

SMCTP 2040

CITY/COUNTY ASSOCIATION OF GOVERNMENTS OF SAN MATEO COUNTY



PRELIMINARY DRAFT SAN MATEO COUNTYWIDE TRANSPORTATION PLAN



Preliminary Draft

San Mateo Countywide Transportation Plan

Prepared by the

City/County Association of Governments of
San Mateo County

2016

Table of Contents

EXECUTIVE SUMMARY	1
Vision and Goals	1
Challenges and Opportunities	1
Rapidly Growing Economy – Booming Technology Sector	1
Approach	6
Major Initiatives	7
Implementation Process	9
1. INTRODUCTION & OVERVIEW	10
Background.....	10
Purpose of the Countywide Transportation Plan 2040.....	10
Relationship of CTP 2040 to Other Transportation Plans	11
Short Range Transit Plans (SamTrans, Caltrain, and BART)	11
Strategic Plans (SamTrans, Caltrain, BART, San Mateo County Transportation Authority).....	11
Congestion Management Program.....	12
Regional Transportation Plan and Sustainable Communities Strategy	12
City/County Capital Improvement Programs.....	12
Sales Tax Expenditure Plan (Measure A)	12
Comprehensive Bicycle and Pedestrian Plan	13
San Mateo County Congestion Relief Plan (Deficiency Plan).....	13
Community-Based Transportation Plans (East Palo Alto, Bayshore, North Central San Mateo).....	13
Organization of CTP 2040.....	13
2. SETTING	14
Background.....	14
Physical Setting.....	14
Socio-Economic Setting	14
Travel Characteristics	16
Transit Ridership.....	18
Forecasts of Growth and Travel	19
Population and Employment Growth	19
Growth in Travel	21
3. VISION & GOALS	22
Background.....	22
An Overarching Vision	22
Visions & Goals for Each CTP 2040 Element	22
Land Use and Transportation	22
Roadway System.....	22
Bicycles	22
Pedestrians	23
Public Transportation	23
Transportation System Management.....	23
Transportation Demand Management.....	23
Parking.....	23
Modal Connectivity.....	24
Goods Movement.....	24

4.	LAND USE AND TRANSPORTATION	25
	Background.....	25
	Issues	25
	Increased Land Use Densities	25
	Mixed Land Uses.....	26
	Transit Station Area Development	27
	Urban/Rural Boundary.....	27
	Jobs and Housing Balance.....	28
	Project Design Standards.....	28
	A Framework for Achieving Better Land Use and Transportation Linkage in San Mateo County	29
	Land Use and Transportation Linkage Vision, Goal, and Policies	29
	Land Use and Transportation Linkage Objectives.....	31
5.	ROADWAY SYSTEM	32
	Background.....	32
	Existing System	34
	Freeways.....	34
	Major Arterials.....	34
	Minor Arterials, Collectors and Local Roads.....	35
	Congestion Management Program Roadway System.....	35
	System Performance	35
	Planned Roadway System Improvements.....	36
	Issues	36
	Congestion	36
	Reliability	36
	Connectivity	37
	A Framework for Optimizing the San Mateo County Roadway System.....	38
	Roadway System Vision, Goal, and Policies.....	38
	Roadway System Objectives	39
6.	BICYCLES	40
	Background.....	40
	Profile of Bicyclists	41
	Issues	42
	Bicycle Facilities	42
	Barriers	42
	Bicycle Access to Major Activity Centers	43
	Engineering, Education, Encouragement, Enforcement and Evaluation	43
	Complete Streets	43
	Improvement Plans and Programs	44
	A Framework for Achieving a Better Bicycling Environment in San Mateo County.....	44
	Bicycling Environment Vision, Goal, and Policies	44
	Bicycling Objectives	46
7.	PEDESTRIANS	47
	Background.....	47
	Issues	48
	Pedestrian Facilities	48
	Neighborhoods	49
	Shopping Districts and Malls	49

Schools.....	50
Bus Stops	50
Barriers to Pedestrian Access: Rail Lines and Freeways	50
BART Stations.....	51
Arterial Streets.....	51
Commercial/Industrial Areas	51
Improvement Plans and Programs	51
A Framework for Achieving a Better Pedestrian Environment in San Mateo County	52
Pedestrian Environment Vision, Goal, and Policies	52
Pedestrian Objectives	53
8. PUBLIC TRANSPORTATION.....	55
Background.....	55
Existing System	55
The Bay Area Rapid Transit District (BART).....	56
Peninsula Corridor Joint Powers Board (Caltrain)	58
San Mateo County Transit District (SamTrans).....	60
Shuttle Services	62
Ferry Service	62
Potential New Transit Services	62
Issues	63
Effective Public Transportation	63
A Framework for Optimizing the San Mateo County Public Transit System.....	64
Transit System Vision, Goal, and Policies	64
Public Transportation Objectives.....	65
9. TRANSPORTATION SYSTEM MANAGEMENT AND ITS.....	67
Background.....	67
Intelligent Transportation Systems.....	68
Issues	69
The Geographic Scope and Duration of TSM Benefits.....	69
TSM, Sustainable Transportation Systems, and Sustainable Communities.....	69
Interagency Cooperation and Coordination	69
Mainstreaming ITS	70
Funding	70
A Framework for Transportation Systems Management and ITS in San Mateo County	71
Transportation Systems Management and ITS Vision, Goal, and Policies.....	71
Transportation Systems Management Objectives.....	72
10. TRANSPORTATION DEMAND MANAGEMENT.....	74
Background.....	74
Issues	75
Increased Complexity in Work Schedules and Locations.....	75
Resistance to Telecommuting.....	75
High Rates of Automobile Ownership	76
A Framework for Successful Transportation Demand Management in San Mateo County	76
Transportation Demand Management Vision, Goal, and Policies	76
Transportation Demand Management Objectives	77
11. PARKING	78
Background.....	78

Issues	80
Parking Management Plans	80
“Right-Sizing” Parking Provision	80
The Local Nature of the Parking System	81
A Framework for Optimizing Parking in San Mateo County Communities	81
Parking Vision, Goal, and Policies	81
Parking Objectives	83
12. MODAL CONNECTIVITY	84
Background.....	84
Issues	84
Access to Public Transportation Stations	84
Coordination of Intermodal Services	86
Dissemination of Information on Availability of Intermodal Services	86
A Framework for Intermodal Connectivity in San Mateo County.....	86
Modal Connectivity Vision, Goal, and Policies.....	86
Modal Connectivity Objectives	88
13. GOODS MOVEMENT	89
Background.....	89
Issues	90
Safe and Efficient Goods Movement	90
Air Quality Impacts of Motor Freight.....	90
A Framework for Goods Movement in San Mateo County.....	91
Good Movement Vision, Goal, and Policies.....	91
Goods Movement Objectives	91
14. FINANCIAL	93
Background.....	93
Issues	93
A Framework for Optimizing Transportation Funding in San Mateo County Communities	95
Financial Vision, Goal, and Policies.....	95
APPENDIX A PERFORMANCE MEASURES	98
Performance Measures	99
Chapter 4: Land Use and Transportation.....	99
Chapter 5: Roadway System	100
Chapter 6: Bicycles.....	100
Chapter 7: Pedestrians	101
Chapter 8: Public Transportation.....	101
Chapter 9: Transportation System Management and ITS	102
Chapter 10: Transportation Demand Management	103
Chapter 11: Parking	103
Chapter 12: Modal Connectivity	104
Chapter 13: Goods Movement	105
APPENDIX B PROPOSED RTP PROJECT LIST	106
Proposed RTP Project List.....	107
APPENDIX C MAJOR FUNDING SOURCES AND TRANSPORTATION NEEDS	111
Existing Fund Sources	112

Federal Funds	112
State Funds	113
Regional and Local Funds	115
Summary of Needs	117
Highway Improvements/ Roadway Maintenance	117
Transit Capital/Operations	117
Bike and Pedestrian Improvements.....	118
Enhancement/Transit Oriented Development (TOD) Transportation for Livable Communities (TLC)/Congestion Management	118
Transportation Services for Seniors and People with Disabilities	118
APPENDIX D CONGESTION AND SAFETY PERFORMANCE ON REGIONALLY SIGNIFICANT CORRIDORS...	119

List of Figures

Figure 1: Roadway System in San Mateo County	33
Figure 2: BART and Caltrain Alignment and Stations in San Mateo County	58
Figure 3: Map of SamTrans Fixed-Route Network.....	61
Figure 4: Road Maintenance Need	94
Figure 5: Transportation Maintenance and Capital Revenues and Shortfall (millions)	95
Figure 6: Shortfall for Roadway Capital Projects	97

List of Tables

Table 1: Countywide Transportation Plan 2040 Statements of Vision and Goals	2
Table 2: Countywide Transportation Plan 2040 Statements of Vision and Goals - Continued	3
Table 3: San Mateo County Population	15
Table 4: Selected San Mateo County Population Characteristics, Comparison to California and the Nation.....	16
Table 5: Means of Travel to Work in San Mateo County.....	17
Table 6: Estimated Travel by Mode within San Mateo County	17
Table 7: Estimated Travel by Mode within, to, and from San Mateo County	17
Table 8: SamTrans Passenger Statistics	18
Table 9: Average Weekday BART Station Entries by San Mateo County Station	19
Table 10: Average Weekday Caltrain Ridership by San Mateo County Station.....	19
Table 11: Forecasted Population by County.....	20
Table 12: Forecasted Employed Residents by County.....	20
Table 13: Forecasted Jobs by County	20
Table 14: Forecasted Travel Growth by Mode for Home-based Work Trips.....	21
Table 15: San Mateo County Roadway Network.....	34
Table 16: San Mateo County BART Station Access Attributes.....	57
Table 17: San Mateo County BART Station Average Weekday Entries.....	57
Table 18: Average Weekday Ridership at San Mateo County Caltrain Stations	59

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EXECUTIVE SUMMARY

Vision and Goals

The San Mateo Countywide Transportation Plan for 2040 (CTP 2040) was conceived by San Mateo County political leaders as a way to provide the county with a long-range, comprehensive transportation planning document that sets forth a coordinated planning framework and establishes a systematic transportation planning process for identifying and resolving transportation issues. CTP 2040 is intended to articulate clear transportation planning objectives and priorities and to promote consistency and compatibility among all transportation plans and programs within the county. By doing so, CTP 2040 supports an integrated, system-wide approach to transportation planning that gives proper consideration to the countywide transportation network as a whole, not just in its constituent parts.

The central vision statement for the CTP is the following:

"Provide an economically, environmentally, and socially sustainable transportation system that offers practical travel choices, enhances public health through changes in the built environment, and fosters inter-jurisdictional cooperation."

The central vision is supported by more specific vision statements and goals for each element of the plan as indicated in **Table 1**. These statements of vision and goals provide a framework for decision making that will guide countywide transportation investment, operation and management for the next two decades. The central theme of the statements in **Table 1** is that a coordinated, multimodal approach that relies on advanced technologies and management practices will be required to meet the growing and changing transportation needs of San Mateo County.

Challenges and Opportunities

As San Mateo County undertakes the adoption of CTP 2040, it faces a number of challenges and opportunities that influence and shape the plan's content. A summary of the most significant challenges is provided below.

Rapidly Growing Economy – Booming Technology Sector

One of San Mateo County's greatest challenges for the future is also one of its greatest strengths. San Mateo County is fortunate to have one of the most robust economies for technology research, development and production. Even during the difficult economic times of the recession of 2008-2010, San Mateo County fared better than the Bay Area as a whole and better than the rest of California. Unemployment in San Mateo County reached a high of 8.8% in January 2010, but that was the second lowest of any county in California and well below the statewide unemployment rate of 12.6%. By February 2016, the unemployment rate in San Mateo County had fallen to 3.0% and was the lowest of any county in the state. The statewide unemployment rate in California was 5.7% in February 2016 and nationwide was 5.2%¹. With the expected growth of the technology sector in the county, it will be a major challenge for the transportation agencies of the county and the region to provide transportation services that keep up with the needs of these industries and their employees.

¹Bureau of Labor Statistics, http://www.bls.gov/regions/west/news-release/unemployment_bayarea.htm.

Trips into and out of the county – Requires Regional Approach

The combination of a robust economy and a limited housing supply has resulted in significant amount of commuting across county lines for San Mateo County residents and employees. In 2015, approximately 60 percent of home-based work trips crossed the county borders. The number of work trips into and out of the county is forecast to increase by 107,500, or 24 percent, by 2040. Not only does the high level of cross-county commuting involve long commutes, but also serving the trips requires close coordination with the surrounding counties of San Francisco, Santa Clara and Alameda and the regional transportation agencies serving those counties.

Table 1: Countywide Transportation Plan 2040 Statements of Vision and Goals

Category	Vision	Goal
Land Use & Transportation	A San Mateo County transportation system that is safe and convenient for all people whether travelling on foot, by bicycle, via public transportation, or in an automobile, to reach places they wish to go.	Integrate transportation and land use plans and decisions in support of a more livable and sustainable San Mateo County.
Roadway System	A multimodal transportation network that contributes to the socio-economic and environmental health and safety of San Mateo County.	Enhance safety and efficiency on the countywide roadway system to foster comfortable, convenient, and multimodal mobility.
Bicycles	A San Mateo County in which bicycling is safe, comfortable, and convenient.	Provide bicyclists viable travel choices and encourage use of healthy, active transportation through a safe, continuous, convenient and comprehensive cycling network that reduces reliance on the automobile for short trips.
Pedestrians	A San Mateo County in which walking for both active transportation and recreation is safe, comfortable, and convenient.	Promote safe, convenient, and attractive pedestrian travel that promotes healthy, active communities while reducing reliance on the automobile for short trips.
Public Transportation	A public transportation system in San Mateo County that provides essential mobility for all, offers a competitive alternative to the automobile, and contributes to environmental and socio-economic well-being.	Develop and maintain a seamless, safe and convenient public transportation system in San Mateo County.
Transportation System Management and ITS	A San Mateo County in which the transportation system is safe, efficient, cost-effective, and environmentally responsible.	Manage travel efficiently through supply-side measures, including low-cost traffic operations improvements and use of technologies that reduce or eliminate the need for increases in physical capacity.

Table 2: Countywide Transportation Plan 2040 Statements of Vision and Goals - Continued

Category	Vision	Goal
Transportation Demand Management (TDM)	A San Mateo County in which reliance on solo occupant motor vehicle travel is minimized.	Reduce and manage travel efficiently through demand-side measures, including land use planning and transportation demand management efforts at work sites.
Parking	Parking in San Mateo County that is a “right-sized” balance of supply and demand, supportive of Transit Oriented Development and Sustainable Communities Strategies, intuitive to use, and environmentally responsible.	Encourage innovations in parking policy and programs, including incentives for reduced parking requirements, and a comprehensive approach to parking management and pricing.
Modal Connectivity	Seamless travel within San Mateo County using different modes of transportation.	Integrate the roadway, public transit, and non-motorized modes transportation networks to advance system efficiency, effectiveness, and convenience.
Goods Movement	Goods movement that supports an economically and environmentally sustainable San Mateo County.	Foster safe and efficient goods movement on the San Mateo County roadway network compatible with countywide economic development and environmental policies.
Finance	Sustainable funding sources to maintain, operate, optimize, and expand all modes of the transportation networks in San Mateo County.	Seek and protect transportation revenues to maintain existing transportation infrastructure and investments, and to improve all modes of transportation systems within San Mateo County in a balanced fashion.

Limited Right of Way for Major Freeway Corridors

The long commutes coupled with the highly dispersed employment locations within San Mateo County make commuting by private automobile a choice for many who live or work in the county. Growth in jobs within the region and particularly the counties along the peninsula will only increase the demand for private automobile use. For a largely built out urban county like San Mateo County, expanding freeways and other roadways to meet the growth demand is difficult because of limited right of way. Most heavily used roadways in the county are built out to the limits of the right of way with houses, businesses or other existing land uses bordering the right of way. Expansion of the most congested roadways would require relocation of residences or businesses and produce potentially significant social or environmental impacts.

Aging Population – Large Increase in Working and Retired Seniors

Like in most urban counties in the US, the population in San Mateo County is aging. In 2040, there will be a significantly larger share of the population over 65 and a larger share of the population over 65 still working. This will have an effect on the transportation needs of the county's residents and the behavior of the travelers. As the aging of the population occurs, many people will be unwilling or unable to drive themselves and become more reliant on public transportation or being driven by others. Because a larger share of the senior population will continue to work, this increasing demand for public transportation and ridesharing services will affect commute and non-commute travel.

Emerging Trends in Transportation Technology and Shared Mobility Options

Recent advancements in technology have already produced significant changes in how transportation services are being provided in the Bay Area, and many more advancements appear to be on the not-too-distant horizon. Significant advances have occurred in sensor-based infrastructure, communications, traveler information, shared mobility, connected and automated vehicles, urban automation, and electric vehicles. Many of these promising technologies have the potential to increase traveler safety, increase mobility, reduce congestion and provide transportation services more efficiently as well as reduce greenhouse gas and other pollutant emissions.

Increases in the availability of real-time information about transit services, shared-use services, parking availability and traffic conditions has significantly increased the level of information of transportation options for travelers and the geographic nature of transportation needs for service providers. These improvements have resulted from advances in GPS and sensor-based technologies as well as advanced communications systems.

Communication technologies and smartphone apps have already made possible shared mobility options, such as Uber and Lyft, which allow private individuals to offer a variety of door-to-door and group-ride services using their private vehicles. This has produced a more ubiquitous mobility service in areas not easily served by public transportation and at a lower cost than conventional taxi service. These options are expected to reduce the demand for privately-owned vehicles by making more options available. Smart parking technologies, including variable and demand-responsive pricing, have the potential to reduce congestion and greenhouse gas emissions by increasing the turnover and productivity of parking spaces.

Connected and Automated Vehicles (CV/AV) have the potential to almost immediately improve traveler safety by introducing collision-avoidance features and reducing congestion by reducing delay caused by collisions. Ultimately, the CV/AV technologies will produce efficiency in the use of street space once there is widespread adoption and thus reduce overall congestion. New cars with CV/AV technologies may also

improve mobility for travelers with special needs if the CV/AV features allow drivers to overcome disabilities by using automation features.

Fully automated vehicles, though probably some years away in terms of high level of private or public use on public streets, will ultimately make possible driverless operations that will allow commuters to make more efficient use of their commute time. Driverless cars may also reduce parking needs by dropping off passengers and returning to a home location or proceeding with other pick-ups or drop-offs. If deployed for shared-use, automated transit vehicles have the potential for long-term cost savings. The rapidly increasing use of all-electric vehicles will also change the relationship between transportation and greenhouse gases. Electric vehicles have the potential to significantly reduce greenhouse gas emissions and therefore reduce the impact of transportation on global climate change.

Increased Emphasis on Reducing Vehicle Miles Traveled and Greenhouse Gas Emissions and Less Emphasis on Traffic Delay

Over the past ten years, concern for global climate change has led to some transformative legislation in California. In 2008, Senate Bill (SB) 375, the “Sustainable Communities Act” was passed to ensure closer integration of land use and transportation planning with the aim of reducing greenhouse gas emissions in California. As instructed by the Act, the California Air Resources Board (CARB) set regional targets for greenhouse gas emissions reductions from passenger vehicle use. In 2010, CARB established these targets for 2020 and 2035 for each region covered by one of the State's metropolitan planning organizations (MPO). In 2013, the Metropolitan Transportation Commission (MTC) adopted Plan Bay Area which identified how the Bay Area would meet its greenhouse gas emission reduction targets.

Senate Bill 743, adopted in September 2013, included elements designed to encourage the type of land-use development encouraged by SB 375 and MTC's Plan Bay Area. The act had three primary objects:

1. Prevent the use of roadway Level of Service (LOS) as an environmental impact – keep LOS concerns from discouraging efficient land use patterns and multimodal transportation services
2. Introduce changes in Vehicle Miles Traveled (VMT) or VMT per capita as a determinant of environmental impact
3. Use the consideration of VMT as an impact in CEQA as a mechanism for achieving state and regional GHG reduction goals

Under SB 743, vehicle delay-based measures will no longer be considered a significant impact under the California Environmental Quality Act (CEQA); changes in VMT will be considered an environmental impact under CEQA if the increase in VMT exceeds a pre-specified threshold level.

On January 20, 2016 the Governor's Office of Planning and Research issued a revised proposal on updates to the CEQA Guidelines on evaluating transportation impacts in CEQA, and these guidelines will ultimately define how SB 743 will affect transportation planning in California. Initially, the updated Guidelines will be implemented in Transit Priority Areas (TPAs) only, or locations within a half mile of a transit station or along a high-quality transit corridor. Within two years after the Guidelines are formally adopted, LOS will no longer serve as a CEQA threshold, regardless of proximity to transit, and changes in VMT in excess of the threshold will be considered an environmental impact. Local jurisdictions, subarea agencies like the Regional Transportation Planning Committees (RTPCs), county agencies, regional agencies and state agencies will continue to have the option of evaluating consistency with formally stated policies regarding LOS, but the impact of a project exceeding the policy standard will not be considered an environmental

impact. Furthermore, capacity-increasing measures that might be proposed to mitigate the exceedance of an LOS standard may themselves produce significant environmental impacts if they result in an increase in VMT in excess of an established threshold.

Approach

There is no single simple solution available to address current and future congestion, environmental, and energy issues that arise from the San Mateo County transportation system. Instead, a combination of multimodal transportation investments, application of advances in electronics and communications, enhanced participation of employers in transportation demand management, transportation facilities pricing policy, local land use policy, and individual actions by those who live and/or work in San Mateo County will be necessary to create more beneficial outcomes from the San Mateo County transportation system.

Enhancing Transit Capacity, Service Frequency and Connectivity

A variety of coordinated programs designed to provide multimodal choices for travel for most trips will decrease reliance on the private automobile by 2040. Although a majority of trips in San Mateo County in 2040 are still expected to be by private automobile, public transit investment will carry a significantly increasing share of travel. Significant investment in public transportation will be required to ensure that there is adequate capacity to absorb this increasing share and to ensure that the transit services are connecting the appropriate origins and destinations with a competitive travel time. The most important markets for improved transit service will be commuters because of the potential to reduce peak period congestion and residents who have limited options because of age, disability or income. Both of these markets are expected to increase significantly by 2040. San Mateo County is one of the most dramatic growth markets for jobs because of the success of high technology industries in the county and in adjacent counties. Like all of the counties in the Bay Area, the population in San Mateo County is also aging. The Baby Boomer generation is approaching retirement age, and by 2040, this will result in a higher number of residents needing mobility options other than driving alone.

Getting the Most out of Existing Roadway Infrastructure – Managed Lanes, Intelligent Transportation Systems (ITS) and Transportation Systems Management (TSM)

Significant increases in roadway capacity are not feasible in San Mateo County because of funding limitations, constrained rights of way in many locations, and environmental concerns, including greenhouse gas emissions effects. Investments in advanced electronics and communications on the roadway system, such as managed lanes, ITS and TSM, can, however, improve motor vehicle traffic operations and moderate the effects of increased congestion. Automated collection and processing of traffic flow data is making possible new methods for optimizing traffic flow management and for informing travelers of traffic conditions that will allow them to make smarter choices for route, mode of travel or time of travel.



Managing Demand through Employer-Based Trip Reduction Programs, Parking Policy and Pricing

There is great scope for private action to reduce congestion, including increased availability of telecommuting and teleconferencing alternatives for workers, optimized travel route choice through use of on-board GPS navigation systems and smart phones, and transportation demand management efforts by employers. Changes to parking policies, such as reduced parking requirements for new development, is another potential tool for reducing drive-alone trips. There is also scope for wider application of pricing mechanisms, including congestion pricing on freeways and variable parking pricing in cities, as a means to moderate the growth of automobile travel within San Mateo County.

Improving Safety for Pedestrians and Bicyclist

Interest in walking and bicycling, whether as a mode of travel, as a means to get to transit, as a recreational activity or for health reasons, has increased dramatically in the past decade in San Mateo County as it has elsewhere in the Bay Area. Many more residents are walking and bicycling, but often on or along roads that were designed for automobile travel and not necessarily for walking or bicycling. Significant investments in pedestrian and bicycle facilities will enhance safety for non-motorized travel as well as contribute to healthier, more active communities.

Major Initiatives

Land Use and Transportation Integration

Local land use policy can be effective in fostering transit-oriented development and mixed-use urban and suburban villages, areas in which walking, cycling, and transit use are more convenient and more practical. Most of San Mateo County is characterized by comparatively low density and by separation of land use types. This low-density development pattern tends to support dependence on automobile use. Policies by local jurisdictions can promote development at higher densities in proximity to downtowns, public rail stations and along major bus transit service corridors. Local policies can also encourage greater mix of uses bringing housing, jobs and retail in closer proximity so that walking and bicycling becomes feasible travel options. These initiatives by jurisdictions within San Mateo County are consistent with the regional Sustainable Communities Strategy developed by the Metropolitan Transportation Commission and the Association of Bay Area Governments (ABAG) in response to Senate Bill 375 and incorporated in Plan Bay Area (the Regional Transportation Plan and Sustainable Communities Strategy for the San Francisco Bay Area 2013–2040, adopted July 18, 2013). The Sustainable Communities Strategy encourages the concentration of future development in the Priority Development Areas, which have been identified as the best locations to increase densities and mix of uses near transit and existing urban services. Locations of particular importance are the Priority Development Areas near Caltrain and BART stations and along El Camino Real where the Grand Boulevard Initiative is being implemented to increase mixed-use development and densities along the densest bus transit services in the county.



Implementing Managed Lanes on US 101

Implementing managed lanes on US 101 through the county will provide a significant new opportunity to enhance mobility through an increase in capacity and management of travel demand. By providing a travel-time advantage for higher occupancy vehicles, completion of the US 101 managed lanes will encourage commuters to carpool or to use the transit services that will make use of the lanes. In addition, managed lanes may be developed as Express Lanes to allow for pricing mechanisms to manage the performance of the lanes, including time periods outside the peak commuting times, and provide revenues for further improvement of the corridor.

Integration with BART, Caltrain and High Speed Rail

BART, Caltrain and ultimately High Speed Rail will provide high-capacity transit service to, from and within San Mateo County. These three services will be essential to meeting the projected growth of inter-county commuting by people living or working in San Mateo County. While these services will provide high capacity for moving commuters during the peak periods, they will not directly serve the locations where many of the commuters live or work. Effective use of BART, Caltrain and High Speed Rail will require an increase in local bus services or shuttles that link the stations on these services with trip origins and/or final destinations in the county.

Expanding SamTrans Express Bus and Commuter Services

With the significant growth of employment expected in San Mateo County by 2040, much of it in locations not directly served by BART, Caltrain and High Speed Rail, additional bus services with routing flexibility will be needed to capture some of the growth in commute trips. Continued growth in the number of commuter-oriented shuttle services as well as new or expanded express bus services will be needed to supplement the high-capacity rail services and the local bus services in the county.

Bus Rapid Transit or Transit Signal Priority

Continued travel growth in San Mateo County is expected, bringing with it additional congestion on the roadway system. Efficient and effective operation of bus and shuttle services within the county will become more difficult unless steps are taken to give priority to transit vehicles on the roadway system. This will include priority at traffic signals and priority use of special lanes where necessary to avoid congestion. These methods for giving priority to transit vehicles will save operating costs, increase the reliability of service and provide a greater travel-time advantage to transit with which to entice new riders.

Arterial Management

While the freeways in San Mateo County will be the backbone of the roadway system and will carry the greatest share of regional trips, the arterial system will also serve a critical role in regional mobility for movement of people and goods. The arterial system will continue to be the connection between the freeway system and local origins and destinations and will be the primary routes for bus transit services, goods pick up and deliveries and local travel within the county. Keeping all modes functioning efficiently and effectively will require management of the traffic flow on arterials through ITS elements for vehicle surveillance and advanced traffic signal systems that allow adaptation to changing conditions and priority to emergency or transit vehicles when appropriate.

Complete Streets

The Complete Streets Act of 2007 created by California Assembly Bill 1358 amended Government Code Sections related to General Plans and General Plan Guidelines. It required that commencing January 1, 2011, cities and counties modifying the Circulation Element of their General Plan must provide a “balanced, multimodal transportation network that meets the needs of all users of the streets, roads, and highways for safe and convenient travel in a manner that is suitable to the rural, suburban, or urban context of the General Plan.” Each new update of the Circulation Element of a General Plan must document how this has been achieved in the plan update. MTC has developed guidance designed to ensure that all Bay Area projects that get federal funds through MTC are giving adequate attention to the needs of bicyclists and pedestrians. The guidance was designed to ensure that projects are consistent with area-wide bicycle and pedestrian master plans and will not adversely impact mobility for bicyclists and pedestrians. MTC and the ABAG have also required that local jurisdictions wishing to apply for grants under the One Bay Area Grant Program have an adopted Complete Streets section in the Circulation Element of their General Plan or have a Complete Streets Policy adopted by the governing body of the jurisdiction. All local jurisdictions in San Mateo County have met the MTC requirements of adopting Complete Streets Resolutions or policies in their General Plan, and as the jurisdictions implement the Complete Street policies, countywide coordination and funding of regional elements of the system will be necessary.

Implementation Process

The process for implementing the 2040 Countywide Transportation Plan for San Mateo County will require a continuing process of consensus building among the numerous local jurisdictions and regional agencies that have responsibility for planning or implementing transportation, housing and land use policy in the county. CTP 2040 has identified Statements of Vision, Goals, Policies and Objectives to cover the land use-transportation interactions and all modes of local and regional travel. The CTP 2040 also identifies major initiatives, the most significant of which are described in this Executive Summary. CTP 2040 provides a framework for establishing coherent and consistent policies that will affect transportation in the county, but it does not define the projects and programs needed to achieve those policies. The process of consensus building that follows adoption of the CTP will include achieving agreement on the initiatives that have been identified and programming of funds to implement the projects and programs of those initiatives.

1. INTRODUCTION & OVERVIEW

Background

The San Mateo Countywide Transportation Plan 2040 was developed in response to the many changes in San Mateo County's transportation system, public policies, and both demographic and land use trends since adoption of the Countywide Transportation Plan 2010 (CTP 2010) on January 18, 2001. CTP 2040 was prepared through a collaborative effort involving the City/County Association of Governments (C/CAG), the County of San Mateo and its municipalities, the San Mateo County Transit District, including SamTrans, the Peninsula Corridor Joint Powers Board (Caltrain), and the San Mateo County Transportation Authority (TA), and other stakeholders. CTP 2040 presents policies and programs that will guide the way in which the county's transportation network takes shape to the year 2040. The following sections present the purpose of the CTP 2040, the relationship of CTP 2040 to other transportation plans, and an outline of how the document is organized.

Purpose of the Countywide Transportation Plan 2040

Transportation planning and programming in San Mateo County is undertaken by a multitude of agencies with sometimes overlapping jurisdictions and responsibilities. The San Mateo County Transit District oversees the County's bus transit system, the Peninsula Corridor Joint Powers Board (JPB) conducts planning and operations for the Caltrain commuter rail system, and the Transportation Authority is responsible for administering the voter approved San Mateo County Measure A half-cent transportation sales tax, which was reauthorized in 2004 for an additional 25 years from calendar year 2009 through 2033. Per the Measure A Transportation Expenditure Plan (TEP), the program is estimated to generate \$1.5 billion (in 2004 dollars) for the categories of transit (30%), highways (27.5%), local streets and transportation (22.5%), grade separations (15%), pedestrian and bicycle (3%) and alternative congestions relief (1%) programs. In addition to funding numerous transportation projects in San Mateo County, the TA is also actively involved with its sponsors and partners in the planning of highway projects. Per the TEP, projects funded through Measure A are to be consistent with the Countywide Transportation Plan.

CTP 2040 is intended to articulate clear transportation planning goals and objectives and to promote consistency and compatibility among all transportation plans and programs within the county.

C/CAG, as the county's Congestion Management Agency, is responsible for administering certain state-mandated programs related to transportation and air quality and certain federal and state transportation funding programs in San Mateo County. The Peninsula Traffic Congestion Relief Alliance (Commute.org) collaborates with employers in San Mateo County to reduce solo occupant vehicle commuting. In addition, the County and the twenty cities within its boundaries each plan and implement improvements to local roadways within their own jurisdictions as well.

The California Department of Transportation (Caltrans) is an important partner to all of the above entities in regard to improving travel safety and efficiency on freeways and other State highways within San Mateo County. The Bay Area Rapid Transit District (BART) serves six stations in San Mateo County as part of its regional passenger rail system. The Metropolitan Transportation Commission (MTC) serves as the metropolitan transportation planning and programming organization for the entire nine-county Bay Area region.

Each of these agencies participates in planning the County's transportation network. These fragmented, yet inter-related efforts require coordination of policies, plans, and projects on a countywide and a system-wide level. Such coordination fosters optimal performance of the County's transportation network and, in particular, the effectiveness of new transportation investments.

CTP 2040 was conceived, as was CTP 2010, by San Mateo County political leaders as a way to provide the County with a long-range, comprehensive transportation planning document that sets forth a coordinated planning framework and establishes a systematic transportation planning process for identifying and resolving transportation issues. CTP 2040 is intended to articulate clear transportation planning goals and objectives and to promote consistency and compatibility among all transportation plans and programs within the County. By doing so, CTP 2040 supports an integrated, system-wide approach to transportation planning that gives proper consideration to the countywide transportation network as a whole, not just in its constituent parts.

Relationship of CTP 2040 to Other Transportation Plans

A number of public agencies independently produce transportation plans in San Mateo County. Each plan considers only that portion of the County's transportation system for which the authoring agency is responsible. As a result, there is sometimes insufficient consideration of the potential synergy in coordinating individual plans to improve mobility throughout the entire county. The primary purpose of CTP 2040, as it was for its predecessor (CTP 2010), is to increase consistency and improve coordination among the various transportation plans. CTP 2040 will serve as a central coordinating document that provides overall policy and program direction for all transportation plans in the county. CTP 2040 is not intended to duplicate or replace other plans, but instead establish broad principles that should influence the preparation of other plans, promoting a high level of interdependence among them.

An important aspect of CTP 2040 is that it integrates all of the County's transportation modes and facilities, while other plans are typically concerned only with a single mode or facility type, such as public transit or highways.

An important aspect of CTP 2040 is that it integrates all of San Mateo County's transportation modes and facilities, while other plans are typically concerned only with a single mode or facility type, such as public transit or highways. The following summarizes the County's key transportation plans.

Short Range Transit Plans (SamTrans, Caltrain, and BART)

All transit agencies are required to prepare Short Range Transit Plans (SRTPs) in order to obtain federal funds. The SRTP establishes operating plans and provides the foundation for capital improvement programs and financial plans. The plans are updated annually and are reviewed by MTC for consistency with the Regional Transportation Plan.

Strategic Plans (SamTrans, Caltrain, BART, San Mateo County Transportation Authority)

Agency strategic plans provide policy level guidance on mission, vision, and both medium- and long-term direction. These documents and the process that leads up to them ensure that operational plans, programs, and projects all contribute to the strategic direction of the agency.

Congestion Management Program

State law requires that each county develop a Congestion Management Program (CMP) to qualify for State transportation funds. The CMPs must establish levels of service standards for roadways, set transit service standards, develop trip-reduction and travel demand management programs, perform land-use impact analyses, formulate capital improvement programs, and monitor conformance in the County with the CMP. CTP 2040 is intended to complement the CMP. The purpose of CTP 2040 is to provide a comprehensive, long-term perspective; the purpose of the CMP, through its project priority and programming function, is to be a vehicle for implementing CTP 2040 in the short term.

Support for congestion-relief initiatives improves mobility countywide and enhances economic and environmental vitality.

Regional Transportation Plan and Sustainable Communities Strategy

Plan Bay Area, adopted in 2013 by the Association of Bay Area Governments (ABAG) and the MTC, includes the region's 2040 Regional Transportation Plan and Sustainable Communities Strategy. The Regional Transportation Plan (RTP), prepared by the MTC and updated every four years, is the Bay Area's region-wide transportation planning document. The RTP is a blueprint for transportation funding twenty years into the future. According to State law, each county's CTP is intended to serve as the primary basis for its portion of the RTP. Upon review of CTPs, the MTC incorporates plan proposals and policies of regional significance. The MTC also reviews CMPs for consistency with the RTP.

The Sustainable Communities and Climate Protection Act of 2008, known as Senate Bill 375, was enacted to ensure closer integration of land use and transportation planning with the aim of reducing greenhouse gas emissions in California. CTP 2040 will reflect this collaboration in policies intended to address greenhouse gases and climate change.

City/County Capital Improvement Programs

Local governments create Capital Improvement Programs (CIPs) to address their physical infrastructure needs. CIPs are sometimes "wish lists" of projects or goods that the various departments of a jurisdiction request. While CIPs can include any kind of physical project, they tend to focus on road improvement and maintenance. Sometimes CIPs are created as part of a larger planning effort, but this is not always the case.

Sales Tax Expenditure Plan (Measure A)

In 2004, San Mateo County voters re-authorized Measure A, a one-half cent sales tax increase, to finance specific road and transit improvements throughout the county. The Sales Tax Expenditure Plan sets priorities for spending the tax revenues. The San Mateo County TA is responsible for putting together the expenditure plan.

The Sales Tax Expenditure Plan sets priorities for spending the one-half percent sales tax revenues generated for transportation by Measure A.

Comprehensive Bicycle and Pedestrian Plan

The San Mateo County Comprehensive Bicycle and Pedestrian Plan completed by C/CAG in 2011 envisions bicycle and pedestrian networks countywide that will support safe, comfortable, and convenient travel for walkers and cyclists of all skill levels. The Plan sets forth an integrated set of policies to support this vision.

San Mateo County Congestion Relief Plan (Deficiency Plan)

The Congestion Relief Plan formulates the county's strategy for reducing traffic congestion through transportation demand management (TDM), encouragement of transit-oriented development (TOD), and provision of additional capacity in the form of shuttle buses. Support for these initiatives improves mobility countywide without dampening economic vitality.

Community-Based Transportation Plans (East Palo Alto, Bayshore, North Central San Mateo)

Community-Based Transportation Plans represent a focused, multimodal approach to addressing mobility needs across population segments. Emphasis is given to community participation in the planning process.

In addition to the above plans, there are many important transportation plans and studies, as well as plans and programs, from public policy sectors closely related to transportation that influence the direction of transportation planning in San Mateo County. These include the San Mateo County Intelligent Transportation

Community-Based Transportation Plans assess the mobility needs for low-income neighborhoods and provide strategies for overcoming transportation challenges.

Systems 20-Year Strategic Plan, the San Mateo County Smart Corridors Program, the 2020 Peninsula Corridor Study, the San Mateo – 101 Corridor Systems Management Plan, the San Mateo County Housing Needs Study, the Airport Land Use Plan, and the San Mateo County Energy Strategy.

Organization of CTP 2040

CTP 2040 is organized into fourteen chapters, presented in the following four groupings:

Context – Overview & Introduction, Setting, Vision & Goals

Travel Determinants/Modes/Networks – Land Use and Transportation, Roadway System, Bicycles, Pedestrians, Public Transportation

Travel Management – Transportation System Management, Transportation Demand Management, Parking, Modal Connectivity, Goods Movement

Transportation Funding - Financial

2. SETTING

Background

San Mateo County is the vibrant, dynamic heart of the San Francisco Peninsula. This chapter describes the county in geographical, socio-economic, and transportation terms. The information will illuminate existing conditions and trends that form the backdrop for CTP 2040.

Chapter 2 is organized in five parts, including this introductory section. The second and third sections describe the physical and socio-economic settings of San Mateo County, respectively. The fourth section describes current and future (2040) travel characteristics. The final section summarizes the material presented previously and points the way to further analysis, including the socio-economic and travel projections to be presented in Chapter 7.

Physical Setting

San Mateo County is located between San Francisco and San Jose on the San Francisco Peninsula. The county is 741 square miles in area, 449.1 square miles of which is land and the remaining 291.9 square miles is water.² San Mateo County extends east to west from the San Francisco Bay to the Pacific Ocean with the Santa Cruz Mountains in between these two bodies of water. The urbanized portion of the county is located between The Bay to the east and I-280 to the west. The City and County of San Francisco forms the northern border and the County of Santa Clara the southern border of San Mateo County. Long Ridge, located in the Long Ridge Open Space Preserve near Highway 35, is the highest point of elevation in the county at 2,600 feet (792 meters).³ Much of the urbanized area alongside US 101 and El Camino Real is comparatively flat and low-lying, however. For example, downtown San Mateo and downtown Redwood City are both an average of 15 feet above sea level.^{4,5} While the lowlands are urbanized, the hill country between I-280 and the Coast side has a rural character, including extensive open space preserves and parklands. The Coast side is an area of beautiful beaches and small communities arrayed along Highway 1, the largest being Pacifica.

Socio-Economic Setting

The estimated population of the county in 2015 was 745,400.⁶ This represents an increase of 26,949 or 3.75%, from the 718,451 people counted in the 2010 Census. Unlike the City and County of San Francisco to the north or the County of Santa Clara to the south, San Mateo County does not have one dominant municipality in size. The two largest cities, Daly City and San Mateo each have approximately 14% of the population of San Mateo County. Redwood City is the third largest municipality in the county, with approximately 11% of the total population.

The estimated population of San Mateo County in 2015 was 745,400.

² California Statistical Abstract, 2008, Table A-1.

³ <http://www.summitpost.org/long-ridge/261661>.

⁴ <http://www.city-data.com/city/San-Mateo-California.html>.

⁵ <http://www.city-data.com/city/Redwood-City-California.html>.

⁶ US Census Bureau and Association of Bay Area Governments.

The distribution of this population by jurisdiction is shown in **Table 3**. An estimated 6.2% of the population was under 5 years of age, 23.2% was 5 to 24 years of age, 56.6% was 24 to 64 years of age, and 14.1% was 65 years of age and over, according to 2010-2014 estimates from the American Community Survey. Approximately 27% of San Mateo County residents over 25 years of age hold a bachelor's degree, 18% a graduate or professional degree, and approximately 7.5% an associate's degree.⁷ The population of San Mateo County on the whole is older, better educated, and higher-earning than that of the state of California and the nation. **Table 4** displays a comparison of the population characteristics of San Mateo County with those of the State of California and the United States as a whole.

Table 3: San Mateo County Population

Jurisdiction	2010 (Census)	2015 (Estimated)	2040 (Estimated)
Atherton	6,914	7,100	7,900
Belmont	25,835	26,400	29,600
Brisbane	4,282	4,400	5,100
Burlingame	28,806	30,200	38,400
Colma	1,403	1,500	2,300
Daly City	101,123	104,000	121,400
East Palo Alto	28,155	29,200	35,500
Foster City	30,567	31,000	33,900
Half Moon Bay	11,324	11,400	12,400
Hillsborough	10,825	11,000	12,100
Menlo Park	32,026	32,900	38,100
Millbrae	21,532	22,800	30,300
Pacifica	37,234	37,600	40,300
Portola Valley	4,353	4,400	4,900
Redwood City	76,815	80,300	100,800
San Bruno	41,114	43,500	56,800
San Carlos	28,406	29,200	34,000
San Mateo	97,207	101,500	126,000
South San Francisco	63,632	67,200	87,700
Woodside	5,287	5,300	5,700
Unincorporated	61,611	64,500	81,200
County Total	718,451	745,500	904,400

Sources: US Census Bureau and Association of Bay Area Governments (ABAG), 2013

⁷ US Census Bureau, 2010-2014 American Community Survey 5-Year Estimates.

Table 4: Selected San Mateo County Population Characteristics, Comparison to California and the Nation

Population Characteristic	San Mateo County	California	United States
Population under 5 Years of Age	6.2%	6.6%	6.4%
Population 5 to 24	23.2%	28.1%	27.1%
Population 25 to 64	56.6%	53.2%	52.8
Population 65 Years & Over	14.1%	12.1%	13.7%
Median Age	39.4	35.6	37.4
Bachelor's Degree or Higher, Population 25 & Over	45.0%	31.0%	29.3%
Median Income, Population 25 & Over with Earnings	\$50,260	\$37,170	\$36,034

Source: US Census Bureau, 2010-2014 American Community Survey 5-Year Estimates (a rolling average of sampling data)

As of 2015, there were 541,792 licensed drivers and 710,094 motor vehicles (including autos, trucks and motorcycles) registered in San Mateo County.⁸ An estimated 63.4% of households in the county had two or more vehicles available and 30.9% had one vehicle available. An estimated 5.7% of households in did not own or have access to a motor vehicle.⁹

As of 2015, there were 541,792 licensed drivers and 710,094 motor vehicles registered in San Mateo County.

Travel Characteristics

The travel characteristics for San Mateo are given based on type of trip as well as origin and destination. **Table 5** shows the mode share for those travelling to work in San Mateo County as measured in the American Community Survey 5-Year Estimates. **Table 6** shows the estimated mode share for trips that stay within the county, and **Table 7** shows the estimated mode share for all trips that start or end within San Mateo County. As shown on **Table 5**, just over 70% of San Mateo County residents 16 years of age and older drive alone to work. Compared with trips made for all purposes, work trips have a lower proportion of carpool use with 11% of the mode share, but are more likely to use public transit with 8.9% of the mode share.

As shown in **Table 6**, an estimated 47% of travel within San Mateo County for all trip purposes was by driving alone, 34% was by carpooling, 2% was by public transit, 2% was by bike, and 15% was by walking. As shown in **Table 7**, when trips crossing county boundaries are included, the mode share is higher for driving alone and public transit and lower for walking than trips staying within San Mateo County.

⁸ California Department of Motor Vehicles.

⁹ US Census Bureau, Selected Housing Characteristics, 2010-2014 American Community Survey 5-Year Estimates.

Table 5: Means of Travel to Work in San Mateo County

Mode of Travel	Mode Share
Drive Alone	70.2%
Carpool	11.0%
Public Transit	8.9%
Walk	2.5%
Other (includes Bicycle)	2.4%
Work at Home	5.0%

Source: US Census Bureau, 2010-2014 American Community Survey 5-Year Estimates

Table 6: Estimated Travel by Mode within San Mateo County

Mode of Travel	Mode Share (All Trip Purposes)
Drive Alone	47%
Carpool	34%
Public Transit	2%
Bicycle	2%
Walk	15%

Source: C/CAG-VTA Countywide Travel Demand Model, 2015

Table 7: Estimated Travel by Mode within, to, and from San Mateo County

Mode of Travel	Mode Share (All Trip Purposes)
Drive Alone	53%
Carpool	33%
Public Transit	4%
Bicycle	2%
Walk	9%

Source: C/CAG-VTA Countywide Travel Demand Model, 2015

Transit Ridership

The three major public transit providers in San Mateo County are the San Mateo County Transit District (SamTrans), BART, and Caltrain. SamTrans operates 76 routes, carrying more than 43,000 passengers each weekday and about 13 million riders per year.¹⁰ **Table 8** shows SamTrans ridership data. As displayed in **Table 9**, BART serves six stations with 36,577 average weekday station entries in the County. Caltrain boards more than 18,000 passengers each weekday at 12 stations in the county. **Table 10** shows passenger boarding details for Caltrain.

San Mateo County's major transit providers are:

SamTrans – Operates 54 Routes
BART – Serves Six Stations
Caltrain – Serves 12 Stations

Table 8: SamTrans Passenger Statistics

Total Annual Bus Passengers	
Fixed Route	13,629,434
Redi-Wheels	326,706
Total Revenue Vehicle Hours	
Fixed Route	525,786
Redi-Wheels	185,026
Passengers per Revenue Hour	
Fixed Route	26.13
Redi-Wheels	1.67
Passengers per Revenue Mile	
Fixed Route	1.92
Redi-Wheels	0.11

Source: San Mateo County Transit District FY 2014-2023

¹⁰ San Mateo County Transit District Short-Range Transit Plan, FY 2014-2023.

Table 9: Average Weekday BART Station Entries by San Mateo County Station

Station	Station Entries
Daly City	10,085
Colma	4,761
South San Francisco	3,681
San Bruno	3,975
San Francisco Airport	6,995
Millbrae	7,080
Total	36,577

Source: BART, 2015 Ridership by Station

Table 10: Average Weekday Caltrain Ridership by San Mateo County Station

Station	Boardings
Bayshore	254
South San Francisco	472
San Bruno	682
Millbrae	3,536
Burlingame	998
San Mateo	2,061
Hayward Park	367
Hillsdale	2,706
Belmont	699
San Carlos	1,435
Redwood City	3,233
Menlo Park	1,762
Total	18,205

Source: Caltrain, 2015 Annual Passenger Count

Forecasts of Growth and Travel

Population and Employment Growth

Table 11 gives existing and forecasted population values for San Mateo and surrounding counties. By 2040, San Mateo County is expected to experience an increase of 159,000 residents, a 21.3% increase in total population. San Francisco, Santa Clara County and Alameda County are expected to have larger increases in population, in terms of the total number and the percentage increase.

Table 11: Forecasted Population by County

County	Population			
	2015	2040	Growth	% Growth
San Mateo	745,400	904,400	159,000	21.3%
San Francisco	847,000	1,085,700	238,700	28.2%
Santa Clara	1,877,700	2,423,500	545,800	29.1%
Alameda	1,580,800	1,987,900	407,100	25.8%

Source: Association of Bay Area Governments (ABAG), Projections 2013

Table 12 gives the existing and forecasted number of employed residents for San Mateo and surrounding counties. San Mateo County is expected to have an increase of 69,980 employed residents, a 19% increase. San Francisco, Santa Clara County and Alameda County are expected to have larger increases in employed residents, in terms of the total number and the percentage increase.

Table 12: Forecasted Employed Residents by County

County	Employment			
	2015	2040	Growth	% Growth
San Mateo	368,790	438,770	69,980	19.0%
San Francisco	460,450	571,580	111,130	24.1%
Santa Clara	881,770	1,133,950	252,180	28.6%
Alameda	728,760	899,070	170,310	23.4%

Source: Association of Bay Area Governments (ABAG), Projections 2013

Table 13 gives the existing and forecasted number of jobs in San Mateo and surrounding counties. San Mateo is expected to add 70,130 jobs, an 18.7% increase. San Francisco, Santa Clara County and Alameda County are expected to have larger increases in jobs, in terms of the total number and the percentage increase.

Table 13: Forecasted Jobs by County

County	Jobs			
	2015	2040	Growth	% Growth
San Mateo	374,940	445,070	70,130	18.7%
San Francisco	617,420	759,500	142,080	23.0%
Santa Clara	1,003,780	1,229,520	225,740	22.5%
Alameda	757,010	947,650	190,640	25.2%

Source: Association of Bay Area Governments (ABAG), Projections 2013

Growth in Travel

Table 14 gives the forecasted growth of home-based work trips for San Mateo County by destination and mode. By 2040, total travel in San Mateo is expected to increase by 22% from the level experienced in 2015. Travel by all modes is expected to increase, but the largest percentage increase will be in transit at 70%. By far, the largest increase in absolute terms will be in automobile (driving alone and ridesharing) – approximately 116,000 daily trips, compared to 37,000 for transit and 6,000 for bicycle and walking. Travel within the county is expected to increase less in percentage terms than travel into and out of the county, a 19% increase in internal trips compared to a 24% increase in trips into and out of the county. One of the areas of highest percentage growth is in transit trips into and out of San Mateo County, a 67% increase.

Table 14: Forecasted Travel Growth by Mode for Home-based Work Trips

	Drive		Transit		Bike		Walk		All	
	Growth	%	Growth	%	Growth	%	Growth	%	Growth	%
Outbound and Inbound trips	73,098	19%	30,683	67%	3,365	64%	402	43%	107,547	24%
Internal trips	43,354	15%	6,551	87%	2,721	59%	6,045	38%	58,670	19%
Total trips	116,452	17%	37,233	70%	6,086	62%	6,447	39%	166,218	22%

Source: CCAG Travel Demand Model (2015 and 2040 PA Matrices by Trip Purpose & Mode Choice), DKS Associates 2016

3. VISION & GOALS

Background

CTP 2040 is guided by an overarching vision and a set of visions, goals, and objectives for each of its elements. These statements of desired ends were developed in collaboration among stakeholders and in consultation with the San Mateo County traveling public.

An Overarching Vision

"Provide an economically, environmentally, and socially sustainable transportation system that offers practical travel choices, enhances public health through changes in the built environment, and fosters inter-jurisdictional cooperation."

Visions & Goals for Each CTP 2040 Element

Land Use and Transportation

Vision:

A San Mateo County transportation system that is safe and convenient for all people whether travelling on foot, by bicycle, via public transportation, or in an automobile, to reach places they wish to go.

Goal:

Integrate transportation and land use plans and decisions in support of a more livable and sustainable San Mateo County.

Roadway System

Vision:

A multimodal transportation network that contributes to the socio-economic and environmental health and safety of San Mateo County.

Goal:

Enhance safety and efficiency on the countywide roadway network to foster comfortable, convenient, and multimodal mobility.

Bicycles

Vision:

A San Mateo County in which bicycling is safe, comfortable, and convenient.

Goal:

Provide bicyclists viable travel choices and encourage use of healthy, active transportation through a safe, continuous, convenient and comprehensive cycling network that reduces reliance on the automobile for short trips.

Pedestrians

Vision:

A San Mateo County in which walking for both active transportation and recreation is safe, comfortable, and convenient.

Goal:

Promote safe, convenient, and attractive pedestrian travel that promotes healthy, active communities while reducing reliance on the automobile for short trips.

Public Transportation

Vision:

A public transportation system in San Mateo County that provides essential mobility for all, offers a competitive alternative to the automobile, and contributes to environmental and socio-economic well-being.

Goal:

Develop and maintain a seamless, safe and convenient public transportation system in San Mateo County focused on the customer.

Transportation System Management

Vision:

A San Mateo County in which the transportation system is safe, efficient, cost-effective, and environmentally responsible.

Goal:

Manage travel efficiently through supply-side measures, including low-cost traffic operations improvements and use of technologies that reduce or eliminate the need for increases in physical capacity.

Transportation Demand Management

Vision:

A San Mateo County in which reliance on solo occupant motor vehicle travel is minimized.

Goal:

Reduce and manage travel efficiently through demand-side measures, including land use planning and transportation demand management efforts at work sites.

Parking

Vision:

Parking in San Mateo County that is a “right-sized” balance of supply and demand, supportive of Transit Oriented Development and Sustainable Communities Strategies, intuitive to use, and environmentally responsible.

Goal:

Encourage innovations in parking policy and programs, including incentives for reduced parking requirements, and a comprehensive approach to parking management and pricing.

Modal Connectivity

Vision:

Seamless travel within San Mateo County using different modes of transportation.

Goal:

Integrate the roadway, public transit, and non-motorized transportation networks to advance system efficiency, effectiveness, and convenience.

Goods Movement

Vision:

Goods movement that supports an economically and environmentally sustainable San Mateo County.

Goal:

Foster safe and efficient goods movement on the San Mateo County roadway network compatible with countywide economic development and environmental policies.

These vision and goal elements are further elaborated in Chapters 4 through 15. Each element chapter will include these sections:

- Background
Information on the topic and a description of how it relates to San Mateo County.
- Issues
Current issues facing the county relevant to the chapter topic including specific examples.
- Framework
A brief description of the approach taken to address the issues presented in the previous section.
- Vision, Goal and Policies
An overall vision and goal pertaining to the future of the county within the topic of the chapter followed by specific policies to achieve those goals.
- Objectives
Specific results that the policies are intended to achieve toward the vision and goal defined for each of the plan elements.

Performance measures associated with each element are provided in Appendix A.

4. LAND USE AND TRANSPORTATION

Background

Much of San Mateo County is characterized by comparatively low land use densities and separation of land uses. Exceptions to this pattern include the older downtowns and the nearby neighborhoods that developed near the passenger rail stations arrayed along the San Francisco Peninsula. The prevailing pattern of low-density land development supports dependence on the automobile and makes transportation by alternative travel modes like public transit, bicycling, or walking in some areas infeasible or unattractive.

Many research studies have concluded that changes in land use patterns can encourage the use of alternative travel modes and may decrease traffic congestion.

Many research studies have concluded that changes in land use patterns can encourage the use of alternative travel modes and may decrease traffic congestion.¹¹ The land use/transportation linkage factors that are the most influential towards transportation patterns are development density, land use mix, regional accessibility, degree of “centeredness” (or proportion of employment located in major activity centers), walking and bicycling conditions, transit quality and accessibility, parking supply and management, site design, and mobility management (or active encouragement of transportation alternatives).¹²



A concerted countywide effort to encourage land use patterns and supportive transportation practices that foster alternative transportation modes will yield many benefits. These benefits include increased travel choices, improved access to where people work, shop and recreate, and potential congestion relief. With a steady commitment, the County’s land use patterns can be transformed incrementally by making changes to the policies which govern land development, such as those contained in local jurisdictions’ general plans, specific plans, and zoning ordinances. Many San Mateo County jurisdictions have adopted or are in the process of adopting transit oriented development practices of increasing densities in proximity to public rail transit stations and along major bus transit service corridors, as well principles of mixing land uses to

bring jobs, housing and retail in closer proximity so that walking becomes a feasible travel option.

Issues

Increased Land Use Densities

Density refers to the amount of housing and employment within a given area.¹³ Increasing density results in decreased auto use and increased use of

Increasing density results in decreased auto use and increased use of alternative transportation modes.

¹¹ A selection of these studies is listed in the References section of *Land Use Impacts on Transport: How Land Use Factors Affect Travel Behavior*, pp. 63-86.

¹² From *Land Use Impacts on Transport: How Land Use Factors Affect Travel Behavior*, p. 45.

¹³ From *Land Use Impacts on Transport: How Land Use Factors Affect Travel Behavior*, p. 10.

alternative transportation modes (Holtzclaw, et al. 2002; Ewing, Pendall and Chen, 2002; Kuzmyak and Pratt, 2003; Ewing, 1997). In general, as densities increase, people need to travel shorter distances to reach their destinations, and are more likely to choose transportation modes other than the automobile. Further, higher densities improve the viability of transit as increases in ridership allow for improved public transportation service levels.

Employment densities have a particularly significant impact on travel behavior. Employment density has been cited as the primary land use factor determining transit use (Pushkarev and Zupan, 1982). Further, a study conducted in Seattle found that transit ridership increases significantly when employment density exceeds 50 employees per acre in centers that provide at least 10,000 jobs (California EPA, 1994).

Employment density has been cited as the primary land use factor determining transit use.

Residential density has significant effects on automobile use as well (Ewing, Haliyur & Page, 1994). A study comparing travel behaviors in several Bay Area neighborhoods concluded that for each doubling of residential density, the average annual vehicle miles traveled (VMT) per person is reduced 25 to 30 percent (Holtzclaw, 1991). A Bay Area region-wide travel survey also found that there is a strong relationship between overall population density and increased transit availability and use (California EPA, 1994).

Market forces and public policy together drive the land development process. Higher densities can be facilitated by: 1) urban areas- adopting newer zoning practices that are less prescriptive as to location of land uses and may foster more walkable, bicycle-friendly and transit-oriented communities, and 2) less developed rural areas- continuing to limit development and limit extension of urban services. Such measures will help channel and intensify new growth within urban areas while at the same time preserving valued open space.

Mixed Land Uses

Another effective way to reduce dependence on the automobile is by promoting a mix of land uses. In San Mateo County, zoning has often segregated land uses in order to keep incompatible uses, such as heavy industry and housing, from coming into close contact. This principle was extended over time to separate retail and other commercial uses from residential development. The result is development patterns marked by a separation of land uses, often requiring long trips (typically by automobile) to get from one use to another.

However, fundamental transformations in the economy have reduced the importance of separating land uses. Exemplifying this shift is the conversion from a manufacturing-based economy with its adverse environmental impacts, to an information-based economy, which has much lower impacts on neighboring land uses. Thus, a mixed-use development pattern is now more viable than in the past. Greater land use mixture can be achieved through 1) adding housing in commercial areas, particularly along transit stations, major bus transit service corridors, and in existing downtown areas and 2) creating new zoning frameworks that do not prescribe land uses but do establish clear design standards for new development.

Encouraging mixed-use development can reduce VMT and increase transit and pedestrian trips. For example, in single-use office parks, only about 3 to 8 percent of midday trips from work are walking trips, compared to about 20 to 30 percent in mixed-use areas (California EPA, 1994). Mixed-use development also improves mobility in residential areas because it creates more opportunities for residents to live closer to work and other key destinations such as shopping and child care.

Transit Station Area Development

Locating higher-density development near transit stations and along major bus transit corridors can reduce congestion and increase transit trips. The research indicates that people who live or work within one-quarter mile of a transit station are much more likely to use transit. For example, in San Mateo, a study found that 26 percent of trips made by station area residents were by Caltrain, compared with only 3 percent of trips made by residents citywide¹⁴.

Locating around transit stations can also improve the market viability of higher density development, as people may generally be more willing to pay a premium for living near transit. This has been demonstrated over recent years by the many successful transit-oriented development¹⁵ projects that have been established throughout the Bay Area¹⁶ and California.

Transit-oriented development has particular promise in San Mateo County, which is served by thirteen Caltrain and six BART stations. A recent study found that demand for development in proximity to these transit stations will increase through the year 2030 (*San Mateo County Transit Oriented Development Opportunity Study*, 2007).¹⁷ Additional areas for TOD may be available in the future as bus rapid transit stations¹⁸ are being considered along El Camino Real in conjunction with the Grand Boulevard Initiative¹⁹ and C/CAG's TOD Incentive Program.

The “activity center” is a particularly promising concept, combining high density, mixed-use, and transit area development. In an activity center, a large variety of land uses are clustered in close proximity to one another and offer excellent transit, bicycle and pedestrian access. For example, the area surrounding the Bayshore Caltrain station is proposed to be developed with a mix of residential, commercial, and other uses with bicycle and pedestrian access, high-frequency bus service, and connections to light rail.



Urban/Rural Boundary

San Mateo County has established an urban/rural boundary in the Coastal Zone with the goal of channeling growth into defined urban areas while restricting growth in rural areas. In addition, increased densities can only be considered if there is adequate highway capacity, as well as other services that accommodate increased activity. Continued enforcement of this boundary should have the effect of increasing land use densities within the Coastside's urbanized areas, with a

¹⁴ Cervero, R. 1994. *Transit-Based Housing in California: Evidence on Ridership Impacts*. Transport Policy 1, 3: 174-183.

¹⁵ For TOD “best practices” information, see <http://greatcommunities.org/resources/TOD-Best-Practices>.

¹⁶ For a description of Bay Area TOD, see <http://www.ulisf.org/docManager/1000000897/2008%20TOD%20MarketPlace%20FINAL%20small.pdf>.

¹⁷ See http://www.co.sanmateo.ca.us/housingdepartment/PDFS/SamTrans%20TOD_Final_Report_073107.pdf.

¹⁸ For a discussion of Bus Rapid Transit in the US and in San Mateo and Santa Clara Counties, see <http://www.nctr.usf.edu/jpt/pdf/JPT12-2Galicia.pdf>, http://transweb.sjsu.edu/MTIportal/research/publications/documents/BRT2006/BRT_06_02%20book.pdf and <http://www.path.berkeley.edu/PATH/Publications/PDF/PRR/2005/PRR-2005-32.pdf>.

¹⁹ For an overview of the Grand Boulevard Initiative, see <http://www.grandboulevard.net/>.

corresponding decrease in automobile use. However, it is unlikely that the urban/rural boundary will have significant effects on inter-county transportation patterns.

Jobs and Housing Balance

Jobs and housing balance exists when a geographic area has a housing supply that meets the needs of all of its workers. Ideally, not only should the region provide enough housing to accommodate its workers, but also just as importantly, housing prices should be compatible with worker incomes. Since housing prices

This imbalance in housing prices and worker incomes has contributed to some of the highest levels of in- and out-commuting in the Bay Area.

have been bid up by relatively high incomes of San Mateo County residents, a portion of which work outside the County, the County's housing supply is not affordable for many people who work but do not reside in the County. This imbalance in housing prices and worker incomes has already contributed to some of the highest levels of in- and out-commuting in the Bay Area, which has resulted in increased traffic congestion. As discussed in Chapter 2 (Setting), the number of jobs in San Mateo County is projected to increase by 70,130, and the number of employed residents is expected to increase by 69,980 between 2015 and 2040. Given the severity of existing imbalances in jobs and housing in San Mateo County and the projected growth, achieving a better balance may yield transportation benefits.

To promote a jobs and housing balance as the County grows, it is recommended that the cities of San Mateo County continue to encourage production of housing units at a variety of prices to accommodate more workers who wish to live close to their jobs. Further, it is recommended that jurisdictions evaluate the adequacy of general plans to provide housing to accommodate a significant portion of job growth on a countywide level through the year 2040.

Project Design Standards

Automobile use can be discouraged through the project approval process by requiring developers to adhere to site design standards that promote alternative modes of transportation. Many of the design standards commonly used today focus too heavily on accommodating the automobile. For example, most zoning codes require a minimum number of parking spaces. Such requirements have contributed to an asphalt landscape dominated by the automobile and difficult to navigate by foot or bicycle.

Many of the design standards commonly used today focus too heavily on accommodating the automobile.

There are many ways site design can increase the use of alternative travel modes and reduce the attractiveness of the automobile. Designs such as bus turnouts and shelters near building entrances encourage transit use. Pedestrian and bicycle travel can be encouraged by providing amenities such as safe and attractive pedestrian and bicycle paths with convenient connections to nearby land uses, secure bicycle parking, and on-site amenities such as shower facilities. Further, designs can make ridesharing more attractive by providing preferential parking to rideshare vehicles (e.g., carpools and vanpools), with parking spaces located close to building entrances and shuttle stops, sheltered parking, and exemptions from parking fees.

Design standards can reduce the attractiveness of the automobile by promoting on-site employee services such as cafeterias, gyms, and child care centers, which reduce the need for midday trips. Finally, development standards can reduce automobile use by relaxing minimum parking requirements, which are often set higher than actual demand, or establishing parking maxima instead of minima. Other important advances in parking management related to project and site design include "unbundling" (selling/leasing

parking space separately from selling/leasing housing or commercial space) and “shared” parking (location of use with compatible parking demand, such as an office complex and a cinema, in close proximity so that parking supply is used more efficiently throughout the day and evening).²⁰ In addition, placing parking at the rear or to the side of commercial sites shortens the walking distance from the sidewalk to the front door of commercial establishments while also increasing the comfort and safety of the walk.

A Framework for Achieving Better Land Use and Transportation Linkage in San Mateo County

Progress toward improvement of the land use and transportation linkage in San Mateo County requires a planned approach. An overarching vision and a more specific goal to accompany it are needed to keep on course. A set of policies comprise the means to achieve the goal and realize the broad vision. Specific objectives and an associated set of performance measures are needed to chart the amount and pace of progress toward achievement of policies, goals, and vision.

Land Use and Transportation Linkage Vision, Goal, and Policies

Vision

A San Mateo County transportation system that is safe and convenient for all people whether travelling on foot, by bicycle, via public transportation, or in an automobile, to reach places they wish to go.

Goal

Integrate transportation and land use plans and decisions in support of a more livable and sustainable San Mateo County.

Policies

Integrate Land Use and Transportation Planning

- Integrate land use and transportation planning efforts where feasible at the local, county, and regional levels.
- Strengthen the pedestrian, bicycle, and shuttle bus circulation links among land uses, particularly, within TOD areas.

Concentrate Development

- Concentrate new development in urban areas, particularly, those designated as “Priority Development Areas.”
- Promote higher density residential, employment, and mixed-use development near transit stations and along major bus transit corridors throughout the County to create pre-conditions for improved linkages between land use and transportation alternatives to the single occupant automobile.

²⁰ For further information on parking management associated with site and project development, see http://www.vtpi.org/park_man.pdf.

- Support the redevelopment of cities along the Caltrain and BART systems as a balanced mix of retail, office, and residential centers at densities adequate to support transit service that is competitive with the private car.
- Emphasize transportation demand management in planning for more concentrated development.

Enhance Rural Communities

- Promote safe, convenient transportation links to activity centers and services in rural San Mateo County.
- Consider any potential growth-inducing impacts of transportation projects in Priority Conservation Areas.

Housing Supply

- Promote the development of a range of housing types along a spectrum of prices within the County, especially near transit stations and along major bus transit corridors.
- Support creation of “complete communities” for San Mateo County’s diverse population that contain an array of housing types affordable at different income levels and a range of community services.
- Encourage the preservation and improvement of existing affordable housing and avoid displacement of existing residents in new developments.

Jobs and Housing Balance

- Promote the creation of housing units to meet the needs of existing or potential households who work in the County.
- Encourage the construction of housing units in or near jurisdictions which have a high number of jobs compared to working residents.
- Encourage the creation of jobs in or near jurisdictions which have a high number of working residents compared to jobs.

Development Standards

- Give priority to development that encourages transit use, walking, and bicycling.
- Minimize motor vehicle traffic generated by new development, both within and adjacent to San Mateo County when the traffic impacts of such development spill out onto the San Mateo County highway network.
- Encourage the adoption of zoning codes and land use regulations to foster more walkable, bicycle-friendly, and transit-oriented land development patterns.
- Foster accessible design in housing, commercial properties, public areas and transportation facilities so that access is readily available to all who work and or live in San Mateo County.

Attractive and Engaging Public Places and Spaces

- Foster exemplary public places and spaces as focal points for the social, economic, and recreational life of communities.

Land Use and Transportation Linkage Objectives

1. Develop a “Multimodal Connections” Program to be included in San Mateo County’s portion of the Metropolitan Transportation Commission’s Transportation for Livable Communities Program.²¹
2. Implement a “TOD Employment Incentive Program.”
3. Implement the Grand Boulevard Initiative vision of transit-oriented development along the El Camino Real corridor in proximity to Caltrain, BART, and prospective bus rapid transit stations.
4. Enhance the TOD Housing Incentive Program.
5. Enhance the quality of public places and spaces in San Mateo County.
6. Revise and enhance the Transportation Demand Management Guidelines.

²¹ http://www.mtc.ca.gov/planning/smart_growth/tlc_grants.htm.

5. ROADWAY SYSTEM

Background

The roadway system plays an important role in San Mateo County. Travel by all modes relies on the roadway system in one way or another. Not only is the roadway system the infrastructure over which travel by cars, trucks, buses, motorcycles and bicycles occurs, but it also provides access for passengers using rail, water and air modes. While the role of the roadway system is supporting all modes of travel, its role in accommodating individuals driving their own automobiles is probably the most essential. Even with significant new transit investments, the private automobile will remain the dominant mode of travel within San Mateo County in the year 2040.

The roadway system in San Mateo County consists of five types of facilities:

- Freeways
- Major Arterials
- Minor Arterials
- Collectors
- Local Roads

Figure 1 shows the freeways, state highways and major arterials in San Mateo County. San Mateo County has nearly 2,100 centerline miles of public highways, streets, and roads. These roadways accommodated 18,680,360 daily vehicle miles of travel, or 25.5 miles per capita, in 2013.²² Most of the roadways are owned and operated by cities, towns, and the County of San Mateo. Caltrans owns and operates approximately 10% of the centerline miles, including major facilities such as US 101, I-280, Highway 1, I-380, State Route (SR) 92, and SR 84. **Table 15** summarizes roadway mileage in San Mateo County.

San Mateo County has nearly 2,100 centerline miles of public highways, streets, and roads. These roadways accommodated 18,680,360 vehicle miles of travel each day in 2013.

The major roadways are generally oriented north-south due to the barrier formed by the Santa Cruz Mountains. Major north-south travel facilities include US 101, I-280, Highway 1, SR 82 (El Camino Real/Mission Street), SR 35, and both the Caltrain and BART corridors. East-west travel is by SR 84, SR 92, and I-380. Connections across the Bay are via SR 92 to the San Mateo Bridge and SR 84 to the Dumbarton Bridge.

²² <http://www.vitalsigns.mtc.ca.gov/daily-miles-traveled>.

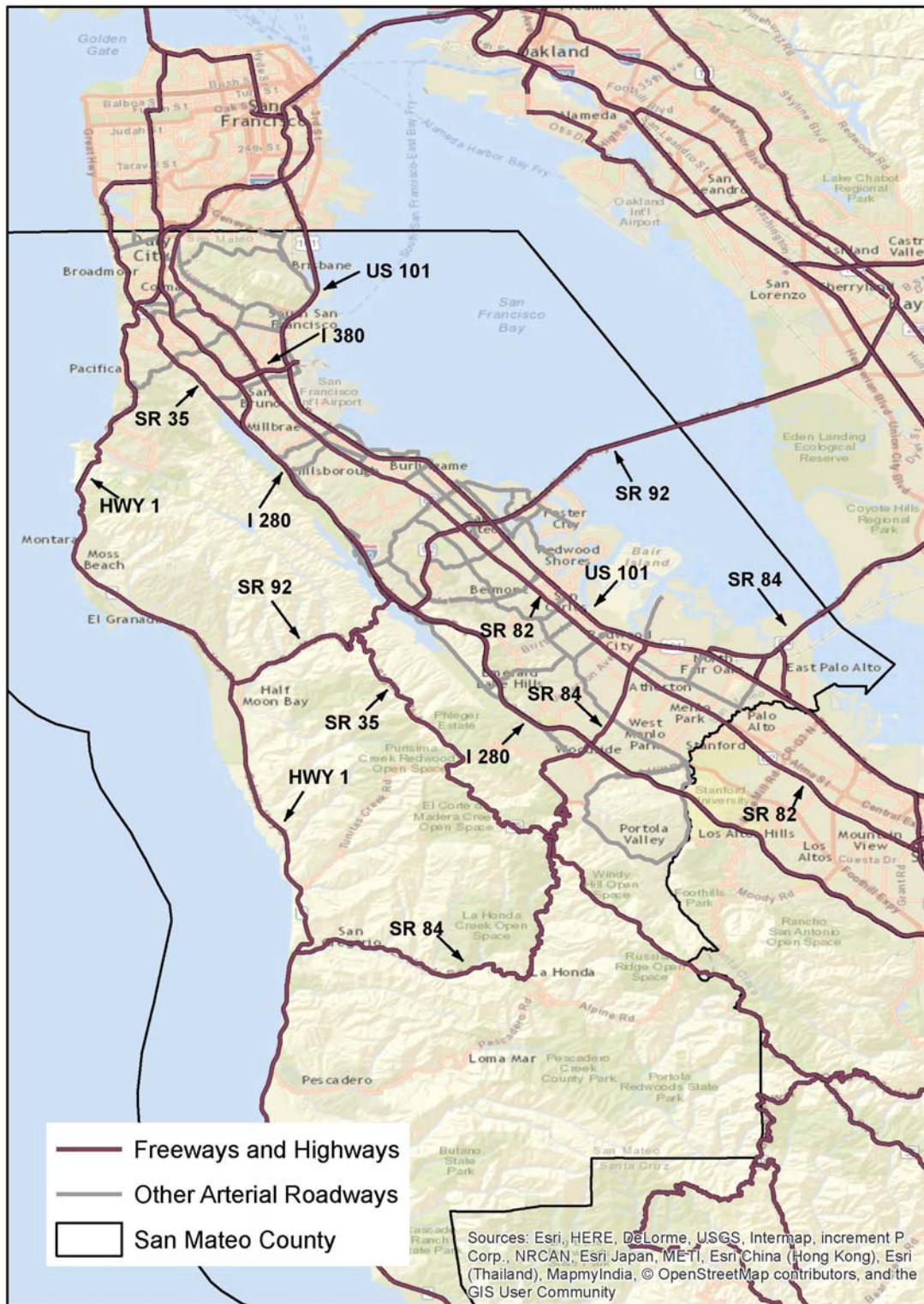


Figure 1: Roadway System in San Mateo County

Table 15: San Mateo County Roadway Network

Ownership	Mileage	Percent of Total
State Highways	213.13	10%
County Roads	322.32	15%
City Street & Roads	1,519.88	73%
Other Roads	34.94	2%
Total	2,090.28	100%

Source: California Public Road Data 2013, Caltrans

The roadway network has a variety of roles in San Mateo County:

- **Connectivity:** provides good points of access and egress and good connections between facilities
- **Safety:** designed to minimize conflicts and to minimize the extent of damage and injury when crashes occur
- **Travel Time:** allow reasonable travel times between major destinations
- **Reliability:** designed and operated in a way that minimizes the impacts of non-recurring events such as accidents and weather conditions on roadway level of service so that travel times are reasonable and predictable

The performance of the roadway system and its future needs are described in this chapter in relationship to these identified roles.

Existing System

Freeways

Six freeway routes provide high-capacity, limited-access roadway mobility within San Mateo County: US 101, I-280, I-380, and portions of Highway 1, SR 84 and SR 92. While I-380 is completely within San Mateo County, the other five routes link the county with other parts of the region. US 101 connects the county with San Francisco County to the north and Santa Clara County to the south. I-280 also connects the county with San Francisco and Santa Clara County but the route ends within those counties. SR 92 and SR 84 connect the county with Alameda County via the San Mateo-Hayward Bridge and the Dumbarton Bridge, respectively.

Major Arterials

There are six state routes providing major arterial access throughout San Mateo – SR 82, SR 114, SR 109 and portions of Highway 1, SR 35, SR 84 and SR 92. In general the major arterials are multilane divided roadways offering alternative routes to the freeways. SR 82, also known as El Camino Real, is a major arterial connecting Daly City to San Jose, running parallel and between US 101 and I-280. SR 114 and SR 109 are short arterials, completely within the county, connecting East Palo Alto with the Dumbarton Bridge. Highway 1 and SR 92 are the main roadways serving communities along the west coast of the county. Highway 1 is a major arterial between Pacifica and Half Moon Bay and SR 92 is a major arterial west of I-280. SR 35 is a major arterial in the north part of the county, joining with I-280 south of San Bruno. SR 84 is a major arterial between US 101 and I-280 in Redwood City and Woodside.

One of the major transportation initiatives in the county as it relates to major arterials has been the Grand Boulevard Initiative. This multi-year program has been a cooperative effort of 19 cities, 2 counties, and local and regional agencies to improve El Camino Real. The goal of the program is to improve the safety, performance, and attractiveness of the corridor.

Minor Arterials, Collectors and Local Roads

The state route roadway network in the county south of Half Moon Bay and west of I-280 is made up of two lane isolated roadways providing connections between the cities along the San Francisco Bay with the cities along Highway 1, Santa Clara County, and Santa Cruz County. Additionally, a system of minor arterials, collectors, and local roads connect the freeways and major arterials with the surrounding cities and communities.

Congestion Management Program Roadway System

Within the overall roadway network in San Mateo County, a portion deemed to be of greatest importance for regional connectivity and intra-county mobility has been designated as the Congestion Management Program Roadway System (CMP). This CMP network is the primary focus of the county-wide investment strategy. Other parts of the roadway system are considered to be the primary responsibility of local jurisdictions or Caltrans. As part of the Congestion Management Program for the county, the level of service on these roadway segments and intersections is monitored every two years and the results are compared to established standards and reported.

The specific roadways included in the CMP Roadway System and the reasons why these roadways were included are as follows:

- SR 1, SR 35, SR 82, SR 84, SR 92, US 101, SR 109, SR 114, I-280, and I-380 are part of the California State Highway System. These are all the State Highways in San Mateo County.
- Geneva Avenue, Mission Street and Bayshore Boulevard are not State Highways but are included because they connect to roadways included in the CMP of an adjacent county. These roadways were included in San Mateo County's CMP Roadway System to be consistent with San Francisco County's CMP Roadway System. (No roadways, in addition to the state highways already mentioned, needed to be added to be consistent with the CMP Roadway Systems of Alameda, Santa Clara, and Santa Cruz Counties).

In addition to the roadway segments on these 13 routes, there are 16 intersections on the routes that are designated CMP Intersection.

System Performance

Based on the monitoring conducted for the CMP in 2015, the following roadway segments were found to have a peak-hour segment level of service of "F":

- SR 35 - Sneath Lane to I-280
- SR 84 – Willow Road to University Avenue
- SR 84 – University Avenue to Alameda County Line
- SR 92 – I-280 to US 101
- US 101 – San Francisco County Line to I-380

- US 101 – Broadway to Peninsula Avenue
- US 101 – Peninsula Avenue to SR 92
- US 101 – SR 92 to Whipple Avenue
- US 101 – Whipple Avenue to Santa Clara County Line
- I-280 – SR 1 to San Bruno Avenue
- I-380 – I-280 to US 101

The following intersections in the CMP Road System were determined to operate at a level of service “F”:

- University Avenue and SR 84 (PM)
- Willow and SR 84 (PM)
- SR 84 and Marsh Road (AM and PM)

Planned Roadway System Improvements

A number of projects have focused on the roadway system in San Mateo County. Longer-term improvements are listed in the Metropolitan Transportation Commission’s twenty-year Regional Transportation Plan. The proposed RTP project list for San Mateo County can be found in Appendix B.

In addition, a system for determining congestion and safety performance and hot spots for freeways and state highways is under development. This system can be considered when making funding decisions for roadway projects on the state system in San Mateo County, as discussed in Appendix D.

Issues

Congestion

Congestion on the roadway system has multiple and compounding impacts. Congestion increases the time travelers have to devote to travel leaving less time for work, personal business, or social activities. Congestion also increases the likelihood of accidents and incidents and the resulting cost in property damage, injuries and potentially deaths. Additional accidents and incidents in turn result in additional delay and congestion. The CMP monitoring for San Mateo County indicates that there is serious congestion on almost all of the major commute routes with the county, and forecasts for 2040 indicate that the congestion on these facilities will increase substantially if there is no increase in capacity beyond what is already programmed, unless the travel demand decreases substantially or is shifted to other modes.

Reliability

Much of the congestion in San Mateo County, as in other urban counties, is the result of accidents, vehicle breakdowns, or other incidents that result in blockage of roadway lanes on major roadways. This unpredictable disruption in traffic flow tends to produce 40 to 50 percent of urban delay on major facilities. Because this type of collision or incident, produced delay is common but not predictable for a specific location or route; this affects the reliability of travel far more than average delay. This impact on reliability is likely to be greatest when the normal flow on a roadway is approaching capacity – without a collision or incident the roadway functions well, but with the collision or incident back-ups and delay

result. When accidents and incidents occur during heavily congested times, the impact on delay may be exponential.

Connectivity

One of the major limiting characteristics of the roadway system in San Mateo County is the lack of adequate east-west roadway capacity. Because of the geography of the county and the history of its development, the major roadway capacity, freeway and arterial, is north-south. A consequence of the lack of east-west capacity is heavy congestion on the limited number of existing east-west routes such as I-380, SR 92 and SR 84, but also intrusion of traffic on arterials that traverse residential neighborhoods, such as Westborough Boulevard, Crystal Springs Avenue, Hillcrest Boulevard, Millbrae Avenue, Trousdale Drive, Crystal Springs Road, West Hillsdale Boulevard, Ralston Avenue, Brittan Avenue, Farm Hill Boulevard/Jefferson Avenue, and Woodside Road. This use of roadways not designed for high capacity operation, results in congestion and conflicts with local traffic, transit operations and pedestrian and bicycle traffic.

One of the major limiting characteristics of the roadway system in San Mateo County is the lack of adequate east-west roadway capacity.

Serving All Modes

The transportation system in San Mateo County cannot serve all travel successfully with one mode. While the private automobile is the predominant mode of travel for all trip purposes in the County, many travelers do not have the option of travel by private automobile because of age, income, or disability. Nor would it be appropriate to try to serve all travel with private automobiles. The required land for additional roadways, parking and other automobile-serving facilities would be too great an impact on the economic production of the county and the environmental impacts on the lives of residents too great. Maintaining a high level of mobility with San Mateo County to support continued strong economic growth and high quality of life will require development of all modes and ensuring good access to these modes for the majority of travelers in the county. The roadway system in San Mateo County plays an important role in supporting all modes of travel because the roadway system either provides the facilities on which the modes travel or provides access to the facilities that they use. High capacity freeways and major arterials carry express buses in HOV lanes and general purpose lanes; local buses use local streets and arterials; bicyclists use local streets and bicycle lanes on arterials; pedestrians use sidewalks on local streets and arterial rights of way and crosswalks at intersections. In addition, roadways provide automobile access to BART and Caltrain stations as well as other park-and-ride opportunities that support transit and ridesharing in the county.

Without maintenance, the condition of the roadway deteriorates, resulting in poor operating conditions, reduced capacity and more accidents and other incidents that result in delay, property damage, injury and potentially deaths.

Maintenance

The performance of the roadway system requires substantial maintenance. Without maintenance, the condition of the roadway deteriorates resulting in poor operating conditions, reduced capacity and more accidents and other incidents that result in delay, property damage, injury and potential deaths. A recent assessment of the total maintenance needs for the local streets and roads in San Mateo County to keep the system in a state of “good repair” for the period 2017 to 2040 indicated a total cost of \$3 billion over

the 24-year period of which only \$1.1 billion could be funded through existing, known sources. The remaining \$1.9 billion (63%) is unfunded.

A Framework for Optimizing the San Mateo County Roadway System

The Countywide Transportation Plan should provide a structured approach to making the roadway system in San Mateo County as effective and efficient as possible and one that supports all modes of travel. This in turn requires a comprehensive vision accompanied by a more explicit goal and set of policies by which to achieve the goal. These policies are operationalized through a set of objectives. Progress toward achievement of these objectives is charted through performance measures.

Significant increases in roadway capacity are not feasible due to funding limitations, constrained right of way in many locations, and environmental concerns, including greenhouse gas emissions effects.

Investments in advanced technologies and communications on the roadway system can, however, improve motor vehicle traffic operations and moderate the effects of increased congestion.

There is also great scope for private action to reduce congestion, including increased availability of telecommuting and teleconferencing alternatives for workers, optimized travel route choice through use of on-board GPS navigation systems and smartphone apps, and transportation demand management efforts by employers.

Roadway System Vision, Goal, and Policies

Vision

A multimodal transportation network that contributes to the socio-economic and environmental health and safety of San Mateo County.

Goal

Enhance safety and efficiency on the countywide roadway network to foster comfortable, convenient, and multimodal mobility.

Policies

Improve the efficiency of the existing roadway system in San Mateo County

- Increase the connectivity of the roadway system to provide more direct routes between origins and destinations.
- Develop a more complete system of managed lanes to provide an incentive for ridesharing and to increase transit operating speeds.
- Improve freeway interchanges at key locations.

Focus capacity-increasing program on the most congested commute corridors

- Construct key highway projects that remove or reduce bottlenecks in the most congested commute corridors.

- Give consideration to the VMT-inducing impacts of roadway projects that increase capacity, consistent with state law.

Improve connections with regional transportation facilities

- Construct or improve roadways that connect major inter-county highway facilities and transit stations.

Enhance safety for travel by motorized modes

- Identify and eliminate roadway and intersection hazards.
- Improve the geometric design of roadways where current design is creating vehicle conflicts and crashes.
- Consider the use of roundabouts, where appropriate, to improve safety at intersections.
- Create separate lanes or facilities for non-motorized modes where feasible.
- Provide grade separation for Caltrain where feasible.

Maintain the roadway system

- Maintain an inventory of roadway facilities and maintenance needs.
- Provide adequate funding for roadway maintenance.

Roadway System Objectives

1. Improve the person throughput of the roadway system.
2. Reduce the number and severity of crashes on roadways in San Mateo County.
3. Reduce the rate of growth of roadway congestion.
4. Maintain the roadway system at an acceptable level.
5. Reduce the per capita vehicle miles travelled on the roadway system.

6. BICYCLES

Background

Bicycling has the greatest untapped potential of any travel mode in the United States. Only about 2% of local travel in the country is by bicycle, compared to 27% in the Netherlands, 18% in Denmark and 10% each in Germany and Sweden. These developed nations with much higher rates of bicycle travel than the US engage in a number of best practices that encourage cycling, including the following²³:

- Extensive systems of separate cycling facilities
- Intersection modifications and priority traffic signals
- Traffic calming
- Bike parking
- Coordination with public transport
- Traffic education and training
- Traffic laws that recognize the rights and responsibilities of cyclists

Bicycling represents one of the most cost-effective, cleanest ways of reducing automobile use in San Mateo County. The bicycle emits no air pollution and is virtually silent. Cycling is both energy-efficient and space efficient. A cyclist requires only one-fifth the energy of a pedestrian to travel one kilometer. In one hour, 14,000 cyclists can theoretically use a typical travel lane compared to 2,000 people in private vehicles.²⁴ Bicycles offer other considerable personal and social benefits over the automobile, including substantially lower acquisition and maintenance costs, as well as health benefits.

Bicycling represents one of the most cost-effective, cleanest ways of reducing automobile use in San Mateo County.

In addition, bicycling is often the swiftest form of transportation door-to-door in locations with high traffic congestion and a short supply of car parking. Bicycles, like automobiles, are convenient to use and are available on demand. For these reasons, bicycling can be a viable and attractive alternative to the automobile, particularly in areas that are not well served by public transit.

A major impediment to bicycle use in San Mateo County is that the road network has been principally designed for the automobile. At times and in some locations, this means reduced safety and comfort for bicyclists. Comparatively high auto speeds, inadequate shoulder widths, a lack of dedicated street space for cycling, poor signage or road markings, broken or uneven pavement, and difficult to maneuver freeway overpasses and interchanges all present potential safety hazards and discourage bicycle use. Another significant obstacle to bicycle use is that bicycle facilities have been created over time by the County and individual cities in a somewhat piecemeal and uncoordinated fashion, resulting in gaps and lack of continuity in the bikeway network. Addressing this concern is a key focus of the *San Mateo County*

²³ Pucher, John and Buehler, Ralph (2008), "Making Cycling Irresistible: Lessons for the Netherlands, Denmark and Germany." *Transport Reviews*, 28:4, pp. 495-528.

²⁴ Kurt, Van Hout (2008), "Annex I: Literature search bicycle use and influencing factors in Europe," Universiteit Hasselt, Instituut Voor Mobiliteit, EIE-programme 05/016 Intelligent Energy Europe.

*Comprehensive Bicycle and Pedestrian Plan.*²⁵ The *Countywide Transportation Plan 2040* presents a set of policies to encourage more bicycling to mirror the comprehensive approach taken in the *San Mateo County Comprehensive Bicycle Plan*.

Profile of Bicyclists

The County's major population and employment centers are located within a few miles to the east and west of the El Camino Real corridor, creating numerous opportunities for using bicycles to get to work or run errands.

In 2015, bicycling as a primary mode of travel represented an estimated 2% of all person trips that began and ended in San Mateo County. Bicycle use is most feasible when trips are relatively short (i.e., less than five miles), terrain is flat, traffic conditions are calm, and secure parking is available at the destination. San Mateo County offers several advantages for bicyclists. The county's major

population and employment centers are located within a few miles to the east and west of the El Camino Real corridor, creating numerous opportunities for using bicycles to get to work or run errands. Further, due to its location in the Bay plain, the topography in this part of the county is mostly flat. Moreover, bicycles can be brought aboard SamTrans buses and Caltrain commuter trains, which facilitate longer distance travel in the north-south direction.

Cyclists are a diverse group across a wide age range, who use the roads and paths for commuting to work and school, short trips around town, and recreation. In San Mateo County, as in the rest of the county, there are four categories to describe the varying attitudes toward bicycling²⁶:

1. "Strong and fearless" (less than 2% of the population old enough to bicycle)
2. "Enthusiastic and confident" (about 13% of the population old enough to bicycle)
3. "Interested but concerned" (about 60% of the population old enough to bicycle)
4. "No way no how" (about 25% of the population old enough to bicycle)

Addressing the concerns of the large group of "interested and concerned" people is an important task for public policy in support of bicycling.

Bicycling in San Mateo County is for utilitarian as well as recreational purposes. Typical bicyclists include school children commuting to school and adults commuting to work. Both children and adults enjoy cycling for recreation. Some San Mateo County residents use bicycles for short trips to the market, the public library, local parks, and other activity centers. Adventurous cyclists ride up to the hills and back down again or transport their bicycles by car for use in trail riding in the hills or along the Bay Trail. The bicycle is a versatile mode of transportation in San Mateo County, as it is elsewhere.

²⁵ As an example, one of the Project Ranking Criteria in the San Mateo Countywide Comprehensive Bicycle and Pedestrian Plan is "Gap Closure in Priority Corridor", p. 59.

²⁶ San Mateo Countywide Comprehensive Bicycle and Pedestrian Plan, pp. 25-36.

Issues

Bicycle Facilities

The *San Mateo Countywide Comprehensive Bicycle and Pedestrian Plan* describes three types of bicycle facilities in San Mateo County²⁷: Multi-Use Path (Class I), Bike Lanes (Class II) and Bike Routes (Class III). Multi-use paths allow for two-way off-street use by bicycles and may also be suitable for shared use with pedestrians. Bike Lanes are a striped portion of road space for the preferential or exclusive use of bicyclists. Bike Routes are streets signed for shared bicycle and motor vehicle use, but without a dedicated space for bicyclists. Bike routes may incorporate Shared Roadway Bicycle Markings, sometimes referred to as “sharrows,” as an additional treatment. In December of 2015, Caltrans provided design guidance for Class IV bikeways, referred to as Separated Bikeways or Cycle Tracks. These on-street facilities are designed for the exclusive use of bicycles and include a separation between the bikeway and the through vehicular traffic. The separation may include grade separation (raising the level of the bikeway by several



inches above the roadway, similar to a sidewalk), flexible posts, inflexible physical barriers, or on-street parking (so that parked cars provide physical barrier between cyclists and motorists).²⁸

A total of 54 off-street and 177 on-street bicycle facilities comprising a 231-mile network were identified in the San Mateo County in the 2000 San Mateo County Comprehensive Bicycle Route Plan. As of 2010, 141 miles (61%) of the network has been completed, including 42 miles of off-street facilities and 99 miles of on-street facilities. A map showing the countywide bikeway network, including existing and proposed facilities, is provided in the San Mateo Countywide Comprehensive

Bicycle and Pedestrian Plan.

Bicyclists also need support facilities at the destination end of their trips. There should include bicycle parking in the form of racks and lockers, and both showers and lockers at the end of longer distance bike commutes. These support facilities are deficient in some areas within San Mateo County.

A total of 54 of off-street and 177 of on-street bicycle facilities comprising a 231-mile network were proposed for San Mateo County in the 2000 San Mateo County Comprehensive Bicycle Route Plan.

Barriers

Only 15 of the 83 road crossings (fewer than one out of five) of Caltrain, US 101, I-280, and SR 1 in San Mateo County have bicycle lanes or sidewalks wide enough to accommodate bicycles. In addition, traversing on- and off-ramps with comparatively high speed entering (and at times exiting) motor vehicle traffic at freeway and urban arterial street interchanges (Woodside Road and El Camino Real in Redwood City, for example) can be a formidable challenge for even the most experienced bicyclist.

²⁷ San Mateo Countywide Comprehensive Bicycle and Pedestrian Plan, p. 16.

²⁸ California Department of Transportation, *Class IV Bikeway Guidance*, Design Information Bulletin Number 89, Approved December 30, 2015.

Bicycle Access to Major Activity Centers

Access to San Francisco International Airport and regional shopping malls is difficult for workers and customers who wish to reach these destinations by bicycle. In each environment, priority is given to facilitating efficient motor vehicle circulation.

Engineering, Education, Encouragement, Enforcement and Evaluation

Unlike walking, during which pedestrians spend most of their trip on a sidewalk or path separated from motor vehicle traffic, bicyclists spend much of their travel on roadways with motor vehicles. Helping

Helping people who do not currently bicycle overcome their reluctance to do so on the roadway, as well as to make all bicyclists safer and more comfortable, requires a comprehensive set of measures.

people who do not currently bicycle overcome their reluctance to do so on the roadway, as well as to make all bicyclists safer and more comfortable, requires a comprehensive set of measures. Engineering streets and roads so that they accommodate the needs of bicyclists, including space in which to ride, safe navigation through intersections, and lowering the speed differential between motor

vehicles and bicycles, creates a safe operating environment for cycling. Education in safe cycling in traffic, as well as in rules of the road as they pertain to both cyclists and motorists is essential. Encouragement and cultural support in affirmation of bicycling as an accepted mode of everyday travel is needed from the wider community. Enforcement of traffic laws as they pertain both to motorists and cyclists provides legal sanctions to those who uses either mode of travel in an imprudent way. Evaluation provides valuable feedback on the effectiveness of the improvements.

Education in safe cycling in traffic is essential.

All of these approaches are currently being used in San Mateo County to support bicycle travel. Engineering to develop bicycle overcrossings, bicycle lanes, shared use paths, as well as to calm motor vehicle traffic, is an on-going effort in San Mateo County. Cycling education programs in schools give children a good start toward safe, life-long cycling. Encouragements in the form of events like Bike to Work Day give both visibility and credibility to bicycle commuting. Traffic law enforcement is also a continuing responsibility of public safety agencies in the county. In each case, however, much more could and should be done to create the physical and cultural conditions for safer, more comfortable cycling in San Mateo County and to evaluate these ongoing efforts.

Complete Streets

There is increasing support nationally,²⁹ within California,³⁰ and in San Mateo County³¹ and throughout the Bay Area for provision of “complete streets.” These are roadways that safely and comfortably accommodate pedestrians and cyclists as well as motor vehicles. Bicyclists in San Mateo County have a big stake in this policy since most cycling and nearly all cycling for utilitarian purposes takes place on streets and highways within the county.

²⁹ See <http://www.completestreets.org/>.

³⁰ See http://www.dot.ca.gov/hq/tpp/offices/ocp/complete_streets.html.

³¹ See <http://www.grandboulevard.net/projects/complete-streets.html> and http://www.mtc.ca.gov/planning/bicyclespedestrians/routine_accommodations.htm.

Improvement Plans and Programs

There are many established transportation funding programs that can finance improvements to cycling facilities. At the local, regional, and state levels, these include San Mateo County's Measure A, California's Transportation Development Act and Safe Routes to Schools programs, and the Bay Area's Transportation Fund for Clean Air, Livable Communities, and Safe Routes to Schools programs. On the federal level, there are a variety of other programs funded by the federal Fixing America's Surface Transportation (FAST) Act, including Enhancements, Congestion Mitigation and Air Quality Improvement, Livable Communities, and Safe Routes to School. These federal funds are typically sub-vented to the Metropolitan Transportation Commission for distribution regionally.

A Framework for Achieving a Better Bicycling Environment in San Mateo County

Progress toward improvement of the cycling conditions in San Mateo County requires a planned approach. A broad vision and a more focused goal to accompany it are needed to keep on course. A set of policies represents the means to achieve the goal and bring the vision to life. Specific objectives, accompanied by a set of performance measures, are needed to chart the amount and pace of progress toward achievement of policies, goal, and vision.

Bicycling Environment Vision, Goal, and Policies

Vision

A San Mateo County in which bicycling for active transportation and recreation is safe, comfortable, and convenient.

Goal³²

Promote safe, convenient, and comfortable bicycle travel in support of healthy, active communities while reducing reliance on the automobile for short trips.

Policies

A Convenient Travel Option

- Continue to develop a safe, reliable, comprehensive, and convenient bikeway system competitive in door-to-door with the automobile for many short distance trips.

Integration with Public Transit

- Encourage local agencies and transit operators, such as SamTrans, Caltrain and BART, to work cooperatively to encourage bicycling over transit by improving access to and through stations and stops, installing bicycle parking and maximizing opportunities for on-board bicycle access.

³² A full set of bicycle goals was developed for the San Mateo County Comprehensive Bicycle and Pedestrian Plan, Adopted September 8, 2011.

Encouragement, Education, and Incentives

- Work with local, county and regional agencies and organizations – including those with a focus on public health – to develop effective encouragement programs that promote bicycling as a safe, convenient and healthy mode of transportation.
- Provide funding for effective support programs and events that encourage bicycling among a broad range of potential users.
- Encourage local school districts to implement projects and activities that promote bicycling to school among students and staff.
- Promote integration of bicycle-related services and activities into broader countywide transportation demand management and commute alternative programs.
- Provide support for programs that educate drivers and bicyclists about their rights and responsibilities, as well as traffic education and safety programs for adults and youth.

Safety

- Promote collaboration among the Sheriff's Office, local police departments and other county and local agencies to develop and administer effective safety, education and enforcement strategies related to bicycling.
- Provide support for programs that educate drivers and bicyclists about their rights and responsibilities, as well as traffic education and safety programs for adults and youth.

Complete Streets

- Comply with the complete streets policy requirements of Caltrans and the Metropolitan Transportation Commission concerning safe and convenient access for bicyclists, and assist local implementing agencies in meeting their responsibilities under the policy.
- For transportation projects funded by county or regional agencies, require that local implementing agencies incorporate "complete streets" principles as appropriate, provide at least equivalently safe and convenient alternatives if it results in the degradation of bicycle access, and provide temporary accommodations for bicyclists during construction.
- Monitor countywide transportation projects to ensure that the needs of bicyclists are considered in programming, planning, design, construction, operation and maintenance, and encourage local agencies to do the same for their projects.
- Provide support to local agencies in adopting policies, guidelines and standards for complete streets and routine accommodation of bicyclists in all new transportation projects.
- Strongly encourage local agencies to adopt policies, guidelines, standards and regulations that result in truly bicycle-friendly land use developments, and provide them technical assistance and support in this area.

Traffic Calming

Support efforts to calm motor vehicle traffic to enhance travel conditions for bicyclists.

Barriers to Bicycle Access and Circulation

Reduce barriers to bicycle access and circulation, including those caused by gaps in the bicycle facilities network and the severance effect on bicycle travel due to rail lines, freeways, and major arterial streets.

Bike Sharing

Encourage efforts to establish bike-sharing programs in communities throughout the county.

Bicycling Objectives

1. Increase the number of miles of Class I, II, III and IV bicycle facilities added in San Mateo County.
2. Increase the number of bicycle lockers and racks in San Mateo County.
3. Increase bicycle safety education and training in San Mateo County.
4. Establish bike sharing programs in San Mateo County.
5. Increase the use of bicycles as a mode of transportation in San Mateo County.

7. PEDESTRIANS

Background



Before the advent of trains, streetcars, and automobiles, walking was the principal form of transportation for most people. Because walking trips are inherently limited to a few miles, cities had to be smaller and much more compact than today, and housing was closely interspersed with industrial and commercial areas. Even after the advent of streetcars, walking remained a primary mode of transport in cities.

The importance of walking in traditional cities and towns was

Walking in traditional cities and towns was an important part not only of transportation but also of social life and recreation.

reflected in urban design. Wide sidewalks were common, and stores took advantage of pedestrian traffic with ground-level window displays. Walking was an important part not only of transportation but also of social life and recreation.

The extent of walking diminished as automobiles became widespread. The automobile was a convenient, readily-accessible transportation mode from home to workplace, and allowed commuters to live much farther from their jobs than in the past. As automobiles became more affordable, people increasingly chose to live in lower-density suburbs designed for the automobile.

Because walking trips are inherently limited to a few miles, cities had to be smaller and much more compact than today, and housing was closely interspersed with industrial and commercial areas.

Automobiles had significant impacts on urban design. Stores were moved back from the street to make space for parking. Neighborhoods were sometimes built with limited provision for pedestrians. Sidewalks were at times narrowed to increase roadway capacity. Homes and businesses were oriented around the garage and the parking lot rather than the street front and sidewalk. These changes often diminished the safety, ease, and pleasure of walking.

Development in San Mateo County over the past seven decades of the post-World War II era has often been auto-oriented. While there are fine examples of compact, pedestrian-friendly development (mainly around Caltrain stations) and new transit-oriented projects being planned and built, much of the county's urbanized area comprises single-use districts accessible most conveniently by car. Consequently, urban design focuses on accommodating the needs of the automobile.

Yet walking holds great promise as an alternative to short automobile trips in San Mateo County. The average annual temperature in the county is a comfortable 68 degrees, ice and snow are nowhere to be seen, and average annual rainfall is only 20 inches.³³ In addition, the terrain is relatively flat in much of the urbanized portion of the county. Furthermore, public policy in San Mateo County increasingly supports

³³ <http://www.sanmateocountycvb.com/film/about/weather.html>.

changes in the built environment that support active transportation on foot and by bicycle.³⁴ County residents are environmentally conscious and increasingly interested in the health benefits of active transportation. Although rail lines, freeways, and wide arterial streets can be barriers to pedestrian access in some parts of San Mateo County, many trip origin and destinations are in comparatively close proximity. Examples include the many residential neighborhoods in proximity to downtowns and to businesses along arterial street corridors in the county.

Profile of Pedestrians

In 2015 an estimated 15% of all person trips that began and ended within San Mateo County were on foot. An estimated 9% of all person trips originating in San Mateo County, including both those with a destination in the county and those outside of the county, were by walking. However, only an estimated 2.5% of people travelling to work in San Mateo County commuted by foot.

While most County residents rely on the automobile for their daily transportation needs, some residents have no other option but to walk. Children often walk to and from school, if the school is nearby, or to a transit stop. Elderly residents with impaired vision or other limitations may not be able to drive, but may still desire to independently fulfill their shopping or recreational needs by walking. Persons with disabilities that do not preclude travel on foot represent another group for whom walking, or walking combined with transit, may be the only mobility option. Furthermore, an estimated 5.7% of households in San Mateo County did not own or have access to an automobile.³⁵ People in these zero-vehicle households have to rely on alternatives to the automobile, beginning with travel on foot.

While most County residents rely on the automobile for their daily transportation needs, some residents have no other option but to walk.

Walking is a part of almost every trip, even if the walk portion is to and from a private automobile. As such, most people who reside and/or work in San Mateo County have a practical stake in the safety, convenience, quality, and comfort of the walking environment.

Issues

Pedestrian Facilities

The pedestrian infrastructure is comprised of the physical links between origins and destinations of walking trips and the supporting devices that facilitate travel on foot. This section describes the elements of this infrastructure and explains how land use decisions and practices encourage or discourage its use.

Sidewalks are the staple element of the pedestrian infrastructure. Off-street paths, typically shared with bicyclists, supplement the sidewalk network. Pedestrian under- and over-crossings of freeways and rail lines provide essential links that overcome barriers to pedestrian travel.

Sidewalks are the staple element of the pedestrian infrastructure.

³⁴ For example, see San Mateo County Health System, Health Policy and Planning, Building Health into San Mateo County Cities: Resources and Case Studies, Winter 2010.

³⁵ US Census Bureau, Selected Housing Characteristics, 2010-2014 American Community Survey 5-Year Estimates.

Most walking trips involve crossing a street. Therefore, crossing signals, marked crosswalks, and signs alerting automobiles of the presence of pedestrians are ancillary parts of the pedestrian infrastructure. In San Mateo County, as elsewhere in the Bay Area, many pedestrian crossings are equipped with pedestrian signal heads. These are sometimes supplemented by countdown signals that display the time remaining for safely crossing the street. For school children, human crossing guards give added protection against car traffic. At some street crossings, audible signals for the visually impaired provide an important support for pedestrian travel. Another provision for persons with disabilities is the curb cut or ramp, a portion of the sidewalk that slopes to the level of the roadway to facilitate crossing.

Land use has a major influence on use of the pedestrian network. Some areas of San Mateo County have no nearby destinations convenient for walking, such as parks or local markets. There are residential, office, and industrial areas that either have no sidewalks or lack a continuous connection to a wider sidewalk network. Such areas contribute to regional congestion and air pollution by inducing more automobile use. In addition, they also isolate those residents who cannot drive as well as those employees who may desire an alternative to the automobile for either commuting to and from work or for short trips during the work day. While some of San Mateo County fits this description, there are also good examples of pedestrian-friendly neighborhoods and commercial districts, for example the environs of downtown areas in San Mateo County.

Some areas of San Mateo County have no nearby destinations convenient for walking, such as parks or local markets.

Neighborhoods

In general, the county's oldest residential neighborhoods are well suited for walking. Such neighborhoods are generally located close to El Camino Real and Caltrain stations, where commercial activities, public buildings and other important locations are concentrated. Although El Camino Real can present a noisy, intimidating barrier to pedestrian movement, it also serves as a destination for those living on nearby residential streets. The residential areas that surround the downtowns of Burlingame, San Mateo, San Carlos, Menlo Park, Redwood City, and other San Mateo County cities offer low-traffic, tree-lined streets that invite walking to nearby destinations.

Shopping Districts and Malls

Commercial areas that developed before the automobile became the primary mode of transportation in San Mateo County and are better suited for walking than those that have developed in more recent decades. These traditional downtown and neighborhood commercial districts have buildings that are sited close to the sidewalk and the street to invite the pedestrian to look in display windows, as well as provide a sense of enclosure, shelter and protection. Their streetscape often features trees for visual amenity and shade, as well as other amenities such as pedestrian seating and pedestrian scale lighting. These traditional streets are narrower than suburban arterials and thus induce drivers to slow down. Slower car speeds in turn make them safer and more comfortable to cross.

These traditional downtown and neighborhood commercial districts have buildings that are sited close to the sidewalk and the street to invite the pedestrian to look in display windows, as well as provide a sense of enclosure, shelter and protection.

In contrast, auto-oriented commercial locations are less pedestrian-friendly. Shopping malls, for example, are typically surrounded by large expanses of parking lot which the pedestrian must cross (all the while

keeping a wary eye out for parking and un-parking motor vehicles) in order to reach the mall itself. Both regional shopping malls and strip malls on arterial streets are set back from the street and its sidewalk, hence less accessible to pedestrians and transit patrons who board and alight at curbside. Being set back from the street also means that shopping malls and strip malls do not contribute to the sense of enclosure along the street front that characterizes traditional main streets.

Schools

While school sites in San Mateo County do not typically located on busy arterial streets, some students commuting on foot or by bicycle are required to cross these streets in order to reach their campus. Crosswalks with raised center medians, crosswalk pedestrian signal heads and countdown signals, and crossing guards can serve to address safety concerns at these locations. Even in the calmer street environs of schools in residential areas, traffic congestion and potential traffic safety hazards in the vicinity of school sites during drop-off and pick-up times can present challenges for students bicycling or walking to school.

Bus Stops

Although bus stops are generally accessible by sidewalk, pedestrian amenities such as lighting, benches and shelters are sometimes inadequate. These conditions can discourage transit use, or at minimum detract from the transit user's experience. Provision of safe, convenient, comfortable, and direct pedestrian routes to transit stops is important to encourage use of public transit.

Barriers to Pedestrian Access: Rail Lines and Freeways

In recent years, Caltrain has substantially improved pedestrian access and safety at Caltrain stations, grade crossings, and right of way in the county. These improvements include pedestrian and vehicle crossing gates at stations and at-grade crossings, as well as climb-proof mesh fencing along sections of the right of way.

Since Caltrain is not grade-separated in most locations, long walking distances between crossings make walk trips to destinations on the other side of the tracks much less convenient.

Despite these impressive improvements, the Caltrain tracks at times present a barrier to pedestrian travel that is analogous to the barrier effect of the US 101, I-280, and I-380 freeways. Since Caltrain is not grade-separated in most locations, long walking distances between crossings makes walk trips to destinations on the other side of the tracks much less convenient, and

thus, may discourage walking as an alternative to driving for otherwise short trips.

The extent of the highway and rail line barrier effect on pedestrian travel continues to be an important issue in San Mateo County. Of the 83 road crossings over I-280, US 101, Highway 1, and Caltrain, for example, 17 (or 20%) had no sidewalk on either side and another 13 (or 16%) had a sidewalk on only one side of the crossing.³⁶

Pedestrian access to Caltrain stations, as well as to bus stops and BART stations, can be impeded by uncomfortable, inconvenient, and at times unsafe intersection crossing conditions in the vicinity of and en route to these transit facilities. In some cases, inadequate sidewalk conditions and poor lighting along access routes to transit can also discourage walking to transit stops.

³⁶ San Mateo County Comprehensive Bicycle and Pedestrian Plan, Adopted September 8, 2011, p. 15.

BART Stations

BART has promulgated and is implementing an excellent set of station access guidelines that include attention to pedestrian safety and convenience, as well as to accessibility for persons with disabilities.³⁷ Since all BART tracks are grade separated, they do not usually act as barriers to pedestrian movement.

Arterial Streets

The San Mateo County Comprehensive Bicycle and Pedestrian Plan has identified major roadways like El Camino Real, Woodside Road, and Highway 1 in San Mateo County as having “high traffic volumes and infrequent crossings,” along with limited pedestrian amenities, and auto-oriented street frontage that in combination “act as pedestrian barriers.”³⁸ The innovative Grand Boulevard Multimodal Transportation Plan presents solutions to some of the challenges facing pedestrians who wish to safely and comfortably cross as well as walk along such streets. This important and highly promising initiative to change the pedestrian environment for the better on El Camino Real advocates more pedestrian-friendly intersections, more compact development at increased densities near transit stations, better enclosure of the street front, and increased landscape and urban design amenity.³⁹ These improvements to El Camino Real may become a model for other arterial streets in San Mateo County.

Sophisticated tools for planning and engineering more pedestrian-friendly arterial streets in San Mateo County and elsewhere have emerged in recent years. These include guidance for pedestrian level of service analysis provided in *NCHRP Report 16: Multimodal Level of Service Analysis for Urban Arterial Streets*⁴⁰ and *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*,⁴¹ a set of street design guidelines published under the auspices of the Institute of Transportation Engineers and the Congress for the New Urbanism. The Caltrans Complete Streets Program,⁴² which emphasizes provision of pedestrian and bicycle facilities into street design as a matter of course, provides powerful support for efforts to accommodate pedestrian needs. The Grand Boulevard Plan offers the opportunity to put all of this guidance into practice in San Mateo County as an example of best practices in arterial street design.

Commercial/Industrial Areas

Many large employment sites in San Mateo County are located near US 101, in facilities with at times limited pedestrian access. They are typically set back far from the street, surrounded by parking, in some places lack continuous sidewalk connections to housing and shopping, and are located far from residential areas. Consequently, these areas are often heavily reliant on private auto trips for access.

Improvement Plans and Programs

There are many established transportation funding programs that can finance improvements to pedestrian facilities. On the local, regional, and state levels, these include San Mateo County’s Measure A, California’s

These federal funds are typically sub-vented to the Metropolitan Transportation Commission for distribution regionally.

³⁷ See http://www.bart.gov/docs/planning/access_guidelines.pdf.

³⁸ San Mateo County Comprehensive Bicycle and Pedestrian Plan, February 24, 2011 Draft.

³⁹ http://www.grandboulevard.net/images/stories/documents/DraftCorridorPlan/gbi_corridor_plan_low_res.pdf.

⁴⁰ http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_616.pdf.

⁴¹ Institute of Transportation Engineers and the Congress for the New Urbanism, 2010..

⁴² http://www.dot.ca.gov/hq/tpp/offices/ocp/complete_streets.html.

Transportation Development Act and Safe Routes to Schools programs, and the Bay Area's Transportation Fund for Clean Air, Livable Communities, and Safe Routes to Schools programs. On the federal level there are a variety of other programs funded by the federal Fixing America's Surface Transportation (FAST) Act, including Enhancements, Congestion Mitigation and Air Quality Improvement, Livable Communities, and Safe Routes to School. These federal funds are typically sub-vented to the Metropolitan Transportation Commission for distribution regionally. C/CAG's Transit-Oriented Development program encourages multi-use, higher-density development located close to transit, and therefore encourages planning for pedestrian and circulation within the specific projects.

A Framework for Achieving a Better Pedestrian Environment in San Mateo County

Progress toward improvement of the pedestrian environment in San Mateo County requires a planned approach. An overarching vision and a more specific goal to accompany it are needed to keep on course. A set of policies comprises the means to achieve the goal and realize the broad vision. Specific objectives and an associated set of performance measures are needed to chart the amount and pace of progress toward achievement of policies, goal, and vision.

Pedestrian Environment Vision, Goal, and Policies

Vision

A San Mateo County in which walking for both active transportation and recreation is safe, comfortable, and convenient.

Goal⁴³

Promote safe, convenient, and attractive pedestrian travel in support of healthy, active communities while reducing reliance on the automobile for short trips.

Policies

Integration with Public Transit

- Encourage local agencies and transit operators, such as SamTrans, Caltrain and BART, to work cooperatively to promote walking to transit by improving access to and through stations and stops, installing adequate pedestrian seating, and ensuring opportunities for access by people with disabilities.

Encouragement, Education, and Incentives

- Work with local, county and regional agencies and organizations – including those with a focus on public health – to develop effective encouragement programs that promote walking as a safe, convenient and healthy mode of transportation.
- Provide funding for effective support programs and events that facilitate mobility among a broad range of potential users, including pedestrians and people with disabilities.

⁴³ A full set of pedestrian goals was developed for the San Mateo County Comprehensive Bicycle and Pedestrian Plan, Adopted September 8, 2011.

- Encourage local school districts to implement projects and activities that promote walking to school among students and staff.
- Promote integration of pedestrian-related services and activities into broader countywide transportation demand management and commute alternatives programs.
- Provide support for programs that educate drivers and pedestrians about their rights and responsibilities, as well as traffic education and safety programs for adults and youth.

Safety

- Promote collaboration among the Sheriff's Office, local police departments and other county and local agencies to develop and administer effective safety, education and enforcement strategies related to pedestrians.

Complete Streets

- Comply with the complete streets policy requirements of Caltrans and the Metropolitan Transportation Commission concerning safe and convenient access for pedestrians, and assist local implementing agencies in meeting their responsibilities under the policy.
- For transportation projects funded by county or regional agencies, require that local implementing agencies incorporate "complete streets" principles as appropriate, provide at least equivalently safe and convenient alternatives if they result in changes to pedestrian access, and provide temporary accommodations for pedestrians during construction.
- Monitor countywide transportation projects to ensure that the needs of pedestrians are considered in programming, planning, design, construction, operation and maintenance, and encourage local agencies to do the same for their projects.
- Provide support to local agencies in adopting policies, guidelines and standards for complete streets and routine accommodation of pedestrians in all new transportation projects.
- Strongly encourage local agencies to adopt policies, guidelines, standards and regulations that result in truly pedestrian-friendly land use developments, and provide them technical assistance and support in this area.

Traffic Calming

In areas with high levels of pedestrian traffic, encourage cities to implement appropriate traffic calming measures to slow approaching car speeds and thus lengthen reaction time available to both drivers and pedestrians in the event of a potential conflict.

Barriers to Pedestrian Access and Circulation

Reduce barriers to pedestrian access and circulation, including those caused by gaps in the pedestrian facilities network and the severance effect on pedestrian travel due to rail lines, freeways, and major arterial streets.

Pedestrian Objectives

1. Increase the number of pedestrian signal heads and countdown signals in San Mateo County.
2. Increase the number of intersections with enhanced treatments for pedestrian safety and comfort, such as raised center medians, in-pavement lights, pedestrian-activated crossing signals, and raised crosswalks appropriate to the location.

3. Increase the sidewalk network in San Mateo County by closing gaps, restoring deteriorated sidewalks and providing adequate maintenance.
4. Increase pedestrian mode share for all person trips originating in San Mateo County from an estimated 9% in 2015 to 15% in 2040.
5. Increase pedestrian mode share for trips to work from an estimated 2.0% in 2015 to 5.0% in 2040.

8. PUBLIC TRANSPORTATION

Background

Public transportation is an important component of the *mobility* (the movement of people and goods) and *accessibility* (the ease of reaching desired goods, services, and activities) strategies of urban areas, particularly, those experiencing substantial traffic congestion. A comprehensive approach to planning public transit services and facilities, however, takes into account many factors beyond congestion. Todd Litman of the Victoria (B.C.) Transportation Policy Institute describes this more comprehensive approach in the following terms:

“Modern planning ... tends to give more consideration to other planning objectives besides congestion reduction, and to a wider range of accessibility improvement strategies, including various mobility management strategies and smart growth land use policies. More comprehensive planning tends to place a higher value on public transit investments, particularly when implemented in conjunction with supportive policies such as road and parking pricing, commute trip reduction programs, and transit oriented land use development.”⁴⁴

Public transportation has a variety of roles in San Mateo County and other urban areas. Transit vehicles carry people to and from work, serve those who have no alternative means of travel, provide an important alternative for those who do have other travel choices, and complements other transportation modes. This complementary function includes connection to other surface transit services (bus and rail), to pedestrians and bicyclists, to air passenger terminals, and to the automobile as an access mode to transit.⁴⁵ Transit service quality factors include the following⁴⁶:

- Coverage: the route network is in close proximity to major destinations
- Comfort: vehicles and facilities are safe, clean, well-lit, accessible
- Travel Time: services are frequent and direct; transit priority measures are used
- Reliability: vehicle breakdowns are minimized; transfer connections are made; services are on time
- Convenience: good pedestrian access to transit stops; stops and platforms are well-designed and well-maintained; accessible vehicles are used
- Courtesy: passengers are treated with politeness and respect; staff provides reliable information to customers; complaints are investigated and corrective action is taken promptly

Existing System

There are three primary public transit operators in San Mateo County: BART, Caltrain, and SamTrans. This section gives a brief description of the county's existing transit system and summarizes the most significant changes to the public transportation system since the Countywide Transportation Plan 2010.

⁴⁴ Litman, Todd, Smart Congestion Reduction II: Re-Evaluating the Role of Public Transit for Improving Urban Transportation, p.2. See http://www.vtpi.org/cong_reliefII.pdf.

⁴⁵ Vuchic, Vukan, Transportation for Livable Cities, p. 37.

⁴⁶ Litman, Todd, Valuing Transit Service Quality Improvements, p. 3. See <http://www.vtpi.org/traveltime.pdf>.

The Bay Area Rapid Transit District (BART)

BART operates electrified, grade-separated heavy-rail trains between the East Bay and Millbrae via downtown San Francisco. BART service was extended in 2003 from Colma to both the San Francisco International Airport and Millbrae, where a direct transfer to Caltrain is provided. There are six BART stations in San Mateo County: Daly City, Colma, South San Francisco, San Bruno, Millbrae, and the San Francisco International Airport. Each weekday over a twenty-hour service day, there are 292 trains serving Daly City and 151 serving Millbrae.⁴⁷ In 2015, the average weekday BART station entries in San Mateo County, in numerical order, were Daly City (10,085), Millbrae (7,080), San Francisco International Airport (6,995), Colma (4,761),

There are six BART Stations in San Mateo County with a combined daily average of 36,577 station entries.

San Bruno (3,975), and South San Francisco (3,681).⁴⁸ **Table 16** displays BART station access attributes in San Mateo County. **Table 17** lists average weekday station entries in 2015. **Figure 2** shows the BART alignment and BART station locations in San Mateo County.



⁴⁷ <http://www.bart.gov/schedules/byline>.

⁴⁸ <http://www.bart.gov/about/reports/profile>.

Table 16: San Mateo County BART Station Access Attributes⁴⁹

Station	Access Mode from Home to BART					
	Median Distance (All Modes)	Walk	Bicycle	Transit	Drive Alone/ Carpool	Drop off/taxi/ other
Daly City	1.36 miles	31%	3%	16%	24%	26%
Colma	1.19 miles	25%	3%	8%	44%	19%
South San Francisco	1.46 miles	34%	4%	5%	34%	24
San Bruno	1.54 miles	29%	5%	3%	42%	21%
Millbrae	4.58 miles	15%	3%	16%	48%	19%

Note: Total percentages by station may not equal 100% due to rounding

Table 17: San Mateo County BART Station Average Weekday Entries⁵⁰

Station	Station Entries
Daly City	10,085
Colma	4,761
South San Francisco	3,681
San Bruno	3,975
San Francisco Airport	6,995
Millbrae	7,080
Total	36,577

Source: BART, 2015 Ridership by Station

⁴⁹ <http://www.bart.gov/about/reports/profile>.



Figure 2: BART and Caltrain Alignment and Stations in San Mateo County

Peninsula Corridor Joint Powers Board (Caltrain)

Caltrain is a commuter rail service that operates diesel-powered trains between downtown San Francisco and Gilroy, with fourteen stations along the urban bayside corridor of San Mateo County. Weekend-only service is provided to two stations, Broadway in Burlingame and Atherton. As of 2016, Caltrain operated 46 northbound and 46 southbound trains in San Mateo County each weekday, 18 trains in each direction

on Saturday, and 16 trains in each direction on Sunday.⁵¹ As of 2015, an average of 18,205 passengers boarded Caltrain stations in San Mateo County each weekday.⁵² **Table 18** shows average weekday boardings for each of the twelve Caltrain stations in San Mateo County with weekday service. **Figure 32** displays the Caltrain alignment and Caltrain stations in San Mateo County.

Table 18: Average Weekday Ridership at San Mateo County Caltrain Stations

Station	Boardings
Bayshore	254
South San Francisco	472
San Bruno	682
Millbrae	3,536
Burlingame	998
San Mateo	2,061
Hayward Park	367
Hillsdale	2,706
Belmont	699
San Carlos	1,435
Redwood City	3,233
Menlo Park	1,762
Total	18,205

Source: Caltrain, 2015 Annual Passenger Count

Caltrain is owned and operated by the Peninsula Corridor Joint Powers Board (JPB), which is comprised of three members from each of the JPB partners: San Francisco, San Mateo, and Santa Clara Counties.⁵³ The Caltrain system has been substantially upgraded since adoption of the Countywide Transportation Plan in 2001. These improvements have included new track, rolling stock, signal systems, and station improvements. In 2004, Caltrain inaugurated express “Baby Bullet” service, which reduced travel time between San Francisco and San Jose to less than one hour.

More recently, Caltrain has undertaken the Caltrain Modernization program, a nearly \$2 billion investment that will upgrade the signal system for increased safety and performance and replace the diesel-powered trains with electric multiple unit trains.⁵⁴ The improvements are expected to be complete in 2020 and will result in significantly lower emissions, reduced noise, improved frequency and speed, and increased ridership. The Caltrain corridor will also be used in the planned California High Speed Rail system (see Potential New Transit Services below). The California High-Speed Rail Authority (CHSRA) has approved nearly \$800 million to electrify the Caltrain line and provide three new grade separations in San Mateo,

⁵¹ <http://www.caltrain.com/schedules.html>.

⁵² http://www.caltrain.com/Assets/_Marketing/pdf/2015+Annual+Passenger+Counts.pdf.

⁵³ Caltrain Strategic Plan 2004/2023, p. 7.

⁵⁴ <http://www.caltrain.com/projectsplans/CaltrainModernization/Modernization.html>.

\$713 million for the Peninsula Corridor Electrification Project and \$84 million to the City of San Mateo, respectively. Caltrain and the High-Speed Rail Authority will share approximately 50 miles of tracks between San Jose and San Francisco once the high-speed rail service begins operation, as early as 2025.

San Mateo County Transit District (SamTrans)

The San Mateo County Transit District (SamTrans), which was formed through the consolidation of eleven different city bus systems, began operating fixed-route public bus transit service throughout the San Mateo County in 1976. A year later, SamTrans began mainline service from Palo Alto in Santa Clara County to downtown San Francisco, with intermediate stops throughout San Mateo County. Also in 1977, SamTrans inaugurated paratransit service to the mobility-impaired through the Redi-Wheels service. In addition, SamTrans offers free community shuttle in Brisbane/Bayshore and East Palo Alto, an extensive array of employer shuttles, as well as free shuttles to BART and Caltrain stations.

SamTrans fixed-route service comprises 76 routes, including the KX express route to downtown San Francisco via the San Francisco International Airport. In the fiscal year ending June 30, 2015, SamTrans fixed-route buses carried 13,158,700 passenger trips.⁵⁵ Ridership on SamTrans paratransit services in the same period was 329,040.⁵⁶ In 2013, SamTrans implemented recommendations from the SamTrans Service Plan, which included modifications to fixed-route service to more efficiently serve its customers and support long-term, financially viable bus service.⁵⁷ **Figure 3** displays the SamTrans fixed-route network available for download on the SamTrans website.

⁵⁵ http://www.samtrans.com/about/Bus_Operations_Information/Ridership.html.

⁵⁶ http://www.samtrans.com/about/Bus_Operations_Information/Ridership.html.

⁵⁷ http://www.samtrans.com/Planning/Planning_and_Research/SamTransServicePlan.html.



Figure 3: Map of SamTrans Fixed-Route Network

Shuttle Services

Shuttle services can be classified as commuter or community shuttles. Commuter shuttles provide the first/last mile connection to and from regional transit services, such as BART and Caltrain. Commuter shuttles typically operate on weekdays during peak hours and provide access to employment centers. Community shuttles typically provide mid-day and/or weekend service for shopping, medical appointments, dining and other purposes. Community shuttles are generally used for shorter trips within a community and often provide lifeline transportation mobility to low income populations and seniors. Other shuttles represent a mixture of both commuter and community shuttles depending on the hours of service and route.

Lead agencies for the shuttles include, but are not limited to Caltrain, municipalities, the Peninsula Traffic Congestion Relief Alliance, SamTrans, and the private sector. Staff from C/CAG, the Peninsula Congestion Relief Alliance, SamTrans, and the San Mateo County Transportation Authority have been working together to better coordinate and improve the shuttle program in the county. Together they developed a Shuttle Business Practices Guidebook (2012) and are currently implementing the near term recommendations.

Ferry Service

The revival of passenger ferry in San Mateo County began on October 19, 2009 with groundbreaking ceremonies for a new passenger ferry service at Oyster Point in South San Francisco. Ferry service between the South San Francisco and the East Bay began in June 2012. The San Francisco Bay Ferry provides weekday-only, commuter service between Oakland's Jack London Square or Alameda Main Street terminals in the East Bay and South San Francisco's Oyster Point Marina terminal.⁵⁸ The service operates three departures from Oakland and Alameda during the morning commute period and three departures from South San Francisco to Oakland/Alameda during the evening commute period.

Potential New Transit Services

Work is currently underway to enhance transit services in San Mateo County. Caltrain is implementing the Caltrain Modernization Program that will upgrade the performance, operating efficiency, capacity, safety and reliability of Caltrans's commuter rail service, while also providing infrastructure that will help prepare the Peninsula Corridor to accommodate the California High-Speed Rail service. Caltrain and high-speed trains will primarily share Caltrans's existing tracks providing service that remains substantially within the existing Caltrain corridor creating a "blended" system of operation as early as 2025.⁵⁹

Phase 1 of the California High-Speed Rail system will connect the New Transbay Terminal in downtown San Francisco to the Los Angeles Basin via the Diridon Station in San Jose and the Central Valley, with extensions to Sacramento and San Diego in Phase 2. The primary goal of high-speed rail is to serve as an alternative to airplane and long-distance automobile travel by connecting major population and multimodal transit centers throughout the state, including the Peninsula corridor. The California High-Speed Rail Authority's 2016 Business Plan describes the sequencing to initiate service between the Central Valley and Silicon Valley by 2025.⁶⁰ The initial service would be between San Jose and an interim station north of Bakersfield. Pending funding, the initial service may include service to San Francisco via the

⁵⁸ <http://sanfranciscobayferry.com/route/oakland/ssf>.

⁵⁹ <http://www.caltrain.com/projectsplans/CaltrainModernization/BlendedSystem.html>.

⁶⁰ http://www.hsr.ca.gov/docs/about/business_plans/2016_BusinessPlan.pdf.

Caltrain corridor, with an intermediate station in Millbrae, and extensions to Merced and Bakersfield. The Authority is studying the option for an additional station in Redwood City.

SamTrans is also in the process of studying enhanced transit service on El Camino Real and has prepared a number of plans. SamTrans, C/CAG and VTA prepared the Grand Boulevard Multimodal Corridor Plan (2010), which looked at the potential market for enhanced transit services on El Camino Real and developed some qualitative goals for future transit service.⁶¹ The SamTrans Service Plan (2013) includes a comprehensive review of fixed route bus service in the county and makes near-term recommendations to consolidate existing bus service on El Camino Real to improve reliability and frequency.⁶² SamTrans will build upon the work from these plans to determine the near- and long-term transit vision for El Camino Real.

In addition, the Grand Boulevard Initiative is a collaboration of 19 cities, counties, local and regional agencies united to improve the performance, safety and aesthetics of El Camino Real. The Grand Boulevard vision is for El Camino Real to “achieve its full potential as a place for residents to work, live, shop and play, creating links between communities that promote walking and transit and an improved and meaningful quality of life.” C/CAG, Joint Venture: Silicon Valley Network, SamCEDA, SamTrans, and VTA work in collaboration to coordinate the local planning efforts along El Camino Real.⁶³

Other potential future public transit improvements in San Mateo County include the possible introduction of commuter rail service across the Dumbarton Rail Bridge from Alameda County to Redwood City and creation of a network of high-speed ferries.⁶⁴ In addition, other options for increasing the transit capacity of the Transbay corridor are under study.⁶⁵ One such option is a second Transbay rail crossing (using BART or standard-gauge rail) that would be closely integrated with existing rail stations.⁶⁶

Issues

Effective Public Transportation

Increased use and effectiveness of public transportation requires a comprehensive strategy. Elements of such a strategy include the following⁶⁷:

- Enhanced Service – faster travel times (competitive with the automobile), increased frequency, service coverage, operating hours
- Improved Connections – coordinated schedules between bus, rail, and ferry services; prepaid fare zones; integrated fare media
- Transit Priority – dedicated bus lanes, “queue jump” lanes, bus priority at traffic signals

⁶¹ <http://www.grandboulevard.net/projects/multi-modal-corridor-plan>.

⁶² http://www.samtrans.com/Planning/Planning_and_Research/SamTransServicePlan.html.

⁶³ <http://www.grandboulevard.net/>.

⁶⁴ See <http://www.watertransit.org/> under Proposed Routes.

⁶⁵ <http://mtc.ca.gov/our-work/plans-projects/other-plans/core-capacity-transit-study>.

⁶⁶ See

http://www.spur.org/sites/default/files/publications_pdfs/SPUR_Designing_the_Bay_Area%27s_Second_Transbay_Rail_Crossing.pdf.

⁶⁷ See <http://www.vtpi.org/tdm/tdm47.htm>.

- Reallocation of Street Space to Pedestrians and Transit Vehicles – wider sidewalks for access and egress from transit stops and stations, bus bay or pullover space, dedicated transit lanes within the street right of way
- Improved Stops and Stations – shelters (enclosed waiting areas), seating, lighting, way finding signs and service information, washrooms, refreshments, Internet services, and other convenience and comfort features
- Improved Rider Information and Marketing Programs – real-time information on transit vehicle arrival
- Transit-Oriented Development – increased densities and land use mixes around transit stations, improved pedestrian and bicycle access to and egress from stations
- Enhanced Security and Safety for Transit Patrons – on transit vehicles and at transit stops and stations
- Bicycle and Transit Integration – bicycle access to and from transit facilities, bike-sharing near transit stops
- Improved Access to and Egress from Transit Stops and Stations – sidewalks, bicycle lanes, paved walking and cycling paths, safe street crossing opportunities, balanced with passenger drop-off areas and managed/shared parking supply

A Framework for Optimizing the San Mateo County Public Transit System

There needs to be a structured approach to making the public transit system in San Mateo County as effective and efficient as possible. This in turn requires a comprehensive vision accompanied by a more explicit goal and set of policies by which to achieve the goal. These policies are operationalized through a set of objectives. Progress toward achievement of these objectives is charted through performance measures. BART, SamTrans and Caltrain have each developed Strategic Plans and will be updating their respective plans over time. These Strategic Plans outline the goals, policies and objectives for their systems as well as performance metrics. C/CAG's Vision, Goal, Policies and Objectives for public transit listed here are consistent with those of the Strategic Plans of BART, SamTrans, and Caltrain. Each organization is responsible for developing its policies related to these principles. Performance measures that can be useful in tracking progress toward meeting the objectives or in defining needs and gaps in transit serve in future planning and programming efforts are provided in Appendix A.

Transit System Vision, Goal, and Policies

Vision

A public transportation system in San Mateo County that provides essential mobility for all, offers a competitive alternative to the automobile, and contributes to environmental and socio-economic well-being.

Goal

Develop and maintain a seamless, safe and convenient public transportation system in San Mateo County focused on the customer.

Policies

Develop Improved Service Efficiency and Cost-effectiveness to Increase the Utility of Public Transportation

- Continue to tailor public transportation service in response to the needs of the traveling public.
- Avoid or minimize publicly-provided transit service duplication within target markets of the San Mateo County public transportation system.
- Reduce where possible conflicts between modes or services that are resulting in congestion and higher operating costs.
- Identify ways to reduce operating cost through the application of new or different technologies for propulsion, communication, system operation and management.
- Explore ways to emphasize the role of transit hubs of regional importance to improve service coordination.

Enhance Access to Public Transit

- Work cooperatively with local law enforcement agencies to improve the safety of passengers while on public transportation vehicles and while getting to and from the service.
- Examine ways to cost-effectively improve the east-west connectivity of public transportation services.
- Continue to research the needs of special populations, including seniors, persons with disabilities, low income transit dependents and those for who English is a second language and explore ways to meet their needs.
- Continue to explore and evaluate amenities to enhance the transit experience and reduce travel times.
- Advocate for funding opportunities to create a more stable, predictable financial base for public transportation in San Mateo County.

Encourage a Customer-friendly Public Transportation System that is Logical, Intuitive, and Easy to Use

- Continue to explore ways to improve the coordination and interface of transit services, schedules, and information among multiple providers within San Mateo County with the goal of developing a seamless network for the user.
- Continue to explore ways to provide easily understood bus and train service information at transit stations and other stops to reduce customer anxiety about accessing transit service.

Public Transportation Objectives

1. Improve the competitiveness of public transit relative to private transportation for key trips as measured by travel time, reliability and customer satisfaction
2. Lower the cost per passenger, mile and hour for public transit service in the county, discounting for inflation

3. Improve system productivity as measured by passengers per hour and passengers per mile of service provided
4. Increase the public transit mode share of travel to, from and within San Mateo County over both a ten-year and twenty-five-year horizon

9. TRANSPORTATION SYSTEM MANAGEMENT AND ITS

Background

Transportation Systems Management and Operations (TSM) and Intelligent Transportation Systems (ITS) focus on efficiency improvements to existing transportation infrastructure rather than major investments in system capacity. This approach is often cost-effective, particularly in largely built out areas such as much of San Mateo County to the east of I-280. In these areas, land and construction costs, along with the impacts of major new infrastructure projects, make provision of significant increases in transportation capacity exceedingly difficult. TSM measures comprise a wide array of projects and strategies, including the following⁶⁸:

- Intersection and traffic signal improvements
- Traffic signal timing optimization
- Controller/cabinet/traffic signal head upgrades
- Turning lanes
- Lane assignment changes
- Pavement striping
- Signage and lighting
- Real-time systems operations information
- Incident prevention and response
- Vehicle detectors repair/replacement
- Data collection to monitor system performance



TSM measures such as these are often comparatively low-cost, have limited negative impacts during construction, and can be implemented in a shorter period of time than construction of new transportation system physical capacity elements such as new travel lanes or whole new roadways.

TSM tactics and strategies are an important part of the San Mateo County Congestion Management Program (CMP).⁶⁹ The CMP emphasizes removing traffic congestion bottlenecks at the 53 intersections and 16 roadway links that comprise San Mateo County's Congestion Management System. Local jurisdictions within the county also undertake TSM on the network of local street sections and intersections. The CMP and local jurisdictions rely on the metrics of level-of-service (largely a function of travel delay), and travel time to identify the need for and measure the effectiveness of TSM improvements.

⁶⁸ Adapted from Transportation Systems management (TSM) in <http://www.nctcog.org/trans/tsm/> and *Operations and Management* in <http://www.vtpi.org/tdm/tdm111.htm>

⁶⁹ See http://www.ccag.ca.gov/pdf/tac/2009/FINAL_SMC_2009_CMP.pdf

Intelligent Transportation Systems

Intelligent Transportation Systems is the collective term for an array of applications of electronics and communications technologies used to solve transportation problems. Examples include systems for automated traffic control at intersections, dissemination of real-time information about traffic congestion, weather conditions and transit services, transit fleet management, automated counting of passenger boarding, and electronic fare payment, electronic bridge and highway toll payment, and both parking electronic payment service and information dissemination about availability of parking spaces.

In 2005, C/CAG and the San Mateo County Transportation Authority completed an *ITS Strategic Plan for San Mateo County*.⁷⁰ The Plan was comprised of seven elements, as follows:

- Freeway/highway management
- Arterial management
- Transit management
- Traveler information
- Parking management
- Emergency/incident management
- Supporting elements

The ITS Strategic Plan emphasized the importance of integrating ITS technologies into the mainstream transportation planning and engineering process. The Plan called for bringing the ITS components that were already deployed in San Mateo County “into full and stable operation”; upgrading existing traffic signal systems with new technology; implementing automated vehicle location on the Caltrain system; providing electronic information signs on transit vehicles and at transit stations; installation of changeable message signs at key locations on freeways and other highways in the county; deployment of CCTV cameras at selected spots along the roadway



system to provide emergency response agencies with real-time views on traffic incidents; and an upgrade to the communications infrastructure, including fiber optic networks, that are essential to the functioning of ITS components.

There is a growing array of ITS deployments in San Mateo County. These include traffic adaptive signalization along El Camino Real in Menlo Park, ramp metering at US 101 on-ramps, electronic information signs disseminating transit service information at Caltrain and BART stations in San Mateo County, changeable information signs at several locations on US 101, electronic fare payment at Caltrain and Bart stations,

⁷⁰ San Mateo County ITS Strategic Plan: Final Report.
http://www.ccag.ca.gov/pdf/documents/San%20Mateo%20County%20ITS%20Strategic%20Plan_A.pdf.

and smart parking meters in downtown Redwood City, among other examples. These advances in electronics and communications technology in the transportation system have been accompanied by the growing proliferation of smart phones and in-vehicle navigation systems that provide systems users ready access to information about travel conditions in San Mateo County.

The San Mateo County Smart Corridor Project⁷¹ is one example for advanced ITS deployment in San Mateo County. The ITS deployments envisioned in the Smart Corridor deployment include enhanced transit signal system control on arterial streets interchanging with or parallel to US 101, digital guidance signs for motorists in the event of an incident on US 101, and a prospective traffic management center in San Mateo County.

Issues

The Geographic Scope and Duration of TSM Benefits

TSM not only provides interim solutions to system capacity problems, it can be a continuous approach to optimizing available capacity anywhere in the transportation system.

Since their effects are limited in geographic scope, TSM actions tend to provide short- to medium-range benefits. They are not intended to address longer-term problems at a citywide or countywide scale. Nevertheless, TSM can provide near-term efficiency and safety benefits while a broader approach that integrates land use and multimodal transportation facilities and services is implemented. It is important to

emphasize that TSM cannot by itself solve a community or region's transportation access and mobility problems, but it can reduce their effects for a time in specific locations. Some TSM measures, such as improved information about roadway and transit fleet operations, can have enduring benefits over a wide area.

TSM, Sustainable Transportation Systems, and Sustainable Communities

TSM by itself does not have a substantial impact on community quality of life, as would a major public transit or highway facility, nor does TSM influence population and economic growth as would a transportation system capacity increase. Despite these limitations, there are sustainability benefits in linking TSM and operations to more comprehensive transportation systems planning efforts.⁷² TSM not only provides interim solutions to system capacity problems, it can be a continuous approach to optimizing available capacity anywhere in the transportation system. In fulfilling this role, TSM can contribute to "right-sizing" transportation facilities and potentially reduce transportation's fiscal, social, and environmental impacts. In this sense, TSM is one of the tools in the toolkit for sustainable transportation in San Mateo County and elsewhere.

Interagency Cooperation and Coordination

To be effective, TSM requires collaboration among state, regional, and local agencies, as well as between those charged with highway and public transit operations. Roadway corridors as well as transit routes

⁷¹ See http://www.ccag.ca.gov/smart_corridor.html.

⁷² For a good discussion of linkage opportunities, see *Getting More by Working Together — Opportunities for Linking Planning and Operations*, http://www.ops.fhwa.dot.gov/publications/lpo_ref_guide/prim0403.htm.

readily cross jurisdictional boundaries. Information sharing and coordination among traffic engineers, public works officials, public transport operations planners, and public safety officers is essential for realizing the benefits of TSM. The epitome of this interagency, inter-disciplinary collaboration is the transportation management center, the nerve center for video and data on the highway and public transit systems.⁷³ C/CAG and the other Bay Area congestion management agencies serve an essential interagency coordination function for TSM. Examples of C/CAG's role in countywide TSM coordination in San Mateo County include development of the biennial Congestion Management Program and the Smart Corridor Project.⁷⁴

ITS, like the transportation system itself, crosses jurisdictional boundaries. For San Mateo County, this means that all twenty-one cities and the County, as well as Caltrans, C/CAG, the San Mateo County Transportation Authority, SamTrans, Caltrain, and BART need to coordinate on ITS planning, design, and deployments. Other entities, including the Federal Highway and Federal Transit Administration also need to be kept informed and involved as appropriate in ITS implementation within San Mateo County. The ITS Strategic Plan has given strong impetus toward close coordination among these entities. Nevertheless, a continuing emphasis on collaboration across jurisdiction is needed due to the connected nature of ITS technology and the complex institutional context in which ITS is deployed.

Mainstreaming ITS

The San Mateo County ITS Strategic Plan and the Smart Corridor project have given strong impetus toward close coordination among transportation providers within the County.

ITS projects can both enhance the operation of the existing transportation infrastructure and substitute “virtual” capacity for new physical capacity in the transportation system. The latter is most clearly seen in deployment of advanced traffic signal control systems at intersections along arterial street corridors to increase the efficiency of traffic operations. Since ITS is still an emerging field in transportation planning

and engineering, it is sometimes considered to be in a category by itself. In reality, ITS can and should be seen as a potential component of many transportation highway and transit projects, rather than a stand-alone investment competing with more traditional solutions to transportation problems. Thus it is essential to mainstream ITS into the transportation planning, funding, design, and implementation programs throughout San Mateo County.

Funding

ITS technology can be expensive if deployed extensively. Like other infrastructures, the fiber optic networks, traffic signal system controllers, arrays of changeable message signs, and other ITS components require front-end investment in order to realize long-term benefits. The big advantage of ITS investments is that they often add great value to existing transportation infrastructure, and thus, can yield a high benefit to cost ratio. The potential rewards of investing in ITS should attract the funding needed for ITS deployment. In reality, however, the transportation system in San Mateo County as elsewhere has many other pressing needs, including repair, rehabilitation, and replacement of existing highway and transit

⁷³ For an excellent overview of the eight Caltrans transportation management centers statewide, see Caltrans TMC Coordination, <http://leonard.csusb.edu/research/documents/1017FinalReport.pdf>.

⁷⁴ For a description, see San Mateo County Smart Corridors Program: Concept of Operations <http://www.ccag.ca.gov/pdf/incident%20management/docs/San%20Mateo%20County%20Smart%20Corridors%20Program102908.pdf>.

infrastructure and equipment. These pressing needs should be met to the extent feasible, but not to the exclusion of productive investments in ITS throughout San Mateo County.

A Framework for Transportation Systems Management and ITS in San Mateo County

The 2005 ITS Strategic Plan for San Mateo County provides a good framework for ITS deployment. The San Mateo County Congestion Relief Plan commits seed funding annually for ITS projects. C/CAG will work with the San Mateo County Transportation Authority (SMCTA), the Metropolitan Transportation Commission (MTC), and the California Transportation Commission (CTC) to develop funding for ITS deployment.

Transportation Systems Management and ITS Vision, Goal, and Policies

Vision

A San Mateo County in which the transportation system is safe, efficient, cost-effective, and environmentally responsible.

Goal

Manage travel efficiently through supply-side measures, including low-cost traffic operations improvements and use of technologies that reduce or eliminate the need for increases in physical capacity.

Policies

Increase Efficiency on Existing Facilities Before Adding New Capacity

- Invest in enhanced traffic signal system capabilities, provision of center left turn pockets, improved incident detection and management, and similar traffic management measures to reduce vehicle delay on San Mateo County roadways before investment in new through lane capacity.

Deploy Advanced Information and Communications Technology to Manage and Reduce Vehicular Travel

- Continue investment in initiatives such as the Smart Corridor project and public transit traveler information systems that disseminate information about real time travel conditions and options to San Mateo County travelers, as well as enhance roadway efficiency.

Deploy Intelligent Transportation System Technologies to Improve Traffic Incident Management

- Traffic incidents on the roadway cause extensive delays and congestion. Deployment of ITS equipment can reduce or minimize those delays and congestion by providing first responders, traffic management personnel, and the traveling public with real-time information and tools. The San Mateo County Smart Corridor project aims at doing that. As funding becomes available, such projects can be expanded to cover a larger geographic area and major arterials. This allows signal timing to be optimized to flush traffic caused by an incident.

Encourage Deployment of Intelligent Transportation Systems within San Mateo County for Traffic Management, Public Transportation Management, Parking Management, and Traveler Information Applications

- Support investments in advanced traffic detection, traffic signal systems, transit fleet tracking, real time transit, traffic, and parking conditions information dissemination, and travel route guidance throughout the transportation system in San Mateo County.

Foster ITS Innovation through Deployment of Pilot Projects

- Introduce innovative communications and information technology into the San Mateo County transportation system by means of pilot projects where possible in order to increase the chances of successful larger scale deployment.

Share Resources, Risks, and Benefits of ITS Deployment

- Create partnership among agencies to deploy ITS projects in travel corridors, geographic areas, and across travel modes and jurisdictional boundaries to reduce risk, share benefits, and optimize chances for successful ITS deployment.

Deploy Advanced Information and Communications Technology to Manage and Reduce Vehicular Travel

- Continue investment in initiatives such as the Smart Corridor project and public transit traveler information systems that disseminate information about real time travel conditions and options to San Mateo County travelers.

Consider ITS Deployments as both a Complement and an Alternative to new Roadway Capacity

- Identify and prioritize ITS deployments that can enhance existing or planned roadway capacity or substitute for some or all new physical capacity, especially when doing so reduces impacts on non-motorized modes of travel and/or is more cost-effective than new roadway capacity by itself.

Continuously Evaluate New Technical Solutions and Policy Approaches to Reducing Peak Period Congestion on San Mateo County Transportation System

- Advances in provision and application of information of routes, congestion, and pricing to transportation systems users will assist in travel decision-making and optimize travel choices.

Transportation Systems Management Objectives

1. Develop a “Multimodal Connections” Program to be included in San Mateo County’s portion of the Metropolitan Transportation Commission’s Transportation for Livable Communities Program.⁷⁵
2. Where feasible, implement managed lanes on freeways in San Mateo County.
3. Before consideration of new through lanes, implement improved traffic signal timing, new turn lanes, and other traffic operations measures along streets and highways in San Mateo County.

⁷⁵ http://www.mtc.ca.gov/planning/smart_growth/tlc_grants.htm.

4. Provide ramp-metering on the freeway system including US 101 and Interstate 280.
5. Increase the number of route miles covered by the San Mateo County “Smart Corridors” Program.
6. Increase the number of intersections in San Mateo County equipped to operate in traffic adaptive mode.
7. Increase the number of corridors in San Mateo County equipped with traffic signal interconnections.
8. Increase the number of intersections in San Mateo County equipped with emergency vehicle pre-emption.
9. Increase the number of intersections in San Mateo County equipped with public transit traffic signal priority.
10. Provide improved traveler information to the motoring public.
11. Increase the number of public transit stops and stations in San Mateo County equipped with real-time transit service information.

10. TRANSPORTATION DEMAND MANAGEMENT

Background

Transportation Demand Management (TDM) is focused on influencing travel behavior as well as informing travelers about available mobility choices.⁷⁶ The purpose of TDM is to reduce traffic congestion and associated air emissions. TDM measures cover a broad spectrum, including subsidies for use of alternatives to the solo occupant vehicle, parking and road pricing, disseminating information about travel alternatives, work scheduling alternatives, car sharing programs, guaranteed ride home programs, and many others.⁷⁷ Transportation demand management strategies, like those discussed in the previous chapter on managing transportation systems or supply, tend to be much lower cost than adding new system capacity. Representative TDM measures are as follows:

- Commuter benefit programs to subsidize transit use, bicycling, and walking to work⁷⁸
- Rideshare matching programs
- Vanpool subsidies
- Personalized travel planning for environmentally-friendly commuting⁷⁹
- Preferential parking for carpools and vanpools
- Car sharing⁸⁰
- Demand-based (congestion) bridge and road pricing
- Marketing alternatives to the solo occupant vehicle
- Bicycle parking
- Showers and lockers at work
- Telecommuting
- Compressed work weeks (e.g. longer work days with alternative Fridays off)
- Flexible work hours (e.g. later workday start and end times)



⁷⁶ Meyer, Michael, Demand Management as an Element of Transportation Policy: Using Carrots and Sticks to Influence Travel Behavior, Transportation Research Part A 33 (1999), p. 576.

⁷⁷ For a comprehensive treatment of TDM, see <http://www.vtpi.org/tdm/index.php#strategies>.

⁷⁸ For more information on commute benefits programs nationally, see <http://www.nctr.usf.edu/programs/clearinghouse/commutebenefits/> and http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_87.pdf.

⁷⁹ For detail on personalized travel planning in support of alternatives modes use, see <http://www.itsbenefits.its.dot.gov/its/benecost.nsf/SummID/B2010-00644?OpenDocument&Query=Home>.

⁸⁰ For a description of car sharing programs, see <http://www.vtpi.org/tdm/tdm7.htm>.

In San Mateo County, the Peninsula Congestion Relief Alliance, which offers a wide array of commuter incentives, provides Countywide TDM services to both employers and employees.⁸¹ The Alliance sponsors carpool matching, carpool and vanpool incentives, commuter shuttles, bicycle parking subsidies, bicycle and pedestrian safety workshops, and more.⁸² *The Peninsula Traffic Congestion Relief Alliance 2010-2013 Strategic Plan*⁸³ identified four principal Alliance program areas as follows:

- Working with employers to develop and manage innovative partnerships to reduce peak period commute trips
- Working with commuters to explore and utilize alternative transportation
- Working with public and private partners to collaboratively develop new resources and tools to expand transportation alternatives
- Strengthening the organizational capacity of the Alliance to achieve its goals



Issues

Increased Complexity in Work Schedules and Locations

Efforts to implement TDM programs in San Mateo County, as elsewhere, face the challenges of the contemporary world of work.⁸⁴ Compared to the era in which most employees worked regular shifts at a single location, today's workforce increasingly works less regular hours. Many workers must hold more than one part-time job or one full-time and one part-time job to make ends meet. In San Mateo County, as elsewhere, workplaces are no longer concentrated solely in downtowns, but scattered widely in office and industrial parks. Many workers have or wish to combine trips to or from work with other activities, including child care drop-off and pick-up, as well as trips to the coffee shop, grocery store, health club, dry cleaners, etc. In combination, these factors create many distinct commuter market niches for TDM. No single TDM program could possibly serve the needs or fit the commuter profile of all workers in San Mateo County. Instead, a menu of inducements, such as that provided by the Peninsula Traffic Congestion Relief Alliance, is needed to encourage commuting by modes of travel other than the solo occupant automobile. In addition, personalized commute travel planning assistance is emerging as an important tool in the TDM toolkit.⁸⁵

Resistance to Telecommuting

Despite advances in telecommunications, telecommuting has yet to fulfill the expectation that it offers an effective way to reduce commuter peak period traffic congestion. One reason for these disappointed expectations is employer resistance, especially at the middle management level, to having employees work out of the office on a regular basis.⁸⁶ The proliferation of videoconferencing and electronic file

⁸¹ <http://www.commute.org/>.

⁸² <http://www.commute.org/pdf/board/Alliance%20Strategic%20Plan%20Final%20Rev%201-7-10.pdf>.

⁸³ <http://www.commute.org/pdf/board/Alliance%20Strategic%20Plan%20Final%20Rev%201-7-10.pdf>.

⁸⁴ For a good discussion of the challenges facing rideshare, one of the most important TDM initiatives, see http://www.nytimes.com/2011/01/29/us/29carpool.html?_r=2&hp=&pagewanted=all.

⁸⁵ For example, the personalized commuter travel planning offered to employees at Stanford University.

⁸⁶ See http://www.businessweek.com/debateroom/archives/2007/03/telecommuting_n.html.

sharing programs, as well as continuing education and outreach efforts to employers by organizations such as the Peninsula Traffic Congestion Relief Alliance, will likely reduce the resistance to telecommuting in the future.

High Rates of Automobile Ownership

Since 1960, motor vehicle ownership has risen almost four times faster than population in the United States.⁸⁷ As of 2015, San Mateo County households owned an average of 2.7 motor vehicles and there were almost as many motor vehicles (710,094) as residents (745,400).⁸⁸ The fixed costs of car ownership

As of 2015, San Mateo County households owned an average of 2.7 motor vehicles and there were almost as many motor vehicles (710,094) as residents (745,400).

(e.g. depreciation and insurance), which have to be paid whether or not the vehicle is used, is a built-in incentive to motor vehicle use. Nevertheless, improvements in both travel alternatives to solo occupant driving in San Mateo County and information about these alternatives can help reduce reliance on motor vehicle travel as the sole or primary form of mobility for many households. The environmental consciousness of San Mateo County residents is another potent force that may contribute to the success of TDM initiatives in the years ahead. An important expression of the consciousness is the adoption of local Climate Action Plans in San Mateo County communities, including Menlo Park⁸⁹ and Redwood City.⁹⁰

A Framework for Successful Transportation Demand Management in San Mateo County

Success in managing transportation demand in San Mateo County requires a strategic approach. This begins with a clear, broad vision. A more defined goal to achieve the vision helps bring focus. Policies comprise the means to attain the goal and bring the vision to life. Specific objectives and an associated set of performance measures are the navigational tools used to monitor progress toward realization of policies, goal, and vision.

Transportation Demand Management Vision, Goal, and Policies

Vision

A San Mateo County in which reliance on solo occupant motor vehicle travel is minimized.

Goal

Reduce and manage travel efficiently through demand-side measures, including land use planning and transportation demand management efforts at work sites.

⁸⁷ US Department of Transportation, Highway Statistics, <http://www.fhwa.dot.gov/policyinformation/statistics.cfm> and US Census Bureau Census of Population and Housing <http://www.census.gov/prod/www/decennial.html/>.

⁸⁸ California Department of Motor Vehicles and US Census Bureau.

⁸⁹ <http://www.menlopark.org/departments/env/cap.html>.

⁹⁰ http://www.redwoodcity.org/manager/initiatives/climate%20protection/Verde/Final%20CCAP%20Documents/CCAP_Final_3-25-10.pdf.

Policies

Focus on Reducing the Need to Travel and the Distance of Travel

- Encourage telecommute programs, satellite work centers, teleconferences, and other substitutes for travel within San Mateo County.
- Support local jurisdictions in setting transportation demand management goals.

Involve Private and Public Sector Employers in Efforts to Reduce the Amount of Vehicular Travel

- Support reduction of solo occupant vehicle use through employer-based commute alternatives incentive programs in San Mateo County. Include employee transportation coordinators and transportation management associations (TMAs) as key components of this effort.

Improve Access to Destinations by Means of Non-Motorized Modes and Local Transit to Reduce the Need to Travel by Private Vehicle

- Promote transit-oriented development, traditional neighborhood design, improved bicycle, pedestrian and local transit connections to activity centers and similar efforts to reduce the need to travel by private motor vehicle to, from, and within San Mateo County.

Transportation Demand Management Objectives

1. Increase the number of employers and employees within the geographic limits of San Mateo County who have access to a commute alternatives program at work.
2. Increase the participation in telecommuting by employees who work in San Mateo County.
3. Expand participation in the commuter pre-tax benefit program San Mateo County.

11. PARKING

Background

There has been a substantial increase in public policy focus on parking in recent years. This rising interest is best exemplified in such influential books on the subject as *The High Cost of Free Parking*,⁹¹ by UCLA Professor Donald Shupe, and *Parking Management: Best Practices*,⁹² by Todd Litman of the Victoria Transport Policy Institute. Long considered the most prosaic aspect of urban transportation policy, parking has come to the forefront as a potential tool for transportation demand management. Close to home, Redwood City has been a pioneer in California and the nation in implementing a downtown parking management plan that combines differential parking prices and “smart” parking meters.⁹³

Parking management is comprised of three elements. The first is regulation and pricing (including zero price) of both on-street and off-street parking. The second is setting parking ratios, or amount of parking required for residential and commercial development. The third is the infrastructure and technology used in the parking system. Each will be discussed in turn below.

No matter what type of parking or who owns and operates the parking, regulation of who may park where, for how long, and for how much are important management decisions.

Parking can be provided curbside on both commercial and residential streets, as well as off-street in surface lots or parking structures. Parking capacity can be managed by the public sector, as in curb side spaces and publicly owned parking facilities, or by the private sector as in lots and structures serving commercial and residential uses, as well as in private parking facilities provided for general public use in downtowns. In some hybrid cases, parking facilities are publicly owned but privately operated. No matter what type of parking or who owns and operates the parking, regulation of who may park where, for how long, and for how much are important management decisions. Parking may be available to all on a first come, first serve basis, or to specific categories of users (e.g. those with disabled person parking placards, taxicabs, commercial loading vehicles, residential parking permits, etc.). Parking spaces may be available for use all day or for specific time increments. Parking may be disallowed all together for safety reasons (across driveways, near fire hydrants, or curbside close to intersections, for example) or disallowed part of the day (such as during peak commute times on arterial streets).



The regulation of parking time and price affects parking space turnover, which in turn has both economic and traffic implications.

The regulation of parking time and price affects parking space turnover, which in turn has both economic and traffic implications. Curbside parking space occupied all day by store employees rather than short-term by customers, for example, can reduce turnover in a desirable location near storefronts. This

in turn can induce traffic congestion as drivers circulate around the block or wider environs in search of

⁹¹ Shupe, Donald, *The High Cost of Free Parking*, Planners Press, American Planning Association, 2005.

⁹² Litman, Todd, *Parking Management: Best Practices*, Planners Press, American Planning Association, 2006.

⁹³ See <http://shoup.bol.ucla.edu/Downtown%20Redwood%20City%20Parking%20Plan.pdf>.

available parking. Limiting the time of use of parking spaces and/or setting parking prices so that the more desirable spaces cost more to use, can increase turnover and reduce the searching done by motorists (along with the attendant traffic congestion) seeking a parking space.

Setting parking prices so that the more desirable spaces cost more to use, can increase turnover and reduce the searching done by motorists seeking a parking space.

The second element is setting parking ratios. Zoning ordinances typically stipulate the amount of parking required for a given number of new residential units or per 1,000 square feet of commercial development. These ratios are often derived from national standards based on parking generation studies in suburban settings.⁹⁴ These standards can over-prescribe parking required in downtown settings and in the vicinity of public transit stations, however. Downtowns are by nature mixed use and, as such, consist of land uses with differing parking demand profiles or peaks. This synergy produced in a downtown environment means that needed parking supply is less than the sum of the peak parking demand for each individual land use. In the case of public transit stations, the availability of public transit provides an alternative to private motor vehicle use and increases the probability that some people living and/or working nearby will not need to store their vehicles (or, in the case of households, may not need as many vehicles) in parking spaces. This effect is typically not captured in national parking ratio standards and the zoning ordinances derived from them.



The third element, infrastructure and technology, entails the physical facilities and equipment used in the parking system. The facilities can either be simple marked parking space curbside, surface parking lots, or parking structures above and/or below ground. Equipment ranges from traditional coin-operated parking meters to use of advanced electronics and communications in parking meters, as well in occupancy detection (and dissemination to users) in parking structures and other parking facilities. Additional advances in parking technology include detection of occupancy, length of stay, and payment (if applicable) pertaining to individual parking spaces, both on-street and off-street. Parking enforcement officers can now easily review on a hand-held device the status of cars parked on-street, for example, without chalking tires and making a return check to the vehicle later to see if the chalk mark is still visible. These advances

Additional advances in parking technology include detection of occupancy, length of stay, and payment (if applicable) pertaining to individual parking spaces, both on-street and off-street.

make parking payment easier, parking enforcement more efficient, and improve overall management of the parking system through provision of accurate information on parking demand by location and time of day. Taken together, these capabilities create the opportunity to optimize parking systems throughout an area such as a downtown.

⁹⁴ See the Parking Generation, 4th Edition: An ITE Information Report (Institute of Transportation Engineers, 2010) for a comprehensive set of such studies.

Issues

Parking Management Plans

Parking is an area-wide rather than a single block phenomenon. Motorists who cannot find a parking space (or a parking space at a price that they are willing to pay or for the time they may need) on one block or in one parking structure will move to another, then another until they find a space at an acceptable location and price (if applicable). Motorists who cannot find the parking they seek in a commercial street or district may well try to park in an adjoining residential area. People who drive to a rail station in order to access transit, but who cannot find a place to park at the station may decide to park in a commercial or residential area in the station environs – or may instead simply continue to drive to their destination rather than take the train. These circumstances underline the importance of creating parking management plans for whole districts rather than for only a single street or parking facility.

San Mateo County has some outstanding examples of parking management plans, including those prepared by Redwood City, Burlingame, and other jurisdictions. To be most effective, parking management plans should address the complete access trip to destinations. This may include the walk trip after parking, as well as shuttle bus connections between the parking facility and the destination. These plans need to provide appropriate amounts of parking for both shorter-term and longer-term parkers, induce the desired amount of parking turnover through a combination of time regulation and pricing, minimize spillover of parking demand from commercial to residential areas, and ensure efficient, effective, and fair parking enforcement. If all of these parking management objectives are met, the parking system can contribute to both a balanced transportation system and economic vitality in communities.

To be most effective, parking management plans should address the complete access trip to destinations.

Typically, however, parking management is done on a limited spatial scale and without reference to multimodal connections, spillover into residential areas, or optimization of parking resources. Funding is needed to create parking management plans that take a broader view. Done right, parking management plans can make an important contribution to a community's transportation demand management efforts. If all or most communities in San Mateo County developed and implemented comprehensive parking management plans, the beneficial effects would be county-wide and beyond.

“Right-Sizing” Parking Provision

Matching parking supply with parking demand through investment, time regulation, pricing, and technology may create an optimal parking system. Such a system does not generate spill-over parking demand from commercial to residential areas, does not either encourage more driving or discourage transit use, takes account of and is linked to multimodal transportation services and facilities, and contributes to the economic health of communities.

Providing or requiring too much parking wastes resources and incentivizes more auto use than would otherwise take place. Providing too little and/or ill-located parking frustrates drivers and the merchants who rely on them for trade, generates traffic congestion as drivers search for better parking spots, and can even dampen demand for public transit if train station parking is insufficient. Zoning codes that require

Zoning codes that require more parking than is needed in downtown locations or near transit stations impose unnecessary costs on property developers and can discourage desirable growth, including provision of affordable housing and transit-oriented development.

more parking than is needed in downtown locations or near transit stations impose unnecessary costs on property developers and can discourage desirable growth, including provision of affordable housing and transit-oriented development.

As a result, public policy should focus on right-sizing parking resources. The tools for doing this include revisions to parking requirements in local zoning codes; development of parking management plans; appropriate time regulation, pricing, and deployment of new technology; investment in new capacity as needed; and integration of parking into the multimodal transportation system.

The Local Nature of the Parking System

Parking is above all a local issue, best considered on a district by district, community by community basis. Decisions about parking regulation, pricing, and investment are likely to be most successful if made locally. Nevertheless, the cumulative effect of parking management at the local level throughout San Mateo County is felt county-wide and beyond. C/CAG can and should encourage parking management plans, appropriate revisions to zoning code parking requirements, and investment in new parking technologies. This encouragement can take place both through policies in the Countywide Transportation Plan 2040 and through funding studies, plans, and investments needed to optimize the parking system county-wide, community by community.

A Framework for Optimizing Parking in San Mateo County Communities

Optimizing the San Mateo County parking system in San Mateo County communities needs to take place in a planned, structured way. A broad vision and a more explicit goal to accompany it are needed to help chart progress. A set of policies constitutes the means to achieve the goal and realize the broad vision. Specific objectives and an associated set of performance measures indicate how much progress is being made in attaining the policies, goal, and vision.

Parking Vision, Goal, and Policies

Vision

Parking in San Mateo County that is a “right-sized” balance of supply and demand, supportive of Transit Oriented Development and Sustainable Communities Strategies, intuitive to use, and environmentally responsible.

Goal

Encourage innovations in parking policy and programs, including incentives for reduced parking requirements, and a comprehensive approach to parking management and pricing.

Policies

Support Reduction of Parking Supply

- Encourage adoption of parking reforms including reduced parking requirements (or setting parking maximums) for residential and commercial developments, “unbundling”⁹⁵ parking costs from the cost of housing and commercial space, and use of “shared” parking.

⁹⁵ “Unbundling” parking refers to parking that is sold or rented separately from unit/building purchases or leases.

- Support comprehensive parking management programs to optimize all parking resources, both off-street and on-street.
- Support the sharing of effective practices for parking policy and parking management among local jurisdictions.
- Use technology to minimize the land area needed for parking.

Facilitate Shared Parking Arrangements to Increase the Efficiency of Parking Provision and Reduce the Costs of Parking Provision

- Support shared parking arrangements when and where feasible.

Encourage Implementation of “Green” Parking Lot Initiatives That Serve to Reduce Storm Water Runoff

- Promote the San Mateo County “Green Streets and Parking Lots Program” approach of using swales, permeable pavements, “rain gardens,” and landscaping to capture storm water runoff, enhance aesthetics, and mitigate the urban and suburban “heat island” effect.

Install Solar Panels on Parking Lots and Structures to Conserve Energy

- Encourage projects like the County of San Mateo “Solar Genesis” project to create new sources of renewable energy above parking structures and parking lots, increasing the utility of these facilities without hampering their parking function.

Install Electric Vehicle Charging Stations

- Encourage installation of charging stations in public and private parking areas, including commercial, residential and mixed-use sites.

Promote Installation of “Smart” Parking Meters and Real-Time Parking Information Dissemination in San Mateo County Public Parking Facilities

- Foster implementation of “smart” meter projects to increase parking customer convenience and create opportunities for demand-responsive pricing for on-street and off-street public parking facilities.

Ensure Adequate Wayfinding to Parking Facilities in San Mateo County

- Promote implementation of programs to enhance public information about parking availability, thus decreasing the amount of traffic congestion caused by motorists searching for parking and increasing the convenience of parking customers.

Encourage Placement of Parking Facilities in Locations That Do Not Disrupt Pedestrian Travel or Create a Hazard for Pedestrians

- Discourage location of parking structure and lot entrances on streets that have or are planned to have a substantial flow of pedestrian traffic in order to minimize a potential safety hazard for pedestrians, increase parker convenience, and avoid creating “dead” spaces on shopping streets.

Promote Adequate, Secure, and Safe Bicycle Parking at San Mateo County Shops, Store, and Offices

- Ensure that clean, energy-efficient, and healthful transportation by bicycle is not frustrated by lack of safe, secure parking at the destination end of the cycling trip.

Encourage Development of Master Parking Management Plans for Downtowns and Other Activity Centers in San Mateo County

- Support local government efforts to prepare parking master plans that optimize parking capacity by managing parking demand and “right-sizing” parking capacity.

Reduce On-street Parking along Key Transit Corridors and Downtown Areas

- Encourage the preservation of street capacity for transit, bicycles and other transportation modes while maintaining access to local business.

Encourage Development of Effective Park-and-Ride Facilities

- Explore additional opportunities to support travel by all modes through park-and-ride facilities.

Parking Objectives

1. Increase the number of San Mateo County communities that reduce parking requirements in the case of affordable housing projects, transit-oriented development, and proposed shared-parking arrangements.
2. Increase the number of “green” parking lot projects in San Mateo County.
3. Increase the number of solar panel installations on top of parking facilities in San Mateo County.
4. Increase the number of “smart” parking meters in San Mateo County.
5. Increase the number of bicycle lockers and racks at offices, shops, stores, parking lots and structures, and transit stations in San Mateo County.
6. Increase the number of communities with parking management master plans in San Mateo County.
7. Provide C/CAG incentives for parking standards reform.
8. Develop a “Multimodal Connections” Program to be included in San Mateo County’s portion of the Metropolitan Transportation Commission’s Transportation for Livable Communities Program.⁹⁶
9. Implement a “TOD Employment Incentive Program.”

⁹⁶ http://www.mtc.ca.gov/planning/smart_growth/tlc_grants.htm.

12. MODAL CONNECTIVITY

Background

There is an increasing recognition that urban and regional transportation along corridors as well as city and region-wide must be multimodal to be most effective.⁹⁷ An important success factor for multimodal transportation is that it links the various travel modes together as seamlessly as possible. Seamless

An important success factor for multimodal transportation is that it links the various travel modes together as seamlessly as possible.

connections are facilitated by integration of transit service schedules, electronic fare payment usable across transit modes, bicycle storage on buses or in trains, convenient pedestrian and bicycle access to transit stations and stops, and “right-sized” car parking at rail passenger stations.

Modal connectivity is an important concern in San Mateo County. The Millbrae Transit Center, served by BART, Caltrain, SamTrans, and private taxis, is one of the Bay Area’s most important intermodal transit hubs. Each of the other BART and Caltrain stations in San Mateo County are also multimodal in that pedestrians, bus patrons, bicyclists, taxicabs, as well as automobile drivers and their passengers all require access to trains and their passengers. The San Francisco International Airport (SFO) is one of the country’s premier intermodal hubs, a locus for connections between air travel and a spectrum of land transport, including private automobiles, taxis, airport shuttles, public transit buses, BART trains, and SFO’s automated people mover, AirTrain. There is also an increased focus in San Mateo County, as elsewhere, on affording good pedestrian and bicycle access to local bus stops, an important day-to-day form of multimodal connectivity.

Issues

Access to Public Transportation Stations

An important success factor for public transportation in San Mateo County, as elsewhere, is safe, direct, and comfortable access to transit stations and stops. Ensuring that good “last mile” connections are in place for those who wish to access public transit by bicycle, on foot, or by shuttle bus can also have important air quality benefits.⁹⁸ There have been improvements in access to San Mateo County transit stops and stations in recent years, as well as innovative plans like the “Last Mile Connections” project in Redwood City featuring bicycle sharing and car sharing programs.⁹⁹ Nevertheless, much remains to be done. Many potential access improvements to public transit stations and stops involve the basics of good traffic engineering and street design, including:



⁹⁷ For an excellent overview of multimodal transportation planning, see http://www.vtpi.org/multimodal_planning.pdf.

⁹⁸ See <http://www.ca-ilg.org/node/3216>.

⁹⁹ See <http://redwoodcity.patch.com/topics/last-mile-connection-program>.

- Unobstructed sidewalks, ideally wide enough for two wheelchairs to pass in opposite directions
- Adequate pedestrian crossing time at signalized intersections
- Minimizing pedestrian crossing distance where feasible through use of curb extensions or bulb-outs
- Protecting pedestrian crossing with raised center median islands that include wide channels for passage by those on foot or in a wheelchair
- Curb ramps at pedestrian crossings to facilitate movement by those who have difficulty mounting a curb
- Bicycle lanes to and from transit stations
- Adequate bicycle storage at transit stations and aboard transit vehicles

The Grand Boulevard Multimodal Transportation Corridor Plan¹⁰⁰ features many of these elements of enhanced access to public transit stations and stops in along and near El Camino Real.

In addition, the Bayshore Multimodal Facility Study represents a major potential development in the bi-county area of Brisbane and San Francisco. The area, centered on the Bayshore Caltrain station, is proposed to be developed with a mix of residential, commercial, and other uses with bicycle and pedestrian access, high-frequency bus service, and connections to light rail.



Other types of improvements for transit access include removal of fences and other barriers to direct access by pedestrians and cyclists; provision of over- and under-crossings of rail lines and roadways that sever direct access to transit; and support of commuter vanpools, shuttle buses, and both bikeshare and carshare services at, to, and from public transit stations. Bus access to public transit stations is greatly enhanced by location of passenger loading bays in close proximity to rail passenger station platforms, such as in Redwood City Caltrain station and the Millbrae Transit Center. In recent years, shared mobility options such as carsharing,¹⁰¹ bike-sharing,¹⁰² ridesharing, and ride sourcing have blossomed in the Bay Area. The Redwood City “Last Mile Connections” project features both forms of on-demand transportation for passengers accessing the Redwood City Caltrain station.

Despite the focus on improving access by alternative transportation modes to public transit stops and stations, many rail and some bus passengers drive to access public transit. As a result, “right-sizing” parking for private motor vehicles at transit stations is an important part of planning for modal connectivity. Not enough motor vehicle parking at stations may discourage use of passenger rail service. On the other hand, too much parking is not only uneconomic, but can provide an unintended incentive to access public transit by private motor vehicle rather than by shuttle bus, bicycle, or on foot.

¹⁰⁰ See <http://ccag.ca.gov/pdf/Studies/Grand%20Boulevard%20Multimodal%20Transportation%20Corridor%20Plan.htm>.

¹⁰¹ For research results on the car-sharing programs, see the Transit Cooperative Research Program (TCRP) Report 108, Car-Sharing: Where and How It Succeeds http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_108.pdf.

¹⁰² For an update on bicycle-sharing programs around the nation, see http://www.pedbikeinfo.org/programs/promote_bikeshare.cfm.

Coordination of Intermodal Services

The synchronization of intermodal and inter-line transit services is an important attribute of good public transit service. Passengers who experience the frustration of missing a transit connection because a bus or train was scheduled to arrive just after the departure of a connecting bus or train will find other travel alternatives. The same is true for transit services that are chronically behind scheduled arrival, thus causing passengers to miss a connecting bus or train.

Coordination of transit schedules has at times been a challenge in San Mateo County, in part due to the scheduling imperatives of the Caltrain and BART systems. One of the most difficult challenges in synchronization of these two passenger rail services has been at the Millbrae Transit Center.

Dissemination of Information on Availability of Intermodal Services

Public transit passengers need timely, accurate information about transfer opportunities, service schedules, and fares. While provision of this information has increased dramatically in recent years via smart phones and web sites like Google Transit¹⁰³ and Transit 511,¹⁰⁴ such information at the transit stop and station level has been less readily available in San Mateo County.

A Framework for Intermodal Connectivity in San Mateo County

Enhancing intermodal connections in San Mateo County requires a policy framework that includes an overall vision and a clear goal to guide policy development and implementation. A suite of policies should link directly back to the goal and vision. Objectives define policy aims and performance measures operationalize them so that progress in achieving the objectives can be measured.

Modal Connectivity Vision, Goal, and Policies

Vision

Seamless travel within San Mateo County using different modes of transportation.

Goal

Integrate the roadway, public transit, and non-motorized transportation networks to advance system efficiency, effectiveness, and convenience.

Policies

Promote Interagency Co-ordination in Planning, Design, and Operation of Services at Public Transit Stations in San Mateo County

- Customers should be afforded as convenient and stress-free experience as feasible in accessing public transit services, including transfers from one mode and/or operator to another.

¹⁰³ See <http://www.google.com/intl/en/landing/transit/#mdy>.

¹⁰⁴ See http://tripplanner.transit.511.org/mtc/XSLT_TRIP_REQUEST2?language=en.

Enhance Dissemination of Information on Intermodal Travel Opportunities within and to/from San Mateo County

- Provide timely information on connections between and among bus, rail, private automobile, and non-motorized modes of travel.
- Improve wayfinding to and service information dissemination at public transit station platforms through electronic changeable signage and more traditional static signage.

Remove the Physical Barriers to Intermodal Travel, including Difficult Intersection Crossing Conditions Leading to San Mateo County Transit Stations and Stops

- Encourage clean, efficient intermodal travel by making access to public transit stations safe, convenient, and comfortable for pedestrians and bicyclists. Promote bicycle and pedestrian safety at intersections in the environs of public transit stations and stops.

Encourage Efficient Intermodal Transit Service Scheduling at Public Transit Stations and Other Transit Transfer Locations

- Decrease waiting time for public transit passengers and increase convenience of public transit travel through improved integration of bus and rail transit service schedules.

Consider Satellite Transit Transfer Hubs When and Where Feasible

- Transfer facilities in satellite locations for passenger interchange among line haul bus service routes, as well as between line haul transit services and community, and employer shuttle buses may increase customer convenience while at the same time reduce congestion at major public transit hubs.

Ensure Adequate Bicycle Parking Conveniently Located at Public Transit Stations in San Mateo County

- Promote the clean, energy efficient access to public transit that the bicycle provides by making bicycle parking an important priority at San Mateo County transit stations and other stops.

Support “Right-sized” Auto Parking at San Mateo County Public Transit Stations Through Development of Transit Station Area Parking Management Plans

- Promote “right-sized” parking provision for private autos at transit stations so that there is sufficient parking for patrons. Station area parking management plans should include consideration of pricing policy for station parking facilities and either or both time zoning and nominal cost pricing for nearby on-street parking.

Support On-Demand and Shared Mobility Travel Options

- Encourage the integration of “first/last mile” mobility services to connect with the fixed-route transit system and reduce the need for parking at transit stations and along transit corridors.

Modal Connectivity Objectives

1. Improve intermodal travel information dissemination to San Mateo County transportation system users.
2. Increase the number of intermodal transit service hubs.
3. Implement bicycle and pedestrian access improvements at public transit stations and stops in San Mateo County.
4. Enhance shuttle bus services connecting work sites and public transit stations and stops.

13. GOODS MOVEMENT

Background

Even in an increasingly knowledge-based, service economy, communities depend on the movement by road and rail of goods¹⁰⁵ destined for shops, stores, and warehouses. This movement in turn depends on safe, efficient travel routes on both the highway and rail networks. Responsibility for goods movement is in both the public and the private sectors. The highway network in San Mateo County, as in nearly all of the country, is a public responsibility. On the other hand, trucks and truck freight terminals are overwhelmingly in the private sector. Freight rail track, equipment, and yards are all in the private sector.

Even in an increasingly knowledge-based, service economy, communities depend on the movement by road and rail of goods destined for shops, stores, and warehouses.

Domestic freight flows that take place entirely within the region represent approximately one-quarter of the dollar value of Bay Area goods movement. Another two-fifths is domestic freight that either begins or ends within California but outside of the Bay Area. Domestic freight with an origin or destination outside of California accounts for the remaining 35% of the dollar value of total Bay Area goods movement.¹⁰⁶

The San Francisco International Airport and the Port of Redwood City are important intermodal freight hubs in San Mateo County. US 101 in San Mateo County has been designated the key “North Peninsula Goods Movement Corridor” because of its importance as a motor freight route.¹⁰⁷ The San Francisco Peninsula, including San Mateo County, is served by local freight trains operated by Union Pacific. The market position of rail freight is circumscribed, however, due to “the Bay Area’s location on the western edge of a sparsely populated region” and the fact that “most markets in California are too close for rail

service to establish a strong competitive position” with respect to trucking.¹⁰⁸ As of 2009, there were 147 motor freight haulers in San Mateo County, just over half of which were firms with four or fewer employees. Only five trucking firms in the county had 50 or more employees.¹⁰⁹ In 2008, there were 3,210 airline cargo departures carrying a total of 492,195 metric tons of freight from San Francisco International Airport.¹¹⁰ The Port of Redwood City imported and exported a total of 1,715,633 metric tons of cargo during fiscal year 2015.¹¹¹



¹⁰⁵ Defined as “articles of trade; wares; merchandise”, see <http://dictionary.reference.com/browse/good>.

¹⁰⁶ Regional Goods Movement Study for the San Francisco Bay Area: Final Summary Report.

¹⁰⁷ Goods Movement Land Use Study, 2006.

¹⁰⁸ Goods Movement Industry Cluster Analysis (Task 3), Cambridge Systematics for the Metropolitan Transportation Commission, October 2003.

¹⁰⁹ 2009 County Business Patterns. US Department of Commerce.

¹¹⁰ Draft Final Comprehensive Airport Land Use Compatibility Plan for the Environs of the San Francisco International Airport, Ricondo & Associates for the City/County Association of Governments of San Mateo County (C/CAG), November 2011.

¹¹¹ Annual Report to the Community, Port of Redwood City, September 2015.

Issues

Safe and Efficient Goods Movement

Time is money in freight operations, especially with “just-in-time” inventory practices adopted by shippers and receivers all across the country. Efficient freight operations depend on the availability of rail and road links suitable for freight operations. Since motor freight must rely on highway facilities open to all other motor vehicles, highway congestion can have a deleterious impact on goods movement efficiency. Both goods movement efficiency and safety require roadway facilities designed to accommodate tractor trailers. A truck route network comprising limited access highways like US 101, along with connecting arterial streets, each segment designed with adequate vertical clearances and turning radii for trucks, is essential. Diurnal traffic congestion, exacerbated by crashes and other incidents on roadways, affects all road users, including motor freight haulers. By the same token, improvements to traffic operations on freeways and arterial streets are beneficial to private automobile users as well as to truckers. Best practices for safe, efficient goods movement include the following:

- Adequate vertical clearances, lane widths, and turning radii to accommodate trucks;
- Sufficient freeway and arterial street capacity;
- Efficient traffic signal system operations at intersections and along arterial street corridors;
- Freeway service patrols to assist motorists, and if needed, to clear motor vehicles from the roadway; and
- Greater market penetration for electronic toll payment at bridges.



The San Mateo County Smart Corridor project will significantly upgrade traffic signal systems on arterial streets connecting to and parallel with US 101.¹¹² The Peninsula Ramp Metering Project in San Mateo County has already made an important contribution to traffic operations efficiency.¹¹³ The suite of physical improvements and investments in intelligent transportation systems proposed in the 2020 Peninsula Gate Way Corridor Study hold much promise to increase motor vehicle efficiency in US 101 corridor in South San Mateo County.¹¹⁴

Air Quality Impacts of Motor Freight

Between 1990 and 2005 greenhouse gas emissions from motor freight operations grew by nearly 70%, far outpacing the growth rate of greenhouse gas emissions from other classes of motor vehicles.¹¹⁵ Diesel particulates emitted by trucks and trains pose a health

While zero-emission freight rigs have entered in goods movement industry, both truck and rail freight operations continue to produce substantial air emissions.

¹¹² San Mateo County Smart Corridors Program Concept of Operations, Kimley-Horn and Associates, Inc. for the City/County Association of Governments of San Mateo County (C/CAG) and the San Mateo County Transportation Authority, 2008.

¹¹³ See http://www.mtc.ca.gov/news/transactions/ta_fall_2010/metering.htm.

¹¹⁴ See <http://www.ccag.ca.gov/pdf/gateway%20pac/draft%20assessment%20-%20universe%20of%20projects.pdf>.

¹¹⁵ See http://www.epa.gov/ttnchie1/conference/ei16/session5/davies_pres.pdf.

concern.¹¹⁶ While zero-emission freight rigs have entered in goods movement industry, both truck and rail freight operations continue to produce substantial air emissions.¹¹⁷ Advanced diesel engine technologies can dramatically reduce air emissions, but these have not yet achieved a significant market share in the motor freight industry.¹¹⁸ While neither C/CAG nor any other agency in San Mateo County has regulatory authority over motor freight emissions, public agencies as well as private citizens can encourage regulators to promote the use of low-emission technologies in the freight industry through mandates, incentives, or a combination of the two. Since motor freight carriage in San Mateo County is concentrated along the US 101 corridor, a roadway with a residential population in the environs of much of its reach, cleaner motor freight operations will have a direct benefit to many residents of San Mateo County.

A Framework for Goods Movement in San Mateo County

An overall policy framework needed to encourage safer, more efficient, and cleaner freight movement in San Mateo County includes an overarching vision and a compelling goal to guide policy development and implementation. A set of policies should connect directly back to the goal and vision. Objectives define policy aims and performance measures operationalize them so that progress in achieving the objectives can be measured.

Good Movement Vision, Goal, and Policies

Vision

Goods movement that supports a sustainable San Mateo County.

Goal

Foster safe and efficient goods movement compatible with countywide economic development and environmental policies.

Policies

Enhance safety and capacity on truck routes within San Mateo County

- Ensure adequate turning radii, lane widths, vertical and horizontal clearances, and operational improvements at freeway interchange bottlenecks on designated truck routes to promote safe, efficient goods movement.

Promote Use of Low and Zero Emissions Technologies for Truck Freight in San Mateo County

- Support use of cleaner motor power in goods movement to protect the San Mateo County environment.

Goods Movement Objectives

1. Minimize motor freight travel delay increases on the San Mateo County roadway network.

¹¹⁶ See <http://www.epa.gov/ttn/atw/dieselfinal.pdf>.

¹¹⁷ See <http://articles.latimes.com/2011/jul/23/business/la-fi-0723-hydrogen-truck-20110723>.

¹¹⁸ See <http://articles.latimes.com/2011/jul/23/business/la-fi-0723-hydrogen-truck-20110723>.

2. Reduce the number of crashes involving motor freight haulers on the San Mateo County roadway network.
3. Conserve road capacity for goods movement on truck routes in San Mateo County.
4. Support rail and road grade separation in San Mateo County.

14. FINANCIAL

Background

This chapter contains an overview of high level estimated revenues and expected expenditures traditionally available to fund transportation projects in San Mateo County. It should be noted that this plan and this chapter in particular, is not a programming document. It does not include schedules for specific project implementation nor imply funding any specific project.

Funding projections for the county are estimated with the disclaimer that future funding levels are not always predictable. Some fund sources appear to be fairly stable for planning purposes while others fluctuate greatly with the financial conditions of the state or the country. In general transportation funding comes from three major levels: federal, state, and local levels. Often funds come with restrictions and constraints which dictate how those funds must be spent. Appendix C provides a description of the major funding sources available and the types of transportation needs they are intended to address.

C/CAG has primary responsibility for programming county discretionary share of federal and state transportation funds allocated to this county. Based on historic projections, it is estimated that Federal STBG (superseded Surface Transportation Program (STP))/CMAQ revenues to the county over the next 25 years (to FY 2040) will be approximately \$73 million. It is estimated that the state STIP revenues will be approximately \$800 million over the next 25 years.

Federal FTA funds and state STA funds are estimated at approximately \$1.2 billion over 25 years, are distributed to the transit agencies by formula, and have transit restricted use.

The San Mateo County Transportation Authority (SMCTA) has primary control over the allocation of local sales tax (Measure A) transportation funds, which is estimated to be approximately \$1.79 billion over the 16 year period from FY2017-2033. SMCTA has established their funding policy in their *2009-2033 Transportation Expenditure Plan*.

Issues

Shortfall of funds for the SHOPP

In April 2015, the California Department of Transportation (Caltrans) prepared the 2015 Ten-Year State Highway Operation and Protection Program (SHOPP) Plan for fiscal years 2016/2017 through 2025/2026.¹¹⁹ SHOPP projects are limited to capital improvements relative to maintenance, safety and rehabilitation of State highways and bridges that do not add new capacity lanes to the system.

The SHOPP is funded by the State Highway Account (SHA); however, SHA funding is declining as a result of reduced fuel consumption, funding shortfalls in the Federal Highway Trust Fund, and the redirection of funding for highway maintenance. Projected funding available for the SHOPP is \$8 billion a year.

Caltrans has focused its limited resources on the most critical categories of safety, bridge, and pavement preservation. Even with this focus, the state highway system will continue to deteriorate. A cited example illustrates that the percentage of lane miles of highway pavement in a distressed condition is projected to increase from 26 percent to 40 percent during the next ten years.

¹¹⁹ http://www.dot.ca.gov/docs/2015_Ten-Year_SHOPP.pdf.

Shortfall of funds for Local Streets and Roads and Highway Improvements

A recent assessment by the MTC estimates that \$30 billion is needed to maintain the existing pavement conditions, and \$36 billion is needed to reach a state of good repair. **Figure 4** shows the estimated local streets and roads maintenance shortfall identified for San Mateo County until 2040. For San Mateo County, approximately \$2.9 billion is needed to maintain the existing pavement conditions, and more than \$3 billion is needed to reach a state of good repair.

**Local Streets and Roads
Total Maintenance Need: \$3.04 Billion**

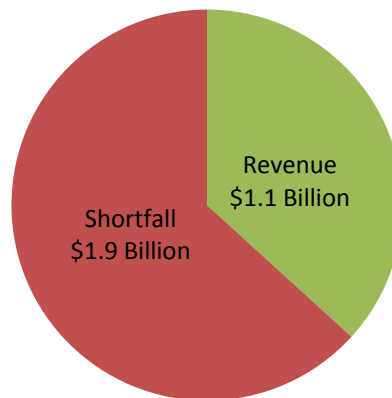


Figure 4: Road Maintenance Need

Roadways and highways continue to experience deterioration and higher congestion along with a significant shortfall in capital revenue. The limited revenue sources supports continuing the C/CAG policy of directing the State Transportation Improvement Program (STIP) funds towards major highway improvement projects of regional significance, by leveraging the San Mateo County Transportation Authority Highway Program funds.

Although C/CAG is responsible for programing the federal STBG/CMAQ funds received by the county, MTC dictates how C/CAG directs those funds, through the adoption of funding and programming policies. Historically, C/CAG was instructed to direct its share of STBG towards local streets and roads maintenance and CMAQ towards bicycle/pedestrian improvements and Transportation for Livable Communities (TLC) projects. In the future, it is anticipated that the direction of MTC will be to direct most of the county's flexible funding towards Priority Development Area (PDA) growth as well as improvements in urban transit corridors. Overall STBG/CMAQ funding levels are expected to remain somewhat stable in the future but the direction of funds at the regional level for specific programs is expected to vary over time.

Shortfall of funds for Capital Projects

Figure 5 shows the estimated revenues and shortfalls estimated for the broad categories of transportation networks in San Mateo County. Transportation funding needs and transit revenues were estimated from the information provided to the region for their 25-year Plan Bay Area plan which covers the time period through 2040. It includes maintenance and capital improvements. Highway improvement and local streets

and roads revenues were extrapolated from the SMCTA 2004 Transportation Expenditure Plan and historical distributions of federal funds and state funds.

Given that all modes of transportation face significant shortfalls, it is clear that the biggest challenge facing our aging transportation infrastructure is that current funding levels cannot meet the needs of this County's transportation systems.

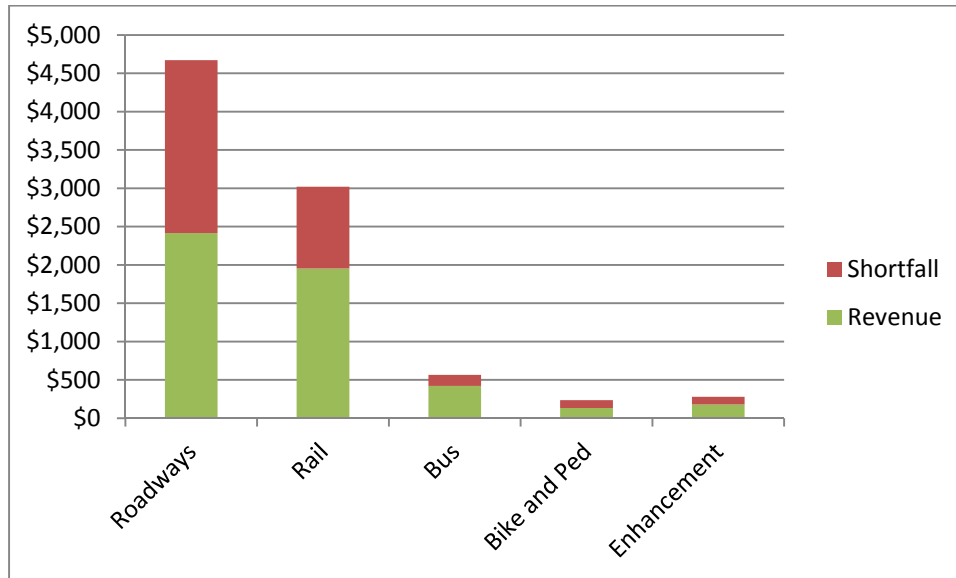


Figure 5: Transportation Maintenance and Capital Revenues and Shortfall (millions)

A Framework for Optimizing Transportation Funding in San Mateo County Communities

C/CAG will work with the San Mateo County Transportation Authority (SMCTA), The California Department of Transportation (Caltrans), the Metropolitan Transportation Commission (MTC), and the California Transportation Commission (CTC) to develop funding plans and priorities.

Financial Vision, Goal, and Policies

Vision

Sustainable funding sources to maintain, operate, optimize, and expand all modes of the transportation networks in San Mateo County.

Goal

Seek and protect transportation revenues to maintain existing transportation infrastructure and investments, and to improve all modes of transportation systems within San Mateo County in a balanced fashion.

Policies

It is already known that existing and projected funding levels will not be able to address all of the needs within this County. Decisions must be made to prioritize and direct available and applicable funds to high priority programs and projects in San Mateo County as well as to leverage other funding where possible.

Support the Protection of the Existing Infrastructure

- C/CAG supports a “fix-it-first” approach to transportation funding in general due to the limited revenue dedicated to roadway rehabilitation. The maintenance and restoration of existing structures and facilities is a cost effective use of limited funds. For example, a city that spends \$1 on timely maintenance to keep a section of roadway in good condition can avoid spending \$5 to restore the same road that is allowed to deteriorate to the point where major rehabilitation is necessary. The “fix-it-first” approach also extends to support state funding for the State Highway Operation and Protection Program, which would help Caltrans maintain mobility throughout the state highway system.

Support Increasing the Operational Efficiency of the Existing Transportation Network

- San Mateo County is built out especially along the El Camino Real and US 101 corridors. Given that most of the transportation corridor rights of way are built out and cannot easily be expanded, it makes sense to seek to optimize the operational efficiency of the existing transportation network where appropriate. Examples of optimizing the existing system include but are not limited to the use of intelligent transportation systems and ramp metering. Increasing the efficiency of the existing transit system should also be supported, such as providing support for Caltrain enhancements as well as development of rapid transit corridors (e.g. preserve capacity on major arterial roadways to facilitate Bus Rapid Transit (BRT)).

Support a Dedicated Source of Funds for Caltrain

- Caltrain is managed through a joint powers agreement among the transit agencies San Francisco Municipal Transportation Agency (SFMTA), San Mateo County Transit District (SamTrans), and Santa Clara Valley Transportation Authority (VTA) and does not currently have a dedicated source of funds. Caltrain is unlike other bay area transit agencies that are funded with dedicated taxes, but must rely heavily on member agency contributions. Caltrain makes yearly funding requests from its member agencies. Member agency contribution levels are not compulsory and tend to fluctuate with the economic conditions of its member agencies. Caltrain needs a steady source of revenue for continued reliable operations.

Support Expansion Projects When and Where it is Appropriate

- Certain appropriate expansion projects could greatly improve the operational efficiency of the overall system. There are also cases where expansion projects can show high user benefit in terms of travel time savings or safety improvements. Detailed traffic analysis would have to show that clear benefits can be gained where expansion projects are proposed. Example projects considered might be the reconfiguration of intersections and interchanges or the inclusion of high occupancy vehicle lanes (HOV) where it is warranted and appropriate.

Priority of the STIP towards State Highway Improvement Projects

- As shown on **Figure 6**, the total shortfalls for roadway and highway projects are approximately \$2.36 billion. Directing STIP funds towards roads and highways will address a portion of the shortfall. In addition, the funds may be used to leverage other funding sources, including federal grants, to further reduce the funding gap.

Roads/Highways
Total Need: \$4.95 Billion

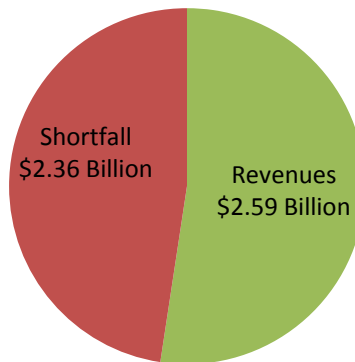


Figure 6: Shortfall for Roadway Capital Projects

Support a Balanced Integrated Approach to Finance a Variety of Transportation Modes

- It is understood that there is no individual project that can solve the congestion problems within the county. Solutions have to come from a variety of projects ranging from technological solutions like ITS installations, operational infrastructure improvements such as reconfiguring intersections, transportation demand management, and alternative mode accommodations.

Appendix A

Performance Measures

Performance Measures

Chapter 4: Land Use and Transportation

Develop a new C/CAG “Multimodal Connections” Program to be included in San Mateo County’s portion of the Metropolitan Transportation Commission’s Transportation for Livable Communities Program. 120

Performance measure: Adoption by the C/CAG Board and implementation of the “Multimodal Connections Program”

Performance measure: Number of projects funded and implemented in furtherance of the “Multimodal Connections Program”

Implement a new C/CAG “TOD Employment Incentive Program.”

Performance measure: Adoption by the C/CAG Board and implementation of the “TOD Employment Incentives Program”

Performance measures: Number of projects, amount of commercial space, and amount of funding provided in furtherance of the “TOD Employment Incentives Program”

Implement the Grand Boulevard Initiative vision of transit-oriented development along the El Camino Real corridor in proximity to Caltrain, BART, and prospective bus rapid transit stations.

Performance measure: Implementation of an enhanced C/CAG El Camino Real Incentive Program

Performance measures: Number of TOD projects, number of housing units, and amount of funding provided in furtherance of C/CAG’s El Camino Real Incentive Program

Enhance the C/CAG TOD Housing Incentive Program.

Performance measure: Adoption by the C/CAG Board and implementation of an enhanced C/CAG TOD Housing Incentive Program

Performance measures: Number of projects, number of housing units, and amount of funding provided in furtherance of C/CAG’s TOD Housing Incentive Program

Effective C/CAG review and comment on all land use plans of regional significance.

Performance measure: Number of all local general plans, specific plans, and area plans commented upon by C/CAG

Provide C/CAG incentives for parking standards reform.

Performance measure: Adoption by the C/CAG Board and implementation of the “Parking Reduction Incentive Program”

Performance measures: Number of projects and amount of funding provided by C/CAG’s prospective “Parking Reduction Incentive Program”

Enhance the quality of public places and spaces in San Mateo County.

¹²⁰ http://www.mtc.ca.gov/planning/smart_growth/tlc_grants.htm.

Performance measure: Adoption by the C/CAG Board and implementation of the “Places for People Planning and Design Program” to fund urban design for exemplary improvements to the public realm that foster walking as well as community livability

Performance measures: Number of public place and space design amenity projects and amount of funding provided

Revise and enhance C/CAG’s existing Transportation Demand Management (TDM) Guidelines.

Performance measure: Adoption by the C/CAG Board and implementation of a revised and enhanced set of C/CAG TDM Guidelines

Chapter 5: Roadway System

Improve the person throughput of the roadway system.

Performance measure: Peak-period person throughput of major roadway facilities

Performance measure: Average peak-period vehicle occupancy of major roadway facilities

Performance measure: Peak-period vehicle throughput of major roadway facilities

Reduce the number and severity of crashes on roadways in San Mateo County.

Performance measures: Annual traffic fatalities and injuries within San Mateo County

Performance measures: Annual rate of traffic fatalities and injuries (per million vehicle miles and/or by roadway segment) within San Mateo County

Performance measure: Annual rate of total traffic crashes within San Mateo County

Reduce the rate of growth of roadway congestion.

Performance measure: Average peak period delay as a percent of total peak-period travel time

Performance measure: Percent of peak period travel at level of service D or better

Performance measure: Peak-period vehicle hours of delay

Maintain the roadway system at an acceptable level.

Performance measure: Percentage of roadway miles at acceptable level of maintenance

Chapter 6: Bicycles

Increase the number of miles of Class I, II, III and IV bicycle facilities added in San Mateo County.

Performance measure: Number of miles of Class I, II, III and IV bicycle facilities added in San Mateo County

Increase the number of bicycle lockers and racks in San Mateo County.

Performance measure: Number of bicycle lockers and racks added in San Mateo County

Increase bicycle safety education and training in San Mateo County.

Performance measures: Number of bicycle safety education programs in San Mateo County and number of participants

Establish bike sharing programs in San Mateo County.

Performance measures: Number of bicycle sharing programs and number of bicycles in these programs implemented in San Mateo County

Increase the bicycle market share in San Mateo County.

Performance measures: A rise in the percentage of people biking for all trip purposes in San Mateo County from an estimated 1.7% in 2006 to 3.0% in 2020 and to 5.0% in 2040 and for trips to work from an estimated 0.75% in 2006 to 1.5% in 2020 and to 3.0% in 2040.¹²¹

Chapter 7: Pedestrians

Increase the number of pedestrian signal heads and countdown signals in San Mateo County.

Performance measure: Number of pedestrian signal heads added in San Mateo County

Increase the number of intersections with enhanced treatments for pedestrian safety and comfort, such as raised center medians, in-pavement lights, pedestrian-activated crossing signals, and raised crosswalks appropriate to the location.

Performance measure: Number of intersections with enhanced pedestrian treatments added in San Mateo County

Increase the sidewalk network in San Mateo County.

Performance measure: Linear feet of sidewalk added in San Mateo County

Increase the pedestrian market share in San Mateo County.

Performance measure: Increase the percentage of people walking for all trip purposes in San Mateo County.

Increase walking for all trip purposes in San Mateo County.

Performance measure: A rise in the percentage of people walking for all trip purposes from an estimated 8.9 % in 2006 to 12.5% in 2020 and to 15.0% in 2040 and for trips to work from an estimated 2.0% in 2006 to 3.5% in 2020 and 5.0% in 2040.¹²²

Chapter 8: Public Transportation

Improve the competitiveness of public transit to private transportation for key trips as measured by travel time, reliability and customer satisfaction.

Performance measure: Point to point travel times for public transportation and private automobiles

Performance measure: On-time performance for bus and rail

Performance measure: Customer satisfaction measured in customer surveys

Lower the cost per passenger, mile and hour for the aggregate of public transit service in the county, discounting for inflation.

¹²¹ 2006 estimates from http://www.mtc.ca.gov/planning/2035_plan/Supplementary/T2035-Travel_Forecast_Data_Summary.pdf.

¹²² 2006 estimates from http://www.mtc.ca.gov/planning/2035_plan/Supplementary/T2035-Travel_Forecast_Data_Summary.pdf.

Performance measures: Transit service costs (2016 \$) per passenger, passenger mile, and per bus or train hour

Improve system productivity as measured by passengers per hour and passengers per mile of service provided.

Performance measure: Passengers per service hour and passengers per service mile

Increase the public transit mode share of travel to, from and within San Mateo County over both a ten-year and twenty-five horizon.

Performance measures: A rise in the percentage of people using public transportation for all trip purposes to, from and within San Mateo County from an estimated 3.1% in 2006 to 5.0% in 2020 and to 7.5% in 2040. Increase the percentage of people using public transportation for work trips to, from and within San Mateo County from an estimated 10.7% in 2006 to 12.5% in 2020 and to 15.0% in 2040.¹²³

Chapter 9: Transportation System Management and ITS

Develop a new C/CAG “Multimodal Connections” Program to be included in San Mateo County’s portion of the Metropolitan Transportation Commission’s Transportation for Livable Communities Program.¹²⁴

Performance measure: Adoption by the C/CAG Board and implementation of the “Multimodal Connections Program”

Performance measure: Number of projects funded and implemented in furtherance of the “Multimodal Connections Program”

Where feasible, implement high occupancy vehicle (HOV) lanes on freeways in San Mateo County.

Performance measure: Number of miles of high occupancy vehicle lanes in San Mateo County

Deploy traffic adaptive signal control at intersections along streets and highways in San Mateo County.

Performance measure: Number of intersections equipped with traffic adaptive signal control in San Mateo County

Before consideration of new through lanes, implement improved traffic signal timing, new turn lanes, and other traffic operations measures along streets and highways in San Mateo County.

Performance measure: Number of intersection improvements that deferred or eliminated the need for new through lanes

Provide ramp-metering on the freeway system including US 101 and Interstate 280.

Performance measure: Number of miles equipped and operated with ramp meters

Increase the number of route miles covered by the San Mateo County “Smart Corridors” Program.

Performance measure: Number of route miles covered by the San Mateo County “Smart Corridors” Program

¹²³ 2006 estimates from http://www.mtc.ca.gov/planning/2035_plan/Supplementary/T2035-Travel_Forecast_Data_Summary.pdf.

¹²⁴ 2006 estimates from http://www.mtc.ca.gov/planning/2035_plan/Supplementary/T2035-Travel_Forecast_Data_Summary.pdf.

Increase the number of intersections in San Mateo County equipped to operate in traffic adaptive mode.

Performance measure: Number of intersections in San Mateo County equipped to operate in traffic adaptive mode

Increase the number of corridors in San Mateo County equipped with traffic signal interconnections.

Performance measure: Number of corridors in San Mateo County equipped with traffic signal interconnections

Increase the number of intersections in San Mateo County equipped with emergency vehicle priority.

Performance measure: Number of intersections in San Mateo County equipped with emergency vehicle priority

Increase the number of intersections in San Mateo County equipped with public transit traffic signal pre-emption.

Performance measure: Number of corridors in San Mateo County equipped with public transit traffic signal pre-emption

Provide improved traveler information to the motoring public.

Performance measure: Number of dynamic message signs on the roadway system

Increase the number of public transit stops and stations in San Mateo County equipped with real-time transit service information.

Performance measure: Number of public transit stops and stations in San Mateo County equipped with real-time transit service information

Chapter 10: Transportation Demand Management

Increase the number of employers and employees within the geographic limits of San Mateo County who have access to a commute alternatives program at work.

Performance measures: Number of Commute Alternative Programs in San Mateo County and number of employees participating in these programs

Increase the participation in telecommuting by employees who work in San Mateo County.

Performance measures: Number of employers with telecommute programs in San Mateo County and number of employees participating in these programs

Expand participation in the commuter pre-tax benefit program San Mateo County.

Performance measures: Number of employers participating in commuter pre-tax benefit programs in San Mateo County and number of employees in these programs

Chapter 11: Parking

Increase the number of San Mateo County communities that reduce parking requirements in the case of affordable housing projects, transit-oriented development, and proposed shared-parking arrangements.

Performance measure: Number of communities with zoning code provisions for reduced parking requirements

Increase the number of “green” parking lot projects in San Mateo County.

Performance measure: Number of “green” parking lot projects in San Mateo County

Increase the number of solar panel installations on top of parking facilities in San Mateo County.

Performance measure: Number of solar panel installation projects above parking facilities in San Mateo County

Increase the number of “smart” parking meters in San Mateo County.

Performance measure: Number of “smart” parking meters in San Mateo County

Increase the number of bicycle lockers and racks at offices, shops, stores, parking lots and structures, and transit stations in San Mateo County.

Performance measure: Number of bicycle racks and lockers installed in San Mateo County

Increase the number of communities with parking management master plans in San Mateo County.

Performance measure: Number of parking master plans

Provide C/CAG incentives for parking standards reform.

Performance measure: Adoption by the C/CAG Board and implementation of the “Parking Reduction Incentive Program”

Performance measures: Number of projects and amount of funding provided by C/CAG’s prospective “Parking Reduction Incentive Program”

Develop a new C/CAG “Multimodal Connections” Program to be included in San Mateo County’s portion of the Metropolitan Transportation Commission’s Transportation for Livable Communities Program. 125

Performance measure: Adoption by the C/CAG Board and implementation of the “Multimodal Connections Program”

Performance measure: Number of projects funded and implemented in furtherance of the “Multimodal Connections Program”

Implement a new C/CAG “TOD Employment Incentive Program.”

Performance measure: Adoption by the C/CAG Board and implementation of the “TOD Employment Parking Incentives Program”

Performance measures: Number of projects, amount of commercial space, and amount of funding provided in furtherance of the “TOD Employment Parking Incentives Program”

Chapter 12: Modal Connectivity

Improve intermodal travel information dissemination to San Mateo County transportation system users.

Performance measure: Proportion of respondents to a survey of San Mateo County transportation system users who rate electronic information availability on intermodal travel “Very Good” or “Excellent”

¹²⁵ 2006 estimates from http://www.mtc.ca.gov/planning/2035_plan/Supplementary/T2035-Travel_Forecast_Data_Summary.pdf.

Increase the number of intermodal transit service hubs.

Performance measure: Number of public transit intermodal service hubs in San Mateo County

Implement bicycle and pedestrian access improvements at public transit stations and stops in San Mateo County.

Performance measure: Number of pedestrian access improvement projects implemented at public transit stations and stops

Performance measure: Number of bicycle access improvement projects implemented at public transit stations and stops

Enhance shuttle bus services connecting work sites and public transit stations and stops.

Performance measure: Number of shuttle bus service hours connecting work sites to public transit stations and stops

Chapter 13: Goods Movement

Minimize motor freight travel delay increases on the San Mateo County roadway network.

Performance measure: Motor freight travel delay

Reduce the number of crashes involving motor freight haulers on the San Mateo County roadway network.

Performance measure: Number of crashes involving motor freight haulers

Conserve road capacity for goods movement on truck routes in San Mateo County.

Performance measure: Miles of truck routes in San Mateo County designed to accommodate safe and efficient goods movement

Support rail and road grade separation in San Mateo County

Performance measure: Number of road and rail grade separation projects

Appendix B

Proposed RTP Project List

Proposed RTP Project List

Sponsor Agency	Project Title
Belmont	Ralston Avenue Corridor Improvements - Phased
Belmont	Alameda de las Pulgas Corridor Study and Improvements
Brisbane	Reconstruct U.S. 101/Candlestick Point interchange to full all-directional interchange - Environmental phase
Brisbane	Construct a 6-lane arterial from Geneva Avenue/Bayshore Boulevard intersection to U.S. 101/Candlestick Point interchange - Environmental phase
Brisbane	Reconstruct U.S. 101/Sierra Point Parkway interchange (includes extension of Lagoon Way to U.S. 101)
Burlingame	Reconstruct U.S. 101/Broadway interchange
Caltrans	Construct auxiliary lanes (one in each direction) on U.S. 101 from Marsh Road to Embarcadero Road
Daly City	Construct streetscape improvements on Mission Street (Route 82) and Geneva Avenue - Phase
Daly City	Provide overcrossing at I-280/John Daly Boulevard
Daly City	I-280 improvements near D Street exit
East Palo Alto	US 101/University Ave. Interchange Improvements
East Palo Alto	Bay Road Improvement Phase II & III
East Palo Alto	University Avenue Complete Streets Pilot Project
Half Moon Bay	Widen Route 92 between SR 1 and Pilarcitos Creek alignment, includes widening of travel lanes and shoulders
Half Moon Bay	Route 1 Improvements in Half Moon Bay
Menlo Park	Reconstruct U.S. 101/Willow Road interchange
Metropolitan Transportation Commission (MTC)	San Mateo Countywide Program: Local Road - Preservation/Rehabilitation
Metropolitan Transportation	SamTrans Program: Public Transit - Preservation/Rehabilitation

Commission (MTC)	
Metropolitan Transportation Commission (MTC)	SamTrans Program: Public Transit - Routine Operations and Maintenance
Millbrae	Construct new multi-purpose pedestrian/bicycle overcrossing across U.S. 101, north of and adjacent to existing Millbrae Avenue Bridge across U.S. 101
Millbrae	Extend California Drive north to the intersection of Victoria Avenue and El Camino Real in Millbrae
Millbrae	Widen Millbrae Avenue between Rollins Road and U.S. 101 southbound on-ramp and resurface intersection of Millbrae Avenue and Rollins Road
Pacifica	The Manor Drive Overcrossing Improvement and Milagra On-Ramp Project
Pacifica	Route 1 San Pedro Creek Bridge Replacement and Creek Widening Project
Pacifica	Palmetto Avenue Streetscape Project
Pacifica	Construct Route 1 (Calera Parkway) northbound and southbound lanes from Fassler Avenue to Westport Drive in Pacifica
Peninsula Corridor Joint Powers Board (Caltrain)	San Mateo County Grade Separation Program
Redwood City	Extend Blomquist Street over Redwood Creek to East Bayshore and Bair Island Road
Redwood City	Implement Redwood City Street Car - Planning Phase
Redwood City	Improve U.S. 101/Woodside Road interchange
Redwood City	Middlefield Road Streetscape
San Bruno	Widen Skyline Boulevard (Route 35) to 4-lane roadway from I-280 to Sneath Lane - Phased
San Bruno	Improve local access at I-280/I-380 from Sneath Lane to San Bruno Avenue to I-380 - Environmental only
San Carlos	Route 101/Holly St Interchange Access Improvements
San Mateo (City)	U.S. 101 Interchange at Peninsula Avenue
San Mateo (City)	25th Avenue Grade Separations
San Mateo (City)	Hillsdale/US101 Ped/Bike Bridge

San Mateo (City)	State Route 92-82 (El Camino) Interchange Improvement
San Mateo City/County Association of Governments (CCAG)	County-wide Implementation of bicycle/pedestrian enhancements
San Mateo City/County Association of Governments (CCAG)	Implement incentive programs to support transit-oriented development
San Mateo City/County Association of Governments (CCAG)	County-wide Local streets and roads operations and maintenance
San Mateo City/County Association of Governments (CCAG)	Improve operations at U.S. 101 near Route 92 - Phased
San Mateo City/County Association of Governments (CCAG)	County-wide Implementation of the Safe Routes to Schools Program
San Mateo City/County Association of Governments (CCAG)	County-wide Implementation of Transportation for Livable Communities Program
San Mateo City/County Association of Governments (CCAG)	County-wide Implementation of Transportation Environmental Enhancements
San Mateo City/County Association of Governments (CCAG)	County-wide Implementation of non-capacity Increasing local road Intersection modifications and channelization countywide
San Mateo City/County Association of Governments (CCAG)	Implement a complete streets design for Mission Street/El Camino Real as part of Grand Boulevard Initiative - Phased
San Mateo City/County Association of Governments (CCAG)	County-wide implementation of local circulation improvements and traffic management programs countywide
San Mateo City/County Association of Governments (CCAG)	Modify existing lanes on U.S. 101 to accommodate HOV/T lane
San Mateo City/County Association of	Add northbound and southbound modified auxiliary lanes and/ or implementation of HOT lanes on U.S. 101 from Oyster Point to San

Governments (CCAG)	Francisco County line
San Mateo City/County Association of Governments (CCAG)	County-wide Intelligent Transportation System (ITS) and Traffic Operation System Improvements
San Mateo City/County Association of Governments (CCAG)	Improve access to and from the west side of Dumbarton Bridge on Route 84 connecting to U.S. 101 per Gateway 2020 Study - Phased
San Mateo County	Westbound slow vehicle lane on Route 92 between Route 35 and I-280 - Environmental Phase
San Mateo County	Hwy 1 operational & safety improvements in County Midcoast (acceleration/deceleration lanes; turn lanes; bike lanes; pedestrian crossings; and trails)
San Mateo County	Middlefield Road Streetscape Improvement Project
San Mateo County Transit District (SamTrans)	Make incremental increase in SamTrans paratransit service - Phase
San Mateo County Transit District (SamTrans)	Add new rolling stock and infrastructure to support SamTrans bus rapid transit along El Camino Real- Phase
San Mateo County Transit District (SamTrans)	Implement supporting infrastructure and Automated Transit Signal Priority to support SamTrans express rapid bus service along El Camino Real
South San Francisco	US 101 Produce Avenue Interchange
South San Francisco	Railroad Avenue Extension
South San Francisco	SSF Sidewalk Gap Closure
Water Emergency Transportation Authority (WETA)/ Redwood City	Redwood City/South Bay Ferry Terminal for Private Ferry Service

Appendix C

Major Funding Sources and Transportation Needs

Existing Fund Sources

The following section contains a description of transportation fund sources that have historically been used to fund transportation projects in San Mateo County. It includes constraints associated with the funding sources and whether or not the source is controlled at the federal, state, regional, or local level.

Federal Funds

Congress has historically passed multiyear acts that fund transportation at the federal level. These acts are typically six-year acts, which are often, extend until new acts are passed. Federal-aid funds are typically distributed through the state (Caltrans) and the region (Metropolitan Transportation Commission (MTC)) before allocations are made to the counties. MTC sets priorities and controls flow of dollars to the region from federal funding programs and often dictates the direction of those Federal funds.

Fixing America's Surface Transportation Act (FAST)

The current act Fixing America's Surface Transportation Act (FAST) supersedes and builds upon the Moving Ahead for Progress in the 21st Century Act (MAP-21) and is the first long-term (five-year) surface transportation authorization enacted in a decade that provides funding certainty for surface transportation. It supplies funding at the federal level to improve the surface transportation infrastructure, including roads, bridges, transit systems, and passenger rail network, as well as to improve federal safety programs for highways and public transportation. Its goals are to improve mobility on highways, including easing congestion and facilitating the movement of freight, create jobs and support economic growth, and accelerate project delivery and promote innovation.

Surface Transportation Block Grant Program (STBG) and Congestion Mitigation Air Quality (CMAQ)

STBG, which supersedes Surface Transportation Program (STP), and CMAQ are flexible funds because they are not restricted to particular modes of transportation. STBG funds can be used for almost all types of transportation capital improvement projects. CMAQ funds are limited to new or expanded transportation projects that support efforts to meet National Ambient Air Quality Standards (NAAQS) under the Clean Air Act in nonattainment or maintenance areas. Examples of CMAQ eligible projects include bicycle and pedestrian facilities, transit projects, rideshare and telecommuting activities, and signal coordination. The FAST Act added eligibility for verified technologies for non-road vehicles and non-road engines that are used in port-related freight operations, the installation of vehicle-to-infrastructure communications equipment, and electric vehicle and natural gas vehicle infrastructure. Both STBG and CMAQ projects follow the federal-aid process.

Federal STBG/CMAQ funds are considered flexible. Historically, the County directed its share of the former STP funds toward local streets and roads maintenance and CMAQ funds toward bicycle and Transportation for Livable Communities (TLC) projects. In the future it is anticipated that most of the flexible funding will be directed toward facility improvements in transit and multimodal corridors.

The FAST Act has also replaced the Transportation Alternative (TA) Program with a set-aside of funds under the STBG, called the TA Set-Aside. The TA Set-Aside authorizes funding for programs and projects defined as transportation alternatives, such as provision of facilities for pedestrians and bicycles, historic

preservation, safe routes to school, and environmental mitigation to address mitigation of water pollution due to highway runoff.

Federal Transit Administration (FTA) Grant Programs

The Federal Transit Administration provides funding to state, regional, and local governments to provide mass transportation services to the public. These funds include:

- FTA Section 5303, 5304, and 5305 for metropolitan and statewide planning and nonmetropolitan transportation planning
- FTA Section 5307 for urbanized area formula grants
- FTA Section 5309 for capital investment grants FTA Section 5310 enhanced mobility of seniors and individuals with disabilities
- FTA Section 5311 for formula grants for rural areas
- FTA Section 5339 for buses and bus facilities grants program.

In San Mateo County, these funds are directed primarily to SamTrans and Caltrain for transit planning, operation, and capital projects.

Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grant Program

The highly competitive TIGER grant program provides funding for road, rail, transit, bicycle and pedestrian, planning, and port projects that have a significant impact on the Nation, a region, or a metropolitan area. It supports innovative projects, including multimodal and multi-jurisdictional projects, which are difficult to fund through traditional federal programs. Projects funded by TIGER

State Funds

Transportation Development Act (TDA)

TDA revenues are derived from a statewide sales tax on gasoline and diesel. TDA funds are primarily used to fund transit operation, maintenance, and capital projects. Historically, San Mateo County has been allocated an approximate average of 24 million in TDA funds. Most of the TDA is allocated directly to the transit operators. Approximately 1 million per year has been set aside and made available for Bicycle and Pedestrian projects through the TDA Article 3. TDA Article 3 funds are administered by C/CAG for bicycle and pedestrian improvement projects.

Gas Tax Subvention

Portions of State sales tax on gasoline are returned to the cities and counties for local streets and roads maintenance. Allocations of these funds are distributed on a formula established by the State Legislature.

Gasoline Excise Tax

In 2010, Proposition 42, which imposed a five percent sales tax on gasoline that was dedicated for transportation and augmented the State Transit Assistance (STA) Program, the State Transportation Improvement Program (STIP), Traffic Congestion Relief Program (TCRP), and local streets and roads rehabilitation Gas Tax Subvention funds, was eliminated and replaced by an excise tax, also known as the

fuel tax swap. The fuel tax swap legislation adjusts the rates of the sales and excise tax on gasoline and is designed to be revenue neutral. The legislation mandates the Board of Equalization (BOE) to adjust the excise tax rate every year by March 1. The revenue effects of this “swap” on STA, STIP, TCRP, and local streets and roads fluctuate with gas prices.

Traffic Congestion Relief Program (TCRP)

A list of specific projects, established by the Senate, is entitled to TCRP funds. Funding levels are dependent on the state budget. When TCRP funds are not available, existing projects that have been allocated TCRP funds may become inactive, receive alternative funding, or have their schedules amended until funds become available.

State Transportation Improvement Program (STIP)

The STIP is a multi-year capital improvement program of transportation projects on and off the State Highway System, funded with revenues from the Transportation Investment Fund, State Highway Account (SHA), and other funding sources. Formula funding is provided to counties for transportation projects that relieve congestion and expand and improve the state’s transportation system (mainly state highways). Caltrans administers 25% of the entire STIP and directs funds towards state/ interstate highway projects, while the remaining 75% of the STIP is administered locally and is distributed to counties on a formula basis. San Mateo’s portion of the STIP is controlled and administered by C/CAG. Projects are nominated and programmed by C/CAG. C/CAG directs most of the STIP towards highway improvement projects administered by Caltrans or the San Mateo County Transportation Authority (SMCTA). Projects are selected through the (SMCTA) Measure A strategic planning process. In previous years, the STIP allocations were entirely State funded. Starting in 2010, all STIP allocations over \$1 million are federalized, requiring all large STIP funded projects to meet both Federal and State requirements.

State Transit Assistance (STA) Program

STA is a state budget item that provides funding to local transit agencies for mass transportation. STA funds may be used for transit capital projects, transit operations, and regional transit coordination. MTC administers the funds and STA funds are claimed directly by the public transit operators. STA funds were historically augmented with funds from Proposition 42.

Proposition 1A - Safe, Reliable High-Speed Passenger Train Bond Act

Proposition 1A bond funding was passed in 2008, to fund pre-construction activities and construction of a high-speed passenger train system in California and capital improvements to passenger rail systems that expand capacity, improve safety, or enable train riders to connect to the high-speed train system. Caltrain is receiving a portion of those funds for grade separation projects and electrification that benefits both Caltrain and high-speed rail.

Proposition 1B – the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act

Proposition 1B funds are designated to fund approximately ten transportation sub programs associated with mobility, safety, and air quality improvements for ten years, starting in 2006. A portion of Proposition 1B funds are used to fund transportation projects in San Mateo County under one or more of the following seven sub programs.

- Corridor Mobility Improvement Account (CMIA) - Funds are for performance improvements on the state highway system or major access routes to the state highway system.
- Public Transportation Modernization Improvement and Services Enhancement Account (PTMISEA) - Funds are for rehabilitation, safety or modernization improvements, capital service enhancements or expansions, new capital projects, bus rapid transit improvements, or for rolling stock procurement, rehabilitation, or replacement.
- State Transportation Improvement Program (STIP) - Funds augment the STIP program.
- Highway-Railroad Crossing Safety Account - Funds are available to Caltrans for the completion of high-priority grade separation and railroad crossing safety improvements.
- Traffic Light Synchronization Program (TLSP) - Funds are for traffic light synchronization projects or other technology-based improvements to improve safety, operations, and the effective capacity of local streets and roads.
- Local Streets and Road, Congestion Relief, and Traffic Safety Account of 2006 - Funds shall be used for transportation facility improvements that reduces local traffic congestion and deterioration, improve traffic flow, or increase traffic safety. Funds are allocated to Cities and the County directly by formula. Examples of projects include:
 - Street and highway pavement rehabilitation
 - Drainage installation and rehabilitation
 - Traffic control installations
 - Maintenance, rehabilitation, installation, construction and reconstruction of facilities that expand rider ship on transit systems
 - Safety projects to reduce fatalities
 - Local match to obtain state or federal transportation funds for similar purposes
- Transit System Safety, Security & Disaster Response Account (TSSS-DRA) - Funds are for capital projects that provide increased protection against a security and safety threat, and for capital expenditures to increase the capacity of transit operators, to develop disaster response transportation systems that can move people, goods, and emergency personnel and equipment in the aftermath of a disaster.
- State-Local Partnership Program (SLPP) Account - Funds are available to eligible transportation projects nominated by an applicant transportation agency. A dollar for dollar match of local funds is required for an applicant transportation agency to receive state funds under this program.

Regional and Local Funds

Measure A

Measure A is a countywide half-cent sales tax intended to fund transportation projects and programs in San Mateo County. The San Mateo County Transportation Authority (SMCTA) administers Measure A funds and directs funding toward six categories projects including, transit; highways, local streets and transportation, grade separation, pedestrian and bicycles and alternative congestion relief. A Strategic Plan has been developed to guide the evaluation of projects that apply for funding. A capital improvement

plan based on forecasts of revenues and projects to be undertaken is being developed and will be refined each year.

AB 664 Net Toll Revenue Reserves

Funds are collected from the Dumbarton, San Mateo-Hayward and San Francisco-Oakland Bay bridges and are used to fund capital projects that further the development of public transit in the vicinity of the bridges. AB 664 funding is programmed to transit agencies as a match for federal funds to cover the cost of replacing buses and improving capital facilities.

Transportation Funds for Clean Air (TFCA)

Transportation Fund for Clean Air (TFCA) is funded by a \$4 surcharge on motor vehicles registered in the Bay Area. TFCA funds are controlled by the Bay Area Air Quality Management District (BAAQMD) which oversees regional and local programs. TFCA funds are available to implement projects that decrease motor vehicle emissions, and improve air quality. Examples of TFCA projects include, the purchase or lease of clean air vehicles; shuttle and feeder bus service to train stations; ridesharing programs to encourage carpool and transit use; bicycle facility improvements such as bike lanes, bicycle parking; arterial management applications to improve traffic flow on major arterials; and transit information projects. BAAQMD has delegated C/CAG to administer San Mateo County's allocation of TFCA revenues for implementation of a shuttle program and a transportation demand management (TDM) program.

Redevelopment Fees

Funds are collected from land developers directly by the Cities or County of San Mateo. Developer funds are controlled entirely by the local jurisdiction and are sometimes used to fund transportation improvements to offset impacts caused by the development.

Measure M San Mateo County Vehicle License Fee

San Mateo currently levies ten dollars for every vehicle registered in San Mateo County. C/CAG administers these funds, and 50% of the funds are returned to the member jurisdictions via reimbursement for specific congestion management activities and implementation of water pollution control measures. The remaining 50% of funds are used by C/CAG for countywide congestion management projects and programs, and water pollution control activities.

Congestion Relief Plan (C/CAG Member Agency Dues)

Per Proposition 111 requirements, local agencies whose developments negatively impact the Congestion Management Plan (CMP) system by causing the level of service on a "non-exempt" segment of the highway to fall to a level of service (LOS) "F" must prepare deficiency plans. C/CAG receives funds from its member agencies for the purpose of comprehensively addressing CMP deficiencies on behalf of its member agencies. Funds must be used for congestion relief planning and implementation activities.

Peninsula Corridor Joint Powers Board (JPB) Member Fees

JPB is the governing body for the Caltrain Peninsula commuter rail transit service between San Francisco, San Jose, and Gilroy and consists of three representatives from each of the three counties (San Francisco, San Mateo County, and Santa Clara County) served by Caltrain. The member agencies make annual funding contributions to operate the Caltrain service and support the capital budget.

Summary of Needs

The following section contains a listing of current and planned transportation improvement projects identified in regional and local level planning documents in San Mateo County. These projects are segregated into the following categories:

- Highway Improvements/Roadway Maintenance
- Transit Capital/Operations
- Bicycle and Pedestrian Improvements
- Enhancement/Transit Oriented Development/Transportation for Livable Communities/Congestion

The estimated cost of each category is matched with the most applicable potential source of funds in an effort to assess the shortfall in each category of projects.

Highway Improvements/ Roadway Maintenance

Highway improvement projects are typically located on state highways or interstate freeways. Projects can expand a facility or modify the configuration of a facility. Example projects include the construction of auxiliary lanes, construction of a new interchange, reconfiguration an existing interchange, and lane additions. These projects are often costly project.

Operational improvements enhance the capacity of a facility without necessarily changing the configuration of a facility. Example projects include Intelligent Transportation System projects, signal interconnects, and ramp modifications, which do not require extensive right of way acquisition.

Roadway Maintenance, also known as “Local Streets and Roads” projects, includes reconstruction and/or capital maintenance projects on local roadways. Example projects include reconstruction or rehabilitation of existing roadways, installation or repair of storm drains, curb and gutters, and sidewalks, installation and repair of traffic signals and streetlights.

Eligible fund sources for these types of projects listed above are STBG, STIP, Proposition 1B CMIA, and Measure A.

Transit Capital/Operations

Transit capital projects include Caltrain, SamTrans, Water Emergency Transportation Authority (WETA), and other transit agency capital improvements within San Mateo County. These projects include station, safety, signal, and communication improvement projects. This also includes rolling stock purchases, and grade separation projects. Typical fund sources for these types of projects include FTA Section 5307 and 5309, STBG, CMAQ, Proposition 1B (PTMISEA, TSSS-DRA, SLPP), STIP, Interregional Transportation Improvement Program (ITIP), AB 664, and Measure A funds.

Transit Operations includes labor, fuel, vehicle parts, utilities, and other consumable expenses needed to run the transit system. Fund sources for transit operations include farebox funds, STA funds, Measure A funds, other state and local revenues, and member fees.

Bike and Pedestrian Improvements

Bicycle and pedestrian improvement projects include the installation of bicycle trails/ lanes, bicycle and pedestrian directional signs, bicycle parking facilities, sidewalks, crossings, and bicycle pedestrian outreach and safety programs. Fund sources for these projects include STBG, CMAQ, TDA Article 3, and Measure A.

Enhancement/Transit Oriented Development (TOD) Transportation for Livable Communities (TLC)/Congestion Management

Transportation enhancement and TOD projects are generally capital improvement projects that include streetscape and landscape installations that encourage walking and/or development near transit stations and the use of transit. TLC projects promote compact, mixed-use development in urban locations near transit hubs by bringing vibrancy to downtown areas, commercial cores, neighborhoods, and transit corridors; enhancing their amenities and ambiance and making them places where people want to live, work and visit.

Congestion Management programs are operational projects such as shuttle programs, educational programs, Safe Routes to School (non-capital), or incentive programs with the goal of encouraging people to use alternative modes of transportation. Fund sources available for these programs are CMAQ, TFCA, Measure A, AB 1546, and Congestion Relief Plan funds.

Transportation Services for Seniors and People with Disabilities

A Regional Transit Connection (RTC) Discount ID Card is available to qualified persons with disabilities and senior citizens. Seniors (age 65 and older) and persons with disabilities who possess a Regional Transit Connection Discount Card, Medicare Card, or Department of Motor Vehicles Disabled Person Placard Identification Card are eligible for discounted fares on SamTrans, Caltrain, and all other Bay Area public transit systems.

Paratransit is provided for persons with disabilities who cannot independently use regular SamTrans bus service some of the time or all of the time. All paratransit participants are screened for eligibility and trips must be prearranged. The San Mateo County Transit District provides paratransit services through Redi-Wheels on the bayside of the county and RediCoast on the coast side.

Paratransit services are funded by fare box funds, STA funds, TDA funds, and Measure A funds.

Appendix D
Congestion and Safety Performance on
Regionally Significant Corridors

Congestion and Safety Performance on Regionally Significant Corridors

A system for determining congestion and safety performance and hot spots for freeways and state highways has been developed. This system can be considered when making funding decisions for roadway projects on the state system in San Mateo County. The system incorporates four of the main factors that affect roadway performance: congestion, projected growth in congestion, reliability and safety. Performance metrics have been defined for each of the four factors and values generated for the X corridors identified in **Figure XX (to be developed)**. The specific performance metrics are as follows:

- Congestion – Peak Period Vehicle Hours of Congested Delay: Vehicle hours of delay are considered when speeds on freeways are below a threshold level - 35 miles per hour for freeways and 15 miles per hour on other state routes. The metric is calculated by summing the additional travel time by all peak-period traffic in the corridor traveling below the respective threshold speed when the average for the corridor is below the threshold speed. This measure can only be calculated from observed data on individual vehicles and cannot be derived from modeling data in which speeds on a corridor for a time period are averaged. As a result, future year values of Vehicle Hours of Congested Delay cannot be estimated using a travel forecasting model.
- Projected Growth in Congestion – Projected Change in Total Vehicle Hours of Delay: The projected change in total peak-period vehicle hours of delay between 2015 and 2040 can be estimated based on modeling of both years with the existing transportation network. Total Vehicle Hours of Delay is all delay produced by average modeled speeds below free-flow speed. This is a different metric than Vehicle Hours of Congested Delay (above) in which only delay caused by speeds below the threshold speeds is included.
- Reliability – Buffer Index: The ratio of the 95th percentile peak-period travel time (the travel time for which 95% of observed travel times were below that level) to the average peak-period travel time.
- Safety – Total annual vehicular crashes: This metric is the total number of annual vehicular crashes averaged over the three most recent years for which a full year of data is available. The number of crashes resulting in a fatality and number of crashes resulting in an injury will be reported as part of the metric.

Table YY (to be developed) provides the value of each of these performance metrics for the existing condition and in the case of Projected Growth in Congestion, the difference between 2015 and 2040. The values for Congestion and Reliability are based on data from 2015, and the values for Safety reflect the three-year period from 2013 to 2015. Three years of crash data are used to get an annual average for the Safety metric because of the highly irregular nature of when and where vehicular crashes occur.