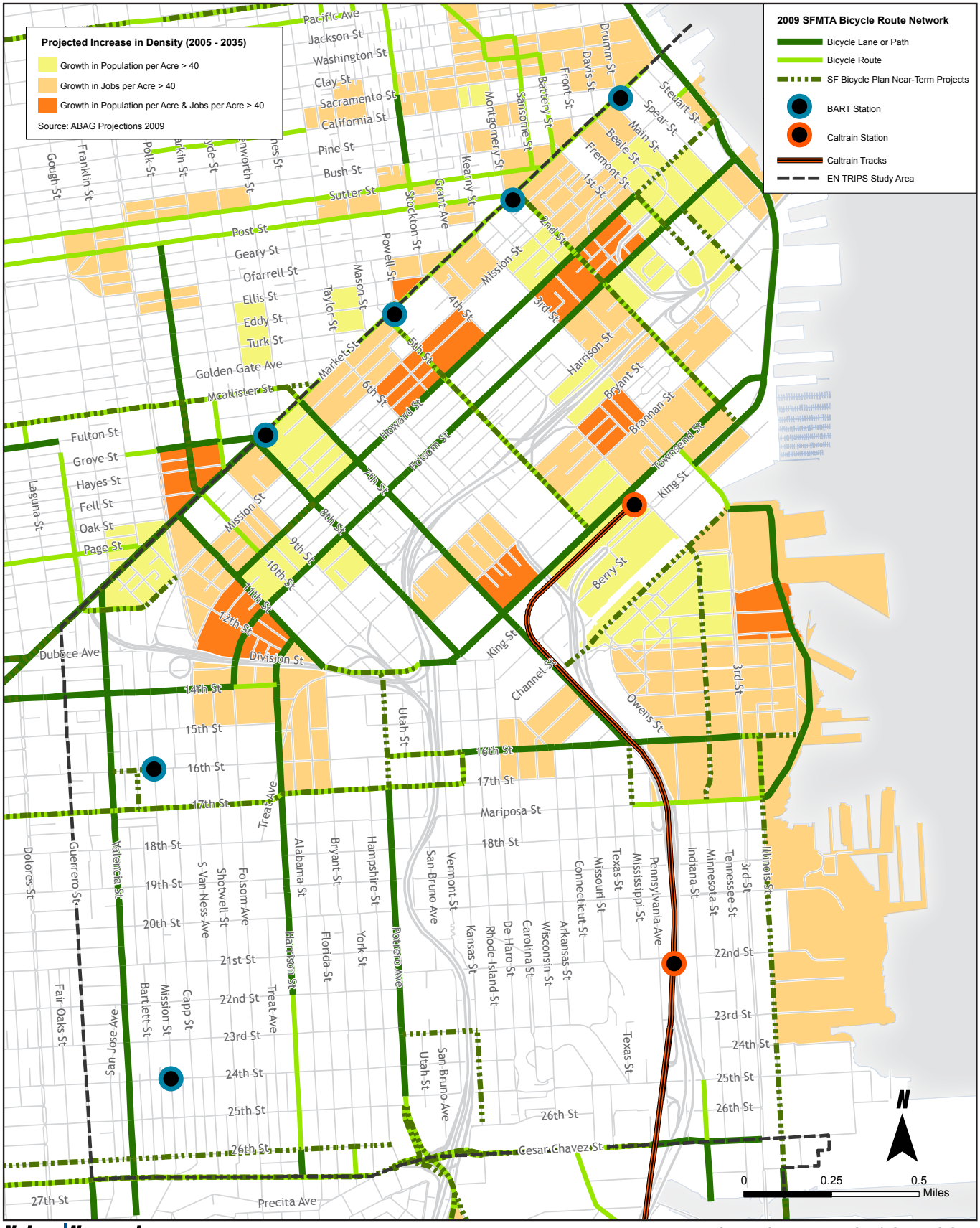
- Given projected population and employment densities, the existing pair of bicycle lanes on Folsom and Howard Streets will become an increasingly important path of travel both for trips east and west across the South of Market, and for trips to downtown San Francisco from neighborhoods to the south. The city may wish to consider buffering these lanes from growing traffic by making them separated bikeways.
- The Second and Fifth Street bicycle lanes, will provide improved access to parts of the Eastern South of Market and the Transbay District that will see substantial growth. These lanes will also serve to connect the Market Street corridor to the 4th and King Street Caltrain Station. Also important for providing Caltrain Station access is the Townsend Street bicycle lane, which will provide access from the east and west on a rebuilt Townsend Street.
- A planned extension of the Seventh Street bicycle lane across Market Street, connecting to a new bicycle lane on McCallister Street will provide an important connection between the bicycle network in the Western South of Market to the neighborhoods north and west of Market, including Civic Center, Hayes Valley, and the Haight.

Growing vehicle volumes may present challenges to cyclists in a number of areas. Given the 15 percent to 35 percent increases in vehicle volumes projected for the east-west arterials in the South of Market, the Folsom/Howard bicycle lane one-way couplet becomes a particularly important facility for cyclists. In the future, one or both of these facilities could be upgraded to provide a separated right-of-way for cyclists. Separated bicycle lanes, or cycle tracks, offer bicyclists a more comfortable riding environment. Additional innovative treatments, such as bike boxes or colored bicycle lanes, have been shown to reduce conflicts, enhance visibility, and improve safety.

Projected vehicle congestion may delay cyclists along several key routes in the South of Market, including Folsom Street, Fifth Street, and Eighth Street. Projected congestion along 16th Street at Potrero and aT–Third may also cause delay. On Third Street, there are large projected increases in vehicle volumes and traffic congestion, combined with projected capacity constraints for the T–Third. Given these potential constraints, bicycling may represent an attractive alternative for a portion of the 20,000 new daily trips projected to travel between the Central Waterfront/Mission Bay and the South of Market area and downtown.

Existing bicycle parking facilities in the study area may be a constraint to bicycling as total demand grows. Particularly in the South of Market, the Mission District, and in Mission Bay, additional bicycle parking may be required as demand grows. The Bicycle Plan will address some of the need through sidewalk racks, but additional capacity may be needed. On-street bicycle corrals offer a potential solution. Additional monitoring of bicycle parking in new developments might also be needed to ensure adequate bicycle parking facilities.

Figure ES-6 Existing and Planned Bicycle Network



Nelson\Nygaard consulting associates

Source: San Francisco City & County GIS

Summary of Transportation Needs and Opportunities

Both the physical constraints of the study area and the City's Transit First Policy preclude major expansions of roadway capacity as a strategy for dealing with projected vehicle volumes and congestion. Instead, the city has already begun exploring a variety of policy approaches to managing congestion. These strategies include: Smart Parking Management, Congestion Pricing, Transportation Demand Management, and expanded efforts at shuttle coordination. Each of these strategies is already under study, implementation or development, but potential exists to expand their application.

In addition to these policy strategies for managing or reducing vehicle congestion, maintaining and improving quality of life in the parts of the Eastern Neighborhoods that are poised for substantial growth will require the City to maintain and expand alternatives to travel by private vehicle. Investments could include:

- *Transit Priority Street treatments.* Already, major transit surface routes operate relatively slowly through the denser parts of the study area. In the future condition, major new traffic delays are projected on Third and Fourth Streets (affecting the 45 and the 30), on Division (affecting the 47 and the 9) and on 16th Street (affecting the 22 and the 9). Transit Priority Streets (TPS) and Bus Rapid Transit (BRT) improvements to stops including prepaid and level boarding could be used to reduce delay. However, to provide the level of capacity necessary to meet demand, it might ultimately be necessary to provide exclusively transit lanes.
- *New bicycle facilities.* Growing vehicle volumes may present challenges to cyclists in a number of areas. Separated bicycle lanes, or cycle tracks, offer bicyclists a more comfortable riding environment. Additional innovative treatments, such as bike boxes or colored bicycle lanes, have been shown to reduce conflicts, enhance visibility, and improve safety. In addition, in some corridors, it may be appropriate to prioritize certain bicycle lanes, or even set aside dedicated right-of-way to buffer bicycle networks from increased vehicle volumes.
- *Further developing comfortable pedestrian spaces.* These can include public open space as well as wider sidewalks, curb bulb outs, medians, pedestrian-scale landscaping, and other treatments.

As a result of the projected growth, there will be competing demands for space on South of Market streets. In addition to internal trips, there will also be a very large increase in travel to and from the South of Market area, and a large increase in pass-through trips. As a result of this growing travel demand, the South of Market arterial network may see large increases in vehicle volumes (15 – 35 percent on major east-west arterials), and increased congestion and delay at key intersections during peak times. Potentially costly delays are projected in the PM Peak on Harrison and Bryant Streets near the I-80 approaches, as well as along Third and Fourth Streets.

At the same time, density increases create the possibility of expanded pedestrian and bicycle travel in this area. About two thirds of these new internal trips (those inside the South of Market and between the South of Market and downtown) are projected to be made on foot. However, South of Market arterials were built to accommodate high volumes of regional traffic, and the major arteries in the South of Market area already present challenges for pedestrian comfort. To reduce the effects of new vehicle volumes on pedestrians and cyclists, and to encourage walking and bicycling for new trips, the City may wish to explore the following possible changes to the South of Market street network:

- The City may wish to select one or more arterial corridors for major improvements aimed at creating space that prioritizes the needs of pedestrians and cyclists, and that provides attractive public space. Of the east-west arterials, Folsom is a logical candidate for this type of investment because it is centrally located within the South of Market area, because (unlike Harrison and Bryant Streets) it is not a freeway approach corridor, and because it is the location for a portion of the increase in residential and employment density planned for the area. Changes to Folsom Street could include conversion to two-way operations; implementing a road diet or major traffic calming effort while maintaining one-way operations; adding wider sidewalks and/or separated bicycle facilities; and/or major investments in greening, pedestrian scale lighting, or other design treatments.
- For the other South of Market area arterials, a set of investments are available to improve pedestrian comfort and safety. Among the most important of these are the additions of signalized mid-block crossings in key locations to allow pedestrians more direct paths of travel. Other potential adjustments include completing crosswalks in areas where they are currently missing; the addition of more pedestrian-oriented design treatments, such as wider sidewalks, landscaping, and lights; and the traffic calming treatments at key pedestrian injury collision hot spots. In order to prioritize proposed street design projects and appropriately balance the needs of all modes, the EN TRIPS study team will develop a set of street design guidelines for South of Market arterials. Like the proposed street design framework created for the Mission Streetscape plan[1], these guidelines will be based on the Better Street Plan street typology, but will be tailored carefully to the particularities of the South of Market.
- It will be particularly important to invest in pedestrian amenities on corridors that provide paths of travel to important regional transit infrastructure. Townsend Street, which provides access to the Fourth and King Caltrain Station from the east and west, is an important candidate for improvement, as is Fourth Street, which provides access to that station from Market Street.
- The South of Market area's network of alleyways already provides pedestrians space that is separated from the high vehicle volumes on the arterial streets. Additional traffic calming treatments, addition of landscaping, or even innovative shared space treatments can help to turn these spaces into more attractive and useable public space. In addition, alleys that continue on either side of an arterial may be particularly important locations for new mid-block crossings.
- In order to better serve growing demand for bicycle travel, and to buffer cyclists from growing traffic volumes, the City may wish to expand and improve bicycle facilities in the South of Market. Given the 15 percent to 35 percent increases in vehicle volumes projected for the east-west arterials in the South of Market, the Folsom/Howard bicycle lane one-way couplet becomes a particularly important facility for cyclists. In the future, one or both of these facilities could be upgraded to provide a separated right-of-way for cyclists. The planned Second and Fifth Street bicycle lanes are crucial for completing the South of Market bicycle grid and connecting the growing Eastern South of Market area to Market Street and the Fourth and King Caltrain station. The planned extension of the Seventh Street bicycle lane across Market Street is also an important opportunity to better connect the South of Market area to the neighborhoods north and west of Market Street.

[1] The Mission Streetscape Plan is being lead by the San Francisco Planning Department's City Design Group. More detail is available here: http://www.sf-planning.org/ftp/CDG/CDG_mission_streetscape.htm

Outside of the South of Market area, several corridors face capacity constraints. These include the following:

- *16th Street* emerges from this analysis as a multimodal corridor of interest. As the only arterial that runs in the east-west direction and connects the North Mission, Showplace Square, and Mission Bay, this corridor is the focus of a number of competing demands. It will see increased vehicular volumes, and substantial delay is projected at two key intersections (Potrero Avenue and Third Street). The 22–Fillmore, which is planned to be re-routed so that it travels all the way to Mission Bay, may also face these delays unless transit priority treatments are completed. Finally, an extension of the 16th Street bicycle lane is planned to Mission Bay. At the same time, as part of the California High Speed Rail project, it has been proposed that 16th Street should be routed through an underpass under the Caltrain right-of-way. This plan would further constrain this high-demand corridor.
- *Third Street* is the primary arterial for the Central Waterfront and Mission Bay, connecting these growing areas to the South of Market and downtown. It also provides downtown access for the western side of Potrero Hill. In the future condition, expected growth in travel demand between these neighborhoods may result in substantially increased travel volumes on Third Street. This growth includes increased vehicle volumes, which are expected to generate major delays at the intersection of Third Street and 16th Street. Growth will increase demand for the T–Third light rail service, which is expected to have average loads exceeding 125 percent of total capacity during the PM peak hour. Having already invested heavily in the T–Third service and upgrades to Third Street, the City has few attractive options to increase capacity through this travel corridor.
- *On Potrero Avenue and Mission Street*, transit is expected to be over capacity. Even with assumed headways much more frequent than it is currently operating, the 9–San Bruno on Potrero Avenue is expected to have average PM peak hour passenger loads of more than 125 percent of capacity. The Mission District segment of the 49–Van Ness Mission faces the same challenge.

Areas with lower projected growth may also require pedestrian and public realm improvements. In addition to these key corridors, the pedestrian realm in other growth areas outside the South of Market may require improvement. These neighborhoods include the Central Waterfront, the north east Mission, and Showplace Square, where streetscape and pedestrian realm improvements are called for to improve the environment for new workers and residents. New streetscapes must be carefully designed to allow access for the trucks that businesses in these neighborhoods will require while maintaining safe conditions for pedestrians and cyclists.

The other neighborhoods in the study area also have pedestrian and public realm improvement needs, although many of these have been studied in detail recently through other ongoing planning efforts. The Mission Streetscape Plan and the Potrero Hill Traffic Calming Plan have developed and prioritized key street improvements for those neighborhoods. In the Central Waterfront/Mission Bay Area, the Mission Bay redevelopment plan, the Pier 70 Plan, and the Blue Greenway project would serve to reconnect the City to its waterfront. However, even with these improvements, deficiencies in the Central Waterfront sidewalk network would remain. In Showplace Square, key pedestrian considerations include an incomplete sidewalk network, as well as a lack of signalized crossings at 16th Street. For these other neighborhood-scale pedestrian improvement projects, the EN TRIPS project team will work to develop a prioritized list of needs.

Chapter 1. Introduction

The Eastern Neighborhoods Transportation Implementation Planning Study (EN TRIPS) is intended to develop transportation infrastructure improvements for the neighborhoods included in the Eastern Neighborhood Area Plans, adopted by the San Francisco Board of Supervisors in 2009.

San Francisco's Eastern Neighborhoods are made up of the diverse communities of the Mission, Eastern South of Market, Central Waterfront, and Showplace Square/Potrero Hill. A community planning process was initiated for these areas in 2001 with the goal of developing new zoning controls for the industrial portions of these neighborhoods. To support those new zoning controls, the Eastern Neighborhoods Area Plans were developed to identify at a high level the types of infrastructure improvements necessary to enhance livability, enable development intensity, and serve these changing neighborhoods. The transportation investments envisioned in the plans are designed to support integrated, mixed use, transit-rich neighborhoods.

To ensure integrated planning, the EN TRIPS study area also includes several adjacent neighborhoods, including the Western South of Market community planning area, the Transbay Transit Center District, the Mission Bay Redevelopment Area, Rincon Hill, and parts of the Mid-Market and Market-Octavia planning areas. This study area, pictured on Figure 1-1, includes nearly one-third of the city's land area, including some of the fastest growing neighborhoods in San Francisco.

EN TRIPS will address future transportation impacts of expected growth by identifying, designing, and seeking funding for transportation infrastructure projects timed to support growth in the Eastern Neighborhoods in the next 25 years. EN TRIPS is a coordinated multi-agency partnership led by the San Francisco Municipal Transportation Agency (SFMTA) with the San Francisco Planning Department (Planning Department) and the San Francisco County Transportation Authority (SFCTA). Specifically, EN TRIPS will:

1. Perform technical analysis to determine existing and future circulation needs based on land use growth/change
2. Select critical transportation projects
3. Determine conceptual designs for projects
4. Environmentally clear select projects
5. Develop funding and implementation strategy

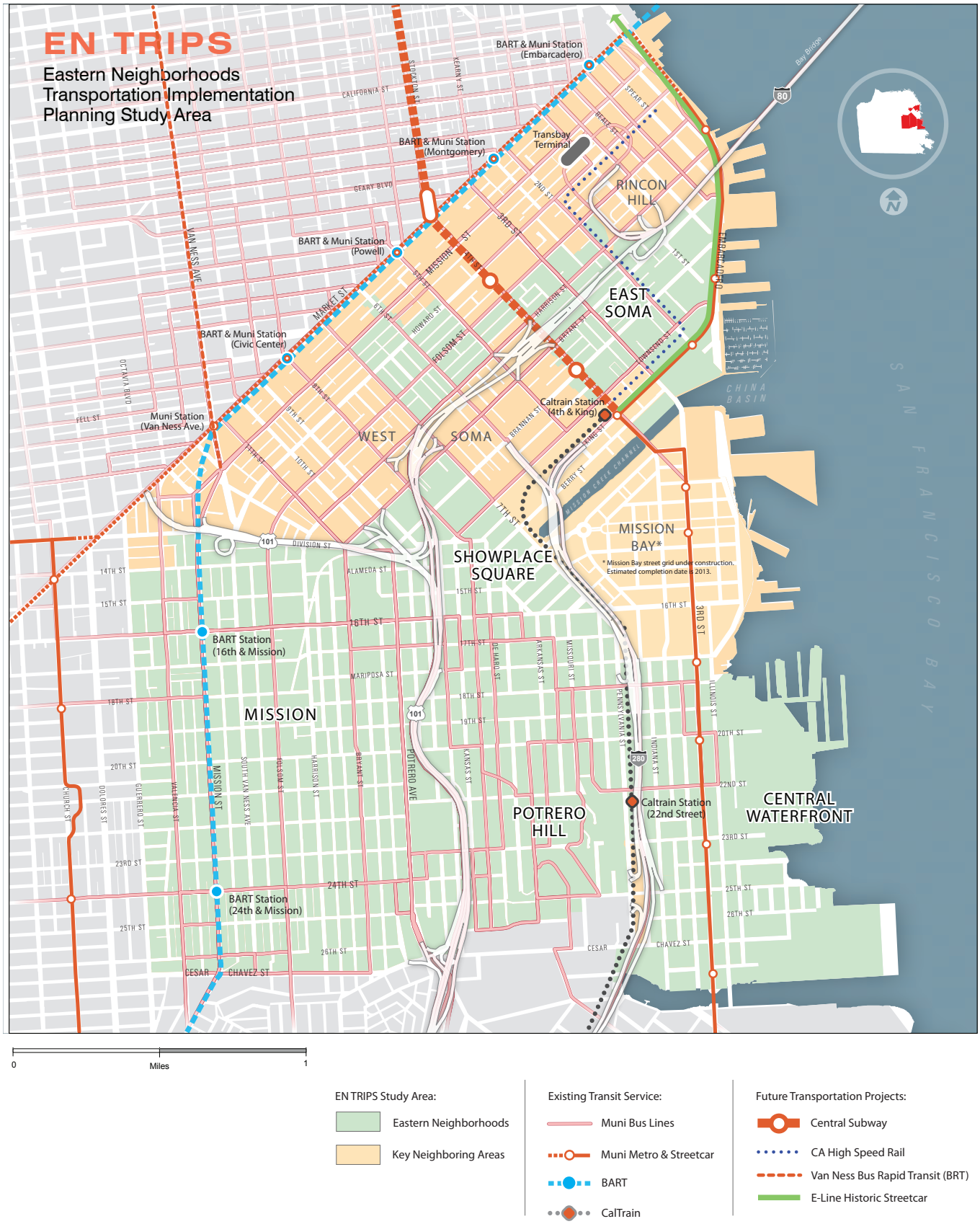
The process through which the EN TRIPS project team will select and design specific transportation improvement projects is detailed at the end of this report.

As the second major work product for EN TRIPS, this Future Conditions Report provides an assessment of the likely impacts of growth and change over the next 20 years on the transportation system in the Eastern Neighborhoods. It assesses potential changes in land use patterns and travel behavior and draws conclusions about the impact on the transportation system in light of the key existing issues and opportunities already documented. The horizon year for the purposes of identifying future needs is 2035, when the land use changes envisioned for the Eastern Neighborhoods and surrounding planning districts may be fully realized. While future conditions cannot be known with certainty, this report relies on the best tools available to present potential transportation system conditions in that future horizon year. Based on these projections, this report presents an assessment of the major transportation corridors in the study area for each mode of transportation, and for the system as a whole. The report includes the following sections:

- *Chapter 2* reviews expected land use change in the Eastern Neighborhoods, including growth in population and employment. This growth includes not only the land use change expected as a result of the Eastern Neighborhoods area plans, but also in adjacent planning areas, in the City of San Francisco as a whole, and in the San Francisco Bay Area. The projections are based on the population and employment allocations from the Association of Bay Area Governments (ABAG Projections 2035), and are modified by the San Francisco Planning Department to reflect the city's best current understanding of expected land use change.
- *Chapter 3* reviews overall travel demand projections. The projections of travel behavior presented here, including overall trip volumes, trip-making patterns, and mode splits, are projections from SF-CHAMP, the travel demand model maintained by the SFCTA.
- *Chapter 4* provides a circulation and operational needs analysis. It assesses the likely impact of growth and changing travel behavior on the performance of existing facilities for each mode of transportation in the Eastern Neighborhoods, noting key capacity constraints and other expected new problems for each mode in light of existing issues. It reviews the impact of growth on motor vehicle conditions, assessing potential vehicle volumes by corridor, and then presents a set of projections for intersection level of service in the South of Market and on 16th Street. It reviews transit conditions, focusing on growth and capacity issues for SFMTA's Muni service. Finally, this chapter reviews projected conditions for non-motorized transportation in the Eastern Neighborhoods, including pedestrian and bicycle travel. It then summarizes the key systemwide issues that will guide the upcoming phases of the study.
- *Chapter 5* presents a summary of findings, including potential transportation investment opportunities.
- *Chapter 6* presents next steps for EN TRIPS, noting the process that will be followed to select, prioritize, and design transportation investments for the Eastern Neighborhoods.

Following publication of this report, in collaboration with community stakeholders, the EN TRIPS project team will then recommend, design, and develop implementation plans for priority transportation improvements. It should be noted that the current recession has slowed projected growth in the Eastern Neighborhoods and it is not clear that 2035 represents a "build out" target for development in the study area. However, by using 2035 as the build out year, it is possible to project future needs assuming full development in the Eastern Neighborhoods along with robust development in other areas of the city that will contribute to transportation issues within the study area.

Figure 1-1 EN TRIPS Study Area



Existing Issues for the Eastern Neighborhoods Transportation System

This Future Conditions report is the second major deliverable for EN TRIPS. It builds on the EN TRIPS Existing Conditions Report, relying on projections of land use and travel behavior as described by the city's SF-CHAMP transportation demand model. The Existing Conditions Report catalogued existing transportation needs in the Eastern Neighborhoods by neighborhood plan area and by mode of transportation. From this assembled information, a group of core themes emerged as issues and opportunities for the study area as a whole. These findings reinforce and build upon the major transportation needs identified through the Eastern Neighborhoods Area Plans. The issues are as follows:

Built and operated to accommodate high volumes of regional traffic, the major arteries in the South of Market area present challenges for pedestrian and transit rider comfort. There are opportunities to create more livable streets in the South of Market while maintaining the grid's role in regional transportation. The types of transportation investments needed to make the South of Market more livable are easy to recognize: narrower streets and wider sidewalks; more frequently spaced street crossings; transit-only lanes to speed buses; landscaping and pedestrian scale lighting would all make a difference. However, there is a tension between these needs and the South of Market street grid's role in the regional transportation system, distributing traffic from the Bay Bridge to downtown and to the rest of San Francisco. While congestion management strategies such as congestion pricing or smart parking management may one day help to reduce Bay Bridge traffic volumes, the South of Market grid will continue to receive high traffic volumes for the foreseeable future. In selecting pedestrian priority investments in the South of Market, potential impacts on regional auto circulation and local transit service must be carefully considered.

Even in designated transit-priority corridors, Muni's most important routes operate relatively slowly. Transit priority investments and operational adjustments will be crucial to maintaining and enhancing the performance of the overall transportation system. Local bus services fill an essential role in the Eastern Neighborhoods, bridging the gap between shorter trips that can be well-served by improvements to pedestrian and bicycle infrastructure and the longer trips that will be served by improvements to regional transit infrastructure. Transit-priority treatments can be relatively inexpensive and incremental in nature; yet the cumulative impact of many small changes over the course of a route can be substantial. The Transit Effectiveness Project set a goal of 15 to 20 percent improvement in travel times for Muni's busiest routes using measures such as transit lanes (continuous or "queue jumps" at intersections), traffic signal priority, "bulb-out" sidewalk extension stops, and a policy of "proof-of-payment" all-door boarding at major stops facilitated by ticket vending machines. Major stops might also offer an enhanced level of passenger amenity and improved multimodal access, including bicycle lockers. Stop consolidation could also benefit many routes.

In constrained rights-of-way, transit priority can negatively impact other vehicles. Buses may stop in travel lanes, may be provided with priority at signals, or may be given their own lanes. These measures can impact not just autos, but delivery vehicles, and balancing the competing needs of transit riders and other users can be challenging. City policy, however, is clear: San Francisco is a "transit-first city" in which transit and non-motorized modes are to be prioritized in decisions related to allocation of rights-of-way.

The regional-scale rail service investments planned for the Eastern Neighborhoods create both opportunities and challenges. To realize maximum benefit and mitigate negative impacts, there will be a need for complementary smaller-scale investments near stations and along rail corridors.

While the Eastern Neighborhoods stand to benefit greatly from the increased access to be provided by Muni's Central Subway, the Downtown Rail Extension and California High-Speed Rail, these projects also create challenges for the neighborhoods where they will be built. Local transit and people walking or biking must be able to come and go in large numbers from the station.

In sub-neighborhoods throughout the Eastern Neighborhoods plan area, the public realm could benefit from additional investment. Streetscape improvements can help improve the quality of life for residents, workers, and visitors. Streetscape improvement opportunities are particularly apparent in the transitioning industrial areas, where pedestrian facilities may simply be lacking at present. Notable opportunities include: The eventual build-out of the Central Waterfront's pedestrian grid in coordination with private development, and the completion of the Blue-Greenway could help open the City's eastern Waterfront to public enjoyment. Even in established residential neighborhoods such as Potrero Hill and the southern parts of the Mission, recent community planning efforts have catalogued needed pedestrian and traffic-calming improvements. Continued efforts by diverse City agencies will be required to ensure that these projects are implemented.

Physical and visual obstacles such as elevated freeways, railroad tracks, wide arterials, and natural barriers divide neighborhoods. In some cases, transportation projects can help to mitigate these barriers. Steep hillsides (in particular, both the eastern and western slopes of Potrero Hill), freeways (Interstates 80 and 280 and U.S. 101, including the Central Freeway), and the Caltrain tracks and yard north of 16th Street both define and divide the Eastern Neighborhoods. Freeways, in particular, can serve as barriers not just along the mainline roadway but at the touchdown points where on- and off-ramps intersect with the surface street grid, and where pedestrian crossings are often prohibited or problematic. The Bay Bridge Approach, as previously noted, is porous – yet the viaduct is a wide structure that casts long shadows and degrades the pedestrian environment. Between Beale and Second Streets, it forms a wall between the Rincon Hill and South Beach neighborhoods. The surface grid itself can also sometimes serve as a barrier where streets are especially wide, blocks are especially long and pedestrian paths are limited, as is the case throughout South of Market.

The Eastern Neighborhoods remain the industrial heart of San Francisco. Even as neighborhoods change, the heavy and light industry businesses that provide nearly 30,000 jobs in Eastern Neighborhoods plan areas will continue to require delivery trucks of all kinds. Accommodation of freight deliveries over highways and local streets is an economic imperative for the city. In districts that are transitioning from traditional industrial areas to mixed-use neighborhoods, including much of South of Market, the northeastern Mission, Showplace Square and the Central Waterfront, resolution of tensions between established users and new residents can require a delicate balancing act of competing concerns. It should be noted that these themes address existing issues without regard to the impact of changing land uses, which will be explored in subsequent tasks. However, in most cases, changing land uses are most likely to exacerbate existing conditions. As EN TRIPS proceeds to future conditions analysis, an understanding of these study area-wide challenges will guide project development.

Chapter 2. Projected Population and Employment Growth

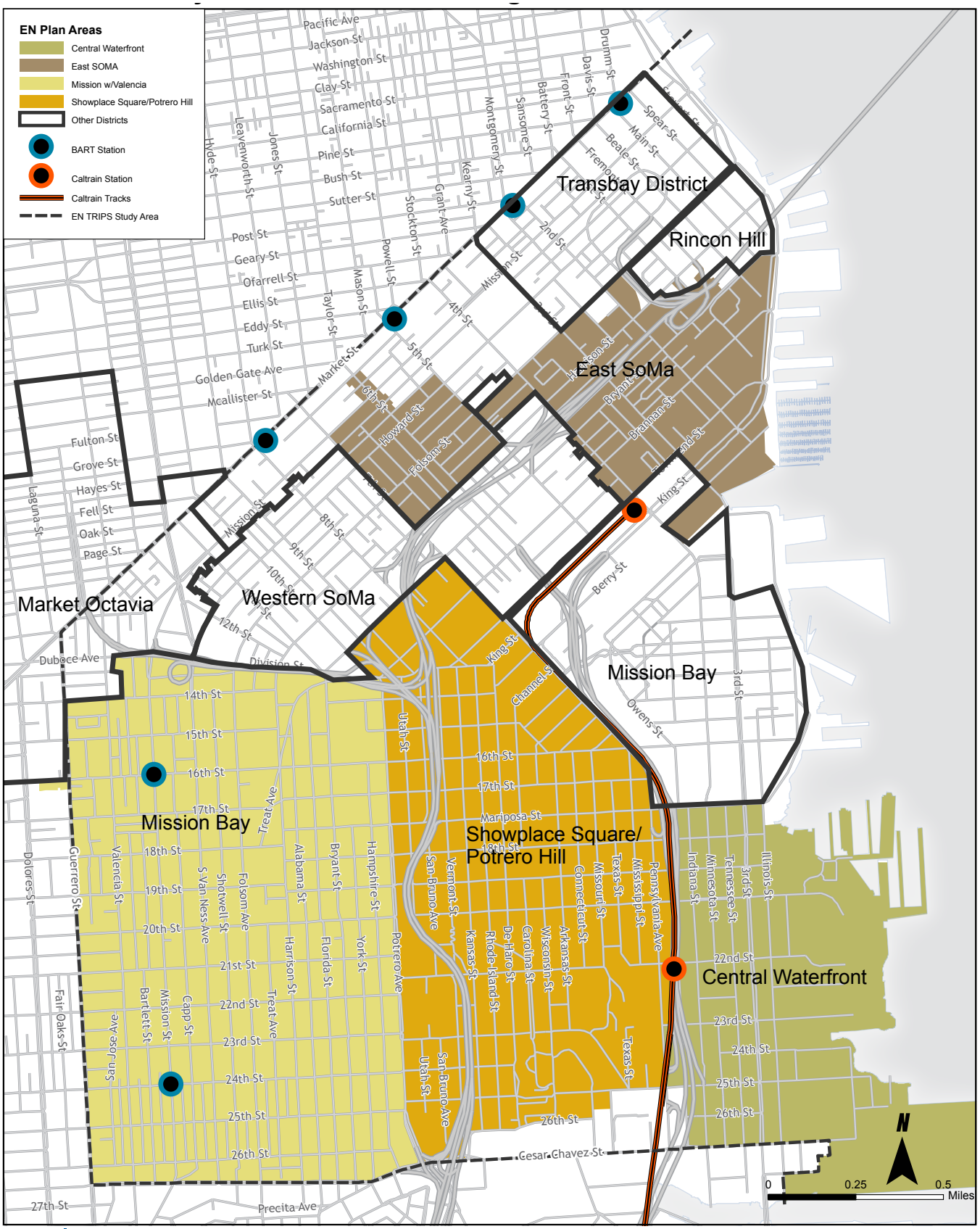
This chapter presents recent changes in land use regulation and projected changes in population and employment in the study area by 2035. In addition to population growth and increases in employment resulting from expected economic growth, a number of planning efforts have recently changed zoning in the study area, permitting new businesses and households that might not otherwise have located in San Francisco. These zoning changes are described in detail below. Population and employment projections are based on the allocations from the Association of Bay Area Governments (ABAG), and are modified by the San Francisco Planning Department to reflect the City's best current understanding of expected land use change. [1]

Recent Changes in Land Use Regulation

The Eastern Neighborhoods Area Plans (including the Eastern South of Market District, the Mission District, Showplace Square/Potrero Hill, and the Central Waterfront), adopted in 2009, made zoning changes to some but not all of the EN TRIPS study area. In addition, several major land use development plans for areas within the study area (but separate from the Eastern Neighborhoods land use plans themselves) will result in growth. These include the Western South of Market community planning area, the Transbay Transit Center District, the Mission Bay Redevelopment Area, and Rincon Hill. The Eastern Neighborhoods themselves, as well as the adjacent planning districts, are illustrated in Figure 2-1.

[1] ABAG Projections 2009, adjusted by the San Francisco Planning Department

Figure 2-1 EN TRIPS Study Area Land Use Planning Districts



Nelson\Nygaard consulting associates

Source: San Francisco City & County GIS

Zoning changes implemented as a result of the Eastern Neighborhoods Area Plans include:

Eastern South of Market: Along the Sixth Street corridor, the land use plan encourages small-scale neighborhood serving uses. On the Folsom Street Corridor between Sixth and Third Streets, the plan aims to permit increased housing development, as well as limited office and retail for projects that also include housing. For Second Street and the surrounding alleys, the plan encourages continued development of medium and large office as a "secondary office reservoir" for downtown. This designation is consistent with a vision for downtown office development that includes movement south from what has traditionally been the Financial District. These changes are illustrated in Figure 2-2.

Mission District: In the Mission District, the plan enacted a mix of adjustments to land use controls in certain areas combined with large areas of continuity. Along the Mission and Valencia Street corridors, the plan encourages transit-oriented neighborhood commercial development with housing and small office above. Land use controls for the 24th Street corridor are intended to maintain its existing character. Controls for the south Mission between Capp Street and Potrero remain largely unchanged, preserving the existing residential character. The north east Mission, between 20th and Division Streets, currently includes a mix of uses including substantial PDR. Land use controls were adjusted with the intention of largely retaining this character while permitting limited new housing development. On 16th street between Capp and Bryant, more flexible land use controls will permit denser new housing development. These changes are illustrated in Figure 2-3.

Showplace Square/Potrero Hill: The Area Plan for this neighborhood retains the Potero Hill residential area as small-scale residential. The Potrero Hill public housing development will be redeveloped through the HOPE SF program, adding some new residential density. Along the 16th and 17th Street corridors (particularly the south side of the 16th Street corridor), new housing and commercial development will be permitted alongside existing PDR. In the core Showplace Square design district, the plan permits a limited amount of new retail and office, but prohibits residential. North of Division Street, the plan permits new housing and mixed use development. These changes are illustrated in Figure 2-4.

Central Waterfront: The Central Waterfront Area Plan envisions a mix of changes. North of 22nd Street, the plan permits both new housing and mixed use development, along with bioscience and office development associated with Mission Bay. By contrast, in the Dogpatch neighborhood, land use controls encourage some new housing and mixed use development while excluding new office. Along the Third Street commercial and transit corridor, the plan envisions continued mixed use development. The southern portion of the district is set aside as a PDR development district, prohibiting residential development. Pier 80 is expected to continue to function as a manufacturing zone and port. The Pier 70 site has been proposed for mixed use redevelopment. These changes are illustrated in Figure 2-5.

Figure 2-2 Eastern South of Market Generalized Zoning Districts

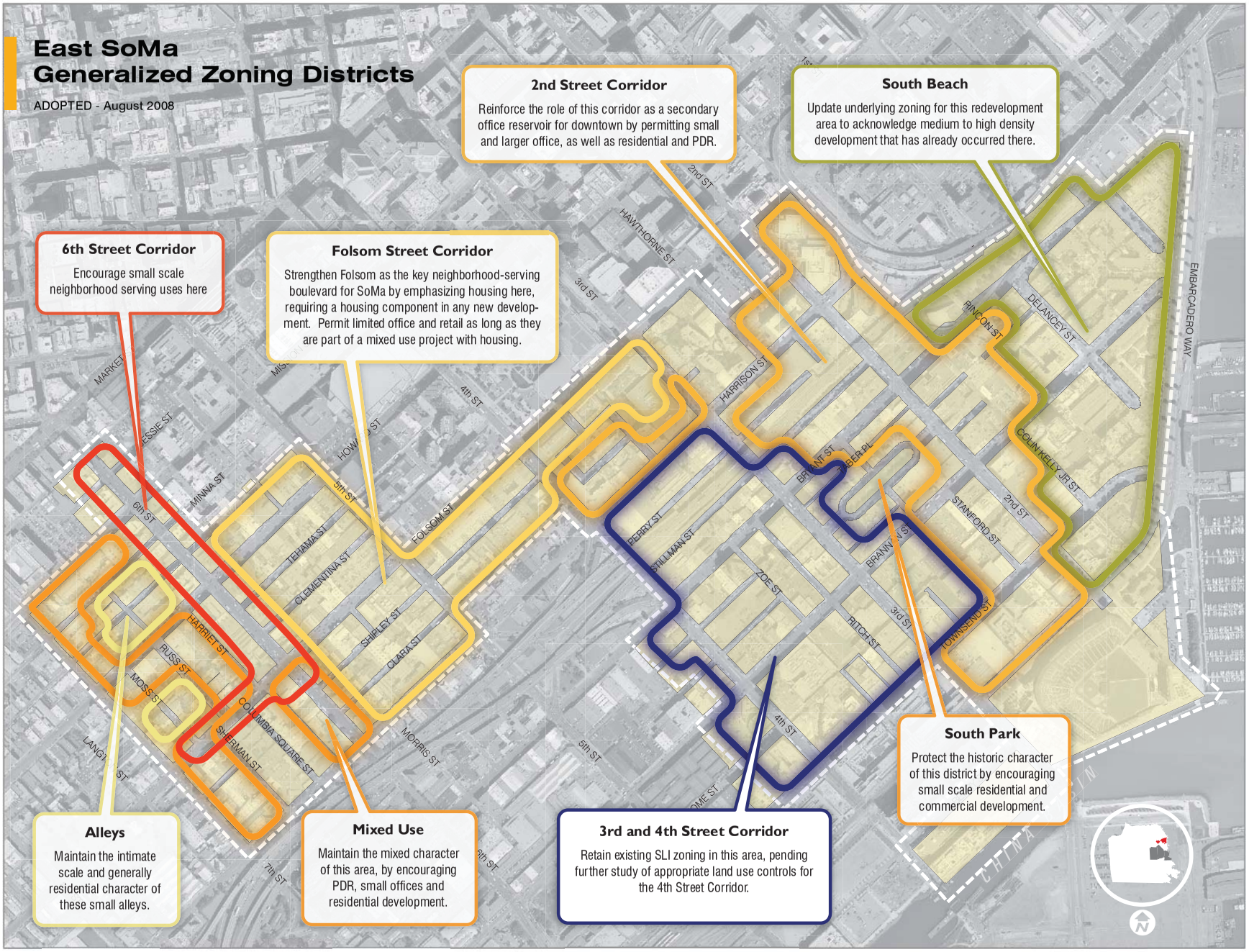


Figure 2-3 Mission District Generalized Zoning Districts

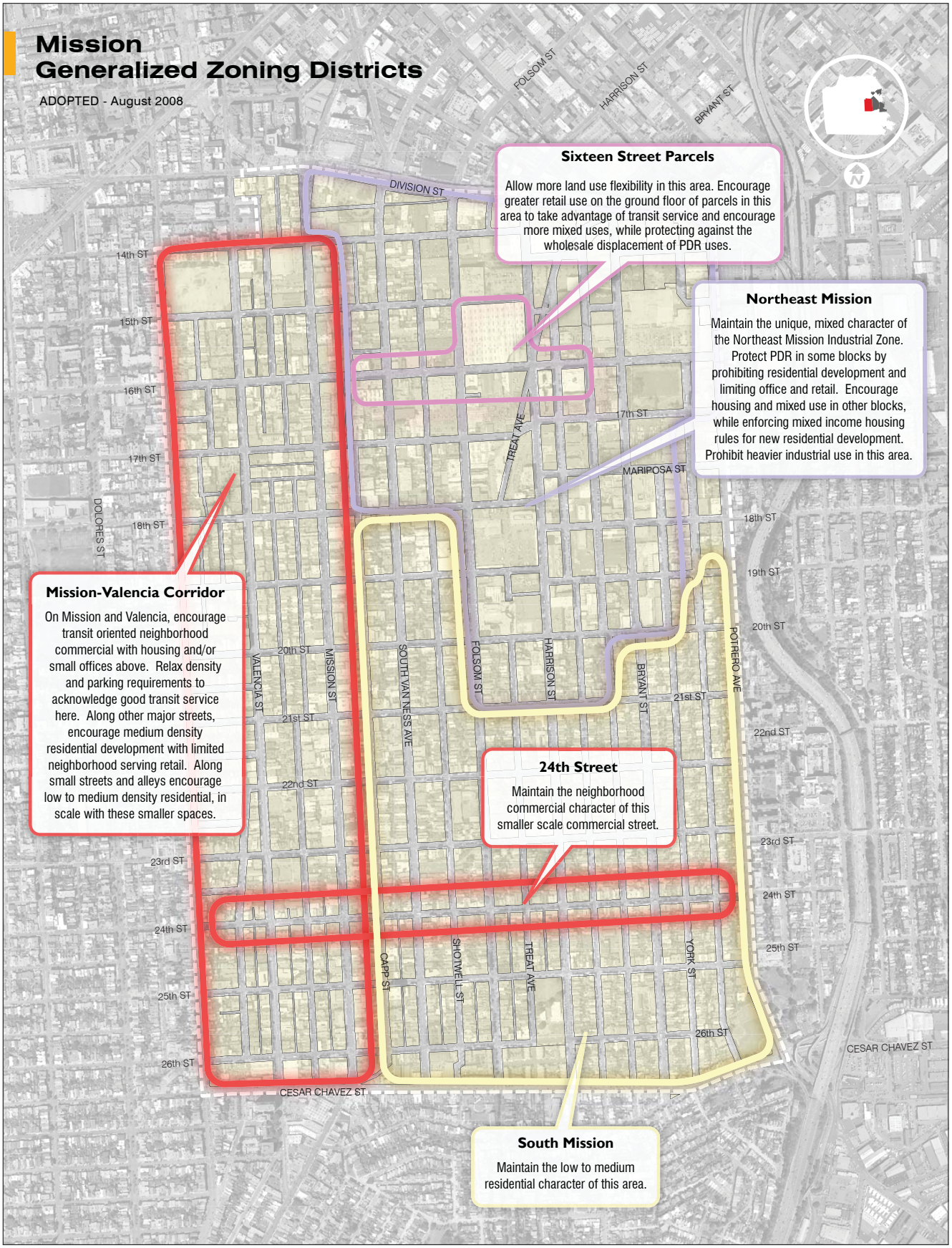


Figure 2-4 Showplace Square/Potrero Hill Generalized Zoning Districts

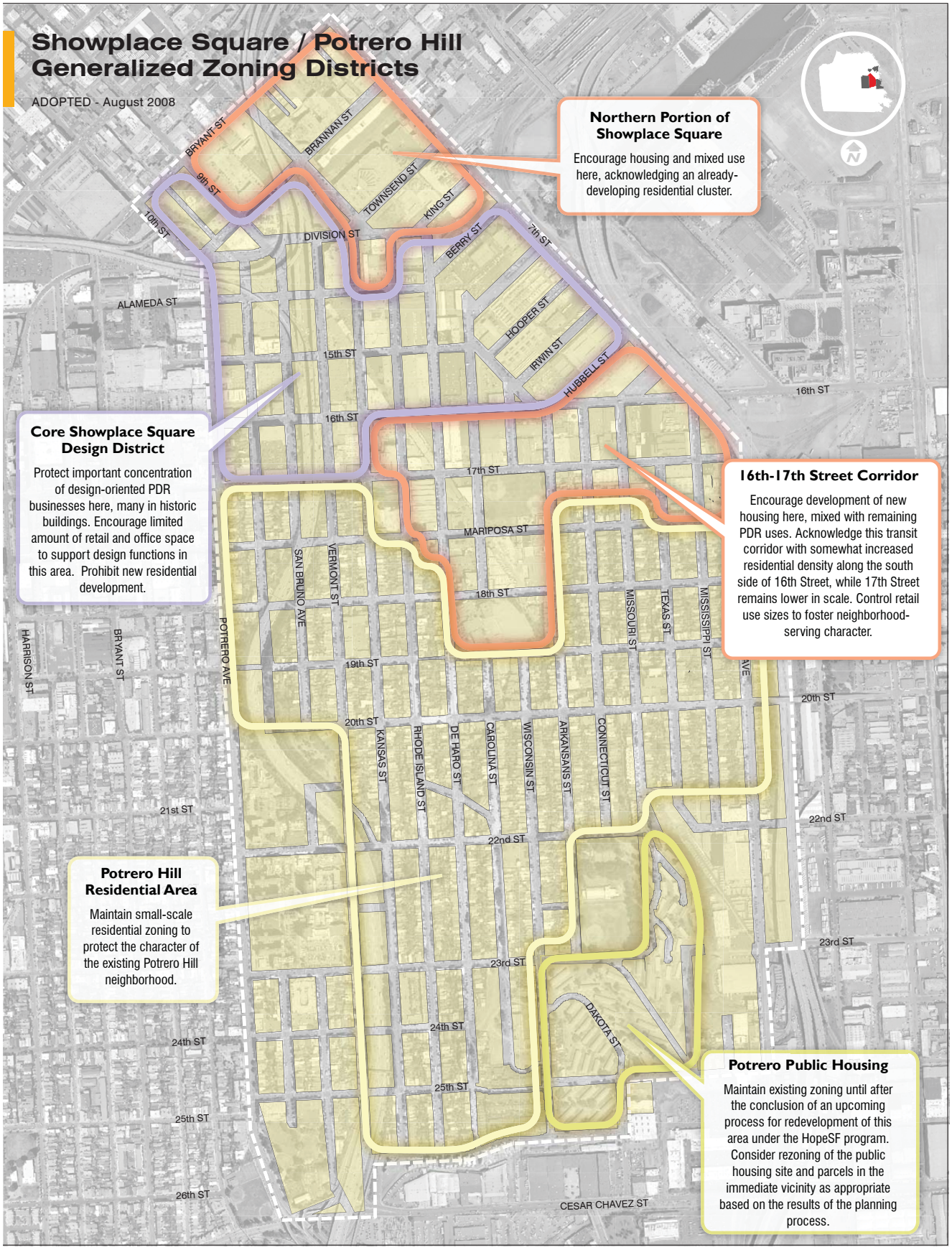
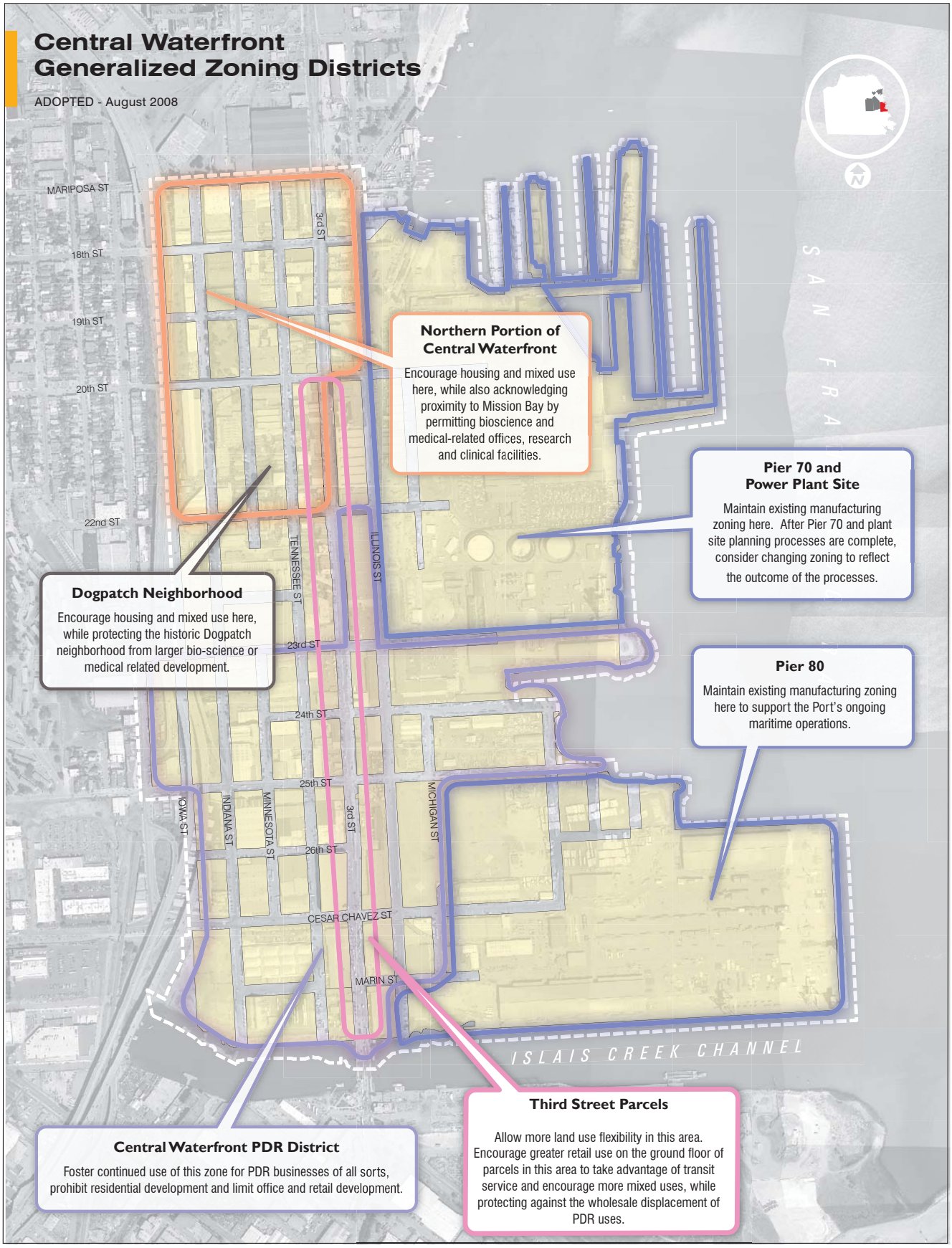


Figure 2-5 Central Waterfront Generalized Zoning Districts



In addition to the Eastern Neighborhoods Area Plans, the following major planning areas are also located inside (or partially inside) the EN TRIPS Study area:

- **Western South of Market Community Plan Area:** The Western South of Market neighborhood, defined as the area between Fourth and 12th Streets and Howard and Townsend Streets, has been the focus of a Community Plan process that envisions land use and transportation changes to improve livability in the neighborhood while preserving its historical character. Created through a multi-year process led by the Western SoMa Citizens Planning Task Force, the Western SoMa Community Plan includes changes to the zoning in the area, preserving the Western South of Market as a mix of small-scale PDR and other uses while permitting substantial new residential development. The Plan also includes land use regulation and transportation investments designed to support the designation of Folsom Street as a Civic Boulevard and a center for neighborhood-serving retail.
- **Transbay Transit Center District:** The Transbay Transit Center will replace the existing Transbay Terminal at First and Mission Streets, serving as the transfer point for regional bus service and the eventual terminus of Caltrain and California High Speed Rail. The Transbay Transit Center District is the area around the Transit Center site. It is defined as the area between Market and Folsom and Hawthorne and Steuart Streets. A redevelopment plan for the district proposes more than 2.5 million square feet of new office and residential uses permitted above existing zoning.
- **Rincon Hill:** Rincon Hill is a historically industrial district just to the north of the Bay Bridge approach that has recently begun to undergo high-rise residential redevelopment. Generally bounded by Folsom Street, the Embarcadero, the Bay Bridge approach and the Fremont/Folsom Street off-ramp from Interstate 80, it is a relatively small area – approximately 55 acres – yet under the Rincon Hill Plan, approved by the City in 2005, it could eventually be home to as many as 10,000 residents, giving it a population density greater than that of the Tenderloin, Chinatown, or likely any U.S. neighborhood west of Chicago.
- **Mission Bay:** Mission Bay is a 303-acre redevelopment site bordered by South of Market, the waterfront, the Central Waterfront district, and Interstate 280. At buildout, Mission Bay is planned to include 6,000 units of housing (1,700 of them below market rate), 4.4 million square feet of office and R&D space, 500,000 square feet of retail, a 500-room hotel, 41 acres of open space, and community facilities including a 500-student public school, a library, and police and fire stations. The UCSF Mission Bay campus will feature an additional 2.65 million square feet of building space, and its hospital is currently planned to offer 289 beds in its first phase, scheduled to open in 2014. To date, about one-half of the housing and one-third of the office and R&D space has been built, and four major biomedical research buildings, a community center, housing and a parking garage have been constructed on the UCSF campus.

Projected Employment and Population Growth

As a result of the land use regulation changes described above, the EN TRIPS study area will see a large increase in its population and employment in the next 25 years. Population and employment projections are based on the allocations from the Association of Bay Area Governments (ABAG), and are modified by the San Francisco Planning Department to reflect the City's best current understanding of expected land use change. [2]

[2] ABAG Projections 2035, adjusted by the San Francisco Planning Department

Projected Population Growth

The total population of the study area in 2035 is expected to be just over 158,000, an increase of 56,000 (or 35 percent) from the 2005 total. Figure 2-6 displays projected population growth for each district within the study area, while Figure 2-7 illustrates the projected increase in population density by Transportation Analysis Zone (TAZ). Important growth areas are as follows:

- The South of Market area is expected to have very large increases in population and population density. Total growth in the South of Market District broadly defined is expected to exceed 35,000 new residents, more than doubling the existing total, and representing more than 60 percent of the overall absolute population growth. A relatively small share of this growth (5,000 new persons) is projected to occur in the Eastern South of Market Neighborhood Plan area. The rest will occur in the adjacent planning areas.
- Within the South of Market area[3], there is substantial variation from block to block in projected growth. One important area of growth is the area east of Third Street between Mission and Bryant Streets, including the greatest densification in the Transbay District (9,000 persons) and Rincon Hill (4,000 persons).
- The Western End of the South of Market will also see substantial increases in population density, particularly the area west of Seventh Street between Market and Harrison. The Western South of Market Neighborhood Planning Area as a whole will include a total of 9,000 new residents.
- The area adjacent to the Fourth and King Caltrain Station (stradling the Western SoMa, Eastern SoMa, and Mission Bay planning areas will also see increases in population density. The region extending both south and west from the Caltrain station, extending into the northern portions of Showplace Square and Mission Bay, constitute a significant new population center in the Study area.
- The Mission District, which is home to just over half of the EN TRIPS study area's present population, is expected to have relatively little population growth. Portions of the Mission/Valencia corridors adjacent to the 16th Street BART station and near 21st Street may see increases in population, but the overall increase is expected to be less than 5,000 new residents.
- Potrero Hill will also see only a small increase in population. The only area projected to have a large increase in residential density is around the public housing development in the south portion of the neighborhood, where the HOPE SF redevelopment may result in substantial increases in residential density.[4]
- Beginning from a very low base, the Central Waterfront area will more than double its population with the addition of just under 2,000 residents. While this is a major increase relative to the current population, densities remain relatively low in that area. Additional population growth could occur at the site of the existing Potrero Generating station if and when that facility closes.

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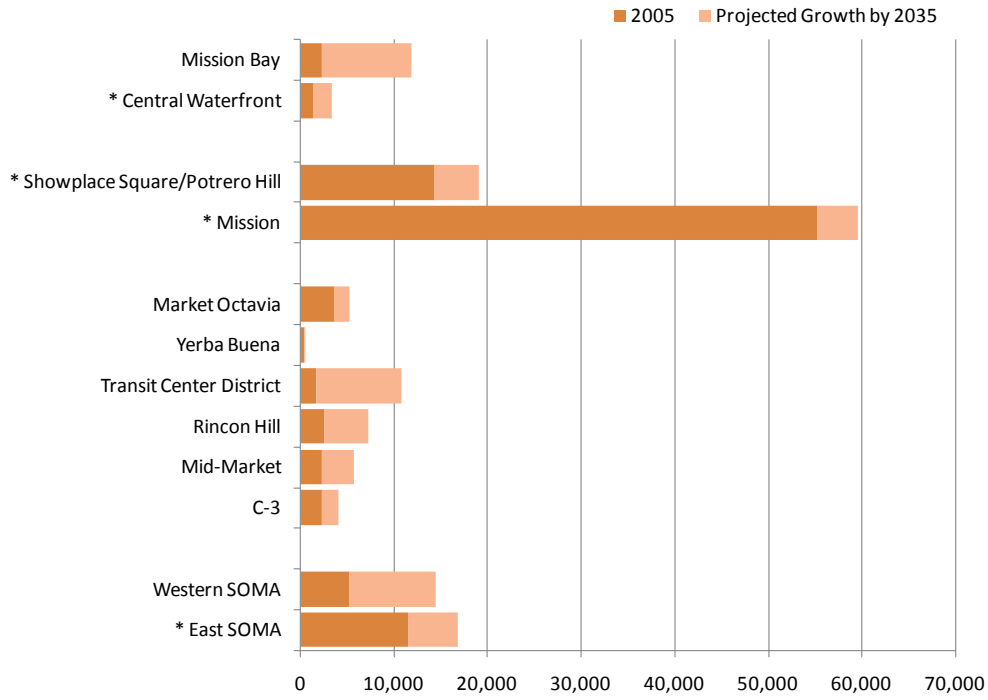
[3] For this report, the term “South of Market” includes the entire area from 11the Street to the Embarcadero and from Market Street to the boundary of Mission Bay. It includes not only the East and West South of Market Planning areas, but also the Transbay District, Rincon Hill, and Portions of Mid Market and Market Octavia.

[4] The Mayor's Office of Housing is leading a community process to establish a new site plan for the HOPE SF project in Potrero Hill. The proposed project will replace the existing 660 public housing units with between 1,400 and 1,700 units on the 33 acre site. The new units will be a mix of subsidized and market-rate housing. The developer also proposes creating new street grid to tie the development to the surrounding neighborhood, which will include new vehicular connections, as well as bicycle paths and accessible pedestrian paths. Under TEP recommendations, the development will be served by Muni route 12-Pacific, providing service along Wisconsin Avenue, with connections to Mission Bay, Caltrain, and downtown.

Figure 2-6 Projected Population Growth by District, 2005 - 2035



Source: ABAG Projections 2035
* Indicates an Eastern Neighborhoods Area plan neighborhood

Figure 2-7 Projected Increases in Population Density (2005-2035)

Nelson\Nygaard consulting associates

Source: San Francisco City & County GIS

Employment Growth

Total employment in the study area in 2035 is projected to be just less than 302,000, an increase of 104,000 (or 53 percent) from the 2005 total. Figure 2-8 displays projected employment for each district within the study area, while Figure 2-9 illustrates the projected increase in employment density by Transportation Analysis Zone (TAZ). As with population, the largest increases in employment densities are projected to occur in the South of Market area. Important centers of employment growth include:

- Large amounts of downtown office development are expected in the area east of Third Street and just south of Market Street. The Transbay Transit Center District, currently the zone with by far the highest employment density (with almost 78,000 jobs in five square blocks), is expected to add a further 26,000 jobs by 2035.
- The rest of the South of Market area will add 25,000 jobs by 2035. Some of the largest South of Market area employment increases outside of the Transbay District are projected in the mid-market area, adjacent to Market Street between Seventh and Fifth Streets. Another area of employment growth is projected along Bryant, Brannan, and Townsend streets, between I-80 and the Caltrain right-of-way.
- Outside of the South of Market area, another important area of projected employment growth is in Mission Bay, which is projected to add 25,000 jobs. An important component of this development will be the expansion of UCSF Medical Center at Mission Bay. Travelers to and from this site will include visitors and patients as well as workers.
- Large increases in employment density are also foreseen along the waterfront south of Mission Bay. As a whole, the Central Waterfront neighborhood plan area is projected to grow by about 15,000 jobs. A large share of this growth is expected to come as a result of the planned redevelopment of Pier 70. The Port of San Francisco's recently completed Pier 70 Preferred Master Plan would add an additional 6,000-8,000 new employees within approximately 3.7 million square feet of Office, R&D and light industrial development.
- Extending west from Mission Bay along the 16th Street corridor, employment growth is also anticipated in the southern part of Showplace Square and in the northern portion of the Mission District. As a whole, the Mission District will add 8,000 new jobs, and Showplace Square/Potrero Hill will have relatively little growth, with fewer than 3,000 new jobs.

Of these 104,000 new jobs, three quarters are projected to be in the management, information, and professional services sectors. Workers in this sector would be expected to commute mostly during peak periods, putting additional stress on transportation facilities. However, some may have the flexibility to adjust work schedules or to telecommute in response to peak-period congestion, price incentives, or other transportation demand management policies. About half of the remaining employment growth is projected retail sector (16,000 new jobs), while Medical, Visitor, and Cultural/Institutional/Educational Services sectors will combine to add a total of 16,000 new jobs. The Production, Distribution, and Repair sector is expected to see a net loss of about 1,600 jobs.

Figure 2-8 Projected Employment Growth by District, 2005 - 2035

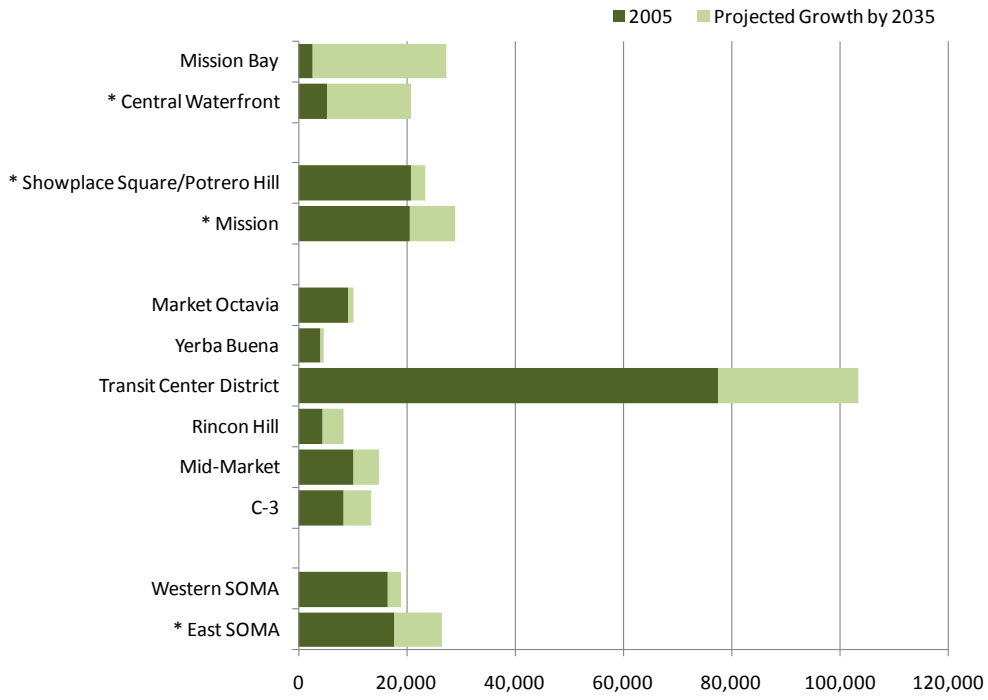
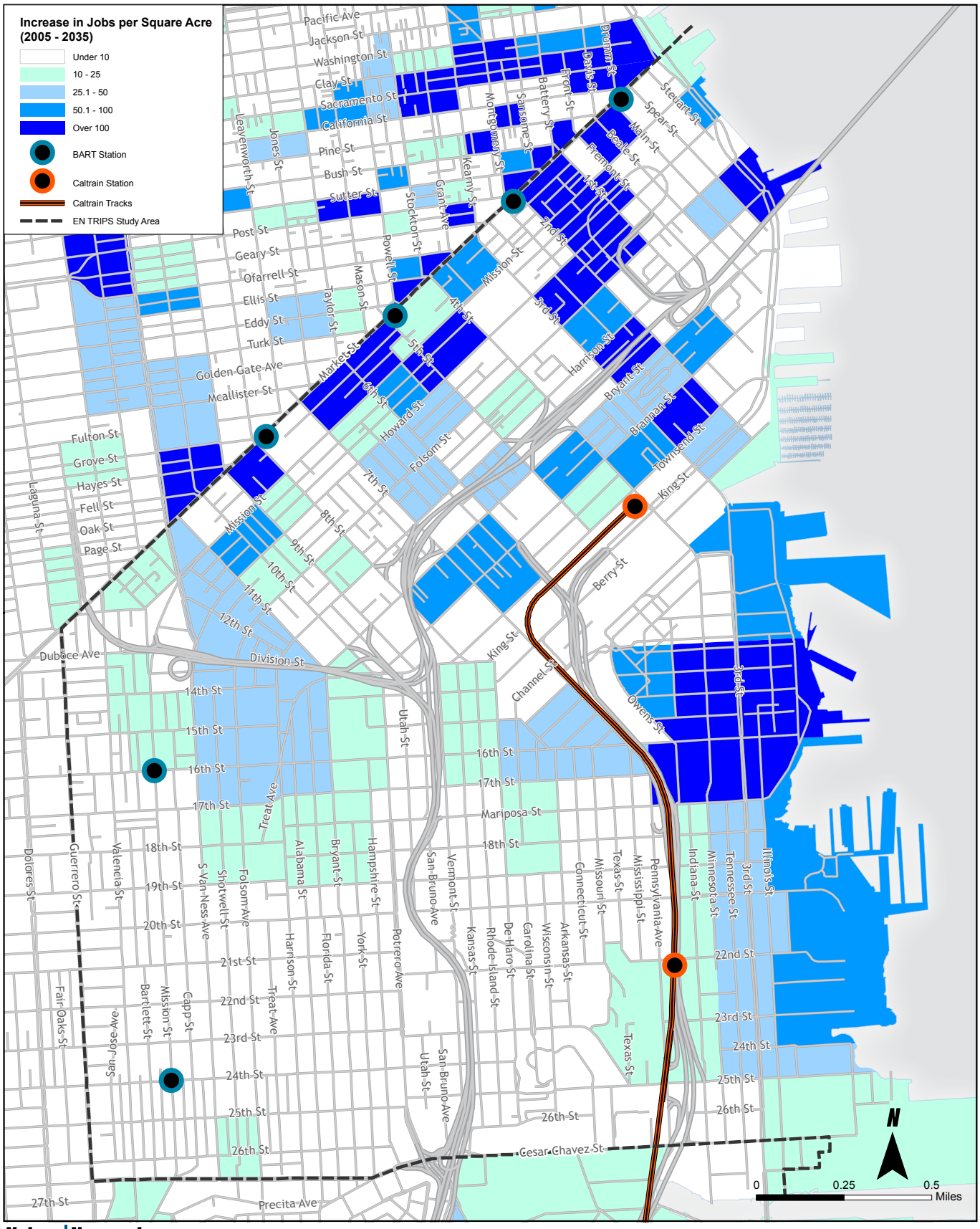


Figure 2-9 Projected Increases in Employment Density (2005-2035)



Nelson\Nygaard consulting associates

Source: San Francisco City & County GIS

Combined Population and Employment

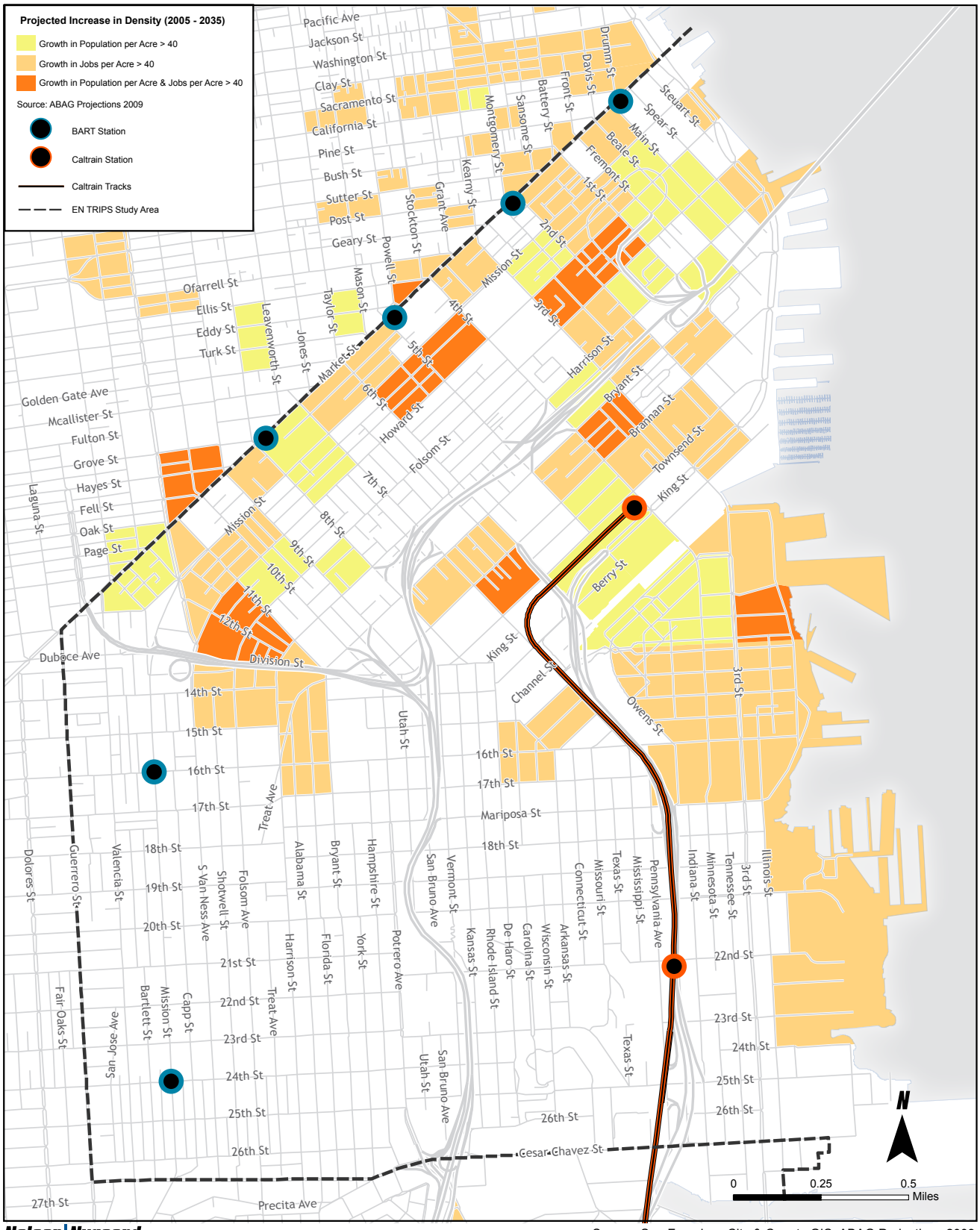
Figure 2-10 illustrates the areas with large projected increases in both population and employment density. TAZ's with projected increases of at least 40 persons per acre or 40 jobs per acre are highlighted.

It emphasizes that the South of Market generally is projected to have large increases in density. High employment growth areas can be found the length of the South of Market area between Howard and Market Street, as well as south of the freeway, along Townsend and Brannan Streets. Outside of the South of Market, high employment growth areas can be found in the north east Mission District, at Mission Bay, and at Pier 70.

High population growth areas can be found in and around the Transbay District, in portions of the Western South of Market, around the Fourth and King Caltrain Station, and in the northern part of Mission Bay. TAZ's with both high population growth and high employment growth have been identified between 11th and Division Streets, between Fourth and Sixth just north of Howard Street, between Bryant and Brannan west of Third, between Brannan and Townsend east of Seventh, and at Mission Bay.

Figure 2-11 illustrates total population and employment density in the EN TRIPS study area following the projected growth. It shows that the South of Market area is projected to have the highest combined population and employment densities in 2035, with the highest densities concentrated around the Transbay District and portions of the mid-market area. The Fourth and King Caltrain Station and the Third and Fourth Street corridors in the South of Market will also be relatively dense mixed-use areas. While not as dense as the densest parts of the South of Market, Mission Bay will also have relatively high concentrations of both population and employment. The established residential areas of the Mission District will continue to have high population densities but relatively low employment density. The north east Mission, Showplace Square, and the Central Waterfront south of Mission Bay will have moderate employment and relatively low population.

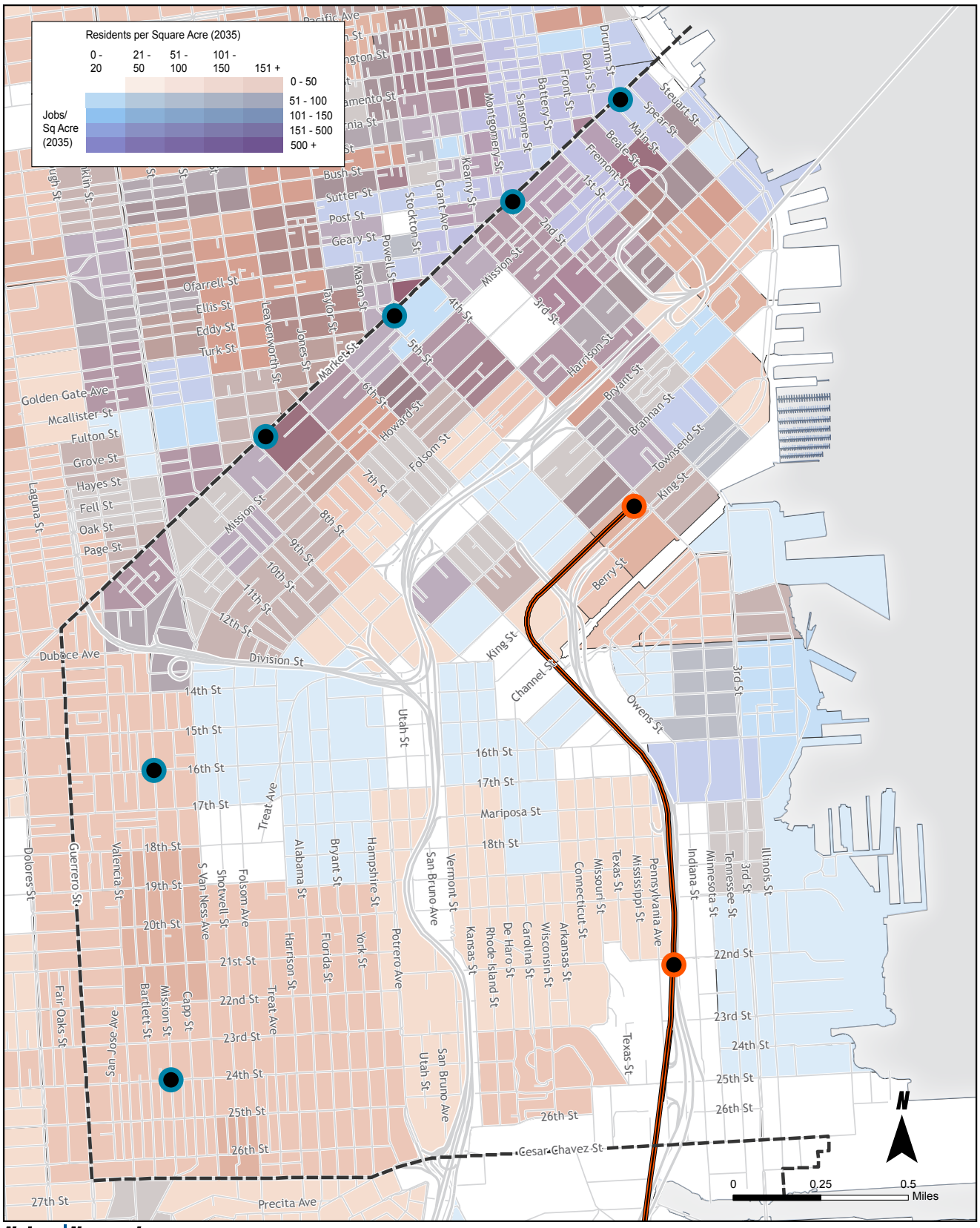
Figure 2-10 Projected Increases in Employment Density and Population Density (2005-2035)



Nelson|Nygaard consulting associates

Source: San Francisco City & County GIS, ABAG Projections 2009

Figure 2-11 Total Projected Employment Density and Population Density (2035)



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Source: ABAG Projections 2009

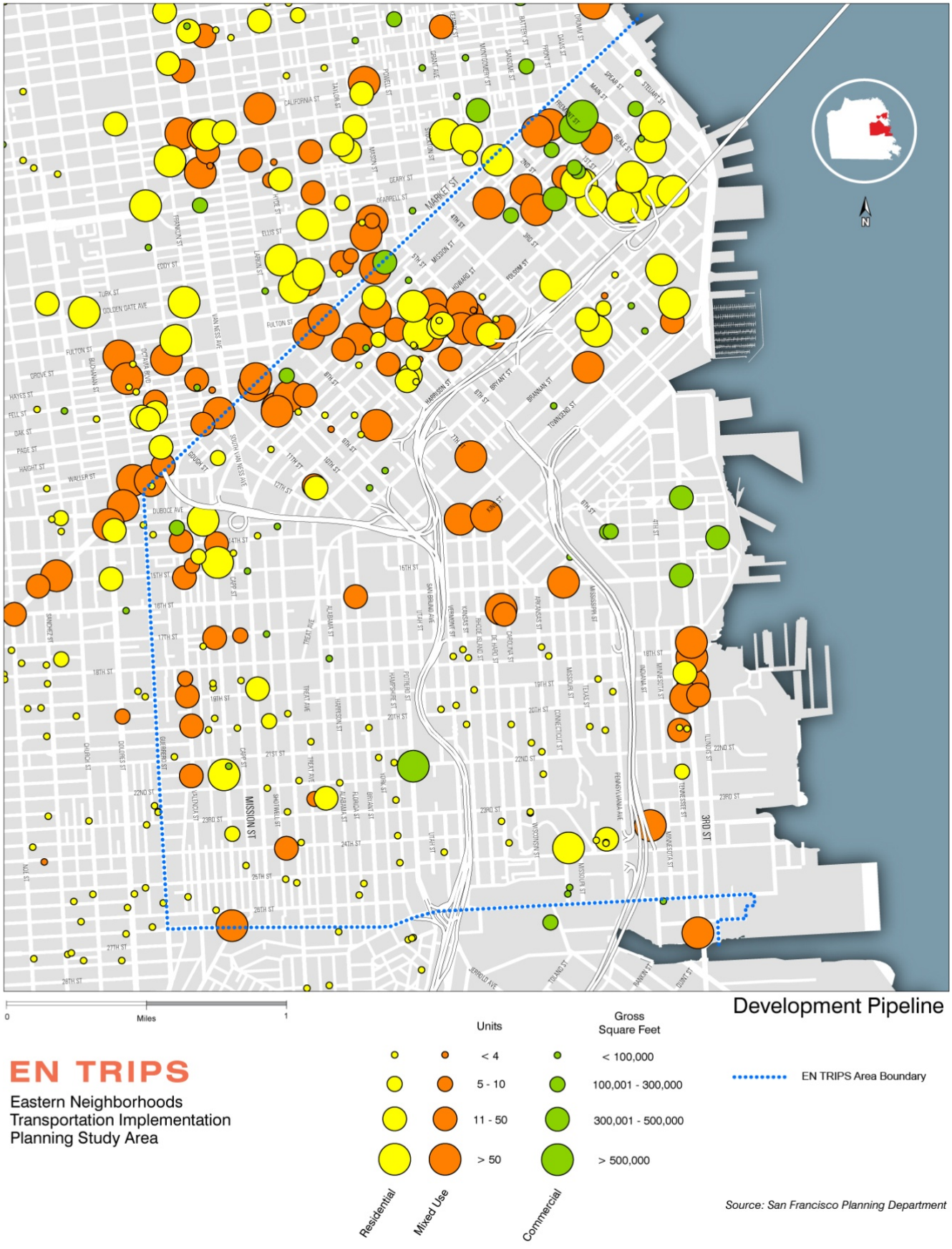
Proposed Development

The development “pipeline”, as recorded by the San Francisco Planning Department, consists of development projects that would add residential units or commercial space, applications for which have been formally submitted to the Planning Department or the Department of Building Inspection (DBI). Pipeline projects are at various stages of development: from applications having been filed to entitlements secured; from building permits approved and issued to projects under construction. The pipeline includes only those projects with a land use or building permit application. It does not include projects undergoing preliminary Planning Department project review or projections based on area plan analysis. The current pipeline only includes projects filed during the last five years, projects approved in the last four years, and projects that started construction during the past three years.

Figure 2-12 illustrates the location, type, and size of development projects in the pipeline as of April, 2010. Of these, more than 9,000 units are planned for the South of Market area, and most of the remainder is planned for Showplace Square. There are currently more than 4 million square feet of commercial development proposed for the South of Market area, and 1.5 million square feet of commercial development proposed for Mission Bay.

Some near-term transportation investments could be prioritized to coincide with and support this expected development. However, it is important to note that recent turbulence in the real estate markets and subsequent economic downturn has affected many of these projects, resulting in financing challenges, project delay, and potential project cancellation. It is not possible to know for certain how many of the proposed projects will ultimately be built, and on what time frame.

Figure 2-12 Proposed Residential, Commercial, and Mixed-Use Development for Eastern Neighborhoods



Chapter 3. Projected Travel Demand

The increases in population and employment densities anticipated in the Eastern Neighborhoods and elsewhere in the region will result in a large increase in the number of trips made to, from, and within the Eastern Neighborhoods. Accommodating this additional travel demand will require changes in transportation behavior and changes to transportation infrastructure. In some cases, existing facilities may be inadequate to serve the projected demand.

To help assess which transportation facilities may need to be upgraded, expanded, or improved, this section presents overall travel demand projections for 2035. The projections of travel behavior presented here, including overall trip volumes, trip-making patterns, and mode splits, were derived using SF-CHAMP (SF-CHAMP 4.2 / ABAG Projections 2009), the City's travel demand model. The San Francisco County Transportation Authority (SFCTA) maintains and operates the travel demand model used for forecasting.

SF-CHAMP can be used to assess the effects of land use, socioeconomic, and transportation system changes on the performance of the local transportation system. It includes information about observed travel patterns, transportation networks, transit ridership, roadway vehicle volumes, and demographic characteristics of San Francisco residents and workers. It relies on future-year land use and socioeconomic information projected by the Association of Bay Area Governments. Using future year transportation, land use, and socioeconomic inputs, SF-CHAMP forecasts future travel demand. [1]

SF-CHAMP output is developed on a weekday daily basis comprised of five time periods: AM (6:00 – 9:00 AM), Mid-Day (9:00 AM – 3:30 PM), PM (3:30 – 6:30 PM), Evening (6:30 PM- 3:00 AM), and Owl (3:00 – 6:00 AM). The horizon year for this study is 2035. A corresponding base year model network is assigned to each forecast year in order that the increment of change from existing conditions can be determined. For the EN TRIPS project, the corresponding base year is 2005.

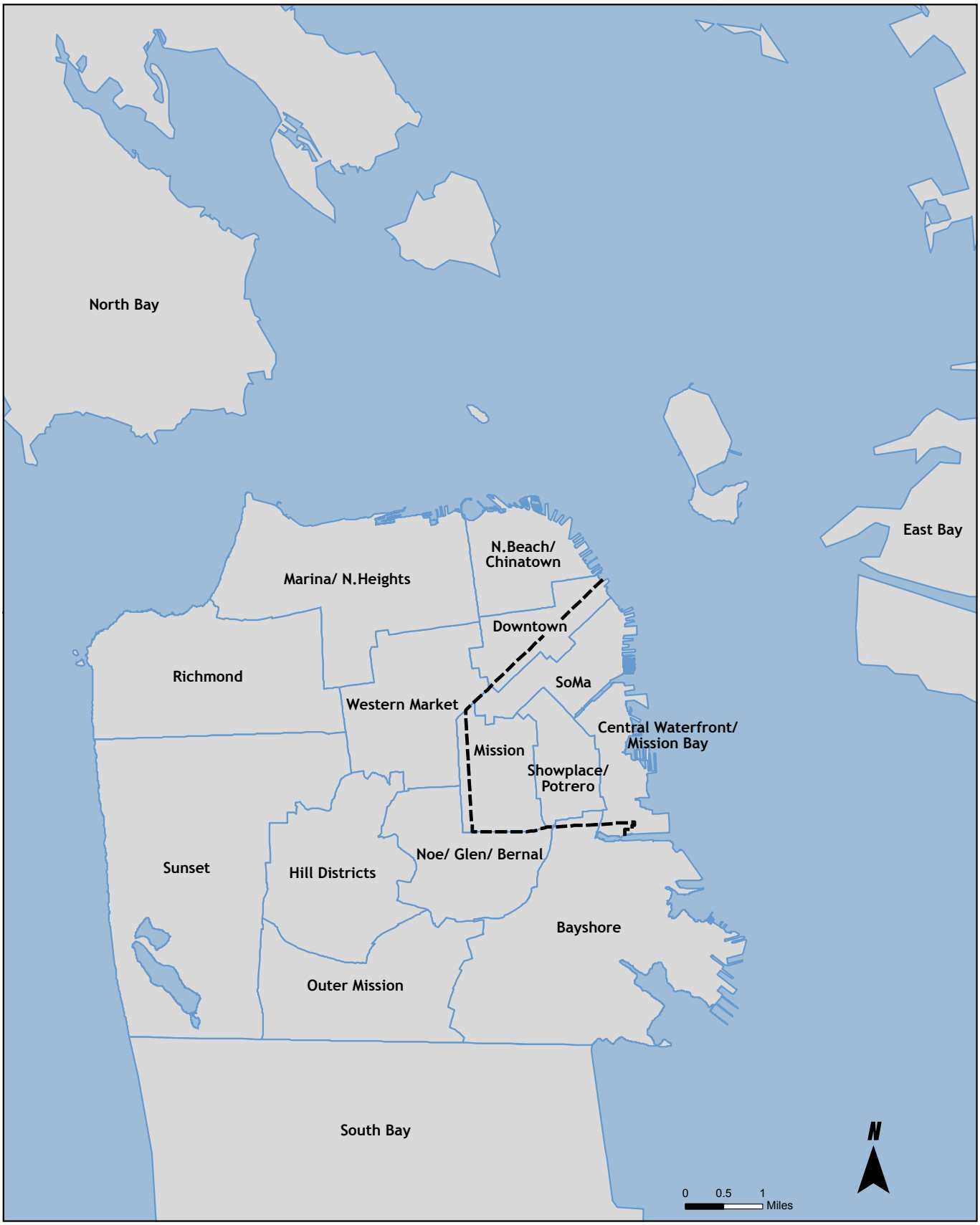
For the analysis that follows, model TAZ's have been grouped into neighborhoods, the boundaries of which do not always correspond exactly with the boundaries of specific plan areas. The groupings are illustrated in Figure 3-1.

Model forecasts are only as valid as their inputs and assumptions. While the current most likely assumptions about land use, transportation investments, travel costs, travel policies have been included in this baseline forecast, these will likely evolve and change in time.

Changes to transportation infrastructure that may result from this study are not included in this set of model projections. Future phases of the EN TRIPS project will evaluate the impact of infrastructure and policy changes on future travel conditions.

[1] For additional information on SF-CHAMP, please see the SFCTA web site. http://www.sfcta.org/content/category/4/67/145/

Figure 3-1 TAZ Groupings for Origin-Destination Analysis



Nelson|Nygaard consulting associates

Source: San Francisco City & County GIS

Overall Projected Increase in Travel Demand

Figures 3-2 and 3-3 illustrate the projected increase in Daily and PM peak period trips originating in the Eastern Neighborhoods. SF-CHAMP predicts an additional 320,000 daily trips to and from the Study Area by 2035, an increase of about 70 percent over the 2005 condition. Of this increase, about half will occur in the South of Market area. SF-CHAMP projects that demand for travel to and from the South of Market area will roughly double, from 160,000 daily trips in 2005 to a total of just over 320,000 in 2035.

Much of the remaining increase in travel demand will include trips to and from the Central Waterfront and Mission Bay. With just 12,000 daily trips in the 2005 model scenario, demand for these trips will increase nearly ten-fold, to more than 100,000 trips.

With much smaller changes to existing land use patterns expected, SF-CHAMP projects that the Mission District and Showplace Square/Potrero Hill will have smaller but still notable increases in travel demand. The Mission District is projected to have an increase of 48,000 daily trips, or an increase of about 23 percent as compared to 2005. The Showplace Square/Potrero Hill area will see an increase of 23,000 trips, or 30 percent higher than the base year.

Percentage increases in PM peak period trips are projected to be comparable to increases in daily trips. Overall, PM peak period trips are projected to increase by 68 percent, from about 122,000 to just over 200,000. Of this increase, more than half will occur in the South of Market area, where PM peak period trips will increase from 4,000 daily trips to almost 86,000. In the Central Waterfront and Mission Bay, peak period travel will increase from just 160 trips in 2005 to more than 33,000 in 2035. In the Mission District and Showplace/Potero, peak period travel will increase by a combined 16,000 trips.

Figure 3-2 Projected Increase in Travel Demand

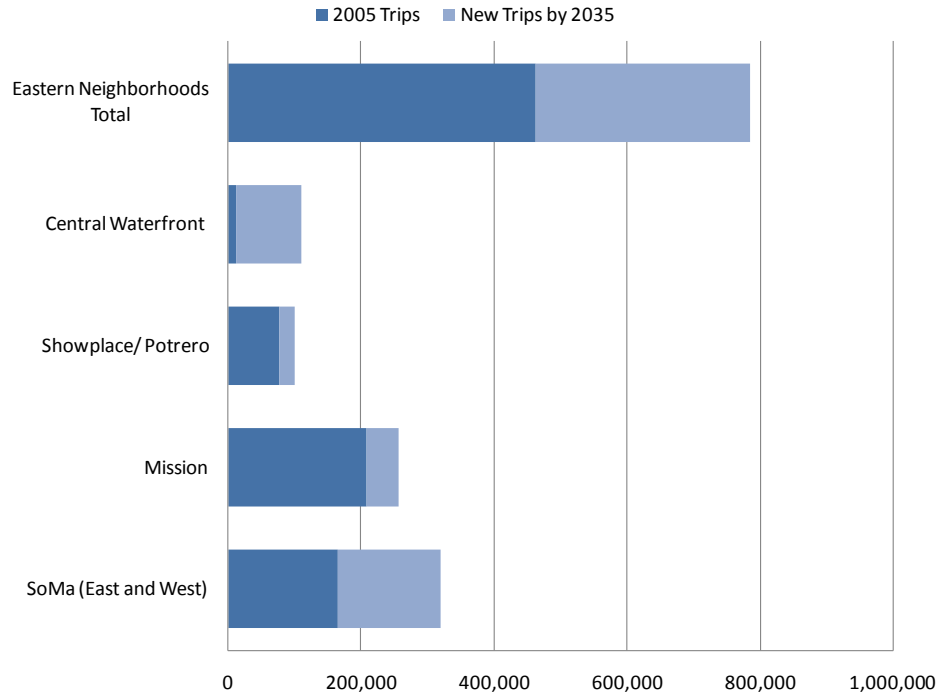
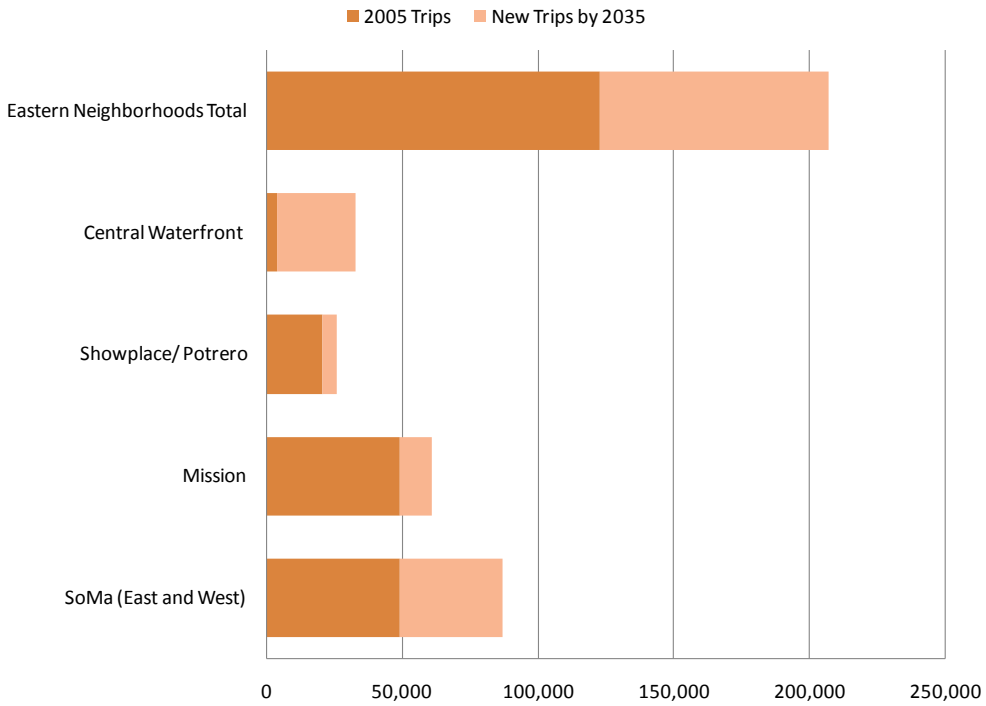


Figure 3-3 Projected Increase in PM Peak Period Travel Demand



Projected Increase in Travel Demand by Destination

Figures 3-4 and 3-5 illustrate projected travel demand by destination for trips originating in the study area. Of the 320,000 new trips originating in the study area, just less than one-third, or 97,000 will have destinations within the Eastern Neighborhoods. Half of these internal new trips (48,000) have destinations in the South of Market area, and about a quarter (28,000) will be bound for the Central Waterfront or Mission Bay.

The remaining 220,000 new trips will have destinations outside of the Eastern Neighborhoods. Of these, just over 60,000 (or about 18 percent) will have destinations outside of the City of San Francisco. The East Bay is projected to receive the largest share of new trips (30,000), with the South Bay also receiving a large number (21,000).

The remaining new trips will have destinations in other San Francisco neighborhoods. The largest share (46,000 new trips) will be trips between the Eastern Neighborhoods and Downtown. However, the Bayshore area just south of the Eastern Neighborhoods (which includes the Bayview Hunters Point neighborhood and the planned redevelopment areas at Candlestick Point and Hunters Point) will also receive a very large number of new trips, more than doubling from 20,000 daily trips in 2005 to almost 50,000 in 2035. This likely reflects increased development in those areas, including both housing and employment opportunities. Chinatown/North beach and the area just west of Market Street (including Civic Center, Hayes Valley, and the Haight) will also receive more than 15,000 new trips each. This rough distribution of new trip destinations holds for the PM peak period as well as all day travel.

Figure 3-4 Growth in Eastern Neighborhoods Origin Trips by Destination

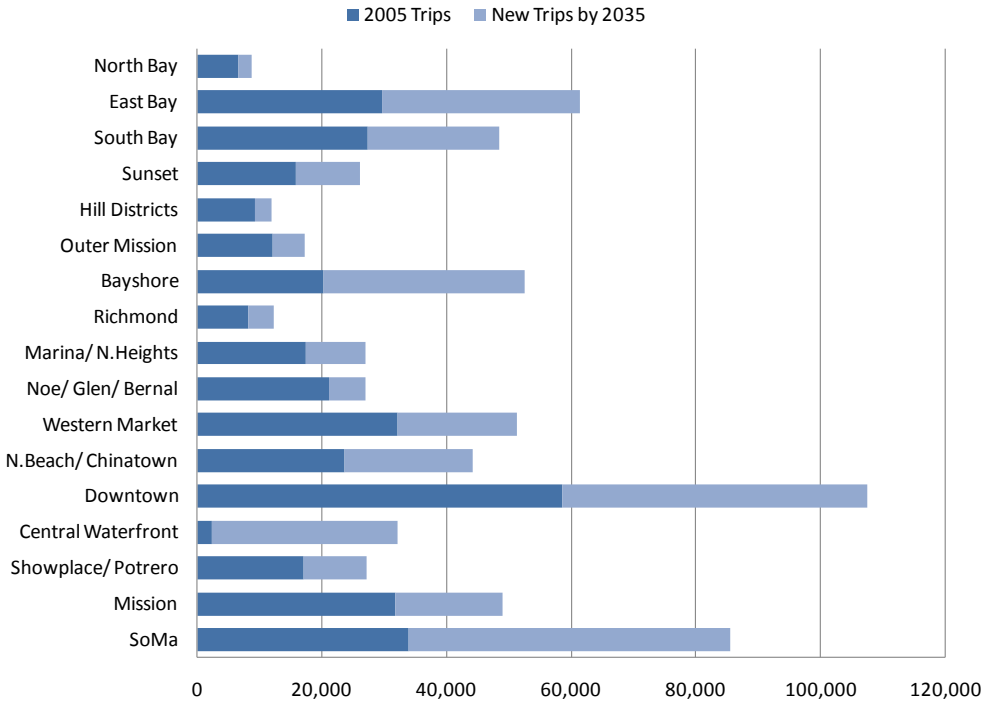
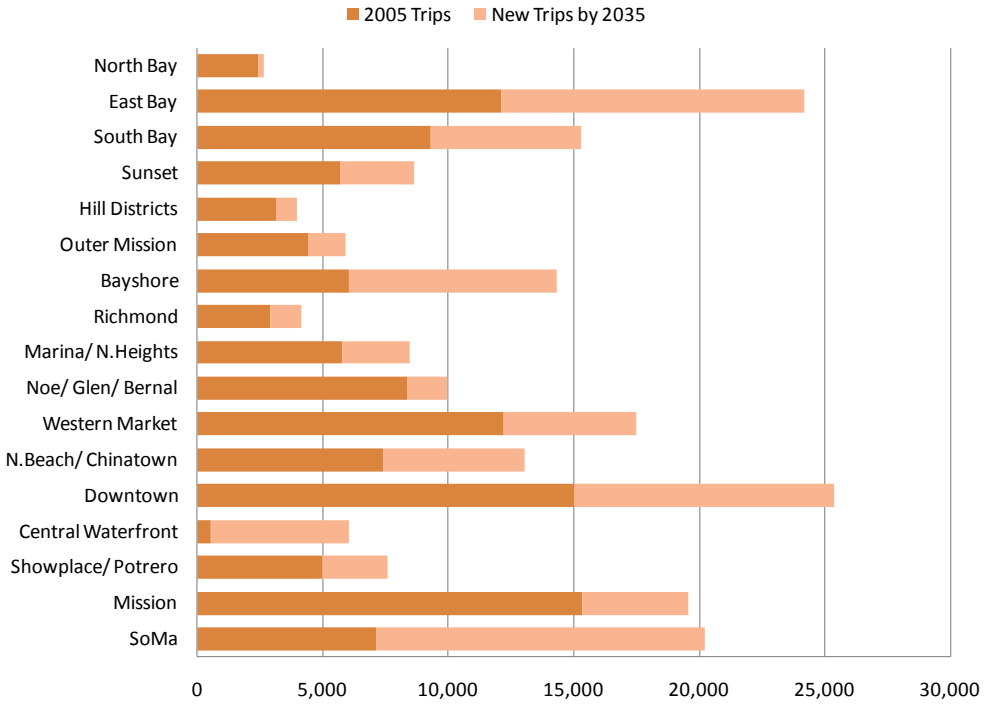


Figure 3-5 Growth in Eastern Neighborhoods Origin Trips by Destination, PM Peak Period



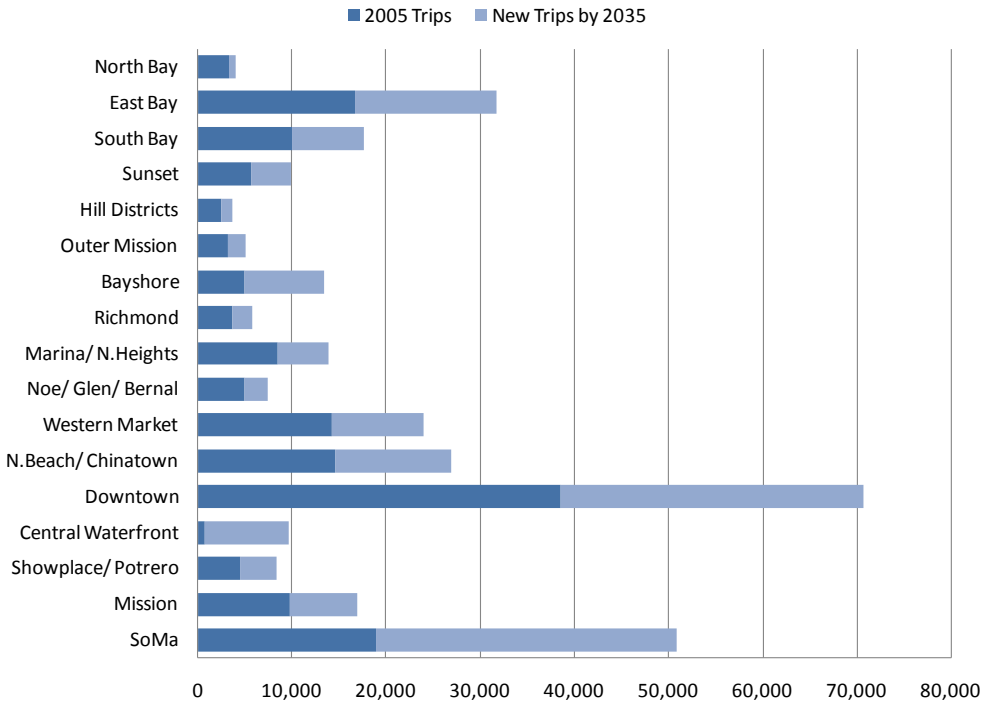
Projected Increase in Travel Demand by Neighborhood of Origin

The projections that follow present the destinations of new trips originating in each of the Eastern Neighborhoods areas.

Figure 3-6 illustrates that of the 150,000 new daily trips originating in the South of Market area, about 15 percent or 22,000 are projected to be internal to the district, and another 15 percent are projected to be destined for Downtown. These internal and Downtown trips originating in the South of Market represent an excellent opportunity for the city to encourage non-motorized forms of transportation such as walking and bicycling.

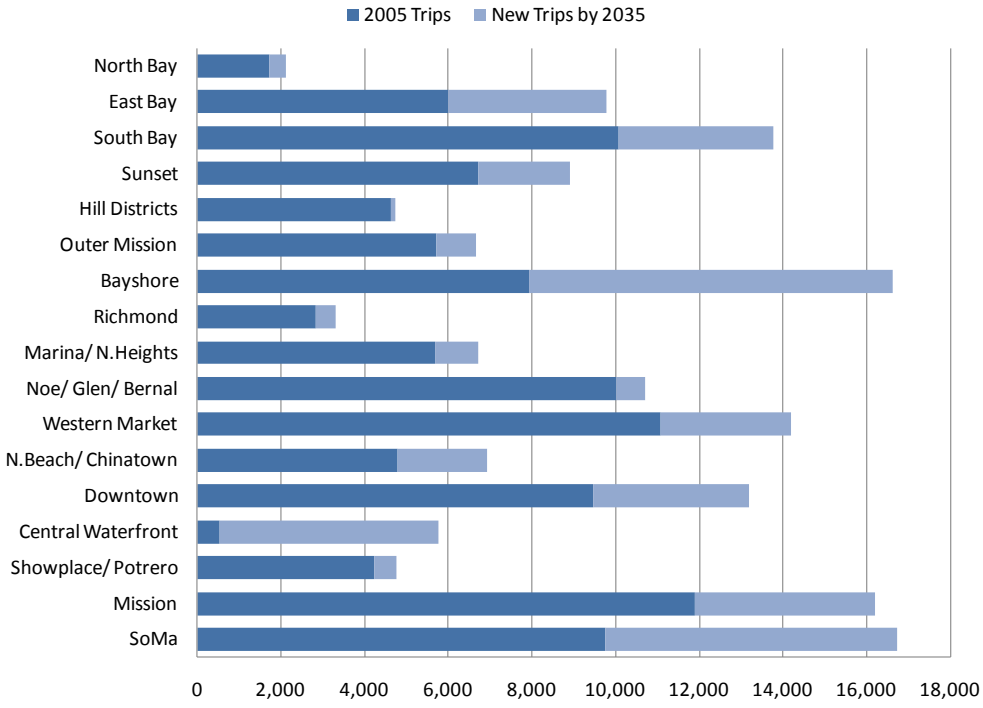
While trips to Downtown and within the South of Market area may be managed with improvements to transit, pedestrian and bicycle projects, another 15 percent of the projected new trips South of Market will be trips between the South of Market area and either the East Bay or South Bay. These trips will depend on both transit and regional roadway infrastructure. Trips between the South of Market area and the Central Waterfront will increase more than tenfold from today's very low base. Another important area of growing travel demand for the South of Market is the Bayshore district. Travel between these districts will increase by 170 percent from 2005.

Figure 3-6 Projected Increase in Travel Demand – South of Market Origin



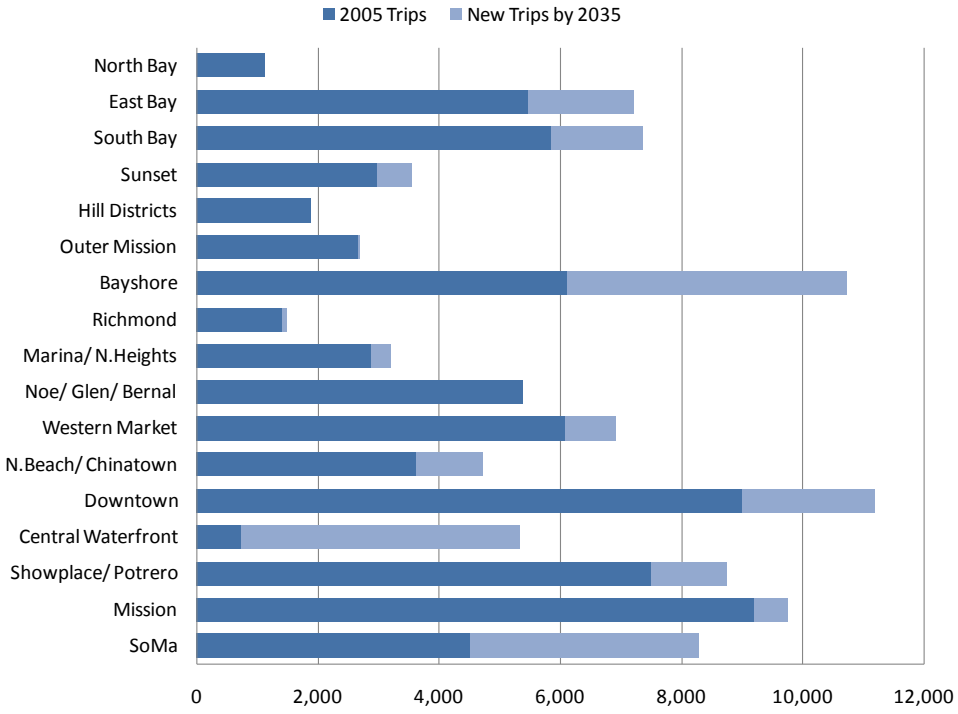
The Mission District, with much less projected land use change, is expected to generate far fewer new trips than its neighbor in the South of Market area. Very few new internal trips are projected. The largest share of new trips will be bound for Bayshore (including Candlestick Point/Hunters Point). The bulk of the remaining new trips will be bound for the South of Market area, the Central Waterfront, and the South Bay. The pattern of trips in the PM peak period is roughly the same as daily trips.

Figure 3-7 Projected Increase in Travel Demand – Mission District Origin



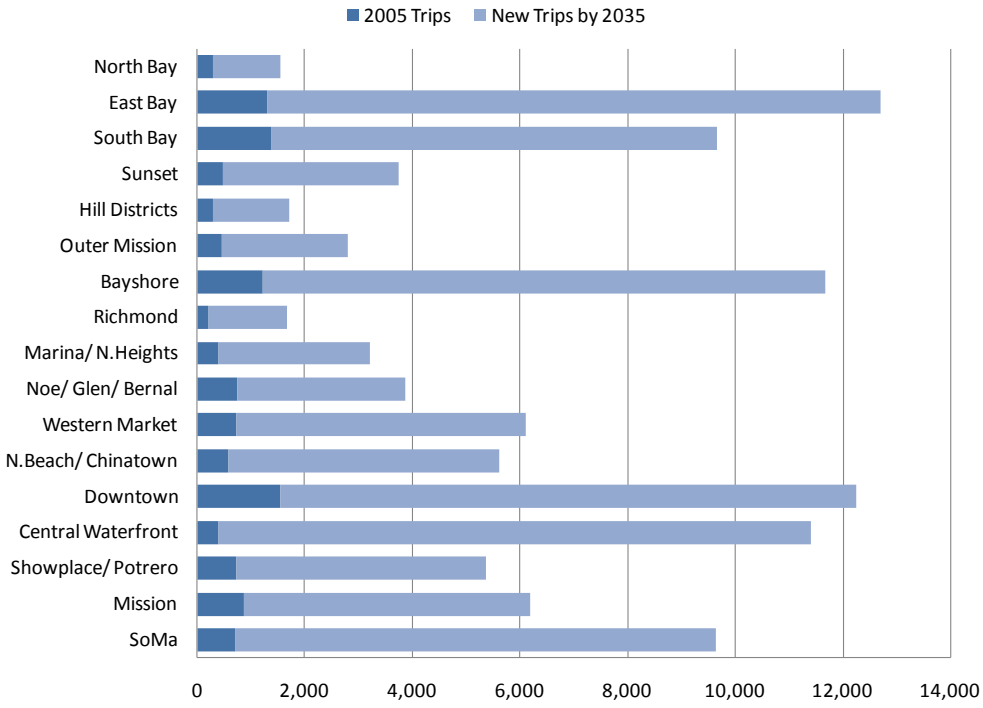
The Potrero Hill/Showplace Square area will also have a substantial number of new trips to the South of Market, the Central Waterfront, and Bayshore. About 20 percent of all new Bayshore trips from the Eastern Neighborhoods will originate from Potrero Hill/Showplace Square.

Figure 3-8 Projected Increase in Travel Demand – Potrero Hill/Showplace Square Origin



From a very low base of just over 12,000 trips per day, the Central Waterfront and Mission Bay will see huge percentage increases in travel as planned development is built. About one in ten new trips originating from the Central Waterfront and Mission Bay will be bound for each of the following destinations: Bayshore; Downtown San Francisco; the South Bay; and the East Bay.

Figure 3-9 Projected Increase in Travel Demand – Central Waterfront/Mission Bay Origin



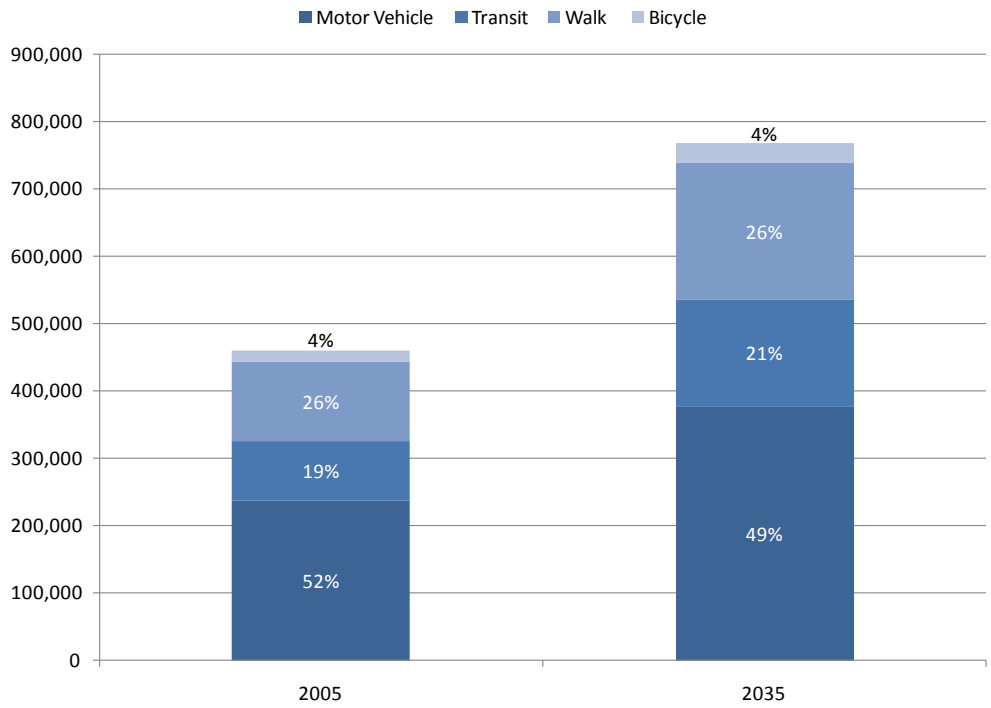
Chapter 4. Circulation and Operational Needs Analysis

Travel Demand by Mode of Transportation

Increases in trip making will result in expanded use of the transportation facilities in the study area. The study area's roads, transit operations, sidewalks, and bicycle facilities will all see more use. In some cases, particularly for peak period trips in key travel corridors, this additional demand will tax the capacity of the facilities. This section reviews projections for the use of important travel corridors by mode of travel, noting places where growth in demand is likely to put pressure on the existing facilities. In addition, this section notes places where growth in travel demand may aggravate existing deficiencies.

Figure 4-1 illustrates how the SF-CHAMP travel demand model has allocated trips between modes in 2005 and 2035. While it predicts a large increase in the overall number of trips, it projects that mode share will remain mostly consistent, with just a 3 percent shift from private motor vehicle to transit.

Figure 4-1 Overall Volumes and Mode Share (All Daily Trips)

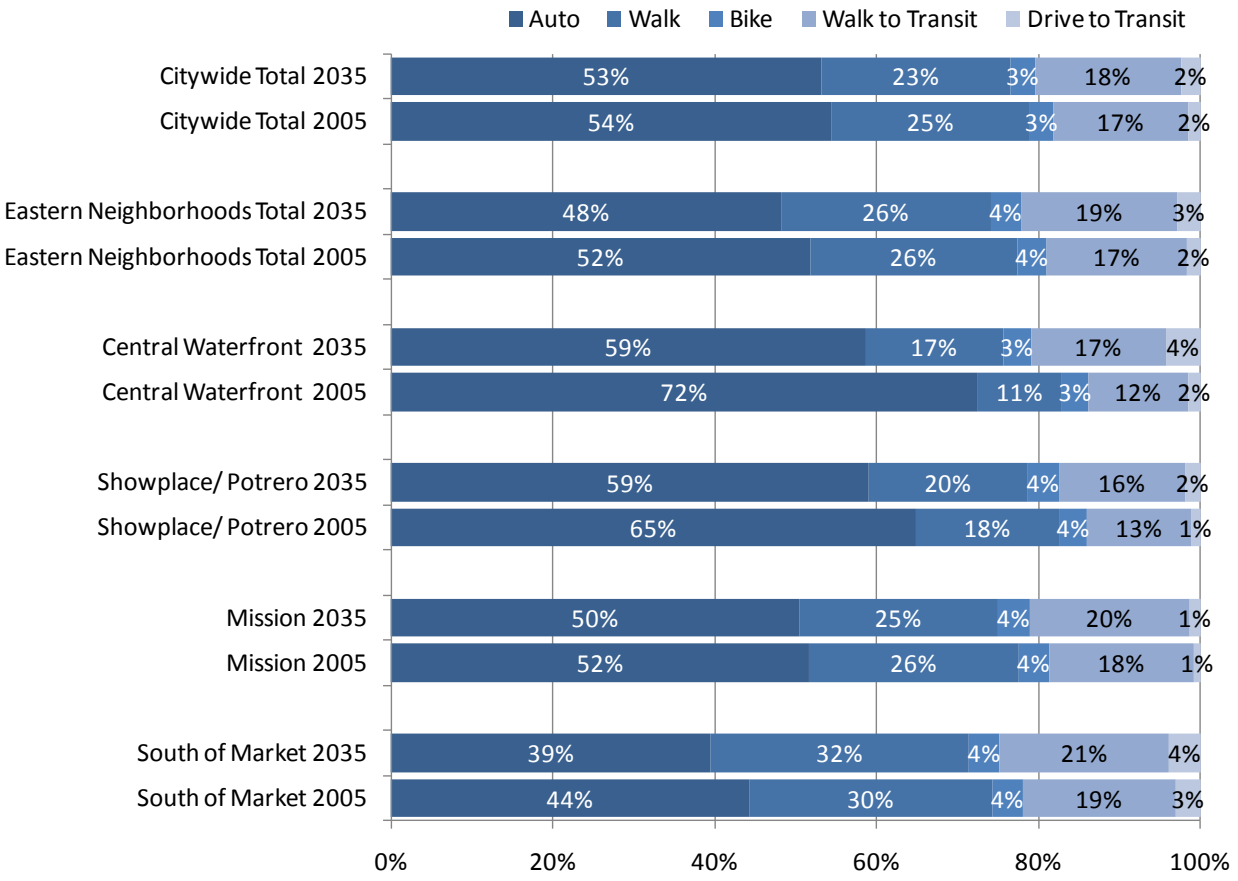


Source: SF-CHAMP 4.1/ABAG 2035

Figure 4-2 illustrates modeled mode share by neighborhood for 2005 and 2035 as compared to the Eastern Neighborhoods as a whole and San Francisco as a whole. It shows that, while the auto mode share for the city as a whole is projected to remain roughly constant (falling from 54 percent to 53 percent of all trips), there is a projected 5 percent decrease in auto mode share in the South of Market area and in Showplace Square/Potrero Hill (corresponding with slight increases in transit and non-motorized mode share). In the Central Waterfront/Mission Bay area, auto mode share is expected to fall by 13 percent as dense, mixed use development at Mission Bay becomes the center of population and employment in the area. In the Mission District, which

has the bulk of the study area's existing population and for which little growth is projected, auto mode share is projected to fall 2 percent, from 52 percent to 50 percent.

Figure 4-2 Mode Share by Neighborhood (All Daily Trips)



These mode splits are based on a number of assumptions having to do with the cost of each mode, the travel speeds, and the nature of the facilities and services available. The analysis assumes a base transportation network that includes the existing facilities, plus additional transportation projects that are currently funded and planned for construction. Figure 4-3 lists the transportation projects included in the base 2035.

Figure 4-3 SF-CHAMP 4.1 Base Network Model Assumptions

San Francisco Transportation Projects
San Francisco Bicycle Plan Implementation
Doyle Drive project
Muni Transit Effectiveness Project Implementation
Geary Boulevard Bus Rapid Transit
Van Ness Avenue Bus Rapid Transit
Central Subway
T–Third Extension to the Caltrain Bayshore station
Regional Transportation Projects
MTC Regional Transportation Plan outside of San Francisco
Caltrain Electrification
BART extension to San Jose
West Dublin BART station
eBART
SMART Rail

Source: San Francisco County Transportation Authority

Changes to transportation facilities proposed and built over the next 25 years, including those designed by the EN TRIPS project, could influence future travel behavior. Once EN TRIPS projects have been selected and designed, additional model projections will be produced to test the potential impact of the proposed projects on travel behavior.

It should be noted that while the capacity of the roadway system is a constraint on the number of trips that are assigned to motor vehicles, the capacity of the expected 2035 transit system has *not* been used to constrain the projected transit demand. The relationship between this project level of transit ridership and the actual capacity of the planned system are explored below.

Motor Vehicle Circulation

This section assesses projected demand as compared to available capacity for motor vehicle travel in the EN TRIPS study area for 2035. Because many of the future year issues and opportunities are simply extensions of the current conditions, this section builds on the detailed examination of current motor vehicle conditions presented in the EN TRIPS Existing Conditions report.

Summary of Existing Conditions

Private vehicle travel currently represents just over half of all trips made in the study area (52 percent, compared to 54 percent in the city as a whole) and will continue to be an important part of the area's transportation system, even as other parts of the multimodal transportation system develop. The study area is home to a diverse street network, including a large portion of the city's freeway system, more than a dozen major arterials, transit priority streets, important pedestrian corridors, and the bicycle network. Most streets in the eastern neighborhoods serve an important function for more than one mode. Each of these street types present a unique set of circulation challenges and opportunities for improvement.[1]

Most of the streets in the Mission District, Potrero Hill/Showplace Square, and the Central Waterfront plan areas are not designated as primary vehicle corridors, and on many of these streets there may be opportunities to focus on multi-modal transportation improvements. In those areas, street design plans can focus on prioritizing travel for other modes and creating quality public spaces. Automobile travel speeds through these areas could be reduced through traffic calming measures where needed, and parking could be priced to ensure availability so that drivers circling for parking do not generate unneeded traffic.

South of Market arterial streets are designed to accommodate high volumes of vehicle traffic, and every arterial street in the South of Market is designated as part of the primary vehicle network. There may be an opportunity to change the character of at least some of these arterials in ways that better accommodate the needs of other modes of transportation. Even on streets that remain part of the primary vehicle network, the City may have the opportunity to reduce the effects of vehicle traffic on quality of life for residents and visitors, and on other travel modes. North-south streets in the South of Market area, such as Fremont, First, Third, Fourth, Sixth, Seventh, and Eighth Streets, have the highest street volumes in the area. Much of this traffic can be attributed to pass-through traffic since the highest volume segments are between the I-80/US-101 and I-280 freeways and the North of Market area.

[1] The Mission Bay Redevelopment Plan includes the following heirarchy of streets: 16th, Third, and King Streets are designated as Arterials; Channel, Owens, Mariposa, Terry Francois, and Townsend are designated as Minor Arterials; Fourth (south) is designated as a Collector; Berry and Fourth (north) are designated as Connectors.

The Bay Bridge currently operates at or near vehicular capacity in the peak direction most weekdays during the AM/PM peak periods, resulting in queuing on local approaches. Queues are most pronounced on southbound First Street, Third Street, Fourth Street, eastbound Folsom Street, westbound Harrison Street, and eastbound Bryant Street. Three study intersections in the AM peak hour and six intersections in the PM peak hour are highly congested. Intersections operating with delay in the AM and PM peak hour are located along streets that are generally heavily used as regional routes, such as Third, Fourth, Fifth, Bryant, Harrison, and Folsom Streets.

2035 Projected Motor Vehicle Volumes

In the future, overall motor vehicle person trips originating in the Eastern Neighborhoods are projected to increase by 58 percent, from 238,000 daily trips to 377,000. PM period trips with Eastern Neighborhood origins are expected to increase by about 33,000, or 52 percent. In addition, there is projected to be a similarly-scaled expansion of pass-through trips traveling from the Bay Bridge, through the South of Market arterial grid, and on to other parts of the city and region without stopping in the Eastern Neighborhoods. In the current condition, these pass-through trips represent 70 percent of all trips on South of Market Streets during the PM period.

Figure 4-4 illustrates projected growth in vehicle volumes during the PM period (3 PM–6:30 PM) for streets that have at least 250 projected new trips. While the travel demand model is an imprecise tool for allocating trips to particular street segments, its projections can help give a general picture of how demand might be distributed through the network. As expected, the regional freeways and the major arterial network in the South of Market area are projected to carry far more trips in 2035 than they do today. At least a thousand new PM period trips are projected on Howard, Folsom, Harrison, and segments of Bryant and Harrison Streets, and on the north-south number streets between 10th and Third Streets. The implications of this large potential increase in vehicle trips in South of Market is explored in detail in the circulation analysis below. Most South of Market alleys are expected to have fewer than 250 new vehicle trips.

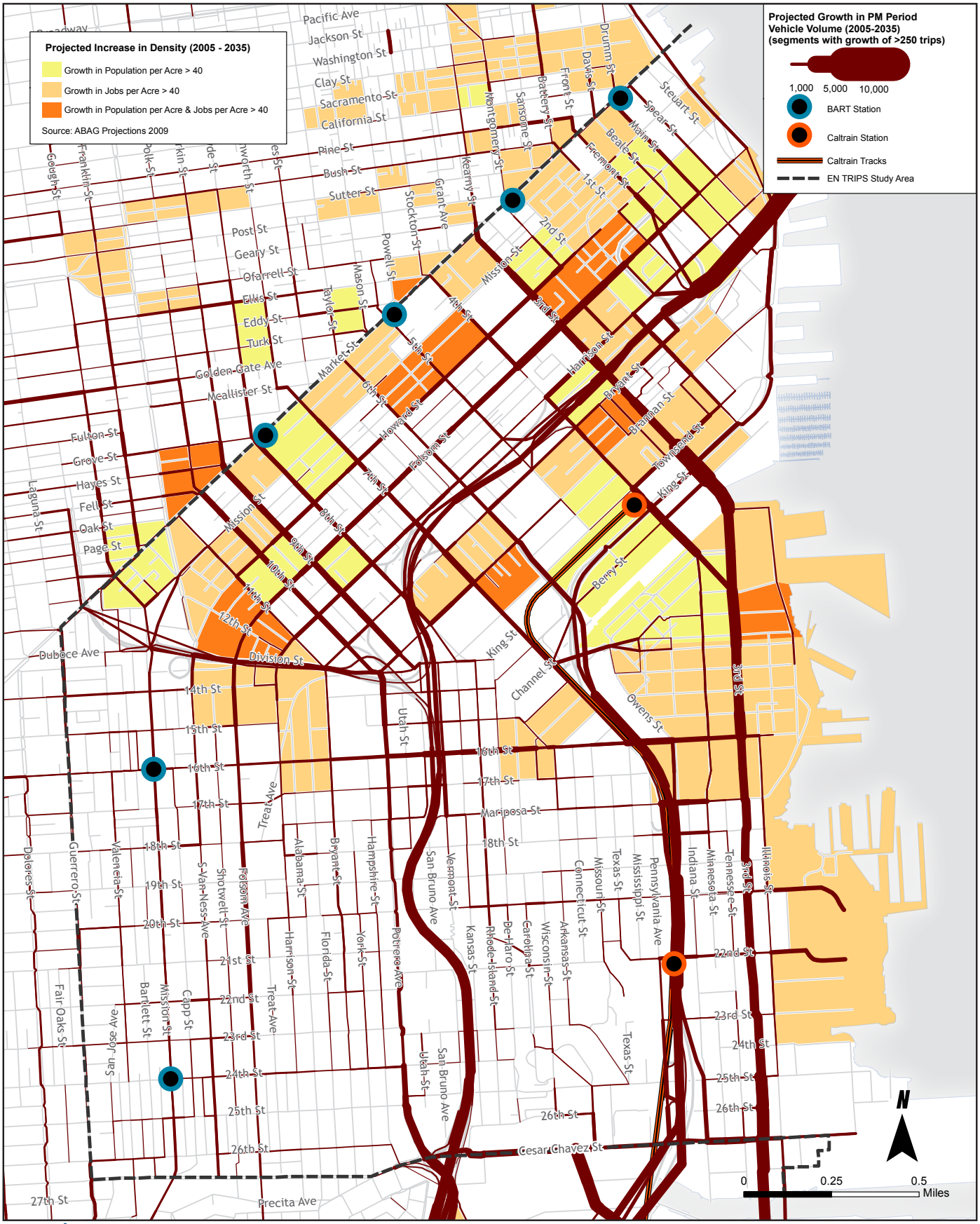
Outside of the South of Market area, the largest increase in vehicle volumes is projected on Third Street, which is expected to carry more than an additional 1,500 PM period trips as it passes through the Central Waterfront, Mission Bay, and across the channel into the South of Market. Adjacent minor streets, including Illinois Street, Minnesota Street, and Tennessee Street, could also have expanded vehicle volumes.

Residential and mixed-use streets adjacent to freeway ramps throughout the study area are expected to see growing vehicle volumes. For example, there are already substantial vehicle volumes at the I-280 freeway ramps at Mariposa Street, and substantial growth in vehicle volumes is projected on Mariposa east of the freeway ramp.

Other arterials that could experience large increases in vehicle volumes include 16th Street, particularly east of Potrero Avenue. Operating conditions on 16th Street are also explored in more detail in the next section. Expanded vehicle volumes are projected along several other arterials outside of the South of Market area, most notably Potrero Avenue and Cesar Chavez Street east of Potrero Avenue, but also Mission Street, South Van Ness Avenue, and Folsom Street. In addition to the major arterials, many residential streets in the Mission District and Potrero Hill could have at least 250 new PM period vehicle trips.

Figure 4-5 illustrates total projected PM period vehicle volumes in 2035 following the projected growth.

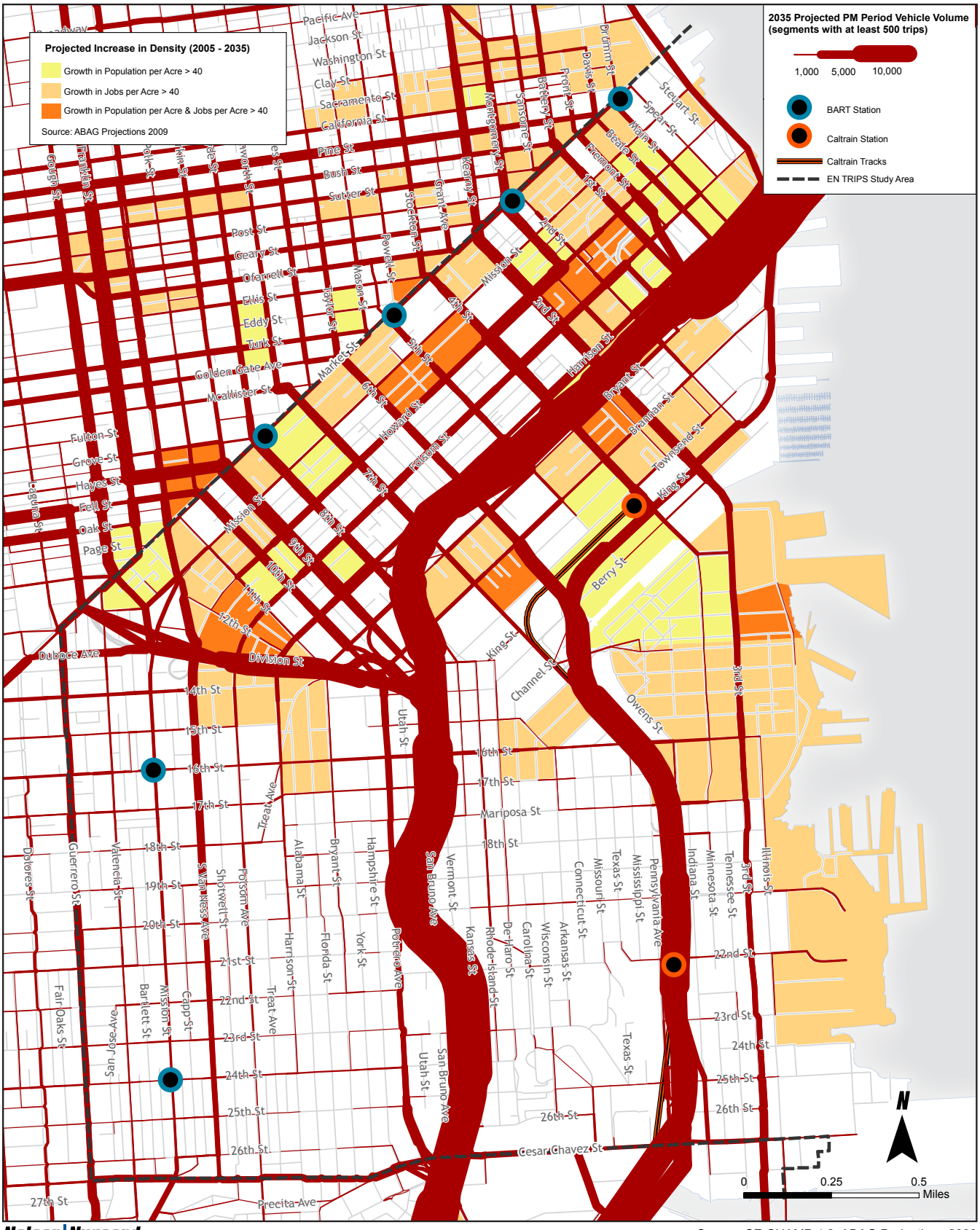
Figure 4-4 Projected Change in Vehicle Volumes by Street Segment, PM Period (3 PM – 6:30 PM)



Nelson\Nygaard consulting associates

Source: SF-CHAMP 4.2, ABAG Projections 2009

Figure 4-5 Projected Vehicle Volumes by Street Segment, PM Period (3 PM – 6:30 PM)



Nelson\Nygaard consulting associates

Source: SF-CHAMP 4.2, ABAG Projections 2009

2035 Projected Truck Volumes

Goods movement is an essential function of the transportation network citywide; however, it is an issue of even greater importance in the Eastern Neighborhoods, where not only retail business but heavy industry and production, distribution and repair (PDR) businesses are prevalent. Delivery vehicles, ranging in size from vans to multi-axle trucks, must navigate the street network and find space to load and unload. Commercial uses in the Eastern Neighborhoods include heavy industry and port operations, which will continue to function along the waterfront (particularly at Pier 80); light industry and Production, Distribution, and Repair (PDR) businesses, which are expected to continue to operate (mixed with residential and other commercial uses) in the Western South of Market, the north-east Mission, and portions of the Central Waterfront and Potrero Hill; large retail, including grocery stores, "big box" chains, and other large-floorplate retail outlets, located throughout the Eastern Neighborhoods but particularly in the vicinity of Division Street and on 16th Street in Potrero Hill. Finally, there are many retail storefronts in residential neighborhoods that require deliveries. Each of these types of businesses require deliveries and have distinct loading and unloading needs. These are catalogued in the EN TRIPS Existing Conditions Report.[2]

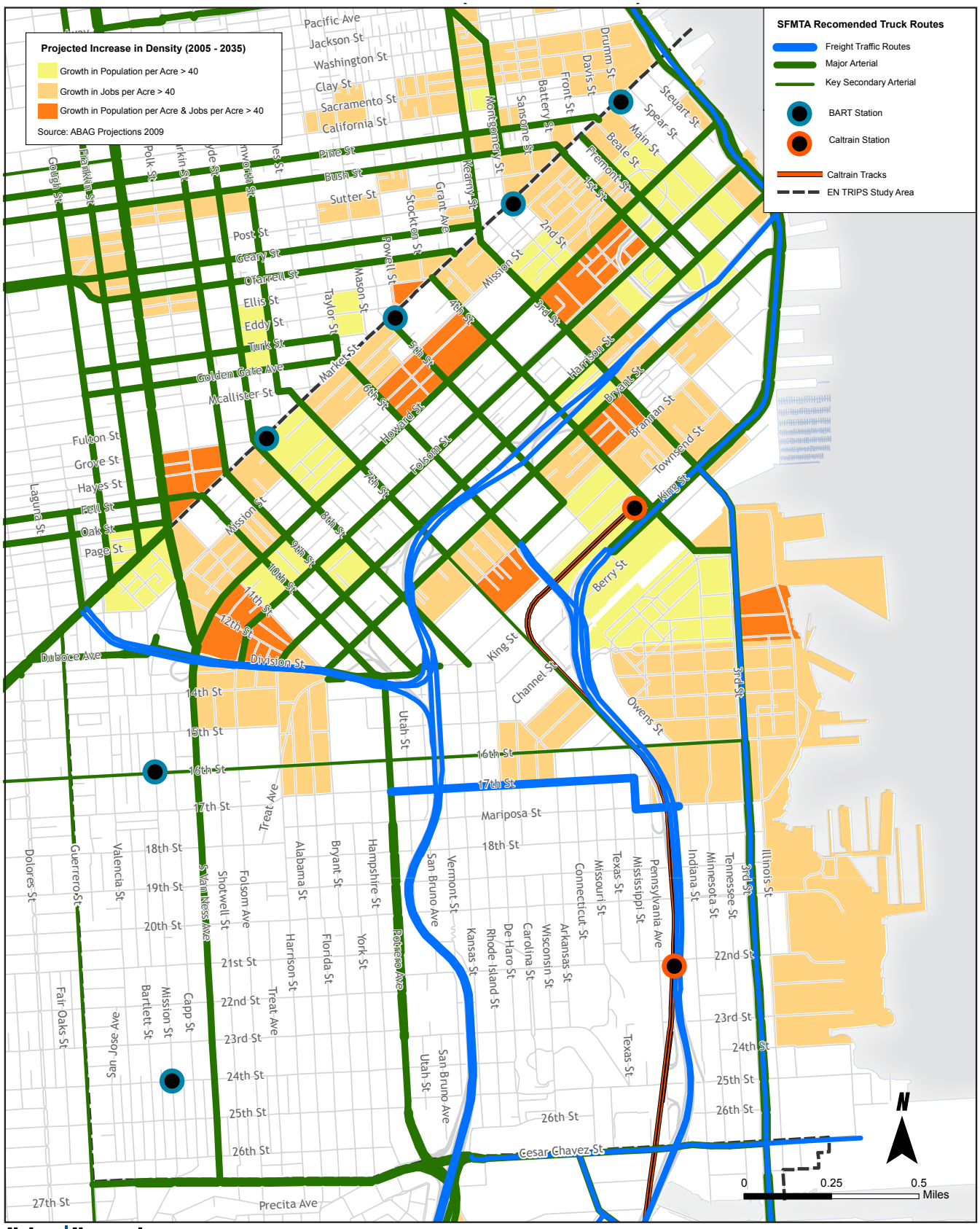
Figure 4-6 illustrates the SFMTA's recommended freight traffic network. The city's designated truck routes include the freeway network, major arterials, and designated freight traffic routes. While this network has not been formally adopted as part of the City's General Plan, it does guide SFMTA planning for truck traffic.

Figure 4-7 illustrates projected truck volumes on street segments in the EN TRIPS study area. All segments with at least 100 projected daily truck trips are illustrated. While SF-CHAMP can forecast truck volume, these forecasts are based on limited data. The projections will be considered in planning, but they are not as robust as other model projections in this analysis. SF-CHAMP projects that high volumes of trucks will use the US-101 and I-280 freeways to access the city, and that these trips will be distributed through the South of Market arterial network. In addition to the truck traffic serving South of Market businesses, very high volumes of truck trips are expected to be concentrated on the Third and Fourth Street corridors traveling to and from Downtown. Folsom, Howard, and Harrison Streets are also expected to carry high volumes of truck trips.

SF-CHAMP projects that are outside of South of Market, Third Street through Mission Bay, and the Central Waterfront will be the arterial corridor most heavily trafficked by trucks, as industrial uses along the Waterfront will require deliveries. While Third Street is currently identified as a designated truck route in the SFMTA's recommended truck routes map (Figure 4-6), the model projection may overstate Third Street's role for truck traffic. Illinois Street may be preferred for some truck travel because Third Street has limitations on size and turning radius for trucks because of light rail station locations. South Van Ness Avenue, Potrero Avenue, and 16th Street between Mission Bay and Potrero Avenue are also projected to carry notable volumes of truck traffic.

[2] EN TRIPS Existing Conditions Report, 5-55.

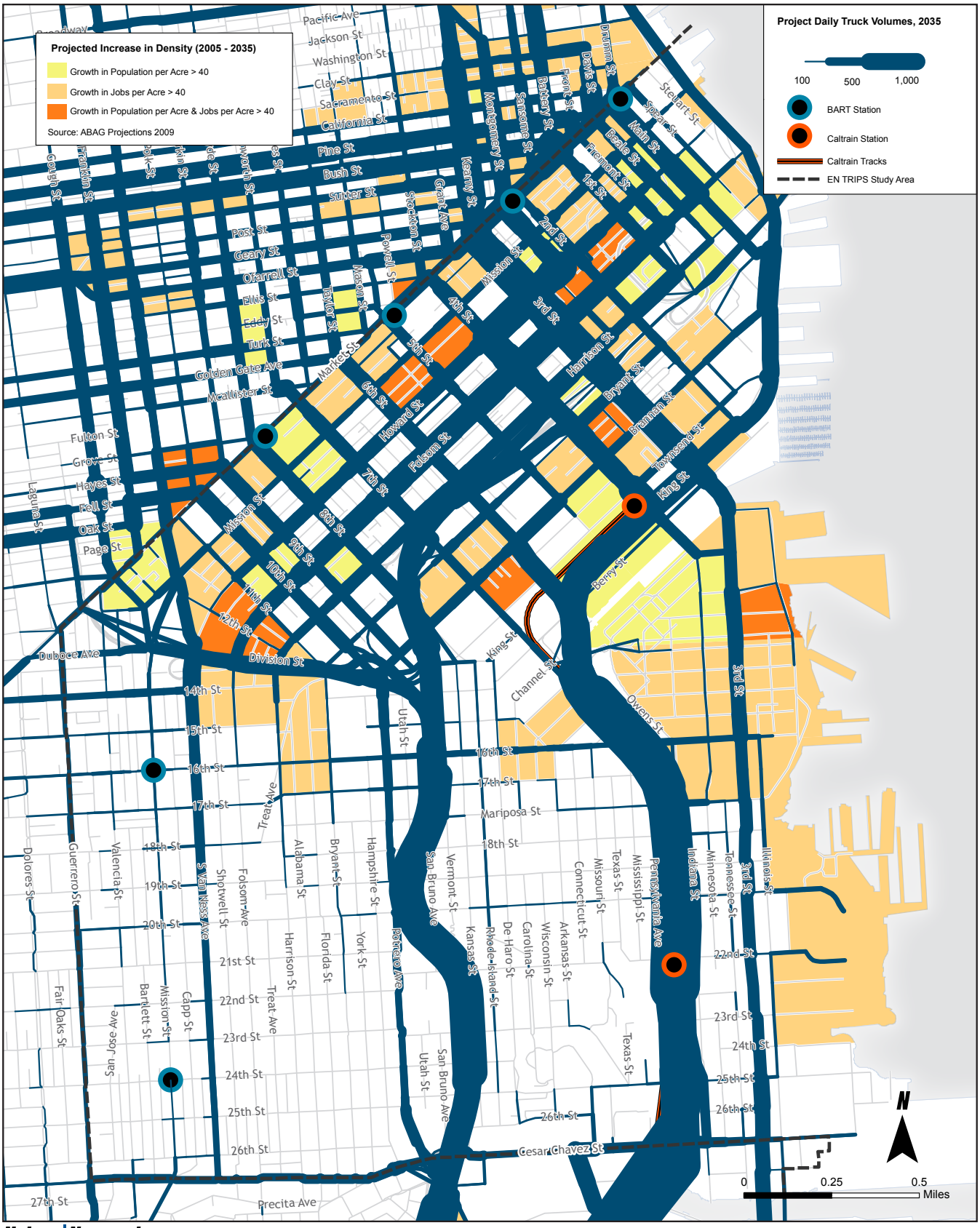
Figure 4-6 SFMTA Recommended Truck Routes



Nelson|Nygaard consulting associates

Source: San Francisco City & County GIS

Figure 4-7 Projected Truck Volumes by Street Segment, Daily



Nelson\Nygaard consulting associates

Source: SF-CHAMP 4.2, ABAG Projections 2009

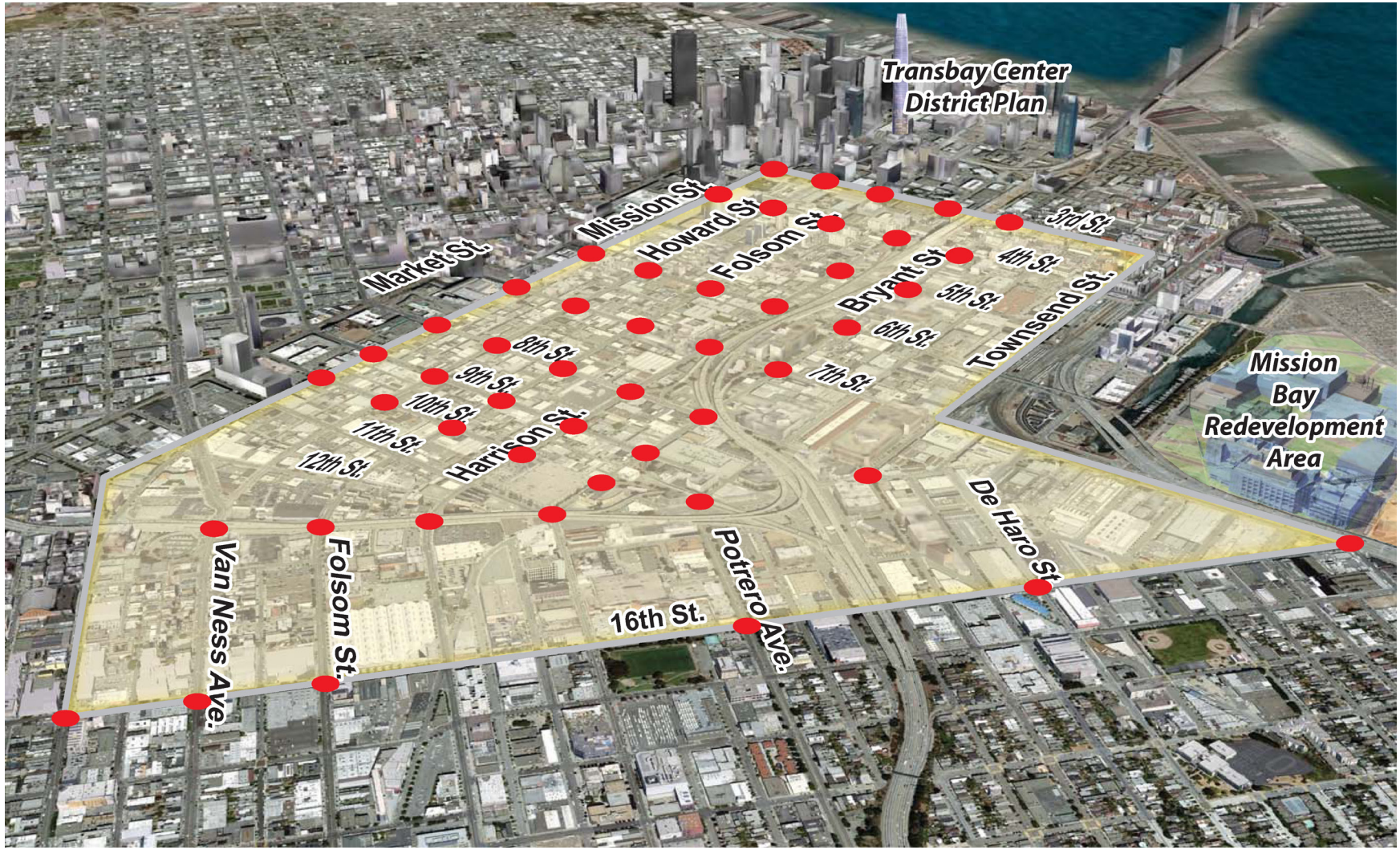
South of Market Area and 16th Street Circulation Analysis

The arterial network in the South of Market area carries by far the highest volumes of vehicle traffic in the study area. The area is also predicted to see a very large share of the study area's population, employment, and overall travel demand growth. Because of these two factors, traffic operations in the South of Market area are of particular concern for this study. Also of particular concern is the 16th Street corridor, where several proposed transportation projects (including the implementation of California High Speed Rail), combined with the population and employment growth expected as a result of Mission Bay will require the City to make choices about how to best use the already constrained right-of-way. In order to understand these important areas in greater detail, the EN TRIPS project team has conducted a more detailed analysis of current and future year circulation in the South of Market area and at key intersections on 16th Street. As part of the EN TRIPS Existing Conditions Report, the project team selected approximately 50 study intersections, primarily focused in the South of Market (SoMa) neighborhood. These study intersections are shown in Figure 4-8.

This section provides a comparison between existing and 2035 PM peak hour corridor volumes in the South of Market area. It then summarizes 2035 peak hour level of service (LOS) for the study intersections.[3] Generally, 2035 traffic volumes, when compared to existing traffic volumes, were shown to increase by approximately 15 to 35 percent during the PM peak hour. Levels of traffic growth were not confined to one area; rather growth spread to most study corridors. Commensurate with the increase in the amount of vehicle traffic in the area, intersection delay, and thus LOS, of most study intersections are expected to degrade. Finally, this section provides an assessment of the growth in pass-through traffic in the South of Market Area.

[3] The travel demand forecasting process through which Future Year (2035) peak period traffic volumes were developed is summarized in Appendix A.

Figure 4-8 Circulation Study Intersections

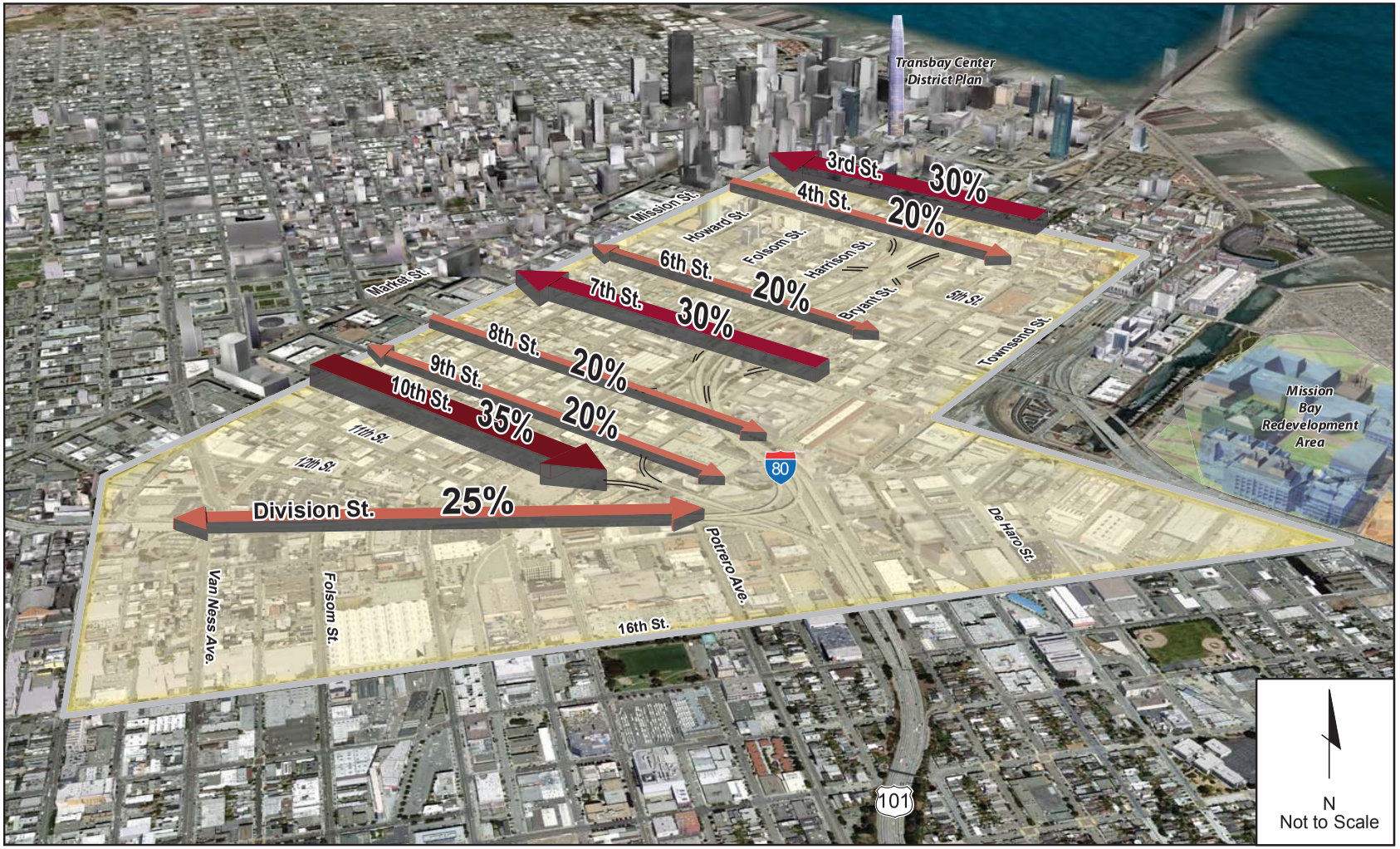


Peak Hour Corridor Traffic Volume Comparison

The PM Peak hour was selected for the comparison due to the larger amount of study intersections, and thus data available during that time period. A comparison between 2005 and 2035 PM Peak period corridor volumes was performed in order to determine the percentage of vehicle traffic growth in the South of Market area resulting from forecasted increases in population and employment in the neighborhood, City, and San Francisco Bay Area region.

With the exception of Mission Street, Fifth Street, Sixth Street, and Brannan Street, corridors in the South of Market area are one-way streets with multiple lanes of vehicle traffic. In addition, many streets feature connections to the regional freeway network. Because of these common features, levels of forecasted traffic growth on parallel corridors in the South of Market area are fairly uniform. On east-west streets, the amount of forecasted traffic growth during the PM peak period is approximately 30 percent, with the exception of Mission Street and Harrison Streets, where traffic growth is more modest. On north-south streets, the amount of forecasted traffic growth during the PM peak period is between 20 and 35 percent, with traffic growth spread evenly amongst the streets. Although there are several transit projects planned for Eastern Neighborhoods that will increase connectivity to the city and region (including the Central Subway, Transbay Transit Center, and the High Speed Rail), this comparison assumes that roadway capacity remains unchanged between the existing and Future Year scenario. Figures 4-9 and 4-10 present the forecasted traffic growth during the PM Peak period on the north-south and east-west study corridors, respectively.

Figure 4-9 Projected Growth in Vehicle Volumes: PM Peak Period (North-South Corridors)



EN Trips

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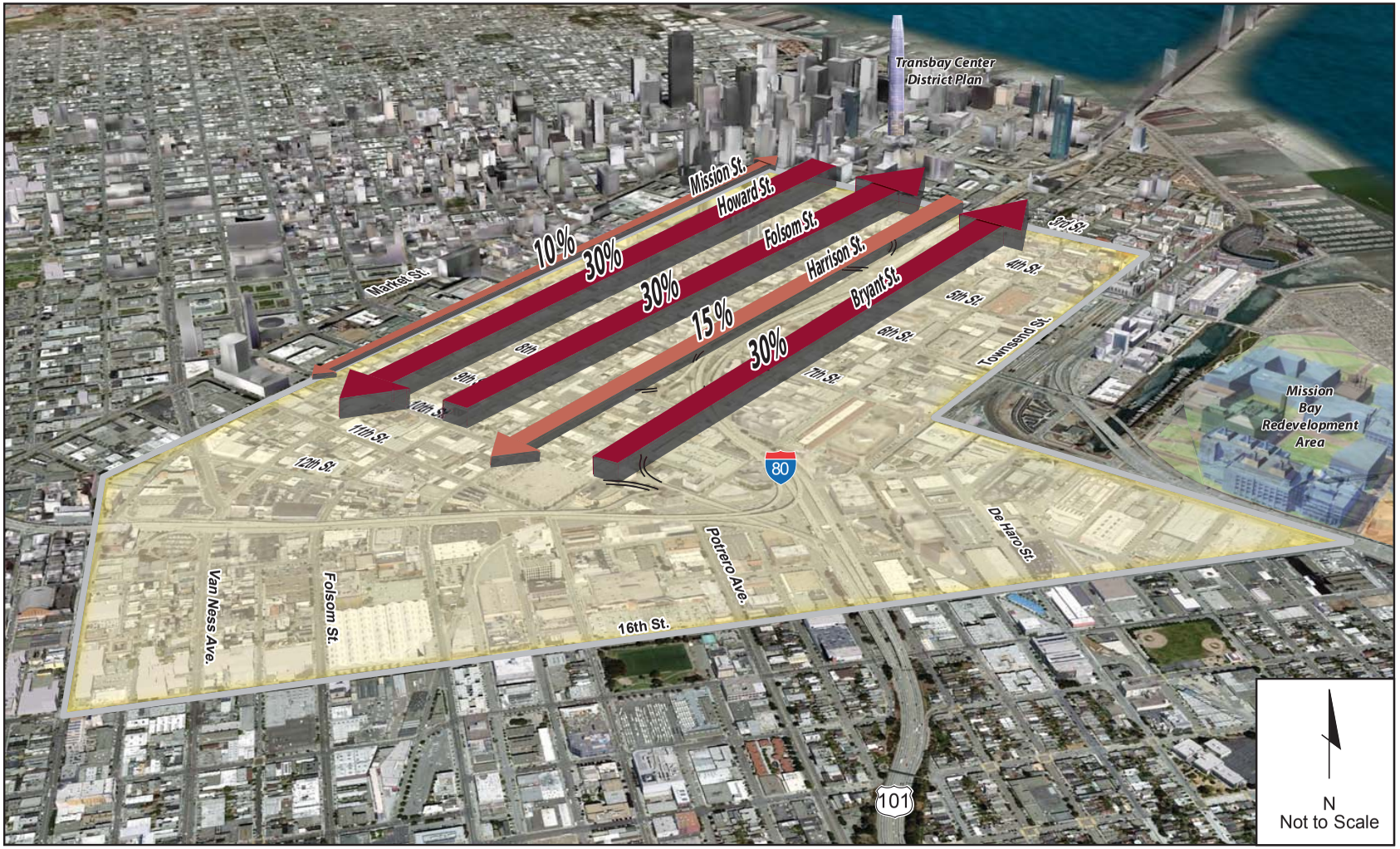
TRANSPORTATION CONSULTANTS

NORTH-SOUTH CORRIDORS FORECASTED TRAFFIC GROWTH

Figure 4-10 Projected Growth in Vehicle Volumes: PM Peak Period (East-West Corridors)



EN Trips

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EAST-WEST CORRIDORS FORECASTED TRAFFIC GROWTH

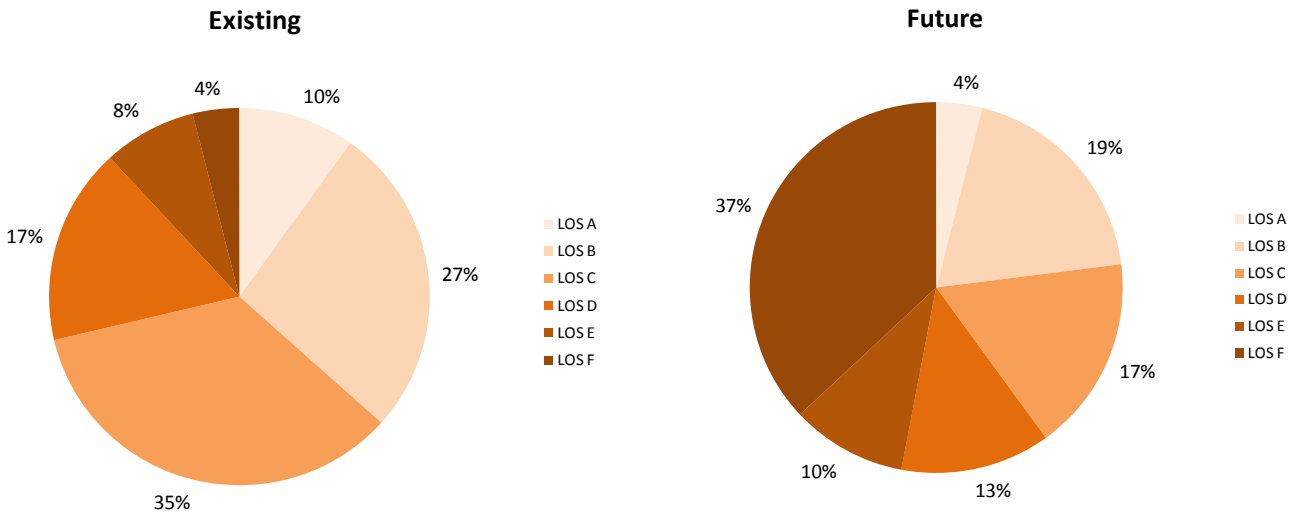
Peak Hour Intersection Level of Service

Intersection operating conditions are characterized by the concept of Level of Service (LOS), which provides a description of an intersection's performance based on traffic volumes, intersection capacity, and vehicle delays. LOS A represents free-flow conditions, with little or no delay, while LOS F represents congested conditions, with extremely long delays; LOS D (moderate high delays) is considered the lowest acceptable level of service in San Francisco. Often, intersection LOS is used as a proxy to determine how traffic is operating in a study corridor or area.[4]

With the increases in the amount of Future Year vehicle traffic forecast, intersection delay will increase, and thus LOS at study intersections will generally degrade during the PM peak hour when compared to existing LOS. Currently, approximately 90 percent of study intersections operate acceptably (LOS A-D) during the PM peak period. In the Future Year, the number of study intersections operating acceptably during the PM peak period will be reduced to approximately 50 percent assuming projected growth in employment and housing materializes and mode shares, i.e., the percent of person trips that are made by autos, remain relatively constant at 45–50 percent.

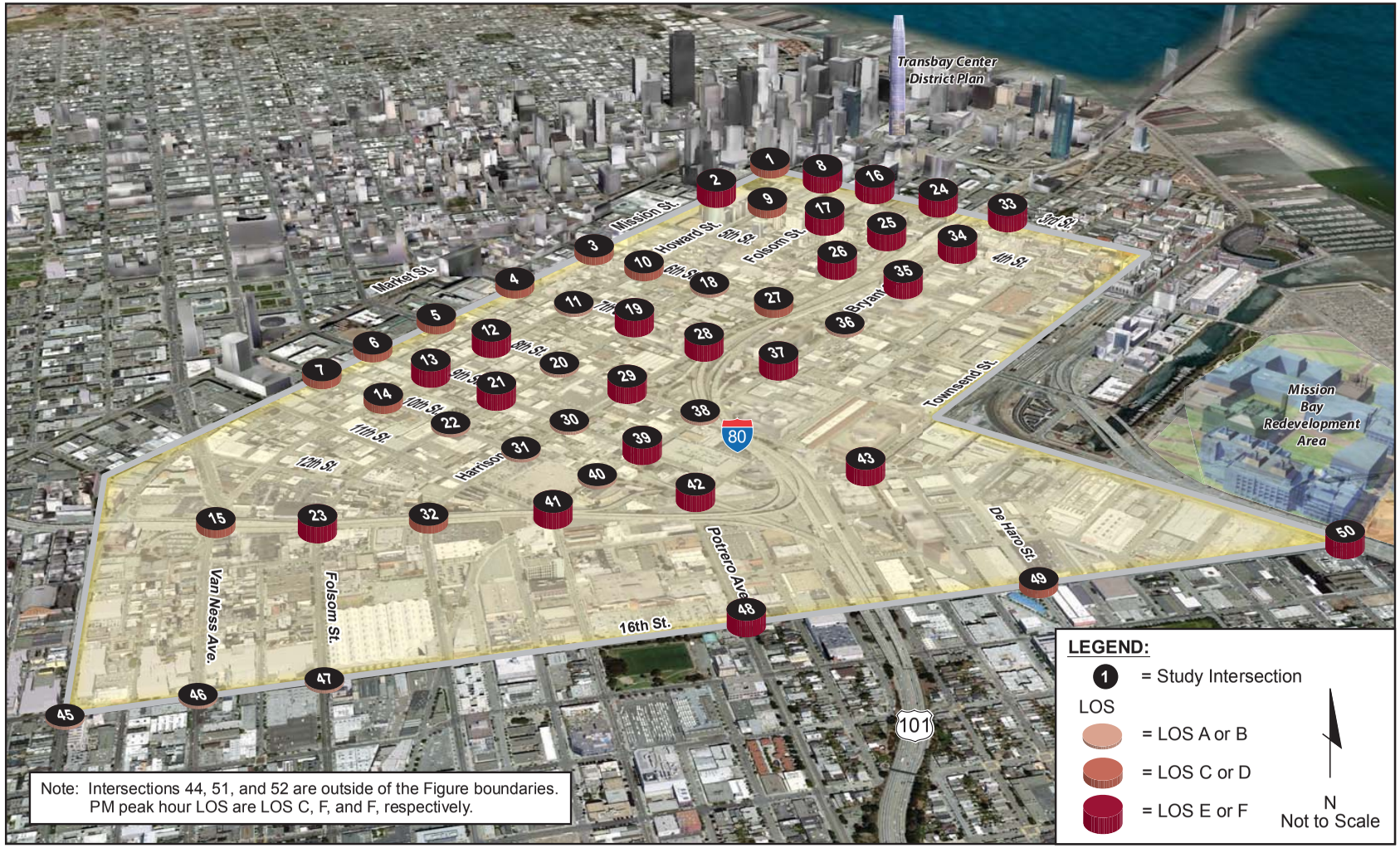
Below, Figure 4-11 summarizes the distribution of intersection LOS during the PM peak period for the existing and Future Year scenarios. Figure 4-12 provides a visual perspective of the Future Year PM peak period operating conditions for EN TRIPS study intersections. Table B-3, located in Appendix B of this report, summarizes 2035 delay, LOS, and volume over capacity ratios for all EN TRIPS study intersections.

Figure 4-11 PM Peak Hour Intersection LOS Distribution



[4] As an input to the LOS analysis, future Year intersection turning movement analyses were produced for the 21 AM peak hour and 52 PM peak hour study intersections. Appendix B depicts 2035 turning movement projections for all EN TRIPS study intersections.

Figure 4-12 Projected PM Peak Intersection LOS



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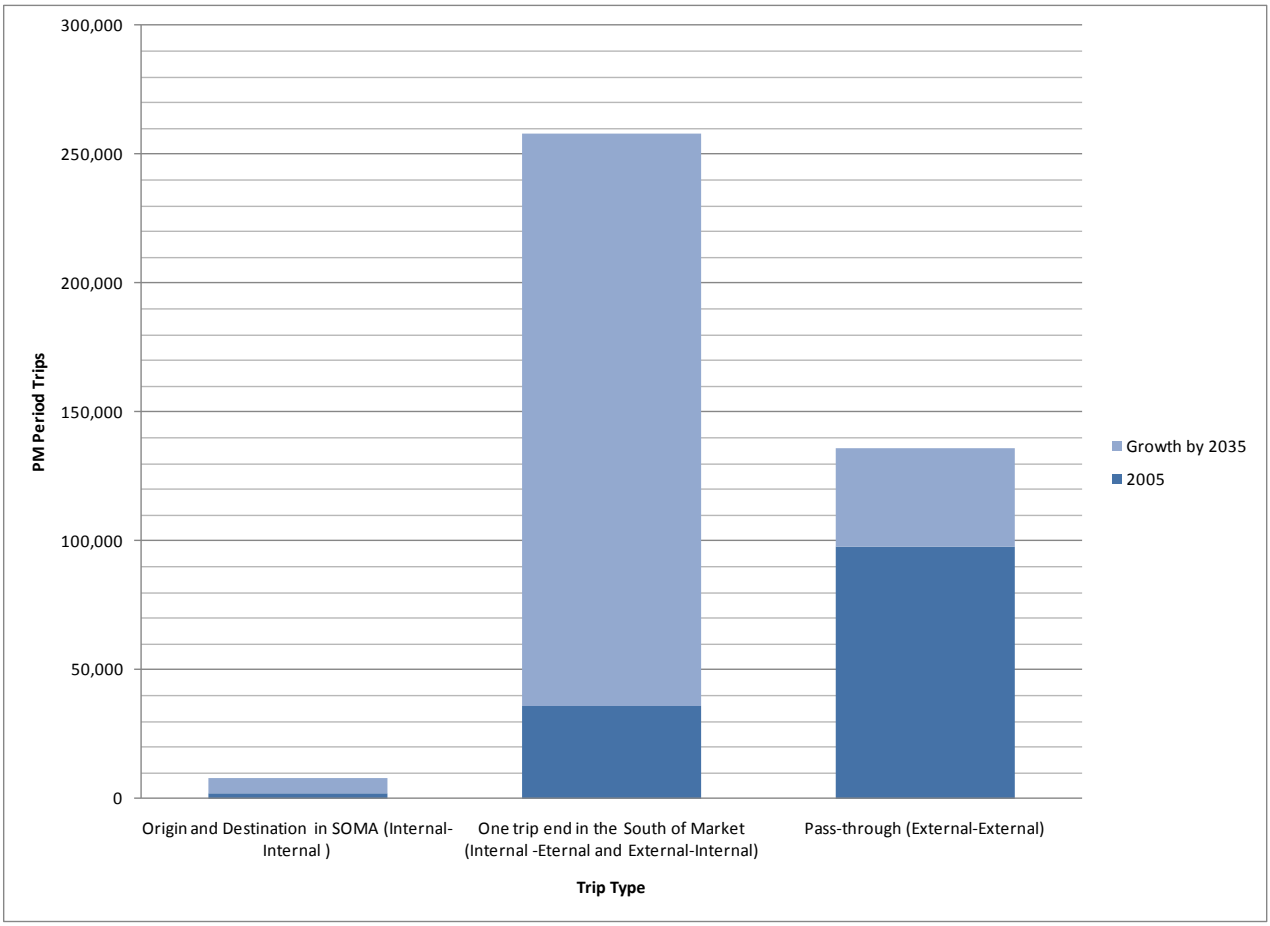
FUTURE YEAR (2035) INTERSECTION LEVELS OF SERVICE - PM PEAK HOUR

Assessment of Pass-Through Traffic

High volumes of vehicle traffic in the South of Market area are an important challenge for transportation planning in the Eastern Neighborhoods. The role of the South of Market street grid in collecting and distributing regional vehicle traffic to and from the Bay Bridge and regional freeways has implications for vehicle congestion, noise, and pollution, as well as transit performance, and pedestrian and cyclist comfort and safety. This section provides additional details concerning the origin and destinations of vehicle trips within the South of Market, focusing on the portion of trips that are "pass-through vehicle trips" traveling through the area to and from the regional freeways.[5]

Figure 4-13 Change in PM Period Vehicle Trips in the South of Market Area (2005 – 2035)



Source: Fehr and Peers analysis of SF-CHAMP 4.2 model projections.

Figure 4-13 illustrates the projected growth in PM period vehicle trips in the South of Market area between 2005 and 2035. It shows that SF-CHAMP projects a large change in the pattern of vehicle travel in the South of Market area by 2035. In the PM period, vehicle trips internal to the South of Market (those with origins and destinations in the neighborhood) are projected to increase from under 2,000 trips to just under 8,000 trips. However, even with this large percentage increase, internal trips with remain a small share of all vehicle trips (about 2 percent).

[5] An explanation of the methodology for this analysis is provided in Appendix C. The analysis excludes trips that travel only on the freeway and do not use any surface street in the South of Market.

Pass-through trips (those that travel through the South of Market area but have neither an origin nor a destination in the neighborhood) represent 70 percent of all vehicle trips on South of Market streets in the 2005 model estimate. However, pass through trips are projected to increase more modestly, increasing from 98,000 to 136,000 daily trips (a roughly 40 percent increase).

By far the largest increase is projected for the class of trips with one trip end (either an origin or a destination) in the Eastern Neighborhoods. Reflecting both the large increase in employment and the large numbers of new residents projected to work outside the South of Market area, this type of trip is expected to increase from 35,500 to more than 220,000, and represents 60 percent of all trips in the projected future condition.

Motor Vehicle Circulation Findings

As a result of large increases in employment and population density in the study area, the travel demand model projects that there will be a large increase in motor vehicle travel in the Eastern Neighborhoods: a 58 percent increase in daily auto person-trips originating in the Eastern Neighborhoods, and a 52 percent increase in PM Peak period trips. Combined with a large increase in pass-through trips resulting from regional growth outside of the Eastern Neighborhood, vehicle volumes in Eastern Neighborhoods streets could increase substantially.

SF-CHAMP projects a 15 percent to 35 percent increase in vehicle volumes on South of Market arterial corridors, as well as major increases in vehicle volumes on segments of Third Street, 16th Street, and Cesar Chavez Street outside of the South of Market. Many neighborhood streets could also see large increases in vehicle volumes. Vehicle volume increases on this scale could have negative impacts on traffic operations. Notable projected delays include:

- During the PM Peak period, the projected volume increases would lead to notable new delays in the South of Market, particularly on Third Street at Mission and Fourth Street at Folsom. Harrison Street and Bryant Streets (home to the I-80 freeway approaches) will also have delays, particularly at Harrison and Fifth, Harrison at Seventh, and Bryant at Fifth.
- Expanded travel through Showplace Square, as well as to and from Mission Bay could have major impacts on traffic operations. The intersection of Division/Eighth/Townsend, where there is now a traffic circle, is projected to have major delays (LOS F). The intersection of 11th Street and Division is also projected to have substantial delays (LOS E).
- Two intersections on 16th are projected to have major delays (LOS F): 16th and Potrero Avenue, and 16th and Third Street. While the circulation study didn't examine any other Third Street intersections in detail, much higher projected vehicle volumes on Third Street suggest that there may be more intersections along this corridor that could have delays.

Some of the areas with the highest projected increases in vehicle volumes and traffic delays (in the South of Market and along Third Street) are the parts of the study area with the largest projected increases in population and employment density. Increased traffic would present challenges to quality of life for those living and working in these areas. Challenges may include increased delays for pedestrian travel, as well as increased exposure to vehicle emissions and noise. Vehicle volume increases on this scale would also have negative implications for transit and bicycle travel. These implications are discussed in more detail in the report sections that follow.

It is important to note that these outcomes are not pre-determined. New infrastructure investment and/or changes in City policy could influence the number of new vehicle trips, help to reduce congestion, or lessen the impact of increased vehicle volumes on other modes of transportation.

Both the physical constraints of the study area and the City's Transit First Policy preclude major expansions of roadway capacity as a strategy for dealing with projected vehicle volumes. Instead, the City has already begun exploring a variety of policy approaches to managing congestion. These strategies include:

- **Smart Parking Management.** As detailed in the EN TRIPS existing conditions report, the SFMTA's SF*park* pilot programs have begun exploring the potential for a variety of parking management strategies, including real time information and adjustment of prices in peak times and places, as a strategy for managing congestion by reducing the vehicle volumes generated by cars circling for parking.
- **Congestion Pricing.** As detailed in the EN TRIPS existing conditions report, the San Francisco County Transportation Authority is conducting a Mobility, Access, and Pricing Study to make policy recommendations about congestion pricing in the downtown area of the city, including SOMA.
- **Other Transportation Demand Management.** TDM can include subsidized transit passes, guaranteed rides home for non-auto commuters, and promotion of ridesharing. In the South of Market Area and Mission Bay district, employers are already required to have a Transportation Management Program and to provide Transportation Brokerage Services (TBS). The Transportation Management Association (TMA) of San Francisco, in operation since 1989, is an association of more than 60 building owners and managers that implements the required Transportation Demand Management programs of member buildings. Expanded TDM investments or requirements from the City could potentially reduce peak period vehicle volumes.

In addition to the above strategies for managing or reducing vehicle congestion, maintaining and improving quality of life in the parts of the Eastern Neighborhoods that are poised for substantial growth will require the City to maintain and expand alternatives to travel by private vehicle. Doing so will include further development of comfortable pedestrian spaces, completing and refining the bicycle network, and implementing transit priority treatments to speed key surface transit routes. Conditions for these other transportation networks are discussed further in the sections that follow.

Two objectives of the Eastern Neighborhood Area Plans are directly related to transit: improve public transit to better serve existing and new development and increase transit ridership by making it more comfortable and easier to use. This section assesses projected transit demand as compared to available transit capacity in the EN TRIPS study area for 2035. In the 2035 condition, demand for transit trips was projected using the SFCTA's SF-CHAMP model. The transit network evaluated here is not the current network, but is based on the SFMTA's Transit Effectiveness Project (TEP) recommendations (including recommendations for new routes and realignments of existing routes) and assumptions about levels of service. It should be noted that in estimating transit ridership, the frequency of service on each route was used as one of several factors determining the attractiveness of transit service to riders, but did not serve as a constraint on ridership. In some cases, projected ridership exceeds available capacity. This issue is discussed further below.

Summary of Existing Conditions

As many of the future year problems, issues, and opportunities are simply extensions of the current conditions, this section builds on the detailed examination of current motor vehicle conditions presented in the EN TRIPS Existing Conditions report. The existing conditions report noted the following conditions for transit in the study area:

Transit mode share in the Eastern Neighborhoods (19 percent) is equivalent to the citywide average. However, Muni service, which largely consists of bus routes operating in traffic, is relatively slow. In segments of several major streets, including much of Mission, 16th, and 24th Streets in the Mission District and Mission Street South of Market, buses average less than eight miles per hour during the PM peak period.

On streets including Mission Street, much of Potrero Avenue, and parts of 16th Street in the Mission, and on segments of Folsom Street and several of the north-south numbered streets in the South of Market, average peak-period bus speeds are less than half of average auto speeds.

The three busiest rail stations in the Eastern Neighborhoods, the 16th Street Mission and 24th Street Mission BART Stations and the Fourth and King Caltrain Station, are relatively well-served by connecting transit and pedestrian pathways, and mode shares for connections to and from them are dominated by non-auto modes. However, the primary mode for access to the 22nd Street Caltrain Station is driving. A number of challenges are unique to individual neighborhoods, including limitations on pedestrian access and legibility of transit routes imposed by the South of Market street grid; notable gaps in coverage in the Mission; and physical barriers in Potrero Hill, Mission Bay, and the Central Waterfront.

A number of major improvements to the transit system in the Eastern Neighborhoods are planned, including SFMTA Transit Effectiveness Project (TEP) changes to bus lines, the Central Subway project and the intertwined California High-Speed Rail, Transbay Transit Center and the extension of Caltrain to the Transbay Terminal. Each of these improvements is planned for completion by 2035.

Figure 4-14 shows the SFMTA's 2035 transit network as planned under the TEP. Figure 4-15 shows the share of the study area that is within ¼ mile of one of the corridors that make up the TEP's Rapid network. A large majority of the study area falls into this ¼ mile buffer. However, the following areas are more than ¼ mile from one of these high frequency transit routes:

- A portion of the western South of Market, between Folsom and Bryant streets and between 5th and 8th Streets, is more than 1/4 mile from the nearest proposed TEP rapid route. This area will receive bus service from the 19–Polk. A very small area just south of the Transbay District is also more the ¼ mile from one of these routes.

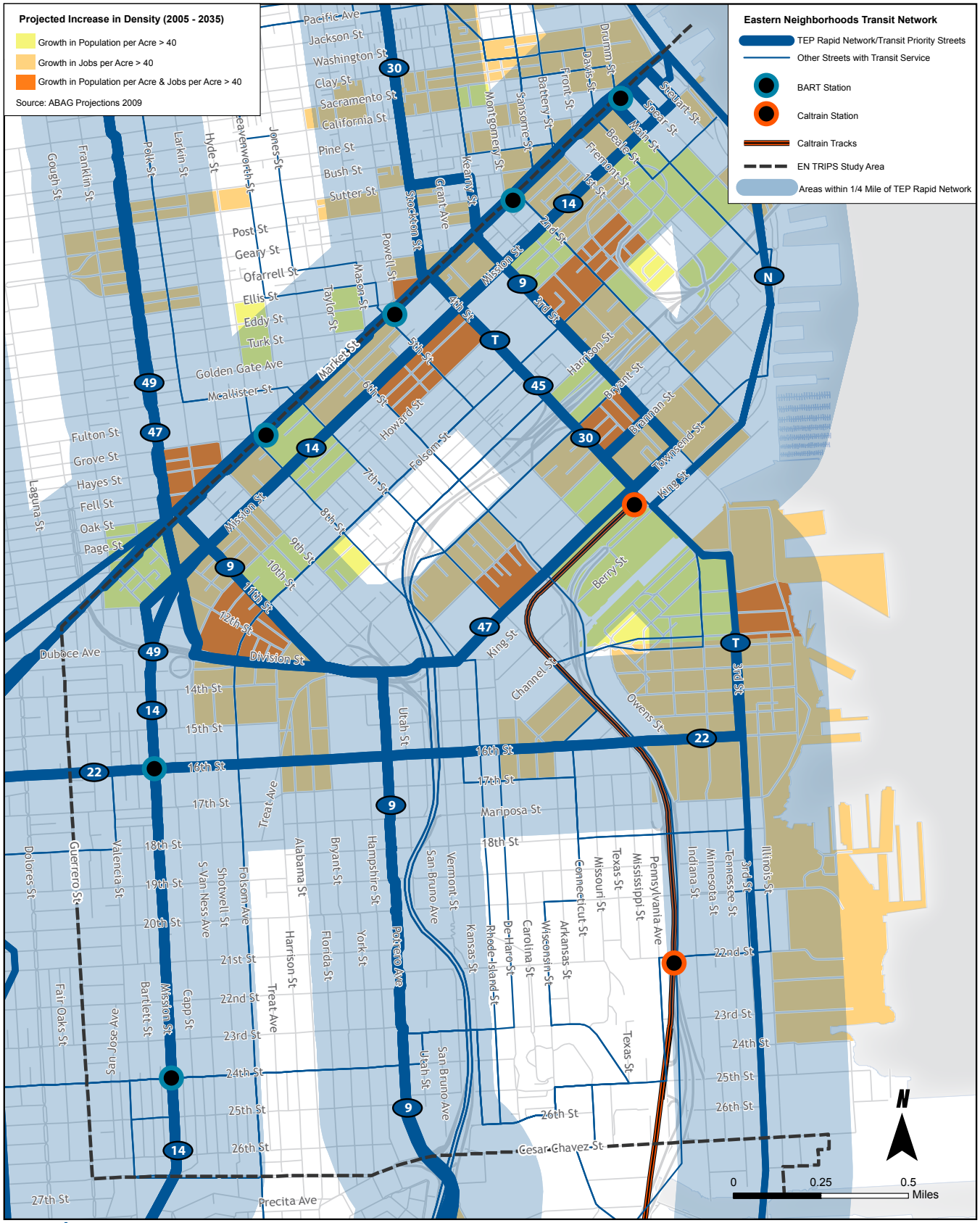
- The portion of the Potrero Hill neighborhood south of 18th Street and between Rhode Island and Pennsylvania streets is more the 1/4 mile from a TEP rapid route. In this area, the topography makes running a high frequency transit route difficult. Most of this portion of Potrero Hill is not projected to experience significant growth. However, substantial population growth is projected at the Potrero Hill public housing development in the southern portion of this area, which is slated for HOPE SF redevelopment. As currently planned, this area will be served by the 12–Pacific.
- While the areas of the Mission District with the highest population and employment densities are well served by transit, the Mission District south of 18th between Folsom and Alabama Streets is also more than ¼ mile from a high TEP rapid route. This area will be served by the 27–Folsom.
- In the Central Waterfront, the easternmost portions of Pier 70 are more than ¼ mile from the T–Third rail line, the nearest TEP Rapid route.

Figure 4-14 TEP-proposed Primary Transit Network

Nelson|Nygaard consulting associates

Source: San Francisco City & County GIS

Figure 4-15 Areas with ¼ Mile of TEP-Proposed Primary Transit Network



Nelson\Nygaard consulting associates

Source: San Francisco City & County GIS

Projected Transit Demand

As illustrated in Figure 4-16, transit trips are expected to nearly double over the base year of 2005, from approximately 87,500 daily trips to approximately 173,500. This growth rate would increase transit mode share from approximately 19 percent to approximately 22 percent.

As illustrated in Figure 4-17, even greater growth in transit use is projected in the PM peak period: an increase of over 100 percent, from slightly less than 28,000 trips to slightly more than 58,000. More than one-third of daily transit trips would take place during the PM peak period.

Within the Eastern Neighborhoods, the greatest rate of growth in daily transit trips is projected to take place in the Central Waterfront/Mission Bay (approximately 1,247 percent, from fewer than 2,000 daily trips to almost 23,000). However, the greatest raw growth by far is projected to occur in the South of Market (approximately 43,000 additional trips, for a total of more than 79,000). There would be less growth in the Mission and Showplace Square/Potrero Hill in both percentage and raw terms.

For transit trips originating in the Eastern Neighborhoods, the destinations experiencing the greatest growth, by far, would be the East Bay (approximately 17,500 additional trips, for a total of more than 29,000) and Downtown (approximately 14,000 additional trips, for a total of almost 32,000). Trips to the East Bay are dependent on the capacities of BART and AC Transit's transbay bus network (and, to a lesser extent, the ferry system). Trips to downtown depend on local Muni routes.

In the following sections, projected transit use is discussed at the neighborhood, station, line (including line segments outside of the corridor or neighborhood), and corridor segment levels.

Figure 4-16 Projected Increase in Transit Demand, Daily

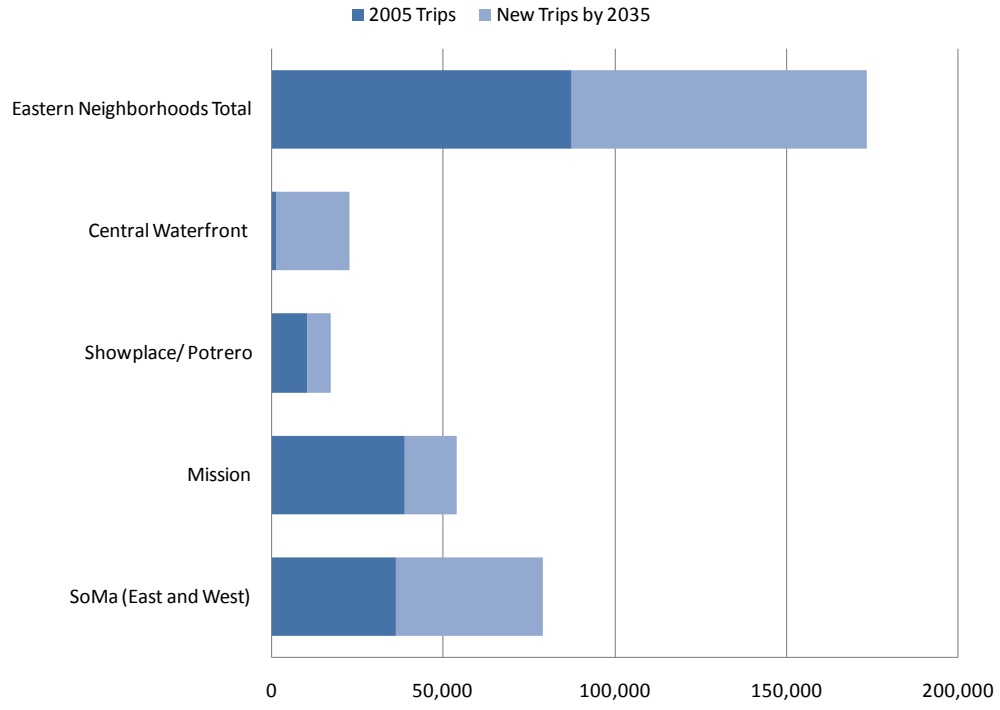
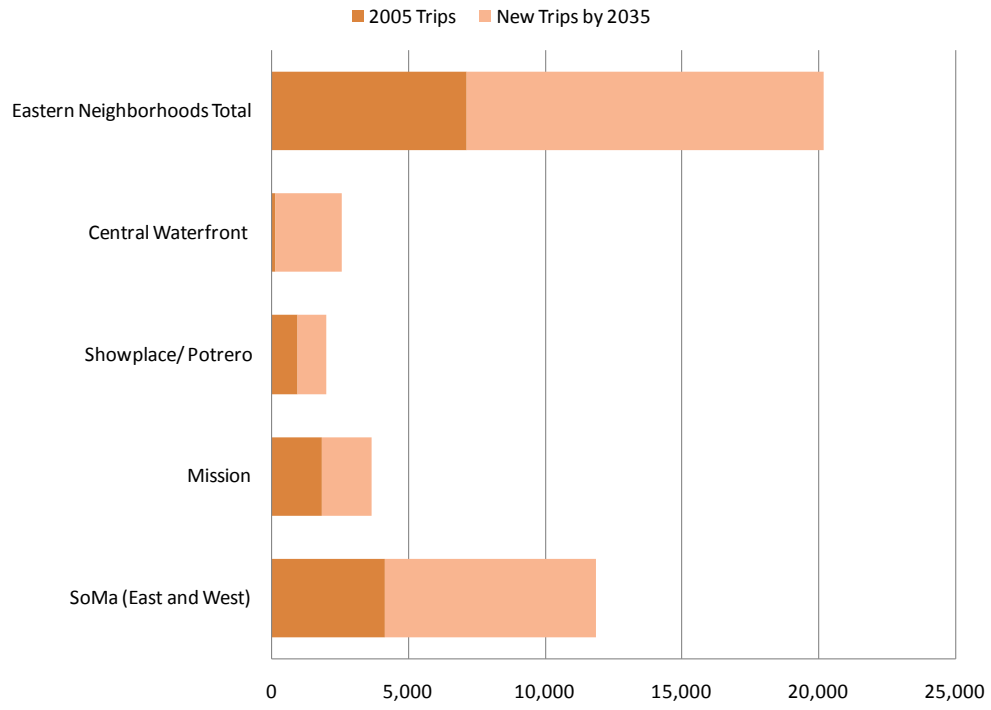


Figure 4-17 Projected Increase in Transit Demand, PM Peak



Transit Demand by Neighborhood

South of Market Area Transit Trips

By 2035, the number of daily transit trips originating in the South of Market area is projected to increase approximately 119 percent, to more than 79,000. As illustrated in Figure 4-18, approximately 46 percent of all transit trips taken in the Eastern Neighborhoods would be in the South of Market area, up from approximately 41 percent in the base model year of 2005. The largest share of these new trips are projected to be either internal to the South of Market area (4,000 new trips), or bound for either downtown San Francisco (8,000 new trips), or the East Bay (9,000 new trips). Starting from a low base, the neighborhoods receiving the largest percentage increases in transit trips from the South of Market will be the Central Waterfront and Bayshore.

Major investments in rail service will have important impacts on transit demand in the South of Market, and will require new investment in station access facilities. The Transbay Transit Center will replace the existing Transbay Terminal at First and Mission Streets, serving as the transfer point for regional bus service and the eventual terminus of Caltrain and California High Speed Rail. This facility will be a major generator and attractor of transit, bicycle, and pedestrian trips in the South of Market. The Transbay Transit Center District is the area around the Transit Center site. It is defined as the area between Market and Folsom Streets and Hawthorne and Steuart Streets. The Transbay Terminal Center District Plan, prepared by the San Francisco Planning Department's City Design group, identifies a number of access needs and potential infrastructure investments and transportation policies to help serve these needs. The plan focuses on expanding pedestrian space for the thousands of travelers expected to access the terminal on foot each day, improving pedestrian connectivity, integrating the transit center into the city's bicycle network, upgrading existing transit lanes to self-enforcing designs, and expanding the network of transit-only lanes.[6]

Use of the busiest transit hub within the neighborhood, the Fourth and King Caltrain Station, would increase approximately 77 percent over February 2010 levels (as reported by Caltrain) to more than 15,000 daily entries. While this would amount to a substantial increase, it is well below the 119 percent rate of increase projected for the neighborhood as a whole. While construction of the Transbay Transit Center and Downtown Rail Extension would mean that the station would no longer serve as the terminus for Caltrain, it is likely that service to the station would be expanded, as electrification would reduce the cost to provide service and extension to downtown would increase the demand for service. Planning for the area should take into account the potential for greatly increased demand for transit service both at the station and along feeder routes connecting to the station. In particular, bus and Muni Metro stops outside of the station might be reconfigured and/or redesigned to improve connectivity at this important hub, and a coordinated wayfinding strategy should be part of any such process.

The San Francisco Planning Department City Design Group is creating a plan for development at the Fourth and King Street Rail Yards site. As part of that planning effort, the project has produced an opportunities and constraints report. Details of station access needs can be found in that report. Identified station access needs include tying the stations more closely into the surrounding city fabric, reconfiguration of Townsend Street and the extension of King Street between I-280 and the railroad tracks, bicycle facility upgrades, and transit route reconfigurations. The exact configuration of the Fourth and King rail station will depend on the final alignment chosen for the California High Speed Rail and Caltrain.[7]

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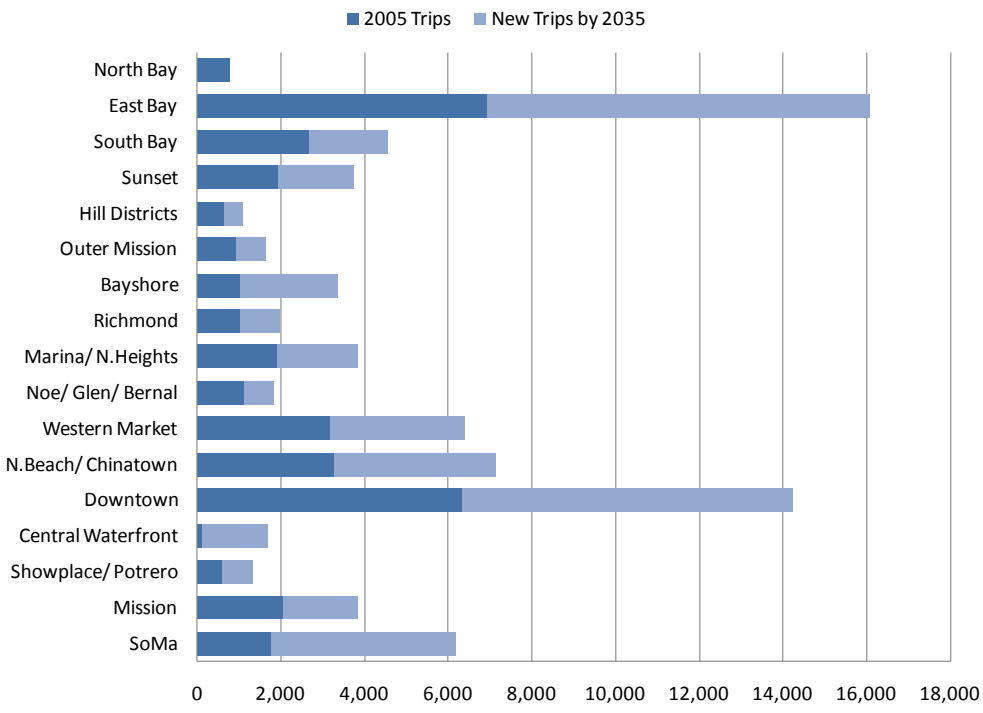
[6] Detail on the transportation facilities planned for the Transbay Transit Center District can be found here: http://transbaycenter.org/uploads/2010/10/2010-10-12-CAC-mtg-Transit-Center-District-Plan-Update.pdf

[7] Detail on the transportation needs and opportunities for the 4th and King Rail Yards site can be found at: http://www.sf-planning.org/ftp/CDG/CDG_railyards.htm

Figure 4-18 Projected Increase in South of Market Area Origin Transit Trips by Destination, Daily



Central Waterfront/Mission Bay Transit Trips

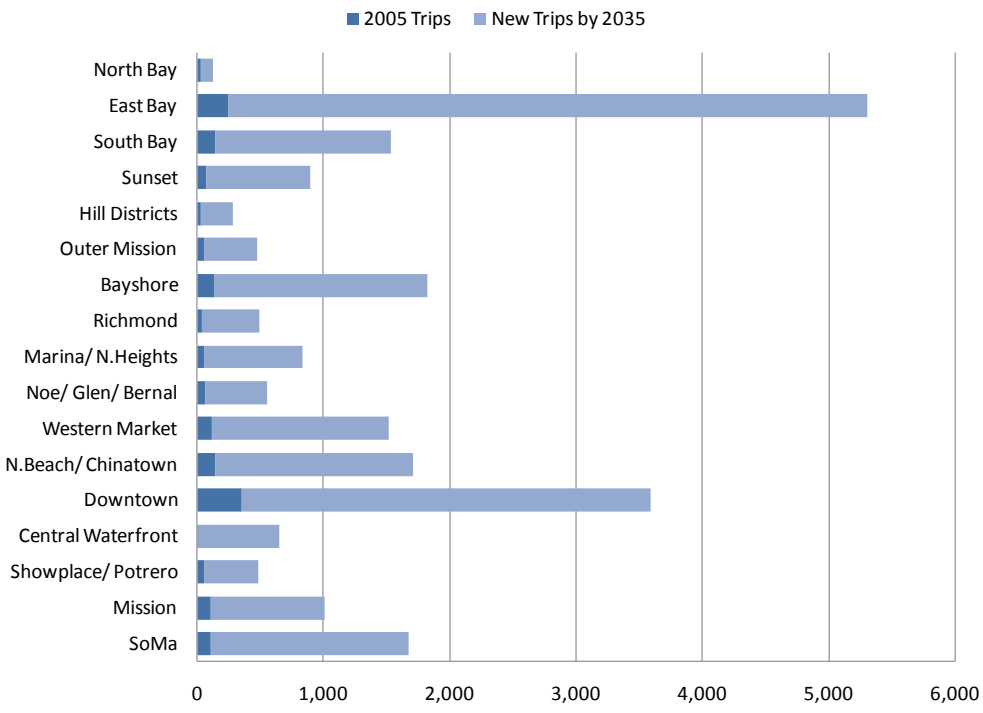
By 2035, the number of daily transit trips in the Central Waterfront and Mission Bay is projected to increase more than twelve-fold, from fewer than 2,000 to almost 23,000. The area accounted for less than two percent of all transit trips in the Eastern Neighborhoods in the base model year of 2005; by 2035, it would account for approximately 13 percent. The largest share of these new trips will be between the Central Waterfront/Mission Bay and the South of Market area, Downtown San Francisco, and the East Bay. As today, relatively little bus service would be available in Mission Bay and the Central Waterfront in 2035 under TEP recommendations. However, the T–Third Street light rail line was built in large part to accommodate projected growth in the area by providing a high-capacity north-south link to Caltrain, BART, and downtown. Under the projections, the T–Third would be heavily used in 2035, carrying nearly 90,000 riders per day. The TEP and the Mission Bay South Infrastructure Plan also recommended that the 22–Fillmore be realigned to serve Mission Bay. This service change is included in the SF-CHAMP future conditions projections and the 22–Fillmore is projected to see ridership growth of 144 percent– although ridership on its segments in Mission Bay, near the end of the line, would remain relatively low.

While currently lightly used relative to Caltrain's terminus at Fourth and King Streets in Mission Bay, the 22nd Street Caltrain station is an express stop serving "reverse commutes" from San Francisco to Silicon Valley, a growing market. Access to the station could be enhanced either with an improved pedestrian environment or, if new transit service were implemented, between the station and growing areas just outside of its walk shed, including the Northeast Mission and northern Potrero Hill. Alternatively, if high-speed rail service were implemented along the Caltrain right-of-way, requiring reconstruction of the corridor, it might be worthwhile to study alternative locations for the station, most obviously near 16th Street, which would allow a direct connection to Muni Route 22–Fillmore and pedestrian access to and from the south side of Mission Bay, including the UCSF–Mission Bay campus and planned hospital.

Among the transportation projects assumed in this analysis is the "E–Line"– the extension of Muni's historic streetcar service along the Embarcadero east of the Ferry Building to the Fourth and King Street Caltrain Stations. An additional service change that has been proposed by the Market Street Railway would be the further extension of the E–Line to through the Central Waterfront Pier 70, sharing tracks with the T–Third and using the turnaround loop at 19th Street. This project presents one possible strategy for increasing transit capacity in the Third Street corridor.

During the planning for Mission Bay redevelopment, there were proposals to extend either Muni's 30 or the 45 bus routes south of the Channel to serve Mission Bay. However, the TEP determined that the most effective bus service change for this area would be to re-route the 12–Pacific. The 12–Pacific would provide direct service from the financial district and Caltrain, through Mission Bay to Potrero Hill and SF General Hospital.

Figure 4-19 Projected Increase in Central Waterfront Area Origin Transit Trips by Destination, Daily

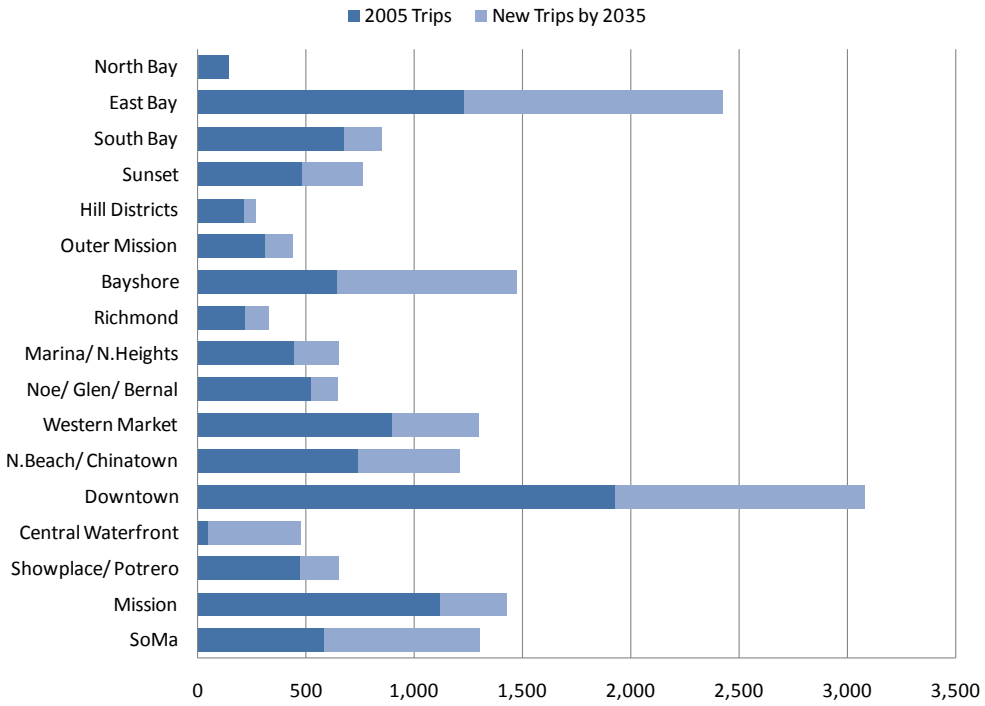


Potrero Hill/Showplace Square Transit Trips

By 2035, the number of daily transit trips in Potrero Hill and Showplace Square is projected to increase approximately 63 percent, to just more than 17,000. While a 63 percent increase is notable, it is well below the rates of growth anticipated for the South of Market area and the Central Waterfront/Mission Bay, and there would be fewer transit trips in Potrero Hill/Showplace Square than in any of the other Eastern Neighborhoods, accounting for less than 10 percent of the study area total.

Relatively low transit use in this neighborhood is the result of lower-density land use patterns, as well as the lack of high frequency transit offerings. Because of the topography, Muni transit priority corridors serve only the edges of the neighborhood: on Potrero, 16th, and Third Streets. The 47–Van Ness also serves Showplace Square. The rest of the Muni service in the area is relatively infrequent, and likely to remain so in the future condition. There are only two areas in Potrero Hill/Showplace Square where there are substantial numbers of transit boardings: on 16th Street near the western end of Showplace Square, where both the 22 and the 33–Stanyan would operate, and along Wisconsin, 26th, Kansas and Rhode Island Streets in the southwest corner of Potrero Hill, where three lines (the 12–Pacific, 19–Polk, and new 58–Second Street) would converge.

Figure 4-20 Projected Increase in Showplace Square/Potero Hill Origin Transit Trips by Destination, Daily



Mission District Transit Trips

The Mission District is located at the midpoint of several major transit routes, and also has BART service at the 16th Street Mission and 24th Street Mission BART stations. By 2035, the number of daily transit trips in the Mission is projected to increase approximately 39 percent, to slightly less than 54,000. Approximately 31 percent of all transit trips taken in the Eastern Neighborhoods would be in the Mission, down from approximately 44 percent in the base model year of 2005. This trend is perhaps unsurprising given the limited population and employment growth expected to occur in the Mission District relative to other areas of the Eastern Neighborhoods. The areas receiving the largest percentage growth in transit trips from the Mission District are the Central Waterfront, the South of Market area, the Bayshore area, and the East Bay. Despite the modest growth in transit use forecast for the Mission, ridership in the neighborhood would remain relatively high (approximate 21 percent mode share for transit, roughly equivalent to that for the Eastern Neighborhoods at large).

Figure 4-21 Projected Increase in Mission District Origin Transit Trips by Destination, Daily

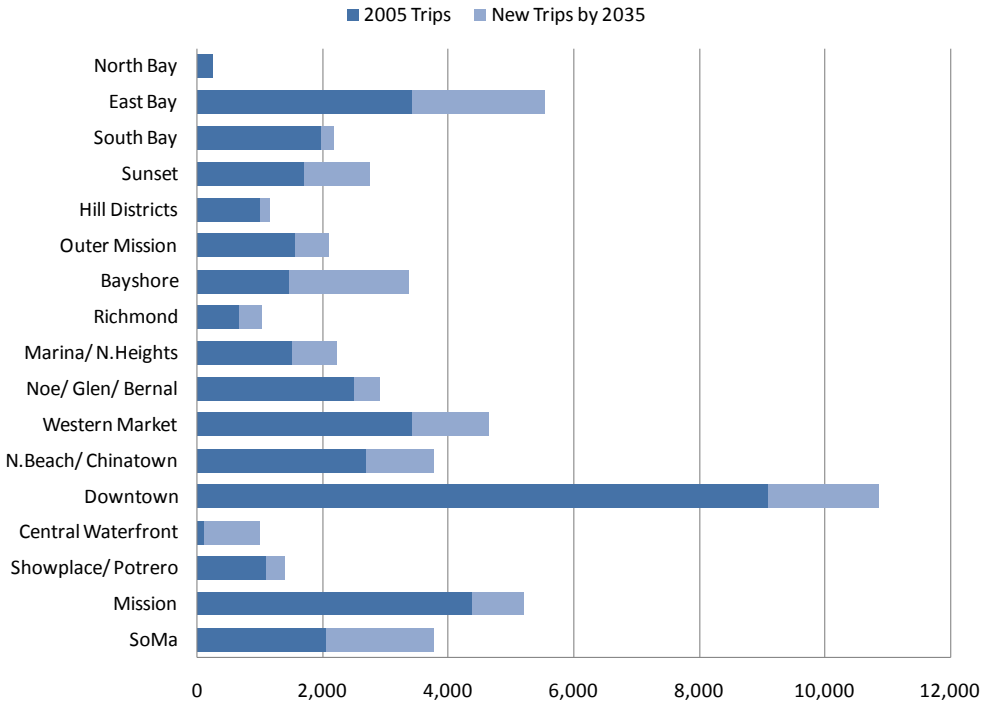
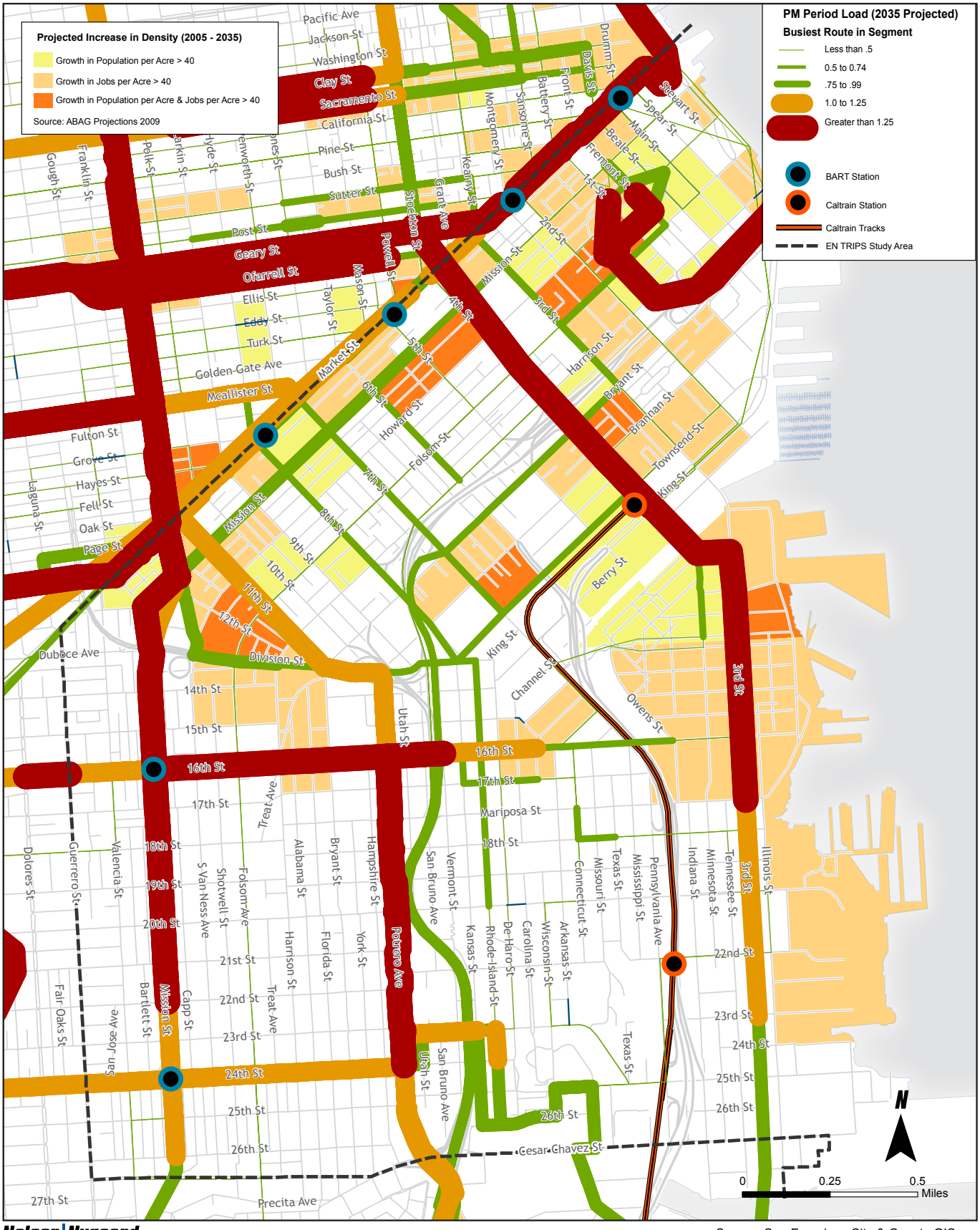


Figure 4-22 Projected PM Period Transit Ridership Volume by Segment, 2035

Nelson\Nygaard consulting associates

Source: San Francisco City & County GIS

Figure 4-23 Projected Line Load by Segment in Key Transit Corridors, 2035



Nelson\Nygaard consulting associates

Source: San Francisco City & County GIS

Major Transit Corridors

The increases in transit demand described above would lead to substantial increases ridership on many Muni routes.

Figure 4-22 illustrates total Muni ridership volumes by street segment. The ridership totals are aggregated by segment to demonstrate total demand in each corridor.

Figure 4-23 illustrates total projected PM peak hour loads for all of the SFMTA transit routes operating in each street segment, include both bus and light rail. Loads are calculated by dividing total projected ridership over the period by the total capacity (including both seats and standing room) of the vehicles operating in that segment, using capacities defined by SFMTA (see Figure 4-24). A load of 1 (or 100 percent) represents a full vehicle; however, vehicles regularly exceed capacity. In quarterly Service Standards reports, SFMTA defines a "maximum load" as "125 percent of comfortable sitting/standing capacity."

Figure 4-24 Capacity of Muni Vehicles

Vehicle	Capacity
30' Bus	45
40' Bus	63
60' Bus	94
Light Rail Vehicle	119
Historic Streetcar	60
Cable Car	63

Source: SFMTA

Figure 4-25 illustrates the transit network in the South of Market and on 16th Street alongside projected 2035 intersection LOS for motor vehicles. Projected future conditions for key Eastern Neighborhoods transit corridors are discussed below.

Third Street Corridor and the Central Subway

Third Street is a vital transit corridor for the Eastern Neighborhoods, where the T–Third rail line currently links Potrero Hill, the Central Waterfront, and Mission Bay to the Embarcadero and the Market Street subway. This service will change in the future condition, as the T–Third will be re-routed through the new Central Subway, which it will use to travel along Fourth and Stockton Streets, across Market Street to Chinatown. In the South of Market area, there will be new surface stops along Fourth between Brannan and Bryant Streets and an underground station at Moscone Center, between Folsom and Howard Streets. Trains will operate in semi-exclusive right-of-way on Fourth Street (south of the Bay Bridge approach, Fourth will be reconfigured to provide one northbound and two southbound travel lanes) and will enter and exit the subway via a portal beneath the Bay Bridge approach. By eliminating the need to share tracks with the N–Judah, the project will also serve to improve the reliability of the T–Third Street, which is now often delayed where it transitions between Fourth and King Streets. T–Third trains will also no longer have to pass AT&T Park, where they are delayed by additional game-day trains and large crowds of pedestrians before and after baseball games.

Despite these improvements, model projections and traffic analysis suggests that the T–Third will face operational challenges in the future condition. Ridership is projected to increase approximately 173 percent over fall 2007 levels observed for the TEP, to nearly 90,000 daily boardings. This is especially notable since the T–Third Street is currently interlined with the K–Ingleside, and the 2007 count was based on this configuration, including ridership on both lines in

a combined total. Projected daily ridership of nearly 90,000 on the 6.7-mile T–Third Street would represent an average of almost 13,500 boardings per mile. Average PM peak hour load factors of greater than 125 percent of seated and standing capacity are projected on the line between Mariposa and Market Street.

A large majority of the transit demand in the Fourth Street corridor in the South of Market is projected to use the T–Third as it operates through the Central Subway. A much smaller share of ridership in this corridor will use the 45–Union Stockton and 30–Stockton, which will continue operating on the surface of Fourth Street. Ridership on the 30–Stockton is projected to decrease slightly (approximately one percent, to slightly less than 22,000). Ridership on the 45–Union Stockton is projected to increase approximately 34 percent over TEP counts collected in 2006 and 2007, to more than 16,000. The expected vehicle delays on Third and Fourth Streets would cause delay for the 30 and the 45.

Mission Street Corridor

Mission Street is the major transit corridor traveling east and west through the northern portion of the South of Market, and it continues as the transit spine of the Mission District. It is both a major local and regional transit corridor: on the surface, it includes Muni's busy 14–Mission and 14L–Mission Limited routes, as well as the portion of the 49–Van Ness/Mission that travels through the Mission District. BART travels underneath Mission Street in the Mission District.

Combined usage of Muni's 14–Mission and 14L–Mission Limited bus lines is projected to increase approximately 54 percent over levels observed in 2006 and 2007 for the TEP to more than 58,000 (it should be noted that service on the 14L has been substantially increased since TEP data were collected). Much of this growth will occur in the Mission District. Neither the 14 nor the 14L is projected to have passenger loads that exceed available capacity. In the circulation study area, all Mission street intersections are projected to be LOS C for vehicles, except Fourth Street, where there are substantial delays projected for motor vehicles (LOS E).

A 104 percent increase in ridership is projected for the 49–Van Ness/Mission, to approximately 51,500 daily boardings. While much of the growth in usage of Line 49 would take place in the Van Ness corridor north of the study area, the 49–Van Ness/Mission is expected to have average passenger loads exceeding 125 percent of total capacity north of 22nd Street during the PM peak.

Some growth is projected in usage of both the 16th Street Mission and 24th Street Mission BART stations. For the Fourth quarter of Fiscal Year 2010 (April-June), BART recorded weekday averages of approximately 10,000 exits at 16th and 11,000 at 24th. For 2035, these totals are projected to be approximately 13,000 and 15,000, respectively. The increases would represent growth rates of approximately 27 percent over the current condition (not the base model year of 2005) at 16th and 35 percent at 24th. While these projected growth rates are noteworthy, they are well below the near-100 percent rate of increase projected for all transit trips in the Eastern Neighborhoods and somewhat below the 39 percent increase over 2005 projected for all transit trips in the Mission.

Other South of Market Corridors

With the exception of Mission Street, the travel demand model projects relatively little travel by transit in the east-west direction through the South of Market. The TEP recommended that Folsom Street become the primary east-west transit spine between Mission and Townsend streets, with routes operating in both directions on the street, and a new line, the 11-Downtown Connector , operating between Second and Eleventh Streets. By 2035, however, the 27–Bryant (which the TEP recommended be re-named the 27–Folsom) would have daily ridership of just more than 3,000 (a notable decrease from existing levels), while the new Line–11 would have

slightly less than 6,000 daily boardings.[8] According to model projections, parts of Mission, Bryant, and Townsend Streets would all see greater transit use than Folsom Street, using the current one-way street pattern. It is possible that transit priority treatments would allow transit in these corridors to capture some of the trips now projected to be vehicle trips. Ridership would also be high along Eleventh Street, on the 9 and 9L.

Ridership on the 47–Van Ness is projected to increase approximately 122 percent, to more than 28,000. The 47 would benefit from new bus-only lanes on Van Ness Avenue, and would follow a new alignment, as recommended by the TEP, in South of Market, along South Van Ness Avenue and Division and Townsend streets rather than Eleventh, Harrison, and Bryant Streets. While this re-routing will allow the 47 to avoid projected congestion on Bryant and Harrison Streets, the route would have to travel through the intersection of Eighth/Division/Townsend, which is projected to be LOS F during the PM Peak.

Market Street Corridor and Muni Metro

The Market Street BART and Muni Metro stations are major transit hubs adjacent to the South of Market area, as well as the destinations of many connecting trips. Significant variations are anticipated in rates of ridership growth for BART at each station: While the current first- and second-busiest stations in the BART system, Embarcadero and Montgomery, would experience some growth (approximately 12 and 36 percent, respectively, to almost 39,000 and 44,000 daily exits), patronage at Civic Center would increase approximately 83 percent, to more than 32,000 daily exits, and use of Powell would increase approximately 117 percent, to more than 51,000 daily exits. This increase might be partly explained by transfers between BART and the Muni Metro T–Third line, which upon completion of the Central Subway will take place at Powell and at the adjoining Market Street/Union Square Station on the T–Third line.

16th Street Corridor

The 16th Street corridor is the primary east-west connection linking the North Mission, Showplace Square, and Mission Bay. With employment growth projected in all of these areas and increased population projected for Mission Bay, the importance of this transportation corridor will increase in the next 25 years.

The TEP recommends that the 22–Fillmore be re-routed to remain on 16th Street east of Potrero, providing an east-west connection between Mission Bay and the Mission District. Ridership on the 22–Fillmore is projected to increase approximately 144 percent over 2006-2007 levels by 2035, to more than 46,000 daily boardings. The route is projected to be overcrowded, with average PM peak hour passenger loads exceeding 125 percent of capacity west of Potrero but progressively less ridership in segments farther east.

At the intersection of 16th and Potrero, PM peak hour intersection LOS F is projected. Transit priority at this location could substantially reduce delay and increase capacity; however, it would aggravate projected traffic congestion. PM Peak LOS of F is also projected at the intersections of Third and 16th streets.

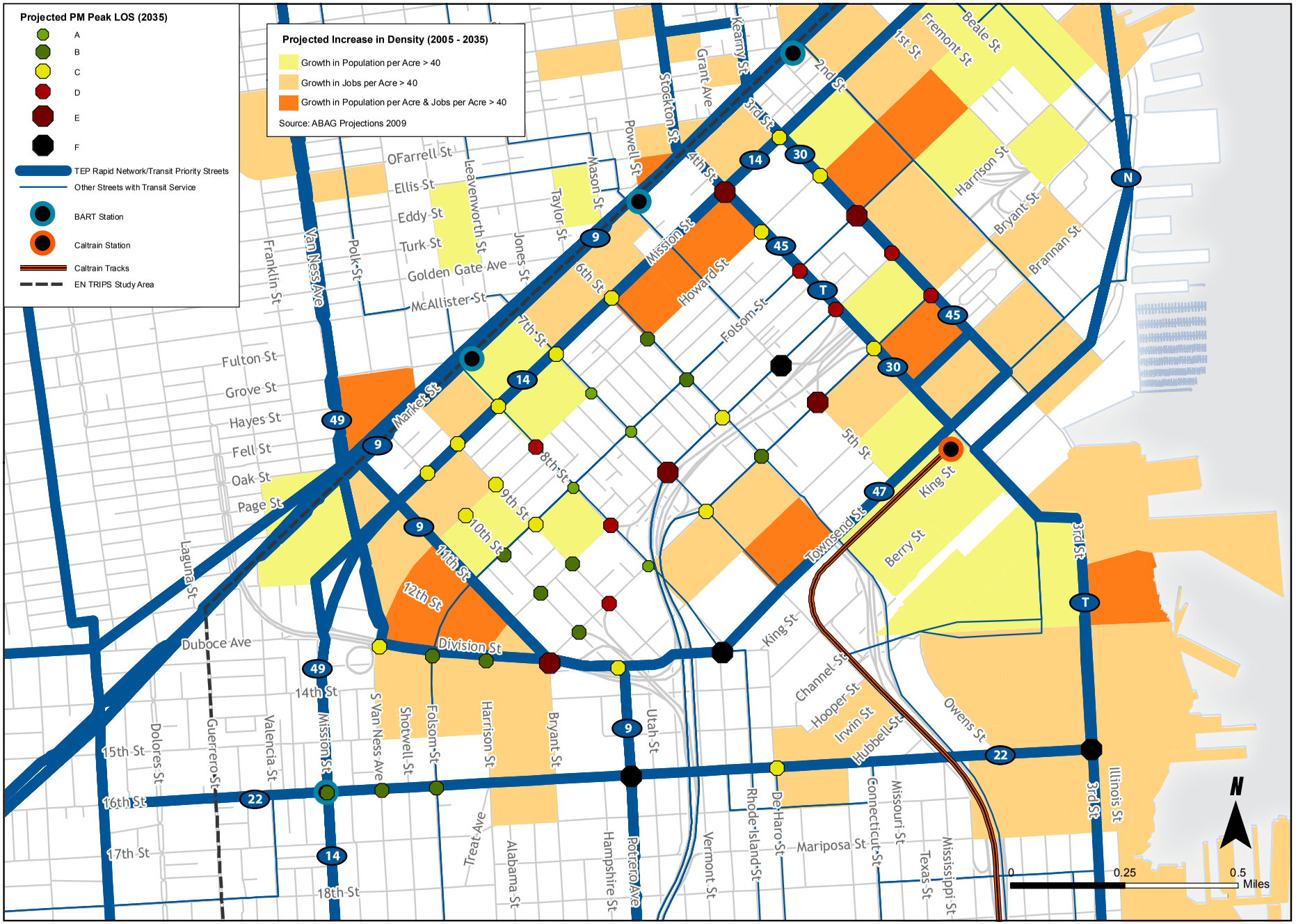
Finally, engineering issues must be addressed in the 16th Street corridor where it intersects with the Caltrain right-of-way and the proposed California High Speed Rail corridor. The Preliminary Alternatives Analysis report put forward by the California High Speed Rail Authority in April 2010 proposed maintenance of the existing Caltrain tracks at street grade, which would require the trenching of 16th, Seventh, and Commons streets and the severing of other connecting streets

[8] For this analysis, a single transit trip may include multiple boardings, in cases where travelers transfer between two or more transit routes on the way from their origin to their destination. The term “boarding” refers to the beginning of the segment of transit trip on a single route.

along the right of way. Trenching 16th Street under the Caltrain tracks would pose substantial engineering challenges for transit service on 16th. Doing so would constrain the available right-of-way, which is already projected to be in high demand by all modes of transportation. There would also be challenges regarding the overhead wires on which the 22–Fillmore runs.

The City and County of San Francisco responded to the Preliminary Alternatives Analysis proposal with a letter noting that this configuration would "degrade the function and character of this quadrant of City," and urging the Authority to consider proposals that would maintain 16th, Seventh, and Commons Streets at grade. City agencies are now working with the High Speed Rail Authority to develop alternative proposals.

Figure 4-25 South of Market and 16th Street Transit Network and 2035 Projected LOS for Motor Vehicles



Source: San Francisco City & County GIS, Fehr and Peers

Potrero Avenue Corridor

The 9–San Bruno and 9L–San Bruno Limited are projected to have combined ridership of more than 34,000 daily boardings. More than 22,000 of these boardings would occur on the 9L, a relatively new service that did not yet exist at the time of TEP observation (and, indeed, was recommended as part of the TEP). For Line 9, the TEP found ridership of slightly more than 12,000. On Potrero between 16th and 24th Street, average PM peak hour load factors would exceed 125 percent of capacity. The 9–San Bruno will also have to navigate increased vehicle volumes on Potrero Avenue, and traffic delays (LOS F) at the intersection of Potrero Avenue and 16th Street.

Transit Operations Findings

Transit service in the Eastern Neighborhoods faces a number of challenges in the future condition. First, in many cases, the projected demand exceeds available capacity. Even with assumed headways much more frequent than are currently operated (in the SF-CHAMP model run, the T–Third Street operates every three minutes during peak periods in its northernmost segments), the travel demand model finds peak-period overcrowding in four of the six primary transit corridors: Third Street (the T–Third), Mission Street (the 49–Van Ness in the Mission District), 16th Street (the 22–Fillmore), as well as Potrero Avenue (the 9–San Bruno).

In some cases, it may not be possible to meet the projected demand given physical constraints. On Third Street, for example a major investment in additional capacity will already have been made (indeed, much of the increased demand projected for that corridor can no doubt be attributed to the increased capacity and quality of service the Central Subway investment would provide).

There are limits to the capacity that a bus line operating in congested traffic can provide. Buses, of course, are smaller vehicles than railcars; but there is also a limit to the number of vehicles that can be operated in traffic, as delay not only reduces speed and reliability but limits capacity by lengthening headways, or reducing the number of vehicles able to pass any given point over a period of time. Furthermore, overcrowding itself causes additional delay by lengthening dwell times, resulting in a vicious cycle as more passengers have time to arrive at each remaining stop.

Surface transit options will also have to contend with growing traffic. Already, major transit surface routes operate relatively slowly through the denser parts of the study area. In the future condition, major new traffic delays are projected Third and Fourth Streets (affecting the 45 and the 30), on Division (affecting the 47 and the 9) and on 16th Street (affecting the 22 and the 9). Transit Priority Streets (TPS) and Bus Rapid Transit (BRT) improvements to stops including prepaid and level boarding could be used to reduce delay. However, to provide the level of capacity necessary to meet demand, it might ultimately be necessary to provide exclusively transit lanes.

Transit on 16th Street faces unique challenges. An important issue that must be addressed as part of extending this line to Mission Bay is the crossing of the existing Caltrain right-of-way at Highway 280.

In the 2035 projected condition, there will be greater use of the BART and Caltrain stations, and the opportunity exists to provide enhanced pedestrian and bicycle connectivity to these stations. Pedestrian and bicycle access to transit are discussed further in the sections that follow.

Pedestrian Network

The Eastern Neighborhoods Area Plans have two objectives directly related to walking: consider the street network in the Eastern Neighborhoods as a City resource essential to multimodal movement and public open space, and support walking as a key transportation mode by improving pedestrian circulation within the Eastern Neighborhoods and to other parts of the city. This section assesses pedestrian conditions in the EN TRIPS study area for 2035.

Summary of Existing Conditions

Walking is an important mode of transportation in the Eastern Neighborhoods, with about a fifth of all trips made on foot in the current condition. Despite relatively high walk mode shares, pedestrian conditions are not consistent throughout the study area and some significant barriers to pedestrian travel were identified. The Eastern Neighborhoods contain a variety of street types, from busy commercial and transit corridors with high-volumes of pedestrians, to quiet residential areas on steep topography, to fine-grained grid patterns that offer strong connectivity and an abundance of amenities, as well as busy arterial streets with high traffic volumes and long pedestrian crossing distances.

Gaps and barriers in the pedestrian network are present in all neighborhoods within the study area. These include long crossing distances created by intersections with closed crosswalks and streets with multiple turn lanes (as at several freeway ramp touchdowns in the South of Market), missing or narrow sidewalks (particularly in the Central Waterfront), and steep grades on many residential streets (particularly in Potero Hill). Of particular note are the physical and visual barriers created by the freeways and rail corridors that run throughout the study area.

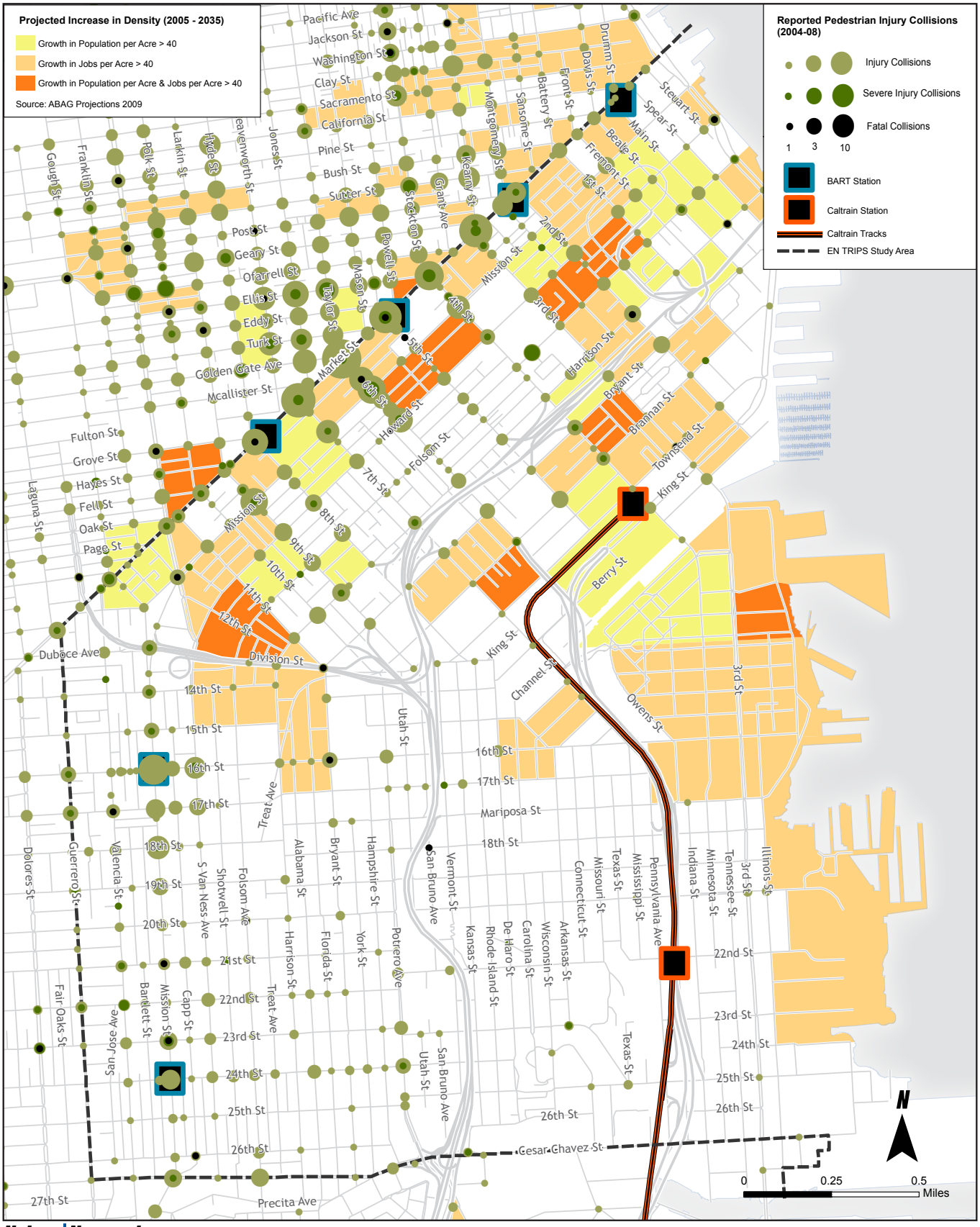
The arterial streets in the South of Market present particular challenges to pedestrians. These streets are built to accommodate high volumes of vehicle traffic. Because South of Market arterials serve vehicles traveling to and from the Bay Bridge, the design of some arterials will continue to accommodate high volumes of vehicles in the future condition. However, pedestrian conditions can be improved despite this limitation. For certain key streets in the South of Market area, wholesale redesign of the right-of-way may be possible, changing the character of the street from an auto-oriented street to a more complete, multimodal street, with more space allocated to pedestrians. The South of Markets alleyways also present an opportunity to improve the quality of the pedestrian experience and offer a substantial opportunity to expand public/shared space.

Among those streets in the South of Market lacking sidewalks, Townsend Street between Fourth and Seventh Streets is of particular concern. Sidewalks on Townsend street are important for serving the high numbers of existing pedestrians, but also for increasing non-motorized access to regional transit services.

The difficulty of crossing 16th Street currently presents a barrier to pedestrian connections between Showplace Square and Potrero Hill. Pedestrian travel between these two neighborhoods could be improved through appropriate treatments of 16th Street, including enhanced crosswalks, curb bulb outs and countdown signals at signalized intersections.

In a neighborhood poised for growth, the pedestrian network in the Central Waterfront is incomplete, with missing sidewalks in some areas and poor access to the waterfront itself. New development in these areas may be an additional catalyst and opportunity to move forward with pedestrian improvements. While the study area's established residential neighborhoods have relatively complete pedestrian networks and good walking conditions, several complementary pedestrian improvement projects have been identified through other public planning processes, such as the Mission Streetscape Plan and the Potrero Hill Traffic Calming Project.

Figure 4-26 Eastern Neighborhoods Pedestrian Collisions Hot-spots and Projected Land Use Change



Nelson\Nygaard consulting associates

Source: San Francisco City & County GIS, San Francisco Department of Public Health

Pedestrian Injury Collisions

The record of pedestrian injury collisions over the last five years (illustrated in figure 4-26) suggest widespread challenges to pedestrians on all South of Market arterials. Figure 4-27 documents reported pedestrian injury collisions per mile by street segment for the north-south numbered streets in the South of Market. It shows that the greatest numbers of pedestrian collisions occur between the freeway and Market Street, the area that has the most pedestrian and vehicular traffic. By far the highest numbers of pedestrian collisions in this stretch occur on Sixth Street, with 97 reported pedestrian injury collisions per mile. Sixth Street has both high volumes of fast moving traffic and large numbers of pedestrians. This segment of Sixth Street is also the location of a large number of single-room occupancy hotels. The second highest number of pedestrian injury collisions north of the freeway occurs on Fourth Street, which has 45 injury collisions per mile. Fourth Street is the primary path between Market Street and the Fourth and King Caltrain Station. All of the other numbered streets have between 30 and 40 pedestrian injury collisions per mile north of the freeway.

The number of pedestrian injury collisions is lower but still substantial south of the freeway. Second, Third, Fifth, and Seventh Streets have between 25 and 32 pedestrian injury collisions per mile. Fourth, Sixth, and Eighth Streets have fewer than 20. On the Western Side of the South of Market, Ninth Street has a high number of collisions: 56 per mile, reflecting large volumes of fast moving traffic as well as substantial numbers of pedestrians.

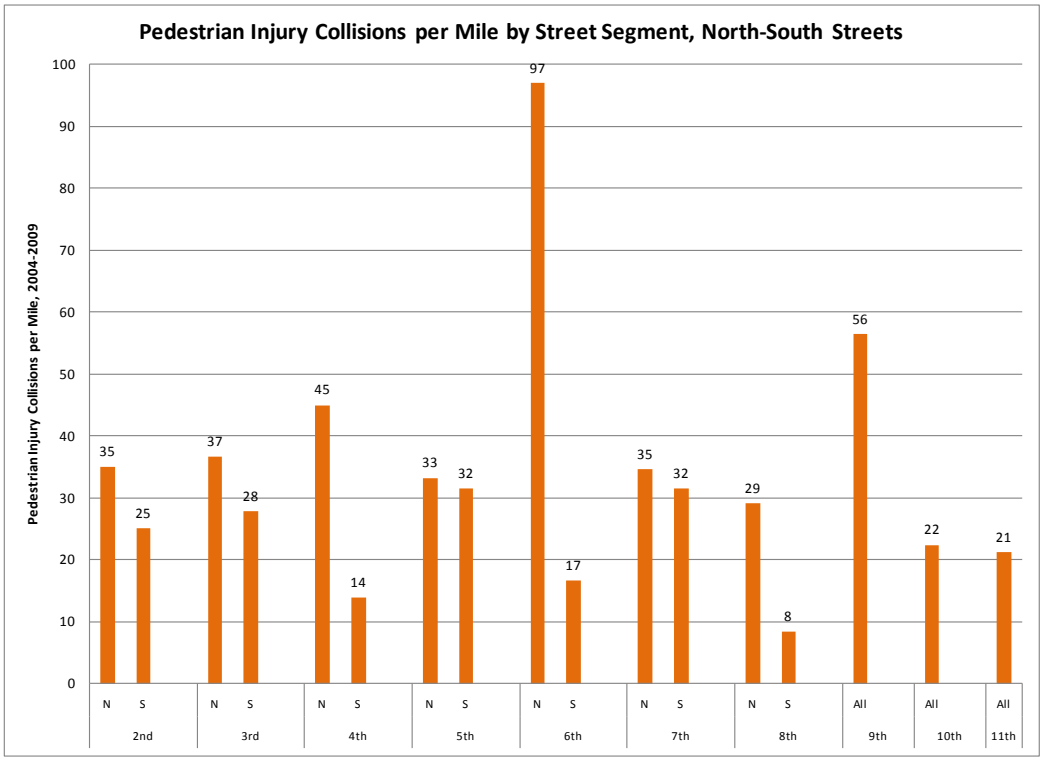
Of these collisions on the north-south numbered streets, about 80 percent occur at or near the intersection of a major east-west arterial, with many of the remaining collisions occurring at or near the intersection of an alleyway. Most alleyways in the South of Market do not have marked or signalized crossings of the arterial.

Figure 4-28 documents reported pedestrian injury collisions per mile by street segment for the east-west named streets in the South of Market area. Of the east-west streets, the highest numbers of pedestrian collisions occur in the central segments. Mission and Howard Streets between Third and Fifth have more than 40 reported pedestrian collisions per mile. Folsom, Harrison, Bryant, and Brannan have between 23 and 25 per mile.

In the Easternmost part of the South of Market, Howard (34) and Folsom (38) have the highest numbers of pedestrian collisions per mile, but Harrison (23) and Bryant (21) also have substantial number of reported collisions. West of Fifth Street, Folsom, and Harrison Streets have more than 20 pedestrian collisions per mile. The other east-west arterials have few collisions in this stretch.

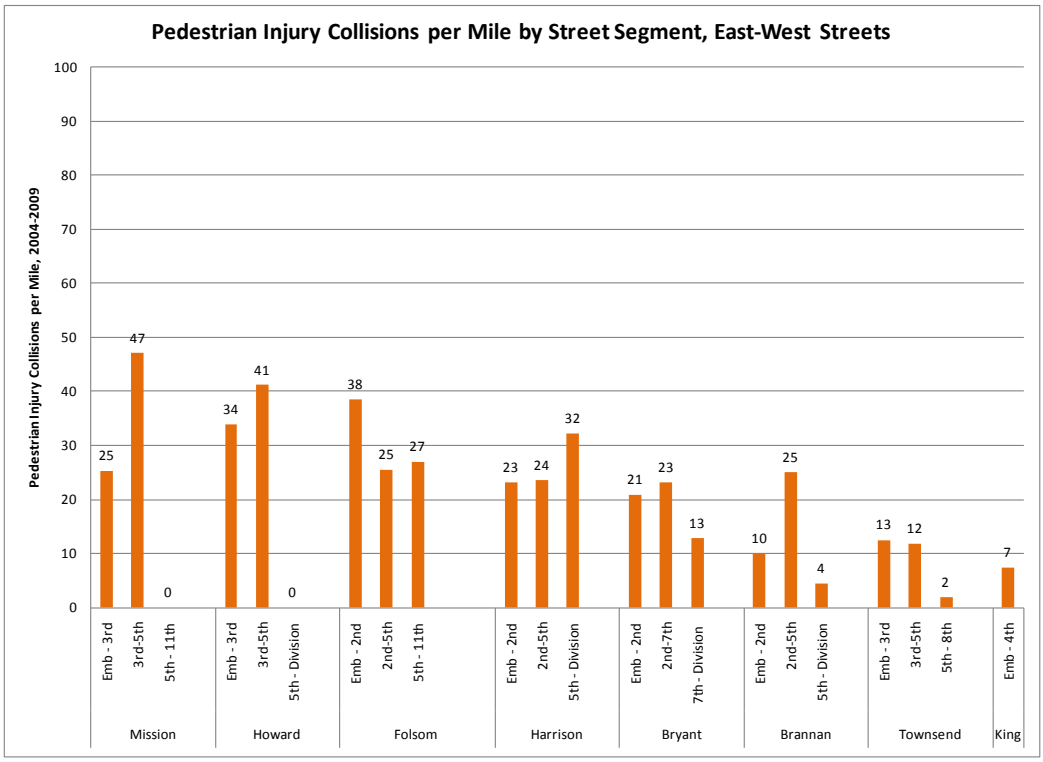
In the Mission District, the majority of pedestrian collisions have occurred along the major commercial corridors of Mission, 24th, and 16th Streets, where pedestrians, private vehicles, and transit vehicles are all present in high volumes. Along Guererro and Valencia Streets, there have been fewer collisions overall, but a higher number of severe collisions. With lower populations and fewer pedestrian trips, Showplace Square/Potrero Hill and the Central Waterfront have had few serious pedestrian collisions.

Figure 4-27 Pedestrian Injury Collisions per Mile by Street Segment, SOMA East-West Arterials (2004-2008)



Source: San Francisco Department of Public Health Data

Figure 4-28 Pedestrian Injury Collisions per Mile by Street Segment, SOMA North-South Arterials (2004-2008)



Source: San Francisco Department of Public Health Data

Vehicle Speeds

High vehicle travel speeds are associated with higher rates of pedestrian injury collisions. A number of arterials in the study area have vehicle travel speeds that regularly exceed posted speed limits. The SFMTA's most recent speed data are presented in detail in the EN TRIPS existing conditions report.[9] The data demonstrate that in the South of Market area, 85th percentile vehicle speeds exceed posted speed limits on Sixth, Seventh, Eighth, Bryant, Folsom, Harrison, and Howard Streets. The most notable speed issue is on Sixth Street–typical vehicle speeds exceed the posted 25 mile per hour speed limit by about 6 miles per hour.

Speed survey data also shows that a number of streets in the Mission District are experiencing higher vehicle speeds than the posted speed limit. Of particular note is Guerrero Street between 17th and 18th Streets and Potrero Avenue between 17th and Mariposa Streets.

In the Showplace Square area, 85th percentile speeds typically exceed the posted speed limits, but a few streets are more notable than others. For example, 85th percentile speeds on northbound Pennsylvania Street between 22nd and 23rd Streets are more than ten miles per hour than the posted speed limit. Although no pedestrian collisions were reported on Pennsylvania Street, this trend is worth monitoring given its proximity to the 22nd Street Caltrain Station. In addition, the higher vehicle speeds on Seventh Street merit additional attention given the number of pedestrian collisions in this corridor. In the Central Waterfront area, 85th percentile vehicle speeds exceed posted speeds limits by at least five miles per hour on several segments of Cesar Chavez Street.

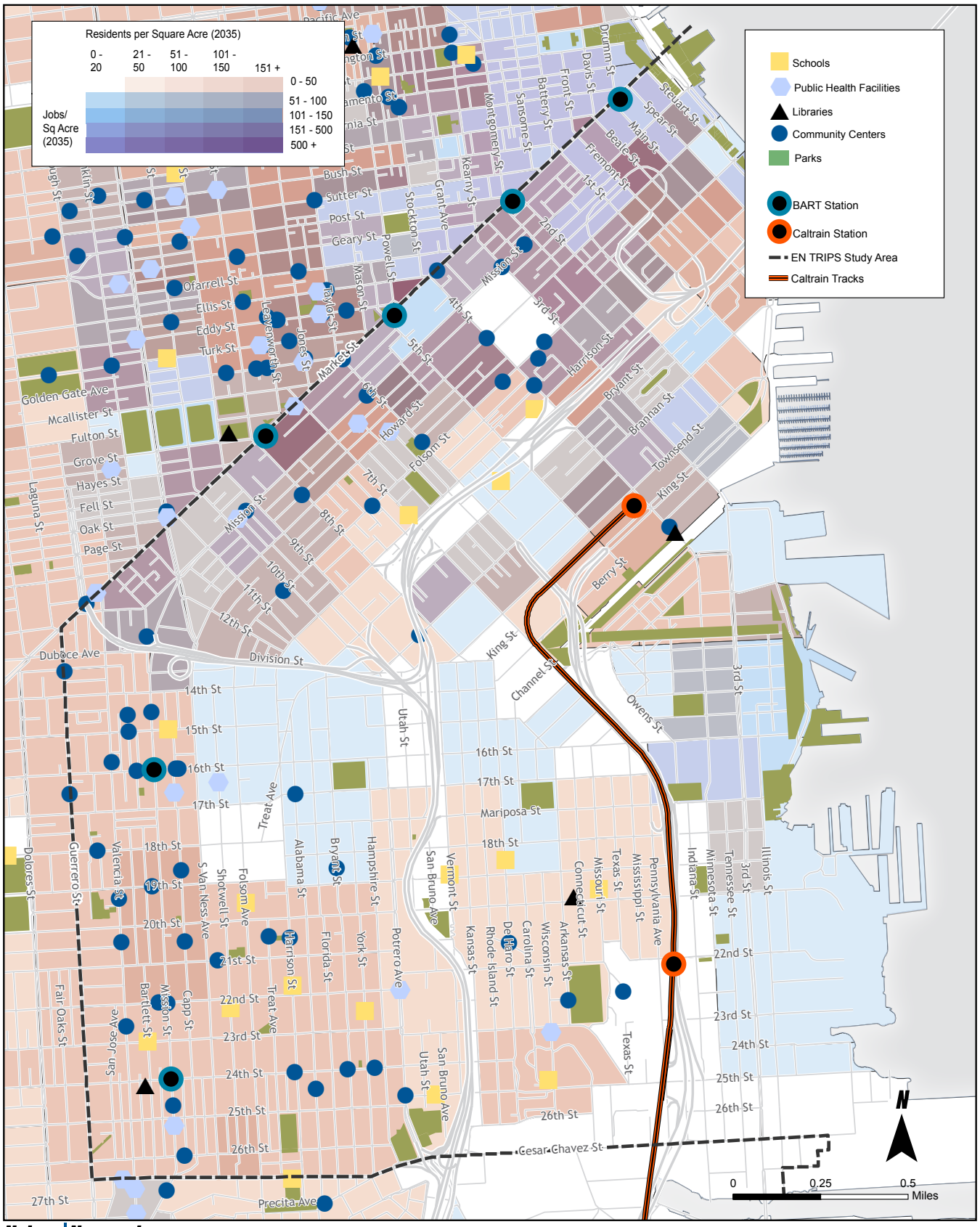
Key Pedestrian Attractors

Figure 4-29 illustrates projected population and employment density along with several existing land uses that may attract substantial numbers of pedestrian trips. These land uses include existing parks, community centers, public health facilities, schools, and libraries. While there are few parks in the South of Market area, the area does have a number of community centers, public health facilities, and schools. These land uses are also clustered in the established residential and neighborhood commercial areas of the Mission District.

The study area's neighborhood commercial streets are also important attractors of pedestrian trips. Major neighborhood commercial corridors include Mission, Valencia, 16th, and 24th Streets in the Mission District, segments of Sixth Street and Folsom Street in the South of Market area, segments of 18th and 20th Streets in Potrero Hill.

[9] EN TRIPS Existing Conditions Report, Chapter 4.

Figure 4-29 Key Existing Pedestrian Attractors and Projected Densities



Nelson\Nygaard consulting associates

Source: ABAG Projections 2009, San Francisco Department of Public Health HDMT Data

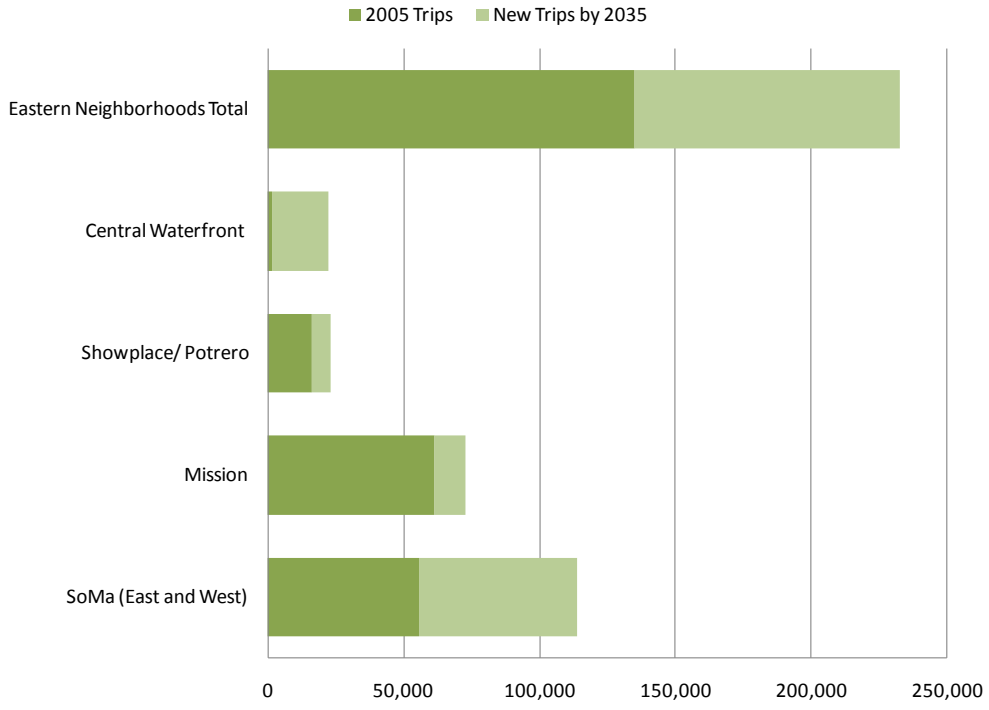
Projected Pedestrian Travel Demand

Important areas of new density in the EN TRIPS study area include several parts of the South of Market area, but also locations within Mission Bay and the Central Waterfront. As these areas grow denser with households and businesses, pedestrian travel is likely to increase naturally. Additional investment in improved pedestrian conditions will help to encourage walking as an important mode of transportation.

Current modeling tools are relatively unsophisticated in distinguishing between pedestrian and bicycle trips. For this reason, this section discusses the total demand for non-motorized trips.[10] As with all modes of transportation, the actual level of pedestrian travel in 2035 may depend heavily on the design of streets and sidewalks made available to pedestrians. As noted above, SF-CHAMP projects that there will be a total of 97,000 new walk or bike trips made by 2035, or about 39 percent of all new trips, roughly equivalent to the current mode share. This modeled growth in non-motorized travel should be considered the minimum likely increase. Additional policy change or new investment in pedestrian and bicycle infrastructure could lead to higher non-motorized mode shares.

This amounts to about 58,000 new trips originating in the South of Market area (a rough doubling of current non-motorized trips), 11,000 new trips in the Mission District, and 7,000 new trips in Showplace Square. The Central Waterfront and Mission Bay are projected to have 21,000 new non-motorized trips, a huge increase from today's very low base. SF-CHAMP projects that walk and bike trips will represent about 38 percent of all new trips in the South of Market, 31 percent in Showplace Square/Potrero Hill, and just over 20 percent in the Mission and the Central Waterfront.

Figure 4-30 Non-motorized Trips with Origins in the Eastern Neighborhoods by Destination



Source: SF-CHAMP 4.2/ABAG Projections 2009

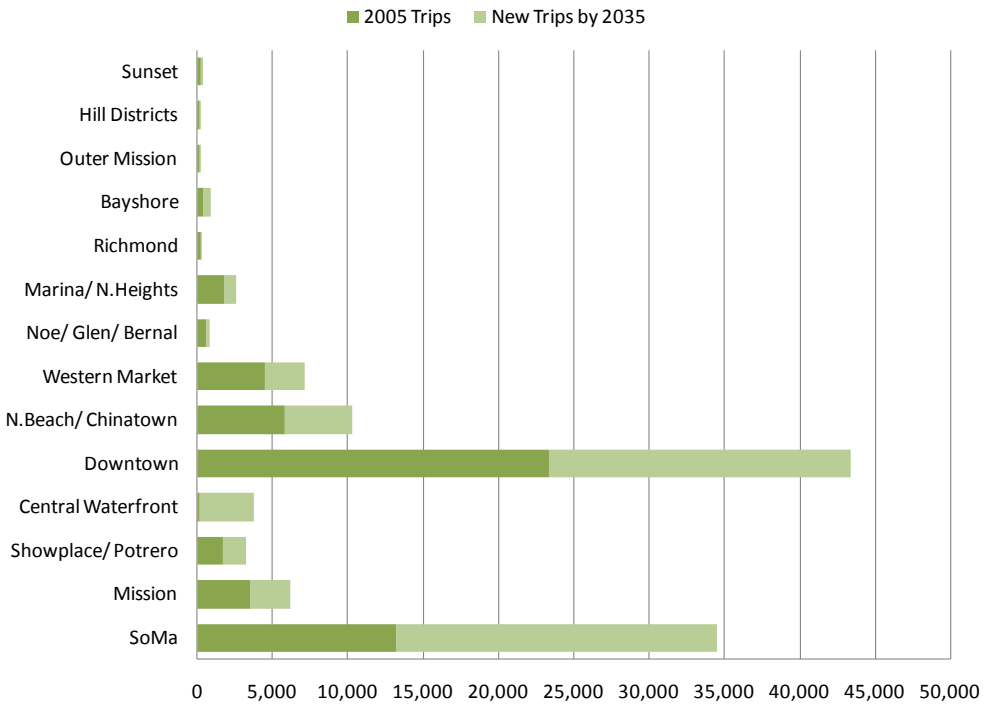
[10] For additional information on SF-CHAMP, please see the SFCTA web site. http://www.sfcta.org/content/category/4/67/145/

South of Market Pedestrian Conditions

The South of Market area is expected to see large increases in population and employment, leading to increased densities in several parts of this neighborhood. Major new areas of population and employment density in the South of Market area include the Transbay District and Rincon Hill; the Mid-Market area, adjacent to Market Street between Seventh and Fifth streets; parts of the Western South of Market plan area, particularly Seventh Street between Market and Harrison; and the area immediately adjacent to the Fourth and King Caltrain Station.

As a result of these increased population and employment densities, huge increases in pedestrian trips are projected. SF-CHAMP projects an increase of 21,000 daily walk and bike trips internal to the South of Market, which would represent a 160 percent increase over the 2005 level. A further 20,000 new non-motorized trips are projected between the South of Market and downtown.

Figure 4-31 Daily Non-Motorized Trips with South of Market Origins, 2035



Source: SF-CHAMP 4.2/ABAG

This growth in pedestrian travel presents both an opportunity and a major challenge. Currently, every South of Market arterial is part of the city's primary network for vehicle travel, as well as its network of truck routes. Very large increases in vehicle volumes are projected, including 15 percent to 35 percent increases in vehicle volumes on each of these arterials during the PM Peak hour. Among the challenges for South of Market pedestrians that were identified in the EN TRIPS Existing Conditions Report, several are likely to be aggravated by increased vehicle volumes. Of particular concern are:

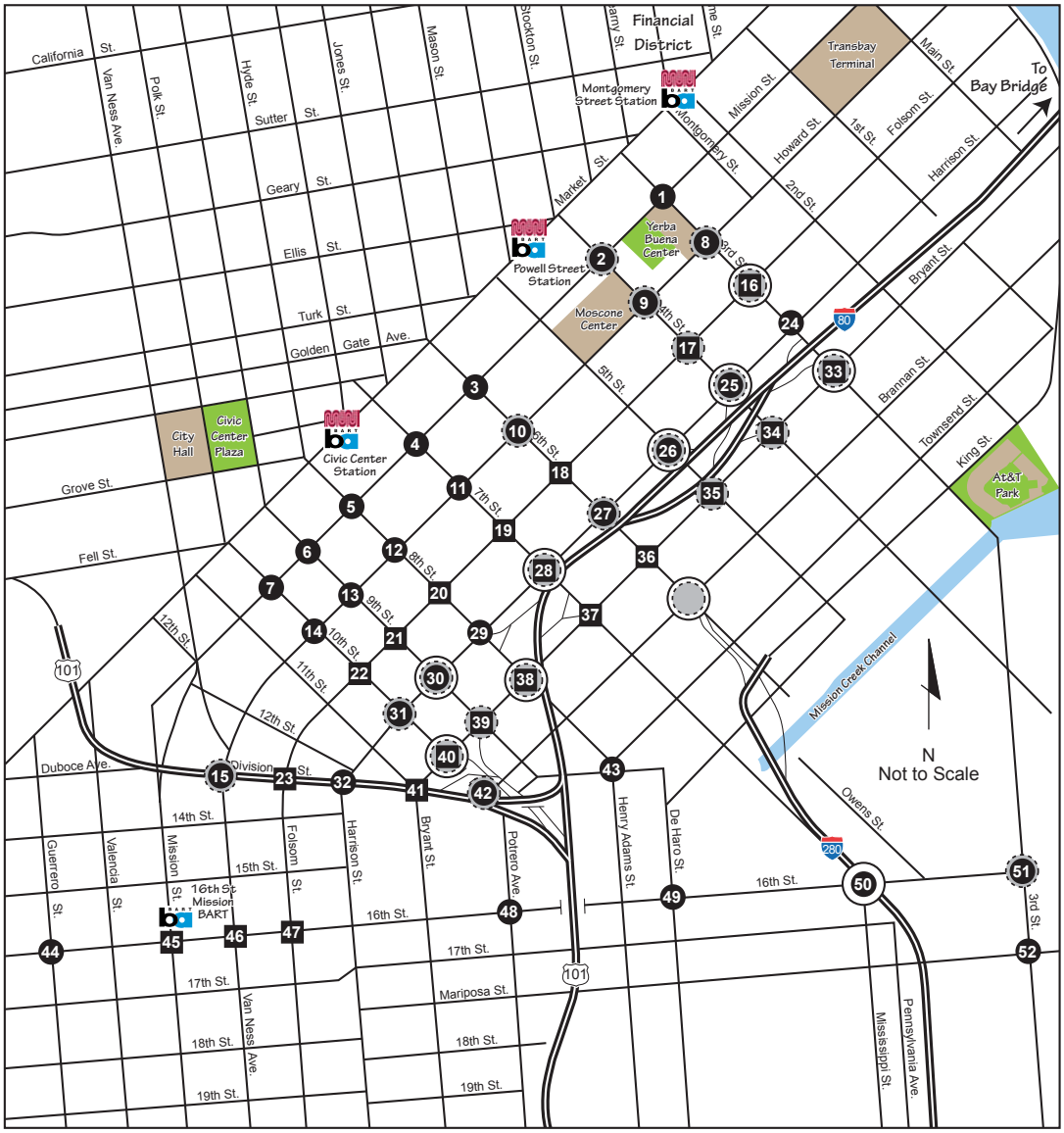
- **Incomplete crosswalks and multiple turn lanes.** Intersections that lack crosswalks obstruct the path of travel for pedestrians. Multiple turn lanes can make it difficult for a motorist driving in the inside lane to see a pedestrian entering the crosswalk. A common factor in the presence of either incomplete crosswalks or multiple turn lanes is proximity to freeway ramps. There are numerous freeway ramp touchdowns in the South of Market area, primarily on Harrison and Bryant Streets. As illustrated in Figure 4-32, 21 South of Market intersections have multiple turn lanes, and nine have closed crosswalks. Harrison and Bryant Streets are projected to have substantial increases in vehicle volumes as well as several intersections operating with traffic delay. Incomplete crosswalks and multiple turn lanes are also found on Fourth Street and Third Street, which are also projected to have large increases in vehicle volumes and traffic delay. Fourth Street is an important pedestrian corridor because it represents the most direct path of travel from Market Street to the Fourth and Caltrain Station.
- **Long Blocks/Long Crossing Distances.** The block pattern in the South of Market area is also much larger than elsewhere in the city, with double the typical distance between intersections. These long blocks require pedestrians to walk out of their way or risk jaywalking across busy streets. At the same time, the South of Market area has very wide arterial streets. Combined with vehicle travel speeds, street widths can make even crossing at intersections challenging for some pedestrians. Increased vehicle volumes associated with the long term growth trends may further complicate street crossings for South of Market pedestrians, particularly for seniors and disabled persons. In some cases, signalized mid-block crossings may be appropriate to provide more direct pedestrian paths of travel. For example, mid-block crossings of Seventh and Eighth Streets at Minna Street have been proposed as part of the SFCTA's Western South of Market Neighborhood Transportation Plan.
- **Vehicle-oriented design.** Sidewalks in the South of Market area are typically narrow given the projected pedestrian volumes, ranging from 10 to 12 feet in width. Many of the sidewalks have also been encroached upon by newspaper boxes, trees, utility poles, bicycle racks, and furniture or accessories in front of local businesses. Lighting in SoMa is vehicle-oriented, with tall lamps that do not fully illuminate the sidewalks. For example, poorly illuminated streets and alleyways, along with Division Street under the Central Freeway and crossings under I-80, create challenges for pedestrians in the South of Market. Finally, tree coverage is extremely sparse in the South of Market. The trees that do exist are young, provide limited coverage, or are in need of maintenance.
- **Collisions hot-spots.** As illustrated in Figure 4-26, many of South of Market intersections with the highest numbers of collisions over the last five years are in the areas forecast for increases in population and employment densities. In the South of Market, nearly all of the major arterial corridors from Bryant to Market Street and from Eleventh to Second Street have had injury collisions. Sixth Street had the most collisions and the highest occurrence of severe collisions, particularly north of Howard Street. There were also numerous injury collisions on Fourth and Fifth Streets. Areas with both high collisions and high expected growth should be considered priorities for pedestrian improvement projects.

In addition to these challenges, there are a number of opportunities to improve pedestrian conditions in the South of Market. These include:

Paths to transit and other major pedestrian attractors. As regional-scale investments are made in rail service to this area, they may be accompanied by upgrades in pedestrian amenities. For example, Townsend Street (from Fourth to Seventh Streets) currently lacks sidewalks on the north side of the street. The south side of Townsend Street has a continuous walkway between the parked cars and the Caltrain fence, but this walkway is narrow and is often obstructed by utility poles, parked vehicles, and motorcycle parking. The future Caltrain extension to downtown provides an opportunity to not only rebuild Townsend Street to accepted standards, but to also implement a redesign of Townsend to make it a more pedestrian-oriented street. Pedestrian facility upgrades may also be important on Fourth Street, which is the key pedestrian route between Market Street, the planned Central Subway stations in the South of Market, and the Caltrain Station. Finally, ensuring safe and comfortable routes to other key pedestrian attractors such as school, parks, libraries, groceries stores, and senior centers will also be important for a complete, safe pedestrian network that can support vehicle trip reduction.

Use of alleyways as pedestrian and public open space. The South of Market area's network of alleyways already provides pedestrians space that is separated from the high vehicle volumes on the arterial streets. Additional traffic calming treatments, addition of landscaping, or even innovative shared space treatments can help to turn these spaces into more attractive and useable public space. The City may wish to capitalize on the expected growth in the South of Market as a lever to improve this alley network. For example, the SFCTA's Western South of Market Neighborhood Transportation Plan has proposed development of a shared space treatment for Ringold Alley in combination with a proposed mixed use development sited on an adjacent lot.

Figure 4-32 Closed Crosswalks and Multiple Turn Lanes in the South of Market Area



LEGEND:

- 16 = AM and PM Peak Hour Study Intersection
- 1 = PM Peak Hour Study Intersection
- = Study Intersection with Multiple Turn Lanes
- = Study Intersection with Closed Crosswalk
- = Traffic Signal
- Fwy = Freeway on-ramp accessible from lane
- = Multiple Turn lanes
- = Closed Crosswalk

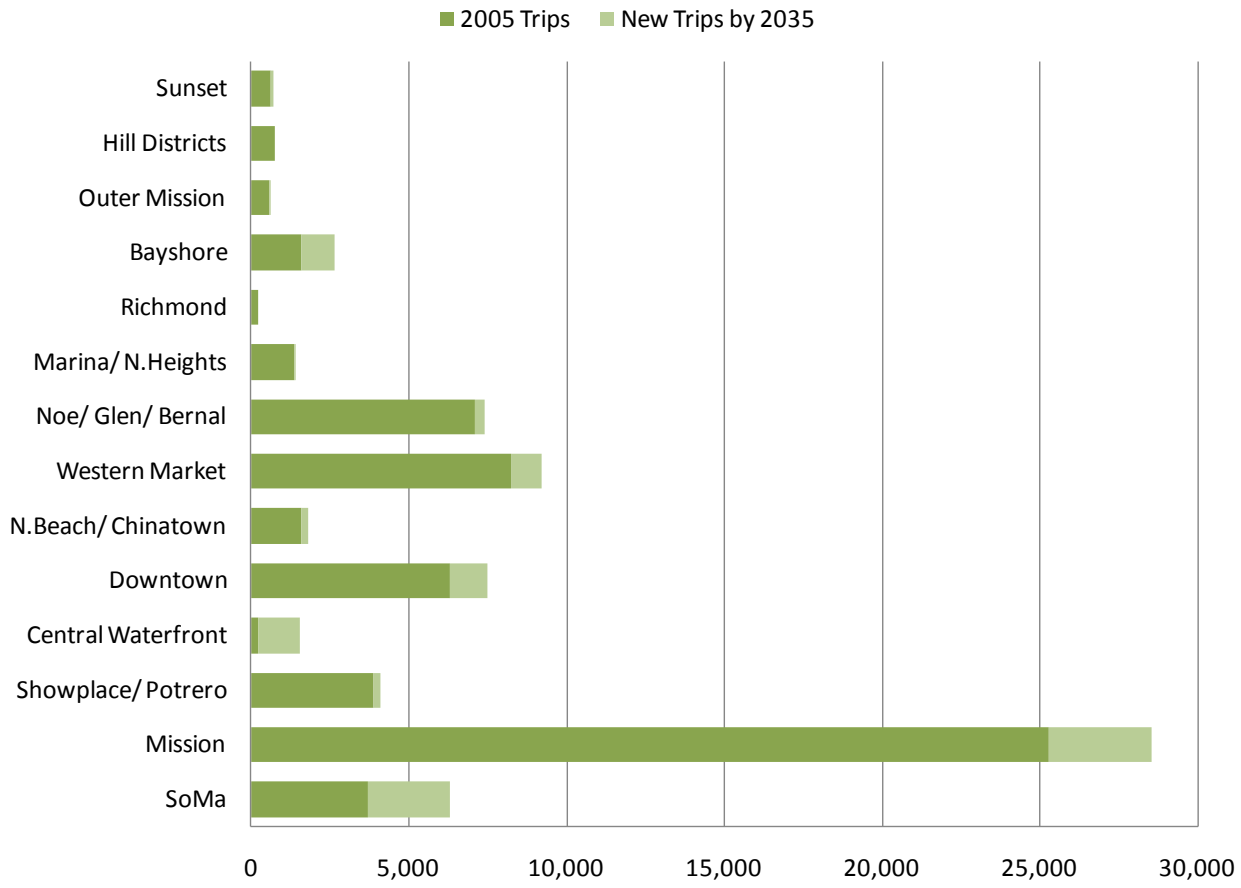
Source: Fehr and Peers

Mission Pedestrian Conditions

The Mission District's commercial corridors and many of its residential streets offer vital and inviting pedestrian environments, and the street grid generally offers good connectivity for pedestrians wishing to reach many of the commercial, recreational, and transit assets within the area. Most of Mission District streets have sidewalks and crosswalks. Pedestrian volumes are generally low to moderate in residential and industrial areas and moderate to high in the core of the commercial areas. The block lengths in the Mission are typically small and there exists a network of small alleys throughout the neighborhood that present easy access routes for pedestrians.

With only a small projected increase in density, the Mission District will see relatively small increases in non-motorized trips on a percentage basis. Three thousand new daily internal trips will occur inside the Mission District, and a further 2,600 trips will travel from the Mission District to the South of Market.

Figure 4-33 Daily non-motorized trips with Mission District Origins, 2035



Source: SF-CHAMP 4.1/ABAG Projections 2035

2035 travel demand model projections suggest that increased vehicle volumes are projected in the Mission District on major arterials such as South Van Ness Ave, Folsom Street, and Potrero Avenue. Increased volumes are also projected on smaller residential and mixed-use streets, such as 17th, 18th, 20th, 23rd, and 24th Streets.

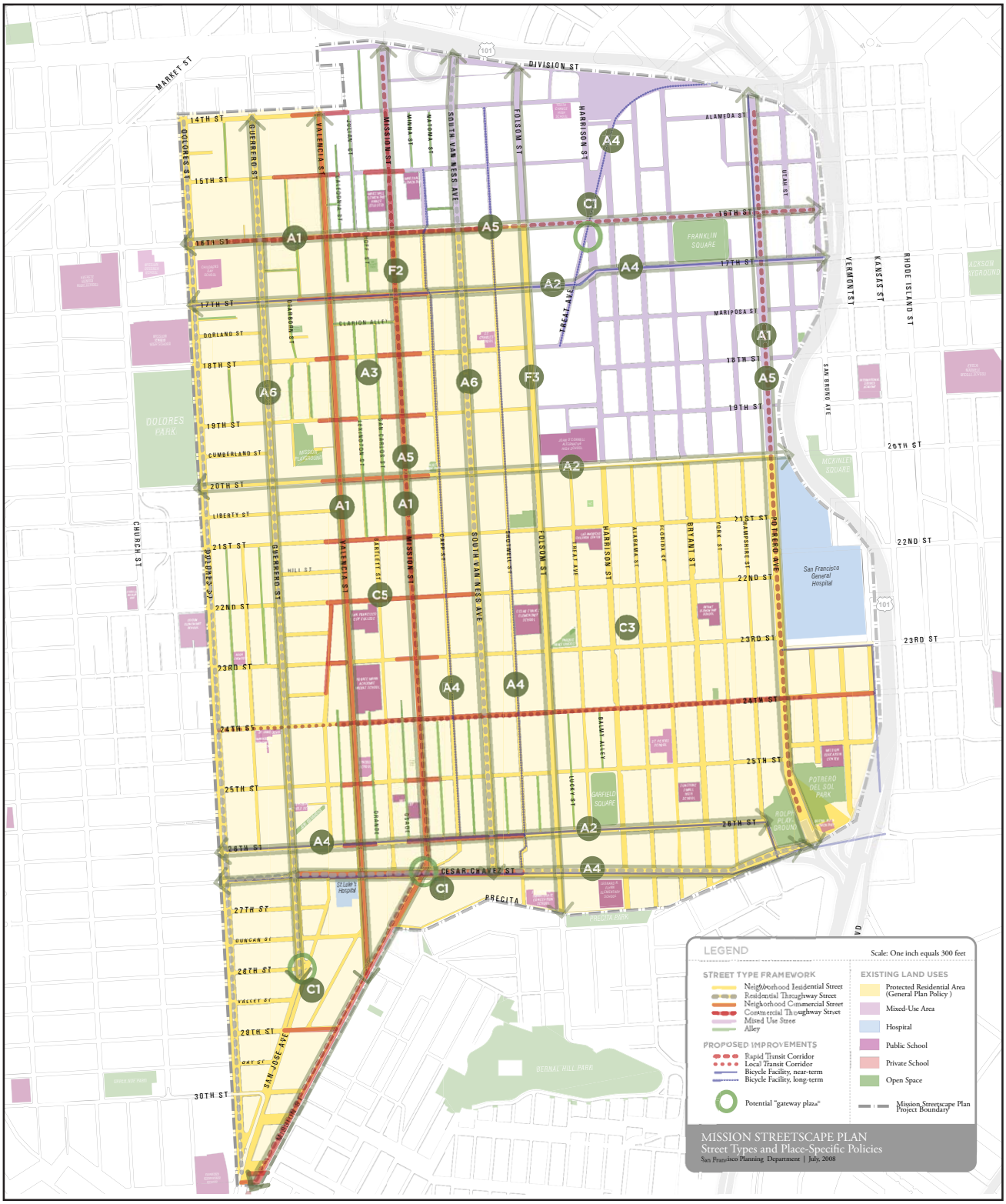
Future pedestrian conditions in the Mission District will be shaped in large part by the still-underway Mission Streetscape plan. Undertaken by the San Francisco Planning Department's City Design Group, this plan has proposed a Street Design Framework for the Neighborhood (Figure 4-34), as well as proposed a group of traffic calming and public realm improvement projects. Specific proposals include

- A number of new plazas at the "gateways" to the neighborhood, such as at Dolores Street and San Jose Avenue.
- Traffic calming projects on Capp, Hampshire, 20th, and 26th Streets.
- Road diets and traffic calming on Folsom and Bryant Streets.
- Intersection improvements, including bulb outs and raised crosswalks, throughout the Mission.
- A design overhaul–sustainable paving, "greening" elements, improved crosswalks–of many of the small alleys that permeate the neighborhood, such as Cunningham, Hoff, and Osage.

The Mission Streetscape Plan is currently in the planning, design revision, and environmental review phase. Funding for implementation is still being identified. The draft plan has been released, but the implementation timeline remains uncertain. Given the difficult funding environment, however, it is possible that many of the project's proposals will not be implemented in the near term.

The Cesar Chavez Street Design Plan is a San Francisco Planning Department project that will redesign Cesar Chavez Street from Hampshire to Guerrero Streets. Currently, Cesar Chavez Street is primarily a vehicle-oriented travel corridor that funnels traffic through the southern part of the Mission to the US-101 freeway. The project's goals are to make Cesar Chavez Street a safer place for all users, redesign the street to include a wide range of pedestrian-scale amenities, ensure that Cesar Chavez Street provides a better connection within and to/from the neighborhood, improve bicycle connectivity, and improve storm water management through sustainable design features. The project has been in the planning phase since 2008 and a preferred alternative was selected in 2009. The preferred alternative calls for the removal of two traffic lanes to accommodate a new 14-foot center median, new left turn pockets, corner bulb outs, new street trees, pedestrian refuge areas, new lighting, and storm water planters. The Plan also calls for new 5-foot bicycle lanes. The Plan is currently being finalized and construction is scheduled to begin in 2010.

Figure 4-34 Mission Streetscape Plan Proposed Design Framework



Potrero Hill/Showplace Square Pedestrian Conditions

The San Francisco travel demand model estimates that pedestrian travel currently represents about one in five trips in the Potrero Hill/Showplace Square Plan area. In the future condition, 2,000 new non-motorized trips are projected to travel to the Central Waterfront/Mission Bay areas. A further 1,500 new pedestrian trips are projected to travel to the South of Market area. This relatively small increase in non-motorized trips reflects a modest increase in density, nearly all of which will be found in the Showplace Square portion of the plan area.

The Showplace Square subarea of the neighborhood can be roughly defined as the area north of 16th Street. While this area has gone through a major transformation in the past 20 years, many streets still reflect the historic industrial nature of the area. As noted in the EN TRIPS Existing Conditions report, current challenges for pedestrians in the Showplace Square area include:

- Beyond the core commercial area, many streets lack sidewalks and marked crosswalks. Streets with missing sidewalks include Berry, Hopper, and Hubbell Streets, and portions of De Haro, Rhode Island, Kansas, Vermont, Ninth, and Utah Streets.
- Parking patterns obstruct pedestrian travel. Vehicles of various sizes (from standard size vehicles to large size trucks) often park perpendicular to buildings. Double-parked trucks and trailers are a common phenomenon in the eastern part of this subarea, particularly along De Haro Street. These vehicles often partially or completely block the sidewalks or, in the absence of sidewalks, block the portion of the street closest to the property lines. Along these streets, pedestrian circulation is restricted and pedestrians must often walk in the roadways and mix with vehicles.
- Many intersections lack signals at major crossings. The presence of crosswalks at non-signalized intersections is inconsistent. The lack of signalized crossings at 16th Street east of De Haro is of particular concern given the expected increases in vehicle volumes that are projected in this corridor.

Since traffic volumes are generally low in Showplace Square, there are currently minimal conflicts between pedestrians and vehicles. However, given the additional residential and commercial growth expected in Showplace Square, along with increased vehicle volumes, these deficiencies may become more noticeable.

The Potrero Hill neighborhood is the primarily residential area south of 16th Street. Of the challenges to pedestrians noted in the EN TRIPS existing conditions report, the only one likely to be aggravated by the small increases in vehicle volumes projected for this area is the occurrence of cut-through traffic on residential streets, some of which exceeds posted speed limits. However, the Potrero Hill Traffic Calming Plan has assembled a set of proposed traffic calming projects to address this need. The purpose of this project, completed in December 2009, was to improve access and safety for pedestrians, transit users, and motorists in the neighborhood. It recommends several strategies to calm vehicular traffic and improve the pedestrian environment in the neighborhood. The project proposes:

- Gateway treatments on Mariposa, 23rd, and 26th Streets to announce to drivers that the conditions have changed from the nearby arterials and freeways to a residential street with a 25 MPH speed limit.
- A speed hump on 19th Street that will slow traffic.
- Bulb-outs at numerous locations near local schools and parks to ease pedestrian crossings and improve pedestrian visibility.

- A variety of parking changes, striping changes, and median islands on Kansas, Wisconsin, Vermont, Mariposa, Rhode Island, Pennsylvania, and Dakota Streets that will narrow the roadway and slow vehicles.
- Chicanes on 18th and 26th Streets to break up long sightlines and slow vehicles on these east-west streets.

The project will progress in four phases, with the first phase including the Mariposa Street gateways, 18th Street chicane, 19th Street speed hump, Kansas Street islands and edge lines, and Rhode Island/Southern Heights intersection improvements. More than two thirds of the cost of Phase One improvements will be paid for with Proposition K funds. The remaining proposed improvements are to be paid for in part with Proposition K funds, but at least $3.6 million in additional funds will have to be secured through competitive funding programs such as Safe Routes to School, Transportation Fund for Clean Air (TFCA), Regional Bicycle and Pedestrian Program (RBPP), and Transportation for Livable Communities (TLC) grants.

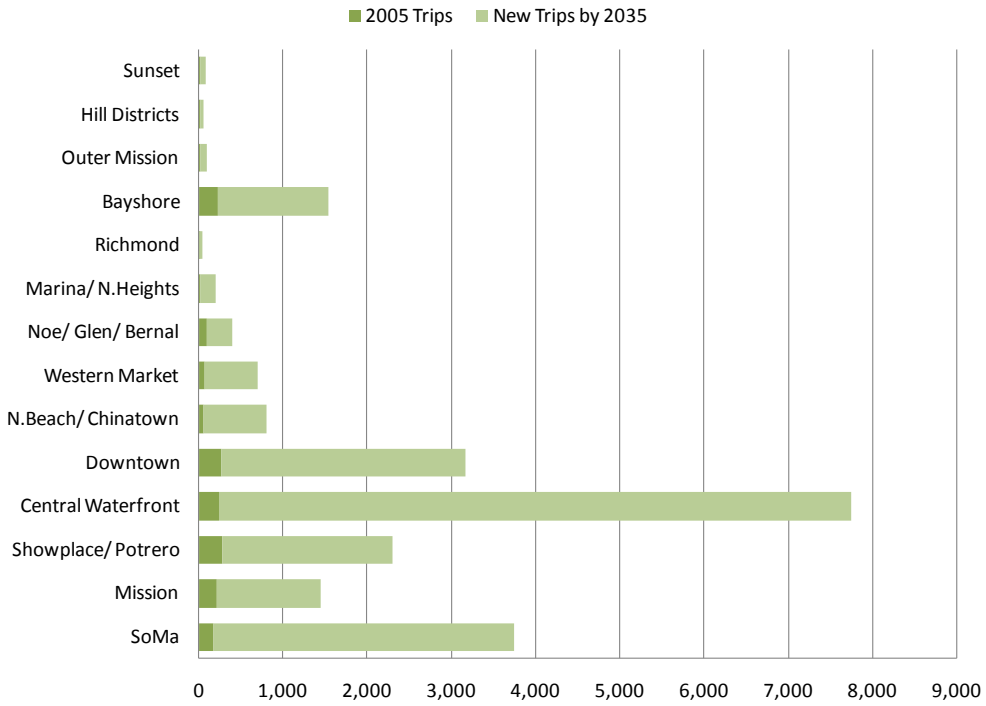
Central Waterfront/Mission Bay

With the smallest existing residential population of the four Eastern Neighborhoods, the Central Waterfront has relatively low pedestrian travel volumes. In the current condition, pedestrian travel represents 11 percent of all trips in the Central Waterfront Plan area. For a further 17 percent of all trips, travelers walk to transit. However, the Central Waterfront and Mission Bay areas are projected to experience a very large increase in total trips on a percentage basis. By 2035, 7,500 new non-motorized trips are projected that will be internal to the Central Waterfront and Mission Bay Areas. A further 3,500 trips are projected to travel to the South of Market area, and 3,000 to downtown. This large projected increase is illustrated in Figure 4-35.

Third Street is likely to carry a large share of the neighborhood's new pedestrian trips. As part of the Third Street Light Rail project, the corridor has already received upgraded sidewalks, crosswalks, and new pedestrian countdown signals. While there have been few pedestrian injury collisions on Third Street in the Central Waterfront and Mission Bay, this may be due to low pedestrian volumes. As growth occurs in this area and Third Street becomes a more important pedestrian corridor, a number of design features of Third Street may warrant monitoring and attention. First, there is no parking lane on Third, which leaves no lateral separation between pedestrians on the sidewalk and the travel lane. Second, all of the pedestrian crossings of Third Street are pedestrian actuated. An analysis of pedestrian behavior in the Bayview neighborhood (the only stretch of Third Street that currently has high pedestrian volumes), found that pedestrians nearly always cross the street without actuating the signal. In addition to Third Street, pedestrians are also likely to use the Baytrail along Illinois Street and Terry Francois Boulevard for north-south travel through this neighborhood.

The California High Speed Rail/Caltrain project represents both an potential challenge to pedestrian travel in the Central Waterfront as, as well as a potential improvement, depending upon on the alignment chosen for the rail project. As discussed above, the Preliminary Alternatives Analysis report put forward by the California High Speed Rail Authority in April 2010 proposed maintenance of the existing Caltrain tracks at street grade, which would require the trenching of 16th, Seventh, and Commons Streets and the severing of other connecting streets along the right of way. This alignment would create new barriers to pedestrian travel in the neighborhood. An alignment that had both Caltrain and California High Speed Rail below grade could open new opportunities for pedestrian connections in the neighborhood.

Figure 4-35 Daily Non-Motorized Trips with Central Waterfront/Mission Bay Origins, 2035



Source: SF-CHAMP 4.1/ABAG Projections 2035

Apart from Third Street, the Central Waterfront offers a mix of relatively complete streets, and streets that lack basic amenities. Some blocks, primarily residential blocks, have complete sidewalks and attractive pedestrian environments. In areas that retain industrial uses, the sidewalk networks are interrupted, obstructed, or simply absent. Of the neighborhood's north-south streets, sidewalks are intermittent along Illinois Street. Indiana, Minnesota, and Tennessee Streets and all have sidewalk gaps, particularly industrial zone areas south of 24th Street. However, with little development projected for this area, there may be little momentum to close these sidewalk gaps.

Currently, there are challenges for pedestrians attempting to access the Caltrain station at 22nd Street and Pennsylvania Avenue. Located under I-280, the station has few amenities. It feels isolated and is out of sight of surrounding land uses, creating security concerns for passengers. Little land use change is projected for the area around the station. However, it may be possible to make the station more prominent and pedestrian access more comfortable by providing improved lighting, wider sidewalks, emergency call boxes, and way finding signage around the station.

East of Illinois Street, traditional land uses include heavy industry, including the Port at Pier 70 and, to the south, the power plant. These areas have no established pedestrian network. This neighborhood is currently poorly connected to the waterfront from a pedestrian perspective. However, three major projects, one approved and in process, and two proposed, would remake the pedestrian and open spaces along the Waterfront and help to reconnect the Eastern Neighborhoods and the city to this natural resource. The projects are:

- The first and largest is the ongoing redevelopment of Mission Bay. This project will be responsible for most of the projected growth in pedestrian trips in the area. Planned development will house a mix of uses, including 6,000 units of housing; 4.4 million square feet of office and research and development space; 500,000 square feet of retail, a 500-room hotel, and community facilities including a 500-student public school, a library, and police and fire stations. It will also include a network of pedestrian paths and 41 acres of

open space. Figure 4-36 illustrates the planned pedestrian and open space facilities that will be built at Mission Bay. Among the most important of these new facilities is the planned pedestrian bridge at Fifth Street, which would create an additional pedestrian connection between Mission Bay and the proposed development at the Fourth and King rail yards, the Caltrain Station, and the South of Market area. There will also be substantial pedestrian upgrades to Fourth Street, south of the channel through Mission Bay North.

- Second, the Port of San Francisco recently completed a Draft Preferred Master Plan for Pier 70 along the Central Waterfront. The plan includes a mix of uses that would include a new street network, as well as investment in pedestrian, bicycle, and public realm amenities. The Plan also proposes the extension of 19th, 20th, 21st, and 22nd Streets from the existing city street grid to integrate Pier 70 and the waterfront with adjacent neighborhood districts. Similarly, the Plan promotes creating north-south streets through the site, which interface with the network of Pier 70's historic rail spurs, pathways, and internal access routes. The Draft Master Plan was submitted in 2009 and was open to public comment until October of 2009. Figure 4-37 illustrates the proposed Pier 70 redevelopment plan.
- Finally, the "Blue Greenway" is a proposal to upgrade a 13-mile portion of the Bay Trail along the southeast shoreline from China Basin to Candlestick Point State Recreation Area with enhanced bicycle and pedestrian facilities designed to improve connectivity to a series of new waterfront parks. The exact alignment of the Blue Greenway is under study, but it will generally follow the alignment of the Bay Trail from Mission Creek on the north to the County line on the south. The final alignment is ultimately dependent on a number of larger scale development projects within the area.

Figure 4-36 Mission Bay Pedestrian and Open Space Plan

Source: San Francisco Redevelopment Agency

Figure 4-37 Pier 70 Draft Preferred Master Plan Street Grid and Open Space proposal

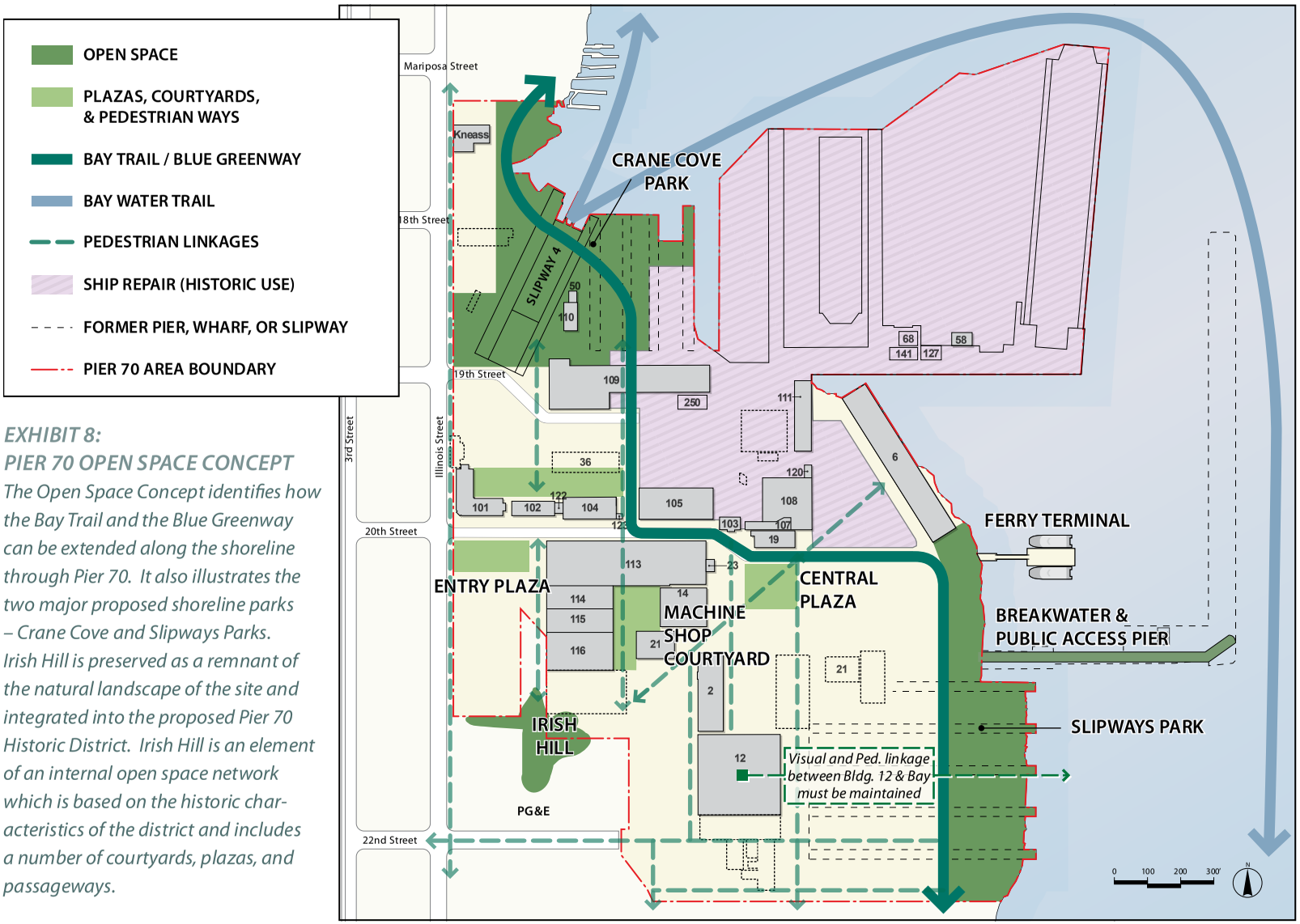


EXHIBIT 8:
PIER 70 OPEN SPACE CONCEPT

The Open Space Concept identifies how the Bay Trail and the Blue Greenway can be extended along the shoreline through Pier 70. It also illustrates the two major proposed shoreline parks – Crane Cove and Slipways Parks. Irish Hill is preserved as a remnant of the natural landscape of the site and integrated into the proposed Pier 70 Historic District. Irish Hill is an element of an internal open space network which is based on the historic characteristics of the district and includes a number of courtyards, plazas, and passageways.

Source: Pier 70 Area - Draft Preferred Master Plan, Port of San Francisco

Pedestrian Conditions Findings

The most urgent pedestrian issues that emerge from this future conditions analysis are in the South of Market area. There, very large projected increases in residential and employment densities will lead to a greatly expanded potential demand for pedestrian travel. A projected 30,000 new trips will occur entirely within the South of Market area, and a further 20,000 trips will occur between the South of Market area and downtown San Francisco. At the same time, thousands of daily trips will occur between the neighborhood's growing residential and employment centers and its transit hubs: the three BART stations on Market Street, the Fourth and King Rail station, the new Central Subway stations, and the Transbay Terminal. By improving pedestrian conditions, the City has the opportunity to steer a majority of these trips toward walk trips, diverting them from some of its most constrained roadway and transit corridors.

At the same time, very large increases in vehicle volumes are projected for most South of Market area arterials. More vehicles on the roads may aggravate the challenges that pedestrians already face on these streets, which include long blocks, long crossing distances, narrow sidewalks, multiple vehicle turn lanes, and closed crosswalks. Some streets also lack pedestrian design treatments such as landscaping or pedestrian-scale lighting.

On some arterials, the City may have the opportunity to improve on these conditions by widening sidewalks, adding mid-block crossings to improve pedestrian paths of travel, adding curb bulb-outs, and adding pedestrian-scale design treatments. More ambitious designs could even convert one or more South of Market arterials to two-way operations. In other cases, investments in the South of Market's system of alleyways may be the best way to provide public open space that is separate from high traffic volumes. At the same time, changes to the South of Market arterial network must also take into account the needs of other modes, including vehicles, bicycles, and transit.

In order to prioritize proposed pedestrian improvement projects and appropriately balance the needs of different modes, the EN TRIPS study team will develop a set of street design guidelines for South of Market arterials. These guidelines will be based on the Better Street Plan street typology, but will be tailored carefully to the particularities of the South of Market.

The other neighborhoods in the study area also have pedestrian and public realm improvement needs, although many of these have been studied in detail recently through other ongoing planning efforts. The Mission Streetscape Plan and the Potrero Hill traffic calming plan have developed and prioritized key street improvements for those neighborhoods. In the Central Waterfront/Mission Bay Area, the Mission Bay redevelopment plan, the Pier 70 Plan, and the Blue Greenway project would serve to reconnect the city with its waterfront. However, deficiencies in the Central Waterfront sidewalk network would remain. In Showplace Square, key pedestrian considerations include an incomplete sidewalk network, as well as a lack of signalized crossings at 16th Street. For these other neighborhood-scale pedestrian improvement projects, the EN TRIPS project team will work to develop a prioritized list of needs.

Bicycle Network

Two objectives of the Eastern Neighborhood Area Plans are directly related to bicycling: improve and expand infrastructure for bicycling as an important mode of transportation and consider the street network in the Eastern Neighborhoods as a City resource essential to multimodal movement and public open space. This section assesses bicycle conditions in the EN TRIPS study area for 2035.

Summary of Existing Conditions

As many of the future year problems, issues, and opportunities are simply extensions of the current conditions, this section builds on the detailed examination of current bicycle conditions presented in the EN TRIPS Existing Conditions report.

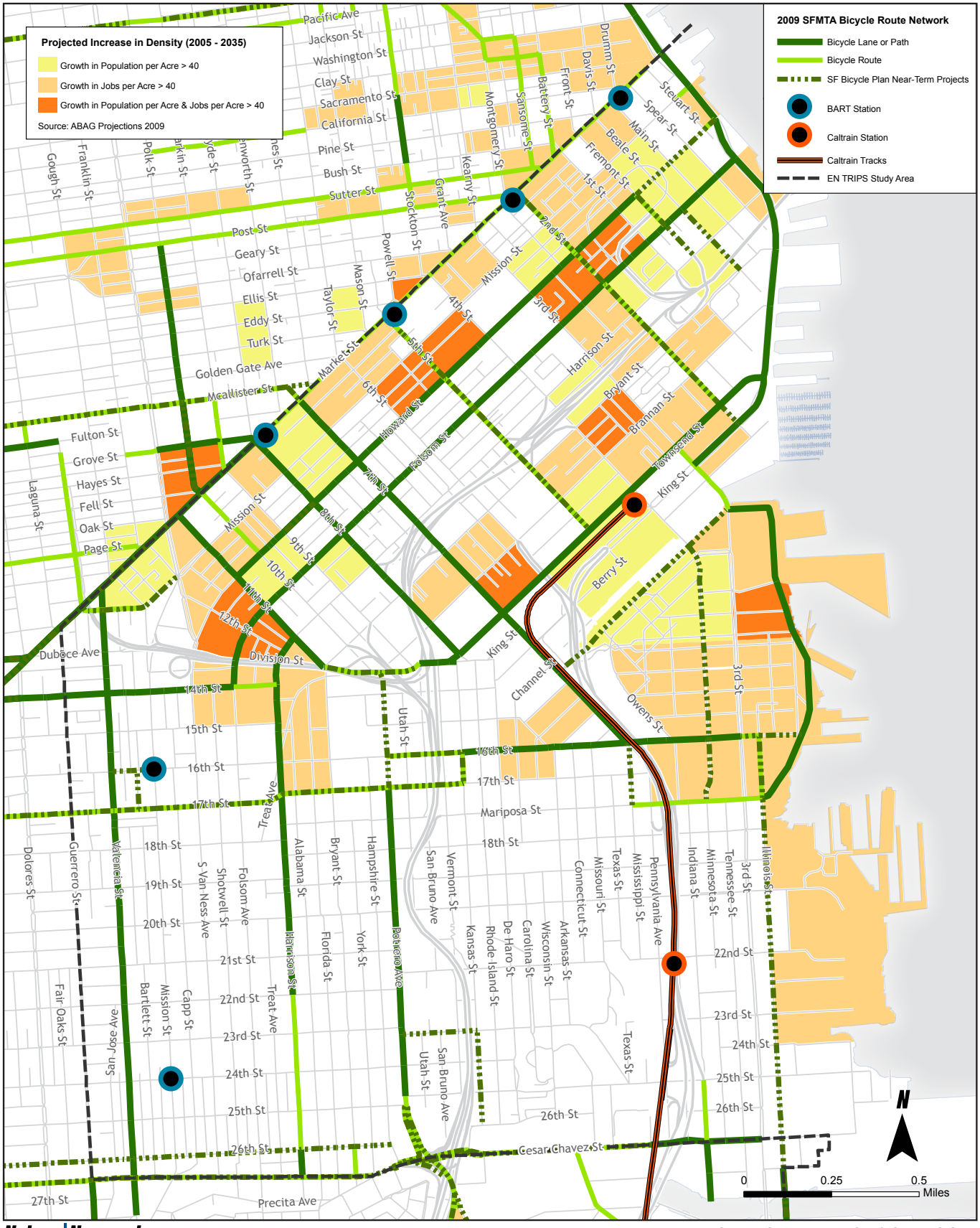
Bicycling mode share is higher in the study area than for the City as a whole. San Francisco's travel demand model estimates that bicycling represents four percent of all trips originating in the Eastern Neighborhoods, as compared to two percent citywide. Data from recent SFMTA bicycle counts also indicates that bicycle usage is on the rise, as counts within or adjacent to the study area have shown a 47 percent increase over the past four years.

The study area offers some of the best bicycling conditions and facilities in the city. Aside from Potrero Hill, the flat topography in the area is highly conducive to bicycle travel, and the myriad of routes provide strong access and connectivity. In particular, Route 45 along Valencia Street and Route 30 on Howard and Folsom Streets offer critical access between downtown and residential neighborhoods and commercial corridors to the south. Connectivity on east-west routes is more challenging, but facilities are provided on Seventh, Eighth, 14th, 16th, and 22nd Streets. However, critical gaps in the network do still exist. Many of these gaps are addressed with proposed projects in the San Francisco Bicycle Plan.

The Eastern Neighborhoods are home to a number of the city's high bicycle injury collision intersections and corridors. Over the last five years, five intersections within or adjacent to the study area ranked among the City's highest for bicycle injury collisions, while four of the city's top seven highest bicycle injury collision corridors were located in the study area.

The South of Market area presents challenges to bicyclists. The grid is dominated by one-way streets, fast moving traffic during non-peak periods, and freeways. The one-way orientation can require bicyclists to circle around very large blocks in order to reach a destination. As a shortcut, some bicyclists will ignore one-way streets and ride on the sidewalk, against traffic, or both. Finally, bicycle parking is in high demand throughout the study area, especially along popular commercial corridors in the Mission, near downtown employment centers, and close to major regional transit stations. As a result, bicycles will often be locked on sidewalk furniture or meter/sign posts, obstructing pedestrian travel. Parking challenges can discourage bicycle travel.

Figure 4-38 Existing and Planned Bicycle Network



Source: San Francisco City & County GIS

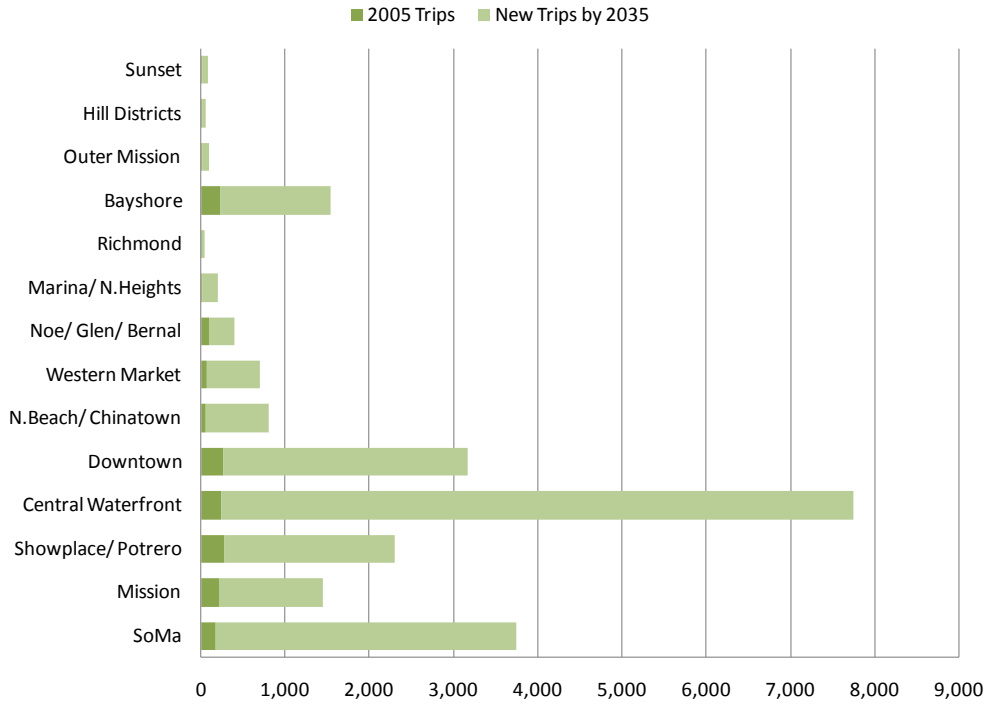
Projected Bicycle Demand

The travel demand model projects that bicycling trips in the Eastern Neighborhoods plan area will hold constant at roughly four percent of all trips. However, demand for bicycle travel is particularly difficult to project. Current modeling tools are relatively unsophisticated in trying to predict bicycle demand, particularly as distinct from walking or transit trips. As with all modes of transportation, the actual level of bicycle travel in 2035 will depend heavily on the design of streets and type of facilities made available to cyclists.

For these reasons, this section makes note of two types of travel projections. First, it observes the total demand for non-motorized trips (either walking or bicycling, as discussed in the pedestrian section above). SF-CHAMP projects that there will be a total of 97,000 new walk or bike trips made by 2035. This amounts to about 58,000 new trips originating in the South of Market area (a rough doubling of current non-motorized trips), 11,000 new trips in the Mission, and 7,000 new non-motorized trips in Showplace Square. The Central Waterfront and Mission Bay are projected to have 21,000 new non-motorized trips, a huge increase from today's very low base. SF-CHAMP projects that walk and bike trips will represent about 38 percent of all new trips in the South of Market, 31 percent in Showplace Square/Potrero Hill, and just over 20 percent in the Mission and the Central Waterfront.

Second, this section observes the projected number of relatively short trips by all modes, particularly those within plan areas and between adjacent plan areas. These trips can be viewed as the largest share of potential bicycle trips, and the ones that the City may wish to try to accommodate with bicycle facilities. Projected demand for new travel within plan areas and between adjacent plan areas is described in the section that follows.

Figure 4-39 Non-motorized Trips with Origins in the Eastern Neighborhoods by Destination



2035 Bicycle Conditions by Neighborhood

South of Market Area Bicycle Conditions

SF-CHAMP projects demand for up to 30,000 new trips that have both origins and destinations in the South of Market area (of these, perhaps 20,000 are projected to be non-motorized trips). A further 20,000 trips are projected between the South of Market and downtown San Francisco. These trips may be more or less attractive to make by bicycle, depending upon cycling conditions. SF-CHAMP also projects substantial new demand for travel between the South of Market and several adjacent areas, including the Mission District, Mission Bay/Central Waterfront, and the Western Market area, which includes the Civic Center area, Hayes Valley, and the Haight. Especially given dedicated bicycle facilities, many of these trips could be made by bicycle. Figure 4-38 illustrates the South of Market bicycle network alongside projected traffic congestion at key intersections. Key bicycle corridors and planned projects are described below.

Market Street, the northern boundary of the study area, is a primary bicycle thoroughfare serving trips both to and from the South of Market and downtown San Francisco. Not only does this facility currently see tremendous bicycle use, it will also get a significant upgrade through the Better Market Street study.[11]

The Folsom/Howard couplet is the major bicycle corridor traveling east and west through the center of the South of Market, with an eastbound bicycle lane on Folsom and a westbound lane on Howard. The San Francisco Bike plan will close the existing gap between the Howard Street lane and the Embarcadero. This corridor is a vital link for San Francisco cyclists–not only those traveling within the South of Market, but also those traveling from points south, including the Mission District, to downtown. The corridor will only grow more important with the addition of substantial new population and employment density projected in the Transbay District and Rincon Hill, as well as in the Western South of Market.

The Transbay Transit Center will be a major attractor of bicycle trips along this corridor. The Transit Center has been designed to provide convenient bicycle access to Caltrain, AC Transit, Muni, Golden Gate Transit, and High Speed Rail. It is expected to have a bike ramp connection to Howard Street. It will have substantial short-term outdoor bicycle parking, as well as an attended bike parking station for up to 500 bicycles.

Folsom and Howard Streets were designed at the scale of motor vehicles, wide streets and fast moving traffic. These conditions may serve to discourage some cyclists, despite the presence of marked bicycle lanes. In the future condition, where large increases in vehicle volumes are projected, the road may come to feel more dominated by motor vehicles than it does today. In addition, worsening delay is projected at Folsom and Fourth (LOS D), Folsom and Third (LOS E), and Howard and Eighth (LOS D). Vehicle congestion may result in some delay or inconvenience to cyclists as well.

In the Eastern South of Market, there are currently no marked bicycle lanes traveling north and south. The San Francisco Bicycle plan includes conversion of bicycle routes on *Second and Fifth Streets* into marked lanes. These facilities will complete the South of Market grid for cyclists, and provide improved access to parts of the Eastern South of Market and the Transbay District that are expected to add substantial population and employment in the next 25 years. These lanes will also improve a vital path of travel from Market Street and Downtown San Francisco to the Fourth and King Street Caltrain Station. For these reasons, they are high priority projects.

The Second and Fifth Street bicycle lanes will connect to the bicycle lane on *Townsend Street*, which has just recently been striped. The Townsend Street bicycle lane provides connections to

[11] http://bettermarketstreet.org/

the Fourth and King Caltrain Station. This street will be rebuilt as part of the larger rebuild of Townsend Street that will accompany the addition of California High Speed Rail.

On Seventh and Eighth Streets, a pair of marked one-way bicycle lanes provide a corridor of travel across the Western South of Market area. In the future, this corridor may be challenged somewhat by the increasing vehicle volumes projected on Seventh and Eighth Streets, as well as by the increased congestion projected at the freeway ramps at Seventh/Eighth and Harrison Streets. A planned extension of the Seventh Street bicycle lane across Market Street will allow the facility to connect to a new bike lane on McAllister Street. The combination of the new Townsend Street bicycle lane, the extended Seventh Street bicycle lane, and the McAllister Street bicycle lane will provide a bicycle facility connection between the Fourth and King Caltrain Station and the neighborhoods north and west of Market Street, including Civic Center, Hayes Valley, and the Haight.

With a very large increase in travel projected for the South of Market area, including 58,000 new non-motorized trips, the existing supply of bicycle parking is probably not adequate to meet the potential demand, and may act as a constraint on new bicycle trips. Adding additional bicycle parking in the South of Market area may help to shift some demand away from motor vehicle and transit trips, both of which have constrained capacity, toward bicycling.

The South of Market area will also be a hub for the pilot test of a regional bike sharing program, recently recommended for an MTC Climate Initiatives Grant. Beginning in 2011, there will be 500 shared bicycles in San Francisco, dispersed at 50 stations around Market Street between the Financial District and the Civic Center. There will be additional clusters near the Transbay Terminal and the Fourth and King Caltrain Station. If successful, this program may grow over time, increasing the number of bicycle trips made for both commuting and non-commuting purposes.

The Bay Bridge Bikeway Project, a joint venture between the Metropolitan Transportation Commission and Caltrans, is currently studying the feasibility of adding a bicycle and pedestrian path on the west span of the San Francisco-Oakland Bay Bridge. This facility would complement the bicycle path now being built as part of the reconstruction of the east span of the bridge and allow bicycle travel between San Francisco and the East Bay. While the project faces both funding and engineering challenges, if built it could be a major facilitator of new bicycle trips in the South of Market area. The touchdowns for the paths were originally designed to occur in the Rincon Hill area, but subsequent development may make the original design infeasible. The precise location of these touchdowns is under study.

Mission District and Potrero Hill/Showplace Square

The travel demand model projects an increase of about 4,000 daily trips that have both origins and destinations in the Mission Distinct. The largest increase in travel from the Mission District to adjacent neighborhoods will be to the South of Market area (7,000 new trips), and to the Bayshore area (9,000 new trips).

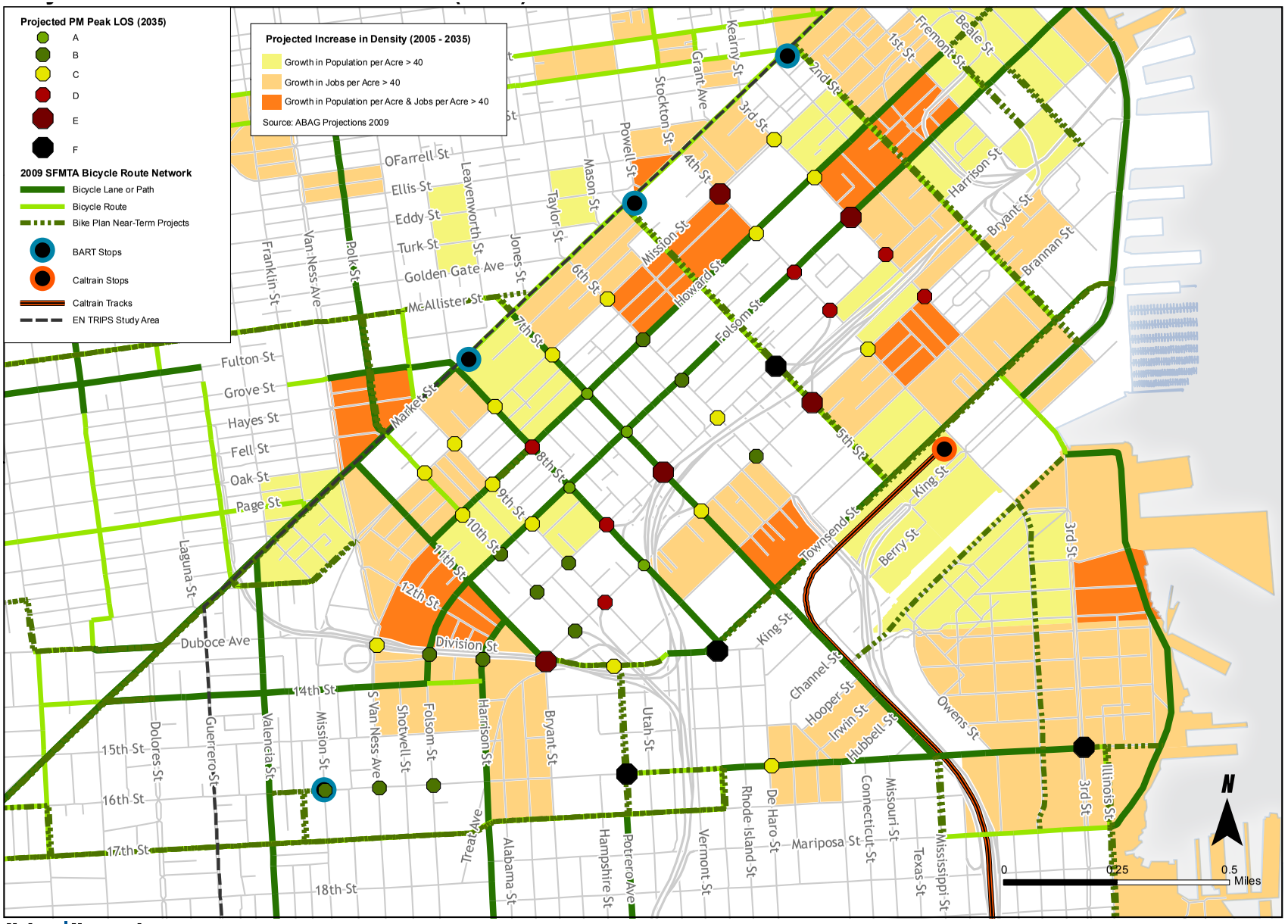
Bicycle facilities on three streets provide bicycle access north and south through the Mission District: Valencia Street, Harrison Street, and Potrero Avenue. The most heavily used of these, on Valencia Street, has recently been upgraded with wider bike lanes between 15th and 19th Streets as part of the Valencia Streetscape project. The Valencia Street bicycle lanes will serve the growth expected in the Mission and Valencia corridors, and provide connection to Market Street and to the South of Market Area by connecting to the Folsom Street bicycle lane via 14th Street. The existing Harrison Street bicycle lane serves to connect the central part of the Mission to the South of Market and downtown.

The Potrero Avenue bicycle lane, which now terminates at 17th Street, will be extended north. Combined with another short segment of new bicycle lane on Division Street, the facility will connect to both the 11th Street and Eighth Street bicycle lanes. This project will provide marked bicycle lanes linking the north-east Mission to the Western South of Market in a corridor that is projected to have large increases in vehicle volumes.

The Mission District currently lacks east-west bicycle facilities. Under the bicycle plan, two lanes will be added. One is the previously described 17th Street bicycle lane in the north Mission. In the southern portion of the neighborhood, new facilities on Cesar Chavez and 26th Street will provide east-west connections serving the projected travel demand to the Bayshore area.

Because of the topography, no bicycle facilities cross Potrero Hill, but the neighborhood will have bicycle lanes around its perimeter on 16th, Potrero, Cesar Chavez, and Illinois Street.

Figure 4-40 Bicycle Network and PM Peak LOS (2035)



Nelson|Nygaard consulting associates

Source: San Francisco City & County GIS, Fehr and Peers

Central Waterfront and Mission Bay

The travel demand model projects demand for up to 11,000 new trips that have both origins and destinations in the Central Waterfront or Mission Bay. A further 10,000 trips are projected between Central Waterfront/Mission Bay and the South of Market (9,000 new trips) and downtown San Francisco (11,000 new trips). This origin-destination pair may be particularly important for bicycling because both motor vehicle and transit capacity are projected to be constrained along Third Street. However, the only bicycle connection between the northern parts of Mission Bay and the South of Market area is the Third Street Bridge across the channel.

SF-CHAMP also projects substantial new demand for travel between the Central Waterfront and several adjacent areas to which bicycle trips may be attractive, including the Mission District (5,000 new trips), and the Western Market area (5,000 new trips).

A dedicated bicycle lane currently provides access along the waterfront through Mission Bay. As part of the Bay Trail, the bicycle lane will continue along Terry Francois and on Illinois Street south through the Central Waterfront, providing north and south bound bicycle access for new residents and workers in this neighborhood. It should be noted that some segments of Illinois Street may experience growing motor vehicle volumes as the Central Waterfront grows and congestion increases on Third Street. The Bay Trail continues south along Third Street, providing connections to the Bayview, Hunters Point, and Candlestick point. This connection is important given the large increases in travel demand projected from all of the Eastern Neighborhoods to the Bayshore region of the city.

Currently, 16th Street provides a dedicated bicycle lane between Kansas and Third Street. The bicycle plan proposes to extend this lane east, connecting all the way to the waterfront, and west, connecting it to an additional new bicycle lane that will continue west along 17th Street all the way through the Mission District. This continuous bicycle corridor will knit together three Eastern Neighborhoods plan areas. A potential challenge to this project, however, will be the competing demands on the constrained right-of-way on the eastern end of 16th Street. That segment is projected to have increasing motor vehicle volumes (with major delays, projected as LOS F during the PM peak for the intersection of the 16th Street and Third Street), as well as the re-routed 22–Fillmore service, and has been proposed for transit priority street treatments. Finally, current plans call for Caltrain to be “electrified” using overhead wires, and for the right-of-way to remain at grade as part of the California High Speed Rail project, with 16th Street to be routed through an underpass under the train tracks. It may be challenging to provide transit priority treatments as well as a bicycle lane and to accommodate projected vehicle volumes all in an underpass at this location.

Findings for Bicycling

Bicycling has the opportunity to attract a substantial share of the new trips projected in the Eastern Neighborhoods. Once it is fully implemented, the adopted San Francisco Bicycle Plan will complete a grid linking neighborhoods and major nodes in the Eastern Neighborhoods study area. A notable exception is Potrero Hill, where no bicycle facilities are planned due to steep topography. Bicycle facilities of particular importance given the expected increases in population and employment density include:

- Given projected population and employment densities, the existing pair of bicycle lanes on Folsom and Howard Streets will become an increasingly important path of travel both for trips east and west across the South of Market, and for trips to downtown San Francisco from neighborhoods to the south. The City may wish to consider buffering these lanes from growing traffic by making them separated bikeways.
- The Second and Fifth Street bicycle lanes, which will provide improved access to parts of the Eastern South of Market and the Transbay District that will see substantial growth.

These lanes will also serve to connect the Market Street corridor to the Fourth and King Street Caltrain Station. Also important for providing Caltrain Station access is the Townsend Street bicycle lane, which will provide access from the east and west on a rebuilt Townsend Street.

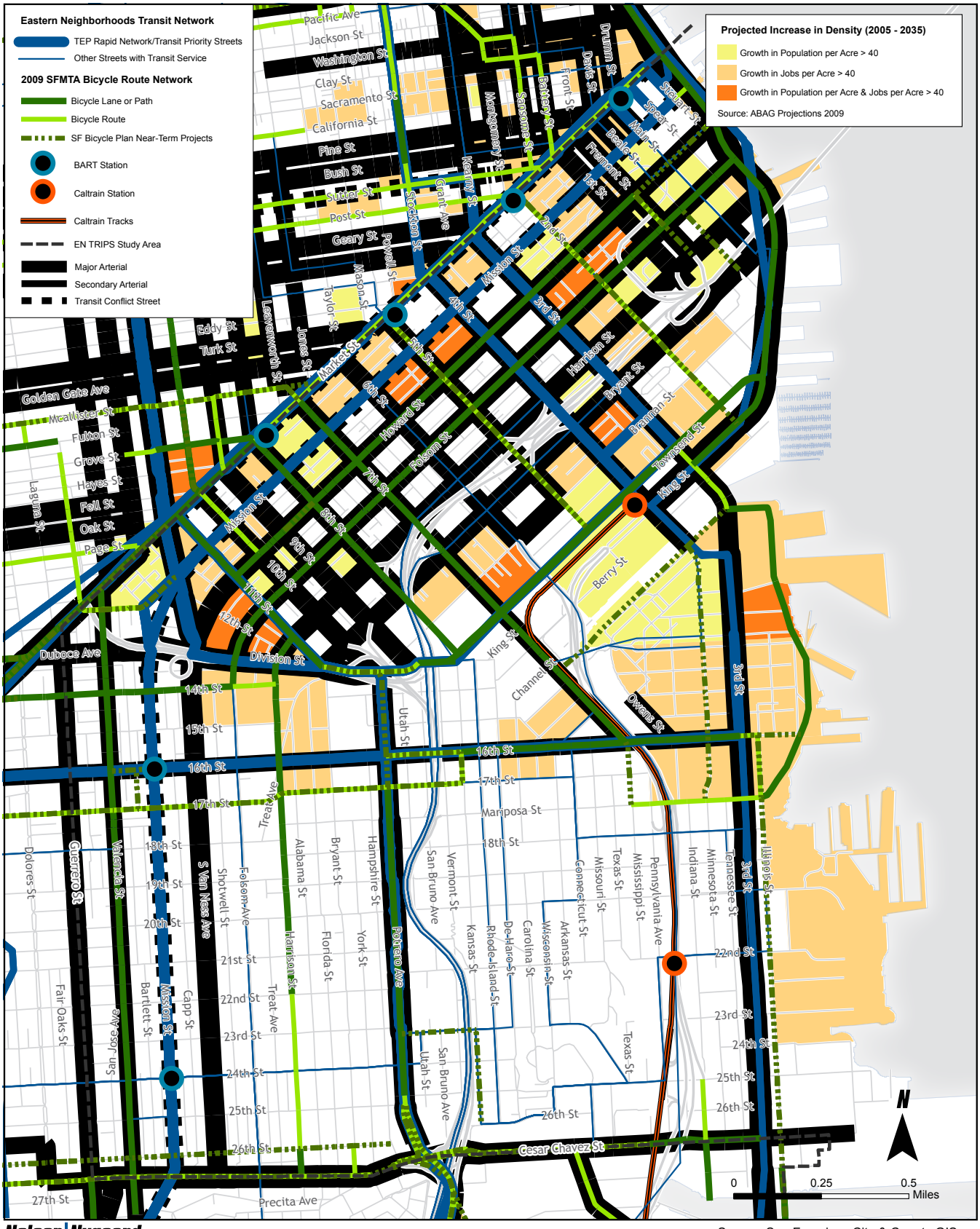
- A planned extension of the Seventh Street bicycle lane across Market Street, connecting to a new bicycle lane on McCallister Street will provide an important connection between the bicycle network in the Western South of Market to the neighborhoods north and west of Market, including Civic Center, Hayes Valley, and the Haight.

Growing vehicle volumes may present challenges to cyclists in a number of areas. Given the 15 percent to 35 percent increases in vehicle volumes projected for the east-west arterials in the South of Market, the Folsom/Howard bicycle lane one-way couplet becomes a particularly important facility for cyclists. In the future, one or both of these facilities could be upgraded to provide a separated right-of-way for cyclists. Separated bicycle lanes, or cycle tracks, offer bicyclists a more comfortable riding environment. Additional innovative treatments, such as bike boxes or colored bicycle lanes, have been shown to reduce conflicts, enhance visibility, and improve safety.

Projected vehicle congestion may delay cyclists along several key routes in the South of Market, including Folsom Street, Fifth Street, and Eighth Street. Projected congestion along 16th Street at Potrero and aT–Third may also cause delay. On Third Street, there are large projected increases in vehicle volumes and traffic congestion, combined with projected capacity constraints for the T–Third. Given these potential constraints, bicycling may represent an attractive alternative for a portion of the 20,000 new daily trips projected to travel between the Central Waterfront/Mission Bay and the South of Market area and downtown.

Existing bicycle parking facilities in the study area may be a constraint to bicycling as total demand grows. Particularly in the South of Market, the Mission District, and in Mission Bay, additional bicycle parking may be required as demand grows. The Bicycle Plan will address some of the need through sidewalk racks, but additional capacity may be needed. On-street bicycle corrals offer a potential solution. Additional monitoring of bicycle parking in new developments might also be needed to ensure adequate bicycle parking facilities.

Figure 4-41 Combined Eastern Neighborhoods Transportation Networks



Nelson|Nygaard consulting associates

Source: San Francisco City & County GIS

Chapter 5. Summary of Findings

From the preceding discussion, several key findings emerge that will guide the upcoming phases of the EN TRIPS project. These are discussed below.

Land use change and travel demand growth

As the result of land use regulation changes and overall regional growth, very large increases in population, employment, and total travel demand are projected for the Eastern Neighborhoods study area by 2035. The study area's population is expected to increase by about a third, and employment is projected to increase by nearly half. As a result of this growth, SF-CHAMP predicts an additional 320,000 daily trips to and from the Eastern Neighborhoods by 2035, an increase of about 70 percent over the 2005 level.

The majority of population, employment, and travel demand growth is expected to occur in the South of Market area. SF-CHAMP projects that demand for travel to and from the South of Market area will roughly double. Within the South of Market, important new areas of growth include the following:

- The easternmost portions of the South of Market, including the Transbay District, where 25,000 new jobs will magnify the importance of an already vital employment node. Population density will surge near the Transbay district, including at Rincon Hill.
- The rest of the South of Market area will add a further 25,000 jobs by 2035. Some of the largest South of Market employment increases outside of the Transbay District are projected in the mid-market area, adjacent to Market Street between Seventh and Fifth Streets.
- The western end of the South of Market area will also see substantial increases in population density, particularly the area west of Seventh Street between Market and Harrison. The Western South of Market Neighborhood Planning Area as a whole will include a total of 9,000 new persons.
- The area adjacent to the Fourth and King Caltrain Station (including portions of the Western South of Market, Eastern South of Market, and Mission Bay planning areas) will also see increases in population and employment density. Substantial employment growth is also projected along Bryant, Brannan, and Townsend Streets, between I-80 and the Caltrain tracks.

As a result of this growth, the South of Market area will see travel demand increase within the neighborhood, between the South of Market and downtown, between the South of Market and each of the Eastern Neighborhoods Areas.

While the South of Market area will see the majority of population growth, several areas of growth are projected in the rest of the study area. Much of the remaining increase in travel demand will come from trips to and from the Central Waterfront and Mission Bay.

- The largest center of new population is Mission Bay, which is projected to add 25,000 jobs. Large increases in employment density are also projected along the waterfront south of Mission Bay, with the Central Waterfront neighborhood plan area contributing 15,000 new jobs. Extending west from Mission Bay along the 16th Street corridor, employment growth is also foreseen in the southern part of Showplace Square and in the northern portion of the Mission District.

- Beginning from a very low base, the Central Waterfront will also add substantial population density, more than doubling in population with the addition of just under 2,000 persons. From a very low base of just over 12,000 trips per day, the Central Waterfront and Mission Bay will see huge percentage increases in travel as planned development is built out. The Central Waterfront and Mission Bay will be bound for each of the following destinations: Bayshore; downtown San Francisco; the South Bay; and the East Bay.
- With much smaller changes to existing land use patterns expected, SF-CHAMP projects that the Mission District will have modest growth in trips. The largest share of Mission District new trips will be bound for Bayshore (including Candlestick Point/Hunters Point). The bulk of the remaining new trips will be bound for the South of Market area, the Central Waterfront, and the South Bay.
- Showplace Square/Potrero Hill Districts will have smaller but still substantial increases in travel demand. The Potrero Hill/Showplace Square area will also have a substantial number of new trips to the South of Market, the Central Waterfront, and Bayshore.

As a result of this growth, travel by all modes of transportation will expand. SF-CHAMP projects that mode share will remain mostly consistent between 2005 and 2035, with just a 3 percent shift from private motor vehicles to transit. It is important to note that SF-CHAMP projections described in this report are uncertain and are not pre-determined. New infrastructure investment and/or changes in City policy could influence the number of new vehicle trips, help to reduce congestion, or lessen the impact of increased vehicle volumes on other modes of transportation. One consequence of expanded travel may be large increases in motor vehicle volumes on arterials throughout the study area. Vehicle drivers will face some delays, and buses, cyclists, and pedestrians will also have to contend with growing vehicle traffic.

Transportation Needs and Opportunities

Both the physical constraints of the study area and the City's Transit First Policy[1] preclude major expansions of roadway capacity as a strategy for dealing with projected vehicle volumes and congestion. Instead, the City has already begun exploring a variety of policy approaches to managing congestion. These strategies include: Smart Parking Management, Congestion Pricing, employer-based Transportation Demand Management, and adjustment of off-street parking standards. Each of these strategies is already under study, implementation or development, but potential exists to expand their application.

In addition to these strategies for managing or reducing vehicle congestion, maintaining and improving quality of life in the parts of the Eastern Neighborhoods that are poised for substantial growth will require the city to maintain and expand alternatives to travel by private vehicle. Investments could include:

- *Transit Priority Street treatments.* Already, major transit surface routes operate relatively slowly through the denser parts of the study area. In the future condition, major new traffic delays are projected on Third and Fourth Streets (affecting the 45 and the 30), on Division (affecting the 47 and the 9) and on 16th Street (affecting the 22 and the 9). Transit Priority Streets (TPS) and Bus Rapid Transit (BRT) improvements to stops including prepaid and level boarding could be used to reduce delay. However, to provide the level of capacity necessary to meet demand, it might ultimately be necessary to provide exclusively transit lanes.

[1] San Francisco's Transit First Policy , Section 8A.115 of the City Charter, governs allocation of transportation rights-of-way and resources. Introduced in 1973 and revised by voters in 1999, it prioritizes the needs of transit and nonmotorized modes over vehicular travel. San Francisco's Climate Action Plan, as well as the City's responsibilities under SB 375 also discourage creation of new motor vehicle capacity.

- *New bicycle facilities.* Growing vehicle volumes may present challenges to cyclists in a number of areas. Separated bicycle lanes, or cycle tracks, offer bicyclists a more comfortable riding environment. Additional innovative treatments, such as bike boxes or colored bicycle lanes, have been shown to reduce conflicts, enhance visibility, and improve safety. In addition, in some corridors, it may be appropriate to prioritize certain bicycle lanes, or even set aside dedicated right-of-way to buffer bicycle networks from increased vehicle volumes.
- *Further developing comfortable pedestrian spaces.* These can include public open space as well as wider sidewalks, curb bulb outs, medians, pedestrian-scale landscaping, and other treatments.

As a result of the projected growth, there will be competing demands for space on South of Market streets. In addition to internal trips, there will also be a very large increase in travel to and from the South of Market area, and a large increase in pass-through trips. As a result of this growing travel demand, the South of Market arterial network may see large increases in vehicle volumes (15 – 35 percent on major east-west arterials), and increased congestion and delay at key intersections during peak times. Potentially costly delays are projected in the PM Peak on Harrison and Bryant Streets near the I-80 approaches, as well as along Third and Fourth Streets.

At the same time, density increases create the possibility of expanded pedestrian and bicycle travel in this area. About two thirds of these new internal trips (those inside the South of Market and between the South of Market and downtown) are projected to be made on foot. However, South of Market arterials were built to accommodate high volumes of regional traffic, the major arteries in the South of Market area already present challenges for pedestrian comfort. To reduce the effects of new vehicle volumes on pedestrians and cyclists, and to encourage walking and bicycling for new trips, the City may wish to explore the following possible changes to the South of Market street network:

- The City may wish to select one or more arterial corridors for major improvements aimed at creating space that prioritizes the needs of pedestrians and cyclists, and that provides attractive public space. Of the east-west arterials, Folsom Street is a logical candidate for this type of investment because it is centrally located within the South of Market area, because (unlike Harrison and Bryant Streets) it is not a freeway approach corridor, and because it is the location for a portion of the increase in residential and employment density planned for the area. Changes to Folsom Street could include conversion to two-way operations; implementing a road diet or major traffic calming effort while maintaining one-way operations; adding wider sidewalks and/or separated bicycle facilities; and/or major investments in greening, pedestrian scale lighting, or other design treatments.
- For the other South of Market area arterials, a set of investments are available to improve pedestrian comfort and safety. Among the most important of these are the additions of signalized mid-block crossings in key locations to allow pedestrians more direct paths of travel. Other potential adjustments include completing at crosswalks in areas where they are currently missing; the addition of more pedestrian-oriented design treatments, such as wider sidewalks, landscaping, and lights; and the traffic calming treatments at key pedestrian injury collision hot spots. In order to prioritize proposed street design projects and appropriately balance the needs of all modes, the EN TRIPS study team will develop a set of street design guidelines for South of Market arterials. Like the proposed street design framework created for the Mission Streetscape plan, these guidelines will be based on the Better Street Plan street typology, but will be tailored carefully to the South of Market.

- It will be particularly important to invest in pedestrian amenities on corridors that provide paths of travel to important regional transit infrastructure. Townsend Street, which provides access to the Fourth and King Caltrain Station from the east and west, is an important candidate for improvement, as is Fourth Street, which provides access to that station from Market Street.
- The South of Market area's network of alleyways already provides pedestrians space that is separated from the high vehicle volumes on the arterial streets. Additional traffic calming treatments, addition of landscaping, or even innovative shared space treatments can help to turns these spaces into more attractive and useable public space. In addition, alleys that continue on either side of an arterial may be particularly important locations for new mid-block crossings.
- In order to better serve growing demand for bicycle travel, and to buffer cyclists from growing traffic volumes, the City may wish to expand and improve bicycle facilities in the South of Market. Given the 15 percent to 35 percent increases in vehicle volumes projected for the east-west arterials in the South of Market, the Folsom/Howard bicycle lane one-way couplet becomes a particularly important facility for cyclists. In the future, one or both of these facilities could be upgraded to provide a separated right-of-way for cyclists. The planned Second and Fifth Street bicycle lanes are crucial for completing the South of Market bicycle grid and connecting the growing Eastern South of Market area to Market Street and the Fourth and King Caltrain station. The planned extension of the Seventh Street bicycle lane across Market Street is also an important opportunity to better connect the South of Market area to the neighborhoods north and west of Market Street.

Outside of the South of Market area, several corridors face capacity constraints. These include the following:

- *16th Street* emerges from this analysis as a multimodal corridor of interest. As the only arterial that runs in the east-west direction and connects the North Mission, Showplace Square, and Mission Bay, this corridor is the focus of a number of competing demands. It will see increased vehicular volumes, and substantial delay is projected at two key intersections (Potrero Avenue and Third Street). The 22–Fillmore, which is planned to be re-routed so that it travels all the way to Mission Bay, may also face these delays unless transit priority treatments are completed. Finally, an extension of the 16th Street bicycle lane is planned to Mission Bay. At the same time, as part of the California High Speed Rail project, it has been proposed that 16th Street should be routed through an underpass under the Caltrain right-of-way. This plan would further constrain this high-demand corridor. City agencies are currently working with the California High Speed Rail authority to develop alternatives to this proposal.
- *Third Street* is the primary arterial for the Central Waterfront and Mission Bay, connecting these growing areas to the South of Market and Downtown. It also provides downtown access for the western side of Potrero Hill. In the future condition, expected growth in travel demand between these neighborhoods may result in substantially increased travel volumes on Third Street. This growth includes increased vehicle volumes, which are expected to generate major delays at the intersection of Third Street and 16th Street. Growth will increase demand for the T–Third light rail service, which is expected to have average loads exceeding 125 percent of total capacity during the PM peak hour. Having already invested heavily in the T–Third service and upgrades to Third Street, the City has few attractive options to increase capacity through this travel corridor.

- *On Potrero Avenue and Mission Street*, transit is expected to be over capacity. Even with assumed headways much more frequent than it is currently operating, the 9–San Bruno on Potrero Avenue is expected to have average PM peak hour passenger loads of more than 125 percent of capacity. The Mission District segment of the 49–Van Ness/Mission faces the same challenge.

Areas with lower projected growth may also require pedestrian and public realm improvements. In addition to these key corridors, the pedestrian realm in other growth areas outside the South of Market may require improvement. These neighborhoods include the Central Waterfront, the north east Mission, and Showplace Square, where streetscape and pedestrian realm improvements are called for to improve the environment for new workers and residents, but new streetscapes must be carefully designed not to impede the trucks that businesses in these neighborhoods will require.

The other neighborhoods in the study area also have pedestrian and public realm improvement needs, although many of these have been studied in detail recently through other ongoing planning efforts. The Mission Streetscape Plan and the Potrero Hill Traffic Calming Plan have developed and prioritized key street improvements for those neighborhoods. In the Central Waterfront/Mission Bay Area, the Mission Bay redevelopment plan, the Pier 70 Plan, and the Blue Greenway project would serve to reconnect the City to its waterfront. However, even with these improvements, deficiencies in the Central Waterfront sidewalk network would remain. In Showplace Square, key pedestrian considerations include an incomplete sidewalk network, as well as a lack of signalized crossings at 16th Street. For these other neighborhood-scale pedestrian improvement projects, the EN TRIPS project team will work to develop a prioritized list of needs.

Chapter 6. Next Steps and Project Development Process

This report has projected future transportation conditions in the EN TRIPS study area. The needs described here will be refined through public outreach. The SFMTA study team will then proceed with the following steps:

- *Transportation Project Concept Development and Evaluation.* Following the completion of the future conditions analysis, the SFMTA project team will work with stakeholders to develop and prioritize a group of transportation projects and programs that best address the highest priority needs. These projects will include up to three major capital projects, but may address other needs as well.
- *Transportation Project Refinement and Design.* For priority projects, the SFMTA project team will work with stakeholders to design transportation improvement projects that help to meet the identified needs.
- *Funding and Implementation Strategy.* The SFMTA project team will create a funding and implementation plan for the proposed priority projects.
- *Environmental Review Document.* For the highest priority project or projects, the study team will perform a full environmental review to clear the project or projects for implementation under the California Environmental Quality Act (CEQA).

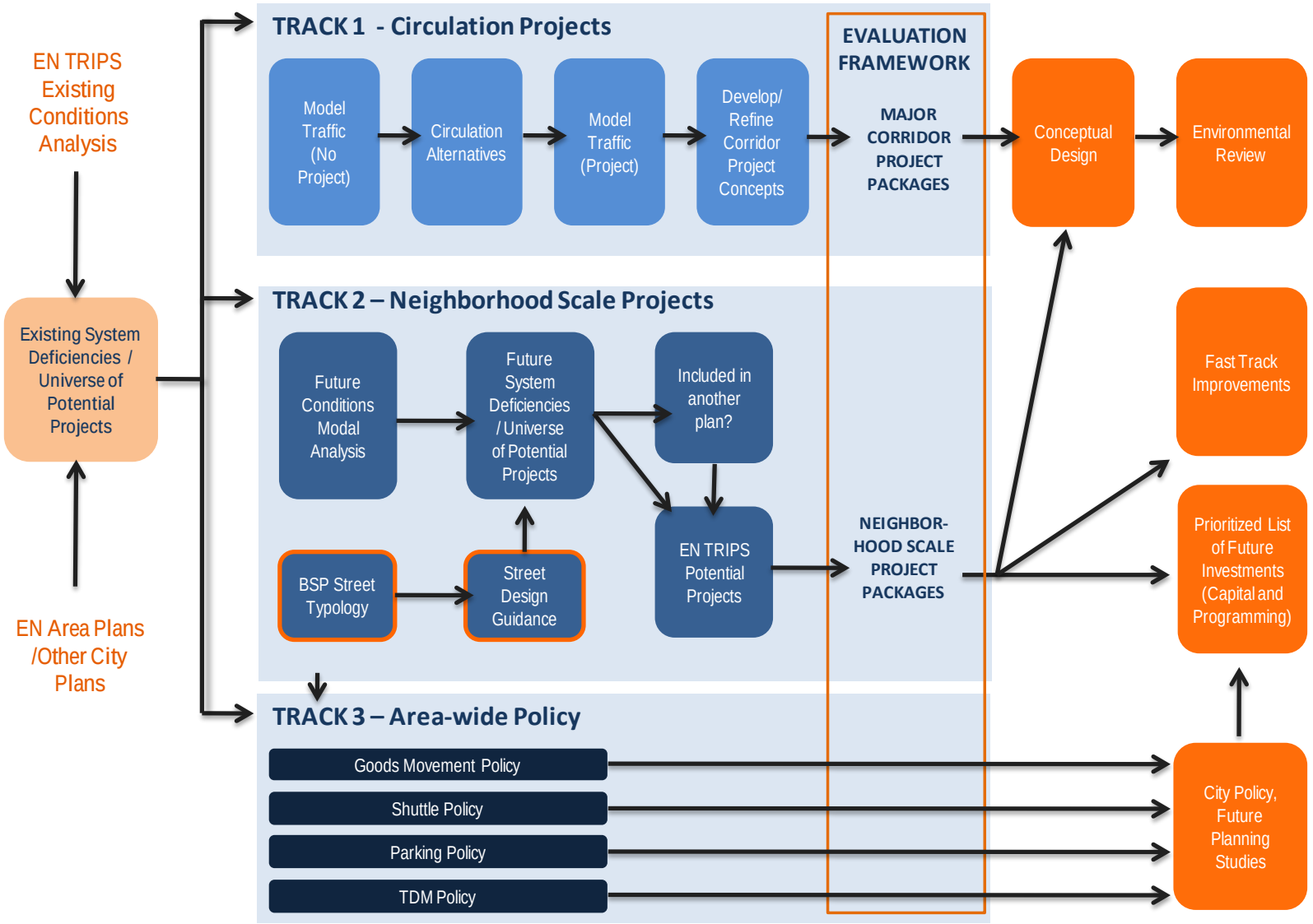
The next step in this process will be Transportation Project Concept Development. The projects will fall into one of three distinct project "Tracks." The evaluation tracks are determined by the type of project being evaluated and the level of environmental scrutiny that that project might require. Figure 6-1 below illustrates the process for developing and implementing each EN TRIPS project track. The three tracks are:

Track 1 – Major Circulation Projects. These projects are the projects that are expected to impact circulation on a system-level. The EN TRIPS study team will perform modeling analysis to evaluate these projects. At the end of the EN TRIPS process, there will be a legal environmental review process that will have to evaluate the impacts of this type of project in more detail.

Track 2 – Neighborhood Scale Projects. These are the smaller scale projects that would improve mobility and quality of life in the Eastern Neighborhoods but would not make major changes to the pattern of circulation. For these types of projects, the EN TRIPS study team will develop prototypes for street operations and urban design on different block-types in the EN TRIPS area, and then work with the community to identify deficiencies that can be improved by projects on the neighborhood scale. The final product for Track 2 projects will be a prioritized list of similar projects by type throughout the study area. These projects may proceed as funding becomes available.

Track 3 – Area-wide Policy Projects. There are a number of mobility issues in the EN TRIPS area that are not addressed by capital projects. These include policies related to parking management, private shuttles, taxi deployment and other issues that have been raised by the community, but that are not addressed with physical solutions. For these issues, policy documents will be created that address individual policy issues, with implications throughout the study area, and to the City as a whole.

Figure 6-1 EN TRIPS Project Development Workflow Diagram

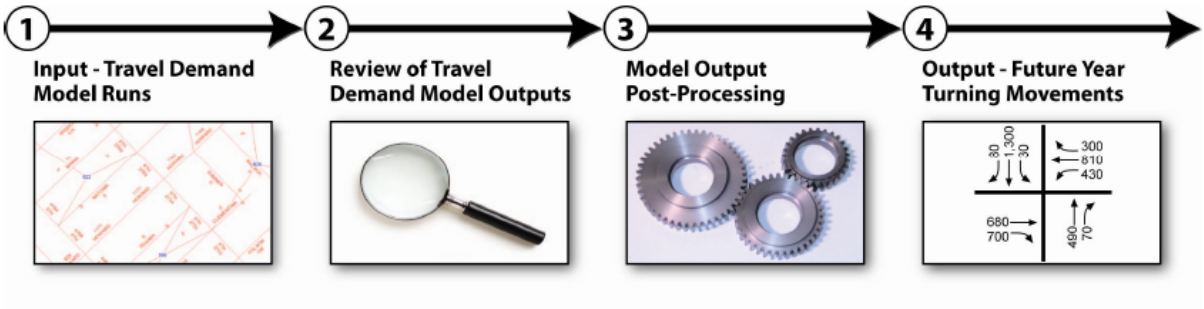


APPENDIX A

TRAVEL DEMAND FORECASTING AND POST-PROCESSING APPROACH

Appendix A. Travel Demand Forecasting and Post-Processing Approach

The development of Future Year traffic volumes via travel demand forecasting can be summarized as a four-step process, as illustrated in Inset 3 below. It is important to note that this process only addresses motor vehicle travel demand.



Inset 3. Travel Demand Forecasting and Post-Processing Approach

Step 1: Input - SFCTA SF-CHAMP Model Runs

The San Francisco County Transportation Authority (SFCTA) maintains and operates the travel demand model (SF-CHAMP) used for forecasting in San Francisco. The travel demand model works by dividing the City and the San Francisco Bay Area region into geographic areas, known as Traffic Analysis Zones (TAZs). For each TAZ, the model:

- Estimates the travel demand based on TAZ population, employment, and socio-economic data informed by the General Plan and projections provided by the Association of Bay Area Governments (ABAG);
- Determines the origin and destination for each trip; and Assigns those trips to the roadway network.

The model output is developed on a weekday daily basis comprised of five time periods: AM (6:00 – 9:00 AM), Mid-Day (9:00 AM – 3:30 PM), PM (3:30 – 6:30 PM), Evening (6:30 PM- 12:00 AM), and Owl (12:00 – 6:00 AM). The most recent SF-CHAMP forecast year is 2035. A corresponding base year model network is assigned to each forecast year in order that the increment of change from existing conditions can be determined. For the EN TRIPS project, the corresponding base year is 2005. After a travel demand model is run, outputs include the assigned roadway traffic in the form of “loaded networks.” Upon receipt of the loaded networks from the SFCTA, both the turning movement volumes and roadway segment volumes were reviewed to ensure that the magnitude and direction of roadway changes were logical. For example, if a TAZ is coded with extensive land use changes, then nearby roadway segments would likely have volume shifts as a result.

Step 2: Review SF-CHAMP Model Outputs

Likewise, the roadway network was reviewed to assess whether the roadways where new trips were assigned was logical. In travel demand forecasting models, trips are generally assigned to the route with the shortest expected travel time. Roadway speed, capacity, and facility type play a role in the attractiveness of a given route. Upon review, if roadway segment volumes do not make sense (i.e., the roadway seems attractive but does not have any new trips, or all new trips are being assigned to a local roadway), then nearby routes are evaluated to see whether there are any attributes that made adjacent facilities more or less attractive than the roadway in question.

Model outputs that are found to be inconsistent with logic or past experience may require further investigation, possibly resulting in additional model runs.

After a thorough review of model output, and assuming roadway volumes appear to be logical, it is possible to post-process model outputs to obtain meaningful traffic volume forecasts.

Step 3: Model Output Post-Processing

Since the base year turning volumes produced by SF-CHAMP are not validated to existing intersection turning movement counts (which fluctuate depending on factors including: season, day, regional or national economic conditions and by proxy, the unemployment rate, etc.,), it is not recommended to use 'raw' model turning movement outputs of the forecast year model directly. Instead, the output should be 'post-processed' in a manner that includes parts outlined methodology (see below), engineering judgment, past experience, and knowledge of the study area.

The post-processing of SF-CHAMP model output to determine Future Year turning movement volumes for the EN TRIPS project is being performed consistent with methodologies defined in National Cooperative Highway Research Program (NCHRP Report 255), Highway Traffic Data for Urbanized Area Project Planning and Design, Pedersen, N.J. and Samdahl, D.R., Transportation Research Board, 1982 - specifically, those outlined in Chapter Eight, Turning Movement Procedures.

Post processing of model output begins with two calculations:

Delta Calculation

Forecast Year Turning Movement = Existing Turn Count + (Forecast Year Model Turn – Base Year Model Turn)

Since this calculation involves determining the difference between forecast and base year model output, it is often referred to as the delta or difference calculation.

Ratio Calculation

*Forecast Year Turning Movement = Existing Turn Count * (Forecast Year Model Turn/Base Year Model Turn)*

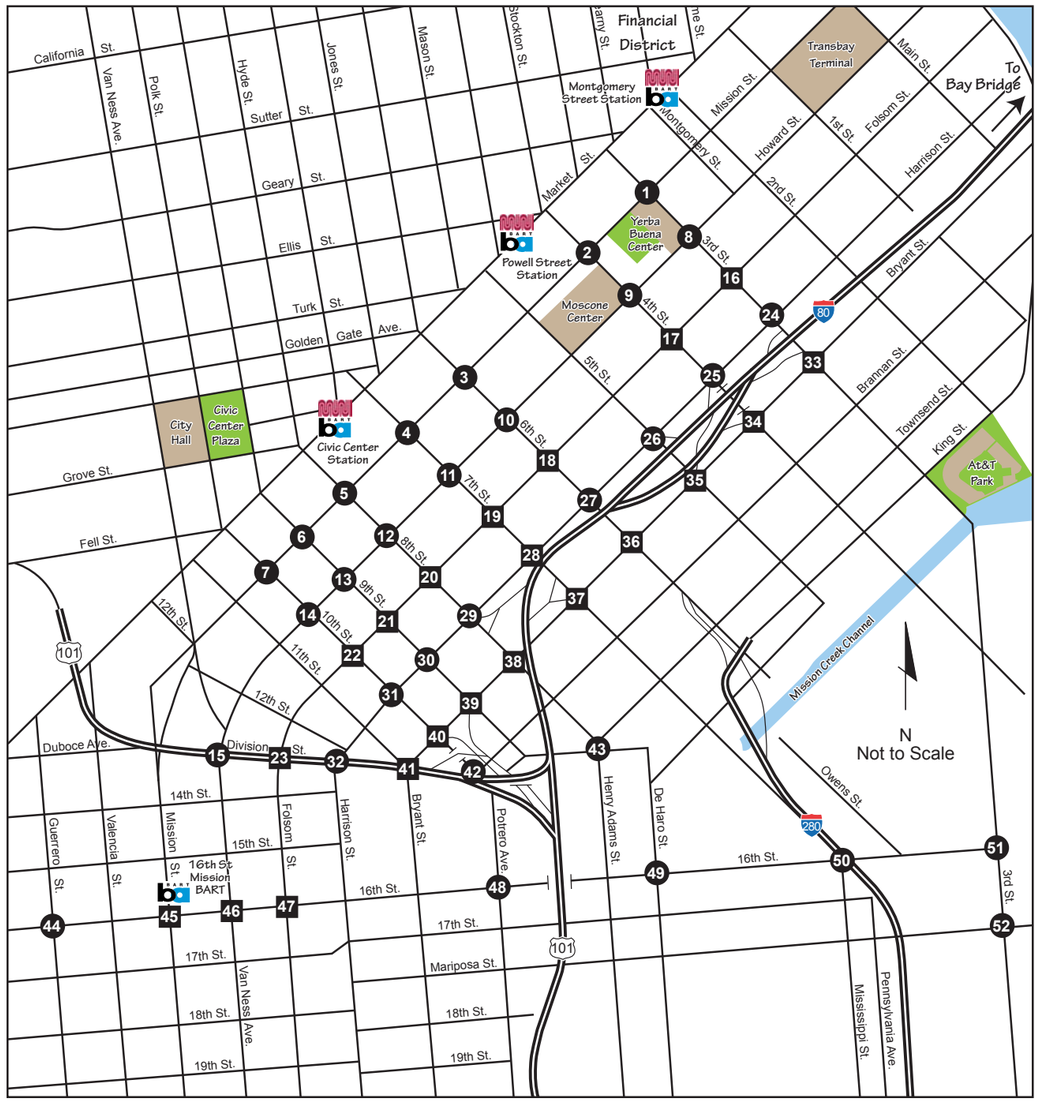
Since this calculation involves determining the ratio of growth between the forecast and base year model output, it is often referred to as the ratio calculation.

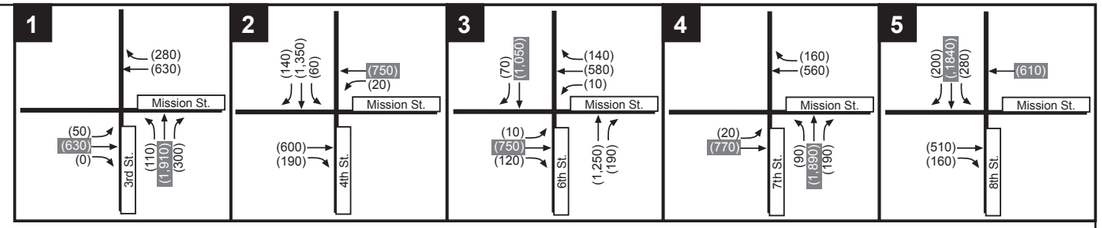
Both calculations (or methods as they are often called) assume that the number of approach/departure legs at the intersection and roadway network is consistent over time. Where intersection or roadway changes occur, such as will occur with the addition of a new roadway, engineering judgment to determine the best means to rectify the results is appropriate.

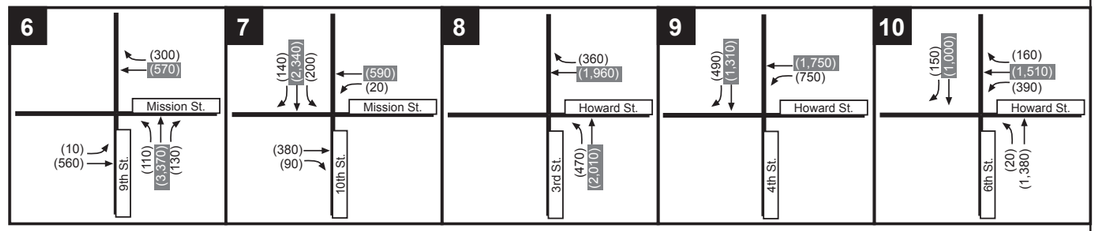
As a means for comparison, both the delta and ratio methods were employed for calculating Future Year intersection turning movements. Although the most appropriate method ultimately is left to the judgment of the engineer depending on factors including the project and setting, the Transportation Research Board (TRB) has published guidelines for determining which method is most appropriate based on the difference between counts and model total intersection volumes: “Generally, use the difference method when the existing counts and base year turning movements agree, and the ratio method otherwise.” This approach minimizes the chance that Future Year turning movements are inflated, which may lead to the conclusion that Future Year traffic operations are worse than forecast by the travel demand model. Additionally, the postprocessing methods may result in volume imbalances that are later adjusted to preserve conservation of flow, as appropriate.

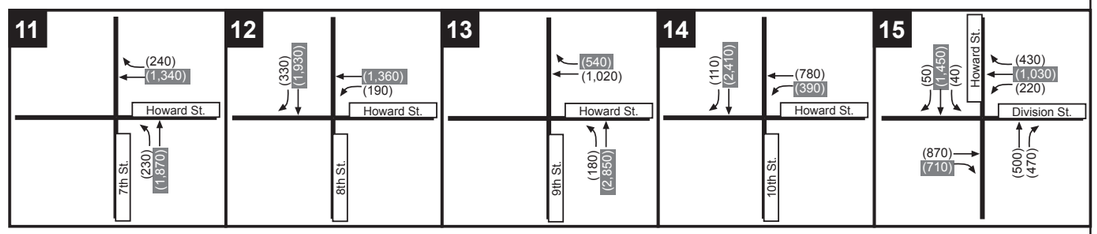
APPENDIX B

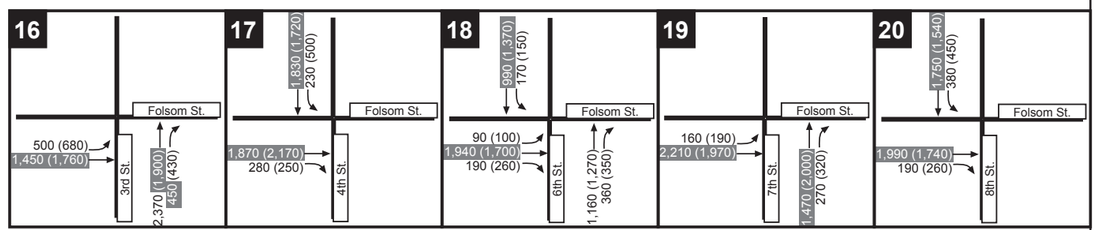
TURNING MOVEMENT DIAGRAMS

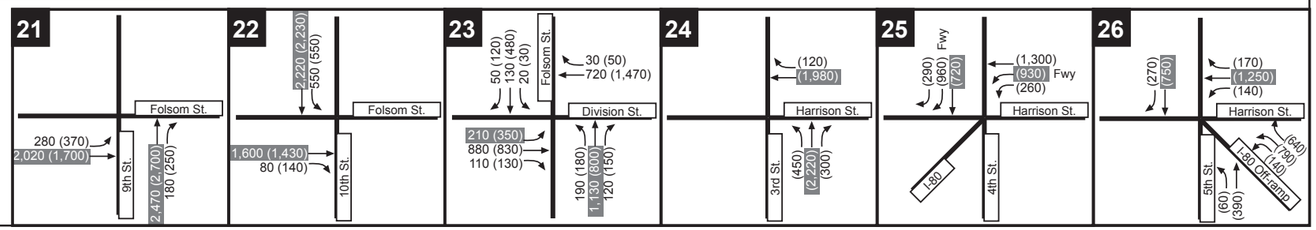












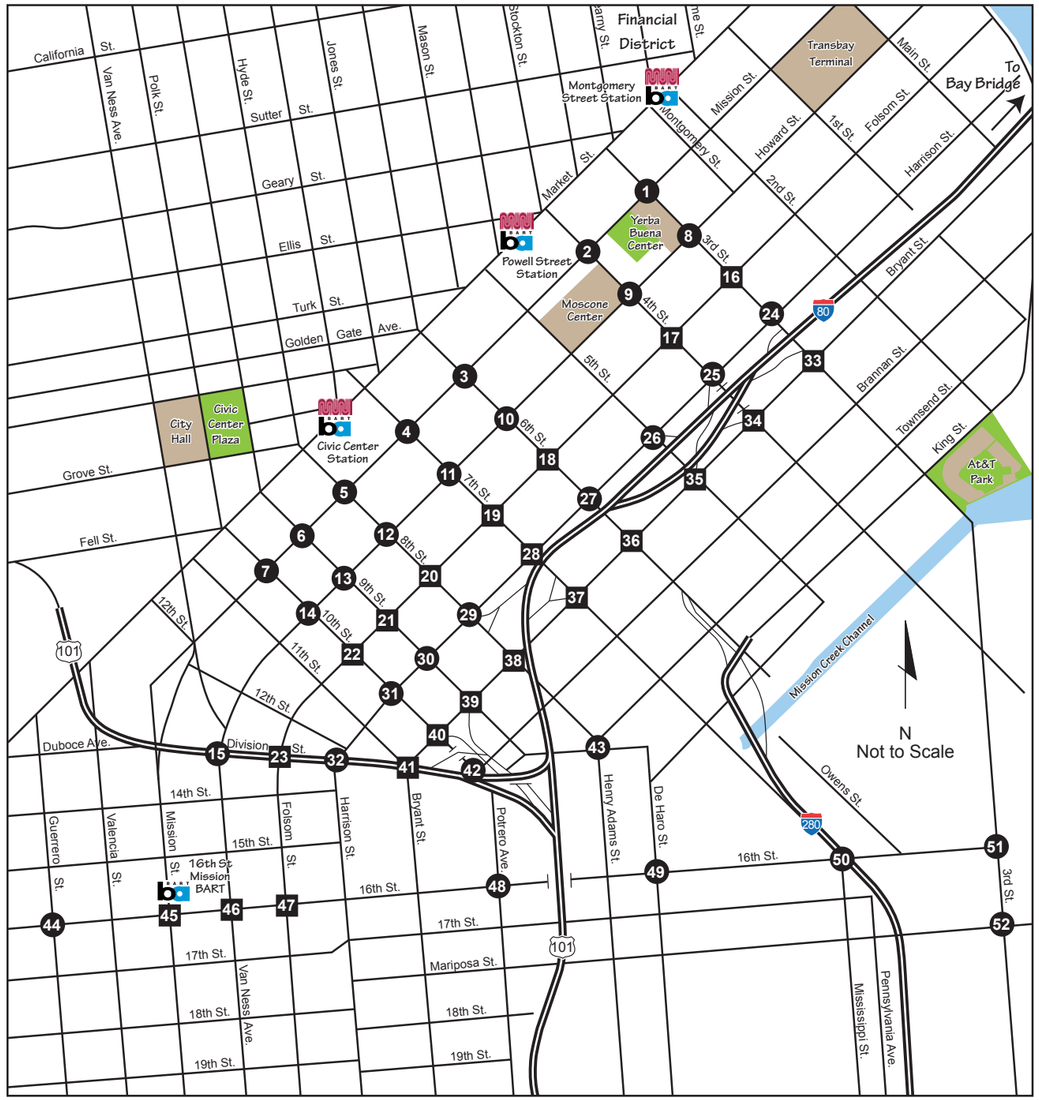
LEGEND:

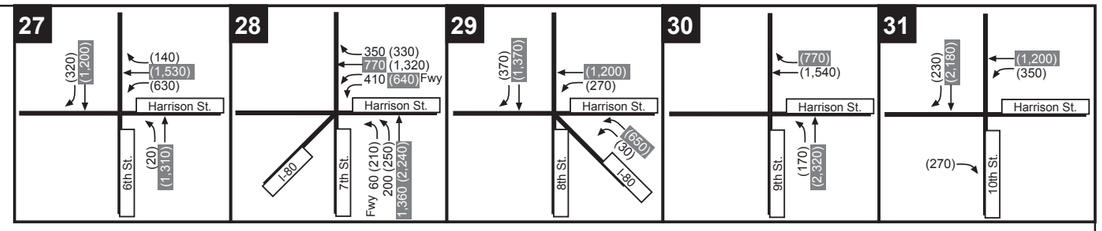
- 16 = AM and PM Peak Hour Study Intersection
- 1 = PM Peak Hour Study Intersection
- Fwy = Freeway On-ramp Movement
- XX (YY) = AM (PM)
- = Critical Movement

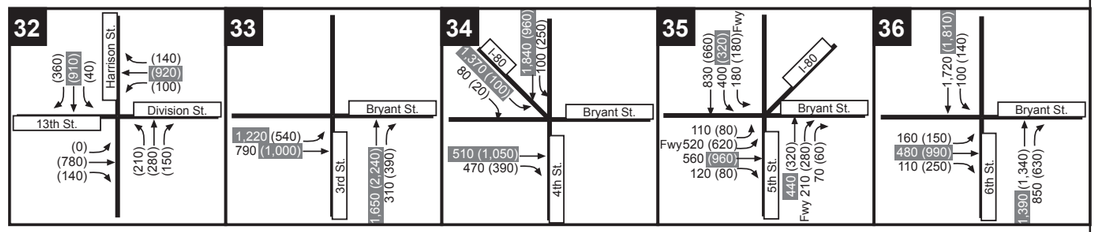
EN Trips

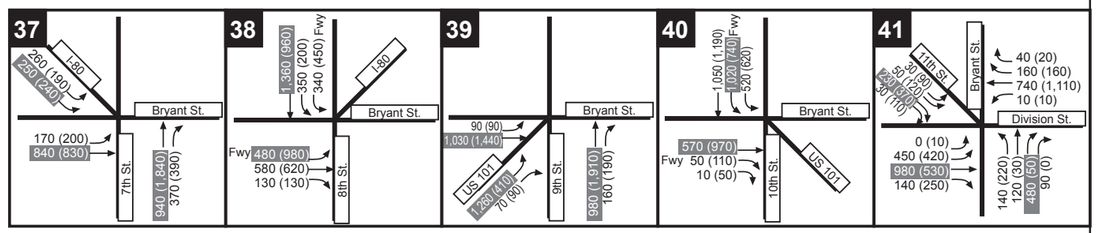
FEHR & PEERS
TRANSPORTATION CONSULTANTS

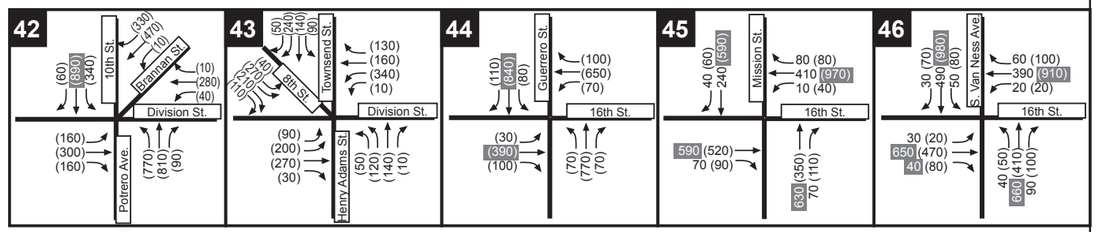
FUTURE YEAR (2035) PEAK HOUR TRAFFIC VOLUMES

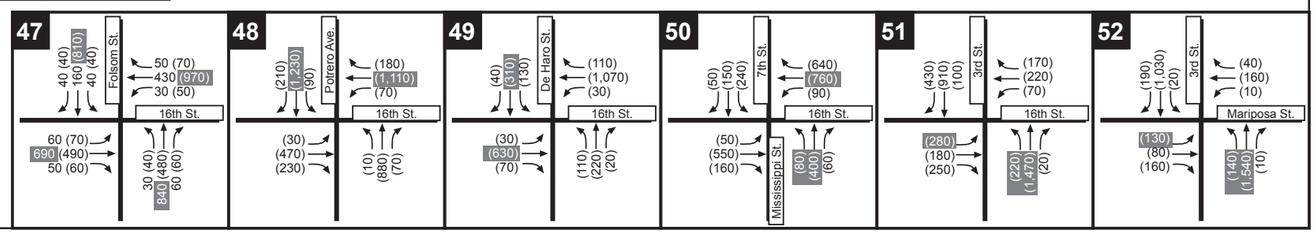












LEGEND:

- 16 = AM and PM Peak Hour Study Intersection
- 1 = PM Peak Hour Study Intersection
- Fwy = Freeway On-ramp Movement
- XX (YY) = AM (PM)
- = Critical Movement

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EN Trips

FUTURE YEAR (2035) PEAK HOUR TRAFFIC VOLUMES

TABLE B-1

EXISTING AND FUTURE YEAR (2035) COMPARISON

Intersection[1]	Peak Hour	Existing		Future Year	
		Delay (V/C)[2]	LOS[3]	Delay (V/C)	LOS
1. Mission Street/3rd Street	PM	45	D	53	D
2. Mission Street/4th Street	PM	**60**	**E**	**>80 (1.17)**	**F**
3. Mission Street/6th Street	PM	24	C	36	D
4. Mission Street/7th Street	PM	25	C	34	C
5. Mission Street/8th Street	PM	27	C	43	D
6. Mission Street/9th Street	PM	25	C	53	D
7. Mission Street/10th Street	PM	25	C	35	C
8. Howard Street/3rd Street	PM	29	C	**75**	**E**
9. Howard Street/4th Street	PM	33	C	42	D
10. Howard Street/6th Street	PM	15	B	21	C
11. Howard Street/7th Street	PM	3	A	4	A
12. Howard Street/8th Street	PM	52	D	**>80 (0.86)**	**F**
13. Howard Street/9th Street	PM	30	C	**76**	**E**
14. Howard Street/10th Street	PM	25	C	29	C
15. Howard Street/13th Street/South Van Ness Avenue	PM	25	C	32	C
16. Folsom Street/3rd Street	AM	**63**	**E**	**>80 (1.43)**	**F**
	PM	**79**	**E**	**>80 (1.47)**	**F**
17. Folsom Street/4th Street	AM	41	D	**68**	**E**
	PM	36	D	**>80 (1.05)**	**F**
18. Folsom Street/6th Street	AM	13	B	33	C
	PM	11	B	19	B
19. Folsom Street//7th Street	AM	14	B	22	C
	PM	9	A	**58**	**E**
20. Folsom Street/8th Street	AM	9	A	14	B
	PM	4	A	5	A
21. Folsom Street/9th Street	AM	23	C	46	D
	PM	23	C	**63**	**E**
22. Folsom Street//10th Street	AM	19	B	30	C
	PM	14	B	15	B
23. Folsom Street//13th Street	AM	26	C	**72**	**E**
	PM	16	B	**>80 (2.42)**	**F**
24. Harrison Street/3rd Street	PM	37	D	**68**	**E**
25. Harrison Street/4th Street	PM	46	D	**>80 (1.24)**	**F**
26. Harrison Street/5th Street	PM	**>80**	**F**	**>80 (1.36)**	**F**
27. Harrison Street/6th Street	PM	20	C	28	C
28. Harrison Street/7th Street	AM	10	B	13	B
	PM	20	C	**76**	**E**

TABLE B-1

EXISTING AND FUTURE YEAR (2035) COMPARISON

Intersection[1]	Peak Hour	Existing		Future Year	
		Delay (V/C)[2]	LOS[3]	Delay (V/C)	LOS
29. Harrison Street/8th Street	PM	45	D	**>80 (1.0)**	**F**
30. Harrison Street/9th Street	PM	12	B	17	B
31. Harrison Street/10th Street	PM	13	B	15	B
32. Harrison Street/13th Street	PM	14	B	30	C
33. Bryant Street/3rd Street	AM	51	D	**65**	**E**
	PM	37	D	**>80 (0.94**	**F**
34. Bryant Street/4th Street	AM	**>80**	**F**	**>80 (1.34)**	**F**
	PM	25	C	**55**	**E**
35. Bryant Street/5th Street	AM	41	D	**>80 (1.99)**	**F**
	PM	**68**	**E**	**>80 (1.73)**	**F**
36. Bryant Street/6th Street	AM	11	B	20	C
	PM	11	B	18	B
37. Bryant Street/7th Street	AM	17	B	21	C
	PM	21	C	**>80 (0.96)**	**F**
38. Bryant Street/8th Street	AM	13	B	30	C
	PM	10	A	10	B
39. Bryant Street/9th Street	AM	23	C	33	C
	PM	38	D	**>80 (0.77)**	**F**
40. Bryant Street/10th Street	AM	10	A	11	B
	PM	16	B	18	B
41. Bryant Street/11th Street/Division Street	AM	**>80**	**F**	**>80 (1.59)**	**F**
	PM	**72**	**E**	**>80 (2.03)**	**F**
42. Brannan Street/10th Street/Division Street	PM	34	C	**>80 (1.14)**	**F**
43. Townsend Street/8th Street/Division Street/Henry Adams[4]	PM	**>50**	**F**	**>50**	**F**
44. Guerrero Street/16th Street	PM	15	B	28	C
45. Mission Street/16th Street	AM	16	B	28	C
	PM	10	A	14	B
46. South Van Ness Avenue/16th Street	AM	11	B	12	B
	PM	12	B	16	B
47. Folsom Street/16th Street	AM	12	B	13	B
	PM	14	B	18	B
48. Potrero Avenue/16th Street	PM	19	B	**>80 (1.15)**	**F**
49. De Haro Street/16th Street	PM	15	B	30	C
50. 7th Street//16th Street	PM	46	D	**>80 (1.00)**	**F**
51. 3rd Street/16th Street	PM	23	C	**>80 (1.00)**	**F**
52. 3rd Street/Mariposa Street	PM	24	C	**>80 (0.83)**	**F**

APPENDIX C

PASS-THROUGH TRIPS METHODOLOGY

Appendix C. Pass-through Trips Methodology

To estimate the share of pass-through vehicle trips in the South of Market, two "select zone" and "select link" analyses were conducted based on the SF-CHAMP travel demand model:

- *Select zone analyses* track the distribution and assignment of trips starting at one traffic analysis zone (TAZ), referred to as a centroid, and terminating at another.
- *Select link analyses* track the travel patterns of vehicle trips traveling on a single roadway segment, but do not necessarily identify the ultimate origins and destinations.

Vehicle trips with origins or destinations in SoMa and/or other portions the Eastern Neighborhoods ("I-X" or "X-I") or trips with both origins and destinations in the study area ("I-I") were collected by recording volumes from centroid connectors within SoMa or the Eastern Neighborhoods. Vehicle trips traveling through SoMa or the Eastern Neighborhoods were identified by counting through-trip roadway volumes at the boundary of the study area ("cordons"). A sum of each trip type was collected as follows described for the SoMa neighborhood and illustrated in Figure C-1:

- *Internal-Internal (I-I)*–trips originating and terminating in the SoMa:
  - I-I trip volumes were identified at centroid connectors from the select zone analysis
  - I-I trip volumes for the total study area were added together
  - Since I-I trip volumes have both their origins and destinations within the study area, the total I-I volumes were divided by two, so that trips were not be double-counted
- *Internal-External (I-X)*–trips originating in SoMa and terminating outside of SoMa:
  - I-X volumes were identified at centroid connectors from the select zone analysis
  - I-X trip volumes for the total study area were added together
- *External-Internal (X-I)*–trips originating outside of SoMa and terminating in SoMa:
  - X-I volumes were identified at centroid connectors from the select zone analysis
  - X-I trip volumes for the total study area were added together
- *External-External (X-X)*–trips originating and terminating outside of SoMa, but passing through SoMa:
  - X-X volumes were determined by adding together the through-trip volumes at the boundary around the Eastern Neighborhoods study area
  - X-X volumes were then divided by two, since each through-trip would enter and exit the neighborhood thus being counted two times at cordon locations, even though constituting a single pass-through vehicle trip
  - X-X volumes were also determined for freeway ramp locations within the model, to identify the percentage of through trips that were traveling through the neighborhood to or from the freeway

Figure C-1 Origin/Destination Trip Type Summary