SAN FRANCISCO

Congestion Management Program

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PREPARED BY

THE SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY

2013
San Francisco Congestion Management Program

CONTENTS

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CHAPTER 1

Background and Program Overview

KEY TOPICS

- CMP Background
- Congestion Management in San Francisco
- 2013 Program Overview and Key Changes from 2011 CMP

1.1 Background

1.1.1 Purpose of the CMP

The purpose of the 2013 San Francisco Congestion Management Program (CMP), prepared by the San Francisco County Transportation Authority, (the Transportation Authority) is to:

- Comply with state law by adopting a biennial CMP and submitting it to the Metropolitan Transportation Commission (MTC) for a conformance finding. Conformance ensures the City's eligibility for the state fuel tax revenues authorized by CMP legislation.
- Guide San Francisco agencies involved in congestion management;
- Outline the congestion management work program for fiscal years 2013/14 and 2014/15; and
- Set forth policies and technical tools to implement the CMP work program.

1.1.2 Organization and Approach

The document follows MTC's Guidance for Consistency of Congestion Management Programs with the Regional Transportation Plan, per MTC Resolution 3000, last revised July, 2013.[10]

Each element required by the CMP legislation is discussed in a separate chapter. Each chapter describes the element's context in San Francisco, the work plan, and implementation guidance. The Transportation Authority Board will adopt any revisions developed during fiscal years 2013/14 and 2014/15 as amendments to the 2013 San Francisco CMP.

The 2013 CMP updates information from the 2011 CMP and reflects several important developments since 2011. The Transportation Authority prepared most of the 2013 CMP. The data in Chapter 4 (Multimodal Performance) is derived from a report prepared by Iteris, Inc. on behalf of the Transportation Authority. In preparing the CMP update, the Transportation Authority has consulted with the San Francisco Municipal Transportation Agency (SFMTA) and other partner agencies to update policies and compile system performance data.

[10] For the complete text of MTC's guidance, please refer to Appendix 1.

1.1.3 | Origins and Intent of the CMP Legislation

CMP requirements were established in 1989 as part of a bi-partisan state legislative package, known as the Katz-Kopp-Baker-Campbell Transportation Blueprint for the Twenty-First Century (AB 471). These requirements became effective when voters approved Proposition 111 on June 5, 1990. AB 1963 (Katz) in September 1994 and AB 2419 (Bowler) in July 1996 further modified CMP law. The passage of AB 298 (Rainey), effective January 1, 1997, made the CMP exempt from the California Environmental Quality Act (CEQA). SB 1636 (Figueroa), passed in September 2002, amended CMP requirements to allow local jurisdictions to designate Infill Opportunity Zones (IOZs). For the complete text of the CMP legislation, see Appendix 2.

The 1989 state legislation not only provided for increases in transportation funding, but also made significant changes in the requirements for planning and programming the transportation projects funded from these revenue sources. The goal of the legislation is to prioritize transportation funding decisions based on transportation system performance, local land use decisions and their impacts on transportation, and transportation control measures that address air quality goals.

The CMP requirements are the legislature's response to the traffic congestion experienced by all urbanized areas of California. Traffic congestion is widely perceived as outpacing the ability of the traditional transportation planning process to provide solutions. In San Francisco, with its high-intensity land uses and extensive transit network, traffic congestion poses a different problem than in lower-density counties, challenging conventional interpretations of the nature of the congestion problem. For the majority of the state's highly suburbanized metropolitan areas, traffic congestion has its roots in the following:

- Transit does not work well in the suburbs. The low-density suburban growth pattern throughout the state's metropolitan areas does not lend itself to cost-effective transit service, and therefore mobility depends largely on automobiles and freeways.
- Freeways full of solo drivers are inefficient investments. Pricing strategies (e.g., tolls, paid parking at work sites) are politically complicated, and ridesharing strategies (i.e., carpooling and vanpooling) have shown narrow success in sprawled suburbs. Most automobiles still carry just one person, regardless of trip purpose or time of day. The result is inefficient roadway facilities: even when full of cars, they carry only a fraction of the number of people they could accommodate.
- Building freeways and widening roads to address transportation demand is not cost-effective. These high-cost facilities, which maximize automobile trips but do not maximize the number of people carried, result in a high cost per person transported.
- It is hard to keep up with transportation demand by building freeways and widening roads, and we cannot afford such investments either. Because land for transportation facilities is scarce, construction costs have escalated, and environmental constraints are significant, the real costs of capital investment in roads have risen dramatically. Fewer and fewer new miles of roadway facilities are built every year to address a growing demand for transportation.

The CMP legislation aims to increase the productivity of existing transportation infrastructure and encourage more efficient use of scarce new dollars for transportation investments, in order to effectively manage congestion, improve air quality, and ultimately allow continued development. In order to achieve this, the CMP law is based on five mandates:

- Require more coordination between federal, state, regional, and local agencies involved in the planning, programming, and delivery of transportation projects and services;
- Favor transportation investments that provide measurable and quick congestion relief;
- Link local land use decisions with their effect on the transportation system;
- Favor multimodal transportation solutions that improve air quality; and
- Emphasize local responsibility by requiring a Congestion Management Agency (CMA) in each urban county in the state.

1.2 Congestion Management in San Francisco

1.2.1 | Applicability of the Concept

The main impetus for the CMP legislation was worsening *suburban* transportation conditions, caused by land use patterns that perpetuate over-reliance on the private automobile. San Francisco has an extensive transit network and long-standing policies to encourage a multimodal transportation system. Congestion management goals are reinterpreted here (within the constraints of State law) to add value to San Francisco's transportation planning process. The City's Transit First policy, for instance, gives rise to our local interpretation of CMP rules: San Francisco tolerates a certain level of traffic congestion in order to enhance the competitiveness of transit service in comparison to private automobiles. The San Francisco General Plan also specifically discourages roadway capacity increases, stating that:

> "The existing vehicular capacity of the bridges, highways and freeways entering the city should not be increased and should be reduced where possible." (SF General Plan, Transportation Element, Objective 3, Policy 1).

If interpreted as improving the throughput of cars in the roadway network, congestion management is at odds with this policy. However, by re-interpreting congestion management as maximizing person throughput, then we have opportunities to capitalize on the City's significant supply of transit services, high densities, and relatively pedestrian-friendly environment. San Francisco can achieve congestion management goals if the measures of performance support the City's transportation and land use patterns and priorities.

1.2.2 | History of Congestion Management in San Francisco

Historically, San Francisco has managed travel demand well, especially automobile access to the downtown area during commute periods. Many of the transportation demand management and land use polices and regulations described throughout this CMP have existed for decades and have allowed growth in downtown activity through investment in transit infrastructure and service. This success has also been the result of the combined application of these investments with several major policies, in particular parking supply policies that have limited the provision of parking spaces with new downtown office development.

Other factors aided the City's ability to absorb the extraordinary levels of employment growth between 1970 and 1985, including:

- The City's historic record of investment in local public transit**:** High levels of transit service and coverage within the city provided a credible option to driving and made development impact mitigation fees and parking demand management policies politically viable;
- The BART system and the demographics of downtown employment**:** A large portion of employment growth in this period was absorbed by suburban residents. The opening of BART in 1973 expanded transit capacity to provide: a) excellent regional access to stations within walking distance of most downtown employment locations; and b) no financial burden to the City for providing adequate transit coverage at the residential (suburban) end of the BART trip; and
- The City's investment in its street system: San Francisco's dense grid of streets and arterials is a major transportation asset. It provides multiple travel route options, keeps local trips from clogging the freeway system (as is so often the case in the suburbs), and enhances the system's ability to recover quickly when congestion problems occur.

1.2.3 | Relationship to RTP Goals

In July 2013, MTC and the Association of Bay Area Governments (ABAG) adopted Plan Bay Area, the region's long-range Regional Transportation Plan (RTP) and Sustainable Communities Strategy (SCS). The CMP provides

context and implementation tools for San Francisco in advancing the goals established in Plan Bay Area, particularly those that pertain to transportation: climate protection, healthy and safe communities, adequate housing, equitable access, economic vitality, and transportation system effectiveness, with emphases on decreasing automobile use and maintaining the system in a state of good repair. These goals are directly supported in San Francisco's CMP through transportation and land use policies; strategic investments and system management; and the performance measures the Transportation Authority uses to monitor transportation system performance. These elements are discussed throughout the 2013 CMP, as appropriate.

1.2.4 | Future Trends and Strategies

The City's track record highlights the importance of maintaining travel *options,* not just to prevent worsening congestion, but to improve access and mobility for San Francisco residents, workers, and visitors, as the city continues to grow and develop.

Understanding demographic trends is important in charting future action. A development boom in the 1970s and 1980s was characterized by the growth of the city's financial district. This boom was followed by modest employment growth until the mid-1990s. Employment growth in San Francisco and the rest of the Bay Area has been cyclical in the years since, with employment booms accompanied by increases in construction followed by periods of economic recession. Currently, employment growth and construction of both commercial and residential development are robust.

Future economic and population growth in the Bay Area will differ significantly in pace and character from historic development trends. Regional land use forecasts and policies call for focused housing and employment growth in the region's urbanized core areas. This growth, in conjunction with rising incomes and the increase in commuting by San Francisco residents to job locations outside of the city, will bring new pressures to the local and regional transportation networks. This pattern is already in evidence, with thousands of new housing units and hundreds of thousands of square feet of commercial space currently under construction and more in the pipeline.[11]

Increasing numbers of San Francisco residents are out-commuting to take advantage of work opportunities in other Bay Area counties: the number of San Francisco residents traveling daily to work in Santa Clara County is approximately 75% the number of Santa Clara County residents employed in San Francisco.[12] These trends result in auto congestion and high transit ridership both into and out of San Francisco in the peak periods. Long-distance, auto-dominated commute patterns (such as the peninsular corridor) are heavy contributors to regional VMT. Efforts to combat global climate change have made clear the imperative to reduce vehicle miles traveled (VMT) at the regional level. However, current fiscal conditions are difficult for both infrastructure improvements and transit operating expenses, with declining Federal and State funding, resulting in an increasing reliance on local funding sources for solutions to both local and regional transportation challenges.

In spring of 2013, ABAG and MTC released their Draft Plan Bay Area detailing their land use projections to 2040. According to the Plan, San Francisco is set to absorb 90,000 new households by 2040 (using 2010 as a baseline), bringing the number of households to 470,000. Employment in San Francisco is expected to increase by 190,000 jobs, culminating in over 750,000 jobs in the city by 2040. Enriching the city's inventory of available and auto-competitive transportation options–particularly transit system development–will be a key strategy for congestion management in San Francisco.

Enhancing transit service and reliability is essential to ensure that transit is a viable option to the private automobile as new residential neighborhoods develop, especially in the city's eastern neighborhoods. Non-traditional transit options (zonal express bus service, demand responsive, etc.) may need to be explored as additional alternatives to drive-alone in some instances.

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[11] San Francisco Pipeline Reports, San Francisco Planning Department.
[12] Estimated from the 2010-2012 California Household Travel Survey Data

Bicycling is a primary mode of travel for a growing number of trips. Bicycling can be a suitable modal shift for many San Francisco automobile trips.

Finally, every trip begins or ends as a pedestrian trip, and many San Franciscans make a substantial number of their trips entirely as pedestrians. Pedestrian safety and access are critical to meet the growing demand for pedestrian-friendly neighborhoods and employment centers.

The Prop K Expenditure Plan for the local half-cent transportation sales tax is San Francisco's investment blueprint for congestion relief: on November 4, 2003, San Francisco voters extended the existing half-cent sales tax (Prop B) and approved a new 30-year Expenditure Plan, with a 75 percent approval rate. The primary goal of the Expenditure Plan is to implement the priorities of the countywide San Francisco Transportation Plan through investment in a set of projects and programs that include planning, maintenance and rehabilitation, and improvements to the city's multi-modal transportation system. In addition, focused planning efforts will be needed where planned growth areas overlap with key parts of the transportation network, such as SOMA and along the waterfront, to develop strategies that balance the need for neighborhood livability enhancements with management of transportation network demands.

Congestion and demand management measures are also necessary to avoid further deterioration of transit travel times. San Francisco's congestion management activities will also need to focus on key improvements to congested roadway facilities to enable transit to get out of automobile traffic and to improve conditions for pedestrians and bicyclists. Particular attention will be paid to projects that improve the operating efficiency of the existing system, such as bus transit priority treatments. These projects help transit re-gain operating speed and retain or expand its market share.

Bus Rapid Transit (BRT) project development is continuing for two key corridors in the Transit Priority Network: Van Ness Avenue and Geary Boulevard, and the Transportation Authority is embarking on a Feasibility Study for a third corridor along Geneva Avenue and Harney Way. These efforts are examples of our commitment to separating transit right-of-way from congested city streets in an effort improve overall person throughput and reduce transit travel times in key corridors. These BRT corridors, which were identified in the Countywide Transportation Plan and Prop K Expenditure Plan, were also confirmed as priorities in the SFMTA's Transit Effectiveness Project (TEP) *Rapid Network*. SFMTA is currently completing environmental review for the TEP set of strategic service changes and transit travel time reduction projects on key corridors citywide.

The 2004 Countywide Transportation Plan (CWTP) identified pricing as an important demand management tool in the County's congestion management toolkit. In September 2009, the Transportation Authority approved the final report of the *San Francisco On-Street Parking Management and Pricing Study*, which examined the role of parking pricing to manage demand, increase availability, and reduce excess vehicular circulation. SFMTA is currently conducting pilot implementation of variable pricing of on-street parking through the SF*park* program. In December 2010, the Transportation Authority approved the final study report on the feasibility of implementing an areawide congestion pricing program to manage weekday peak-period congestion. This *Mobility, Access, and Pricing Study* (MAPS) informs policy-makers of the benefits, costs, and impacts of a potential congestion pricing program. The Transportation Authority initiated the Parking, Pricing and Regulation Study in the summer of 2013 in partnership with the San Francisco Municipal Transportation Agency to investigate whether parking-based regulation could achieve similar congestion reduction benefits as areawide congestion pricing.

An update to the 2004 CWTP planned for adoption by the Transportation Authority Board in December, 2013, the San Francisco Transportation Plan (SFTP), is the city's 28-year plan to identify goals, needs, and investment priorities for the city's transportation system and serves as the citywide long-range transportation planning document. The planning effort recommends an investment plan for projected transportation funds between now and 2040, proposes a San Francisco investment vision and revenue strategy for potential new local revenues, and proposes policy recommendations.

Congestion management activities during the next two fiscal years are set forth in the work plan section at the end of each chapter. These activities will include advancing the recommendations established in the SFTP, multiple planning and environmental studies, development of key system improvement projects, and continued neighborhood transportation planning efforts.

The Transportation Authority will also continue to develop the San Francisco Travel Demand Model in order to measure performance of the multimodal system, analyze Capital Improvement Program (CIP) changes and perform project delivery oversight, and improve forecasting of system performance impacts associated with transportation investments, policies, and land use changes. Since 2011, the Transportation Authority has continued to update and enhance the San Francisco Travel Demand Model, including the development of a Dynamic Traffic Assignment module.

1.3 Program Overview and Key Changes from the 2011 CMP

1.3.1 | Mandated Program Components

The following statutory requirements of CMP legislation are mandated for all urban counties in the state:

1. A CMP updated biennially. The CMP must contain the following:

- A designated CMP roadway network
- Traffic level of service (LOS) standards and a methodology for monitoring LOS on the designated CMP roadway network
- Transit service standards
- A multimodal performance element
- A land use impact analysis methodology
- A seven-year multimodal CIP;

2. A common database and method to analyze impacts of local land use decisions on the CMP network; and

3. A designated CMA for the county.

1.3.2 | Transportation Fund Programming

The CMP legislation included the creation of new funding sources, as well as changes to existing fund programming mechanisms, tied to implementation of CMP requirements. The Transportation Authority at the local level and MTC at the regional level have been empowered to make CMP conformance determinations affecting funding eligibility.

- State Fuel Tax Increment: The CMP legislation established a 9-cent per gallon in-crease in the state's fuel tax. In order to receive these revenues, urban counties must conform with CMP requirements, particularly performance monitoring and the implementation of required CMP elements. The CMP document itself must be updated every two years.
- Regional Improvement Program (RIP): RIP funds are programmed through the Regional Transportation Improvement Program (RTIP), which is biennially developed and adopted by MTC, and subsequently adopted into the State Transportation Improvement Program (STIP) by the California Transportation Commission (CTC). In order to be considered for funding through the RTIP, transportation projects must be included in the CIP of the CMP. The Transportation Enhancement (TE) funds, which used to be part of the RTIP, have been replaced with the Transportation Alternative Program (TAP) through the MAP-21.
- Federal Surface Transportation Program (STP) and Congestion Management and Air Quality (CMAQ) Program Funds: In 1992, the California legislature passed SB 1435, which reconciled the CMP programming process with the then new federal Intermodal Surface Transportation and Efficiency Act (ISTEA). As a result, projects seeking STP or CMAQ funds (continued under TEA-21 and SAFETEA-LU) must be prioritized by each CMA in their biennial CIP for the CMP.

1.3.3 | Relationship to Ongoing Planning and Programming Efforts

CMPs are a component of a more comprehensive set of ongoing transportation planning and programming efforts at the local and regional levels:

- RTP: The CMP implements the local portion of the RTP and must be consistent with it. MTC determines consistency among CMPs in the region. MTC makes these determinations as a part of the conformance finding process for CMPs.
- RTIP: The RTIP is a 5-year (previously 7-year) programming document for a variety of federal and state funding sources (e.g., RIP) that are sub-allocated to the region. In the Bay Area, MTC works with the CMAs to develop the RTIP for our nine-county region. RTIPs statewide are approved collectively as the STIP by the CTC. For certain projects to be included in the RTIP, they must be included in the CMP CIP.
- City of San Francisco General Plan: According to the City Charter (section 3.524), the General Plan is a comprehensive, long-term, guide for the future development of the City and County. The General Plan guides transportation demand management measures that are addressed as part of the CMP. Chapter 6 addresses the Planning Department's role in making consistency findings for the CMP's CIP. While the General Plan provides the policy framework, State law does not require that the CMP be incorporated into the General Plan.
- **Air Quality Attainment Plans:** MTC's RTP is required by federal law to conform to the State Implementation Plan for improvement of air quality. Since the CMP must be found consistent with the RTP, the CMP must therefore also conform to the provisions of the State Implementation Plan. In addition, the San Francisco CMP documents implementation of transportation control measures (TCMs) included in the 2010 Bay Area Clean Air Plan adopted by the BAAQMD pursuant to State requirements. Appendix 10 lists the currently adopted regional TCMs and how they are incorporated into San Francisco's congestion management strategies.

1.3.4 | Key Changes from 2011 CMP

The following sections highlight the most significant updates proposed for the 2013 CMP.

CHAPTER 4: This chapter has been updated to reflect multimodal performance. It discusses both Legislatively Required and Local (San Francisco-specific) performance measures. This CMP update incorporates the results of the Spring 2013 Level of Service (LOS) monitoring effort, which primarily utilized private commercial data in place of the previous floating car data collection method. The chapter also reports transit speeds and now reliability on the Muni bus network for the same time periods as the roadway LOS monitoring period. Additional transit, pedestrian, and bicycle performance measures have also been updated.

CHAPTER 5: The Transportation Demand Management (TDM) Element has been updated to reflect advancements in the TDM Partnership Project, including policy development and pilot program implementation. Also included are updates on carsharing and bikeshare programs in the city. This chapter reflects forward movements in congestion management planning and pricing including support from represented business groups through the Congestion Management Working Group, the undertaking of the Parking Pricing and Regulation Study, and a comprehensive look at downtown congestion management through the Core Network Circulation Study. Finally, this chapter notes the TDM policy and investment plan recommendations of to-be-adopted-in-December-2013 San Francisco Transportation Plan and updates to the SFpark program and Treasure Island Transportation Program.

CHAPTER 6: This chapter has been updated to reflect the region's recently adopted Plan Bay Area and the Priority Development Areas (PDAs) identified in San Francisco. This chapter also notes the impact of SB 743, which revised criteria for determining the significance of transportation impacts within transit priority areas and the developments of the Transit Impact Development Fee and the Transportation Authority's work program regarding CEQA reform.

CHAPTER 7: This chapter reflects amendments made to the CIP. Per adopted procedures, the CIP is amended concurrently with Transportation Authority programming decisions. An ongoing work program item related to the CIP includes monitoring of state and federal funds to ensure that timely use of funds requirements are met. These requirements impose deadlines for project milestones such as obligation of funds, award of contracts and

completion of construction. Failure to meet the deadlines can result in loss of funds to the project, the County, and/or the Bay Area Region.

CHAPTER 8: The Transportation Authority's San Francisco Travel Demand Forecasting Model has under-gone improvements since 2011, which are discussed in this chapter.

1.3.5 | Public Input

A public hearing on the Draft 2011 San Francisco CMP is scheduled for the December 10, 2013 meeting of the Transportation Authority Plans and Programs Committee. The Transportation Authority Board is scheduled to consider approval of the 2013 CMP on December 17, 2013.

CHAPTER 2

Congestion Management Agency Role & Responsibilities

KEY TOPICS

- Legislative Requirements
- Legislative Intent and Application to San Francisco
- San Francisco County Transportation Authority

2.1 Legislative Requirements

California Government Code section 65089 (a), as amended, states "A congestion management program shall be developed, adopted, and updated biennially, consistent with the schedule for adopting and updating the regional transportation improvement program, for every county that includes an urbanized area, and shall include every city and the county. The program shall be adopted at a noticed public hearing of the agency. The program shall be developed in consultation with, and with the cooperation of, the transportation planning agency, regional transportation providers, local governments, the [California] department [of Transportation], and the air pollution control district or the air quality management district, either by the county transportation commission, or by another public agency, as designated by resolutions adopted by the county board of supervisors and the city councils of a majority of the cities representing a majority of the population in the incorporated area of the county." For the complete text of the CMP statutes see Appendix 2.

2.2 Legislative Intent and Application to San Francisco

One of the main thrusts of the CMP legislation is to foster coordination of local land use and transportation investment decisions at the county or subregional level. In order to ensure local involvement in this process, which becomes more complex when the number of local jurisdictions involved increases, the CMP law vests significant authority and responsibility in the Congestion Management Agencies (CMAs). For example, in order to receive state and federal funds, transportation projects in an urban county must now be recommended by that county's CMA as part of its Congestion Management Program[10]. CMAs therefore act as a policy forum and technical resource to guide and help resolve transportation problems within counties when those problems have implications across city boundaries. San Francisco's distinct status as a city and county dictates a somewhat different role for the CMA in this regard, with the focus of involvement shifting to address problems across county lines (such as the effects of regional commute patterns into San Francisco), as well as issues of coordination of city department activities affecting congestion management, such as trip reduction program implementation or transit service improvements.

[10] If a county opts out of preparing a CMP, per ABE 2419 (Bowler), MTC will work with the appropriate agencies to establish project priorities for funding.

2.3 The San Francisco County Transportation Authority

2.3.1| Designation and Composition

On November 6, 1990, the Board of Supervisors designated the San Francisco County Transportation Authority (the Transportation Authority) as the CMA for the County. The Transportation Authority Board of Commissioners consists of the eleven members of the San Francisco Board of Supervisors, acting as Transportation Authority Commissioners.

2.3.2| Roles and Responsibilities

The Transportation Authority is a special-purpose government agency, created on November 7, 1989, when San Francisco voters passed Proposition B. Proposition B increased the local sales tax by ½ cent for a period of 20 years, to fund San Francisco transportation projects and services. In November 2003, voters approved a new Expenditure Plan (Prop K), which superseded Prop B and extends the ½ cent sales tax for 30 years. The Transportation Authority administers, prioritizes, and programs Proposition K revenues. These revenues also leverage large amounts of State and Federal funds for transportation investments in San Francisco.

On November 2, 2010 San Francisco voters approved Proposition AA, authorizing collection of an additional $10 fee annually on motor vehicles registered in San Francisco and approving an Expenditure Plan for the new funds. The fee will fund local street repair, improvements to pedestrian and bicycle conditions, and public transit enhancements. As with Prop K, the Transportation Authority administers, prioritizes, and programs Prop AA funds.

In its capacity as the CMA for San Francisco, the Transportation Authority has primary responsibilities in the following areas:

- Develop and adopt the biennial CMP and related implementation guidance;
- Monitor City agencies' compliance with CMP requirements;
- Program Federal, State, and regional transportation funds;
- Review the programming of all transportation funds for San Francisco;
- Provide policy input into the regional transportation planning and programming process; and
- Develop and periodically update the long-range transportation plan for San Francisco.

The Transportation Authority's dual responsibilities – strategic programming of proposition-authorized funds through Strategic Plan processes, and prioritizing and programming of State and Federal funds through the CMP process – are an opportunity to coordinate San Francisco's transportation planning decisions and optimize the City's investments in transportation infrastructure and services. Leveraging State and Federal funds through strategic use of Proposition K monies is a primary example of the efficacy of this process. The San Francisco Transportation Plan improves the effectiveness of this process by linking transportation objectives and policies to a specific list of transportation investments, prioritized across a long-range planning horizon. The CMP's 7-year CIP and the Authority's Prop K Five-Year Prioritization Programs serve as the main implementation tools for the San Francisco Transportation Plan.

As the CMA, the Transportation Authority served as the lead coordinator for San Francisco involvement in the regional process to develop a Sustainable Communities Strategy (SCS) and update the Regional Transportation Plan (RTP). Plan Bay Area, which integrates the SCS and RTP into a single regional plan, was adopted in July 2013. As required by SB 375 (Steinberg), passed in 2008, Plan Bay Area integrates long-range land use, housing, and transportation planning in the region to reduce greenhouse gas emissions from motor vehicles.

Assembly Bill No. 981, the Treasure Island Transportation Management Act, authorizes the Board of Supervisors (BOS) of the City and County of San Francisco to designate a board or agency to act as the transportation

management agency (TMA) for Treasure Island and implement the Treasure Island Development Program's transportation plan. In October 2011, the Transportation Authority Board recommended to the Board of Supervisors and the Treasure Island Development Authority (TIDA) that the Transportation Authority be designated as the Treasure Island Mobility Management Agency (TIMMA). Subsequent resolutions tasked the Transportation Authority with advancing agency formation documents, planning, and grant-writing.

In addition, acting as the CMA, the Transportation Authority plays a key role in evaluating and providing guidance on major local transportation projects and land use policies that may affect the performance of the transportation system.

2.3.3| Implications of the Board's Multiple Roles

As described above, the San Francisco Board of Supervisors also serves as the Transportation Authority's Board of Commissioners. These multiple roles require careful balancing of the Board's responsibilities. Policy decisions made by the Board of Supervisors may have negative congestion management impacts and place the Transportation Authority Board, as CMA, in a position to find the City in non-conformance with the CMP. This may in turn generate difficult Proposition K funding choices for the Transportation Authority Board.

In order to minimize the potential for conflict, the Transportation Authority cannot limit its role to just monitoring CMP conformance after the fact. Instead, the Transportation Authority must take a proactive role to serve as a resource in analyzing the potential transportation implications of transportation and land use related actions, projects, or policies proposed for the City. In order to fulfill this responsibility, the Transportation Authority regularly participates in and comments on studies and discussions of key San Francisco transportation and land use issues, such as the Transit Effectiveness Project (TEP), Park Merced Project, Eastern Neighborhood Transportation Implementation Planning Study (EN TRIPS), and the Central SoMa Plan. This approach allows the Board to anticipate potential problems, instead of reacting when congestion impacts reach crisis proportions and require hasty actions.

2.3.4| Relationship to City Agencies

State law mandates that the Transportation Authority, acting as CMA, biennially determine if the City is in conformance with the adopted Congestion Management Program. A finding of non-conformance has potentially significant consequences for transportation funding in the City. Also according to state law, it is the City's responsibility to ensure that transportation projects, programs, and services are put in place, through its implementing departments, to maintain conformance with the CMP.

In fulfilling its CMA mandate, the Transportation Authority must function as an independent agency to be able to objectively and credibly evaluate CMP conformance. This dictates a special relationship with City departments involved in transportation-related actions which must be assessed at least biennially relative to their congestion management impacts. On the other hand, because of the Board's multiple roles, as described in the previous section, the Transportation Authority's approach is to act as a resource, maximizing coordination with the City departments responsible for planning and implementation of transportation actions, so that such actions may be evaluated for congestion management impacts before they are put in place.

2.3.5| Relationship to Regional Planning/Programming Agencies

As the Congestion Management Agency for San Francisco, the Transportation Authority plays a key liaison role with the Metropolitan Transportation Commission (MTC), the Bay Area's regional transportation planning agency, and with the Bay Area Air Quality Management District (BAAQMD), the agency responsible for implementation and monitoring of the region's Clean Air Plan. The Transportation Authority coordinates local input into MTC's Regional Transportation Plan (RTP), which establishes the overall vision for long-range transportation development and funding in the region, and the Regional Transportation Improvement Program (RTIP). Through its membership in the Bay Area Partnership, the Transportation Authority plays a key role in shaping the evolution of planning and programming processes affecting San Francisco's ability to make effective transportation investments and preserve its economic vitality. Further, through its leadership in this regional forum the Transportation Authority is in a position

to influence the debate over the vision and goals for transportation and land use planning in the Bay Area, bringing to bear San Francisco's unique perspective on multimodal transportation, mobility, and livable communities.

CHAPTER 3

CMP-Designated Roadway Network

KEY TOPICS

- Legislative Requirements
- San Francisco CMP Roadways
- Work Program Items

3.1 Legislative Requirements

California Government Code Section 65089(b)(1)(A) requires that the designated Congestion Management Network include at least all state highways and principal arterials. No highway or roadway designated as part of the system may be removed from the system. The statutes do not define 'principal arterial.'

The statutes also refer to regional transportation systems as part of the required land use impacts analysis program, California Government Code Section 65089(b)(4). In 1991, the Bay Area's Congestion Management Agencies (CMAs) developed Congestion Management Program (CMP) networks in coordination with MTC's Metropolitan Transportation System (MTS). The MTS network, which includes both highways and transit services, was subsequently designated as the Congestion Management System, as required by the federal Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. The MTC contracted with the congestion management agencies in the Bay Area to help develop the MTS and to use the CMPs to link land use decisions to the MTS.

3.2 San Francisco CMP Roadways

CMP legislation requires that all state highways (including freeways) and principal arterials are included in the CMP network. The network must be useful to track the transportation impacts of land development decisions, as well as to assess the congestion management implications of proposed transportation projects. San Francisco's network therefore includes numerous local thoroughfares since most urban traffic occurs on city arterials (rather than on the freeways). The next sections document the network selection criteria and process used in the initial San Francisco CMP in 1991, and describes the current network.

3.2.1| Selection Criteria

Consistent with State requirements, the San Francisco CMP roadway network includes all freeways and state highways, as well as principal arterials. San Francisco has defined principal arterials as the Major Arterials designated in the Transportation Element of the City's General Plan, defined as follows:

> *"cross-town thoroughfares whose primary function is to link districts within the city and to distribute traffic from and to the freeways; these are routes generally of citywide significance; of varying capacity depending on the travel demand for the specific direction and adjacent land uses."*

Several additional arterials – Market Street, Mission Street, Sutter Street, and West Portal – are also included in the CMP roadway network. These streets experience significant conflicts between auto traffic and transit service.

3.2.2| Segmentation Method

The 1993 CMP documented the criteria used in 1991 to segment the CMP roadway network in San Francisco, including freeway facilities (see Appendix 3). The following five criteria determined segment limits for the city arterials in the CMP: predominant development patterns (e.g., number of driveways, institutional uses); changes in speed limits; major cross streets; significant changes in traffic volumes; and freeway ramps. These criteria are generally recognized as significant in explaining the operating profile of a roadway.

For freeway facilities the segmentation criteria are simpler. They include major interchange on and off ramps, and points were two freeway facilities merge or bifurcate.

3.2.3| Current Network

The complete CMP roadway network for San Francisco consists of 237 directional miles on both arterials and freeways.

Table 3.1: 2013 Monitored Segment Miles

Roadway Type	Total Directional Miles
Arterial	202.1
Freeway	34.9
Total	237.0

As discussed in Chapter 4, performance monitoring was conducted in 2013 for the entire CMP network. The 2013 monitoring network is show in Figure 3-1, including the distinction between "official" and "additional" segments.

3.2.3.1| Freeways and State Highways

San Francisco's CMP roadway network includes freeway segments on Interstate 80, Interstate 280, and US Route 101. State routes designated along City streets are also part of the CMP roadway network, as follows:

- US Route 101 – Richardson Avenue, Lombard Street west of Van Ness Avenue, and Van Ness between Lombard Street and Market Street;
- Route 1 – Park Presidio Boulevard, 19th Avenue, and Junipero Serra Boulevard south of 19th Avenue;
- Route 35 – Sloat Boulevard between 19th Avenue and Skyline Boulevard as well as Skyline Boulevard.

3.2.3.2| City Arterials

The remaining CMP network arterials are city arterials. A table of all arterials included in the CMP network is included in Appendix 3.

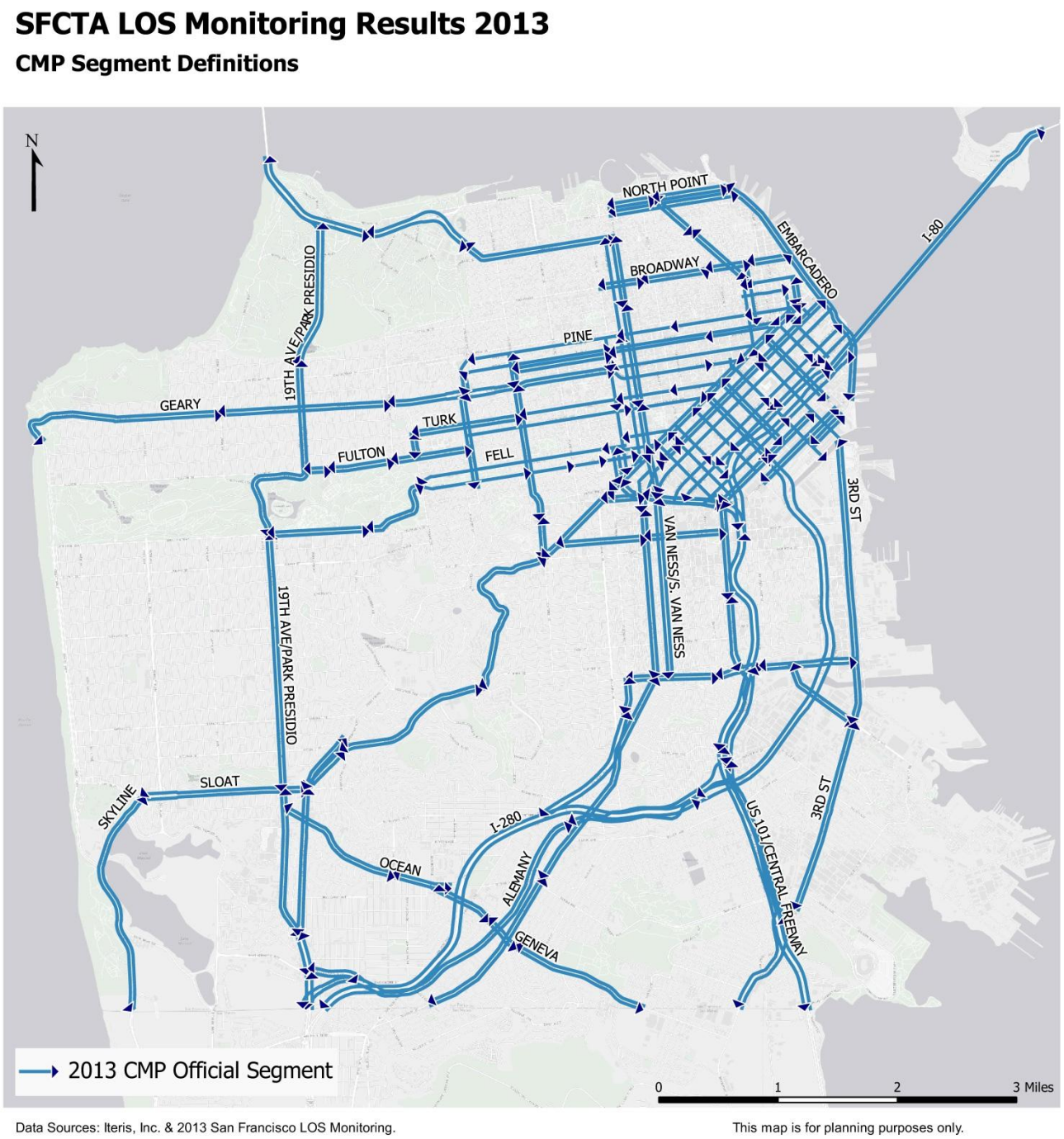
3.2.4| Network Changes

State law prohibits the removal of roadway facilities from the initially designated CMP network (unless facilities are physically removed from the transportation system, such as the Embarcadero Freeway). New facilities may be added to the CMP network without restrictions, subject to the established criteria for inclusion. No network changes are

proposed in the 2013 CMP. Appendix 3 lists all CMP arterials where segmentation changes have been made since 1991, including a technical justification.

From time to time the Transportation Authority may also monitor additional segments that are not part of the official CMP network. These do not constitute official changes to the CMP network, but may be included to support current planning and system management efforts. The Transportation Authority has not monitored any additional segments in 2013.

Figure 3.1: Spring 2013 Monitored Segments



3.2.5| Relationship to the MTS

San Francisco's CMP roadway network is broadly consistent with the Metropolitan Transportation System (MTS) defined by MTC. The MTS is a regional network of roadways, transit corridors and transfer points. The State highways and major thoroughfares designated in San Francisco's CMP roadway network are all included in the San Francisco portion of the regional MTS network. In a few instances, the local CMP roadway network is not identical to the regional MTS network due to differences in the criteria used to define each network. San Francisco's CMP and MTS networks are coordinated with the networks of adjacent counties, to ensure regional connectivity.

A 1993 agreement delegated responsibility from MTC to the Transportation Authority to implement certain mandates in the federal Interstate Surface Transportation and Efficiency Act (ISTEA) of 1991 and by extension, under the Safe, Accountable, Flexible, Efficient Transportation Equity Act—A legacy for Users(SAFETEA-LU) of 2005. These include the analysis of potential impacts on the MTS of proposed local land use decisions (see Chapter 6). The MTS roadway network was updated in 2001 to reflect "support for 'smart growth' and 'environmental justice' by including new focus on facilities that serve major areas of high density, and that provide essential access to disadvantaged neighborhoods."

3.2.6| Non-Automobile Networks

Transportation performance measures in the San Francisco CMP have broadened to increasingly incorporate multimodal performance. However, the city's dense grid allows parallel streets in the same corridor to serve different transportation functions, and the designated CMP roadway network does not necessarily align with the most important or heavily traveled routes for transit riders, bicyclists, or pedestrians. Therefore, many of the non-auto performance measures in this CMP include data from non-CMP portions of the street network or use citywide metrics. Some multimodal measures, such as transit speed, use data collected along CMP network segments to facilitate comparisons with automobile performance. Chapter 4 provides details on multimodal performance.

3.3 Work Program Items

- Participate in any future MTC efforts to redefine the Metropolitan Transportation System (MTS).

CHAPTER 4

Multimodal Performance

KEY TOPICS

- Legislative Requirements
- Legislative Intent and Application to San Francisco
- Applications of Multimodal Performance Measures
- Legislatively Required Performance Measures (Auto LOS and Transit)
- Summary of Monitoring Results
- Local Performance Measures (Transit, Bicycle, and Pedestrians)
- Work Program Items

This chapter presents the 2013 CMP multimodal performance results, including analyses of traffic congestion, transit, and non-motorized performance measures. It combines the traffic Level of Service (LOS) and multimodal performance elements required under state CMP legislation, reflecting the legislation's requirement that LOS be included as one of several multimodal performance measures. This approach is also consistent with San Francisco's urban, multimodal environment. Vehicular traffic congestion remains an important metric of transportation performance in San Francisco, but the City and County's Transit First policy and emphasis on person mobility place higher priority on the performance of alternative modes including transit, bicycles, and pedestrians than on private vehicle speeds.

4.1 Legislative Requirements

4.1.1 | LOS Monitoring

The California Government Code requires that San Francisco use automobile LOS standards to measure the performance of the CMP roadway network, but permits CMAs a choice among the following methodologies for measuring LOS:

- Transportation Research Board Circular 212 (TRC 212);
- Transportation Research Board's Special Report 209: *Highway Capacity Manual (HCM)*; or
- A uniform methodology adopted by the CMA that is consistent with *the Highway Capacity Manual*

The CMA is required to biennially determine the City's conformance with the CMP, including attainment of LOS standards.

In accordance with CMP legislation, the county and city governments are required to show that CMP route segments within their jurisdiction are operating at or above the CMP traffic LOS standard for all segments outside of any designated Infill Opportunity Zone (IOZ). Section 65089(b)(1)(B) states that "In no case shall the LOS standards established be below the LOS E or the current level, whichever is farthest from LOS A except when the area is in an infill opportunity zone. When the level of service on a segment or at an intersection fails to attain the established level of service standard outside an infill opportunity zone, a deficiency plan shall be adopted pursuant to section 65089.4". In addition, Section 65089.3 establishes that "The [California] [D]epartment [of Transportation] is

responsible for data collection and analysis on state highways, unless the agency designates that responsibility to another entity."

Senate Bill 1636 (Figueroa), passed in 2002, authorized local jurisdictions to designate IOZs. IOZs must meet eligibility criteria to ensure they are compact, mixed-use areas that are well-served by transit. In December 2009, the San Francisco Board of Supervisors designated all then-eligible areas within the City and County of San Francisco as an IOZ (see Appendix 4). Senate Bill 743 (Steinberg), passed in 2013, changed the eligibility criteria for IOZ designation. Under the new criteria, an IOZ is an area designated by a city or a county within a half mile of a major transit stop or corridor that is included in a regional transportation plan. Areas that are designated transit priority areas within the regional Sustainable Communities Strategy are eligible for designation. Previous law also set a December 2009 deadline for jurisdictions to designated IOZs and terminated an IOZ designation if no development project was completed within the zone within four years of designation; SB 743 repealed both provisions. Within a designated IOZ, the local jurisdiction is not required to maintain traffic conditions to the LOS standard. Thus, CMP route segments located within an IOZ are exempt from the minimum LOS standards and deficiency plan requirements mandated elsewhere by the CMP legislation.

4.1.2 | Multimodal Performance Monitoring

The CMP legislation also requires a multimodal performance element. AB 1963 in 1994 modified Section 65089(b)(2) of the Government Code to replace the transit service standards requirements previously mandated for the 1991 and 1993 CMPs. The revised statutes state that the CMP shall include "[a] performance element that includes performance measures to evaluate current and future multimodal system performance for the movement of people and goods. At a minimum, these performance measures shall incorporate highway and roadway system performance, and measures established for the frequency and routing of public transit, and for the coordination of transit service provided by separate operators. These performance measures shall support mobility, air quality, land use, and economic objectives, and shall be used in the development of the capital improvement program..., deficiency plans..., and the land use analysis program....".

4.2 Legislative Intent and Application to San Francisco

The original CMP legislation defined performance narrowly as roadway LOS. The amendments acknowledged the need for diversified solutions to complex transportation problems in urban areas, and the inadvisability of tackling them with just one mode. Current performance element requirements recognize that the transportation system performance should be measured for all modes: automobile, transit, bicycle, and pedestrian.

According to the CMP legislation, deficiencies are detected only on the roadway system. Improvements on the LOS scale ensure better travel conditions for motorists, but the LOS scale does not take into account the person throughput capacity of a roadway. A city arterial may carry the maximum number of automobiles at acceptable speed, but if each vehicle carries only the driver, then throughput of the facility is suboptimal. San Francisco therefore includes performance standards and measurements that evaluate all aspects of the City's multimodal transportation network. San Francisco's high transit, pedestrian, and bicycle mode shares and extensive non-auto mode networks mean that the city benefits from a multimodal approach to system performance.

Consistent with State law, the 2013 San Francisco CMP distinguishes between two categories of performance measures. Legislatively Required measures include roadway LOS plus three transit service performance measures: routing, frequency, and inter-operator service coordination. These are the elements of congestion and multimodal performance measurement that are explicitly required by State congestion management statutes. Section 4.4 details the Legislatively Required metrics.

Local performance measures include multimodal metrics that are not used for determination of CMP conformance under State legislation but reflect performance goals for alternative modes in the City of San Francisco. The local measures are used for planning purposes and to track trends over time. Transit measures included in the 2013 CMP include transit speeds, transit-to-auto speed ratios, and transit speed variability. Non-motorized metrics include volumes, network connectivity, and safety. These measures are discussed in further detail in Section 4.5.

4.3 Applications of Multimodal Performance Measures

State law requires that link (roadway) LOS be used for determining CMP conformance and conducting deficiency planning, except within a designated Infill Opportunity Zone. Multimodal performance measures will be used for the following purposes:

- CMP conformance determinations. Link (roadway) LOS will continue to be used for conformance determinations for areas that are not designated by the City as an IOZ. Although areas within the designated IOZ are exempt from deficiency planning requirements, the Transportation Authority will continue to monitor multimodal performance, including LOS.
- CIP amendments. The Transportation Authority will continue to evaluate the potential impacts of proposed CIP changes on the performance of the multimodal network. This information is used as one of the factors in determining Transportation Authority concurrence with such proposals.
- Deficiency plans. Link LOS measurements will be used for deficiency determinations. Portions of the congestion management network within a designated IOZ are exempt from deficiency planning requirements. See Appendix 7 for more information on deficiency plans.
- Land use impacts analysis. Multimodal performance measures will be used for the analysis of impacts of local land use decisions on the CMP network.

4.4 Legislatively Required Performance Measures

4.4.1 | Roadway Level of Service (LOS)

This is the most traditional and best documented performance measure. The CMP legislation defines roadway performance primarily by using the LOS traffic engineering concept to evaluate the operating conditions on a roadway. LOS describes operating conditions on a scale of A to F, with "A" describing free flow, and "F" describing bumper-to-bumper conditions. The HCM defines LOS as "…a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience."

Designation of much of San Francisco as an Infill Opportunity Zone strengthens the Transportation Authority's efforts to develop and employ multimodal performance measures appropriate to a dense, multimodal, urban environment. Under the CMP legislation, CMP segments within an IOZ are exempt from minimum LOS standards. The Transportation Authority continues to work with partner agencies to collect data and develop robust metrics that adequately monitor and evaluate multimodal system performance.

Still, continued monitoring of automobile LOS is useful for a variety of reasons. As the most extensive historical dataset available, LOS allows for the monitoring of traffic conditions over a long period of time. Congestion is also an important factor in the performance of surface-running transit service: where transit operates in mixed traffic, increased congestion will slow transit. Finally, ongoing monitoring of both automobile and transit speeds within the same corridor facilitates the assessment of relative modal performance. As such, the Transportation Authority monitored automobile LOS on the designated CMP network during 2013.

The traffic LOS standard for San Francisco is consistent with CMP-mandated criteria and was established at E in the initial (1991) CMP network. Facilities that were already operating at LOS F at the time of baseline monitoring, conducted to develop the first CMP in 1991, are legislatively exempt from the LOS standards. CMP segments that are within a designated IOZ are also exempt from LOS conformance requirements.

4.4.1.1 | Monitoring Approach

In past years, the Transportation Authority used the floating car method to collect travel time data on the CMP network. However, the resource-intensity of this method led to small sample sizes, which yielded relatively high variability in the results.

Since the adoption of the 2009 CMP update, there has been a proliferation of archived private commercial data. This data is collected through real-time GPS monitoring of a variety of sources such as delivery vehicles, navigational devices, and highway performance monitoring systems. As part of the 2011 CMP update, the Transportation Authority explored the reliability of this new data source by comparing results computed from the floating car data with those computed from INRIX data for the same locations and time periods. The analysis found that, although the INRIX data speeds were somewhat higher, on average, than the floating car speeds, the difference was within the typical range of variation for floating car results and that commercial speed data and floating vehicle data were equally acceptable for meeting CMP legislative requirements. The analysis determined that the commercial data approach was promising for future monitoring cycles. In 2013, MTC contracted with INRIX to obtain regionwide commercial speed data, and has made the data available free of charge to CMAs and other local governments for planning and monitoring purposes.

For the 2013 CMP update, the Transportation Authority has transitioned to using INRIX data as the primary source to calculate official speed and LOS results. Most freeway and arterial segments were monitored using INRIX data; the floating car method was used only for segments for which INRIX data is not available. The INRIX data was collected in April and May, 2013, which is the typical CMP monitoring period for San Francisco. Floating car data collection for segments lacking INRIX data occurred in September, 2013. Supplemental floating car data collection was also conducted on select segments in April and May, 2013 to verify and compare with the INRIX data.

The methodology and results of the 2013 LOS Monitoring effort are detailed in Appendix 5.

4.4.1.2 | Summary of 2013 LOS Monitoring Results

Table 4-1, below, presents the change in CMP network average travel speeds, calculated as time-mean speed, between 2011 and 2013 for the AM and PM peak periods (7:00 to 9:00 a.m. and 4:30 to 6:30 p.m., respectively).

Table 4-1. CMP Network Average Travel Speed

Category		Time-Mean Travel Speed (Adopted)		
		2011	2013	Percent Change
Arterial	AM	17.5 mph	18.4 mph	+ 5%
	PM	16.6 mph	17.1 mph	+ 3%
Freeway	AM	39.4 mph	45.4 mph	+ 15%
	PM	31.3 mph	36.1 mph	+ 15%

Note: 2011 results were collected using the floating car method. 2013 results were collected primarily using INRIX commercial speed data, with floating car used where INRIX data was not available.

Average travel speeds on the CMP network have increased since 2011 for all times measured times and road types. Average arterial travel speeds have increased five percent from 17.5 mph to 18.4 mph in the AM peak and three percent from 16.6 mph to 17.1 mph in the PM peak. The average travel speed on freeways increased 15% from 39.4 mph to 45.4 mph in the AM peak and 15% from 31.3 mph to 36.1 mph in the PM peak.

The magnitude of increase in average speeds, particularly on the freeway network, could be partly explained by the change in methodology from 2011 to 2013, although the results indicate that speeds have increased regardless of methodology. A comparison of PM peak INRIX results for 2011 and 2013 on a portion of the network, representing approximately 71% of arterial segments and nearly all freeway segments, is presented in Table 4-2. The analysis shows that speeds increased by an average of approximately 12% on both arterials and freeways using that

methodology alone. This indicates that the speed increase magnitude could be greater for arterials but less for freeways than reported in the official monitoring results.

Table 4-2. Comparison of Commercial Speed Data, PM Peak Period

Category	Time-Mean Travel Speed (INRIX)*		
	2011	2013	Percent Change
Arterial	17.0 mph	19.0 mph	+ 12%
Freeway	32.7 mph	36.6 mph	+ 12%

*Average speeds calculated on approximately 71% of arterial segments common to 2011 and 2013 results.

Freeway segment speeds are historically highly variable. Average speeds in the AM peak on northbound I-280 from Junipero Serra to Weldon (at U.S. 101) increased by 10 mph, while northbound U.S. 101 from I-80 to Market Street (the Central Freeway) increased by 16 mph. In the PM peak, average speed on northbound I-280 from Weldon (at U.S. 101) to the end of the freeway at 6th and Brannan Streets increased by approximately 15 mph, while southbound U.S. 101 speeds increased by approximately 10 mph between Cortland and the San Mateo county line. These segments contributed to the significant overall freeway speed increase.

Out of 227 CMP arterial segments, average AM peak speeds increased on 136 segments and decreased on 91 segments. In the PM peak, average arterial speeds increased on 141 CMP segments and decreased on 86 segments. The mixed outcome of the analysis, with some arterial segments showing increased speeds since 2011 while others showing decreased speeds may reflect the overall variability of traffic speeds throughout San Francisco's network as well as the natural equilibrium of a grid network that allows traffic numerous paths of travel; if one segment becomes congested, traffic will often switch to a parallel, less congested segment.

Four arterial CMP route segments and no freeway segments evaluated during the morning peak period were found to operate at LOS F. In the PM peak, 11 arterial segments and five freeway segments were found to operate at LOS F. The number of arterial segments operating at LOS F in the PM peak is a significant increase; in 2011, just one arterial segment was at LOS F. Data for all arterial segments operating at LOS F in 2013 in both the AM and PM peak periods was gathered using the floating car method in September, 2013, as INRIX data was not available. These floating car runs were conducted during America's Cup, which held sailing races throughout the month of September and attracted thousands of attendees. The LOS F arterial segments are primarily located downtown and in SOMA, and although many are relatively far from the waterfront, attendees traveling to and from the event could have affected the results significantly.

All arterial and freeway segments operating at LOS F in the 2013 monitoring cycle are exempt from constituting deficiencies, either because they were operating at LOS F during the baseline 1991 monitoring cycle or because they are located within an IOZ.

4.4.1.3 | Deficiency Planning

Since all segments measured at LOS F in the 2013 monitoring were exempt and did not represent a deficiency, and since San Francisco was not found to be deficient for any of the Legislatively Required transit performance measures, no deficiency planning process is triggered by the 2013 CMP. The Transportation Authority is continuing to collaborate with other agencies to incorporate additional mulimodal performance measures into the CMP (see subsequent sections of this Chapter) and to improve the performance of the multimodal transportation system regardless of whether a specific deficiency is identified. For a detailed discussion regarding the CMP deficiency planning process, see Appendix 7.

4.4.2 | Transit Coverage/Routing

This refers to the pattern and hierarchy of the transit route network (e.g., radial/grid, rapid/local, etc.) and the service area covered (e.g., percent of total population served within one-quarter mile; or percent of total urbanized

area served). San Francisco County has the most extensive transit coverage of any Bay Area county. As shown in Table 4-A at the end of this chapter, the Muni coverage standard is to provide service running at least 19 hours per day within a ¼ mile walking distance. Other transit operators serve smaller areas of the City and primarily provide connections to other parts of the region.

4.4.3 | Transit Frequency

This is the number of transit vehicles (buses, trains, or ferries) per hour (e.g., 4 buses per hour). The inverse of the frequency is called "headway," which is the time between transit vehicles (e.g., 15 minutes between buses).

Figures 5-1 and 5-2 show key transit service routes in San Francisco.

Table 4-A, found at the end of this chapter, shows frequency (headway) and coverage standards for the major transit operators that provide service in San Francisco.

A number of transit operators provide connections to and from points outside the city. Because of the predominantly suburban, low-density environment in which they function, which limits the amount and kinds of service they can provide, these operators have significantly different standards from those that Muni is expected to achieve in San Francisco. These differences are reflected in Table 4-A. The transit standards are essentially established policy and in most cases are taken directly from each operator's Short Range Transit Plan.

4.4.4 | Interoperator Coordination

This addresses the linkages between transit services provided by different operators (e.g., timed transfers at transit centers, joint fare cards, etc.), to facilitate the use of transit.

Senate Bill 602 required that MTC, in coordination with the Bay Area's Regional Transit Coordinating Committee (RTCC), develop rules and regulations for fare and schedule coordination in MTC's nine-county Bay region. SB 1474, passed in 1996, set coordination objectives for the region's transit services, and MTC has adopted Resolution 3055, Transit Coordination Implementation Plan, to comply with SB 1474. This MTC-led process is considered sufficient to meet the intent of CMP law regarding transit service coordination in the region. Compliance with MTC's process by Muni and all other operators serving San Francisco will therefore constitute sufficient grounds for a finding of conformance with CMP transit coordination requirements.

The Transportation Authority is currently engaged with partner agencies in various efforts that seek to improve transportation system connectivity and ease interoperator transfers. This unified system, centered on a single farecard known as Clipper, is now operational in San Francisco and provides interoperator functionality. Eventually, Clipper will be part of an even more comprehensive multimodal system. This "integrated mobility account" would potentially include non-transit systems, namely asTrak (automated bridge-tolling), on- and off-street parking payment, and, if implemented, congestion pricing fees. Such a system would provide ready access to account information through web and mobile interfaces. With a centralized mobility management system, users could also be encouraged to make better transportation decisions and evaluate travel costs and tradeoffs in a more comprehensive manner.

4.5 Local Performance Measures

In measuring performance, we are measuring the ability of the system to satisfy the transportation needs of all San Franciscans, and we must therefore measure performance with reference to particular groups of users—e.g., transit riders, bicyclists, and pedestrians.

Traffic congestion has been measured with a widely recognized, standard approach—LOS—for decades. By contrast, information about the performance of the rest of the transportation network, for those who choose to take transit, bicycle, or walk, is less standardized. Although the 2010 Highway Capacity Manual (HCM) now includes a methodology to calculate multi-modal LOS, its applicability to San Francisco's dense urban grid network is limited (see Appendix 5 for further discussion). Historically, certain transit system data has been collected in response to

federal or state requirements tied to eligibility for funding. Typical data collected included total daily ridership—an indicator of current demand for service, and cost per passenger mile, an indicator of cost effectiveness. Increasingly, however, operators are deploying on-board monitoring technologies to help adjust daily operations, improve ongoing system planning, and inform longer-range capital planning.

Similarly, data pertaining to bicycle and pedestrian trips has historically been seldom available. When collected, it is usually in connection with a specific project proposal, and is not a part of a systematic effort that provides a picture of the user's experience.

Multimodal performance data is increasingly needed for system performance measurement pursuant to updates of the San Francisco Transportation Plan and congestion management planning as well as for project planning, transportation impact analysis, and project prioritization. It is necessary to provide better information to the traveling public, as well as to inform policy decisions about funding of transportation projects and services.

By applying the performance measures for travel by car, transit, bicycle, or foot to different neighborhoods in the city, we can produce a countywide picture of comparative mobility between neighborhoods, modes (e.g. transit vs. auto), or types of users (e.g. transit dependent, elderly). We can also evaluate the accessibility of different parts of the city by analyzing the number of destinations that are reachable by different modes of transportation.

The Transportation Authority's travel demand model and GIS database are the main tools for analysis of system performance data.

The Transportation Authority also continues its ongoing technical and policy vehicles for development of further local performance measures. The groundwork for further measures has been supported with allocations of Prop K funding for projects devoted to ongoing collection of multimodal data, such as automatic passenger counters (APCs) on transit vehicles, in-pavement bicycle volume counters, and intersection-level automated pedestrian counters.

4.5.1 | Transit Speed and Variability

4.5.1.1 | APC Data Collection and Analysis Methodology

The San Francisco Municipal Transportation Agency (SFMTA) uses both automatic vehicle locator (AVL) and automatic passenger counter (APC) systems to collect robust, real-time data on bus performance and ridership. AVL and APC data support a wide range of operations, planning, and customer service activities.

AVL technology is installed on Muni's entire fleet of diesel (including hybrid) buses, electric trolley-buses, and light-rail vehicles. A GPS-based real-time monitoring system, AVL is useful both from an operational perspective (i.e., NextBus) and planning perspective. In 2007, the Transportation Authority used AVL data to validate travel demand model improvement efforts, which linked modeled transit speeds dynamically to auto speeds. (The San Francisco model is discussed in further detail in Chapter 8.) The 2007 CMP included, for the first time, reporting of transit speeds on key monitored segments of the Muni system.

APCs are a more robust on-board monitoring tool than AVLs. The SFMTA's APC system provides both running time (i.e., speed) information as well as passenger activity (boardings and alightings) data. In March 2005, the Transportation Authority approved the first of several allocations of Prop K funds to support the procurement and installation of APCs on a portion of Muni's bus fleet. SFMTA's Transit Effectiveness Project (TEP) significantly accelerated the deployment of APCs on Muni's diesel bus and trolley bus fleet, in order to provide the high-resolution (i.e., stop-level and route-level) data necessary for the TEP's comprehensive system analysis.

More generally, the resources and analyses developed for the TEP's original analysis have provided SFMTA with a set of valuable tools and skills for data driven decision-making. Operations-level data, collected in real-time on a sufficient sample of vehicles and runs, supports a range of planning activities, from short-term resource deployment to financial planning and long-range system development. APC data is regularly shared between the SFMTA and the Transportation Authority for planning purposes, including for CMP reporting.

The SFMTA currently has APCs deployed on a significant portion of its bus fleet. Guided by a deployment plan, equipped vehicles are rotated across the system each month; thus each individual run (i.e., a particular scheduled departure of a specific route) is sampled on a regular basis (at least once per month). This is valuable for detailed service planning purposes. For broader system performance monitoring and planning purposes, such as the CMP, the APC data can be aggregated to a weekday peak period and have a relatively large sample set.

APC data was used to report transit speeds in 2009 and 2011. In 2011, transit speeds were reported on CMP segments for the PM peak alone; in the 2013 CMP update, we have included both AM and PM peak results.

For the 2013 CMP, the LOS monitoring consultants (Iteris) processed two months of APC data collected on Muni's bus (diesel and trolley coach) fleet. Muni light rail vehicles are not currently equipped with APCs, and were thus not included in the analysis. After undergoing a quality control "cleaning" to eliminate faulty and outlier data samples, the data was filtered to include only weekday peak periods. The same AM and PM peak time periods were as used as in the LOS Monitoring (7:00am-9:00am and 4:30pm-6:30pm).

The APC equipment relies on GPS technology to recognize Muni's designated stop locations as a vehicle traverses its route. The processed dataset provides stop-to-stop travel speed, inclusive of dwell time. Dwell time is assigned to the "upstream" stop: the segment-level data represents upstream stop-arrival point to downstream stop-arrival point. In this way, the processed data corresponds with the travel time and through-speed experience by a transit rider as he or she passes multiple stops while on-board. (This is comparable to manner in which automobile speed is reported in this chapter by including fully-stopped intersection delay in the calculation of through-travel speed.). Where the transit travel time results have been mapped to CMP segmentation, the bus stop segments were split at CMP boundaries, and the distance of each bus segment within a CMP segment was used to weight the average speed over the segment.

The APC dataset is from April and May of 2013, the same period as the roadway LOS monitoring effort. This allowed the comparison of auto to transit speeds on the portions of the CMP network for which Muni data was available. For each segment, the ratio of auto-to-transit speed was calculated. This figure is equivalent to the ratio of transit travel time to auto travel time. A ratio of 2 would indicate that, for a particular route, on-board transit travel time is twice that of auto travel time.

4.5.1.2 | Transit Speeds

Transit speeds on the CMP network have declined slightly since 2011, likely due to a combination of traffic congestion and ridership increases in the months monitoring was conducted.

The average transit speeds (collected for buses only) on the CMP network[10] were 8.8 mph in the AM peak period and 8.1 mph in the PM peak. In 2011, transit speeds were summarized for most of the same segments in the PM peak only. Average transit speeds were also collected in the PM peak in 2011. Among only segments with transit results from both 2011 and 2013, the average speed was 8.2 mph in 2011 and 8.0 mph in 2013, a three percent decrease. Transit speeds increased on 39 of these segments, while they decreased on 66 segments (speeds on six segments did not change). Segments with the largest decreases in transit speeds were widespread, rather than concentrated in any particular area of the city. Average speeds on segments with existing transit-only lanes in the PM peak period also followed the trend, with average speeds declining from 6.7 to 6.6 mph on the twelve such segments monitored in both 2011 and 2013. Note that existing transit-only lanes are typically located in and near downtown where both auto and transit speeds are generally slow. Although small, these decreases in transit speeds are concerning. Figures 4-1 and 4-2 illustrate average bus speeds on CMP segments in the AM and PM peak periods, respectively.

During weekday peak periods, bus travel times in many corridors exceed auto travel times by a factor of two or more. Ninety-seven CMP segments (where data was available) had a PM peak auto-to-transit speed ratio of 2.0 or greater, indicating that autos travel at least twice the speed of transit vehicles, and the same was true in the AM peak for 87 segments. Table 4-3 displays the 15 segments for which the PM peak ratio is greater than 3.0; these represent

[10] Transit average speeds are unweighted.

11% of the 133 segments monitored during the PM peak for 2013. The full tabular results are included as Appendix 6.

The CMP segment with the highest auto-to-transit ratio, Fulton Street from 10th Avenue to Arguello, is currently part of a pilot service change that has established a limited-stop 5L-Fulton line during daytime hours and is expected to improve transit travel times along Fulton Street. Several other segments with high auto-to-transit ratios are planned for transit improvements, including Van Ness Avenue with the Van Ness Avenue Bus Rapid Transit (BRT) project and Mission Street with planned travel time reduction projects in the TEP.

More segments had transit-to-auto ratios of 2.0 or more in 2013 than in 2011. Of the 111 segments consistently monitored in both 2011 and 2013 PM peak periods, 59 had auto-to-transit ratios of 2.0 or more in 2011, while in 2013 that number increased to 80. Of the 66 segments on which transit speeds declined, auto speeds also declined on 27 segments, indicating that greater congestion is the likely cause for the reduced speeds. On the other 39 segments, transit speeds fell while auto speeds increased, indicating that increased transit dwell times at stops due to increased ridership may be the cause.

In order to provide a clearer indication of where low transit speeds are most attributable to time spent stopped and serving boarding and disembarking passengers, this CMP update for the first time includes an analysis of three components of travel time: dwell time, or the time a vehicle spends stopped with its doors open at a bus stop; pull-out time, or the time after the doors have closed at a stop but before the vehicle begins to move, typically when the driver finds a gap in traffic; and time between stops, or the time a vehicle spends traveling along the route excluding time at stops. Dwell time varies primarily with the number of passengers boarding and disembarking at stops, while pull-out time and time between stops are functions of traffic conditions, delay at traffic signals, and other factors. Time between stops should be most comparable to the travel times of autos traversing the same segment.

On average, buses spend about 40% of their time at stops, including 20% in dwell and 20% in pull-out, and 60% of their time between stops along CMP Segments in the AM and PM peak periods. These proportions vary widely between CMP segments. On some segments with relatively few stops, time between stops is over 80% of the total transit travel time. On a number of the slowest transit segments, which are primarily located in the dense northeastern quadrant of the city, buses spend less than half their time traveling between stops. On most of the segments with the slowest transit speeds or highest auto-to-transit speed ratios, buses' time between stops is less than the network average, indicating that dwell and pull-out times are important contributors to overall slow speeds. Although data on the components of bus travel time is not available from 2011 as a comparison, the 2013 data provides a baseline to track future trends and more easily identify the causes of changes in transit travel speeds.

In addition to greater congestion on some segments, higher ridership may explain both the reduced transit speeds relative to 2011 and the increasing transit-to-auto speed ratios during the same period. Ridership on Muni's bus fleet increased approximately two percent from 2011 to 2013 during the two-month period that the APC data was collected, according to SFMTA data. These additional riders likely caused an increase in the amount of dwell time at stops and thereby reduced transit travel speeds. Higher transit ridership, including observed increases in BART and Caltrain ridership since 2011, may have also resulted in increased auto speeds due to more commuters opting not to drive.

Although useful, the current analysis of individual segments does not account for the number of riders affected on segments or transit routes with different levels of performance. In future monitoring cycles, ridership data could be added to the analysis to enable identification of transit routes that affect the greatest numbers of riders.

4.5.1.3 | Transit Speed Variability

The standard deviation and coefficient of variation of travel time provide indicators of how reliable transit vehicle travel times are for a given segment. The standard deviation provides an absolute measure of variability, and indicates in minutes how far from the mean speeds typically range. The coefficient of variation (CV) is calculated by dividing the standard deviation by the average speed, thereby normalizing the results to compare relative variability between faster and slower segments. The CV is expressed as a percentage of the mean speed.

Transit speed variability is high for many segments. Coefficients of variation on many segments are 20% or more, indicating that transit travel time on a typically 30-minute trip is more than six minutes faster or slower than average

more nearly one-third of the time. The coefficient of variation exceeds 30% for 10 segments in the PM peak and 11 segments in the AM peak, representing approximately ten percent of monitored segments. Table 4-4 displays these least reliable segments in the PM peak period.

Full results are included in Appendix 6.

Figure 4-1: 2013 Average Muni Bus Speeds on CMP Network Segments, Weekday AM Peak

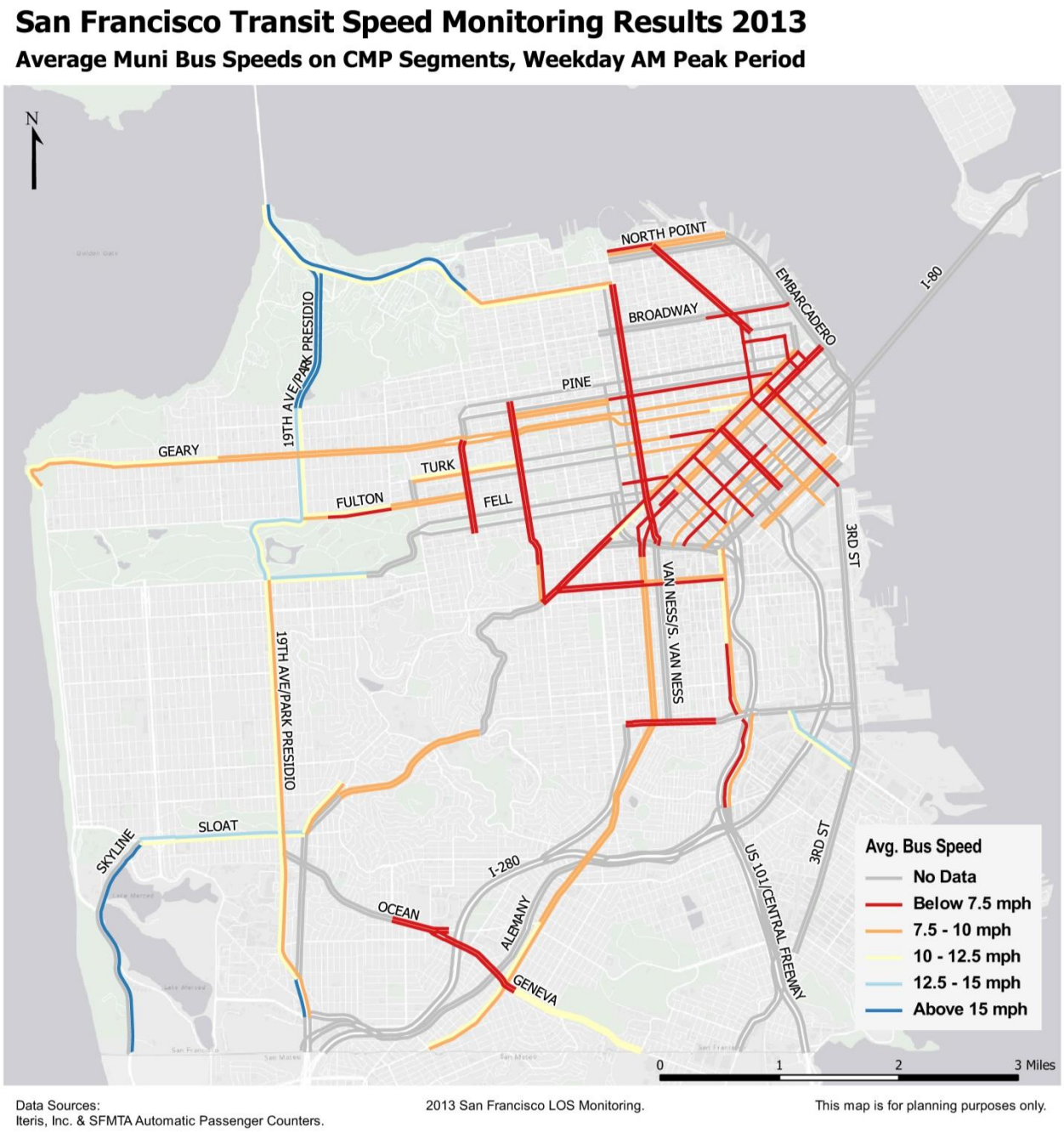


Figure 4-2: 2013 Average Muni Bus Speeds on CMP Network Segments, Weekday PM Peak

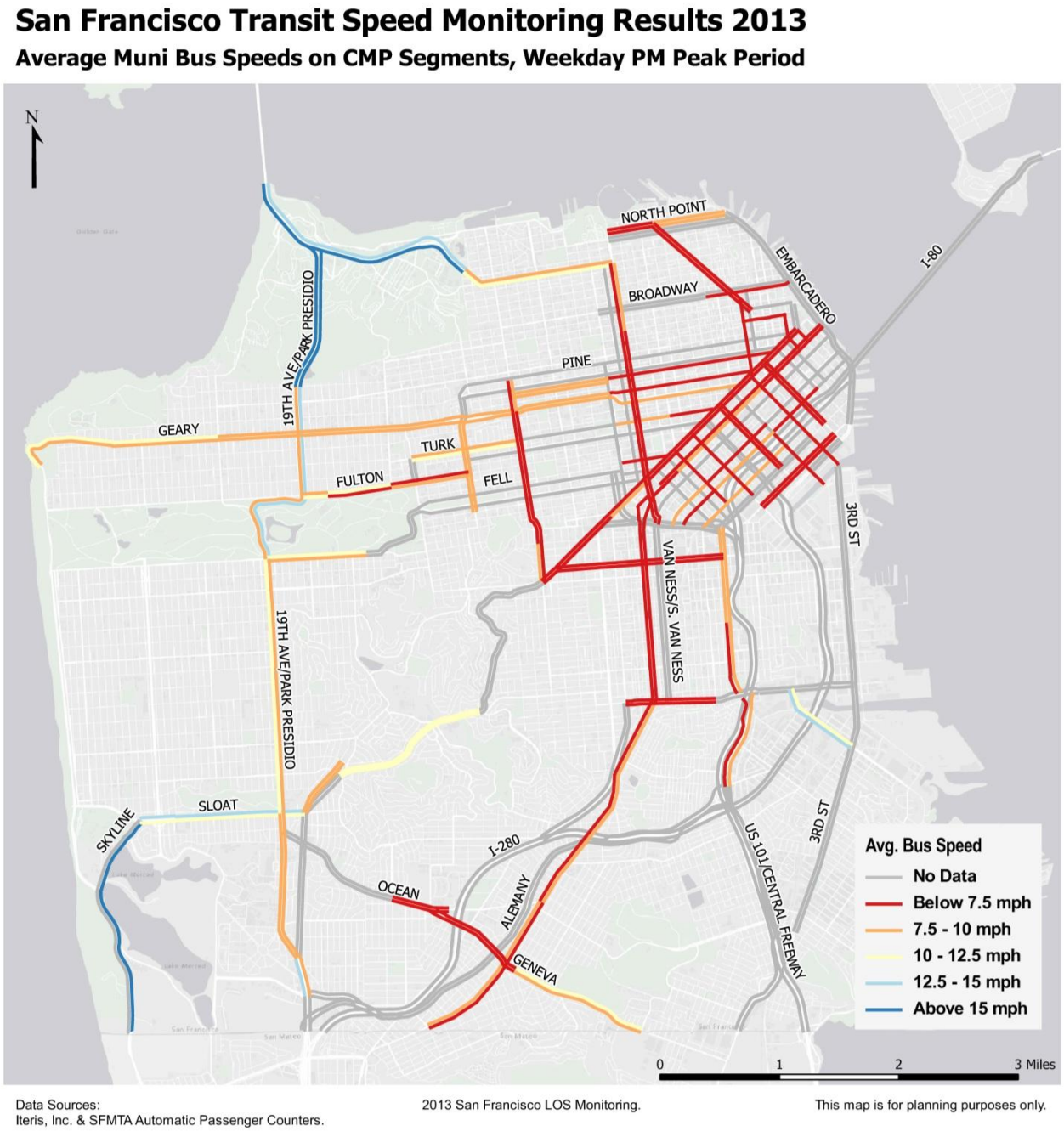


Table 4-3: CMP Segments with Auto-to-Transit Speed Ratios above 3.0 during PM Peak

CMP Segment	Dir.	Avg. Auto Speed (mph)	Avg.Transit Speed (mph)	Auto/Transit Speed Ratio
Fulton: 10th Avenue to Arguello	E	19.8	4.5	4.4
Mission / Otis: Embarcadero to 3rd St	S	14.0	3.5	4.0
Bayshore: Jerrold to Industrial	S	25.9	6.9	3.8
North Point: Van Ness to Columbus	E	9.3	2.7	3.4
Harrison: 8th St to Division	W	17.5	5.4	3.2
Cesar Chavez: Bryant to Guerrero	W	17.2	5.4	3.2
Market / Portola: Van Ness to Guerrero	W	14.5	4.6	3.2
Van Ness / S. Van Ness: Golden Gate to Washington	N	17.0	5.4	3.1
Townsend: 2nd St to 7th St	W	17.7	5.7	3.1
Geneva: Paris to Cayuga	W	14.9	4.8	3.1
Geneva: Cayuga to Paris	E	15.5	5.0	3.1
Columbus: Greenwich to Montgomery	S	12.7	4.1	3.1
Mission / Otis: 14th St to 9th St	N	16.7	5.4	3.1
Mission / Otis: 9th St to 14th St	S	14.9	4.9	3.0
Hayes: Market to Gough	W	13.5	4.5	3.0

Table 4-4: Least Reliable Transit Segments (CV>30%), PM Peak

Segment	Dir.	Avg. Transit Speed (mph)	S.D. Transit Speed (mph)	Coefficient of Variation
Fulton: 10th Avenue to Arguello	E	4.5	2.8	62%
Sloat: Skyline to Junipero Serra	E	11.5	5.6	49%
North Point: Columbus to Embarcadero	E	7.8	3.6	47%
4th St/Stockton: Harrison to Channel	S	7.4	3.4	46%
West Portal: Sloat to Ulloa	N	7.8	3.3	43%
5th St: Brannan to Market	N	4.7	1.9	41%
Market/Portola: Guerrero to Van Ness	E	9.6	3.3	34%
Bayshore: Jerrold to Industrial	S	6.9	2.3	33%
Doyle/ Richardson/ Lombard: Lyon/Francisco to SF Cemetery	W	13.5	4.1	30%
Doyle/ Richardson/ Lombard: SF Cemetery to County Line	W	13.5	4.1	30%

Note: 4th Street between Harrison and Channel was affected by Central Subway construction.

4.5.3 | Muni Service Standards and Milestones

In November 1999, San Francisco voters passed Proposition E which, among other changes, amended the City Charter to require the creation of service standards and milestones for Muni to attain. The SFMTA Board of Directors updates these periodically. Table 4-B lists the service standards and milestones that directly pertain to the improvement of Muni performance.

Muni on-time performance as measured by arrival times against published schedules has fallen since the last CMP update in 2011 from 73% to 60%, below the goal of 85%. Headway adherence has remained constant, with approximately 65% adherence, also below the 85% goal. The proportion of scheduled service hours actually delivered fell to 95 percent from 97% in 2011. The goal for service delivered is 98.5%. Finally, the proportion of vehicles too full to board (pass-ups) increased in the morning peak period to 6.5% (from 5% in 2011) but decreased slightly in the afternoon peak from 8% in 2011 to 7% in 2013. Both morning and afternoon peak pass-ups remain above the 4% goal.

4.5.4 | Pedestrian and Bicycle Volumes

The City and County of San Francisco has placed a high priority on shifting travelers' modes to increase the number of trips made by walking and bicycling. Unlike automobile and transit volumes, increasing volumes of pedestrian and bicycle traffic are a direct indicator of system performance because increased use of these modes alleviates, rather than causes, traffic congestion and transit crowding. Walking and bicycling are space-efficient, healthy, and environmentally beneficial ways to travel, and have minimal negative impact on surrounding communities. The Transportation Authority estimates from the 2010-2012 California Household Travel Survey (CHTS) that during the study period approximately 18% of tours to, from, and within San Francisco were made by walking, while approximately 3% were made by bicycle. Tours beginning and ending in San Francisco were estimated to be about 28% walking and 5% bicycling. In 2010, the San Francisco Board of Supervisors adopted a resolution establishing an ambitious citywide goal of 20% of trips being made by bicycle by 2020.

Little data has historically been available to measure the numbers of trips made by walking and bicycling, but City and County agencies are now working together to collect volume data for both modes on a more regular basis.

In 2009, the Transportation Authority approved two Prop K allocations to develop SFMTA's ability to collect pedestrian and bicycle data on a regular basis, and in 2013 the Transportation Authority approved an allocation to further develop an automated bicycle counter system. These efforts have collected mode-specific volume data at key locations in the city, although the pedestrian count effort has focused more on collecting data at many different locations than on developing a consistent but smaller set of locations to track over time.

Unlike for automobile and transit performance, volume information—tracked over time—is a reasonable proxy for the "performance" of a non-motorized mode of travel and the shifting usage to that mode. Under the City's Transit First policy, the Countywide Transportation Plan, and numerous other policy documents, increases in pedestrian and bicycle travel are central and explicit goals.

4.5.4.1 | Citywide Bicycle Counting Project

The SFMTA has conducted manual bicycle counts by sending staff to 41 locations across the city. While annual bicycle counts have in the past been completed each August, the count date was moved to late September in 2011 both to align more closely with the bicycle counting standards set by the National Bicycle and Pedestrian Documentation Project (NBPDP) and to capture bicycle trips taken while school is in session. Additionally, count duration has been increased from approximately one-and-a-half to approximately two hours. Counts continue to be conducted primarily during the PM peak period. This methodology may be augmented due to the proliferation of automated counters (see below).

Results from bicycle counts through 2011, the most recent year for which data is available, are shown in Table 4-4. The number of bicycles passing the sample locations increased 6% from the 2010 count and 58% since the 2006 count, demonstrating a significant and sustained increase in bicycling in San Francisco. Full results of the bicycle count are available in the SFMTA's 2011 Bicycle Count Report and are also referenced in SFMTA's 2012 State of Cycling Report.

The current manual method of data collection is limited by staffing constraints and lacks the ability to quantify bicycle usage at different times of the day, seasonally, and throughout the year. The Citywide Bicycle Counters Project now allows the SFMTA to utilize automatic bicycle counters to collect more robust bicycle count data.

Table 4-4: San Francisco Bicycle Counts 2006 - 2011

2006	2007	2008	2009	2010	2011*
4,862	5,504	6,943	7,532	7,793	8,314
*Actual 2011 count was 10,139; approximately 18% of the 2011 increase is attributed to shifting the count from early August to late September, which is corrected for by scaling to automatic bicycle counter data.					

Source: SFMTA

The SFMTA's bicycle counting effort has included installation of 25 bicycle counters and modems with wireless service to enable collection of data from some of the locations without the need to staff to visit the sites. Data from these automatic bicycle counters has become available for the first time in 2013, providing a set of continuous streams of ridership data in a cost-effective manner. Data from the bicycle counters will also provide useful information to other agencies, including for the Transportation Authority's travel demand forecasting model. SFMTA plans to expand its system of bicycle counters across more of the city's extensive bicycle network, which includes more than 200 miles of lanes, paths, and routes.

4.5.5 | Bicycle Network Connectivity

The extent and connectivity of the pedestrian and bicycle networks are important metrics of non-motorized transportation performance. Comprehensive networks that allow pedestrians and bicyclists to travel easily and safely between destinations are essential to encourage non-motorized travel as an alternative to driving and contributing to traffic congestion.

The San Francisco Bicycle Plan, adopted by the SFMTA in 2009, includes improvements to and expansion of the City's existing bicycle routes, which comprised 208 total miles in 2008. The Plan, which was originally adopted in 2005 but subject to a four-year court injunction that was lifted partially in 2009 and entirely in 2010, calls for 34 miles of new Class II bicycle lanes in addition to the previously existing 45 miles, 75 miles of shared on-street bike routes marked with sharrows, new and improved bicycle parking citywide, as well as additional programs, policies, and projects to improve bicycle connectivity and safety.

Since the Bicycle Plan injunction was lifted, the City has moved rapidly to implement it. The SFMTA installed nearly fifteen miles of bicycle lanes from January 2010 through June 2011; over the last two years, another seven miles of bicycle lanes and ten miles of bicycle routes were added with Prop K as well as regional funding for many projects. Progress on the Plan has also included upgrades to existing bike infrastructure including sharrows and pilot installation of separated bikeways, bike boxes at intersections, and colored pavement treatments to increase the visibility and safety of bicycling on City streets.

Table 4-5 summarizes the percentage of the bicycle route network completed by facility type. As of January 2013, the completed network included 217 miles of bike routes, of which 15% were Class I paths and 34% were Class II designated bicycle lanes. The rest are Class III signed routes in shared lanes, many of which have wide shoulders or are marked with sharrows.

Table 4-5
San Francisco Bicycle Facilities, December 2011 and January 2013

Facility Type	2011		2013	
	Miles	% Total	Miles	% Total
Bicycle Path (Class I)	33	17%	33	15%
Bicycle Lane (Class II)	67	33%	74	34%
Bicycle Route (Class III)	100	50%	110	51%
Total	201	100%	217	100%

Source: SFMTA

The Transportation Authority is planning to adopt a new 5-Year Prioritization Program in December, 2013 that will identify the highest-priority bicycle improvements to be funded and implemented over the next five years.

4.5.6 | Pedestrian and Bicycle Safety

Safety for pedestrians and cyclists are key measures of non-motorized transportation performance. Our primary source of traffic safety data is the California Statewide Integrated Traffic Records System (SWITRS) maintained by the California Highway Patrol, which compiles all local collision reports into a unified database. Fatalities from traffic collisions are tracked, and collisions resulting in injury are classified by severity of injury. Table 4-6, below, displays injury and fatality statistics by involved party for the most recent decade for which traffic collision data has been analyzed (2001-2011).

As shown in Table 4-6, injury collisions among all users declined by roughly 1,000, from 3,917 in 2001 to a low of 2,869 in 2006. The number of collisions has remained relatively steady since, but rose slightly to 3,111 in 2011.

Occurrence of pedestrian injury collisions fell early in the last decade from a high of 895, before fluctuating and reaching a low of 695 in 2009. These collisions increased significantly in 2010 and 2011, however, to reach 844.. Typically, pedestrian injury collisions have represented approximately 25% of total injury collisions during this period.

The increase in bicycle injury collisions was responsible for the majority of the growth in injuries among non-motorized users from 2006 to 2011. Bicycle injury collisions in the past decade initially fell to a low of 307 in 2002, but subsequently rose to a high of 630 in 2011 This increase is likely due in part both to the significant rise in bicycling activity observed in recent years and to the citywide injunction on bicycle improvements which was in place from 2006 until August 2010; from 2010 to 2011, the increase in injury collisions has slowed.

Collisions resulting in injury are a more reliable indicator of safety trends than traffic deaths: fatal collisions, being rarer events, are subject to more random fluctuation and greater relative (percentage) shifts on a year-to-year basis. Still, across a longer timeframe, traffic fatalities have declined significantly. Annual traffic deaths among all users in the 1960s regularly exceeded 100 per year; during the 2001-2011 period, annual traffic fatality totals have varied between 23 and 48 annually. Pedestrian fatalities have represented approximately 60% of total traffic deaths during this ten-year period, with annual figures varying between 13 and 25 pedestrian fatalities per year.

Table 4-6
Traffic Collision Injuries and Fatalities by Involved Party, 1999-2011

	Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Injury Collisions	All Users	3,917	3,777	3,511	3,038	3,227	2,869	3,021	3,010	2,877	3,081	3,111
	Pedestrians	895	862	815	727	747	726	796	799	695	784	844
	Bicyclists	360	307	311	316	343	343	451	468	531	599	630
Fatal Collisions	All Users	35	32	41	33	26	28	42	27	30	23	28
	Pedestrians	19	18	25	20	14	15	24	13	17	14	17
	Bicyclists	4	1	1	1	2	2	1	3	1	1	4

Source: SFMTA

4.6 Work Program Items

Work program items consist of those intended to improve the City's performance monitoring as well as initiatives targeted at improving system performance. Transportation Authority work program elements intended to continue and enhance performance monitoring include:

- Monitor CMP network speeds and LOS in Spring 2015.
- Monitor transit travel times and reliability on the CMP network and Muni Rapid Network, and work with SFMTA to further develop and establish regular spatial reliability data reporting.
- Work to include transit ridership in future monitoring results in order to estimate person-throughput on the CMP network.
- Coordinate with City departments to improve the availability and collection of data about level of service and performance of all modes. Examples of modal performance analyses include SFMTA's planned bicycle network comfort index study to inform project prioritization.
- Coordinate with the SFMTA on bicycle counting and pedestrian counting projects.
- Collaborate with other City agencies to refine and standardize metrics for bicycle and pedestrian performance.

In addition, the Transportation Authority and City agencies will continue to engage in planning efforts and implement projects to improve performance of the transportation system. The San Francisco Transportation Plan, scheduled for adoption in December 2013, focuses on prioritizing projects and programs and developing strategies to improve system performance. The Transportation Authority will, as part of its efforts to improve performance:

- Continuously improve the San Francisco Model's capability to model all modes of transportation, including bicycle and pedestrian trips.
- Work with SFMTA to identify Transit Performance Initiative priorities (the City's long range priorities for BART, Caltrain, and Muni Metro). Fund a Long Range Transit Network Development study to identify solutions to Muni Metro system bottlenecks and include solutions that would improve the travel time and reliability of Muni Metro tunnel operations.
- Continue to participate in multimodal corridor improvement efforts such as the Better Market Street Project and BRT projects.
- Through a partnership with the region, counties, and Caltrans, identify and promote San Francisco's priorities for the regional freeway network. Set a vision for the management of the City's freeway management through the Freeway Performance Initiative.
- Continue to participate in citywide pedestrian safety initiatives, including through the Pedestrian Safety Task Force, by coordinating with other City agencies to implement the WalkFirst investment strategy, and by supporting the City's traffic calming program.
- Coordinate with SFMTA on development and implementation of the bicycle network.
- Dedicate Prop K funds to the design and implementation of complete streets enhancements that "Follow the Paving."

Table 4-A

Transit Service
Frequency and Coverage Standards
MUNI

Frequency Standard (headway in minutes)

Weekday	**Peak**	**Base**	**Evening**	**Owl**
Radial	10	15	20	30
Express	10	--	--	--
Cross-town	15	15	20	30
Feeder	20	30	30	--

Weekend	**Base**	**Evening**	**Owl**
Radial	15	20	30
Cross-town	20	20	30
Feeder	30	30	--

Coverage Standard

Walking distance to a route that runs at least 19 hours per day is one-quarter mile or less.

AC TRANSIT

Frequency Standard (headway in minutes)

SERVICE TYPE	**TIME PERIOD**				
	Peak	**Mid-day**	**Night**	**Owl**	**Weekend/Holidays**
Transbay Express	10-30	--	--	--	--
Transbay Basic	10-15	30-45	45-60	--	30

Coverage Standard

AC Transit provides two levels of service to the Transbay Terminal in San Francisco. Transbay Express provides medium to high frequency peak-hour service between San Francisco and selected areas of the District where there is demand for transit services which BART cannot meet. Transbay Basic provides direct service between San Francisco and major East Bay areas that are not well served by BART; the service operates all day at a medium to high frequency on a local and/or limited stop basis.

Table 4-A (cont.)

BART

Frequency Standard (headway in minutes)

LINE

TIME PERIOD	Pittsburg/ Bay Point	Dublin/ Pleasanton	Fremont-Daly City	Richmond-Millbrae	Downtown San Francisco (Combined)
Weekday Peak	5	15	15	15	2.7
Weekday Mid-day	15	15	15	15	3.8
Weekday Night	20	20	--	--	10.0
Saturday Day	20	20	20	20	5.0
Saturday Night	20	20	--	--	10.0
Sunday/Holiday all day	20	--	--	10	

Coverage Standard

BART rail service is provided between the hours of 4:00 a.m. and approximately 1:30 a.m. Monday through Friday, 6 a.m. to approximately 1:30 a.m. on Saturdays, and 8 a.m. to approximately 1:30 a.m. on Sundays and major holidays. Closings for individual stations are timed with the schedule for the last train beginning at approximately midnight.

BART has eight stations in San Francisco: Four spaced a half mile apart on Market Street and four at variable distances in the central and southern areas of the City.

CALTRAIN

Frequency Standard
Three trains per hour during peak periods, supplemented by Baby Bullet express service twice per hour during peak periods.

Sixty-minute headways on weekday midday, evening, and weekend service. Weekend service is supplemented by two Baby Bullet express trains.

Coverage Standard
The Caltrain system operates on a 77.2-mile route between San Francisco and Gilroy. There are 33 stations in the 19 cities that Caltrain serves, including two in San Francisco. San Francisco is also directly served by the Bayshore Caltrain station, located immediately south of the City/County limits in San Mateo County

Table 4-A (cont.)

GOLDEN GATE TRANSIT

Frequency Standard (headway in minutes)

SERVICE TYPE	TIME PERIOD Peak	Base
Commute Bus	60 (peak direction only)	
Basic Service Bus	60	60
Larkspur Ferry	2 hrs	2 hrs
Sausalito Ferry	2 hrs	2 hrs.

Coverage Standard

Commute bus routes operate weekdays, in the peak travel direction, between residential areas in Marin and Sonoma Counties and the San Francisco Financial District and Civic Center.
Basic service routes operate all day, seven days a week, between the Transbay Terminal and Civic Center in San Francisco and various suburban centers within Marin and Sonoma Counties.

Commute bus service will be considered in the commute and/or reverse-commute directions along service corridors with a demonstrated or projected daily ridership that supports at least two round-trips carrying 30 passengers per trip on average (120 passengers per day) when resources are available to improve service.

On ferries, improved headways will be considered in cases where the maximum load factor is exceeded and resources are available to improve service.

SAMTRANS

Frequency Standard (headway in minutes)

SERVICE TYPE	TIME PERIOD Peak	Base
Commute Bus	30	--
Basic Service Bus	30	60
Trunk Bus routes (El Camino)	15	30

Coverage Standard
Within walking distance (0.25 mile) of existing route, which covers the majority of urbanized San Mateo County.

TABLE 4-B

1999 PROPOSITION E SERVICE STANDARDS AND GOALS (MUNI)

STANDARD	FY 99/00 Actual	FY 02/03 Goal	FY 02/03 Actual	FY 03/04 Goal	FY 03/04 Actual	FY 04/05 Goal	FY 04/05 Actual	FY 05/06 Goal	FY 05/06 Actual	FY 06/07 Goal	FY 06/07 Actual	FY 08/09 Goal	FY 08/09 Actual	FY 09/10 Goal	FY 09/10 Actual	FY 10/11 Goal	FY 10/11 Actual	FY 11/12 Goal	FY 12/13 Actual
Vehicles that run on time[11]	46%	75%	71%	85%	68%	85%	71%	85%	69%	85%	71%	85%	73.3%	>85%	73.5%	>85%	73%	85%	60.4%
Scheduled service hours delivered	95.6%	97.5%	94.5%	98.5%	97.3%	98.5%	94.3%	98.5%	94.2%	98.5%	94.3%	98.5%	97%	>98.5	96.6	>98.5	97%	98.5%	94.7%
Vehicles too full to board	0.15%	<5%	1.62%	<5%	2.11%	<5%	0.40%	<5%	1.60%	<5%	1.30%	<5%	AM: 3.9% PM: 2.8%	N/A	AM: 4.5% PM: 4.4%	<4%	AM: 5.2 % PM: 8.3%	<4%	AM: 6.5 % PM: 7.2%
Peak period load factors (% of capacity)	Various	No greater than 85%	2 lines exceeded goal	No greater than 85%	3 lines exceeded goal	No greater than 85%	6 lines exceeded goal	No greater than 85%	7 lines exceeded goal	No greater than 85%	14.9% of lines exceeded goal	No greater than 85%	TBD in Next SRTP	TBD in Next SRTP	TBD in Next SRTP	TBD in Next SRTP	TBD in Next SRTP	TBD in Next SRTP	TBD in Next SRTP
Actual headways vs. scheduled	45%	85%	755%	85%	69%	85%	69%	85%	60%	85%	61%	85%	60.2%	>85%	60.1%	>85%	64.7%	85%	64.7%
Vehicle availability	99.6%	98.5%	99.6%	98.5%	99.0%	98.5%	98.4%	98.5%	98.3%	98.5%	99.1%	99.0%	TBD in Next SRTP	TBD in Next SRTP	TBD in Next SRTP	TBD in Next SRTP	TBD in Next SRTP	TBD in Next SRTP	TBD in Next SRTP

Sources: San Francisco Municipal Railway FY2008 – FY2027 Short Range Transit Plan, 2008 and Prop E Annual Reports.

[11] On time defined as no more than one minute early or four minutes late as measured against a published schedule.

CHAPTER 5

Travel Demand Management Element

KEY TOPICS

- Legislative Requirements
- Legislative Intent and Application to San Francisco
- City TDM Policy Framework
- TDM Requirements and Programs
- Strategic Initiatives
- Work Program

5.1 Legislative Requirements

California Government Code Section 65089 (b)(3) requires development of a "...travel demand element that promotes alternative transportation methods, including, but not limited to, carpools, vanpools, transit, bicycles, and park-and-ride lots; improvements in the balance between jobs and housing; and other strategies, including, but not limited to, flexible work hours, telecommuting, and parking management programs." Parking cash-out programs can be considered as well.

5.2 Legislative Intent and Application to San Francisco

The travel demand management (TDM) element is a key feature of the CMP legislation. While the land use impacts analysis program and level-of-service monitoring activities fulfill primarily a diagnostic function, identifying potential or actual congestion problems so that solutions can be developed, the travel demand management element encourages the local policy, coordinated at the subregional (county) level, explicitly promoting changes in trip-making behavior.

5.3 City TDM Policy Framework

While San Francisco does not have an official citywide travel demand management ordinance, over the last three decades the City has adopted a variety of policies designed to discourage travel by single-occupant automobile and promote other modes of transportation. These policies allowed the city to accommodate growth in travel demand without proportionate investments in highway and street capacity. In 1973, the City Planning Commission and the Board of Supervisors adopted the Transit First policy, giving priority to transit rather than accommodating the single occupant automobile. Over the next twenty years, Transit First has evolved into a set of policies advocating travel demand management and prioritization of alternative modes. The City's Transit First Policy is documented in the City Charter, the Transportation Element of the City's General Plan, the Planning Code, and other City ordinances.

The General Plan's objectives and policies that focus on the Transit First policy as well as regional Transportation Control Measures designed to achieve air quality objectives are the policy framework for TDM programs implemented through the Capital Improvement Program. As described below, the Transportation Authority is currently partnering with relevant City agencies to undertake the San Francisco TDM Partnership Project. One of

the outcomes of the TDM Partnership Project is an updated policy framework for TDM in San Francisco to better reflect and support coordinated activities across the City. See Section 5.5.1 for more details.

5.3.1 | Housing and Employment Balance

Downtown San Francisco has the densest concentration of commercial activity and employment in the Bay Area region. Much of the downtown employment growth occurred in the 1970-79 period. During that time about 100,000 new jobs were created and about 11,300 net new residential units were built in the City. For each 100 new jobs created in the city about 11 net new residential units were built during this period. This attracted many new workers from the region and significantly increased the number of suburban commuters into the City.

During the 1980s the rate of downtown employment growth decreased, but at the same time, only about 87 net new housing units were built for every 100 new jobs created during this period. This trend continued through the early 1990s until the dramatic employment growth of the late 1990s occurred, which was accompanied by only a modest increase in residential units.

In recent years, the City has promoted new housing in conjunction with new office developments. Presently new office buildings above 25,000 square feet in the downtown area are subject to housing requirements: Section 313 of the Planning Code, the Office/Affordable Housing Production Program (OAHPP). The project sponsor is required to either build housing at a rate of 38.6 units per 100,000 square feet of office, or pay a housing developer to construct housing, or pay an in-lieu fee to the city-wide Affordable Housing Fund. OAHPP requires that a substantial portion of the units to be allocated for low or moderate-income housing.

Extensive rezonings undertaken in the city since the 1980s have also actively promoted new residential development. The Downtown Plan, as well as the plans for Rincon Hill, North of Market, Chinatown, Neighborhood Commercial, Van Ness Avenue, South of Market, and South Beach, all have measures to retain and increase residential development. The Mission Bay plan area alone will add several thousand new residential units in conjunction with commercial development. More recently, the Market/Octavia, Eastern Neighborhoods, Transbay, Parkmerced, Treasure Island, Hunters Point Shipyard/Candlestick Point, Central SoMa, and Visitacion Valley/Schlage Lock Plans have set the foundation for the production of tens of thousands of new housing units.

5.3.2 | Transportation Control Measures

In 1991 as required by the California Clean Air Act (CCAA), the Association of Bay Area Governments (ABAG), the Bay Area Air Quality Management District (BAAQMD), and the Metropolitan Transportation Commission (MTC) jointly prepared the Bay Area Clean Air Plan, which included measures to reduce the total *number of trips* and miles traveled, ("Transportation Control Measures," or TCMs). The most recent Plan, the *2010 Bay Area Clean Air Plan*, was adopted by BAAQMD in March 2010. The Plan for the first time addresses greenhouse gases, as well as ozone, particulate matter, and air toxics. It also included new and revised TCMs.

The Bay Area is currently not in attainment of Federal PM 2.5 particulate matter standards under the Clean Air Act. In order to be eligible to receive federal transportation funds, the region must prepare a PM2.5 State Implementation Plan to achieve attainment by December 2014.

Local agencies are expected to incorporate TCMs into planning and implementation for transportation and land use programs. The region, through the MTC, is held responsible for overall progress toward the stated goals. The CMP process provides an opportunity to integrate local planning and programming into the regional air quality planning process. Appendix 10 lists the currently adopted regional TCMs, and discusses how San Francisco's congestion management strategies contribute to, or reinforce, these measures.

In 2012, the Governor signed SB 1339 into law, authorizing a four-year program to enable BAAQMD and MTC to jointly adopt a regional commute benefit requirement. The regional ordinance was largely modeled after the San Francisco ordinance (see Commuter Benefits Program, section 5.4.6) and will apply to employers with fifty or more full-time employees in the region (the local ordinance applies to employers in San Francisco with at least twenty employees nationwide). The legislation will require employers to offer their employees one of the following:

- The option to pay for their transit, vanpooling or bicycling expenses with pre-tax dollars, as allowed by federal law;
- A transit or vanpool subsidy up to $75 per month
- A free shuttle or vanpool operated by or for the employer; or
- An alternative program that provides similar benefits in reducing single-occupant vehicles.

BAAQMD and MTC are currently drafting policy and fine-tuning how the policy will be implemented. The San Francisco Department of the Environment (SFE) is working with the region to coordinate both the local and regional ordinances for seamless implementation and program management.

5.3.3 | Objectives in the General Plan

The Transportation Element of the General Plan lays out the City's policy of transit-oriented solutions for accommodating growth in travel demand and discouraging single-occupant automobile travel:

- Objective 3: Maintain and enhance San Francisco's position as a regional destination without inducing a greater volume of through automobile traffic.
- Objective 4: Maintain and enhance San Francisco's position as the hub of a regional, city-centered transit system.
- Objective 7: Develop a parking strategy that encourages short-term parking at the periphery of downtown and long-term intercept parking at the periphery of the urbanized bay area to meet the needs of long-distance commuters traveling by automobile to San Francisco or nearby destinations.
- Objective 10: Develop and employ methods of measuring the performance of the city's transportation system that respond to its multi-modal nature.
- Objective 11: Establish public transit as the primary mode of transportation in San Francisco and as a means through which to guide future development and improve regional mobility and air quality.
- Objective 16: Develop and implement programs that will efficiently manage the supply of parking at employment centers throughout the city so as to discourage single-occupant ridership and encourage ridesharing, transit and other alternatives to the single-occupant automobile.
- Objective 17: Develop and implement parking management programs in the downtown that will provide alternatives encouraging the efficient use of the area's limited parking supply and abundant transit services.
- Objective 20: Give first priority to improving transit service throughout the city, providing a convenient and efficient system as a preferable alternative to automobile use.
- Objective 21: Develop transit as the primary mode of travel to and from downtown and all major activity centers within the region.
- Objective 23: Improve the city's pedestrian circulation system to provide for efficient, pleasant, and safe movement.
- Objective 27: Ensure that bicycles can be used safely and conveniently as a primary means of transportation, as well as for recreational purposes.
- Objective 28: Establish parking rates and off-street parking fare structures to reflect the full costs, monetary and environmental, of parking in the city.
- Objective 32: Limit parking in downtown to help ensure that the number of auto trips to and from downtown will not be detrimental to the growth or amenity of downtown.

- Objective 34: Relate the amount of parking in residential areas and neighborhood commercial districts to the capacity of the city's street system and land use patterns.

5.4 TDM Requirements and Programs

Current TDM strategies in San Francisco primarily focus on employers, with strategies that include covering the whole or partial cost of a transit commute as a pre-tax employee benefit ("commuter benefits"); encouraging employers to offer employees the option of "cashing out" their subsidized parking space and taking transit, biking, walking, or carpooling to work; guaranteeing emergency rides home for people who commute by transit; promoting alternative modes of transportation – such as transit, biking, walking, and ridesharing – for commute trips as well as for trips during work hours; and allowing employers to offer employee shuttles for work trips not well served by the regional transit network or for connections to regional transit.

5.4.1 | Management and Brokerage Services

Transportation Management Programs (TMPs) and Transportation Brokerage Services (TBS) are required under Section 163 of the Planning Code for office buildings in the greater downtown area and the South of Market area. Outside of the downtown area, these programs apply to office and commercial-industrial districts such as the Mission Bay Specific Plan area. Major institutions (e.g., hospitals and universities) subject to institutional master plans can also be required to provide on-site TMP and TBS, depending on the magnitude of development and anticipated transportation impacts. These requirements are imposed when an institution requests approval of building permits.

These programs facilitate transit and rideshare commuting and are intended to minimize the transportation impacts of employment growth at major job centers.

New buildings above 100,000 square feet of gross floor area in the C-3 districts in the downtown area, and above 25,000 square feet of gross floor area in the South of Market area, are required to provide on-site TMP and TBS for the lifetime of the project.[10]

Under the Planning Code, the TMP and TBS are to be designed to:

1. Promote and coordinate effective and efficient use of transit by tenants and their employees, including the provision of transit information and sale of transit passes on-site;
2. Promote and coordinate ridesharing activities for all tenants and their employees within the structure or use;
3. Reduce parking demand and assure the proper and most efficient use of on-site or off- site parking, where applicable, such that all provided parking conforms with the requirements of Article 1.5 of this Code and project approval requirements;
4. Promote and encourage project occupants to adopt a coordinated flex-time or staggered work hours program designed to more evenly distribute the arrival and departure times of employees within normal peak commute periods;
5. Participate with other project sponsors in a network of transportation brokerage services for the respective downtown, South of Market area, or other area of employment concentration in the Eastern Neighborhoods Mixed Use Districts; and
6. Carry out other activities determined by the Planning Department to be appropriate to meeting the purpose of this requirement.

[10] See the Developer's Manual, "Transportation Management Programs in Greater Downtown: Developer's Manual for Procedures and Performance Criteria"

Under the "Developer's Manual" the project owner is required to designate a permanent Transportation Management Coordinator (TMC). For buildings with parking, the TMC must submit a Parking Management Plan (PMP) to the Planning Department. The parking plan should allocate parking among various users such as short-term, handicapped, carpools, vanpools, and bicycles and provide a plan to market preferential on-site parking for carpools and vanpools and limit long-term parking leases to employees of the building.

The TMASF Connects of San Francisco was established in 1989. TMASF is a non-profit association of building owners and managers that coordinates and facilitates implementation of the TDM programs of member buildings. Presently, more than 55 buildings are members of TMASF Connects.

As a condition of the Mission Bay Development Plan, the Mission Bay Transportation Management Association (TMA) was formed and began operating in May 2010. The TMA operates shuttle service to and from BART and Caltrain, facilitates TDM marketing, and provides information via a website. Membership includes all property owners and developers which currently includes six commercial members and seventeen residential.

Currently, a nominal level of reporting is required by project owners in regards to TMPs and TBS to the Planning Department. However, as an outgrowth of the TDM Partnership Project, we are recommending transferring the appropriate language regarding TMPs and TBS from the Planning Code to the Transportation Code. Once this occurs, SFMTA will be responsible for enforcement, and will build the capacity to conduct more through and ongoing enforcement.

The Transportation Authority's Strategic Analysis Report (SAR) on the Role of Shuttles in San Francisco's Transportation System, approved in June 2011, discusses the rationale for helping several downtown employer-based and site-based shuttles coordinate, or potentially consolidate, their operations. The SAR recommends that the San Francisco Municipal Transportation Agency (SFMTA) establish a "Shuttle Partners" coordination program and to work with these sponsors to improve the efficiency of shuttle operations. In 2011, the Transportation Authority initiated a TDM Partnership Project in collaboration with the SFMTA, the Planning Department, and SFE. Among the Partnership Project's components will be a pilot implementation of the Shuttle Partners program. See Section 5.5.1 for more details.

5.4.2 | Carpools

SFMTA encourages the use of carpools and vanpools during the morning and evening commutes. The City provides a casual carpool pick-up location on Beale Street between Howard and Folsom, adjacent to the Temporary Transbay Terminal site. At this location, there is signage indicating several East Bay destination locations.

SFMTA also administers a program through which major employers (those with Transportation Brokerage Services described above) may provide parking for employee carpool vehicles (three or more riders) in City-owned garages at a reduced rate. The City also provides a limited amount of designated on-street parking in the downtown area for registered/permitted vanpool vehicles.

5.4.3 | Carsharing

Carsharing programs are encouraged in San Francisco as a means to reduce car ownership and decrease VMT[11]. The precise number of carsharing members in San Francisco is unknown but is increasing. In 2009, the Bay Area had an estimated 10,000 total carsharing members[12]. However, in 2012, City CarShare had 15,000 active members alone[13]. In Plan Bay Area, the Metropolitan Transportation Commission (MTC) estimated a total of 60,000 carsharing

[11] Cervero, R., Golub, A., & Nee, B. (2007). City CarShare: Longer-term travel demand and car ownership impacts. Transportation Research Record: Journal of the Transportation Research Board, 1992, 70-80.
[12] Shaheen, S. A., Cohen, A. P., & Martin, E. (2010). Carsharing parking policy: review of North American practices in San Francisco, California, Bay Area Case. Transportation Reserach Record: Journal of the Transportation Research Board, 2187, 146-156.
[13] http://www.sfgate.com/business/article/As-City-CarShare-goes-electric-plug-ins-a-problem-3469985.php

members when accounting for both City CarShare and Zipcar (MTC presumed peer-to-peer services were currently too small to matter).

To further encourage carsharing, the Board of Supervisors approved an amendment to the Planning Code in March 2013 to allow developers to exceed parking maximums if new spaces are provided exclusively to carshare vehicles. Beginning in 2014, SFMTA will set aside a small portion of the 281,000 on-street spaces in San Francisco for carshare vehicles. The two-year program will allow as many as 450 spaces to be set aside in the first year and an additional 450 spaces to be set aside in the following year.

5.4.4 | Bikesharing

The first phase of the regional Bay Area Bike Share program opened on August 29, 2013 with 700 bikes at 70 stations in San Francisco and along the peninsula as a pilot program of the Bay Area Air Quality Management District. Half of the bikes are in San Francisco, concentrated around downtown and SoMa. In early 2014, the program will be expanded with an additional 150 bikes placed in nearby neighborhoods to the existing program. The city is actively looking at efforts to further expand the program to increase access and usability of transit and provide a new option for increased mobility.

5.4.5 | Parking Management

The General Plan, Planning Code, and Zoning Code guide parking management in San Francisco. San Francisco's existing parking policies are intended to support the city's development, and have been especially successful in the downtown area by limiting the provision of parking provided with new office development. Parking policies are also designed to support the City's Transit First policy through a combination of regulatory controls, revenue transfers, regulations, and incentives. The San Francisco Transportation Plan and Prop K Expenditure Plan category D1 provide policy guidance and funding for parking management initiatives. In November 2007, San Francisco voters approved Proposition A, which shifted responsibility for parking regulations, fees, and fines from the Board of Supervisors to SFMTA.

In 2007, the Transportation Authority and the Metropolitan Transportation Commission (MTC) applied for and subsequently received a U.S. Department of Transportation (USDOT) Urban Partnership Program (UPP) grant, which includes $19.4 million for a demonstration of variable parking pricing as part of the Federal initiative to fight congestion. SFMTA is leading the implementation of the variable parking pricing pilots through the SF*park* program. These pilots will demonstrate the central recommendation of the Transportation Authority's On-Street Parking Management and Pricing Study (approved in September 2009) to better manage scarce and valuable curbside space through variable parking pricing.

SF*park*

The SF*park* pilots, launched in 2010 and funded by a U.S. Department of Transportation (USDOT) Urban Partnership Program (UPP) grant, utilize new pricing approaches and technology to improve the management of San Francisco's parking supply in pilot neighborhoods in the city. The pilot areas include Civic Center/Hayes Valley, the Financial District, SoMa/Mission Bay, the Mission, Fisherman's Wharf, the Fillmore and the Marina. The first rate adjustment at on-street automobile meters took place in summer 2011. By making it easier to find a legal parking space, SF*park* is intended to reduce excess vehicular circulation caused by drivers searching for parking and double parking, often obstructing traffic and slowing transit. The program includes new networked parking meters, parking occupancy sensors, and parking information systems. The SF*park* pilots include approximately 25 percent of the City's metered parking supply, as well as more than ten City-owned garages.

The SFMTA has installed sensors at each parking space that is part of the pilot to identify whether the space is occupied. Based on the occupancy data collected, meter rates are adjusted according to parking demand with the goal of achieving occupancy rates of between 60 and 80 percent on each block. Rates vary by location and time of day, and between weekdays and weekends. Rates for each location and time period are adjusted no more than once a month, with a $0.25 increase if occupancy is above the target range, and a $0.25 or $0.50 decrease if occupancy is

lower. Management of parking in City-owned garages is coordinated with these on-street price changes, with adjustments made in a similar fashion.

The SFMTA carried out its eighth demand-responsive rate adjustment on October 1, 2013. At that time, 93 percent of garage hourly rates stayed the same, indicating that those rates are helping achieve the occupancy rate goal. Seven percent of the garage hourly rates increased on October 1, where parking demand has been high and occupancy rates are over 80 percent. A full evaluation of the project is currently being conducted and is expected to be completed in late spring.

5.4.6 | City TDM Programs

The San Francisco Department of Environment (SFE) currently conducts many of the City's TDM activities. SFE receives funds for its activities from a combination of sources, including Prop K sales tax funds administered by the Authority.

SFE's Clean Transportation Program includes multiple subprograms that advance the City's TDM goals. The Clean Transportation Program has four components:

1. **Commuter Benefits Program.** The City and County of San Francisco has offered its employees a pre-tax commuter benefits program since 1999. SFE promotes commuter benefits programs and services to private employers throughout the City.

   Pre-tax and subsidized commuter benefits are made possible by tax code changes adopted by the federal government. The benefit must be obtained through participating employers. When an employer offers a pre-tax benefit, an employee can deduct up to $240 per month from their paycheck to pay for transit, and vanpool expenses. Because no taxes are paid on the money deducted, an employee saves up to 40 percent on the cost of transit tickets or vanpool fare. An employer saves money through a reduction payroll taxes. Benefits are directly loaded to participant's Clipper Card or commuter card provided by the benefits vendor, or delivered in the form of vouchers for vanpool users. This incentive increases the appeal and decreases the cost of using transit or vanpool as the commute mode, ultimately resulting in mode shift, reduced traffic vehicle miles traveled, and improved air quality.

2. **Emergency Ride Home Program**. SFE's Emergency Ride Home (ERH) program promotes sustainable commuting by ensuring a free or low-cost ride home in cases of emergency. The program pays for a ride home for employees of registered businesses in the event of illness, severe crisis, unscheduled overtime, or disruption of carpool or vanpool schedules. The program is designed to remove some of the risks and reliability concerns associated with the choice of carpooling or relying on transit service for the commute trip. SFE promotes the ERH program to City employees and all San Francisco employers and commuters. As of October 2013, over 480 San Francisco businesses covering 80,000 commuters are enrolled in the program.

3. **CityCycle Program.** SFE has administered and promoted a bicycle fleet program, CityCycle, since 2005. The aim of the program is to convert a portion of the vehicle fleet of the City and County of San Francisco to bicycles through departmental efforts supplemented by targeted promotion. A Transportation Fund for Clean Air (TFCA) grant funds the bicycles, trailers, locks, helmets, and bike maintenance plan for bicycles in the City's fleet. SFE staff administers the program, including outreach to all City staff making a significant number of vehicle trips to accomplish their work duties.

   Over 500 bicycles have been procured for City employees through the Clean Air Program since 2005. City employees use these bicycles for work-related trips, thereby reducing vehicles miles and the need for City fleet motor vehicles

4. **Regional Ridesharing Program.** The Metropolitan Transportation Commission (MTC) delegated the responsibility for providing employer outreach services for its Regional Rideshare Program to SFE on July 1, 2008. SFE pursued delegation of outreach services in order to consolidate TDM-related employer

outreach into one contact point in the city and to offer a more tailored menu of sustainable transportation modes to San Francisco employers and commuters.

SFE's responsibilities as a delegated agency include:

- Identifying employers that do not have TDM programs or are not aware of the services provided through Regional Rideshare Program to introduce these employers to TDM.
- Encouraging and assisting employers that do not have TDM programs to implement programs at their worksite(s), including use of the Regional Rideshare ride-matching system.
- Working with employers that may already have TDM programs and assisting them to improve the quality and substance of the products and services they offer.
- Communicating with employers about City and regional TDM services and other regional programs.
- Maintaining an employer outreach database that includes key employer information.
- Implementing the interface of the Regional Rideshare ride-matching system so that visitors to the SFE TDM website will have direct access to the regional ride-match tool.
- Participating in and promoting regional marketing campaigns to employers in San Francisco.

In August 2008, the City enacted a landmark Commuter Benefits Ordinance (CBO), which became effective on January 19, 2009. The ordinance requires businesses with locations in San Francisco and more than 20 employees to offer transit, vanpool, and bicycle programs to their eligible employees. Over 1,200 businesses have registered to offer commuter benefits to their employees specifically because of the ordinance. Another 1,800 businesses reported that they already offered a commuter benefits program, regardless of the ordinance. SFE will continue its promotional and outreach activities to reach out to businesses with less than 20 employees, as they are not covered by the ordinance. As mentioned in section 5.3.2, the region has adopted a CBO ordinance, similar to San Francisco's but applicable to employers with 50 or more employees in the Bay Area. As a result, SFE will continue to work with employers with less than 50 employees but will coordinate with the regional for employers with 50 or more employees.

SFE is also part of the Safe Routes to School (SRTS) partnership, and promotes walking, biking, transit and carpooling for school commuting through an online ridematching system administered by the Metropolitan Transportation Commission (MTC) called SchoolPool. Activities include direct outreach to public and private schools on sustainable school commuting and providing materials and assistance to schools to help manage congestion. Over the past two years, SFE has provided direct outreach to 50 schools and has succeeded in registering over 500 families in the SchoolPool system.

5.5 Strategic Initiatives

A central theme of the Transportation Authority's 2040 San Francisco Transportation Plan (SFTP) is the need for proactive transportation system and demand management in light of projected employment and housing growth in the San Francisco Bay Area's core urbanized areas. The SFTP analyses found that, in the absence of strategic investments and demand management policies, increasing automobile use will result in mounting traffic congestion, while transit will experience declines in performance, reliability, and mode share. In addition to establishing investment priorities, the SFTP stresses the need to pursue innovative policies to fulfill transportation objectives and to support broader goals, including quality of life and environmental protection.

5.5.1 | TDM Partnership Project

In December 2009, the MTC adopted the Bay Area Climate Initiatives (BACI) program as part of its framework for programming certain federal funds. Within the BACI program, the Innovative Grants Program is one of the competitive grant programs managed by MTC to support high-impact, innovative projects with the greatest potential to reduce greenhouse gas emissions (GHGs) that could be replicated on a larger scale around the region. In August

2010, the Transportation Authority, in partnership with the SFMTA, SFE, and the Planning Department, submitted an application for the San Francisco Travel Demand Management Partnership Project (Partnership Project).

In October 2010, MTC awarded $750,000 in federal Congestion Mitigation and Air Quality Improvement Program (CMAQ) funds to the Transportation Authority for the Partnership Project.

The purpose of the Partnership Project is to create an innovative and mutually-reinforcing set of TDM resources and activities at the community level, in order to measurably reduce emissions of greenhouse gases (GHGs) and criteria pollutants. Specifically, the project goals include:

- Advance TDM programs that are effective, scalable, and sustainable over time.
- Build partnerships with and among private and institutional actors to achieve more efficient and wider-spread mode-shift impacts.
- Improve the City's capacity to design and deliver effective TDM strategies in a coordinated manner.
- Strengthen the case for TDM in San Francisco, advance methods for measuring the success of TDM approaches, and document project activities and evaluation findings to support learning in other jurisdictions.

The Project will advance these goals through four main areas of activity:

1. Policy Coordination: Reviewing and revising existing TDM policies and programs at each agency and across agencies in a coordinated fashion to meet common goals and objectives, and establishing a consistent policy framework for subsequent implementation of the Integrated TDM Partnership subprojects.
2. Private Employer Shuttle Partnership Program: Improved planning and management capacity to accommodate private employer shuttles while minimizing negative impacts on Muni operations.
3. Employer Parking Management: Pilot deployment of employer-based parking management strategies, focused on a parking cash-out approach.
4. Transportation Working Groups: This component will involve technical assistance and collaboration with geographic and market sector groupings of employers/institutions, focused on developing TDM initiatives of mutual interest such as rideshare, parking management, shuttle coordination, transit pass marketing, and other ways to decrease drive-alone travel.

All activities are entering the implementation stage in 2013 or early 2014, with evaluation wrapping up through 2014.

5.5.2 | Congestion Management Planning and Pricing

Mobility, Access & Pricing Study

In December, 2010, the Transportation Authority Board approved the final report of the San Francisco Mobility, Access and Pricing Study (MAPS). The MAPS feasibility study assessed the potential for pricing to manage travel in San Francisco's most congested core areas (generally, the northeast portion of the city). In addition to detailed technical analyses and extensive interagency consultation, public outreach and stakeholder involvement were central components of the study.

MAPS identified the "Northeast Cordon" as the congestion pricing scenario with the highest performance. The Northeast Cordon program would yield significant benefits with manageable impacts. The program would entail a weekday peak-period charge of about $3.00 for private vehicles crossing in or out of the cordon area. The cordon area's approximate boundaries are Laguna, Guerrero, and 18th Streets and the northeast waterfront (Bay Bridge access points). Fee revenues would be reinvested in a comprehensive package of multimodal improvements focused on improving travel conditions and options for affected travel corridors. The result would be 12 percent fewer vehicle trips in the cordon area during peak hours, reduction of peak-period congestion delay by more than 30 percent, and increased surface-running transit speeds of up to 20 percent in affected corridors. The program would also reduce surface transportation greenhouse gas (GHG) emissions within the priced area by 16 percent (5 percent citywide), and decrease particulate matter (PM2.5) pollutants by up to 17 percent.

MAPS identified steps and issues to be addressed to undertake further planning and analysis of a congestion pricing program for San Francisco. These include: analyzing innovative policies such as robust area-wide parking pricing/management as an alternative or companion to roadway pricing (see Parking Pricing and Regulation Study below); completion of State and Federal environmental review and alternatives analysis leading to selection of a locally preferred alternative; obtainment of legislation to authorize pricing activities and to designate a lead agency and governance structures for oversight and operations of a pricing program; development of system design and integration requirements; selection of a procurement/financing method and program contractor; execution of operating agreements with regional partner agencies; and construction of a pricing system and associated mobility improvements prior to the start of operations.

In 2012, San Francisco's Business Council on Climate Change (BC3) convened a Congestion Management Working Group to discuss the connections between businesses and various transportation strategies in San Francisco's climate strategy. The working group produced a paper, "Business Perspectives on Congestion Management in San Francisco," in February 2013. In it, the group made a number of recommendations and requests of the city. Recommendations included:

- Expand the conversation with business groups beyond greenhouse gas reductions and show how managing congestion will create economic benefits for business.
- Provide transparent data and clear information about policy goals, implementation, and benefits of policies.
- Improve transit significantly before implementing congestion pricing, including clearer information and better communication about transit options.
- Link congestion pricing to the entire city's traffic flow and to parking strategies throughout the city.
- Enforce existing parking laws, including the use of dedicated handicapped spaces, which may require a change in cultural thinking about parking entitlements.
- Continue active ongoing engagement with businesses, including pilot projects.

The report also included a number of other specific recommendations for the city to consider as it moves forward with its study of congestion pricing, including detailed ideas on the specifics of what congestion pricing would entail in San Francisco as well as related issues such as parking cash-out, the need for bicycle and pedestrian-friendly areas, and the contribution of restrictions on delivery times to congestion.

Parking Pricing and Regulation Study

The Transportation Authority initiated the Parking, Pricing and Regulation Study in Summer 2013 in partnership with the San Francisco Municipal Transportation Agency. The Study's purpose is to follow through on feedback received from the business community during the Mobility, Access, and Pricing Study regarding the potential for parking-based regulation to achieve similar congestion reduction benefits as cordon pricing. The Study will explore how parking management, focused on private supplies of off-street parking, could reduce roadway congestion and shift trips to walking, cycling, and transit. The Study will conduct data collection to better understand the quantity and other characteristics of private supplies of parking, and develop and evaluate different policy alternatives for their effectiveness in achieving these goals. The Study will continue through calendar years 2013 and 2014.

Core Network Circulation Study

As a sub-study to the San Francisco Transportation Plan (see 5.5.3), the Transportation Authority conducted a study of the cumulative effects of various proposed transportation and land use plans on the core of San Francisco (the greater downtown area). The Core Network Circulation Study found that the combined plans, which would add many more housing units and jobs to the area, could result in gridlock on downtown streets from resulting car demand. It makes several recommendations for demand management and mobility improvement strategies, but finds even these may not be enough to avoid gridlock should all proposed plans be implemented. The study discussed ways to make transit, walking, and cycling effective travel modes in extremely congested conditions and found that congestion pricing would have the largest impact on decreasing VMT in the core.

Treasure Island Mobility Management Agency

The Treasure Island Transportation Management Act of 2008 (AB 981) granted the San Francisco Board of Supervisors the authority to create or designate a Treasure Island-specific transportation management agency to implement the Treasure Island Development Program's transportation plan. In October 2011, the Transportation Authority Board recommended to the Board of Supervisors and the Treasure Island Development Authority (TIDA) that the Transportation Authority be designated as the Treasure Island Mobility Management Agency (TIMMA). Subsequent resolutions tasked the Transportation Authority with advancing agency formation documents, planning, and grant-writing.

The purpose of the TIMMA is to implement a comprehensive and integrated program to manage travel demand on the island as development occurs. The centerpiece of this innovative approach to mobility is an integrated and multi-modal congestion pricing demonstration program that applies motorist user fees to support enhanced bus, ferry, and shuttle transit, as well as bicycling options, to reduce the traffic impacts of the development on the island. As described in AB 981, the goals of the transportation program are to:

- Develop a comprehensive set of TDM programs to encourage and facilitate transit use and to minimize the environmental and other impacts of private motor vehicles traveling to, from, and on Treasure Island.
- Manage Treasure Island-related transportation in a sustainable manner, to the extent feasible, with the goal of reducing vehicle miles traveled and minimizing carbon emissions and impacts on air and water quality.
- Create a flexible institutional structure that can set parking and congestion pricing rates, monitor the performance of the transportation program, collect revenues, and direct generated revenues to transportation services and programs serving Treasure Island.
- Promote multimodal access to, from, and on Treasure Island by a wide range of local, regional, and statewide visitors by providing a reliable source of funding for transportation services and programs serving Treasure Island that will include bus transit service provided by the City's municipal transportation agency, or its successor agency, and ferry service.

The TIMMA will be responsible for overseeing implementation of numerous TDM and transportation activities, including (but not limited to):

- Public information and transportation coordination services for residents and employers of Treasure Island
- Contracting of transit services, including: ferry service, East Bay bus service, SFMTA bus service, shuttle service
- Demand responsive on-street parking pricing
- Congestion pricing related to the on-ramps for the San Francisco Oakland Bay Bridge
- Carshare services
- Bicycle facilities (fleets)
- Carpool/vanpool services
- Guaranteed ride home services

Supported by a regional Priority Development Area planning grant and a federal Value Pricing Pilot Program planning grant, with matching funds from TIDA, the Transportation Authority is completing the planning analysis for the congestion pricing program and other demand management components of the Treasure Island Transportation Program. The goal of this initial study is to complete the planning work necessary to set up system design and operating agreements, leading to the implementation of congestion pricing on Treasure Island in time to commence the program concurrently with the occupation of the first 1,000 new housing units on Treasure Island.

The specific tasks to be completed during the study include policy development to answer questions such as fee structure and discount rules, development of a cost estimate for system components, and establishment of a funding and implementation plan.

The study will build on the significant community outreach and stakeholder involvement that has already gone into creation of the development plans for Treasure Island, as well as the technical expertise the Transportation Authority has gained in completing the Mobility Access and Pricing Study on cordon pricing alternatives in the greater downtown area of San Francisco.

The Study findings will support the start of preliminary engineering activities in 2014, including the development of a Concept of Operations, Systems Engineering Management Plan (SEMP) and developing system requirements.

5.5.3 | San Francisco Transportation Plan

The San Francisco Transportation Plan identifies TDM as a cost-effective investment to move closer to the plan's goals. Therefore, the SFTP recommends a 20 percent increase in funding in the Investment Plan and a 100 percent increase in funding in the SF Investment Vision scenario. The Investment Plans also recommend the implementation of congestion pricing in the northeast cordon and on Treasure Island. Finally, the SFTP offers specific TDM policy recommendations which are to be consistent with the TDM Partnership Program recommendations.

SFTP Policy Recommendations Related to TDM

- Implement the recommendations of the TDM Partnership Program including a SFMTA Shuttle Partners Program
- Explore an area-wide parking cap or employer trip reduction programs for SoMa/Mission Bay
- Develop TDM program that touches employers, visitors, schools, and residents
- Develop proactive employer outreach and incentive programs in the downtown core, southwest, and southeast parts of the city, and investigate formation of transportation management associations (TMAs) in these areas
- Increase enforcement efforts to ensure TDM measures included in existing development agreements are implemented, and step up enforcement of the city's commuter benefits ordinance
- Support SFMTA's regulatory programs to allow safe integration of third party providers
- Support development and implementation of the Transportation Sustainability Program
- Further evaluate potential congestion pricing program for the Northeast Cordon

5.6 Work Program

- Complete the planning analysis for congestion pricing and other demand management components of the Treasure Island Transportation Program, including developing policy for fee structure and discount rules, developing a cost estimate for system components, and establishing a funding and implementation plan. ,
- Complete TDM Partnership Project, implementing all pilot projects and determine effectiveness through evaluation to consider for further expansion.
- Through the TDM Partnership Project, complete and implement the TDM strategy, developing an integrated TDM framework to guide the development of TDM activities across the City.
- Begin implementation of the recommendations in the SFTP through the Early Action Program (the first five years of the SFTP).

- Continue to work on regional TDM initiatives, coordinating with both regional entities (BAAQMD and MTC), and neighboring local agencies.

CHAPTER 6

Land Use Impacts Analysis Program

KEY TOPICS

- Legislative Requirements
- Legislative Intent and Application to San Francisco
- Institutional Framework for a CMP Land Use Analysis Program
- Neighborhood Transportation Planning
- Infill Opportunity Zones
- Transportation Impact Analysis
- Work Program

6.1 Legislative Requirements

The California Government Code section 65089(b)(4) requires that Congestion Management Programs (CMPs) include a program to analyze the transportation system impacts of local land use decisions. These analyses must measure impacts using CMP performance measures, and estimate the costs of mitigating the impacts. The estimates should exclude costs associated with inter-regional travel and provide credit for public or private contributions to regional transportation system improvements. The legislation specifies that land use analysis programs should be coordinated with California Environmental Quality Act (CEQA) efforts, wherever applicable.

The CMP legislation also requires the Transportation Authority, as the Congestion Management Agency, to "develop a uniform database on traffic impacts for use in a countywide transportation computer model..." that will be used "to determine the quantitative impacts of development on the circulation system..." (California Government Code section 65089(c)). The database must be consistent with the modeling methodology used by regional planning agencies, the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG), to comply with the CMP.

The Transportation Authority's GIS database, including ABAG Projections data, updated CMP networks, and numerous other data items (such as roadway level of service, transit ridership, travel behavior survey results, etc.) constitutes the uniform database for San Francisco. In addition, the Transportation Authority has an activity-based travel demand forecasting model used in combination with the uniform database. This is further detailed in Chapter 8.

In September of 2002 the legislature passed SB 1636, which is intended to "remove regulatory barriers around the development of infill housing, transit-oriented development, and mixed use commercial development" (65088(g)) by enabling local jurisdictions to designate "infill opportunity zones." These zones (IOZs) are defined as areas with compact, transit-oriented housing and mixed use in close proximity to transit service. The CMP network segments within a designated IOZ are exempt from CMP traffic level of service (LOS) standards. SB 743 revised the definition and requirements related to IOZs, as discussed in section 6.5. A map of San Francisco's IOZs can be seen in Figure 6-2.

On September 27, 2013, the governor signed into law SB 743, which revised the criteria for determining the significance of transportation impacts within transit priority areas. Transit priority areas are defined as areas within a half mile of a major transit stop, either existing, or planned, which in San Francisco comprises most of the city. Potential metrics could include vehicle miles traveled, automobile trips generated, or other measures yet to be determined, but automobile delay as measured by level of service is specifically eliminated as a significant impact on the environment in transit priority areas. Parking impacts from infill development also shall not be considered significant impacts on the environment.

6.2 Legislative Intent and Application to San Francisco

The General Plan and the City Charter are the primary institutional parameters that frame the City's process for reviewing land development impacts on the transportation network. San Francisco is a Charter City, and it has a consolidated city and county government. An eleven-member Board of Supervisors serves as the legislative body for the City's unified city and county government. The City Planning Commission (CPC) has responsibility for land use decision-making throughout the City. The Mayor appoints the seven members of the CPC. Among the responsibilities of the CPC are the following:

- Exclusive authority to act on General Plan policies and area land use plans (per City Charter);
- Holding public hearings on all appeals to Negative Declaration determinations and certification of local Environmental Impact Reports; and
- Discretionary actions on Conditional Use permits, (which can be appealed to the Board of Supervisors) and decisions by the Zoning Administrator, Discretionary Reviews, and others that can be appealed to the Board of Appeals

In addition, both the CPC and the Board of Supervisors must approve all rezoning.

The Planning Department's land use responsibilities include transportation matters. The Planning Department has primary responsibility for assessment of the transportation impacts of development proposals, and to determine consistency with land use and transportation policies in the General Plan. The existing local regulations include measures to mitigate project-specific transportation impacts within the policy and priority framework of the General Plan, the long-range transportation plan, and the Capital Improvement Program (CIP) of the CMP.

As CMA for San Francisco, the Transportation Authority ensures that the City complies with CMP requirements including land use impact monitoring. AB 1619, passed by the California State Assembly in 1994, stipulates that the CMA should prepare any countywide transportation plan. Pursuant to a December 1994 action, the Board of Supervisors directed the Transportation Authority to prepare a countywide transportation plan, and to coordinate City Departments. A Memorandum of Agreement (MOA), executed in December 1997, between the Transportation Authority and the Planning Department, outlines roles and responsibilities for developing the Countywide Transportation Plan. The most recently adopted Plan was adopted by the Board in July of 2004. The Transportation Authority is currently completing an update of the Plan, now known as the San Francisco Transportation Plan (SFTP), which is expected to be adopted by the Transportation Authority Board in December 2013.

6.2.1 | Policy Issues in Land Use and Transportation Demand

6.2.1.1 | Local Transportation Impact Analysis

The CMP-based land use analysis program links the City's land development decisions to conditions on the regional transportation system. This link already exists at the regional level in MTC's Regional Transportation Plan (RTP), which links long-range planning for transportation investment with estimates of land development based on regional demographic growth and economic development.

The City already has in place an extensive process for evaluating the transportation impacts of land development proposals. This process, which ensures the City's compliance with State and Federal environmental review requirements, is the responsibility of the Planning Department. Nevertheless, as CMA, the Transportation Authority

has a role in ensuring that the impacts of land use decisions on the transportation system are analyzed with a uniform methodology, consistent with the long-term strategic goals of the General Plan and the San Francisco Transportation Plan.

6.2.1.2 | Uniform Methodology

The Transportation Authority, as CMA, retains its own GIS database and travel demand model to analyze transportation and provide uniform assumptions for City departments. For major land use decisions, the Transportation Authority's tools are used to assess transportation impacts and ensure that the methodology used to assess them is consistent with MTC models and ABAG data.

One key aspect of the CMP approach to land use impacts analysis is that, pursuant to state law, the Transportation Authority will also be responsible for reviewing transportation analysis of specific development projects under CEQA and determining the consistency of these "sub-area" analyses with the citywide model. Examples of this role include our work to support the Bayview/Hunters Point Redevelopment Area Environmental Impact Report (EIR), the Transbay Center District Plan EIR, and the Market/Octavia Better Neighborhoods Plan EIR, and the Central SoMa Study.

The primary purpose of the land use analysis program is, therefore, to inform decisions on the supply of transportation infrastructure to the City and how the City should best spend scarce transportation dollars. This program adds no new requirements to the existing local project environmental review process, but it provides a long-term transportation investment policy context for local environmental review. It also informs decision-making in the reverse direction: as CMA, the Transportation Authority is responsible for commenting on local land use decisions and making such comments with an understanding of how land use choices will shape future transportation demand.

6.2.1.3 | Consistency with Long Term Strategic Goals of General Plan and San Francisco Transportation Plan

San Francisco has been able to maintain one of the highest levels of transit use among U.S. cities because of its relatively high-density development and because topography and geography limit vehicular access routes to and from the City.

There have been significant numbers of non-resident commuters into the city for over a century. To improve the balance of housing and jobs, during the 1980s San Francisco actively promoted new residential development. Extensive revisions to the City's General Plan and rezonings were undertaken. Each of these land use plans—the Downtown Plan, Rincon Hill, North of Market, Chinatown, Neighborhood Commercial, Van Ness Avenue, South of Market, and Mission Bay—incorporated measures to retain and enhance opportunities for residential development.

In recent years, several more area plans have been developed or adopted including: the Market/Octavia Plan, Eastern Neighborhoods Plan, Balboa and Glen Park BART Station Area Plans, the Treasure Island Plan, and the Transbay Center District Plan. In addition, housing development has been promoted by the policies of the San Francisco Redevelopment Agency and its successor agency, the Office of Community Investment and Infrastructure, in various areas, including the Rincon Point/South Beach, Yerba Buena Gardens, Transbay, the Bayview Hunters Point Redevelopment Plan Areas, Candlestick Point-Hunters Point Shipyard Phase 2, Parkmerced, and Visitacion Valley.

San Francisco's continued role as a regional employment center and its policy of housing development have had an impact on the demand for transportation in the city. A primary mission of the Transportation Authority is to strategize investment in the city's transportation infrastructure and promote the development of demand management tools to address growing travel demand. Infrastructure investment is intended both to address future growth in transportation demand and to improve the city's current transportation system. Demand management is needed to promote a balanced and cost-effective transportation system.

In past decades San Francisco's primary transportation challenge was to absorb new jobs downtown without proportionately increasing the number of workers commuting by car. That challenge was successfully met with the construction of BART and MUNI services focused on downtown commuting, combined with limits on parking provision.

Today San Francisco's transportation challenges are more varied. They are numerous and located across the city, throughout the various neighborhoods as well in core areas, which can expect not only employment growth but also extensive residential growth. Challenges include competitive transit service for non-commute and reverse commute trips; neighborhood parking management; safety for pedestrians and bicyclists; improved transit reliability and speed through the development of a transit priority network; and reducing emissions of pollution and greenhouse gasses. Increasingly, the imperative to address regional land use and transportation relationships is moving to the fore, with the targeting of resources to Priority Development Areas (PDAs) and development of a regional High Occupancy/Toll (HOT) lane system. In addition, state laws promulgated in 2006 and 2007 require greater integration of land use and transportation planning processes in recognition of the climate change challenge. Climate change issues and initiatives are discussed further in Section 6.3.5, below.

Underlying these needs is the challenge of finding new mechanisms to pay for needed transit and other improvements as development decisions are made. A discussion of the city's initiative to update transportation impact and mitigation fees is provided in Chapter 4.

NOTE: California Government Code Section 65089(b)(4) requires the land use program to assess the impacts of land development on regional transportation systems. In the 1991 San Francisco CMP this was interpreted to mean impacts on the CMP roadway network. However, the federal Intermodal Surface Transportation Efficiency Act (ISTEA), passed in 1991, explicitly requires the development of a metropolitan transportation system (MTS), including both transit and highways. As discussed in Chapter 3, MTC contracted with the Transportation Authority, acting as CMA, to help develop the MTS and to use the CMP process to link land development decisions to impacts on the MTS. For purposes of the land use analysis program, the San Francisco CMP will use the San Francisco component of the MTS, but conformance with roadway level of service (LOS) standards will continue to be assessed using the CMP roadway network, which is a subset of the multimodal MTS.

6.3 Institutional and Policy Framework for a CMP Land Use Analysis Program

6.3.1 | Prop K Mandate

When voters approved Prop K in November 2003, they approved various policies and priorities in the Expenditure Plan designed to implement San Francisco's Transit First policy, and improve the coordination of land use and transportation.

Transit investment accounts for 65 percent of the San Francisco transportation sales tax expenditure plan (74 percent if paratransit is included), and the investment program supports the City's future growth plans.

The Expenditure Plan directs the Transportation Authority to "give priority for funding to major capital projects that are supportive of adopted land use plans with particular emphasis on improving transit supply to corridors designated for infill housing and other transit-supportive land uses."

The Plan goes on to define transit-supportive land uses as "those which help to increase the cost-effectiveness of transit service by improving transit ridership and reducing traffic along transit corridors."

All projects must also demonstrate consistency with the Prioritization Criteria in the Expenditure Plan. This includes "compatibility with existing and planned land uses, and with adopted standards for urban design and for the provision of pedestrian amenities; and supportiveness of planned growth in transit-friendly housing, employment and services."

Finally, the Expenditure Plan provides funding for neighborhood planning studies and local match for regional planning and capital grants such as the Community-Based Transportation Planning (CBTP) and Transportation for Livable Communities (TLC) grant program. TLC supports transit-oriented development and funds related improvements for transit, bicyclists, and pedestrians including streetscape beautification improvements such as landscaping, lighting, and street furniture.

6.3.2 | MTC/CMA Transportation/Land Use Work Plans

MTC provides the nine Bay Area CMAs with a share of regional planning funds ("3% Planning Funds") to support local and county-level planning functions established under state and federal law. These activities include the development of the CMP.

In 2003, MTC approved the San Francisco CMA's Transportation – Land Use Coordination Work Program (T-PLUS). T-PLUS recognizes the expanded role for the CMAs in coordinating transportation and land use planning, such as through the Transportation for Livable Communities (TLC) program. Pursuant to MTC's CMA Transportation/Land Use initiative, the Transportation Authority focuses on the following activities to help integrate transportation and land use decisions:

First, the Transportation Authority prioritizes transportation planning funds and capital investments that meet performance criteria or demonstrate a strong vision for coordinated land use and transportation development.

The Transportation Authority provides technical guidance and assistance with the planning process to partner agencies, communities, and project sponsors, including neighborhood planning, thereby facilitating access to discretionary state and regional grants and providing for coordinated county-level input into the regional transportation planning process.

The Transportation Authority promotes legislative activities that encourage smart growth, more sustainable transportation and development-related investment decisions by the City and developers, and more efficient travel decisions by all transportation system users. Examples include the Transportation Authority's support of the State Resources Agency's revisions to the CEQA Guidelines Transportation Checklist and our work with local partner agencies to reform the City's CEQA transportation impact analysis process.

The Transportation Authority coordinates county-level input into the regional Sustainable Communities Strategy (SCS), the RTP, and related regional land use planning efforts.

Finally, the Transportation Authority conducts project and program delivery oversight to ensure efficient use of funds and effective project delivery.

6.3.3 | Plan Bay Area and Priority Development Areas

ABAG and MTC have been working for years to encourage the region's municipalities to plan for compact, transit-oriented development to meet the region's sustainability goals. This work was previously conducted through the FOCUS program that invited municipalities to nominate locations to be considered as Priority Development Areas (PDAs) or Priority Conservation Areas (PCAs) based on regionally established criteria. More recently, the region has adopted Plan Bay Area, the first SCS for the San Francisco Bay Area prepared pursuant to Senate Bill 375 (Steinberg). PDAs and PCAs are key "building blocks" of the region's land use strategy presented in Plan Bay Area.

San Francisco has identified twelve PDAs, generally in the eastern part of San Francisco, and generally locations that have been comprehensively planned as part of an Area Plan process. Collectively, San Francisco's PDAs make up approximately 25% of San Francisco's land area and have the capacity to take on approximately 80% of the housing growth and 60% of the job growth that has been forecast in San Francisco as a part of the Plan Bay Area process (or about 80,000 housing units out of 92,000 and 143,000 jobs out of 191,000). San Francisco's PDAs were first identified and approved by the San Francisco Board of Supervisors in 2007 and have been updated since then to reflect slight changes to boundaries. San Francisco's PDAs are shown in Figure 6-1. San Francisco has also identified four Priority Conservation Areas (PCAs): Sutro Tower, Aquavista/Twin Peaks, Bayview Radio Property, and Palou/Phelps Open Space.

Figure 6-1 Priority Development Areas in San Francisco

While encouraging more local action, MTC and ABAG have historically identified only limited funding and investment policies to support PDAs in the form of station area planning grants and an expanded Transportation for Livable Communities program. However, as a part of Plan Bay Area, the region has begun to identify funding incentives for PDAs and PCAs. In May 2012, MTC and ABAG adopted a funding framework using funds from the Cycle 2 federal Surface Transportation Program and from the Congestion Mitigation and Air Quality Improvement Program for the next four-year cycle (Fiscal Years 2012-13 through 2015-16). This includes the OneBayArea Grant program (OBAG). The Bay Area's congestion management agencies are responsible for administration of these funds to support eligible projects. OBAG funds were used to help incentivize jurisdictions that are helping fulfill the region's land use and sustainability goals in several ways:

- OBAG funds were distributed to the region's nine CMAs using a funding formula that was based 50 percent on population, 25 percent on historic housing production (with 12.5 percent of that share for affordable housing), and 25 percent on future housing growth assigned through the Regional Housing Needs Allocation (with 12.5 percent of that share for future affordable housing). While this change did not increase San Francisco's share of funding, it is an important policy direction of linking land use planning with transportation investment;
- San Francisco and the other larger CMAs were required to program 70 percent of funds to support PDAs (smaller CMAs were required to program 50 percent of funds to support PDAs).
- All jurisdictions receiving funds were required to have a certified Housing Element and have adopted a Complete Streets policy to be eligible for funds.
- Each CMA was required to create a Transportation Investment and Growth Strategy that describes how it expects to support its PDAs through transportation investment. The Transportation Authority prepared San Francisco's Transportation Investment and Growth Strategy that was adopted by the Transportation Authority Board in July 2013.

The OneBayArea Block Grant funding framework also created a new program being administered in concert with the Coastal Conservancy to support Priority Conservation Area-related planning and implementation activities.

In order to facilitate growth and transportation investments in the San Francisco's PDAs, the $2.38 million in PDA Planning funds administered by the San Francisco Planning Department (SF Planning) will be aligned with the Transportation Investment and Growth Strategy. San Francisco agencies were polled for candidate planning efforts, and SF Planning convened two meetings with San Francisco agency executive leadership to come to consensus regarding the selected planning efforts. Table 6-1 indicates the draft projects identified for funding.

Table 6-1. Draft Projects Identified for PDA Planning Funds in San Francisco

Project	PDA Supported	Funding Level
Rail Storage Alternatives Analysis & Boulevard Feasibility Study	Multiple (Mission Bay, Eastern Neighborhoods, Transbay Terminal)	$700,000
Embarcadero Multi-Modal Planning	Multiple (Port of San Francisco, Mission Bay, Eastern Neighborhoods, Transbay Terminal, Downtown/Van Ness/Geary)	$300,000
Second Street Environmental Impact Report	Multiple (Eastern Neighborhoods, Transbay Terminal, Downtown/Van Ness/Geary)	$250,000
Bayshore Station Re-location	San Francisco/San Mateo Bi-County Area	$400,000
M-Ocean View Re-Alignment Project Development, Project Study Report	19th Avenue Corridor	$500,000
Better Market Street Environmental Impact Report	Multiple (Downtown/Van Ness/Geary, Transbay Terminal, Market/Octavia)	$111,000

6.3.4 | Multi Agency Land Use and Transportation Studies

In addition to projects identified to receive PDA Planning Funds, San Francisco is leading or plans to lead several studies in which transportation is closely tied to land use development. All planned development areas are located within PDAs and involve a multi-agency approach in which the Transportation Authority has a supporting role.

Pier 30-32/Seawall Lot 330 Transportation Analysis

In September 2013, Vice-Chair Scott Wiener requested Transportation Authority staff to conduct an analysis to the transportation impacts of the Pier 30-32/Seawall Lot 330 Golden State Warriors development. Led by the Mayor's Office of Economic and Workforce Development (OEWD) in partnership with the Port of San Francisco the City is partnering with the Warriors to plan for a state of the art multi-purpose recreation and entrainment facility on Piers 30-32 and mixed use development on Seawall Lot 330. The purpose of the proposed transportation analysis is to ensure the Development Agreement includes adequate funding to support the transportation investments and policies that accommodate the proposed Development's transportation network demands. The study is expected to commence in December 2013 and be completed by Spring 2014.

4th & King Street Railyards

San Francisco is studying the feasibility of redeveloping the current Caltrain railyards at 4th St and King St. The San Francisco Planning Department completed a preliminary study of redevelopment potential in 2012 and subsequent studies are underway to analyze potential development opportunities both at the railyards themselves and in conjunction with a possible I-280 takedown scenario.

Central Subway Extension

SFMTA, in partnership with the Planning Department, is initiating an Assessment of Central Subway extension metrics and opportunities. This Assessment is in response to sketch level analysis by the SFCTA and other agencies that indicates potential significant local and network benefits from an extension of Central Suwbay to North Beach and/or Fisherman's' Wharf. Although this extension concept (and others throughout the system) will be analyzed together as part of planned Long Range Network Development analysis, this near term, 'high level assessment' will identify any near-term opportunities to maintain the viability of the project as a potential future priority, especially considering potential land use opportunities.

Depending on the recommendations of the Assessment and Long Range Network Development Study, a next step could include a larger traditional feasibility study.

Land use is a key to the feasibility of a potential Central Subway extension, in particular, the role of land use development in funding the project. This is similar to the City and SFCTA's approach to past large infrastructure projects such as Octavia Boulevard and the Transbay Transit Center.

SFMTA is leading the Assessment in partnership with the Planning Department. the Transportation Authority will provide technical assistance and support, and can advise on funding and implementation strategy..

Fillmore Fill

The purpose of this land use and transportation project is to re-connect the neighborhoods to the north and south of Geary Boulevard by removing the physical and psychological barrier that the underpass constitutes, calm traffic, improve pedestrian connectivity, and improve the Geary streetscape environment. The next step in project development is a feasibility and conceptual design study of the physical infrastructure changes, paired with a funding and implementation plan that should include a land use development element. Opportunities for improving the land uses near this node could also provide implementation funding for the transportation improvements. THe Planning Department is currently the lead agency scoping the study work; the SFCTA will play an as-needed supporting role.

Total Cost: $30 - $50 million

6.3.5| Climate Change Initiatives

AB 32, enacted in 2006, established a statewide target for greenhouse gas (GHG) emissions reduction and gave the California Air Resources Board (CARB) the authority to regulate GHG emissions, including those from private vehicles. The target reduction is to reach 1990 emission levels by 2020. In 2008, CARB approved a Scoping Plan that outlines the state's approach to reducing GHG emissions. Among other strategies, AB 32 calls for implementation of a cap-and-trade program to regulate GHGs, which commenced in January 2013.

SB 375, passed in 2008, provides a mechanism for the implementation of AB 32 for the transportation sector, which is responsible for approximately 40 percent of the state's GHG emissions. As required by SB 375, the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG) have developed Plan Bay Area the Bay Area's Sustainable Communities Strategy (SCS), described above.

Further proactive approaches that are both realistic and effective in addressing GHG reduction are needed to achieve AB 32 goals. It is also only prudent to recognize that there are limits to what can effectively be achieved in any one region. Climate change is not a local issue, and the federal government will need to play an expanded role in helping the state and region achieve GHG reductions. The effectiveness of that role will depend, in large measure, on the direction of federal climate legislation and the degree to which updates to federal surface transportation legislation will be able to secure reliable and stable revenues for transportation infrastructure projects and services, beyond what the state is able to fund in the foreseeable future.

It is inescapable that, in order for GHG reduction efforts to be effective, there will be a need to realign not just travel behavior, but locational choices for many economic activities that take place in the region. A timid approach will only produce marginal results. Local jurisdictions will be called to do their part in accepting growth, density and changes in travel behavior, and the region will need to realign its transportation investment priorities, to some extent at least, to provide funding for the infrastructure necessary to support those choices.

Locally, the City of San Francisco has adopted a citywide ordinance (81-08) that sets ambitious goals for local reduction to achieve an 80% reduction below 1990 levels by 2050. The Transportation Authority's SFTP effort is exploring strategies to meet that goal for the transportation sector, finding that efforts to significantly increase investment in non-auto transportation infrastructure and strong pricing and other demand management policies will not be enough to get the City to its GHG reduction goals, and that unprecedented behavior change is necessary. The Transportation Authority also coordinated with the San Francisco Department of the Environment (SFE) and the SFMTA on the 2011 update to the Climate Action Strategy (CAS) for the Transportation Sector, a component of the City's Climate Action Plan.

6.3.6| Regional Land Use Forecasts

For most forecasting activities, the Transportation Authority is required to use regionally-adopted projections of future Bay Area land use growth, including the distribution and nature of that growth across the region's individual jurisdictions.

In 2013, ABAG adopted its most recent regional land use forecast. The SCS Jobs Housing Connection targets San Francisco to absorb an additional 76,000 households by 2035 over the current level of 339,000 households (2005 baseline). Employment in San Francisco is projected to increase by nearly 50 percent by 2035 to more than 800,000 jobs located in the city.

The region will require bold investment and system management policies—both to achieve a future in which Bay Area growth is more focused and to reach targets that cannot be attained with land use strategies alone. The need for substantial VMT reduction to reduce climate change impacts makes transit investment a priority need, with increased funding necessary for operations, maintenance, and prioritized capital projects. Transit is most constrained in the region's core areas, as was demonstrated by the ridership increases, experienced during the gas price spike of summer 2008, moderate though they were,

System management and demand management must also begin to be more of a focus in the City's and region's investment programs. Pricing strategies, in particular, will be a crucial growth management tool and means of self-help for the region, system operators, and local jurisdictions. Pricing policies are already regionally supported through development of a regional HOT lane system and regional parking pricing initiatives.

The region must recognize the real and pressing infrastructure and service needs of core areas if the RTP/SCS and related regional planning work is to be meaningful. San Francisco is committed to playing a central role in the region's sustainable growth.

6.4 Neighborhood Transportation Planning

MTC's Lifeline Transportation Program (LTP) program has two components: a planning component consisting of various community-based transportation planning efforts, and an implementation component. The overall intent of the program is to encourage residents and other stakeholders in low income and minority communities to participate in identifying priorities for transportation improvements and ultimately to see those improvements through implementation.

As part of the planning component, MTC provides Community-Based Transportation Planning (CBTP) grants to the nine Bay Area congestion management agencies (CMAs) to help fund planning efforts in minority and low-income communities – referred to by MTC as Communities of Concern – that MTC identified in its Transportation 2030 Equity Analysis. In San Francisco, MTC has identified several Communities of Concern, which include areas in the Tenderloin, Bayview/Hunters Point, South of Market, Outer Mission, Potrero/Inner Mission, Chinatown/Columbus Avenue, and Western Addition. The Transportation Authority has incorporated these planning efforts into our Prop K-funded Neighborhood Transportation Planning Program and is in the process of developing a Neighborhood Transportation Program for each of these areas.

The Prop K Transportation/Land Use Coordination category includes funds for strengthening neighborhood transportation planning efforts, through technical assistance in the development of Neighborhood Transportation Plans (NTPs). This program is designed to build on initial transportation planning efforts by neighborhoods to identify priority needs and potential solutions. The goal of the program is help neighborhoods advance the highest priority solutions from planning studies in order to create a pipeline of grant-ready projects that have a high degree of community and agency consensus. Another objective of the program is to increase the capacity of neighborhoods and Community-Based Organizations (CBOs) to undertake neighborhood transportation planning.

6.5 Infill Opportunity Zones

Senate Bill 1636 (Figueroa), passed in 2002, granted local jurisdictions the authority to designate Infill Opportunity Zones (IOZs) in areas meeting certain specified requirements. Within a designated IOZ, the CMA is not required to

maintain traffic conditions to the automobile level of service (LOS) standard. The San Francisco Board of Supervisors adopted San Francisco's IOZ on December 8, 2009.

SB 743 (Steinberg), passed in 2013, changed the eligibility criteria for IOZ designation. Previously, local jurisdictions that met a minimize population threshold could designate an IOZ in areas that met certain criteria regarding zoning and transit proximity. Under the new requirements, jurisdictions may designate an IOZ in any area:

- That is within a half mile of a major transit stop or corridor that is included in the RTP;
- That is within a designated transit priority area within the regional SCS; and
- Where an IOZ would be consistent with the jurisdiction's General Plan and any applicable Specific Plan.

Figure 6-2 identifies the current IOZ areas in San Francisco. Under the new criteria, additional areas could be eligible for designation. See Appendix 4 for the Board of Supervisors resolution on the IOZ.

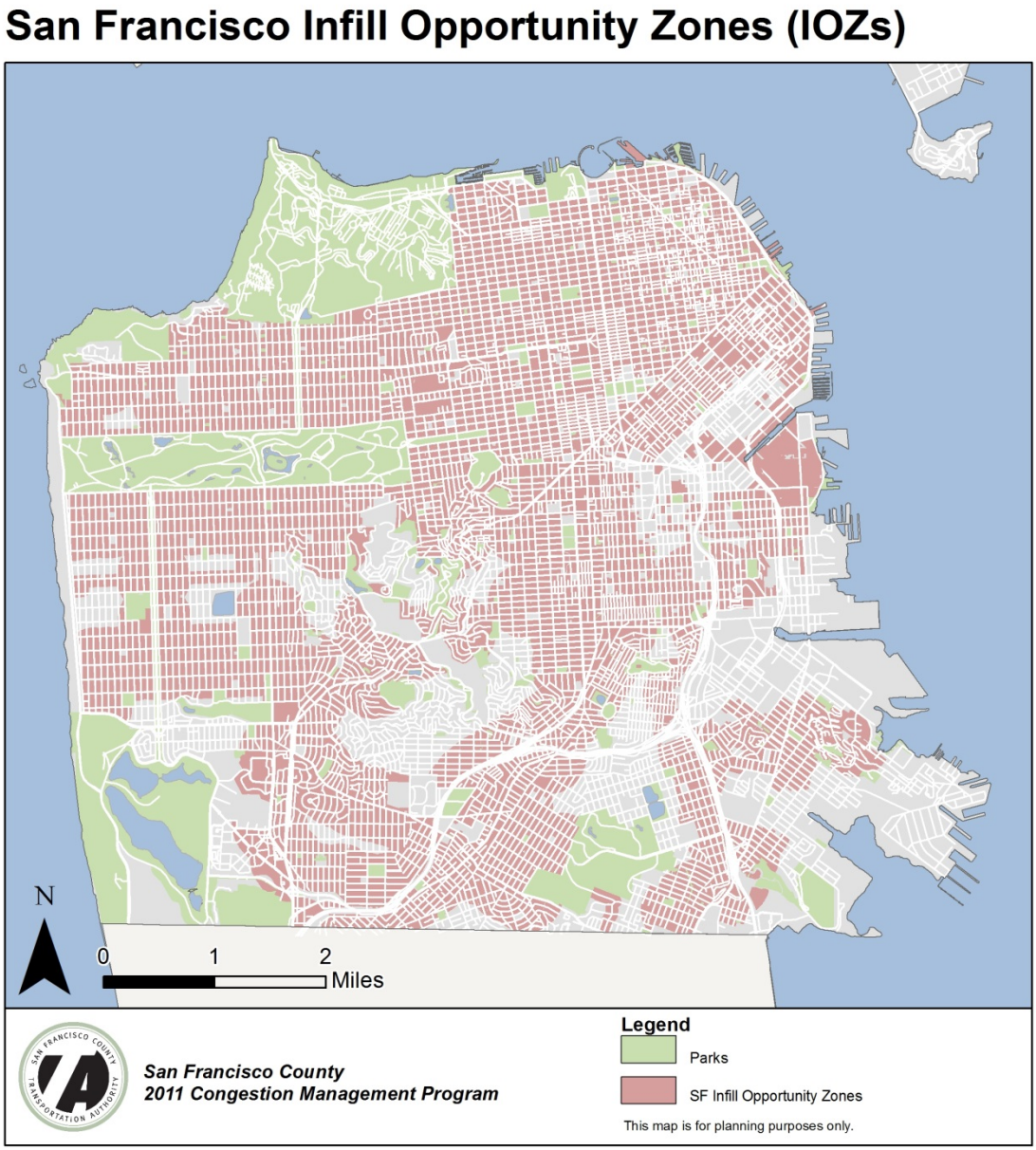


Figure 6-2 San Francisco IOZs

6.5.1| Congestion Management Agency Requirements

State congestion management law requires CMAs to establish vehicle level of service (LOS) standards for a designated countywide network of roadways (see Chapter 3). Within a designated IOZ, CMP automobile LOS standards are not applicable. Instead, an alternative metric can be applied for local analysis of transportation impacts. The Transportation Authority is coordinating with relevant City agencies through the Transit Sustainability Fee effort to develop and implement the alternative to LOS, consistent with statutory requirements. The investment strategies, program funding, and policy recommendations in the San Francisco Transportation Plan is representative of the flexible level of service mitigation options as is required under SB 1636.

6.6 Transportation Impact Analysis

San Francisco's approach to conformance with the CMP land use impacts analysis requirements is based on the existing process administered by the Planning Department. The Planning Department works from its Transportation Impact Analysis Guidelines for Environmental Review (see Appendix 8).

The Transportation Authority is currently partnering with the Planning Department and other City agencies to improve the City's CEQA transportation impact analysis methodology and process, by advancing a measure consistent with SB 743 for assessing transportation impacts.

6.6.1| Uniform Land Use Analysis Methodology

The Transportation Authority uses tools and analysis techniques that use regionally-consistent land use assumptions. For example, in updating the SFTP the Transportation Authority used land use forecasts developed by the Planning Department (subject to regional requirements for consistency with ABAG), generated new estimates of future travel demand, and tested alternative projects and investment strategies to address those future transportation needs.

6.6.2| Transit Impact Development Fee

First enacted in 1981, the Downtown Transit Impact Development Fee (TIDF) ordinance was enacted as a means to have new development pay its fair share for expanded transit capacity to serve that development. TIDF assesses a one-time fee per square foot on new or converted office space in the downtown area.

In 2004, the Board of Supervisors recognized that a significant number of new transit trips would be generated by non-residential development. The Board approved an amendment to the TIDF legislation that expanded the ordinance to include the following land uses: visitor services; medical and health services; cultural, institutional, and educational (CIE); retail and entertainment; office use; and production, distribution, and repair (PDR). The legislation was also amended to include all new developments citywide, rather than just in the downtown office area. The 2004 TIDF ordinance established a fee schedule, which is subject to annual adjustment without further action by the Board of Supervisors to reflect changes in the relevant Consumer Price Index, as determined by the City Controller. The current fee schedule was last updated in February 2013, and is shown in Table 5-1. In addition to the annual fee adjustments, the ordinance lowered the threshold for triggering the TIDF from 3,000 square feet of new development to 800 square feet. It also established a new policy credit against the fee that could be available for small businesses and projects that provide less than the maximum authorized parking.

Table 5-1. 2011 TIDF Ordinance Fee Schedule

Land Use Category	TIDF per sq. ft. of development
Visitor Services	$12.64
Medical and Health Services	$13.30
Cultural/Institution/Education	$13.30
Museums	$11.05
Retail/Entertainment	$13.30
Management, Information and Professional	$12.64
Production/Distribution/Repair	$6.80

Appendix 9 contains a copy of the 2004 TIDF ordinance.

The revenues from the fee may subsidize capital and operating expenses for existing and new transit service. New development generates more transit trips, which add to the already heavily utilized transportation system, especially in the downtown area during peak periods. This, in turn, creates a greater burden on the City transit system. Because transit operates at or near capacity during peak periods, ridership growth must be addressed through increased Muni service frequencies. However, constrained infrastructure (e.g., Market Street tunnel) and reduced operating funding (e.g., from the state) limit the ability of Muni to increase peak-period service.

The impact fee levied on developers must be related to providing new or expanded transit service to support peak period travel generated by new development (including any costs associated with operations or capital). The need for transit services as a result of new development must be established. Furthermore, the proposed expenditures of the fee and the dollar amount of the fee must also have a "nexus" to the development project impacts.

The current TIDF is not adequate to support ongoing operational transit subsidies. The impact fee is a one-time charge, while the cost of subsidizing transit operations is a recurring need.

6.6.3| Transportation Sustainability Fee Nexus Study

6.6.3.1| CEQA Transportation Impact Analysis and Impact Fee Mitigation Reform

CEQA requires California's public agencies to determine the potential for proposed projects to have significant impacts on the environment, including transportation impacts. CEQA also encourages agencies to develop thresholds of significance—the quantitative point at which an environmental effect may be considered significant—to facilitate these determinations. Although CEQA gives local jurisdictions discretion to adopt impact measures and significance thresholds, many agencies in California measure a project's effects on transportation using the Highway Capacity Manual's intersection Level of Service (LOS) measure, which measures delay to automobiles.

In October 2008, the Transportation Authority adopted the Final Report on the Automobile Trip Generation Impact Measure as an alternative to automobile LOS. The Report recommends that the City measure the transportation impacts of projects under CEQA based on the net new automobile trips generated (ATG) by a project. Project sponsors could mitigate trip generation impacts by paying a new auto trip mitigation fee (ATMF) that would fund a set of citywide and local area projects designed to address environmental impacts caused by the project.

The proposed replacement measure and mitigation approach was considered superior to the existing practice because it was:

- A better indicator of environmental effect than LOS;

- Consistent with the City's Transit First Policy and other environmental and health goals;
- More efficient and transparent for the Planning Department to implement and for project sponsors to understand; and
- A more effective approach to transportation impact mitigation.

In a separate but related development the Transportation Authority worked with the State Office of Policy and Research in 2009 to revise the CEQA Guidelines section on transportation impact analysis, which removed the exclusive reference to automobile LOS and replaced it with an option for local jurisdictions to select an alternative measure of transportation impact. The revisions also deleted references to parking as a transportation impact area.

In 2011, the Transportation Authority, together with the Planning Department, SFMTA and Mayor's Office of Economic and Workforce Development (OEWD), completed a Nexus Study for the proposed fee, the Transportation Sustainability Fee Program. The fee would be based upon the motorized trips generated by a project and fund a package of improvements designed to offset the transportation impacts of development including transit service and priority improvements, transportation demand management projects and bicycle and pedestrian network enhancements. Legislation for the Program was introduced to the San Francisco Board of Supervisors in May 2012. Since then, the City has been simultaneously pursuing environmental review and updating of the fee Nexus Study to be consistent with Plan Bay Area.On September 27, 2013, the governor signed into law SB743, which revised the criteria for determining the significance of transportation impacts within transit priority areas. Potential metrics pointed to in the bill are vehicle miles traveled, automobile trips generated, or other measures, but automobile delay as measured by level of service or otherwise is specifically eliminated as a significant impact on the environment. Parking impacts also shall not be considered significant impacts on the environment.

6.6.3.2| Bi-County Transportation Study

Since adoption of the ATG study final report, the Transportation Authority utilized an Automobile Trips Generated measure to complete the Bi-County Transportation Study. The Bi-County Study, conducted in partnership with several agencies on both sides of the San Francisco/San Mateo county line, evaluated potential transportation improvements needed to address significant land use growth on both sides of the border. The study was adopted by the Transportation Authority Board in March 2013.

A portion of the funding for transportation improvements in the bi-county area is to be contributed by the sponsors of major planned development projects. To determine the cost-sharing contributions expected of each development project and jurisdiction, the Transportation Authority modeled the expected automobile trips each project would generate in the 2030 horizon year (above projected background trip growth in the surrounding area). Each project's proportional ATG contribution is the basis for its expected cost-share contribution to the funding plan for delivering a package of infrastructure investments for the area.

The Transportation Authority is currently commenting on the Brisbane Baylands development project and conducting a feasibility study for the Geneva-Harney Bus Rapid Transit project (a project that was a fallout of the Bi-County Transportation Study). As a result of the study, developments at Schlage Lock and Brisbane Baylands will require developers to contribute to implementation of transportation projects in the Bi-Country Transportation Study.

6.7 Work Program

The Transportation Authority will continue to work jointly with City departments and regional agencies to assess the transportation impacts of planned growth, to better link transportation and land use planning, and advance climate change-related goals related to transportation. Specifically, the Transportation Authority will:

- Support the development of the regional land use model.

- Continue to develop applications of land use data within the GIS and model databases to conduct multimodal performance measurement and analysis (e.g., the relationship of land use patterns to transit usage and coverage).
- Participate in statewide, regional, and local SB 375 implementation activities by coordinating San Francisco input and advocating for San Francisco priorities in such activities as the setting of targets and preparations for the next RTP/SCS.
- Coordinate with appropriate City departments to reform transportation impact analysis in San Francisco through participation in the Transit Sustainability Fee Nexus Study and follow-up efforts.
- Continue development of the Neighborhood Transportation Planning and PDA Planning efforts as recommended in the Transportation Investment and Growth Strategy.
- Adopt the SFTP and begin implementing the "first five years" through the Early Action Program.
- Implement project recommended in the Bi-County Transportation Plan as development comes on-line.
- Continue to review and provide technical support to ongoing area plans and land use studies under development, including the Better Market Street Plan, Central SoMa Plan, comprehensive coordination of SoMa congestion and travel demand management, Pier 30-32/Seawall Lot 330 Transportation Analysis, and PDA projects as listed in Table 6-1.

CHAPTER 7

Capital Improvement Program

KEY TOPICS

- Legislative Requirements
- Relationship to Other Plans
- Relationship to City Department Activities
- Funding and Programming
- Amendment
- Project Delivery

7.1 | Legislative Requirements

California Government Code 65089(b)(5) requires that the CMP contain a seven-year Capital Improvement Program (CIP), developed by the Congestion Management Agency (CMA), the Transportation Authority for San Francisco, to maintain or improve the transportation system performance measures established in the CMP, and to address impacts on the regional network, as identified through the land use impact analysis program.

7.2 | Relationship to Other Plans

7.2.1 | Regional Transportation Plan and Countywide Transportation Plan

The CMP statute requires that each CMP be consistent with the long-range Regional Transportation Plan (RTP), developed by the regional transportation planning agency (the Metropolitan Transportation Commission, or MTC, for the Bay Area), and each county's component of the RTP must be supported by a long-range countywide transportation plan (San Francisco Transportation Plan, or SFTP), developed by the CMA. The CIP is intended to serve as a short or medium-range implementation vehicle for investment priorities as prioritized in the long-range plans.

Through the RTP, the MTC establishes the Bay Area's vision for transportation with supporting policies and investment strategies, including a list of specific projects and programs. Inclusion of projects and programs in the RTP is a prerequisite for receiving state and federal transportation grants for certain state or federal approvals and a requirement for capacity expanding projects that may have air quality impacts. The MTC adopted the most recent RTP, titled Plan Bay Area, in July 2013. Plan Bay Area is the region's first RTP that explicitly integrated transportation and land-use strategies to meet the SB 375 requirements to accommodate future population growth and reduce greenhouse gas emissions.

The Transportation Authority develops the SFTP for San Francisco, consistent with MTC guidelines, to guide transportation investment and to serve as a basis for RTP assumptions. The Transportation Authority adopted the first countywide transportation plan in 2004, and has worked closely with the MTC to coordinate the first update of the SFTP with Plan Bay Area. Scheduled for adoption in December 2013, the draft SFTP has identified four goals (economic competitiveness, safe and livable neighborhoods, environmental health, and well maintained

infrastructure) and proposes scenarios that invest strategically in a diverse set of projects to make progress toward each of the goals. The Transportation Authority ensures the CIP projects, as well as their selection processes, are consistent with the SFTP. The SFTP is discussed in further detail in Chapter 6 (Land Use Impacts Analysis).

7.2.2 | Prop K and AA Expenditure Plans

In 2003, over 75% of San Francisco voters approved Prop K, extending the existing half-cent sales tax for transportation and adopting a new 30-year Expenditure Plan. The 30-year Expenditure Plan directs $2.35 billion (in 2003 $'s) to a list of transportation projects that were developed through the first SFTP and are expected to leverage another $9.6 billion in other federal, state and local funds. In 2010, San Francisco voters approved Prop AA, authorizing an additional $10 vehicle registration fee on motor vehicles registered in San Francisco. Prop AA revenues fund projects in a 20-year Expenditure Plan and are meant to complement Prop K by adding funding to address capital shortfalls (e.g. in street resurfacing) and provide new funding for pedestrian safety, which has few dedicated funding sources.

As further discussed in the Funding and Programming section, the Prop K Strategic Plan and 5-Year Prioritization Programs (5YPPs) continue to ensure Prop K investments, one of the major funding sources for the CIP, are aligned with the updated SFTP priorities.

7.2.3 | Bay Area Clean Air Plan

The Transportation Authority ensures that the CIP conforms to air quality mitigation measures for transportation-related vehicle emissions, as detailed in the Bay Area Air Quality Management District's (BAAQMD) Clean Air Plan and related documents. This also raises San Francisco projects' competitiveness for external funds, since the MTC gives priority to proposed projects that support or help implement the mitigation measures outlined in the Clean Air Plan. See Appendix 10 for San Francisco's trip reduction efforts in relationship to the regional mitigation measures.

7.2.4 | Other Capital Plans and Short Range Transit Plans

Each City department develops its own capital investment plans for inclusion in San Francisco's ten-year Capital Plan. In addition to the citywide Capital Plan, the SFMTA has multiple short-term and long-term processes to prioritize its capital needs, including its Strategic Plan, Transit Fleet Management Plan, Short Range Transit Plan, and an Enterprise Asset Management System under development. Five regional transit operators that serve San Francisco also develop their own capital plans and Short Range Transit Plans: BART, AC Transit, SamTrans, Golden Gate Transit, and Caltrain. The Transportation Authority considers these plans as an input into its programming process to facilitate better coordination of San Francisco programming decisions with citywide and regional priorities in compliance with CMP requirements. Also see Section 7.3: Relationship to City Department Activities.

7.2.5 | San Francisco General Plan

The San Francisco City Charter assigns responsibility to the Planning Department for consistency review of capital improvements with the General Plan. This consistency review function is incorporated into the Transportation Authority's CIP programming process. If necessary, projects may be submitted to the Planning Department for a General Plan consistency check. However, in practice, this is not typically required as the SFTP is consistent with the General Plan.

7.3 | Relationship to City Department Activities

The changes in programming introduced by the 1995 CMP, as explained in this chapter, do not substantially alter programming-related activities currently performed by City departments. The goal of the process is, in fact, to streamline the programming process so that complete and timely information is available to the Transportation

Authority Board, providing a well-defined context that facilitates strategic programming policy decisions. It is important to note, for example, that each City department or other eligible project sponsor will continue to develop its own capital investment plans. The Transportation Authority's intent is not to suggest changes to the priorities within those plans, but rather to steer the overall programming strategy and analysis of trade-offs, with a particular focus on the fund sources included in this CIP.

The Transportation Authority review process, as explained in Section 7.5, provides the required structure to analyze programming and performance data that will inform those Transportation Authority Board decisions. It is important to note that the process is intended to function using information already developed by project sponsors. The most significant value added by the Transportation Authority's review process is in providing an overall context for transportation programming strategy and system performance to facilitate Transportation Authority Board decisions.

Key roles and responsibilities of the City departments and the Transportation Authority in the transportation programming process are summarized below.

7.3.1 | City Departments

1. Prepare plans, prioritize capital improvement programs and develop financial plans on an annual or biannual basis
2. Use financial constraints and strategies imposed by external agencies in addition to those established by the Transportation Authority and departments for various funding sources
3. Revise financial plans at regular intervals to reflect changes in project scope, budget or schedule, and changes in funding projections
4. Process CIP amendments through the Transportation Authority, and obtain Transportation Authority Board approval or administrative review before submittal of new information to outside agencies
5. Check eligible project list consistency with the San Francisco General Plan before adoption by Authority Board (performed by the Planning Department)
6. Make prioritization recommendations at the time of eligible project consistency review

7.3.2 | Transportation Authority

1. Develop, adopt, and update the CMP and its CIP
2. Process CIP amendments according to the established procedures
3. Provide input into the MTC, state, and federal agencies' process for the preparation and updates of the Regional, State, and Federal Transportation Improvement Programs (RTIP, STIP, and TIP) in coordination with sponsors.
4. Provide Prop K and Prop AA revenue estimates and advise on financial strategies
5. Develop Prop K and Prop AA Strategic Plan and 5YPP updates to respond to revisions in departments' and other project sponsors' (e.g. regional transit operators) capital and financial plans and to reflect CIP amendment decisions
6. Notify outside programming agencies of decisions on CIP amendments
7. Program the Prop K, the Prop AA, and the local (40%) portion of the TFCA funds, as well as discretionary funds as directed by the MTC, state, and federal agencies

7.4 | Funding and Programming

As a result of the Transportation Authority's role as the Prop K and Prop AA administrator and the CMA, the capital priorities programming process not only involves state and federal funds that are required by state law to be programmed through the CMP but also incorporates the Prop K and Prop AA programming strategy. Listed below are major CIP funding sources administered by the Transportation Authority. Importantly, as described in the Relationship with Other Plans section, the Transportation Authority ensures that all CIP projects, as well as the

programming and project selection processes, are consistent with the RTP, SFTP, and other requirements attached to the funding.

Evaluation of potential impacts of CIP projects on multimodal system performance is embedded throughout the project selection and monitoring processes. The results of the CMP multimodal system performance analysis and any deficiency findings will also be incorporated into the future CIP development as appropriate. Please refer to Chapter 4 for a detailed discussion of multimodal system performance.

7.4.1 | Surface Transportation Program / Congestion Mitigation Air Quality Program

Conformance with the CMP is required for a local jurisdiction to receive federal Surface Transportation Program (STP) funds or Congestion Mitigation and Air Quality Improvement Program (CMAQ) funds. STP funds are among the most flexible and are used to support a wide range of transportation improvement projects across all modes. CMAQ funds are intended for projects that reduce transportation related emissions. Both funds are distributed mainly by the regional transportation planning agency, i.e. the MTC for the Bay Area. The MTC has divided the Bay Area's share of STP and CMAQ funds into multiple programs, each of which typically has its own associated policies and guidelines in pursuant of RTP goals. Since the 2011 CMP, the MTC has adopted an overall STP/CMAQ investment framework for a four-year period (federal fiscal years 2012/13 through 2015/16). One of the centerpieces of the framework is the new OneBayArea Grant (OBAG), which is intended to better integrate the region's transportation program with land use and housing policies and to promote transportation investments in Priority Development Areas (PDAs). PDAs refer to locally-identified, regionally designated infill development opportunity areas within existing communities. The Transportation Authority is responsible for administering the OBAG call for projects for San Francisco. See Appendix 11 for the final project list.

7.4.2 | State Transportation Improvement Program

Inclusion in the CIP is a prerequisite for inclusion in the State Transportation Improvement Program (STIP), a five-year program of projects adopted by the California Transportation Commission (CTC) every two years. Priorities for approximately 75% of the STIP programming capacity are set by regional transportation planning agencies, and the remaining 25% is established by the state. The Regional Transportation Improvement Program (RTIP) is the MTC's submittal to the state, which is merged with other regions' RTIPs and additional CTC priorities to become the STIP. In the Bay Area, the Practice has been for the CMAs to establish priorities for their county share, subject to the MTC's concurrence and the CTC approval of the region's RTIP.

San Francisco has had long-standing Regional Improvement Program (RIP) commitments to four signature capital projects, stemming from the 2001 RTP and then reaffirmed with the 2003 Prop K Expenditure Plan: Presidio Parkway (Doyle Drive), Central Subway, Caltrain Electrification, and Caltrain Downtown Extension to a Rebuilt Transbay Terminal. While all of the projects had previously received RIP funds, the Presidio Parkway became the top priority in recent years due the CTC's priorities for RIP funds and regional momentum to fully fund the project. With the 2012 STIP, the RIP commitment to the Presidio Parkway was fulfilled. The Transportation Authority Resolution 12-44 designated the Central Subway as the next highest RIP priority, followed by repayment of a $34 million MTC advance/loan that was needed to fully fund the Presidio Parkway. As shown on Appendix 11, for the 2014 RTIP, the Transportation Authority approved programming the entire $12.498 million available in project-specific RIP funds to the SFMTA for the Central Subway, which is expected to be approved by MTC in December 2013, followed by the CTC's adoption of the 2014 STIP in March 2014.

Previous STIP cycles included the Transportation Enhancement (TE) program to fund pedestrian and bicycle safety infrastructure and non-infrastructure projects, but the MAP-21 replaced the TE and Recreational Trail programs with the Transportation Alternatives Program (TAP). The CTC is currently working on developing the guidelines for distributing these funds, which will be administered by the CTC and the MTC mostly on a competitive basis.

7.4.3 | Prop K Transportation Sales Tax

Prop B was the first half-cent local sales tax for transportation in San Francisco, approved by San Francisco voters in 1989. Prop K, passed by the voters in November 2003, extended the half-cent local sales tax for transportation and adopted a new 30-year Expenditure Plan, superseding the prior one. At the time of the Expenditure Plan adoption, Prop K was expected to generate $2.35 billion (in 2003 dollars) over 30 years and to leverage close to $10 billion in federal, state, and other local funds.

The Expenditure Plan established four overall categories of investment and attached mandatory percentage shares of total Prop K revenues: Transit (65.5%), Street and Traffic Safety (24.6%), Paratransit (8.6%), and Transportation System Management / Strategic Initiatives (1.3%). The Expenditure Plan details eligible projects and programs, including named major capital projects (e.g. Central Subway, Caltrain Downtown Extension to a Rebuilt Transbay Terminal, Caltrain Electrification, and Replacement of Doyle Drive) and 21 programmatic (i.e. not project-specific) categories, ranging from street resurfacing to pedestrian and bicycle improvements to transit vehicle replacements to transportation demand management. Appendix 12 provides a summary of the Expenditure Plan, which lists the eligible projects and programs along with their shares of Prop K funds and expected leveraging goals.

As required by the Expenditure Plan, the Transportation Authority Board adopts a Prop K Strategic Plan to guide the day-to-day implementation of the Prop K program, and for each of the programmatic categories, a 5YPP. The Prop K Strategic Plan is the financial tool that guides the timing and allocation of Prop K revenues over the 30-year Expenditure Plan period, and it considers many factors, such as the presence of matching funds and the likelihood of projects to move forward in the year proposed. The 5YPP includes prioritization criteria, a five-year list of projects (with scope, schedule, cost, and funding information), and performance measures. The Strategic Plan and 5YPPs are updated quadrennially in coordination with updates to the RTP and may, between quadrennial updates, be amended as needed, as determined and recommended by the Executive Director. The Transportation Authority is in the middle of updating the 2013 Strategic Plan and 5YPPs, which will cover Fiscal Years 2014/15 to 2018/19. This update has been strongly coordinated with Plan Bay Area and the SFTP update. Appendix 13 provides a list of programmatic categories in the Expenditure Plan and refers to the current 2009 5YPP project lists. Appendix 14 summarizes the funding levels in the draft 2013 Strategic Plan baseline as adopted in July 2013.

7.4.4 | Prop AA Vehicle Registration Fee

Prop AA is a $10 countywide vehicle registration fee that was passed by San Francisco voters in 2010. Total revenues are estimated over the 30-year period at approximately $150 million (year of expenditure), or approximately $5.0 million annually, to fund smaller, high-impact projects throughout the city on a pay-as-you-go basis. The Prop AA Expenditure Plan established four categories of investment and attached mandatory percentage shares over 30 years: Street Repair & Reconstruction (50%), Pedestrian Safety (25%), and Transit Reliability & Mobility Improvements (25%). In December 2012, the Transportation Authority Board approved the first Prop AA Strategic Plan, which guides the timing of expenditures, and sets policies for day-to-day management of the program. The Strategic Plan directs $26.4 million to projects through Fiscal Year 2016/17. See Appendix 15 for the Prop AA Strategic Plan Programming.

7.4.5 | Transportation Fund for Clean Air

The Transportation Fund for Clean Air Program (TFCA) was established to fund the most effective transportation projects that achieve emission reductions from motor vehicles. Funds are generated from a $4 surcharge on the vehicle registration fee. Forty percent of the funds are set aside for Program Managers for each of the nine counties in the BAAQMD. The Transportation Authority is the designated TFCA Program Manager for San Francisco. In that capacity, it programs approximately $750,000 every year to clean air vehicles, shuttle operations, bicycle and pedestrian improvements, and other eligible transportation projects that help clean up the air by reducing motor vehicle emissions. The Transportation Authority also provides assistance to project sponsors in applying regional TFCA funds, programmed directly by the BAAQMD. The remaining sixty percent of the revenues, referred to as the

Regional Fund, is distributed on a competitive basis to applicants from the nine Bay Area counties. See Appendix 15 for the list of San Francisco TFCA projects selected since the last CMP.

7.4.6 | Lifeline Transportation Program

The MTC established the Lifeline Transportation Program (LTP) to improve transportation choices for low-income persons as part of the 2005 RTP. For the Cycle 3 LTP, the MTC assigned a total of $5.3 million in three different funding sources (i.e. federal Job Access and Reverse Commute (JARC), federal STP, and State Transit Assistance (STA) funds) to the Transportation Authority, and assigned state Prop 1B funds to transit operators, including $11.7 million to the SFMTA, to program with the Transportation Authority's concurrence. See Appendix 12 for the Cycle 3 LTP project list.

7.5 | Amendment

The previous sections describe the central role of the CMP in establishing standards and measuring or otherwise assessing the performance of the multimodal transportation system, and the role of the CIP in helping to maintain that level of performance. Any proposed changes to CIP projects must therefore first be assessed by the Transportation Authority for potential effects on the system performance. Because project viability can be affected by changes in any component of its funding package, the requirement for Transportation Authority review applies to all funding components of CIP projects, whether they are directly programmed by the Transportation Authority or not. There are two kinds of CIP amendments: policy level and administrative level.

7.5.1 | Policy-Level CIP Amendments

Policy-level amendments apply to changes that are deemed by the Transportation Authority to be significant enough that they have the potential to affect the performance of the multimodal transportation system, such as scope, schedule, or budget changes that will affect the year of delivery (completion), the amount or availability of operating funds, the year of programming, the fund source designation, or any other aspect of the funding packet requiring action by the MTC or the CTC for funds initially prioritized or programmed by the Transportation Authority. Policy-level amendments require approval by the Transportation Authority Board prior to processing of the change by the project sponsor.

Regardless of the funding source or other programming aspects affected, the Executive Director may rule that a requested CIP amendment is administrative if the proposed changes, involving one or more projects and one or more funding sources, requires programming actions that can be authorized at the staff level at the MTC or the CTC, or at the regional office level for federal agencies, such as administrative TIP amendments, or if it results in the following:

- no net change in the total amount of funds allocated to each of the projects involved; and
- no change to the total amount of dollars of each funding source, all affected projects combined; and
- no increase in Prop K or Prop AA match required, all affected projects combined; and
- when a programming year is involved, it will have no effect on the delivery schedule for the project because the schedule is determined by documented external factors.

7.5.2 | Administrative-Level CIP Amendments

These apply mostly to programming changes that can alter the overall transportation programming strategy for San Francisco even though their individual effects on system performance may only be very marginal. Such programming changes will trigger the need for administrative level review even if they are not tied to a specific project listed in the CIP as long as they affect San Francisco's share of a transportation funding source listed in the CIP. The purpose of this requirement is to ensure that the Transportation Authority has the required information to evaluate programming strategy and the performance of CIP projects in the context of the universe of programming

and project delivery decisions in San Francisco. Administrative-level amendments will only require notification to and concurrent review by the Transportation Authority's Executive Director or her designee. In addition, proposed changes to Prop K and Prop AA programming will automatically trigger administrative-level review and, at the Executive Director's discretion, may require policy-level amendments.

7.5.3 | Applicability of CIP Amendments

Applicable funding sources include but are not limited to those programmed directly by the Transportation Authority, such as county share STP/CMAQ, county share TE, RIP, LTP (JARC, STA, and STP), TFCA, Prop K, and Prop AA. Certain funding sources are programmed through state or regional processes and typically become available to project sponsors through a separate application procedure. In some cases, the funds are allocated on a first-come, first-served basis, so project sponsors' ability to act quickly is crucial. Further, many sources have timely use of funds requirements where failure to meet deadlines can result in loss of funds to the project or to San Francisco or prohibition from applying for future cycles until deadlines are met. The MTC has requested that CMAs assist with oversight of certain funding sources (e.g. Highway Safety Improvement Program) even if not directly prioritized by CMAs. The intent is to improve project delivery and specifically to avoid loss of funds to the region. The Transportation Authority encourages sponsors to proactively notify the Transportation Authority of any project delivery issues or other issues that may threaten a project's ability to meet timely use of fund deadlines, whether sources covered by CIP amendments or not. The Transportation Authority can serve as a resource and facilitator to help resolve delivery issues and avoid loss of funds to San Francisco projects.

7.5.4 | Amendment Process

In order to avoid additional reporting burdens on project sponsors, there is no specific form or format for submittals to the Transportation Authority. However, project sponsors wishing to make application to regional, state, or federal programming agencies for changes affecting current CIP programming must provide a brief written explanation (email is acceptable) and a description of proposed changes.

The Transportation Authority performs an initial administrative level review, to determine the need for further application information as well as to suggest the appropriate level CIP amendment required. This is followed by detailed, concurrent reviews for programming and performance implications. The process also calls for discussions with project sponsors to resolve any issues identified by the Transportation Authority's review, and establishes basic procedures to ensure disposition of the requests for review within a reasonable period of time. The timelines proposed below will vary depending upon the urgency of the request and external factors, such as deadlines established by the MTC or Caltrans.

Request In-Take Review: Upon receipt of a request for programming changes, the Transportation Authority will perform an initial staff-level review. Within ten (10) working days after receipt of the request, the Transportation Authority will communicate in writing to the applicant the need for any additional information, necessary in order to further process the application. Within ten (10) working days after receipt of all information necessary to complete the request, the Transportation Authority will notify the applicant in writing if the amendment is approved administratively; appears to be administrative but requires additional information to approve; or is a policy-level amendment requiring Transportation Authority Board action. If the Transportation Authority finds that a policy-level amendment will be required, the communication will include:

- a schedule for Transportation Authority Board approval;
- a preliminary list of unresolved conformance or consistency issues identified in connection with the request; and
- a proposed course of action for resolution of these issues, including, at least, consultation and joint efforts with the applicant.

Detailed Review for Policy-Level Amendment: Unless otherwise specified in the proposed schedule for resolution of issues, within ten (10) working days after the notification, the Transportation Authority will complete a detailed

review of the request. The detailed review will include two components: a programming review, and a performance review. To expedite the process, both reviews will be carried out concurrently at the Transportation Authority.

The programming review will evaluate issues of Prop K and Prop AA Strategic Plan consistency and CMP CIP conformance, focusing on the following key strategic programming and fiscal policy factors:

- **Cost of Money:** Does the proposed change limit availability of funding by Prop K or Prop AA category or by state or federal funding source? Does it require or bring the Transportation Authority closer to the need to bond in order to deliver the Prop K program? Does it otherwise affect other CIP funding sources so as to increase the cost of money?
- **Leveraging Capacity:** Does the proposed programming change improve or worsen the Transportation Authority's prospective ability to capture state and federal funds for San Francisco projects? Does it increase the required local (Prop K, Prop AA, or other) match?
- **Other Programming Policy Consistency:** Does the proposed programming change result in a skew of the funding category targets established in the Prop K or Prop AA Strategic Plan? Does it substantially alter the programming priorities established in the Strategic Plan of 5YPPs? Does it substantially alter the programming priorities established in the latest CMP CIP?

The performance review will evaluate impacts on the performance of San Francisco's multimodal transportation system according to the criteria described below. These analyses are intended to provide order-of-magnitude findings about future system performance, particularly cumulative impacts on operating conditions at the facility, corridor, or systemwide level. The process is not focused on prediction of minor changes in individual CMP network segments.

- **Effects of Schedule Changes on Performance:** Does the proposed programming change involve or result in a delay in the delivery (completion) of any CIP projects? Are there significant anticipated impacts on system performance because of completion delays?
- **Effects of Scope Changes on Performance:** Does the proposed programming change result in a downsizing of CIP projects?
- **Potential Deficiencies:** Does the proposed programming change create the potential for a deficiency on the CMP network? Does it adversely affect the City's ability to implement already adopted deficiency plans? Does it adversely affect the likely effectiveness or delivery timelines for an already adopted deficiency plan?
- **Multimodal Balance:** Does the proposed programming change affect the multimodal balance of the CIP? Does it significantly degrade performance conditions for one mode vis-à-vis other modes? Is it likely to significantly affect certain categories of travelers vs. others (e.g., will it adversely affect off-peak transit riders vs. drivers, or local vs. through trips?).
- **Subarea Impacts.** The analysis will address questions such as is the proposed programming change likely to result in disproportionate adverse impacts to system performance for one subarea of the City vs. the others?

Disposition of Policy-Level Amendment Requests: If there are no outstanding issues identified during the review process, the item will be scheduled for Transportation Authority Board action at the next meeting, with a recommendation for approval. If issues identified during the review process are not resolved within the time frame specified in the initial notification, the Transportation Authority will establish a schedule for final resolution of these issues, and invite the pertinent programming agencies to facilitate the process. The findings and recommendations from this process will be agendized for Transportation Authority Board action on a schedule determined by the Executive Director.

As part of the evaluation process for all CIP Amendments, the Transportation Authority will explicitly consider and recommend adjustments to the Prop K and Prop AA Strategic Plans and to the TFCA program, as appropriate, to

maintain consistency. Such adjustments will be scheduled for Transportation Authority Board action concurrently with the corresponding CIP Amendments.

The Transportation Authority will notify the pertinent regional, state, or federal agencies of the Transportation Authority Board action on policy level CIP Amendments, and/or staff-level approval of Administrative-Level CIP Amendments, as appropriate.

7.6 | Project Delivery

One of the key purposes of the CMP is to establish the link between transportation investment and system performance. Programming projects in the CIP is only half of the picture. In order to be effective, the CIP must also function as a transportation project *delivery* mechanism. Failure to deliver projects or delays in implementation can affect system performance. Further, depending upon the fund source, delay in obligating funds or implementing a project can result in loss of funds to the project, to San Francisco, and/or to the Bay Area. In the long run, poor project delivery rates can influence state and federal authorization levels for transportation funding, leading to fewer resources to dedicate to maintaining and improving the transportation system.

The Transportation Authority has mechanisms in place for tracking Prop K and Prop AA project delivery (i.e., the Strategic Plan, 5YPPs, the Portal, and ongoing project management oversight activities). As a CMA, the Transportation Authority continues to work with the MTC and Caltrans to monitor project delivery rates for projects programmed in the RTIP and federal TIP, and serve as a resource to facilitate and advocate for San Francisco sponsors.

In 2013 and 2014, we will continue to refine and implement a transparent, user friendly and efficient new system for tracking project delivery of Prop K/AA and non-Prop K/AA funded projects in order to respond to the increasingly stringent timely use of funds requirements for state and federal funds, which are in response to concerns about poor project delivery. This will allow us to be more proactive in identifying project delivery issues and helping sponsors resolve the issues and meet timely use of funds requirements. Our intent is to create user-friendly systems which the sponsors can also access to assist their own internal oversight and project management processes.

CHAPTER 8

Travel Demand Model and Uniform Database

KEY TOPICS

- Legislative Requirements
- Legislative Intent and Application to San Francisco
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8.1 Legislative Requirements

California Government Code section 65089 (c), requires that each Congestion Management Agency (CMA), in consultation with the regional transportation planning agency (the Metropolitan Transportation Commission (MTC) in the Bay Area), the county, and local jurisdictions, develop a uniform database on traffic impacts for use in a countywide transportation computer model. The CMA must approve computer models used for county sub-areas, including models used by local jurisdictions for land use impact analysis. All models must be consistent with the modeling methodology and databases used by the regional transportation planning agency.

8.2 Legislative Intent and Application to San Francisco

Congestion management legislation was enacted in part to help transportation planning agencies identify the source of the transportation impacts of land use decisions. All Bay Area counties except San Francisco include multiple local jurisdictions each of which has authority over land use within its boundaries. The transportation impacts of decisions made in one local jurisdiction are felt across local jurisdictional boundaries. The travel demand model is intended as a technical tool to analyze land use impacts across local jurisdictions from a uniform technical basis.

As a unified City and County, San Francisco is spared the need to estimate transportation impacts across city boundaries, although inter-county impacts must still be considered. San Francisco's travel demand forecasting challenge is primarily the forecasting of travel by modes other than the private automobile, (e.g. transit, pedestrian, and cycling trips).

The Transportation Authority continually updates and refines the San Francisco Travel Demand Forecasting Model. Since the creation of the original San Francisco Model in 2000, the model's geographic scope has been extended to the full nine-county Bay Area, along with significant improvements to pricing sensitivity and time-of-day modeling. The Metropolitan Transportation Commission (MTC) has also now developed an activity based model with a similar structure.

A major update to the Transportation Authority's San Francisco Travel Demand Forecasting Model known as SF-CHAMP 4.0 was operationally complete in the summer of 2009. Like SF-CHAMP 3.0, the model was calibrated using Census 2000 and MTC Bay Area Travel Survey (BATS) 2000 data. The Model Consistency Report for CHAMP 4.3, which includes updates to CHAMP 4.0, is included as Appendix 16.

The Transportation Authority continues to use its Geographic Information System (GIS) database as a supplemental analysis tool for appropriate CMP purposes.

The model is integrated with the Transportation Authority's GIS database. The GIS is ideally suited for the graphic display of model outputs and more detailed spatial analysis. Together, GIS and the San Francisco Travel Demand Forecasting Model can be very effective both for sketch planning and the policy-level travel demand and performance forecasting exercises associated with long-range planning. The Transportation Authority's integrated model and GIS allow the ready presentation of data using graphics and maps.

The following section provides an overview of the San Francisco Travel Demand Forecasting Model and the GIS database.

8.3 Technical Approach

8.3.1 | The San Francisco Travel Demand Forecasting Model

The San Francisco Travel Demand Forecasting Model, known as SF-CHAMP, is a computer-based tool used to assess the impacts of land use, socioeconomic, and transportation system changes on the performance of the transportation system. SF-CHAMP was developed to reflect the unique transportation, socioeconomic, and land use characteristics of San Francisco and the Bay Area. The Model uses residents' observed travel patterns; detailed representations of the region's transportation system, population and employment characteristics; transit line boardings during specific time periods; roadway volumes; and the number of vehicles available to households to simulate daily travel activity and measure performance. Future year transportation, land use, and socioeconomic inputs are used to forecast future travel demand.

i. Activity-Based Microsimulation

The San Francisco Model incorporates a state of the art approach to forecasting travel demand. This activity-based microsimulation model is sensitive to a broader array of conditions that influence travelers' choices.

One of the fundamental differences between SF-CHAMP and traditional models is that it is tour-based not trip-based. A tour is a sequence of trips made by an individual that begins and ends at home without any intermediate stops at home, whereas a trip is a single movement from an origin to a destination. Furthermore, the Transportation Authority's model predicts tours for individual household members (over five years old) and the resulting trips that comprise each tour, rather than just trips for each household, as in most traditional travel demand models. Tour-based models do not require data beyond what is needed to develop a four-step travel model system. However, the tour-based methodology allows the model to:

- deal more realistically and precisely with trip chaining and interrelationships between individual trips made over the entire day;
- separate travel into mandatory and discretionary tours; and
- provide a more precise estimate of volumes that can support microsimulation models.

The second fundamental difference between SF-CHAMP and traditional models is that each individual's travel patterns are microsimulated, allowing previous decisions and preferences to inform subsequent decisions. Importantly, the combination of microsimulation and tour-based methodology allows decision-makers to understand not just the changes in the magnitude and direction of trip-making associated with a transportation or land use change, but also which San Francisco or Bay Area residents are most directly affected by that change. This equity analysis is a key advancement over traditional four-step models. Tour-based models also account more reliably for the complexities involved in multi-mode trip making. The San Francisco Model addresses the tradeoffs between modes for the full tour, as well as the tradeoffs between modal options of trips within a tour.

ii. Model Applications

The Transportation Authority uses the San Francisco Model to provide detailed forecasts supporting a number of specific planning applications, including the the countywide transportation plan known as the San Francisco

Transportation Plan (SFTP), the Transportation Authority's Strategic Analysis Reports (SARs), policy analyses, mobility assessments, San Francisco Municipal Transportation Agency's (SFMTA) Transit Effectiveness Project (TEP), SFMTA's Fleet Plan, and environmental analyses. Current model applications include the Central Subway FTA New Starts analysis, the Mobility, Access, and Pricing Study, the Bi-County Transportation Study, and the Geary and Van Ness Bus Rapid Transit (BRT) environmental study, 19th Avenue Transit Investment Study, the Waterfront Transportation Analysis, Geneva BRT Feasibility Study, the Central SOMA plan, and the Treasure Island Mobility Management Study.

Historically, the Transportation Authority also applied the model to assess Proposition K Expenditure Plan performance and impacts, as well as the full 2004 Countywide Transportation Plan package.

iii. Model Development and Enhancements

The key inputs required to develop and apply a travel demand forecasting model include information on household and individual travel behavior (obtained in a household travel survey), representations of the pedestrian, transit, and roadway networks, and spatial representations of employment and residential characteristics. In the San Francisco Model, most of the model components were estimated (the process of establishing the relationship between various relevant inputs) using household travel data collected by the Metropolitan Transportation Commission (MTC). In addition to the household travel survey, a "stated preference" survey collected preference data on transit reliability, crowding, personal security, and auto parking availability and cost.

Note that while the model system is referred to as the "San Francisco Travel Demand Forecasting Model," it is, in fact, a series of component models that operate in a coordinated fashion, each with its own unique purpose. The following paragraphs provide brief overviews of the model inputs and components. Figure 1 illustrates how the model components are structured to produce travel demand forecasts.

SF-CHAMP was one of the first activity-based travel demand models used in practice and has been continuously used and updated both in order to take advantage of new data, and to be appropriately sensitive to issues confronted in new projects and plans for which it is used. SF-CHAMP version 4.3 Fury is the current version of the model, but development is underway and significantly completed for SF-CHAMP 5.0, which will be calibrated to the 2012 California Household Travel Survey data. The following paragraphs discuss the evolution of SF-CHAMP from version 3.0 to 4.3. While SF-CHAMP 3.0 is no longer being actively used for any new projects or studies, results from this model are still referenced for studies commenced many years ago.

SF-CHAMP 3.0 is a hybrid model that forecasts the daily activity patterns and travel for San Francisco residents, but uses the Metropolitan Transportation Commission's (MTC) BAYCAST-90 model for non-San Francisco residents. This approach was appropriate to keep the initial implementation of an advanced tool manageable. For modeling pricing policies in San Francisco, however, this approach is limiting because much of the travel activity within San Francisco is generated by residents of other counties. In order to treat the entire Bay Area region in a consistent manner, CHAMP 4.0 predicts the daily activity patterns and tours of every Bay Area resident in all nine counties.

SF-CHAMP version 4.0 Harold added capabilities with respect to pricing sensitivity. Previous model versions did not have an explicit toll-choice model. Rather, SF-CHAMP 3.0 considered any bridge tolls during the "highway assignment" model component. SF-CHAMP 4.0 uses a "nested logit" approach for modeling tolls, which more accurately represents carpool cost-sharing, variations in travelers' values-of-time, and relationship to mode choice. Through this enhancement, it is possible to represent the choice of driving around a congestion pricing zone for free, or paying a toll to take advantage of time savings offered by reduced congestion in the priced area.

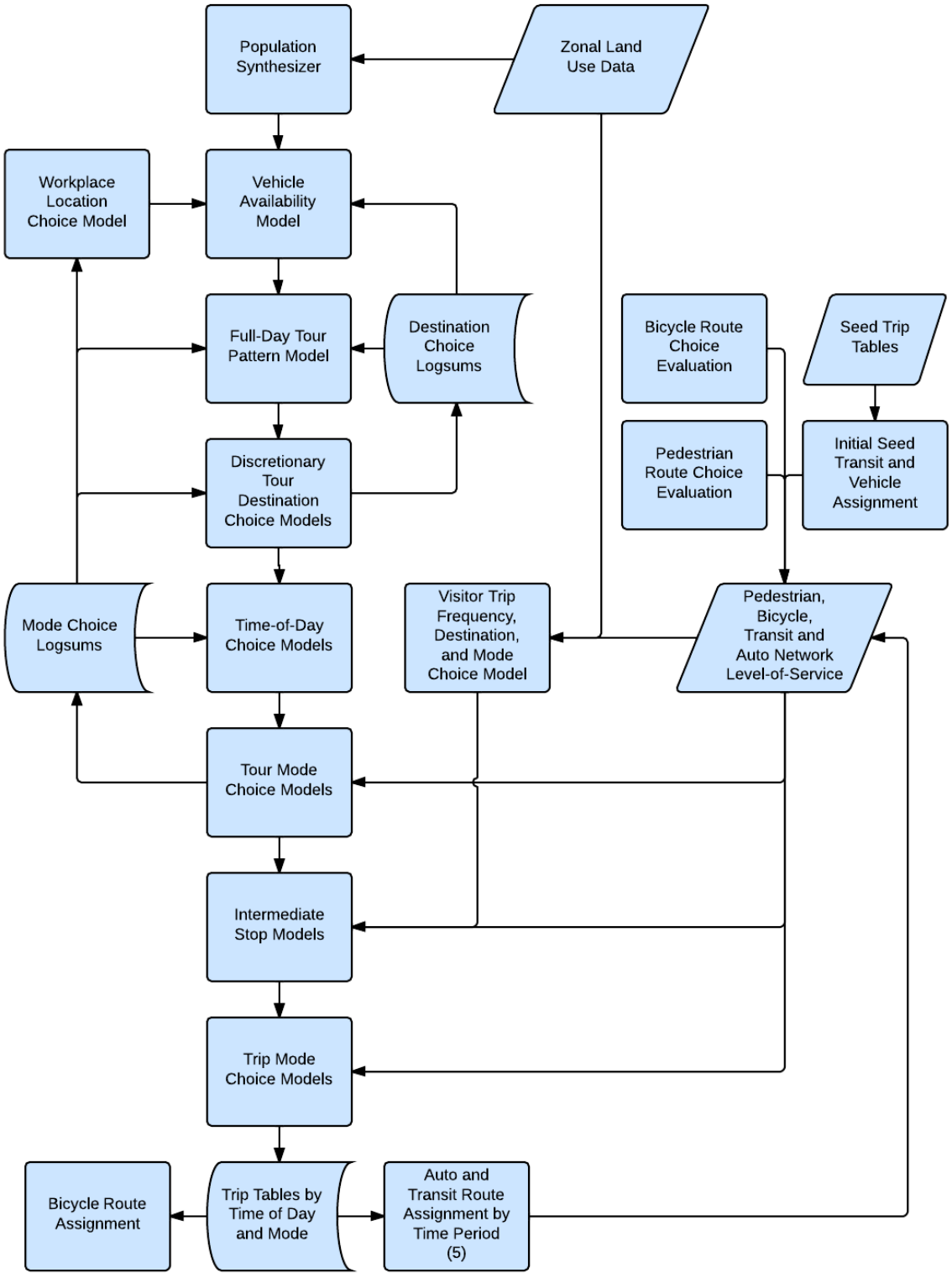
The SF-CHAMP 4.0 model was also enhanced to use continuous value-of-time distributions, rather than a single value of time for each of three income groups. This particular enhancement allows for a much greater range of variability across individuals, and is very well suited to models, such as SF-CHAMP, implemented in a micro-simulation framework. A new stated-preference survey was used to analyze the elasticities of mode and time-of-day choice to pricing policies. In addition, the following structural changes were made:

- Destination choice for non-work tours was moved up in the model chain so that chosen destinations can inform time-of-day choice (work destination choice already preceded time-of-day choice); and

- A detailed half-hourly trip time-of-day choice model was added to the end of the model chain, specifically to model peak spreading for auto trips.

SF-CHAMP version 4.3, Fury , incorporated significant advances in transit, pedestrian, and bicycle modeling. In order to more robustly address the effects of transit crowding, SF-CHAMP version 4.3, Fury, incorporated an iterative transit assignment was used that incorporated a feedback function that calculated dwell times as a function of boardings and alightings, and sought an equilibrated transit assignment similar to how highway assignment has been traditionally addressed. A bicycle route choice model, estimated using the CycleTracks smartphone data, was added in order to capture the effects of bicycle infrastructure construction. Furthermore, a simplified pedestrian route choice model was added in order to take into account hills and varying levels of pedestrian attractiveness. All of these improved route choice components were then used to estimate new mode choice models, which also included additional modes such as Ferry. These mode choice models were estimated using BATS2000 data and also included a more nuanced understanding of the effects of congested travel time on the utility of driving. In addition to mode choice, the auto ownership models were re-estimated using BATS2000 data. All models were calibrated to 2000 and where possible 2010 conditions and validated using transit boardings and vehicle count data.

Figure 8-1. CHAMP 4.3 Model Components



iv. Model Input and Components

The San Francisco Model has the capability to use any standard set of ABAG land use projections as an input. Currently, most projects use the Sustainable Communities Strategies - Jobs Housing Connection ABAG forecast for population, households, jobs, and employed residents. Outside of San Francisco, the direct land use inputs to the MTC model are used. Within San Francisco, the San Francisco Planning Department allocates the countywide control totals for population, households, jobs, and employed residents to TAZs. Base year and future year forecasts were developed using a parcel-level residential and employment database, inventories of new development projects under construction, approved, and under review, and information on development potential for major area plans.

The San Francisco 981 Traffic Analysis Zone (TAZ) system is used within the City and County of San Francisco. Outside of the City, the San Francisco Model zone system is the same as the MTC Model 1454 zone system. Overall the model has approximately 2,250 zones. As part of the CHAMP 3.0 release, the model zone system was updated in 2007 to reflect MTC's new 1,454-zone system. The number of zones within San Francisco was also increased from 766 to 981 as part of this update.

The San Francisco Model transportation networks are very detailed and use network assumptions consistent with the MTC Regional Transportation Plan. Within San Francisco, the network is the original City base map developed by the San Francisco Department of Public Works. It is highly spatially accurate and it includes every street segment within the City. For external counties, the San Francisco Model's roadway network is the MTC regional model highway network was used as a base. All local and regional transit route alignments and all stop locations are coded in the San Francisco Model's transit networks. Outside San Francisco, the MTC regional model transit network is used to represent the pertinent transit services. The model networks are ground-truthed and updated on an ongoing and project-specific basis.

v. Population Synthesis

The model uses a synthesized population of Bay Area residents. As described earlier, the San Francisco Model is an activity-based microsimulation model. This means that the model works at the level of the individual decision-maker – each Bay Area resident. It is therefore necessary to create a representation of each decision-maker. TAZ-level totals of households, population, and employed residents, as well as census-based distributions of household configuration, age, and income-level serve as inputs to the population synthesis model.

The model samples the Census Public Use Microdata Sample (PUMS) (i.e. long form respondents) household records, and then assigns these to the TAZ, based on the control totals and marginal distributions. The result is a file with one record for each decision-maker. It matches all control totals and distributions when aggregated to the TAZ-level.

vi. Vehicle Availability

The vehicle availability model predicts the vehicles available in each household for each Bay Area resident. The model estimates the probabilities of having zero, one, two, or three or more vehicles available. The Model accounts for tradeoffs for auto ownership based on the employment locations of workers in the household. This is a significant factor for auto ownership in a transit-rich environment such as San Francisco. According to the 2000 Census, San Francisco has the second highest percentage of transit usage of any county in the U.S. and the third highest percentage of other non-single occupancy vehicle modes for travel to and from work.

The vehicle availability model was validated primarily on two key variables, number of workers per household and super district10, using the 2000 Census and 2006-2010 American Community Survey (ACS) as the primary source of observed data.

vii. Full Day Pattern Model

The main feature of the full day pattern approach is that it simultaneously predicts the main components of all of a person's travel across the day. Predicting tours (a sequence of trips made by an individual that begin and end at

[10] Superdistrict is a geographic area defined by MTC.

home without any intermediate stops at home) rather than trips is a significant improvement over traditional trip generation procedures because of the relationships between trips on any tour. Figure 2 illustrates the difference between trips (as estimated in the traditional four-step process) and tours.

Several models are used to predict the full day pattern. The **Primary Tour Generation Models** predict whether each individual will make either no tour on a typical weekday or will make a primary tour for one of the following purposes: work, school, or other. The individual's primary tour is defined as the longest tour in elapsed time made with a stop at work, school, or for other purposes. All of these tours are home-based. Work-based tours and secondary home-based tours are also predicted. The models also predict whether there are intermediate stops on each primary tour: none, one, or more on the outbound portion only, one or more on the inbound portion only, or one or more on both portions. Subsequent models predict the exact number of intermediate stops on each tour leg.

By using tours as a key unit of travel, we capture the interdependence of different activities in a trip chain. This provides a better understanding of non-home-based trips, especially in the case of the work-based sub-tours that represent a significant proportion of non-home-based travel.

The full-day pattern tour models were validated by converting tours to trips and comparing these to the 2000 Bay Area Transportation Survey (BATS).

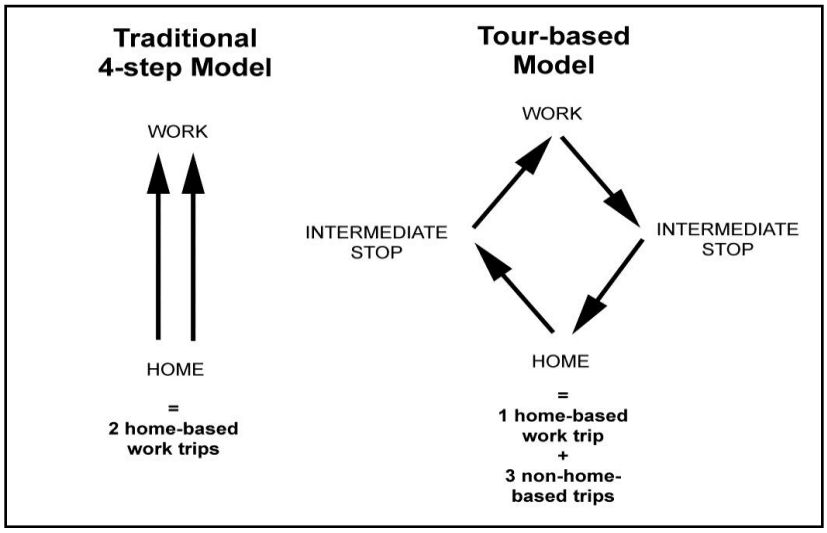
viii. Time of Day Models

The time-of-day model predicts the period when the traveler leaves home to begin the primary tour simultaneously with the period when the traveler leaves the primary destination to return home. It also predicts the time period of any intermediate stops. The periods used in the San Francisco Model are defined as:

- Early (3:00 AM to 5:59 AM)
- AM peak (6:00 AM to 8:59 AM)
- Midday (9:00 AM to 3:29 PM)
- PM peak (3:30 PM to 6:29 PM)
- Late (6:30 PM to 2:59 AM)

Activity-based models can account for tradeoffs between trip chaining and time of day by evaluating time of day decisions at the tour level rather than the trip level. Pricing policies (such as parking or toll policies) can be tested more accurately by including these tradeoffs between the need to travel for purposes that are time-dependent (such as day care or work) and the desire to avoid peak period pricing. Activity-based models can also account more reliably for the complexities involved in multi-mode trip making.

Figure 8-2. Trip Definitions: 4-step model vs. tour-based model



ix. Destination Choice Models

Given that the full day activity model has predicted that a traveler makes a tour with a primary destination as well as potentially some number of intermediate stops, the destination choice models select the likely destinations for these trips. The San Francisco Model includes two types of destination choice models.

The **Primary Tour Destination Models** predict the destination of tours such as the workplace or school. The **Intermediate Stop Location Models** predict the location of intermediate stops for tours with stops on the way to and/or from the primary destination, where those stops are conditional on where the primary destination is located. Factors considered in destination choice include distance, accessibility for various modes (for that individual's auto-ownership level), and the land use density and type at various locations (i.e. retail, office, etc).

The Destination Choice Models were validated against the 2000 BATS survey data and Census 2000 CTPP data (for workplace location) for primary destinations by purpose and trip length frequency distributions.

x. Mode Choice Models

After the Full Day Pattern Models and the Destination Choice Models have predicted the number, timing, and destination of trips, the Mode Choice Models predict the mode used by the traveler to reach their destination. Mode refers to the type of transportation, such as walking, bicycling, riding transit (such as light rail or bus), driving alone, or sharing a ride. The San Francisco mode choice models differ from traditional trip-based mode choice models in that there are two distinct sets of mode choice models. The Tour Mode Choice Model determines the primary mode for the tour, while the Trip Mode Choice Models determine the mode for each individual trip made on that tour, based on the mode chosen for the tour.

An analysis of trips by mode revealed the significant percentage of transit trips and non-motorized (walk and bike) trips made by San Francisco residents. It also showed that a number of transit trips are made using several transit modes; i.e., local bus access to BART. San Francisco can be considered a transit-rich environment, where most residents can walk to transit, and a limited supply of parking is available with a high cost. Based on this analysis, a detailed representation of available modes was developed, including:

- Muni Light Rail
- Muni Local Bus
- Regional bus routes (Golden Gate Transit, AC Transit, SamTrans)
- Caltrain
- BART
- Ferry
- Walk
- Bike
- Drive Alone
- Shared Ride 2
- Shared Ride 3+

The mode choice models were validated against the MTC household travel surveys, Census and ACS Journey to Work data,and observed SFMTA, BART, Caltrain, and Ferry ridership levels.

xi. Visitor Models

Given San Francisco's popularity as a tourist destination, trips made by visitors from beyond the San Francisco Bay Area had to be accounted for in the San Francisco Model. A series of models were estimated to predict the visitor trips by mode for San Francisco tourist destinations. These models were not based on BATS household travel survey of Bay Area residents, but rather were estimated using San Francisco Visitor & Convention Bureau data, and coefficients derived from the Honolulu model visitor development effort.

The visitor models are significantly less complex than the San Francisco resident models. They estimate the number of visitors to 29 key visitor destinations for each of three modes. The destinations include among others, Alcatraz, Golden Gate Park, North Beach, Union Square, and a cable car ride.

xii. Assignment

The detailed estimate of activity patterns of Bay Area travelers (including the type and timing of trips, destinations, and modes of travel) results in tables of trips by mode of travel from zone to zone by time of day. For example, a matrix may contain the number of transit trips during the AM peak, while another may contain a matrix of drive alone trips in the evening time period. This time period-specific demand is then assigned to the regional roadway and transit networks.

There are three primary components to the assignment process – transit, bicycle and roadway. Transit assignment uses detailed information from the mode choice models to determine the particular route that a traveler uses. For example, the mode choice models may predict that a traveler uses a bus to get from the Inner Sunset to Civic Center, but it does not predict which bus. The Transit Assignment Model predicts the specific route chosen, and any transfers, based on walking time to the nearest stop, expected wait time, presence of other transit alternatives (such as the multiple routes that serve a significant portion of Van Ness Avenue), fares, in-vehicle travel time, and walk time to the final destination. The transit assignment algorithm is based on the minimization of generalized cost for a certain origin-destination pair by time period. Generalized cost is a weighted cost that takes into account in vehicle travel time, waiting time, walk access time, transfers, and transfer time. The trip mode choice model dictates which transit modes is the "primary mode" for each user. Depending on the primary mode, other secondary modes may be made available as access and egress modes (e.g., walk access mode to BART primary mode).

Roadway assignment predicts the specific route chosen by travelers based primarily on congested travel times and traveler cost (distance and tolls), collectively summed into a generalized cost function. If a particular route between

two points has a smaller generalized cost than another, it will attract drivers until the generalized cost on all routes between two points is equal. This equilibrated state is often referred to as Static Deterministic User Equilibrium.

Bicycle assignment predicts the route taken by cyclists based on a bike route choice model estimated using revealed choice bicycle route data from the CycleTracks smartphone application. The bicycle route choice model takes into account hills, bike lanes, bike route, number of turns, wrong way streets, and distance.

The validation of transit and highway assignments is done separately, using observed volumes of vehicles and passengers on the highway and transit systems, respectively. Assignment validation at the county level was completed using aggregated volumes by corridor (identified by screenlines), type of service (facility type, mode or operator), size (volume group), and time period. Speeds and travel times are also used in highway and transit validations to ensure that these are accurately represented in the models.

8.3.2 | GIS Database and ArcGIS 10.1

The Transportation Authority uses a GIS database coupled with ESRI's ArcGIS 10.1 software to complement the strategic analysis facilitated by the San Francisco Travel Demand Model. The Transportation Authority's GIS database includes a large repository of shape files corresponding to local and regional street networks, census tracts, census block groups, census blocks, TAZs, transit routes, public facilities, and more.

The GIS database is refreshed on an ongoing basis with data obtained from our citywide and regional partner agencies, as the Transportation Authority generally does not directly develop comprehensive GIS files in-house.

However, the Transportation Authority is obligated to maintain a geodatabase of CMP level-of-service shape files. These shape files contain travel time and speed data for all auto CMP segments. The auto data is updated every two years as part of our CMP update. Transit data is also available.

For all other GIS shape files, the City provides a website complete with Census data for San Francisco geography and street centerline files for throughout San Francisco.

8.3.3 | MTC Model Consistency

The Transportation Authority completed a Model Consistency Report in October 2013 to demonstrate the consistency of CHAMP 4.3 with the MTC regional model and modeling requirements. The MTC Consistency Guidelines list the items that need to be documented as part of this Consistency Report. The CHAMP 4.3 Model Consistency Report is included as Appendix 16.

8.4 Work Program Items

The Transportation Authority will continue to work collaboratively with the Planning Department, MTA, other City agencies, regional transit operators, Caltrans, and MTC to:

- Continue to apply the model to assess impacts of policy and transportation changes on local and regional trip making behavior and network conditions. Geary BRT, the Waterfront Transportation Assessment, and Treasure Island Mobility Management study will depend heavily on modeling support.
- Continue the development of a citywide Dynamic Traffic Assignment model.