2021 CONGESTION MANAGEMENT PROGRAM DOCUMENT

Valley Transportation Authority

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2021 CONGESTION MANAGEMENT PROGRAM (CMP) DOCUMENT

Prepared By The Santa Clara Valley Transportation Authority
The Congestion Management Agency For Santa Clara County

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Valley Transportation Authority

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Acknowledgements

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The Santa Clara Valley Transit Authority (VTA), as the designated Congestion Management Agency (CMA) in Santa Clara County, leads the county's Congestion Management Program (CMP) in accordance with California Statute, Government code 65088. The CMP's goal is to develop a transportation improvement program to improve multimodal transportation system performance, land use decision-making and air quality among local jurisdictions. The purpose of this document is to summarize the elements, policies and procedures of the VTA CMP.

WHAT'S NEW IN THE 2021 CMP

The 2021 update summarizes the current VTA CMP, changes to the CMP over the past two years, as well as key areas that are likely to be addressed in the coming years. The following is a summary of the key changes and additions in the 2021 CMP:

Status of key VTA transportation projects – Chapter 2 includes updated descriptions of transportation projects VTA is leading or participating in, including the BART Silicon Valley extension.

- **Infill Opportunity Zone (IOZ)** — Chapter 3 discusses IOZ, pursuant to California Government Code 65088.4. As of summer 2021, one VTA Member Agency, the City of San Jose, has taken action to designate IOZs. These zones include 40 CMP intersections that are owned by the city that are no longer held to the CMP LOS.
- **VTA's TDM Program** — Chapter 5 discusses VTA's existing TDM practices and explores ways to formalize its role in advancing TDM practices throughout the County.
- **Updated information about regional programs** — Chapter 7 contains updated discussions of regional planning efforts led by the Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC), such as Plan Bay Area and the PDA Investment & Growth Strategy.
- **Future updates to Multimodal Improvement Plan updates** — Chapter 10 touches on potential future updates to MIP Requirements document.

ELEMENTS OF THE VTA CMP

The following elements are included in the 2021 CMP Document, as required by the CMP legislation:

- A system definition and traffic Level of Service (LOS) standard element,
- A multimodal performance measures element,
- A transportation demand management and trip reduction element,
- A land use impact analysis element, and
- A Capital Improvement Program.
- Development of a countywide transportation model
- Development of Multimodal Improvement Plans

With VTA's Strategic Plan and other guiding documents, VTA has expanded the CMP elements beyond the CMP Statute requirements. The following document is divided into ten chapters.

- **Chapter 1. VTA** – Introduces VTA as an agency and reviews VTA's mission statement, vision statement, and core values. It also introduces the Congestion Management Program (CMP) Document and its purpose.

- **Chapter 2. System Definition Element** — The CMP Transportation System consists of a roadway network, a transit network, and a bicycle/pedestrian network. Having a clear definition of the Systems is important since all projects proposed for the Capital Improvement Program must be on or benefit the CMP Transportation System. Additionally, roadways included in the CMP Roadway Network will be monitored for conformance with the CMP level of service standard. While the CMP Statutes do not expressly require adoption of a transit network, bicycle and pedestrian network, VTA has identified them as a core method to reduce congestion.

- **Chapter 3. Traffic Level of Service (LOS) Standard Element** — The CMP statute requires that CMAs develop a minimum automobile Level of Service (auto LOS) standard for CMP Network roadways. Auto LOS describes the operations of roadway segments or intersections in terms of vehicle speed, volume and capacity and traffic delay. The Traffic Level of Service (LOS) Standard Element contains the adopted auto LOS standard for the CMP Roadway Network and describes the methodologies for evaluating auto LOS. CMP Roadway Network facilities must operate within the adopted standard or the Member Agency responsible for the facility must prepare a Multimodal Improvement Plan for that facility.

- **Chapter 4. Multimodal Performance Measures Element** — The Multimodal Performance Measures Element defines specific transportation system performance measures that evaluate how well Santa Clara County's transportation system serves the traveling public. Twelve measures are described in the Element that can be used in a variety of analyses.

- **Chapter 5. Transportation Demand Management (TDM) and Trip Reduction Element** — This element defines and describes TDM programs and their lists funding sources. The chapter discusses VTA's TDM programs and improvements for the future.

- **Chapter 6. Countywide Transportation Model and Database Element** — This element contains a description of the countywide transportation model. The countywide transportation model is used to help evaluate cumulative transportation impacts of local land use decisions on the CMP System.

- **Chapter 7. Land Use Impact Analysis Element** — This element describes the procedures used to analyze the transportation impacts of local land use decisions on the transportation system and the policy and programs to better support a multimodal transportation system. The Land Use Impact Analysis Program links local land use decisions with broader transportation and air quality impact analysis. The VTA CMP includes the Development Review Program and the Transportation Impact Analysis (TIA) Guidelines.

- **Chapter 8. Capital Improvement Program (CIP) Element** — The element is a list of capital projects to improve the transportation system and air quality in Santa Clara County. The CIP consists of a list of transportation facility improvements that is submitted to MTC for inclusion in the Regional Transportation Improvement Program (RTIP), the State Transportation Improvement Program (STIP) and the Federal Transportation Improvement Program (TIP).

- **Chapter 9. Monitoring and Conformance Element** — The CMP Statute requires biennial monitoring to determine Member Agency conformance with all elements of the CMP. The Monitoring and Conformance Element describes the monitoring process used in Santa Clara County. VTA monitors freeway LOS and land use decisions on an annual basis and all other elements of the Monitoring Program on a biennial basis.

- **Chapter 10. Multimodal Improvement Plan Element** – This element summarizes the process for the preparation and approval of Multimodal Improvement Plans. "Multimodal Improvement Plan," or referred to "Deficiency Plan" by state legislation, highlight the range of multimodal solutions available to Member Agencies that have an auto LOS deficiency.

REGIONAL CONFORMANCE

To meet the requirements of CMP legislation, VTA's CMP conforms to the Regional Transportation Plan, as well as the MTC's Guidance for 2021 Congestion Management Programs. The CMP also conforms to the transportation-related provisions of the federal and state California Clean Air Acts, and the regional Clean Air Plan.

MEMBER AGENCY RESPONSIBILITIES

The Congestion Management Program is a cooperative effort between the CMP Member Agencies, the 15 and towns cities in the county, Santa Clara County, and VTA. Table E.1 outlines the element requirements and major responsibilities of VTA and other Member Agencies in complying with the CMP.

THE DEVELOPMENT OF THE 2021 CONGESTION MANAGEMENT PROGRAM

This CMP was developed guidance from state and regional agencies with input from working groups of the Technical Advisory Committee. Since most elements of the CMP are implemented locally by Member Agencies, local input throughout the policy development process is crucial to the success of the Congestion Management Program. After receiving Member Agency and public input, the VTA Board of Directors is responsible for making all policy decisions and for approving the final CMP.

DOCUMENT STRUCTURE & ORGANIZATION

The purpose of the document is to give the reader a comprehensive knowledge of the elements and goals of the VTA CMP. The CMP is organized into ten chapters. Table ES.1 presents a summary of each element. A number of appendices providing additional information are included at the back of this document.

Table ES.1 CMP Elements Summary

CMP Element	Requirement	Timing	Responsible Agency
Transportation Analysis Standards Element	1) Monitor and submit report on the level of service on CMP roadway network intersections using CMP software and procedures.	Dec 1	Member Agencies
	2) Monitor performance of CMP rural highways and freeways.	Dec 1	VTA
Multimodal Performance Measures Element	Collect available transportation performance measurement data for use in land use analysis, deficiency plans and the CIP.	Ongoing	VTA
Transportation Demand Management and Trip Reduction Element	No current requirements.		Member Agencies and VTA
Transportation Model and Database Element	1) Certify that the CMP model is consistent with the regional model.	Biennially	MTC
	2) Certify that Member Agency models are consistent with the CMP model.	As Needed	VTA and Member Agencies
Land Use Impact Analysis Element	1) Prepare a Transportation Impact Analysis (TIA) for projects that generate 100 or more peak hour trips and submit to the CMP according to TIA Guidelines schedule.	Ongoing	Member Agencies
	2) Submit relevant conditions of approval to VTA for projects generating TIAs Ongoing Member Agencies.	Ongoing	Member Agencies
	3) Prepare quarterly report on VTA comments and local agency adopted conditions for VTA Board and Committees.	Ongoing	VTA
	4) Prepare and submit land use monitoring data to the CMP on all land use projects approved from July 1 to June 30 of the previous year.	Oct 1	Member Agencies
Capital Improvement Program Element	Develop a list of projects intended to mirror projects in the Regional Transportation Plan, maintain or improve the level of service on the designated system, and to maintain transit performance standards.	Biennially	Member Agencies with VTA
Monitoring and Conformance Element	Outline the requirements and procedures established for conducting annual auto LOS and land use monitoring efforts. Support the Transportation Analysis Standards and Land Use Impact Analysis Elements.	Dec 1	Member Agencies and VTA
Multimodal Improvement Plan Element	1) Prepare Multimodal Improvement Plan for facilities that violate CMP traffic LOS standards or that are project to violate LOS standards using the adopted Deficiency Plan Requirements.	As Needed	All Affected Member Agencies
	2) Submit Multimodal Improvement Plan Implementation Status Report as part of annual monitoring.	Dec 1	Member Agencies with Multimodal Improvement Plan

CHAPTER 1 | VTA

1. VTA

This chapter explores VTA's mission statement, vision statement, and core values. It also introduces the Congestion Management Program (CMP) Document and its purpose.

BACKGROUND

VTA is a unique organization with a wide-range of authority, including transit development and operations, congestion management, funding, highway design and construction, real estate and transit-oriented development, and bicycle and pedestrian planning. VTA provides a holistic view of the transportation system and is truly a multimodal transportation solutions agency.

VTA is a collection of more than 2,000 dedicated employees working together to provide transportation throughout Santa Clara County. VTA provides a variety of solutions that move people to areas they can live, work and play, meeting the needs of the county's diverse population. From highways to bikeways, VTA works together to ensure Santa Clara County residents, workers and visitors can safely travel to their desired destination.

MISSION

VTA's mission details its values and overarching goal to the community. It answers the questions: "Why does VTA exist?" and "What does VTA do?" Having a clear and memorable mission provides clarity in VTA's work, projects, and overall product.

VTA's mission is to provide **"solutions that move you."** VTA's role is to get people moving and keep them moving through a range of safe, accessible, healthy and equitable methods.

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VISION

VTA's vision describes the long-term results of VTA's work. It answers the question "What is VTA aiming to achieve?" A clear vision gives the community an expectation of VTA's work, now and in the future.

VTA's vision is: **"To innovate the way Silicon Valley moves."** VTA has the unique opportunity of being at the center of Silicon Valley with the constant development of the newest, cutting edge technology. VTA takes innovation to heart and is committed to creating, collaborating and leading new ideas, programs and projects to meet the evolving needs of people in and around the county.

CORE VALUES

VTA's Core Values represent its ethics and code of conduct. They guide the agency's decision-making. The six core values are described below in Figure 1.1.

PARTNERS

VTA works with a variety of partners to implement the congestion management program.

- Local jurisdictions hold the land use authority, which works hand-in-hand with transportation.
- VTA's transportation partner agencies help connect Santa Clara County to regional destinations.
- State and federal agencies set regulations and standards and provide funding.
- Community stakeholders and customers help identify and prioritize solutions and projects.

CONGESTION MANAGEMENT PROGRAM

Within this document VTA outlines how it fulfills its responsibility as a County Transportation Agency (CTA), also called a Congestion Management Agency (CMA). Its main role seeks to reduce congestion at a regional scale through a multimodal approach. An illustration of VTA's efforts and how they relate to the CMP is provided in Figure 1.2.

The following chapters focus on the CMP Statute requirements and details how VTA is meeting those requirements within the context of multimodal transportation solutions that keep Silicon Valley moving.

Figure 1.1 | VTA's Core Values

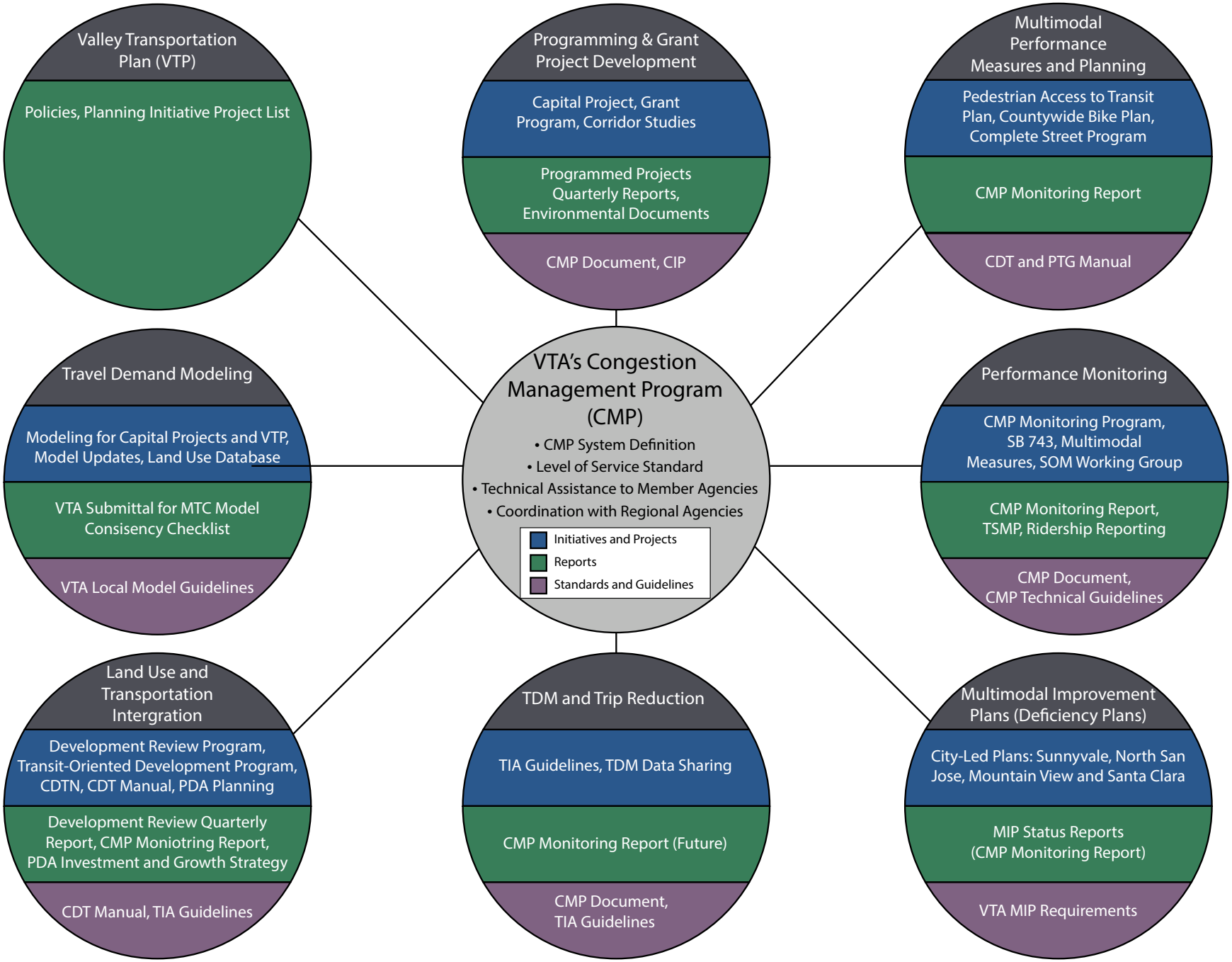

Figure 1.2 | Overview Of VTA's Congestion Management Program

CHAPTER 2 | CMP TRANSPORTATION SYSTEM DEFINITION ELEMENT

2. CMP TRANSPORTATION SYSTEM DEFINITION

This chapter describes the Congestion Management Program (CMP) Transportation System. It consists of roadway, transit, bicycle and pedestrian networks, which includes aspects of the Complete Streets policy and design approach.

BACKGROUND

In the 1990s, Proposition 111 increased funding for California's transportation system by billions of dollars. With the new funding, counties needed agencies to manage and plan the transportation system. As a result, urbanized counties were required to designate a County Transportation Agency (CTA), also called a Congestion Management Agency (CMA), to prepare and implement each county's Congestion Management Program (CMP). The CMP is a multimodal approach to reduce congestion at the regional scale. Part of the CMP includes an update to the CMP Document every odd year, unless the majority of the county's local governments and the County Board of Supervisors elect to be exempt from it.

The 1990s also bought new federal transportation policies and transportation funding programs. These encouraged a more coordinated, regional and multimodal approach to transportation planning. They also shifted major portions of transportation planning from the state government to regional agencies, CTAs and local governments. This overarching philosophy has carried forward in subsequent federal transportation funding bills, including the most recent bill Fixing America's Surface Transportation Act (FAST Act).

At the state level, California has adopted three legislative mandates that guide the development of transportation analyses, plans and strategies, explored in Table 2.1.

At a regional level as of summer 2021, Plan Bay Area 2040, adopted in July 2017, is the current long-range Regional Transportation Plan


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and Sustainable Communities Strategy for the nine-county San Francisco Bay Area. The plan discusses current conditions of the Bay Area and guides growth for the next twenty years to create a more sustainable, equitable and economically vibrant region. Plan Bay Area 2040 is an update to the previous Regional Transportation Plan, Plan Bay Area, adopted in 2013.

As of summer 2021, a draft of Plan Bay Area 2050 has been released and builds on the previous two plans. It provides strategies to ensure by 2050 the Bay Area will be affordable, connected, diverse, healthy and vibrant for all.

Table 2.1 | California Legislative Mandates That Guide Transportation Analyses, Plans And Strategies.

Legislative Mandate	Name	Summary
AB 32 (Nunez)	California Global Warming Solutions Act of 2006	The California Air Resources Board must adopt regulations to require the reporting and verification of Statewide greenhouse gas emissions and to monitor and enforce compliance.
SB 375 (Steinberg)	Transportation Planning: Travel Demand Models; Sustainable Communities Strategy; Environmental Review of 2008	The California Air Resources Board must set regional greenhouse gas emissions reduction targets from passenger vehicles. It also requires the Metropolitan Planning Organizations to develop a Sustainable Communities Strategy as part of its Regional Transportation Plan.
SB 743 (Steinberg)	Environmental Quality: Transit Oriented Infill Projects, Judicial Review Streamlining for Environmental Leadership Development Projects, and Entertainment and Sports Center in the City of Sacramento of 2013	The Governor's Office of Planning and Research is directed to develop a metric other than auto Level of Service (LOS) when evaluating transportation impacts in California Environmental Quality Act (CEQA). Vehicle Miles Traveled (VMT) was selected as the new metric and Lead Agencies had until July 1, 2020 to fully adopt it.

CONGESTION MANAGEMENT PROGRAMS

Although the primary focus of the CMP is to reduce congestion and improve mobility, the CMP requirements recognize the links between transportation, land use and air quality. Over time, CMPs in the Bay Area have evolved to emphasize an overall reduction in single-occupancy vehicle trips and an increase in pedestrian, bicycle and transit mode share. These issues are both functionally and jurisdictionally interrelated. CTAs play a key role in overcoming fragmented planning and effectively integrating transportation and land use planning at the county level by working with local agencies and the regional and state levels of government.

The CMP pursues the interrelated goals of increasing transportation choices, managing congestion and reducing single-occupant vehicle trips through a combination of capital roadway, transit, bicycle and pedestrian improvements and only adding new travel lanes where road-widening is the only solution. The CMP is also intended to improve land use planning, develop strategies to reduce traffic demand and establish Multimodal Improvement Plans to address deficiencies. By addressing these congestion, transportation demand, land use and transportation decision-making issues early on, larger problems that could result in more expensive and less effective solutions can be avoided.

VTA CONGESTION MANAGEMENT PROGRAM

The CTA Statute states that all urbanized counties with 50,000 or more residents must designate a CTA, unless opted out of. Santa Clara's CTA was formed in July 1990. In December 1994, Santa Clara County Transit District was designated as the county's CTA causing two agencies to merge and form the Santa Clara Valley Transportation Authority (VTA).

VTA is an independent special district governed by its own Board of Directors. The VTA Board of Directors consists of elected governing board officials from the cities and towns within Santa Clara County as well as the County of Santa Clara. Board members are appointed by the jurisdictions they represent and all jurisdictions within the county have representation on the Board. The Board consists of 12 voting members, six alternates and three ex-officio members.

VTA's Board of Directors is advised by five Advisory Committees:

Bicycle and Pedestrian Advisory Committee (BPAC) consists of 16 voting members comprised of one member appointed by each of the 15 cities and towns within Santa Clara County and one member appointed by the County of Santa Clara. In addition, the Silicon Valley Bicycle Coalition appoints one ex-officio, non-voting representative.

The BPAC advises the VTA Board of Directors on planning and funding issues related to bicycle and pedestrian mobility and access. The BPAC also serves as the bicycle and pedestrian advisory committee for the County of Santa Clara.

Citizens Advisory Committee (CAC)/2000 Measure A Citizens Watchdog Committee (CWC) is a 13-voting member committee representing the residents of Santa Clara County. Members are appointed to represent stakeholder groups from two broad categories:

a) Community and Societal Interests
b) Business and Labor

The CAC advises the Board and VTA administration on issues impacting the communities and organizations they represent. It also serves as the independent Citizens Watchdog Committee

for the 2000 Measure A Transit Improvement Program and as the 2008 Measure D ballot-specified advisory body that reviews and comments on VTA's comprehensive transit program as part of the countywide transportation plan.

Committee for Transportation Mobility and Accessibility (CTMA) provides advice to the VTA Board and staff on bus and rail system accessibility issues, as well as on paratransit service. Many of these issues are related to VTA's efforts to comply with the federal Americans with Disabilities Act (ADA).

It consists of 17 voting members comprised of individuals from the disabled community and representatives from human services agencies. It also consists of two ex-officio, non-voting members, one each representing VTA's paratransit service provider and the VTA Board of Directors.

Policy Advisory Committee (PAC) is a 16-voting member committee comprised of one City Council Member from each of the 15 cities and towns within Santa Clara County and one member from the County of Santa Clara Board of Supervisors.

The PAC ensures that all local jurisdictions have an opportunity to participate in the development of VTA's policies.

Technical Advisory Committee (TAC) is a 16-voting member committee comprised of one staff member (usually a public works, planning, transportation or community development director) from each of the 15 cities and towns within the county and the County of Santa Clara. In addition, the California Department of Transportation (Caltrans), Metropolitan Transportation Commission (MTC) and Santa Clara Valley Water District (SCVWD) may each appoint one ex-officio (non-voting representative) to the TAC.

The TAC provides in-depth analysis, technical expertise and timely recommendations regarding transportation projects, programs, funding and other policy matters, while giving voice to and reconciling local and regional perspectives.

VTA works with its Member Agencies, Committees and Board of Directors to develop policies, programs and methodologies to promote multimodal transportation planning and land use and transportation integration.


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CMP ROADWAY NETWORK

Clearly defining the roadway network is an important first step in identifying and solving congestion issues. The roadway network consists of the following facilities:

- Freeways
- County Expressway
- Urban Arterials, which are comprised of principal arterials and roadways that connect with the freeway and/or county expressway system
    - Principal Arterials are defined as either
        - State highway,
        - Six-lane facility, or
        - Non-residential arterial with average daily traffic of 30,000 vehicles per day or greater.
- Rural Highways

The CMP Statue allows the CTA to add roadways to the CMP Roadway Network. However, once a roadway is added to the network it may not be removed. The network was originally adopted in the 1991 and has had a few of improvements since its adoption. Figure 2.1 and Figure 2.2 show the CMP Roadway Network and intersections, respectively. Appendix B lists the roadway segments that are part of the roadway network.

Select CMP urban arterials have incorporated or are planned to incorporate Complete Street features, which shifts the view and overall approach of roadways. Historically, roadways have been auto-oriented, placing the travelers in single-occupancy vehicles above other mode choices, such as pedestrians, bicyclist and transit users. The Complete Street policies and design approach places all modes of transportation at equal levels. These streets are planned, designed and operated for safe mobility for all users including pedestrians, bicyclists, motorists and transit users of all ages and abilities. Common design features on Complete Streets include wide sidewalks, safe bike lanes, frequent crosswalks and comfortable and attractive bus stops.

VTA has worked with its Member Agencies and partner agencies to develop a Complete Streets Program for Santa Clara County, which involves education and outreach, corridor studies and policy. As of summer 2021, studies at Story-Keyes, Tasman Drive and Bascom Corridor have been completed and provide specific methods of creating more balanced, safe and vibrate streets.

CMP TRANSIT NETWORK

Even though the CMP Statute does not require adoption of a transit network, it does emphasize the importance of transit service. In addition, legislation enacted in 1994 requires that CMPs include multimodal transportation system performance measures. With this guidance, the VTA CMP includes the transit network in its CMP Transportation System.

The CMP transit network consists of rail transit service (Caltrain, VTA Light Rail and BART service) and bus service. The CMP transit network is illustrated in Figure 2.3 and Appendix C lists the transit network routes.

EXISTING TRANSIT SERVICE

Santa Clara County is currently served by three major transit operators: VTA, Caltrain and BART.

- VTA operates public transit buses, light rail, shuttles and paratransit within Santa Clara County.
- Caltrain operates commuter rail service between San Francisco, San José and Gilroy. It is operated and

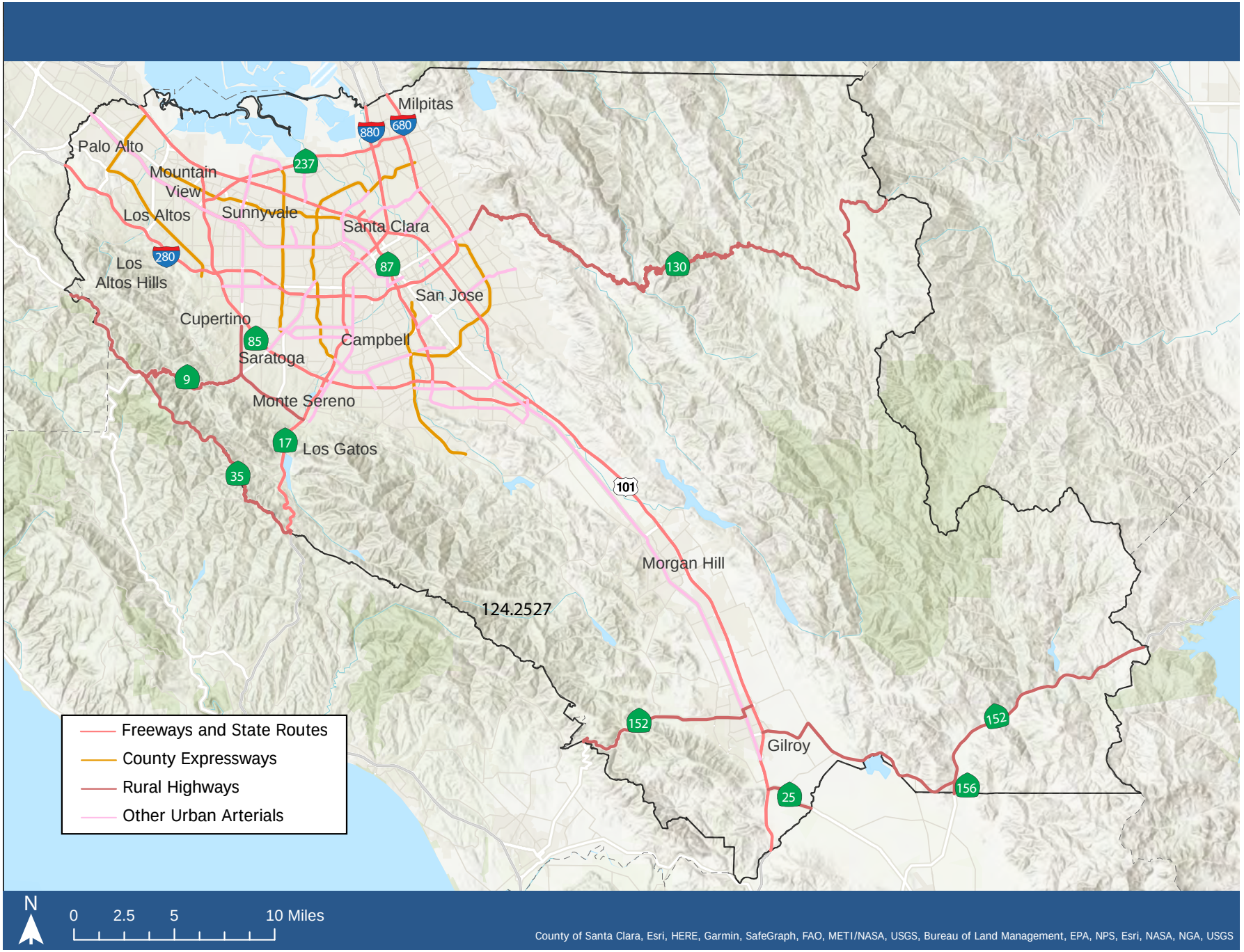

Figure 2.1 | CMP Roadway Network

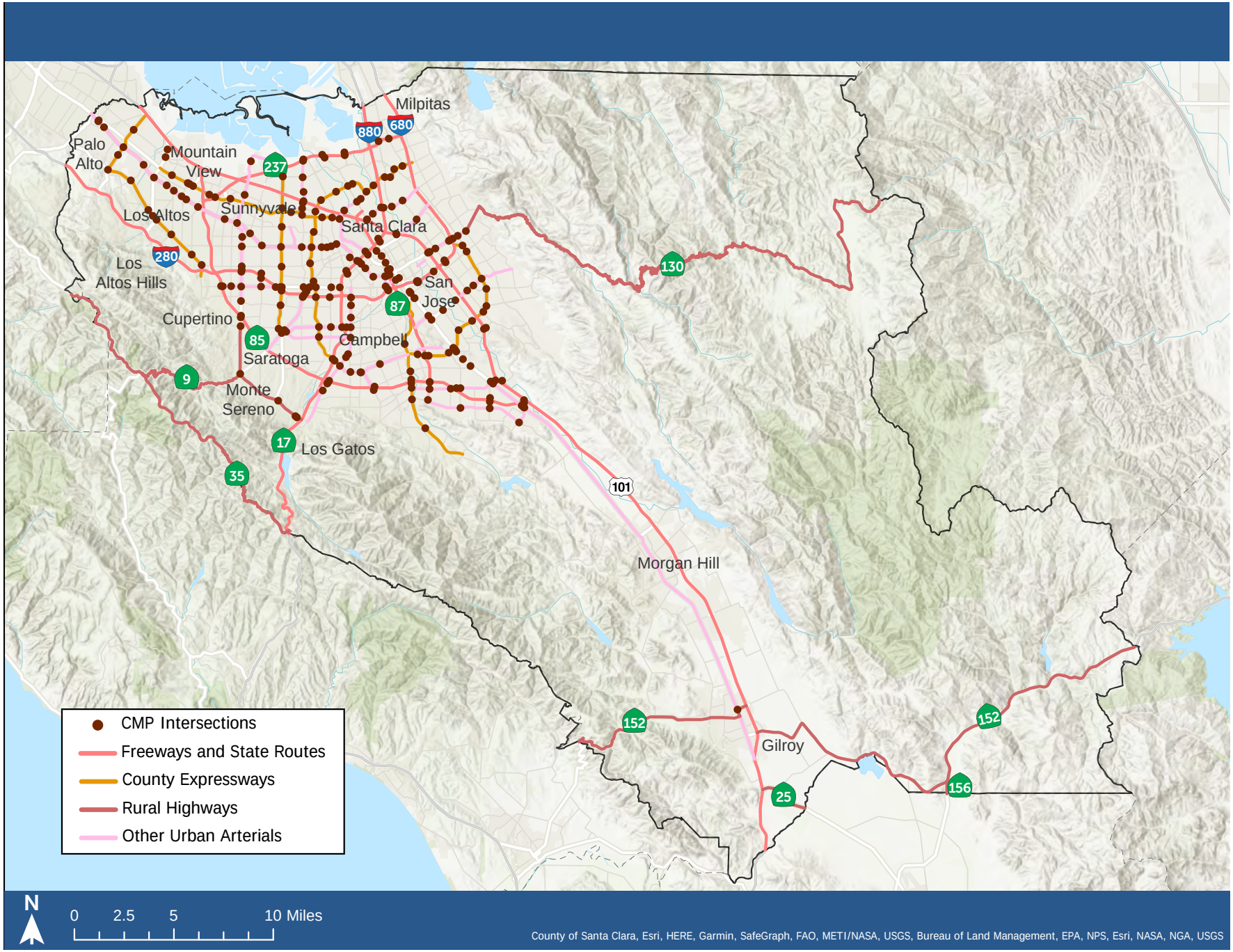

Figure 2.2 | CMP Intersections

managed by the Peninsula Corridor Joint Powers Board (JPB), which consists of VTA, San Francisco Muni and SamTrans.

- BART recently expanded into Santa Clara County with a two-phased 16 mile extension project from South Fremont to Santa Clara. Phase I was completed in June 2020 and provides service from Alameda County to Milpitas and Berryessa/North San José. Phase II is currently in the design and engineering phase and will extend service from the Berryessa Transit Center to stations at 28th Street/Little Portugal, Downtown San José, Diridon Station with the end of service in Santa Clara.

There are a number of other transit services within Santa Clara County provided by other operators or in partnership with VTA, detailed below.

Altamont Corridor Express (ACE) — The Altamont Corridor Express rail service extends from Southern San Joaquin County through Santa Clara County's Great America, Santa Clara University and San José Diridon stations.

It is operated and managed by Altamont Commuter Express Joint Powers Authority (ACE JPA), which consists of Alameda County's CTA, VTA and the San Joaquin Regional Rail Commission.

Altamont Corridor Express (ACE) Shuttles — The ACE shuttles are first and last-mile shuttles that offer connections between the Great America ACE/Amtrak station and employment clusters throughout Milpitas, North San José, Santa Clara and Sunnyvale.

It is operated and managed by VTA in partnership with ACE.

Caltrain Shuttles — The Caltrain Shuttles are first and last-mile shuttles that offer connections between the Mountain View, Lawrence, Diridon and Tamien Caltrain stations and nearby employment centers.

It is operated and managed by Caltrain.

Capitol Corridor Intercity Rail Service — Capitol Corridor is 170 mile commuter rail service that links Sacramento, Oakland and San José.

It is operated and managed by BART, VTA and Caltrans.

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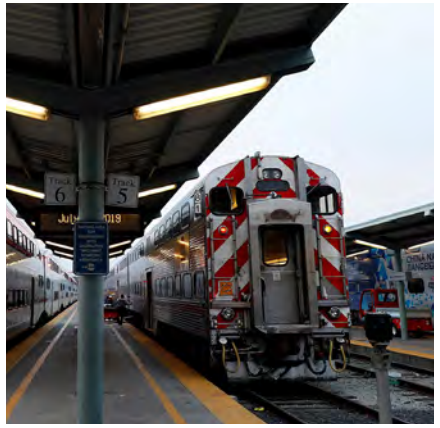
San Francisco Chronicle

BART

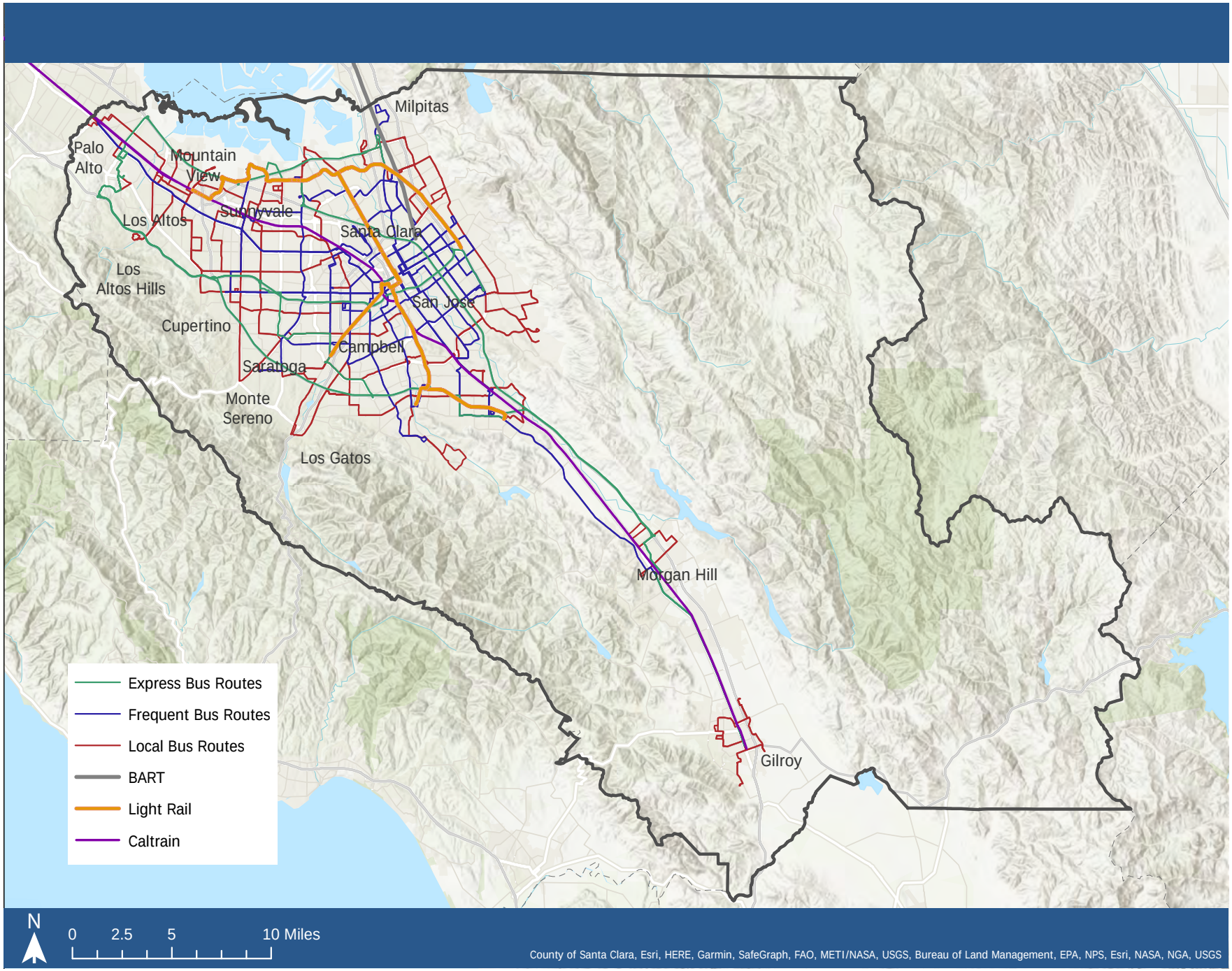

Figure 2.3 | CMP Transit Network

Dumbarton Express Bus (DB) — The Dumbarton Bridge express bus service links the Union City BART station to the Palo Alto Transit Center, Stanford University and the Stanford Research Park.

It is operated and managed by the Alameda-Contra Costa Transit District (AC Transit), BART, SamTrans, Union City Transit and VTA.

Highway 17 Express Bus Service — The Highway 17 Express bus service links Santa Cruz, Scotts Valley and downtown San José.

It is operated and managed by Santa Cruz Metropolitan Transit District (SCMTD).

Marguerite Shuttle — The Marguerite Shuttle serves the Stanford area by connecting the university, Stanford Health Care hospitals and the Stanford Research Park with key destinations such as the Stanford Shopping Center and the Palo Alto Transit Center.

It is operated and managed by Stanford University.

Monterey/Salinas Transit — Monterey/Salinas Transit primarily serves the greater Monterey and Salinas areas, but extends north into San José.

It is operated and managed by Monterey/Salinas Transit.

Mountain View Community Shuttle — The Mountain View Community Shuttle is a free shuttle that provides daily service throughout Mountain View.

It is operated and managed by the City of Mountain View and Google.

Mountain View GO Shuttle — The Mountain View GO Shuttle is a free service that provides first and last-mile connections during weekday commute periods. The shuttles connect the Mountain View Transit Center to employment clusters around the city.

It is operated and managed by Mountain View Transportation Management Association.

CS Engineer Mag

Street Car Mike

Stanford Daily

PLANNED TRANSIT IMPROVEMENTS

There are a number of transit improvements and capital projects planned within Santa Clara County in the coming years. The following section highlights the key projects in the planning or design and engineering phase.

BART Silicon Valley Phase II — BART Silicon Valley is a 16.1-mile extension from Fremont to Milpitas, San José and Santa Clara. Phase II of the project is currently in the design and engineering phase and will extend from Berryessa to downtown San José, Diridon Station and the Santa Clara station.

It is operated and managed by BART.

Better Bus Stops — Better Bus Stops is an ongoing program to improve VTA's 3,000-plus bus stops through repair, rehabilitation and installation of new amenities such as lighting, benches, shelters, signage and concrete work. The project is partly funded by 2016 Measure B's bus stop amenities funding category.

It is operated and managed by VTA.

Caltrain Modernization Program — Caltrain Modernization Program includes the electrification of the existing Caltrain corridor between the Transbay Terminal in San Francisco and Tamien Station in San José and the replacement of Caltrain's diesel trains with electric trains. These improvements will support a blended High-Speed Rail and Electrified Caltrain rail system on the existing two track configuration.

It is operated and managed by Caltrain.

FAST Transit Program — The Fast Transit Program is an agency-wide policy and planning effort to make transit faster and more reliable. The program encompasses complimentary projects aimed at reducing the many sources of delay that compound along a transit route, such as signal delays, boarding delays and traffic delays. The projects benefit the whole transit system, with a focus on VTA's frequent network routes.

It is operated and managed by VTA.

MVGo

BART

Caltrain

High Speed Rail — High Speed Rail is an effort to develop high-speed rail service from Southern California to San Francisco. The proposed route has stations in Gilroy and San José.

It is managed by California High Speed Rail Authority.

RECENTLY COMPLETED TRANSIT IMPROVEMENTS

2019 New Transit Service Plan — The 2019 New Transit Service Plan was implemented in late 2019. The Plan redesigned the transit network to increase ridership, integrate BART service into the network and establish a new foundation for future service changes as the transit markets evolve.

It is operated and managed by VTA.

BART Silicon Valley Phase I — BART Silicon Valley is a 16.1-mile extension from Fremont to Milpitas, San José and Santa Clara. Phase I extended service to Milpitas and Berryessa/North San José. Both stations are completed and are open for ridership.

Operated and managed by BART.

Service Partnership Programs — VTA implemented three new services through partnerships with third-parties.

The Express Bus Partnership Program was launched in mid-2019 and provides Express Bus service tailored to employment clusters.

The Vanpool Partnership Program was launched in 2021 and provides an additional monthly subsidy to commuters in Santa Clara County who participate in the MTC regional vanpool subsidy program.

The SCVMC Shuttle is a first and last-mile shuttle implemented in 2021 between Diridon Station and the Santa Clara Valley Medical Center at Bascom, operated in partnership by VTA with financial support from Santa Clara County.

Transit allows travel within and beyond Santa Clara County and is a key feature in the Complete Street approach. Prioritizing all mode choices, including transit, equally can increase transit ridership, improve transit connectivity, improve transit timing and reduce congestion. Common Complete Street design amenities relating to transit include bus only lanes, signal prioritization and curb extensions, which are a few of the features VTA have incorporated or are planned to incorporate in select CMP urban arterials.

CMP ACTIVE TRANSPORTATION NETWORK

Active transportation is any type of transportation that is human-powered. The two most common examples are bicycling and walking. Active transportation provides direct transportation as well as access to transit services in a healthy and equitable way. While not a requirement of the CMP Statute, VTA has included the bicycle and pedestrian networks as part of its CMP Transportation System since they are a key way to reduce congestion and are aspects of the Complete Street approach.

VTA developed a major update to the county's bicycle plan with the development of the Santa Clara Countywide Bicycle Plan (CBP) in 2018, shown in Figure 2.4. The plan:

- Establishes a network of Cross County Bikeway Corridors (CCBC) that will provide continuous, complete bike

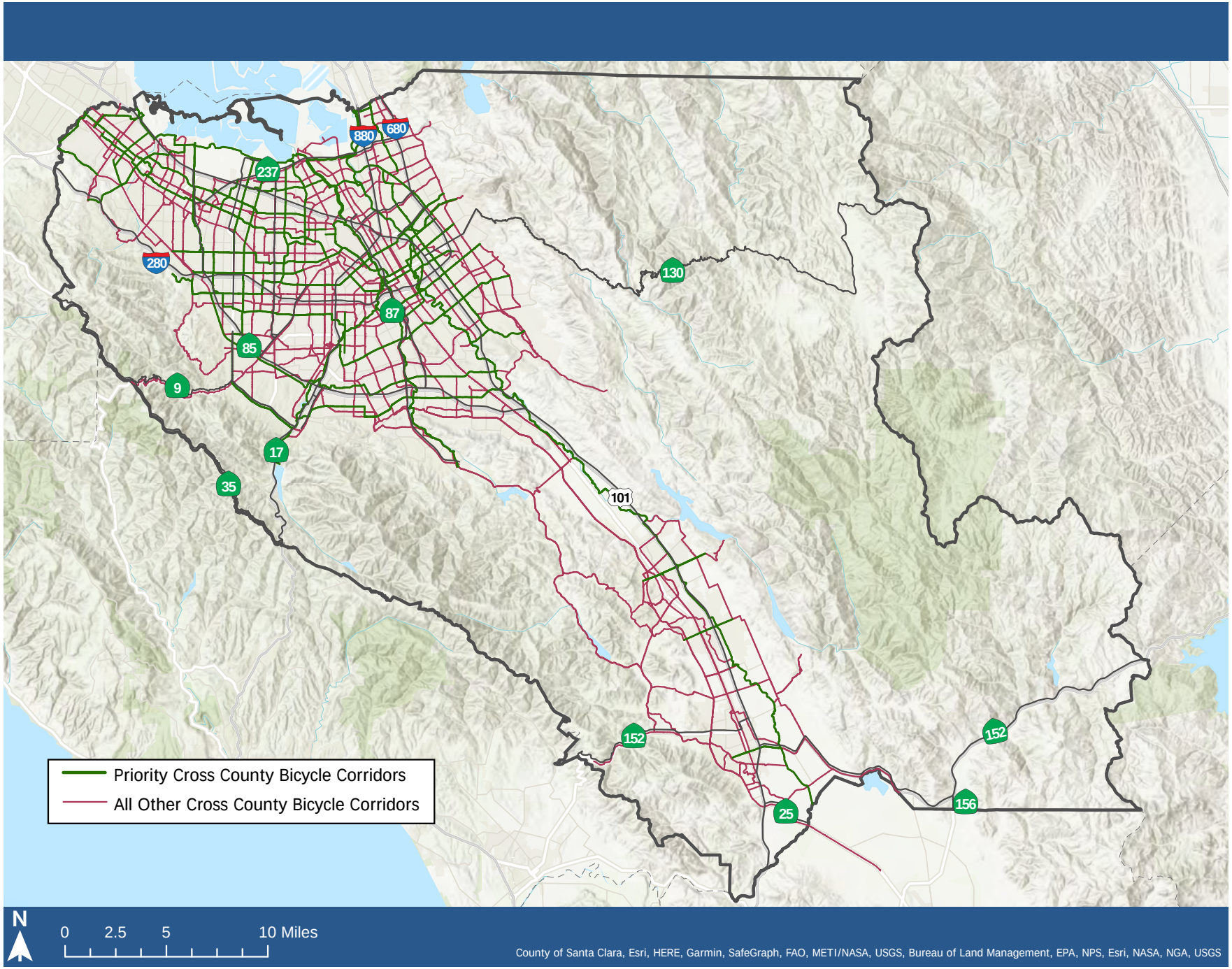

Figure 2.4 | Cross County Corridors

connections across the county;

- Establishes the concept of a Bicycle Superhighway Network, a subset of CCBCs that provide high-quality, uninterrupted, long-distance bikeways separated from motor vehicles;
- Identifies locations where new and improved bicycle connections are needed across freeways, rail lines and creeks; and
- Identifies ways to make it easier for people to use their bicycle with transit, including bicycle access to major transit stops, bicycle parking at stops and bicycle accommodations on board.

Since the plan was adopted, there have been advances in bicycle infrastructure design, advances in planning for bicyclists and a cultural shift toward bicycling. This allows VTA the opportunity to develop new, safe, accessible and equitable bikeways and to model how building new bikeways will affect travel patterns, congestion and greenhouse gas emissions.

The pedestrian network is less defined but includes areas that allow safe travel on foot, such as areas with wide sidewalks, frequent crosswalks, frequent safety features and off-street trails.

The bicycle and pedestrian networks are directly related to the Roadway and Transit Networks. Designing walkable, safe urban arterials can shift users from single-occupancy vehicles to walking or biking. In addition, improving the pedestrian and bicycle network around transit stops can provide first and last mile connections and make transit more attractive.

The CMP Transportation System consists of the roadway, transit, bicycle and pedestrian networks, summarized in Figure 2.5. Each component is an important part of the overall system and is interrelated to one another. The Complete Streets policy and design approach has recently illustrated the importance of designing streets for all modes and users, not just single occupancy vehicles. Integrating this design approach in the CMP Transportation System can reduce congestion, create more equitable transportation choices and create more vibrant communities.

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CMP TRANSPORTATION SYSTEM

CMP ROADWAY NETWORK

- Freeways
- County Expressways
- Urban Arterials
  - Principal Arterials
    - State highway
    - Six-lane facility
    - Non-residential arterial with average daily traffic of 30,000 vehicles per day or greater
  - Roadways that connect with the freeway or county expressway system
- Rural Highways

CMP TRANSIT NETWORK

- Rail Transit Service
  - Caltrain Service
  - VTA Light Rail Service
  - BART Service
- Bus Service

CMP ACTIVE TRANSPORTATION NETWORK

- Bicycle Network
- Pedestrain Network

Figure 2.5 | CMP Transportation System

CHAPTER 3 | TRANSPORTATION ANALYSIS STANDARDS ELEMENT

3. TRANSPORTATION ANALYSIS STANDARDS ELEMENT

This chapter describes VTA's Congestion Management Program (CMP) Transportation Analysis Standards, CMP Auto Level of Service Standards, CMP Auto Level of Service Evaluation Techniques, CMP Roadway Network Level of Service and Compliance and Conformance.

CMP TRANSPORTATION ANALYSIS STANDARDS

BACKGROUND

The CMP Statute requires that CTAs develop a minimum auto Level of Service (LOS) standard for CMP network roadways, which is why clearly defining the roadway network in Chapter 2 is imperative.

There are a variety of ways to measure the transportation impact of a project. The two measurements discussed in this chapter are auto LOS and vehicles miles traveled (VMT), explored in Table 3.1. LOS has been historically used in transportation analysis for the California Environmental Quality Act (CEQA), in the CMP and for local purposes. Recent changes to the legislation have shifted the primary metric for CEQA transportation analysis to VMT. While this shift does not directly impact CMP analysis, it provides a new view of transportation impact analysis in general.

SENATE BILL (SB) 743

In 2013, Senate Bill (SB) 743 directed the Governor's Office of Planning and Research (OPR) to develop a new evaluation criterion for transportation impacts under CEQA. SB 743 stated that the new metric must:

- Promote the reduction of greenhouse gas emissions,
- Promote the development of multimodal transportation networks and
- Promote a diversity of land uses.

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VTA


VTA

Table 3.1 | Auto Level of Services (LOS) and Vehicle Miles Traveled (VMT)

	Auto LOS	VMT
Definition	Qualitatively describes the operating conditions of a roadway based on factors such as speed, travel time, maneuverability, delay and safety.	The total miles of vehicle travel in a set time period.
Metric of Measurement	LOS conditions are indicated by letter designations, from A (least congested) to F (most congested). For complete descriptions of the LOS grading scales for the CMP Roadway Network refer to Appendix D.	VMT is calculated by multiplying the total number of vehicle trips by the average distance of each trip.
CMP Statue Requirement	The CMP must contain traffic LOS standards for a system of key roadways. The LOS standard cannot be below LOS E (or the then-current LOS level if the LOS was below LOS E at the time of the CMA statute adoption in 1991).	The CMP must contain measures to evaluate multimodal system performance, supporting mobility, air quality, land use and economic objectives. While not explicitly mentioned, such measures can include VMT.

Following an extensive guidelines development process, OPR determined that the most appropriate metric to replace LOS in CEQA transportation analysis was VMT. In 2018, the California Natural Resources Agency finalized the revised CEQA Guidelines including changes to implement SB 743. Since then, VTA has engaged with Member Agencies across Santa Clara County, through Working Groups and Board Committees to help implement the CEQA changes via informational and technical assistance.

On July 1, 2020, use of VMT as the primary metric for CEQA transportation analysis became mandatory and in September 2020, the use of VMT for CEQA analysis of capacity-increasing roadway projects became mandatory. As of summer 2021, more than half of VTA's Member Agencies have adopted policies to formalize their use of VMT in CEQA transportation analysis. The remaining agencies are using VMT on an ad hoc basis prior to formally adopting a policy.

POTENTIAL UPDATES TO THE CMP IN RESPONSE TO SB 743

Under the revised CEQA Guidelines issued in December 2018, the Appendix G Checklist includes the new question:

> Would the project…Conflict with an applicable program, plan, ordinance or policy establishing measures of effectiveness for the performance of addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

This new questions in CEQA focuses on aspects of the CMP including transit, bicycle and pedestrian performance. However, auto LOS remains a required method of transportation analysis for CMP purposes. Ultimately, it would be desirable for the transportation analysis required by the CMP to be compatible with the transportation analysis required by CEQA.

One major issue in having two different analyzes in the CMP and in CEQA is that they could conflict. For example, a VMT threshold in CEQA incentives reduction in the overall amount of vehicle travel generated by land use projects. This in turn should incentivize developers to locate projects in infill locations within walking distance of existing jobs, housing, retail, services and transportation facilities, helping meet CEQA VMT standards. However, this strategy could result in additional traffic on CMP facilities already at LOS E or F, which could result in significant impacts according to CMP criteria.

Similarly, mitigating a roadway facility back to compliance with the CMP LOS standard could require adding auto capacity in the form of additional turn lanes or through lanes. However, these mitigation measures could also induce additional vehicle travel and degrade conditions for pedestrian, bicycle and transit modes. This could potentially increase VMT and work against CEQA objectives.

Legislation (AB 1098) was introduced in February 2015 to amend the California Statutes to have the CMP be consistent with the new CEQA metrics per SB 743. However, this bill did not advance through the legislative process. Since then, there has been periodic discussion about other potential legislation to reform to update the CMP Statutes. VTA staff has expressed support to the modernization of the CMP; however, no recent legislation has been introduced since 2015. VTA will continue to monitor this issue and any legislation affecting the CMP.

Regardless of the timing of amendments to the CMP Statutes, VTA staff intends for the CMP to be compatible with the transportation analysis requirements of CEQA. This would support the stated goals of SB 743 and allow a holistic analysis of transportation impacts and solutions. VTA staff has engaged in discussions with Member Agency staff about the possibility of updating the performance measures in the VTA CMP to better align with the direction of CEQA under SB 743.

In April 2019, VTA held a workshop with VTA and Member Agency staff to discuss CMP performance measures. While there was some interest expressed among participants in strengthening the emphasis on VMT and multimodal measures in the VTA CMP, the general consensus was not to make any major changes to the VTA CMP performance measures until after SB 743 is implemented in 2020. As of summer 2021, Member Agencies are still adjusting to the new VMT-focused transportation analysis requirements of CEQA and updating their policies and practices, so VTA and its Member Agencies have not taken any more formal steps regarding potential changes to the CMP performance measures. Several Member Agencies have in parallel taken steps to implement more robust multimodal performance measures for local purposes, particularly for analysis of pedestrian and bicycle conditions.

CMP AUTO LEVEL OF SERVICE STANDARDS

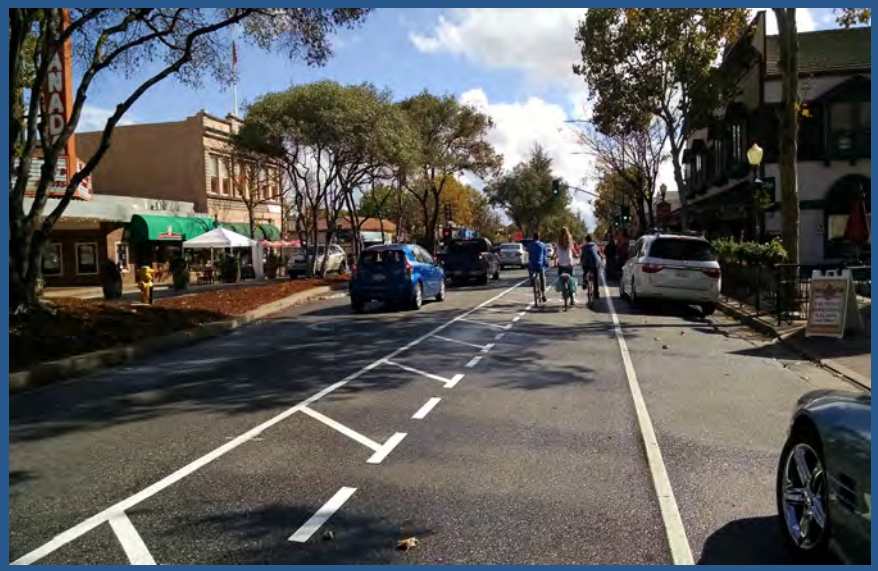
The CMP auto LOS standard must be at or above LOS E with some exceptions. This standard applies across the CMP Roadway Network, including freeways, county expressways, urban arterials and rural highways.

The auto LOS standard of LOS E does not apply for:

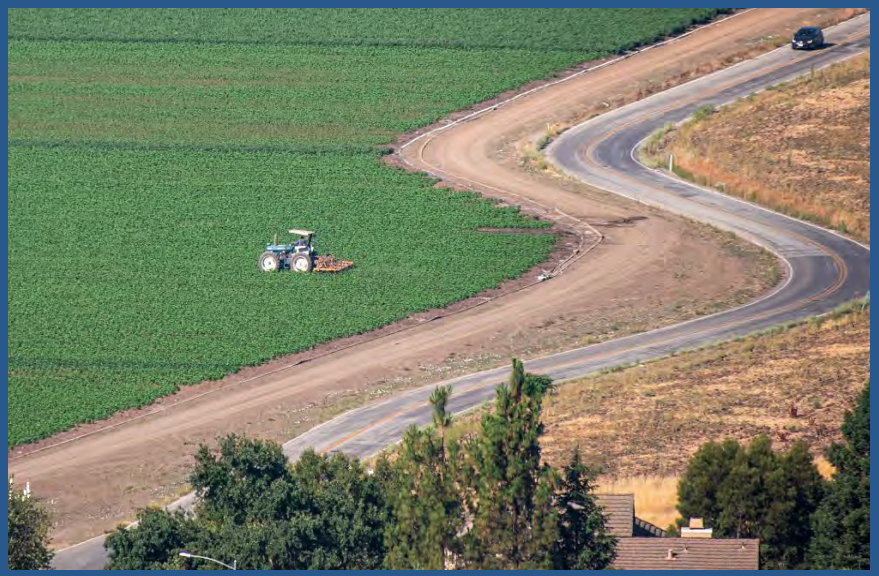
- CMP facilities that had a 1991 baseline of LOS F in the AM or PM peak period. They are “grandfathered” and can

VMT and Auto LOS can Conflict

The **downtown road (left picture)** is a well-used by cars, buses, bicyclists and pedestrians. It has a variety of adjacent land uses, a safe environment for all modes and is in the center of the city.	The **farm road (right picture)** is low-use road. It is primarily used by farm workers in single-occupancy vehicles since the area has limited land uses and is in the outskirts of the city.
If a large-scale apartment complex was proposed in both locations, viewing the transportation impacts through auto LOS and VMT may produce conflicting results.	
The proposed apartment complex may push the already well-used downtown road to **LOS F.**	The proposed apartment complex may keep the farm road **above LOS F.**
The project may generate **low VMT** due to its surrounding land uses and the existing multimodal transportation environment.	The project may generate high VMT, since it is far away from key destinations and does not have a safe multimodal environment.



Complete Streets Project in Morgan Hill, California. *Street Plans.*



Morgan Hill Farms & Markets. *Visit Morgan Hill.*

remain at LOS F. These facilities are shown in Figures 3.1, 3.2 and 3.3 below and listed in Appendix E.
- CMP facilities that fall within an Infill Opportunity Zone (IOZ) established by a Member Agency pursuant to California Government Code 65088.4.

The performance of the CMP facilities is monitored at a minimum every two years. If the minimum Level of Service cannot be maintained on a CMP Roadway, Member Agencies must develop Multimodal Improvement Plans to remain in conformance with the CMP.

If the auto LOS for a CMP facility is currently LOS F and the facility is (1) not grandfathered in, (2) not included in an IOZ, or (3) not covered by an approved Multimodal Improvement Plan, then a project impacts the facility if it will cause changes to traffic conditions greater than the following thresholds:

- **Intersections at LOS F**: The addition of the project traffic increases the average control delay for critical movements by four seconds or more and project traffic increases the critical volume-to-capacity ratio (v/c) by 0.01 or more.
- **Freeway Segments at LOS F**: The number of vehicle trips added by the project is more than one percent of the freeway capacity (the calculation shall be for each direction of travel).
- **Rural Highway at LOS F**: The number of vehicle trips added by the project is more than one percent of the rural highway capacity.

It is important to emphasize that local land use decisions and requirements for improvements can be made based on a stricter LOS standard if established by a Member Agency.

As of summer 2021, one VTA Member Agency – the City of San Jose - has taken action to designate Infill Opportunity Zones. In February 2018, the San Jose City Council designated a number of Infill Opportunity Zones across the City, at the same time that the City approved its new VMT-focused Transportation Policy 5-1 to meet the requirements of SB 743. San Jose's Infill Opportunity Zones (shown in Figure 3.4) include 40 CMP intersections that are owned by the City. As a result of the IOZ designation the CMP LOS standard no longer applies to these 40 intersections, although VTA currently still reports on their performance in the CMP Monitoring and Conformance Report.

CMP AUTO LEVEL OF SERVICE EVALUATION TECHNIQUES

In addition to adopting a LOS standard, the CMP Statute requires that a uniform methodology be used to evaluate LOS on CMP system roadways. VTA fulfills this requirement by maintaining a Traffic LOS Analysis Guidelines document which was developed in consultation with its Member Agencies. The current VTA Traffic LOS Analysis Guidelines (2003) are based on the 2000 Highway Capacity Manual (HCM).

The VTA CMP includes two mechanisms for monitoring the Level of Service of the CMP Roadway Network:

1. **The CMP Monitoring and Conformance Report** — A periodic study that collects Level of Service data on CMP roadways as well as land use approval data by Member Agencies.
2. **Transportation Impact Analysis Requirement** — The CMP requires cities/towns and the County to prepare a Transportation Impact Analysis (TIA) report that documents the impacts that new developments would have on the CMP Roadway Network, as well as other parts of the transportation system, and the transportation

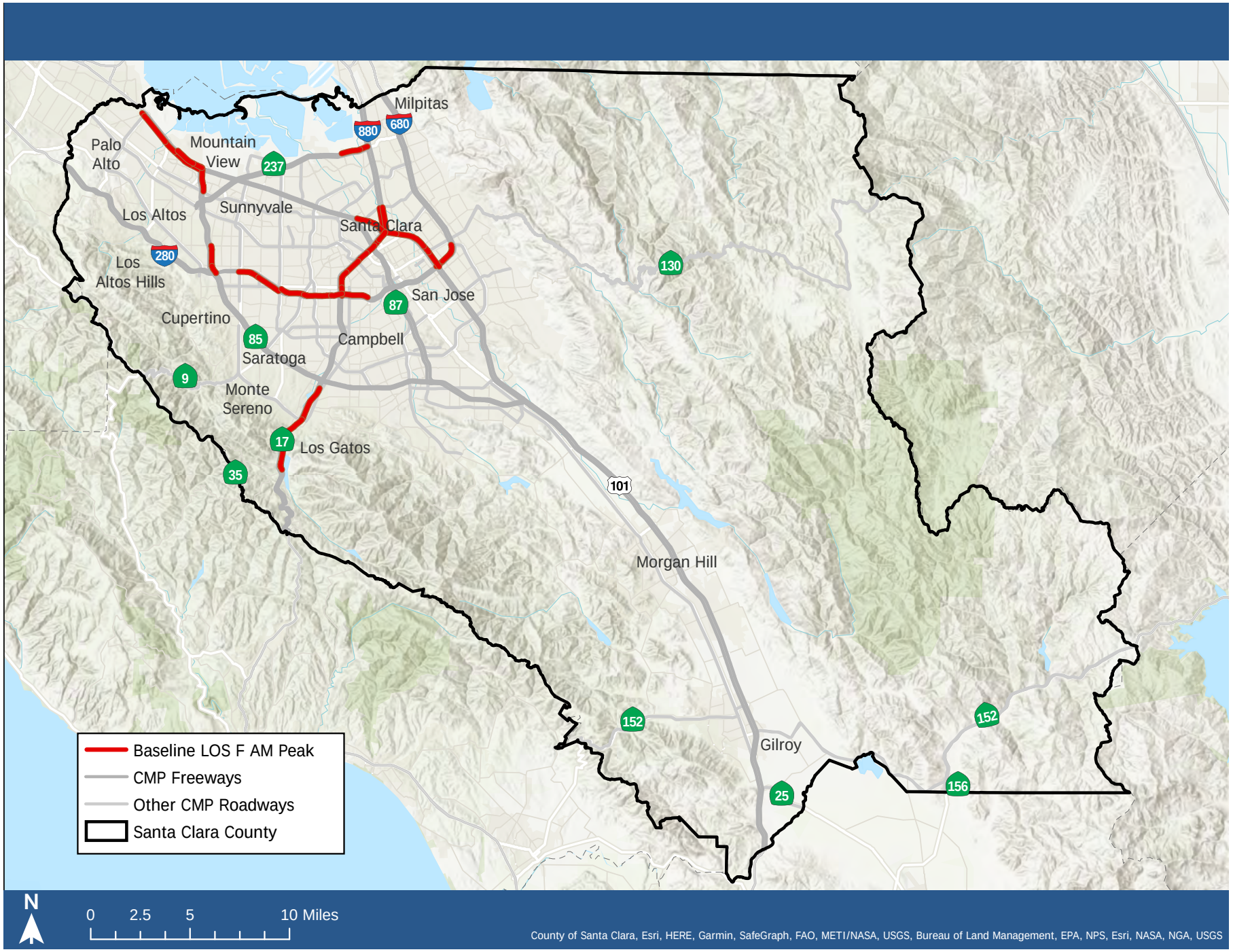


Figure 3.1 | Freeway at LOS F in the 1991 Baseline AM Peak

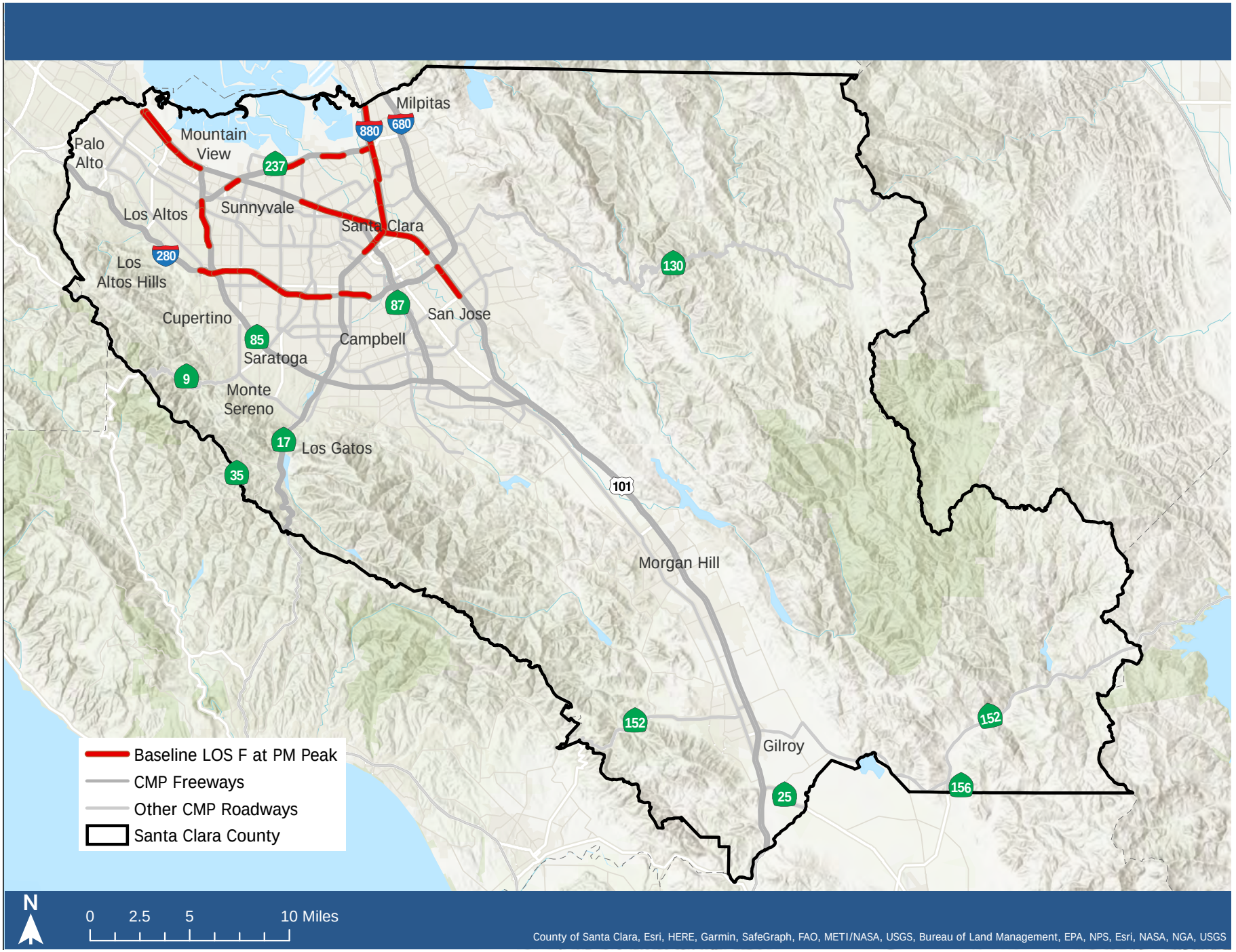


Figure 3.2 | Freeway at LOS F in the 1991 Baseline PM Peak

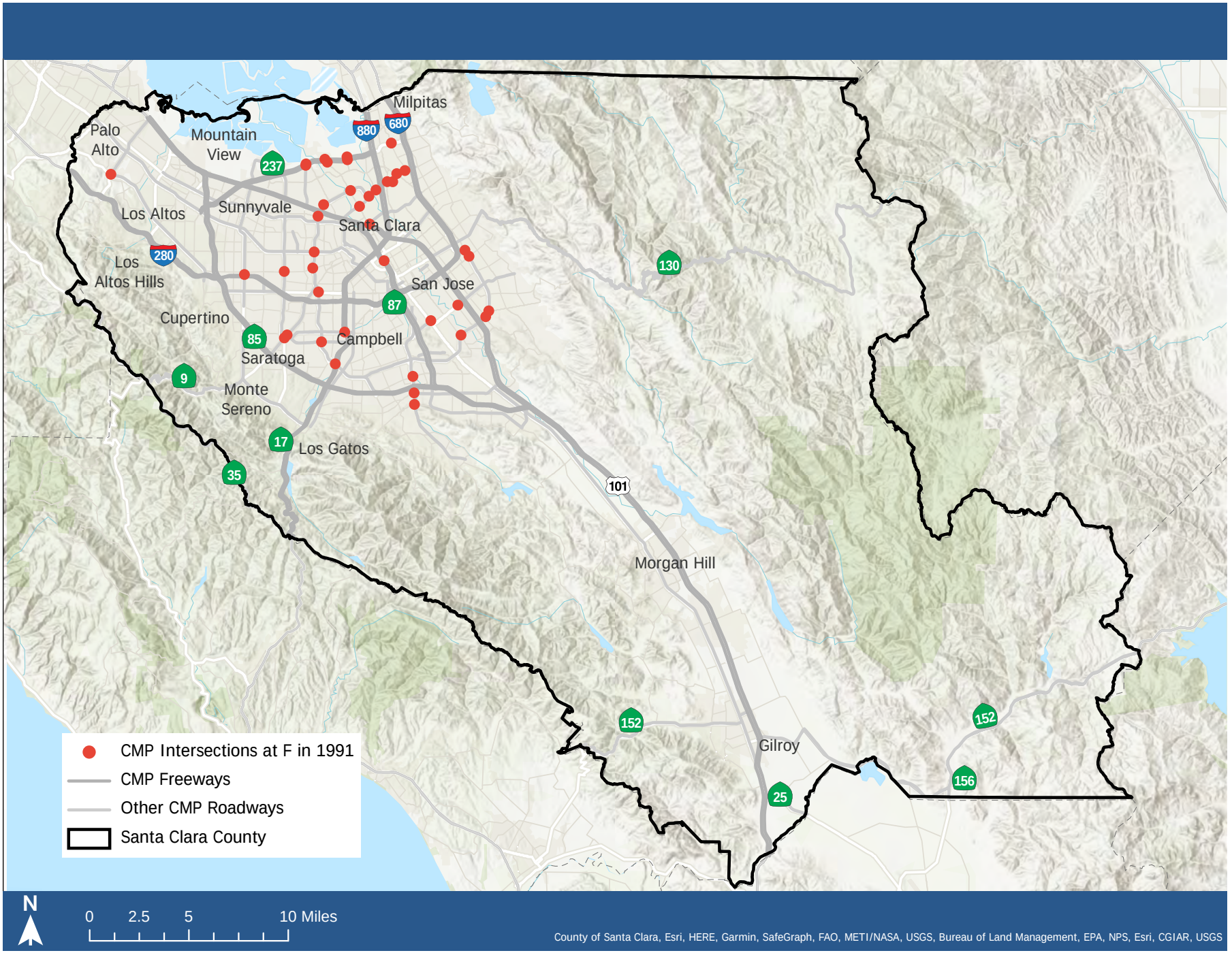


Figure 3.3 | Intersections at LOS F in the 1991 Baseline PM Peak

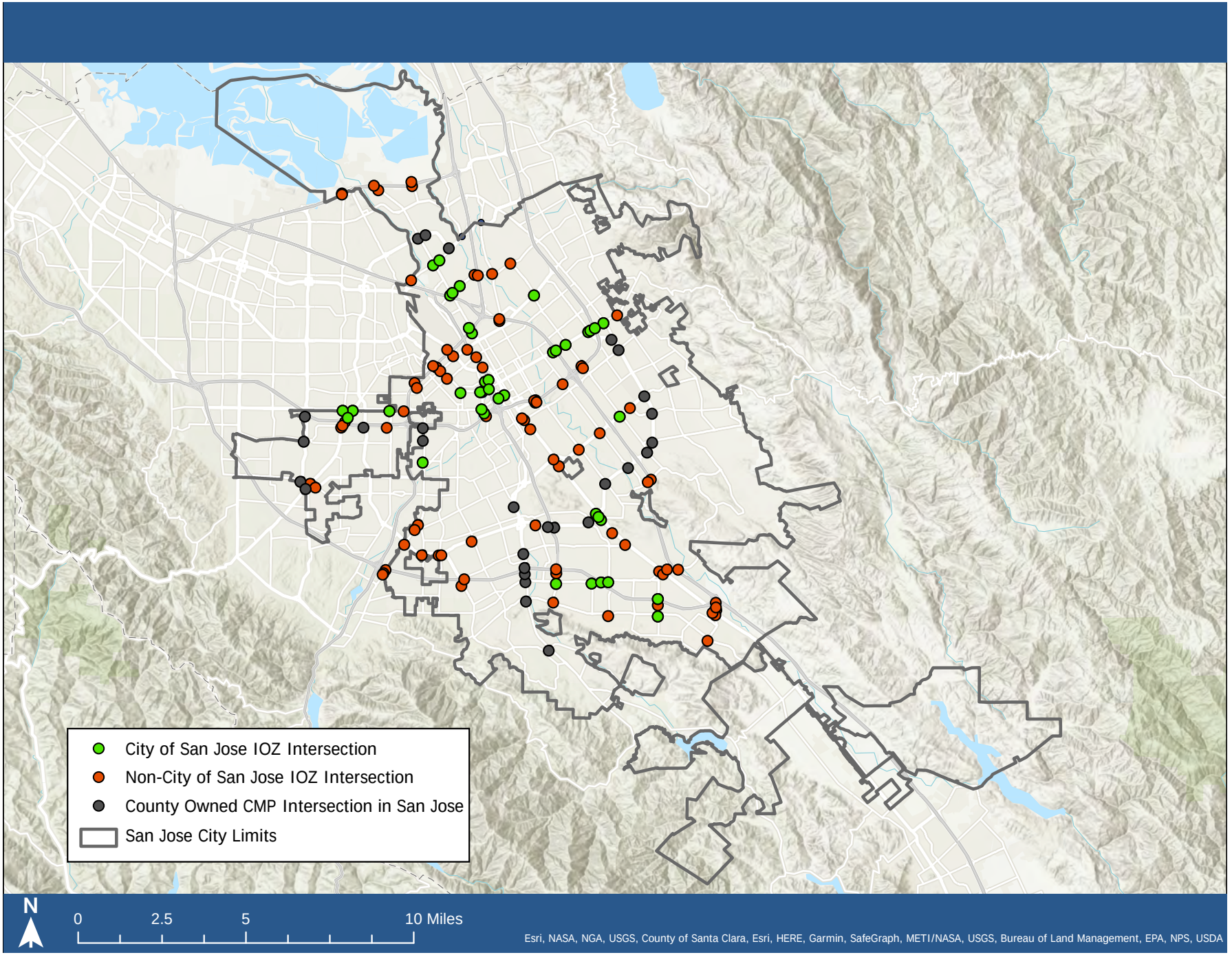


Figure 3.4 | Infill Opportunity Zones in San Jose

improvements required to mitigate these impacts.

CMP AUTO LEVEL OF SERVICE METHODOLOGIES

The following section outlines specific auto LOS methodologies used in the VTA CMP. The Traffic LOS Analysis Guidelines include more technical information on auto LOS measurement.

Urban Arterials and County Expressways — The 2000 HCM intersection analysis operations methodology, which is based on Average Control Delay, is used to monitor auto LOS on urban arterials and county expressways.

Freeway Segments — Freeway segments are evaluated based on the procedures of the 2000 HCM. VTA uses big data to collect a comprehensive set of data for every freeway segment. Big data is used to measure traffic speed, which forms the basis to calculate LOS as well as density and flow rates based on a density-speed curve.

Rural Highways — Procedures described in Chapter 20 of the 2000 HCM are used to measure the percent time-spent following and average travel speed, with appropriate inputs for peak hour and peak 15 minute traffic volumes, the percentage split between the two directions of traffic, the percentage of trucks in the traffic flow and the type of terrain.

CMP AUTO LOS CONFORMANCE EXCLUSIONS

The CMP legislation excludes certain types of traffic and situations from the determination of conformance with CMP traffic LOS standards (California Government Code Section 65089.4 (f)). Exclusions can include traffic caused by interregional travel, construction and ramp metering. VTA CMP Traffic Level of Service Analysis Guidelines contains complete information on how each of these exclusions is to be addressed in a TIA.

While the traffic problems caused by these situations are technically exempt under the CMP Statute, local jurisdictions should try to develop solutions for congested roadway facilities to improve mobility and air quality on the CMP System. This may include operational changes (e.g., traffic signal coordination), improvements to active transportation modes, or Transportation Demand Management strategies. In addition, it is important to note that although these projects or situations are exempt from CMP standards, these exemptions do not necessarily apply to the CEQA process; for instance, construction projects may have temporary air quality, noise or vibration impacts that should be disclosed in a CEQA document.

CMP ROADWAY NETWORK LEVEL OF SERVICE

The CMP Monitoring and Conformance Report summarizes the Level of Service for the CMP Roadway Network. As of summer 2021, the 2018 CMP Monitoring and Conformance Report is the most recent edition released. It includes data from the baseline year, 1991, through the year 2018 for the three roadway facilities included in the CMP Roadway Network. A revised CMP Monitoring and Conformance Report was planned for 2020; however, due to the COVID-19 pandemic, it was recommended that no data be collected in 2020, with VTA resuming efforts in 2021.

A brief summary of the results from the 2018 report is provided below.

ARTERIAL ROADWAYS (CMP INTERSECTIONS)

Auto LOS data was most recently collected and evaluated by VTA and Member Agencies in the fall of 2018. The data collection for 2018 analyzed all 252 CMP intersections.

In 2018, there were three CMP intersections that operated below the CMP level of service standard. Two of these intersections, Page Mill Road/Oregon Expressway and Foothill Expressway and Montague Expressway at McCarthy Boulevard/O'Toole Avenue, are exempt from meeting CMP conformance requirements due to operating at LOS F under 1991 baseline conditions. One intersection, Central Expressway & De La Cruz Boulevard, has been operating at LOS F since 1996, prior to which it was operating at LOS E. The Central Expressway and De La Cruz Boulevard intersection is included in the Santa Clara MIP, adopted November 1, 2018.

Table 3.2 shows the percentage breakdown by LOS for all CMP intersections since 1991. The detailed listing of LOS levels at each CMP intersection is included in the 2018 Conformance and Monitoring Report.

FREEWAYS

Auto LOS data was most recently collected and evaluated in the fall of 2018. In 2018, there were 96 and 117 directional miles operated at LOS F during the AM and PM peak periods, respectively, without consideration of the CMP exemption. There were 44% and 51% of the total directional miles in the county observed LOS E or worse during AM and PM peak period, respectively. In comparison with 2017 CMP monitoring, PM peak period experienced more noticeable deterioration in LOS, since 41 miles (13% of total network) has fallen to LOS D or worse.

Figures 3.5 and 3.6 show the auto LOS on the freeway system in 2018 for the AM and PM Peak Periods, respectively.

RURAL HIGHWAYS

Traffic counts were conducted at the 12 rural highway locations during the fall of 2018. All 12 rural highways operated at LOS E or better in 2018. Traffic volumes in 2018 are generally lower at the 12 locations, overall by 3% compared to 2016. Nine of the 12 segments operate at LOS C or better during the peak hours. The three segments that operated at or below LOS D are:

- State Route 9 south of Big Basin Way operates at LOS E,
- State Route 25 south of Bloomfield Avenue operates at LOS E and

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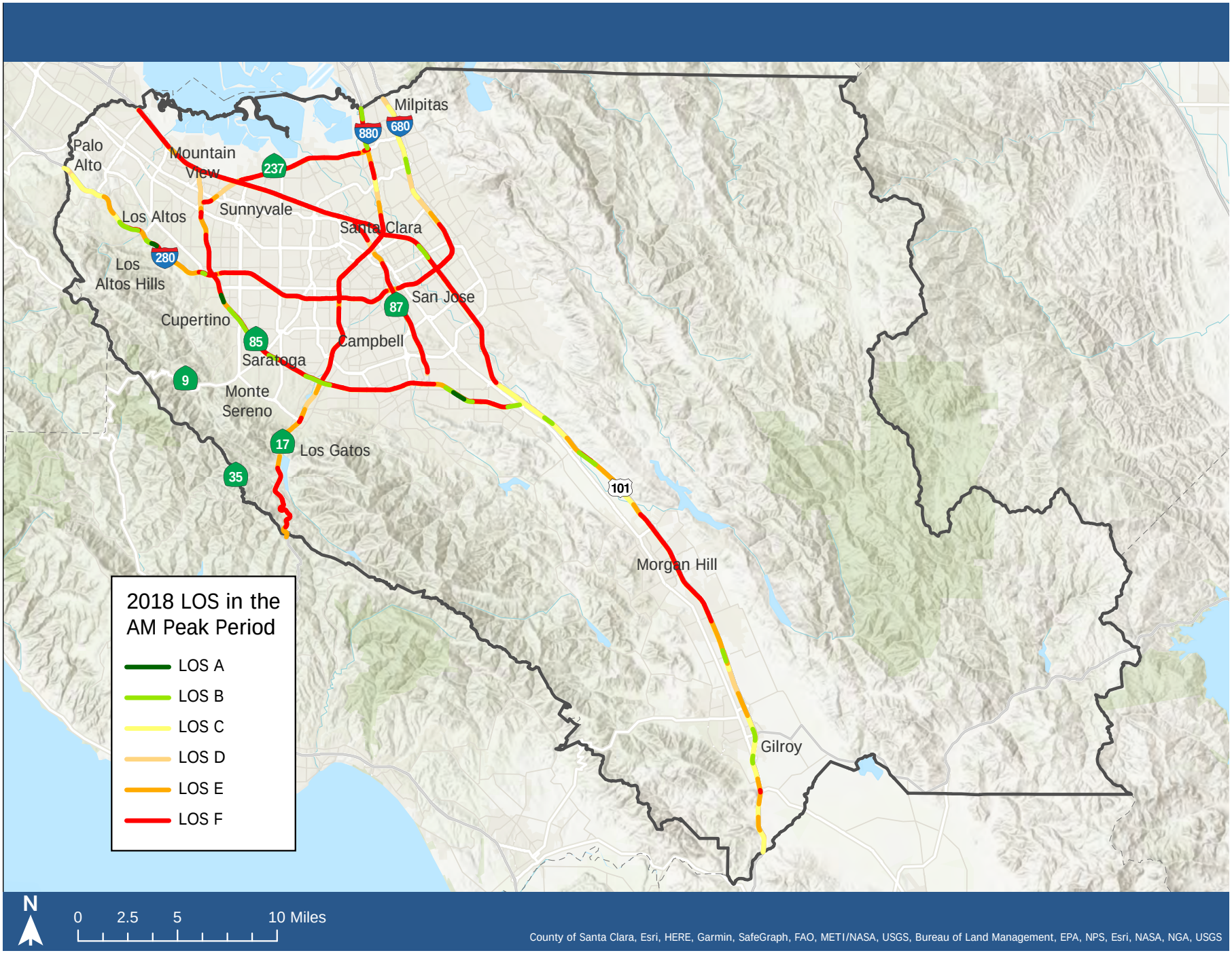

Figure 3.5 | 2018 Freeway Mixed Flow Level of Service in the AM Peak Period

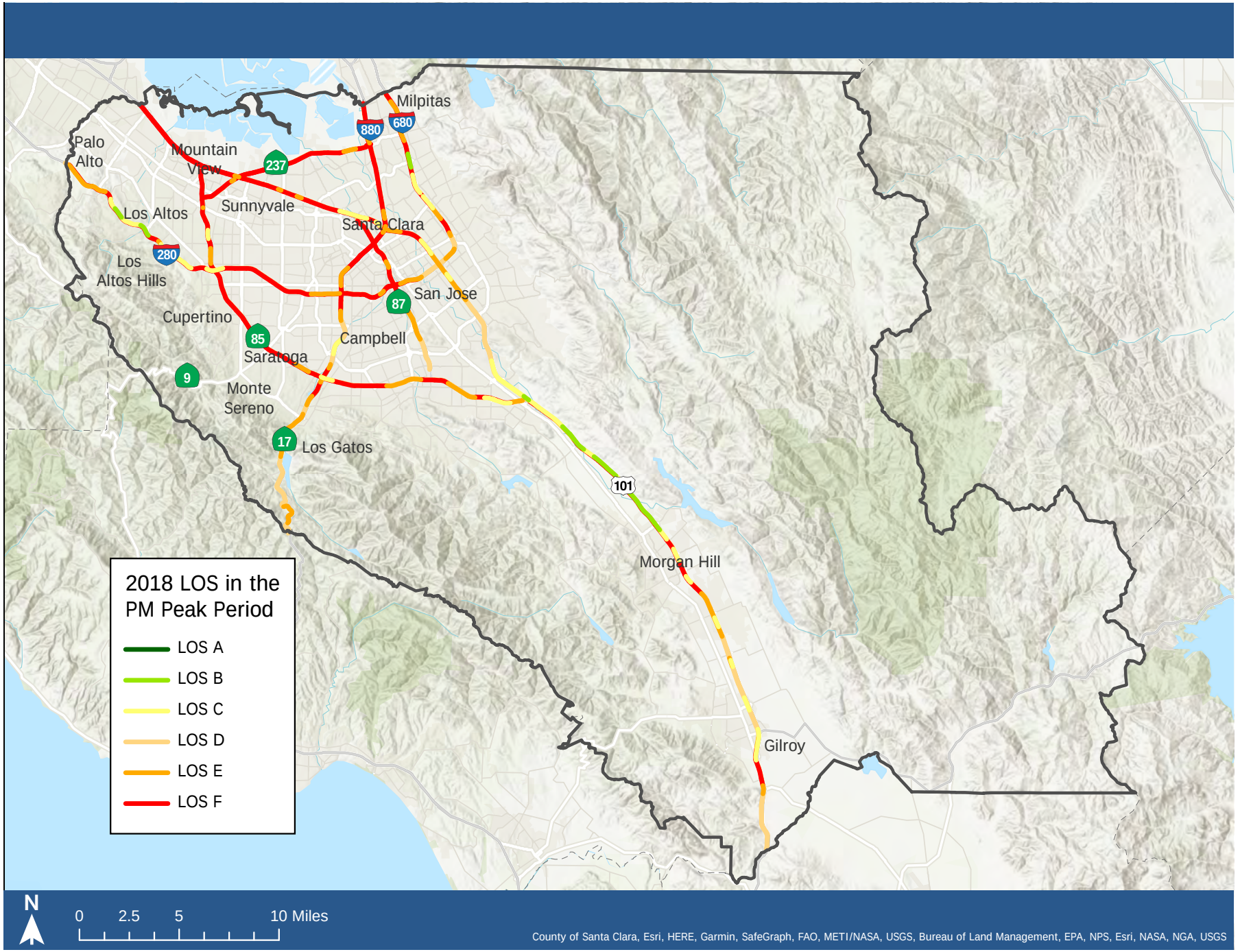

Figure 3.6 | 2018 Freeway Mixed Flow Level of Service in the PM Peak Period

- State Route 156 south of State Route 152 operates at LOS D.

For further details on arterial roadways, freeways or rural highway LOS, refer to the most current CMP Monitoring and Conformance Report.

COMPLIANCE AND CONFORMANCE

To be in conformance with the VTA Congestion Management Program, Member Agencies are required to monitor and submit a report on the Level of Service on CMP intersections within their jurisdiction biennially. Beginning with the 2012 Monitoring cycle, VTA began conducting the monitoring and LOS analysis for CMP intersections on behalf of the Member Agencies.

VTA is responsible for monitoring the performance of CMP intersections, freeways and rural highways and must determine consistency with the LOS standards for the entire CMP Roadway Network. If a roadway facility is not conforming to the LOS standards based on the monitoring process, the affected local jurisdiction will be notified and may elect to remedy the LOS problem or prepare a Multimodal Improvement Plan.

Table 3.2 CMP Intersection Level Of Service By Percentage, 1991 – 2018

	A	B	C	D	E	F
1991	4%	19%	13%	27%	19%	17%
1992	5%	17%	14%	36%	16%	11%
1994	4%	18%	23%	37%	14%	4%
1996	3%	17%	22%	36%	15%	7%
1997	1%	19%	22%	31%	18%	9%
1998	1%	19%	22%	34%	15%	10%
2000	1%	18%	24%	34%	12%	10%
2001	2%	18%	20%	37%	15%	9%
2002	0%	19%	21%	40%	14%	6%
2004	4%	16%	30%	41%	8%	3%
2006	3%	15%	30%	41%	10%	2%
2008	4%	16%	24%	40%	15%	1%
2010	4%	15%	30%	38%	12%	1%
2012	4%	15%	27%	45%	8%	1%
2014	4%	15%	28%	38%	12%	3%
2016	4%	14%	23%	39%	14%	3%
2018	5%	13%	27%	42%	11%	1%

CHAPTER 4 | MULTIMODAL PERFORMANCE MEASURES ELEMENT

4. MULTIMODAL PERFORMANCE MEASURES ELEMENT

This chapter explores the CMP Multimodal Performance Measures development and its use in CMP-related activities.

BACKGROUND

Performance measures are important analytical tools in addressing transportation problems and determining the best solution. Performance measures provide a common framework to evaluate a variety of strategies that might otherwise be difficult to compare. They allow an apples-to-apples comparison and show the tradeoffs between alternatives.

How a problem is defined greatly influences how it is solved. For example, defining transportation problems in terms of congestion and travel delay creates an auto-centric view of transportation. An immediate strategy to address congestion would be to add new travel lanes. However, as discussed in Chapter 3, this does not address the whole issue and could end up creating more congestion in the long-term. If transportation problems are viewed and defined differently, such as through the use of VMT, the overall view and potential solutions change. A wide range of Performance Measures allows VTA and its Member Agencies to look at a problem from many different angles to fully understand it and find the best solution.

The VTA Board adopted ten CMP Performance Measures as part of the 1995 CMP. There has been updates since its original adoption, the current CMP Performance Measures are summarized below and technical documentation is provided in Appendix F.

As noted in Chapter 3, the adoption of SB 743 in 2013 has led California to shift the emphasis of CEQA transportation analysis from auto LOS to VMT; however, the CMP Statutes still require auto LOS for transportation analysis. VTA has included VMT as one of the multimodal performance measures in the CMP for a number of years, although its use has been limited to certain purposes, as described further below. VTA will continue to work with its Member Agencies to look at how VMT may be further incorporated into the CMP in future years.

DEVELOPMENT OF MULTIMODAL PERFORMANCE MEASURES

The purpose of multimodal performance measures is to evaluate how well Santa Clara County's transportation system serves the public and contributes to economic development, environmental sustainability and quality of life. Performance measures may be applied to a specific geographic area or to a single mode type within the County. They may be used to compare alternatives during a specific time period or under alternative investment strategies. The key considerations when selecting performance measures are explored in Table 4.1.

VTA CMP MULTIMODAL PERFORMANCE MEASURES

The 1995 CMP Document identified a set of performance measures to meet specific statutory requirements in the CMP legislation. Through subsequent planning efforts, the performance measures have evolved and have taken a more sensitive, effective and efficient approach. Measures have

also been added for pedestrian and bicycle Quality of Service, transit vehicle delay and transit performance and sustainability.

Table 4.1 Development of Multimodal Performance Measures

Key Consideration	Definition
Suitability	Does the measure meet the goals and objectives of the plan or project they are evaluating?
Clarity	Is the measure understood by policymakers, professionals and the public?
Measurability	Is it possible to use available tools and resources to measure performance? What is the level of accuracy? Is the data reliable? Is the measure related to performance?
Forecastability	Can the performance measure be used to determine if alternatives are comparable? Can existing forecasting tools be used to measure performance?
Multimodality	Does the measure evaluate the travel modes being considered? Does it indicate meaningful tradeoffs between alternative modal investments?
Temporal Issues	Is the measure comparable over time? Is it capable of measuring the magnitude and location of temporal issues on travel demand? Can the measure differentiate between peak-period, off-peak and daily travel demand?
Geography	Is the measure applicable to all areas of the County? Can it differentiate facility types? Can it be applied at a regional, subarea, corridor, or location specific level?

The following section describes the CMP multimodal transportation system performance measures currently in use, which are:

1. Auto Level of Service
2. Vehicle Miles Traveled
3. Modal Split
4. Pedestrian and Bicycle Quality of Service
5. Transit Vehicle Delay
6. Transit Accessibility
7. Air Quality
8. Duration of Congestion
9. Hours of Delay Per Person Per Trip
10. Travel Time and Travel Time Index
11. Transit Service Guidelines
12. Travel Pattern (In Person Trips)

Tables 4.2 and 4.3 summarize the performance measures and their application.

Critical concept – Must be addressed across all performance measures

Performance measure specific concept – Use varies for each of the performance measures

Table 4.2 Summary of VTA's 2021 CMP Multimodal Performance Measures

Performance Measure	Mode(s) Analyzed	Brief Definition	Metric Improves If...
Auto Level of Service (LOS)	Auto	A measure of vehicle delay and traffic flow at intersections and along roadway segments.	Congestion and delay decrease and traffic flows more smoothly at specific intersections or roadway segments.
Vehicle Miles Traveled (Per Capita, Employee or Person-Trip)	Auto	A measure of the total amount of auto travel (trips multiplied by average trip length), associated with a specific site or within a defined area.	The total amount of auto travel to/from a specific site or within a defined area decreases or grows more slowly than the number of residents or employees or the amount of travel by non-auto modes.
Modal Split	All Modes	The percentage of travelers using the major transportation modes (e.g. drive-alone auto, HOV, transit, pedestrian and bicycle).	The total number of trips by transit, pedestrian, bicycle, and HOV modes increases faster than the total number of auto trips to/from a specific site or within a defined area.
Pedestrian and Bicycle Quality of Service (QOS)	Pedestrian and Bicycle	A measure of features of the environment that affect the comfort and safety of pedestrians and bicyclists from the user's perspective.	Physical modifications to intersections or roadway segments provide a greater level of comfort and safety for pedestrians and bicyclists.
Transit Vehicle Delay	Transit	A measure of delay experienced by transit vehicles, associated with overall automobile congestion at specific intersections or along a transportation corridor.	Transit vehicles experience reduced delay at an intersection or along a corridor, either through an overall decrease in congestion or through the implementation of transit priority measures.
Transit Accessibility	Transit	An aggregate index of transit frequency, accessibility and coordination to determine how well transit serves the population of Santa Clara County.	Transit frequency, accessibility and/or coordination improve.
Air Quality	N/A	Countywide measures of specific pollutants emitted by mobile sources (e.g., autos, trucks and transit vehicles).	Travel patterns reflect lower overall vehicle miles traveled (see above), and/or changes to travel speeds, frequency of starting/stopping, or other factors reduce air pollutants.

Performance Measure	Mode(s) Analyzed	Brief Definition	Metric Improves If...
Duration of Congestion	Auto	The length of time that a transportation facility is congested.	The duration of congestion on a transportation facility decreases.
Hours of Delay/ Person-Trip	Auto or Transit	The total amount of delay experienced by users of a transportation facility, divided by the total number of person-trips on the facility.	Transportation facility improvements result in reduced delay or the use of more efficient travel modes increases while delay stays the same.
Travel Time Index	Any mode, most often Auto or Transit	The amount of time to travel between two points by a particular mode or the average across all modes	Travel time between two points by a particular mode or across all modes decreases.
Transit Service Guidelines	Transit	Productivity guidelines that use boardings per hour and average peak load factor.	Average boardings per hour and average peak load factor increase to meet/exceed the productivity guidelines.
Travel Pattern (in Person Trips)	All Modes	The total amount of directional travel between given geographic areas, such as Traffic Analysis Zones (TAZs), cities or counties.	N/A

AUTO LEVEL OF SERVICE

As noted in Chapter 3, auto LOS is used to characterize auto speed, travel time, freedom to maneuver, comfort/ convenience and traffic interruptions. Auto LOS is categorized from A through F; with LOS A representing free-flow travel and LOS F representing congested traffic flow at specific intersections or along roadway segments.

Auto LOS is a vehicle-based performance measure and may be used to measure imbalances between traffic volume (demand) and capacity (supply) in specific locations on the roadway system. Changes in volume can be caused by intensification of development, mode shifts, time of day shifts or changes in travel patterns. In contrast, adding lanes, modifying intersections, increasing transit infrastructure and using intelligent transportation system strategies can increase capacity and improve operations in roadway facilities.

Auto LOS is a widely accepted measure of roadway system performance and when used in conjunction with other performance measures, auto LOS can be a much more meaningful performance measure. By itself, LOS can create a singular focus on traffic and may encourage the belief that a significant increase in roadway, intersection or interchange capacity is the most effective way of addressing roadway performance. Using other performance measures in addition to auto LOS can help decision makers see the benefits of a wider range of improvements that encourage multimodal uses.

Table 4.3 Applicability of VTA 2021 CMP Multimodal Performance Measures

Performance Measure	Member Agencies		VTA/Member Agencies	VTA		
	Evaluation of Development Projects	Evaluation of Long-Range Planning Efforts	Evaluation of Transportation Capital Projects	Countywide Transportation Plan	Monitoring & Conformance	Transit Service & Operations Planning
Auto Level of Service (LOS)	Required per CMP Transportation Analysis Standards	Required per CMP Transportation Analysis Standards	Required per CMP Transportation Analysis Standards	Required per CMP Transportation Analysis Standards	Required per CMP Transportation Analysis Standards	N/A
Vehicle Miles Traveled (Per Capita, Employee or Person-Trip)	Recommended for consistency with recent state legislation	Recommended for consistency with recent state legislation	Recommended for consistency with recent state legislation	Included; Anticipated updates in response to state legislation	Under evaluation for future reporting with Big Data	N/A
Modal Split	Recommended	Recommended	Recommended	Included	N/A	N/A
Pedestrian and Bicycle Quality of Service (QOS)	Required for per CMP TIA Guidelines changes to roadway geometry or signal operations; Recommended for other projects	Recommended	Recommended	N/A	Key CMP facilities evaluated in pilot studies (2011-2013)	N/A
Transit Vehicle Delay	Required per the CMP TIA Guidelines	Recommended	Recommended	N/A	N/A	N/A
Transit Accessibility	N/A	Recommended	Recommended for projects changing frequency, accessibility or coordination of transit routes/facilities	Included	N/A	Included
Air Quality	Recommended; Often required in CEQA evaluation	Recommended; Often required in CEQA evaluation	Recommended; Often required in CEQA evaluation	Included	N/A	N/A

Performance Measure	Member Agencies		VTA/Member Agencies	VTA		
	Evaluation of Development Projects	Evaluation of Long-Range Planning Efforts	Evaluation of Transportation Capital Projects	Countywide Transportation Plan	Monitoring & Conformance	Transit Service & Operations Planning
Duration of Congestion	N/A	Recommended	Recommended	Included	Under evaluation for future reporting with Big Data	N/A
Hours of Delay/ Person-Trip	N/A	Recommended	Recommended	Included	N/A	N/A
Travel Time Index	N/A	Recommended	Recommended	Included	Under evaluation for future reporting with Big Data	N/A
Transit Service Guidelines	N/A	N/A	Required for VTA transit; N/A other projects	N/A	N/A	Included
Travel Pattern (in Person Trips)	N/A	N/A	N/A	Included	N/A	N/A

VEHICLE MILES TRAVELED

Vehicle Miles Traveled (VMT) is a measure of the total amount of vehicle travel on the roadway network. VMT can be normalized to reflect travel efficiency, such as measuring VMT per capita, employee or person-trip.

Normalization is an important step to understand the meaning of a given change in VMT. An absolute increase in VMT could indicate a greater number of single-occupant vehicle trips or an increase in trip lengths; however, if the rise in VMT is slower than the rise in population (showing an overall decrease in VMT per capita), it would indicate that the usage of the transportation network is becoming more efficient over time.

VMT (per capita, employee or person-trip) is therefore a compound performance measure encompassing auto trip generation, average auto trip length and modal split. This makes it a good indication of the overall efficiency of the multimodal transportation network, but not an ideal tool to identify specific problems in specific locations within the network.

Conversely, an increase in VMT per capita, employee or person per trip could be an indication that the total

amount of auto travel is increasing, travel by transit, bicycle, pedestrian and HOV modes is decreasing or not increasing as fast as auto travel. These effects could be caused by an inefficient land use pattern, a degradation of non-auto transportation infrastructure or a significant enhancement to auto infrastructure without equivalent investments in non-auto modes, a reduction in TDM incentives to residents or employees in an area, or any combination of these factors.

With the passage of SB 743, VMT measures will take on greater prominence in transportation analyses for CEQA as well as CMP purposes. As such, VTA will revisit this performance measure to consider updates for future versions of the CMP.

Starting in July 2020, Lead Agencies under the California Environmental Quality Act (CEQA) are required to use VMT as the primary metric for CEQA transportation analysis. Beginning in September 2020, Caltrans began requiring the use of VMT in CEQA analysis of projects that increase roadway capacity on the State Highway System.

VTA has provided several resources to assist cities and the County in conducting VMT analysis of land use projects. In February 2020, VTA provided Base VMT estimates for a base year of 2015, prepared using the VTA travel demand model, to the 15 cities/towns and the County of Santa Clara. VTA has also developed a countywide, web and Geographic Information Systems (GIS)-based tool, called the Santa Clara Countywide VMT Evaluation Tool, which is available at https://vmttool.vta.org.

MODAL SPLIT

Modal Split shows the percentage of travelers using the major transportation modes (e.g., drive-alone auto, HOV, transit, pedestrian and bicycle). Modal Split can be used in making programming decisions such as determining the trade-offs between highway, HOV and transit improvements or it can be used to answer policy related questions such as measuring the effectiveness of increasing parking costs in a downtown area to encourage transit ridership. Some recent major development projects and long-term land use plans in Santa Clara County have set modal split targets, such as Apple Park in Cupertino, San Jose's Envision 2040 and the North Bayshore Precise Plan in Mountain View.

Modal Split is useful in identifying transportation capital projects, TDM strategies and long-term land use planning alternatives that provide the greatest increases in transit, bicycle and pedestrian activity, relative to automobile usage. It is also useful in measuring long-term trends in the usage of various transportation modes in a specific area, within a city or countywide.

PEDESTRIAN AND BICYCLE QUALITY OF SERVICE

As part of the 2014 update of the VTA TIA Guidelines, VTA established a requirement for projects proposing changes to existing roadway, intersection geometry or changes to signal operations to include an informational Quality of Service (QOS) analysis for bicyclists and pedestrians. QOS methodologies typically measure features of the environment that affect the comfort and safety of bicyclists and pedestrians from the user's perspective, such as the presence and width of sidewalks and bicycle lanes, intersection crossing distance and delay, lateral separation from auto traffic, auto volumes and the presence of landscaping or trees.

TRANSIT ACCESSIBILITY

For the purpose of the VTA CMP, one measure of transit service performance is the local Transit Accessibility Index, which disaggregates transit performance by geographic zone. In contrast to the traditional mobility-based approach for the

measurement of transit service performance, accessibility provides a place-based approach for understanding how transit service is divided between areas in Santa Clara County.

The Transit Accessibility Index indicates how well transit serves the population of Santa Clara County. This measure shows where changes in transit service parameters (such as headway and frequency) are desirable and highlights areas where the addition or modification of transit routes and stops may be beneficial. The accessibility index is a sophisticated tool for measuring the effects of changing land uses and densities by striking a balance between zonal travel and household and employment figures. Because it is tied to Traffic Analysis Zones (TAZ), the index can be used to quickly analyze and incorporate both travel demand and demographic data into any accessibility analysis.

The index is derived from travel demand model data, so its outputs are fully in line with the travel model estimations and assumptions used in VTA's transportation demand model. Furthermore, this method of evaluating transit accessibility encourages a systems approach to accessibility analysis through the combined estimation of multiple transit operator performance. Transit Accessibility was used as one of the performance measures during VTA's Next Network transit service redesign effort in preparation for the opening of the BART Phase 1 extension to the Milpitas and Berryessa Stations in 2019.

AIR QUALITY

Vehicle emissions of air pollutants are measured in tons of pollutants and are related to several factors, including vehicle miles traveled, cold and hot starts and stops, speed changes and idling time. The air quality performance measure is necessary for conformance with state CMP guidelines for air quality impacts and is often required in CEQA evaluation.

Air Quality is measured countywide by pollutant type during the A.M. and P.M. peak hours using the VTA transportation model and Direct Travel Impact Model 3.1 (DTIM 3.1) designed by Caltrans. The pollutants measured include Carbon Monoxide (CO), Hydrocarbons (HC), Nitrogen Oxides (NOx) and Particulate Matter (PM).

Air Quality is a good measure of the overall external impacts of transportation system operation, but it does not directly correlate to the benefits of an efficient multimodal transportation system. While increased traffic speed and a reduction in the amount of stopping and starting reduces most emissions, nitrogen oxides tend to increase as travel speeds increase. In addition, reductions in air pollution have been achieved in recent years by modifying the composition

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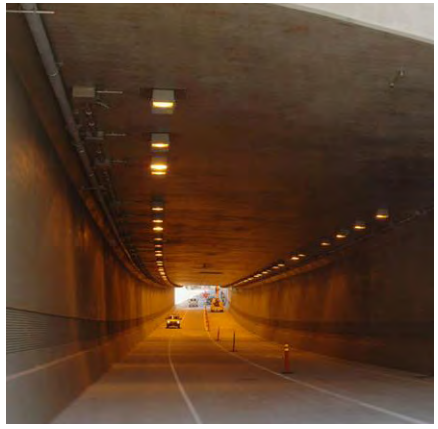

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of gasoline, improving the overall fuel economy of the vehicle fleet on the road and taking measures to reduce pollution of stationary sources. Therefore, it is difficult to know whether improvements in Air Quality are due to efficient modal use or other factors.

DURATION OF CONGESTION

Duration of Congestion measures the length of time that particular transportation facilities are subject to congested conditions. When travel demand begins to exceed capacity, travelers have four possible ways to avoid the congestion:

1. Shift modes
2. Choose not to travel (e.g., telecommute)
3. Take alternative routes
4. Travel at less congested times (this would result in an increase in the Duration in Congestion over a longer time period)

Duration of Congestion is an auto-oriented performance measure typically used on highway segments and arterial streets. Duration of Congestion can be affected by changes in travel demand (such as congestion pricing, land-use policies that result in shorter trip patterns and mode shifts) or changes in transportation capacity (adding highway lanes, modifying intersections, increasing transit infrastructure and using ITS strategies).

HOURS OF DELAY PER PERSON-TRIP

This measure identifies the system-wide hours of delay travelers experience due to congestion on the transportation system. It is generally measured for private vehicle users including SOV and HOV but can also be used to measure delay experienced by users of transit or other modes. Delays are generally determined by comparing travel time on the transportation facilities during peak/congested conditions with off-peak/uncongested conditions. Dividing delay by person-trips accounts for the changes associated with population and job growth.

Delay tends to be more sensitive to mitigation efforts than auto LOS. For example, consider an intersection that is currently operating at LOS F with an average control delay of 100 seconds. An action (or group of actions) could improve the delay to 85 seconds, but LOS would remain LOS F.

Hours of Delay/Person Trip is a good supporting performance measure for freeway and expressway ramp and intersection improvements since most of the delays occur in queuing and stop-and- go situations. Hours of delay can be a good indicator of the effectiveness of adding roadway and transit capacity to a travel market or system wide. It is also a good indicator for system management projects such as ramp metering and signal timing.

TRAVEL TIME AND TRAVEL TIME INDEX

Travel Time is measured for the selected travel markets for a base year and some future year. For autos, the difference in Travel Time indicates the change in congestion over time. For transit, the different in Travel Time may reflect differences in congestion or changes to the amount of priority received by transit vehicles. Travel Time can be a more intuitive measure of mobility than delay because travelers often think more about how long a trip takes than how long they have to wait in traffic at specific locations.

The Travel Time Index reports the travel time by a particular mode or the average travel time across modes. The index compares Travel Time over different years, between different alternatives and between different modes. The strength of this

measure is its ability to show the differences in point-to-point travel time by mode. Therefore, it is an effective measure to use for transit projects as well as roadway improvements.

TRANSIT SERVICE GUIDELINES

In 2018, the Board of Directors adopted the Transit Service Guidelines, a replacement for VTA's Transit Sustainability Policy and Service Design Guidelines. It reflects the Next Network Transit Service Plan and VTA's 2017-2022 Strategic Plan. The Transit Service Guidelines guide VTA's service planning efforts by establishing:

- A framework to objectively monitor and evaluate VTA's transit services.
- A process to develop service change recommendations for the VTA Board of Directors to consider that are based on best practices in the transit industry.
- Objective measures to guide service planning decisions that are equitable, systematic, timely and move VTA toward achieving the goal of providing Faster Frequent Reliable Transit from the VTA Strategic Plan

Under the guideline's new framework, transit routes are classified by their primary purpose: ridership or coverage. Ridership-oriented routes will be held to ridership purposed expectations such as productivity, simplicity and directness and less to coverage purposed expectations such as geographic coverage or service to special need facilities. In comparison, coverage-oriented routes will be held to coverage-purposed expectations such as geographic coverage, service to vulnerable groups and service for specific communities and less to ridership-purposed expectations such as productivity or speed.

The Transit Service Guidelines includes service productivity guidelines. These guidelines allow VTA to monitor and evaluate the productivity of transit routes, using boardings per hour as the primary metric for non-express routes and average peak load factor as the primary metric for express routes. These guidelines are intended for VTA to understand service productivity. In cases where routes do not meet minimum productivity guidelines, service changes should be made to improve route performance.If no changes can be identified or if service changes fail to improve productivity to meet the guidelines, service should be discontinued and the resources invested in more productive uses elsewhere in the system.

Also included in the Transit Service Guidelines is a revised service planning process to regularly monitor, evaluate and develop service change recommendations for VTA's transit services. The intent of the new service planning process is to establish an ongoing process where VTA

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iteratively makes improvements to the transit network, route by route, so that the network is continually being updated and improved over time.

TRAVEL PATTERN (IN PERSON TRIPS)

Travel Pattern measures the balance between people and activities such as employment, recreation and shopping. It is evaluated in terms of person trips, which provides a measure of mobility. Increasing person trips indicates increased mobility. The Bay Area and Santa Clara County are divided into several subareas. As a result, travel patterns are used to capture the travel demand and growth projection, in terms of person movements, among these subareas.

USE OF MULTIMODAL MEASURES IN CMP ELEMENTS

The CMP Statute requires that the multimodal transportation system performance measures be used to prepare the CMP Capital Improvement Program (CIP), the Land Use Impact Analysis Program and Multimodal Improvement Plans. At this point, the multimodal transportation performance measures are not used to determine Member Agency conformance with the CMP, except for auto LOS.

The following is a summary of the applicability of these measures to the elements of the VTA CMP. The application of these measures is also summarized in Table 4.3 above.

Countywide Transportation Plan and Capital Improvement Plan Element — VTA uses the CMP multimodal performance measures in the development of its long-range countywide transportation plan for Santa Clara County, Valley Transportation Plan (VTP). VTP includes an analysis of two scenarios (a) a baseline year and (b) baseline plus the program of projects outlined in the plan. These performance measures are used to evaluate the systemwide effects of the two alternatives. A similar analysis will be calculated for VTA's future long-range countywide transportation plans. Projects from VTP that are expected to occur in the near-term are then included in the Capital Improvement Plan element of the CMP.

Land Use Impact Analysis Element — VTA uses a number of these multimodal performance measures to evaluate the effects of land use changes on the CMP Transportation System. Each year, land use data is collected and the countywide land use database is updated. The countywide transportation model can then be used to calculate the performance measures

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under current conditions and compare them with previous land use conditions. This comparison will be particularly useful as data is collected over the long term.

Member Agencies are not currently required to use most of the performance measures in their evaluation of land-use development proposals, general plans, general plan amendments, or specific plans. The 2014 VTA TIA Guidelines Update included a requirement for Pedestrian and Bicycle Quality of Service analysis for certain projects and Transit Vehicle Delay analysis for all projects. These QOS measures may be useful in implementing alternative mitigation measures associated with creating pedestrian and transit-friendly development patterns. Many VTA Member Agencies have also used several of these multimodal performance measures (such as VMT, modal split and air quality measures) in the analysis of major development projects and long-range planning efforts, often for CEQA purposes or local objectives.

Multimodal Improvement Plans — These performance measures may be used to evaluate the alternative packages of improvements and actions considered for Multimodal Improvement Plans. While state law requires the application of performance measures to local Multimodal Improvement Plans, these particular measures may not be meaningful when applied to small geographic areas. Therefore, for deficiencies that occur on principal arterials located on the CMP System, the jurisdiction in which the deficiency occurs will be responsible for preparing a Multimodal Improvement Plan, which includes Level of Service as a performance measure and may propose other performance measures. The proposed performance measures must be approved by the VTA Board before the Multimodal Improvement Plan can be approved.

COMPLIANCE AND CONFORMANCE

VTA is responsible for collecting transportation performance measurement data for use in the countywide transportation plan, land use analysis, Multimodal Improvement Plans and the CIP. Member Agencies are responsible for analyzing multimodal performance measures as required per the CMP and associated Technical Guidelines.

CHAPTER 5 | TRANSPORTATION DEMAND MANAGEMENT AND TRIP REDUCTION ELEMENT

5. TDM AND TRIP REDUCTION ELEMENT

The chapter discusses Transportation Demand Management including its definition, VTA's Guidelines and programs, legislation and funding.

BACKGROUND

Transportation Demand Management (TDM) are strategies that encourage and incentivize the use of a broader range of transportation options other than single-occupancy vehicles. These include ridesharing, walking, biking and taking public transit. TDM aims to reduce traffic congestion, VMT and emissions and make more efficient use of the existing transportation system.

TDM programs range from marketing efforts to promote ridesharing to parking pricing programs to changes in public policy. These programs are designed to improve the overall performance of the CMP System through elimination or shortening of auto trips, mode shifting, time shifting or trip linking. To be successful, TDM programs must encourage ridesharing, transit, bicycling and walking as attractive, sustainable modes.

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TDM, AUTOMOBILE TRIP REDUCTION AND VTA GUIDELINES

TDM strategies, when successful, reduce the total number of automobile trips, benefit the transportation system and reduce transportation impacts found in environmental review and Transportation Impact Analysis (TIA) processes. Some recent developments in Santa Clara County, such as Apple Park in Cupertino, new Google buildings in Mountain View and the Peery Park Specific Plan area of Sunnyvale, have applied aggressive trip reduction targets of 30% or more as part of their TDM programs.

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In October 2014, VTA updated the CMP TIA Guidelines with automobile trip reduction through TDM as one of the primary focus areas and added two additional approaches to reduce auto trip:

- **Target-Based Reductions** may be taken when the project applicant has entered into an enforceable agreement with the Lead Agency that limits the number of automobile trips traveling to and from the project site. The trip reduction program must include a commitment to monitor trip generation and determine whether targets are met, an enforcement structure and a commitment to summary-level data sharing;
- **Peer/Study-Based Trip Reductions** may be taken when studies of similar projects, or of other sites occupied by the project applicant, have demonstrated comparable trip reductions through survey results or other data. The trip reduction program must include a commitment to monitor trip generation and a commitment to summary-level data sharing.

The 2014 TIA Guidelines also added a requirement for projects to complete an Auto Trip Reduction Statement (ATRS) in the Executive Summary of the TIA report. The ATRS provides a summary of all automobile trip reduction efforts, including any reductions claimed in the Trip Generation section of the TIA and any additional trip reduction efforts undertaken to mitigate or lessen project impacts.

In recent years, VTA has gathered some information from Member Agencies on TDM and Trip Reduction efforts by major projects utilizing the "Target-Based" and "Peer/Study-Based" approaches to auto trip reductions in TIAs. With the shift in emphasis of CEQA transportation analysis towards VMT, agencies are often documenting TDM efforts proposed by projects to reduce VMT. In the future, it may be possible to create a "TDM Clearinghouse" of example projects and data on various TDM strategies in Santa Clara County.

VTA is also taking on a more prominent role in coordinating TDM strategies across multiple jurisdictions in high-growth areas of the county. VTA has provided information and input to Transportation Management Associations (TMAs)in the Stanford Research Park, Palo Alto and Moffett Park area of Sunnyvale. VTA will work proactively with Member Agencies to identify opportunities to help establish TDM programs or strengthen existing TDM programs, in partnership with TMAs.

TDM AND LEGISLATION

This chapter conforms to the requirements of the State CMP Statute and the Federal and California Clean Air Acts. The CMP Statute requires that CMPs contain a Travel Demand Element that promotes sustainable transportation methods and improves the balance between jobs and housing. The CMP must also consider the potential effect of regional air quality measures in the Trip Reduction and Transportation Demand Element, the Capital Improvement Program and the Multimodal Improvement Plan Element.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT (BAAQMD) TRIP REDUCTION REQUIREMENTS

The Bay Area Air Quality Management District (BAAQMD) regulates the stationary sources of air pollution in the nine Bay Area counties. It also recommends programs to reduce solo commuting such as guaranteed ride home programs, shuttles to transit and subsidy programs for transit passes.

In Fall 2012, California Senate Bill 1339 was signed into law authorizing the BAAQMD and MTC to jointly adopt a regional commute benefit program. They later developed the Bay Area

Commuter Benefits Program to promote the use of sustainable commute modes such as transit, ridesharing, biking and walking. The Program requires employers with 50 or more full-time employees in the Bay Area to offer commute benefits to employees who work 20 hours or more per week. Employers can meet the requirement by offering any of the following benefits:

- Allowing employees to pay for transit, vanpool or bicycle expenses with pre-tax dollars;
- Directly subsidizing transit or vanpool costs up to $75 per month;
- Providing employer-operated transit, shuttle or vanpool services; or
- Providing an alternative benefit that would be equally effective in reducing auto trips.

TRANSPORTATION REQUIREMENTS OF THE CALIFORNIA CLEAN AIR ACT (CCAA)

The CCAA of 1988 expanded the scope and accelerated the pace of air pollution control efforts in California. The Act established a planning process to meet the State's health-based ambient air quality standards' level of attainment.

Each Air District is required to adopt a Clean Air Plan (CAP) that contains a strategy for attaining air quality standards. BAAQMD's CAP was most recently updated in April 2017 with the Bay Area 2017 CAP. The 2017 CAP's main objective is to reduce ozone pre-cursors, particulate matter, toxic air contaminants and greenhouse gases to improve public health and protect the environment and climate by:

- Updating the Bay Area ozone plan in compliance with the requirements of the California Health & Safety Code
- Providing an integrated, multi-pollutant strategy to improve air quality, protect public health and protect the climate.
- Including 23 Transportation Control Measures (TCMs) aimed at reducing motor vehicle emissions contributing to ozone, particulate matter, air toxics and greenhouse gas emissions, detailed in Table 5-2 of Volume 1 of the CAP.

TDM implementation is a major feature in the 2021 CMP Document and the region's Clean Air Plan. VTA administers funding for TDM projects to improve air quality and encourages Member Agencies to implement TDM programs in development projects, land use plans and in Multimodal Improvement Plans.

CATEGORIES OF TDM STRATEGIES

There are a variety of TDM practices that employers, developers and local agencies can adopt to manage congestion on the transportation network. TDM measures can generally be classified into the following categories: pricing, sustainable transportation modes, employee services and amenities, jobs/housing balance and promotion/marketing.

PRICING

Pricing strategies aim to adjust the cost of transportation to encourage mode shifts away from single occupant automobile. They may also raise the price of transportation during peak periods to encourage shifting automobile trips to non-peak hours and redistribute traffic to reduce congestion during high volume times of the day. The following is a list of typical pricing strategies used to manage transportation demand.

Cash Incentive Programs is where employees can participate in an incentive program to win prizes, such as a monthly raffle,

for using sustainable commute modes.

Congestion Pricing charges drivers a fee depending on the level of congestion. Pricing can encourage some drivers to consider sustainable modes of travel, alternative travel times or travel routes, thereby relieving congestion at peak hours.

Employee Pre-Tax Commuter Benefits provide a range of commute fringe benefits for employees pre-tax. This provides a benefit for both employers and employees, while encouraging sustainable modes of transportation. Federal legislation currently allows employers to offer up to $270 per month for tax-free commuter benefits.

Express Lanes are modified High-Occupancy Vehicle (HOV) lanes that allow non-carpool drivers to use the lane for a fee that varies depending on traffic conditions. This strategy takes advantage of excess capacity in HOV lanes, which makes efficient use of the existing roadway system and raises revenue for future corridor improvements.

Parking Cash-Out Program is where employers provide their employees a cash allowance if they do not use a parking space. This allowance is equivalent to the cost the employer would pay for the parking space. Businesses with at least 50 employees in Santa Clara County (a non-attainment area) are required to offer parking cash-out if they subsidize employee parking that they do not own, per California state law Section 43845 of the Health and Safety Code.

Parking Management and Pricing is where the price of parking on city streets or in off-street parking facilities are raised. As costs go up, commuters are likely to explore alternate ways to reach their destination without paying for parking, such as taking transit or carpooling.

Ridesharing Subsidies is where employers encourage carpooling and vanpooling by subsidizing those who carpool.

Road Pricing charges drivers a direct cost for driving on a particular roadway, such as toll bridges.

Transit Subsidies provide free or discounted transit passes to employees and residents. Programs like VTA's SmartPass and Caltrain's Go Pass allow employers, universities and residential communities to purchase annual and deeply discounted passes to encourage greater usage of the transit system.

Unbundled Parking is where developers charge for parking spaces separately or "unbundle" the price of parking from the price of housing. This practice allows residents with fewer cars to

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San Francisco Chronicle


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save money and thus encourages lower rates of car ownership and usage.

SUSTAINABLE TRANSPORTATION MODES

The following is a list of strategies that can reduce the number of travelers that drive alone to their destination by providing or making sustainable modes of transportation more attractive.

Bicycle and Pedestrian Improvements make the streets safer, more vibrant and attractive to walk or bike to a desired destination. Bicycle and pedestrian improvement strategies can include:

- Traffic calming,
- Complete Streets policies and physical improvements,
- Provision of a complete sidewalk and walking path network,
- Bike lanes, racks and other facilities; and
- Publicity campaigns that encourage drivers to share the road safely.

Car Sharing Programs make vehicles available to people on a per-use basis. They allow people to use a car when they need it without incurring fixed costs. Vehicles are located throughout cities and reservations are available online or thorough a smartphone app.

Carpools and Vanpools encourage commuting with others traveling to nearby destinations using the same vehicle. Employers and other organizations can help employees form carpools and vanpools and provide incentives to participate through subsidies.

Emergency Ride Home Program provide employees who use sustainable modes of transportation an employer-paid taxi or ridesharing service in case of an emergency or change of work schedule.

First and Last Mile Connections include shuttle services, park-and-ride facilities and bicycle and pedestrian connections. They help fill the "first or last mile" connection between the transit stop and the desired destination.

On-Site Amenities and Services offer commuters amenities at or near their work site to make sustainable commute modes more desirable. Popular amenities include bicycle facilities, pedestrian friendly networks and employee-serving uses such as restaurants and ATMs, so employees do not have to travel far during their lunch break to run errands.

Park and Ride Lots provide areas for commuters to park their car near a transit stop and take transit the remainder of the way to their destination. This increases the appeal of the transit system by making it feasible for people who live in outlying, low density areas that are difficult for transit to serve directly to take advantage of transit services.

EMPLOYMENT FLEXIBILITY

These strategies rely on employers to provide flexibility in where and when work is completed. This opens the possibility of reducing the transportation demand during congested periods of the day or reducing the number of commute trips overall. The COVID-19 pandemic showed that there is flexibility in where, how and when employees work. Working remotely became the new normal for many and dramatically reduced congestion throughout Santa Clara County by implementing employment flexibility.

Flexible Schedules and Work Arrangements allow workers to set their own work hours or facilitate setting staggered working hours. This can change the company's peak travel period and reduce peak-period demand on the roadway system as a whole.

New Working Arrangements forego the traditional office model. Employees may share desks or have multiple coworking spaces rather than one central office where workers converge every day.

Telecommuting allows employees to work from home either part-time or full-time. Software such as VPN let employees access files remotely, while Zoom and Microsoft Teams allow employees to instant message and hold video meetings. The COVID-19 pandemic demonstrated that many office-employees can complete some portion of their work from home and many have grown to prefer telecommuting. Many companies are planning to continue to allow employees to telecommute at least a few days per week.

JOBS/HOUSING BALANCE AND MIXED USES

This category covers a range of strategies that bring the places people go throughout the day –employment sites, shopping and other destinations – closer to where people live, thus requiring fewer and shorter trips to accomplish daily tasks.

Encourage employment in housing rich areas and vice versa corrects the mismatch of residential and office/employment development in the Bay Area. Currently, there are some cities in Santa Clara County with a high residential population but low office/employment population or a high concentration of jobs with low residential population. These imbalances cause residents to commute to and from neighboring cities for work. This is one of the greatest contributors to peak hour traffic congestion and long commute trip lengths. By correcting this imbalance residents can work close to their place of work and reduce congestion.

Mixed-Use Development combines two or more land uses into a building or a set of buildings. This can include commercial development, such as office, restaurants and retail, adjacent to residential development. The variety of land uses in close proximity allow people to travel shorter distances, often attainable by biking or walking, to their desired destination.

PROMOTIONS AND MARKETING

Promotion and marketing increase the public's knowledge and awareness of TDM strategies and prompts the target audience to change their travel behavior.

Marketing campaigns encourage people to participate in TDM programs. They can include:

- Events such as a "bike to work week" or "eco-commute challenge";
- Surveys to determine travel preferences, knowledge and opportunities among the population of an area;
- Campaigns that highlight the benefits of sustainable
- modes and seek to change public attitudes;
- Temporary discounts or free service on public transit and shared mobility services to encourage people to try the system; and
- Campaigns that connect transportation mode choice to environmental objectives, such as the Bay Area's "Spare the Air" campaign.

Promotion strategies increase awareness of TDM programs. They can include:

- Bike, pedestrian and transit maps located in highly used areas of buildings, such as lobbies and breakrooms;
- Education programs for public officials, businesses and employees about TDM;
- Websites or smartphone applications to provide information about transit and other sustainable transportation options;
- Wayfinding systems that make the transit system easier to understand;

- Signage programs or publicity campaigns that encourage drivers to "share the road" with bicyclists and pedestrians; and
- School programs that educate children about sustainable and safe modes of travel from home to school.

TDM PROGRAMS THAT VTA IMPLEMENTS

VTA's current countywide transportation plan, VTP 2040 and its Community Design & Transportation (CDT) Manual encourage successful trip reduction efforts through partnerships and incentive programs. VTA implements certain TDM programs directly, serves as a partner on other programs and in general promotes the use of TDM programs across Santa Clara County.

VTA, through its Development Review Program, works with local agencies to review and comment on transportation and environmental analyses of development proposals. This allows VTA to offer recommendations regarding TDM measures.

VTA maintains several successful TDM programs that can be utilized by residents, employees, business and new land use development projects, which are listed below.

EXPRESS BUS PARTNERSHIP PROGRAM AND OTHER TRANSIT SERVICE PARTNERSHIPS

In early 2020, VTA implemented a new Express Bus program model aimed at discontinuing low-performing routes, offsetting the high cost of operation and bringing more routes into compliance with VTA's performance standards. Prior to 2020, VTA operated nine Express bus routes that offered weekday, peak hour, one-directional service between corporate parks, business centers and some of VTA's major transit centers. Several of these routes suffered from low ridership and a high cost per passenger that amounted to nearly four times the cost of operating VTA's Frequent and Local routes.

Before eliminating bus lines, VTA contacted nearly 400 Silicon Valley companies whose employees may have relied on the Express bus routes. The companies had an opportunity to partner with VTA to save an Express Bus route from discontinuation by partially funding the route and have influence on the schedules and path of travel. As a benefit of partnering with VTA, employees of companies sponsoring the routes are able to ride VTA's Express Busses fare free.

As of 2021, VTA has been successful in partnering with Stanford Research Park, Juniper Networks and Lockheed Martin on operating five Express routes. This partnership model has also already paved the way for more transit service partnership programs such as the SCVMC Shuttle.

Following the same partnership model adopted by the Express Bus Program, the County of Santa Clara became another partner of VTA in implementing a new route. The SCVMC Shuttle is a direct, non-stop first/last-mile weekday service offering seven trips in the morning from San Jose Diridon Station to the Valley Medical Center campus at Bascom and seven trips in the afternoon in the opposite direction. These trips are timed to meet ACE Train, Amtrak Capital Corridor and Caltrain arrivals and departures at Diridon and are aligned with SCVMC's busiest work shifts.

HOV LANES AND EXPRESS LANES

VTA, in cooperation with Caltrans, plans for and maintains HOV lanes throughout Santa Clara County to encourage more efficient use of highways. Santa Clara County has the most extensive HOV network of any county in the Bay Area with approximately 190 miles of HOV lanes. The Silicon Valley

Express Lanes Program, established in 2008, implemented a roadway pricing system to allow single occupancy commuters to use the HOV lanes for a fee. The fee changes dynamically in response to existing congestion levels and available capacity in the HOV lanes.

In March 2012, VTA opened its first express lane in Santa Clara County on the SR 237/I 880 connector ramp it was further extended westward towards US 101 with new operating rules in November 2019. Clean Air Vehicles (CAV) using a special CAV transponder are tolled at a 50% discounted toll. In October 2020, when the I-880 Express Lanes (operated by Metropolitan Transportation Commission) opened for tolling, the occupancy requirement for both SR 237 Express Lanes and I-880 Express Lanes were set to HOV 3+ to achieve consistent occupancy requirement between the two seamless facilities.

Due to the ongoing COVID-19 pandemic, total traffic volumes along the SR 237 corridor have decreased. Corridor traffic volumes have since recovered and are about 80% compared to the traffic volumes prior to the pandemic in February 2020. However, the Express Lane traffic volumes continues to be low at about 40% compared to traffic volumes in February 2020. During FY 2021, over 2,184,000 vehicles used the express lane including over 1,541,000 (about 70% toll paying customers). The estimated toll revenues for SR 237 Express Lanes was $1.6 million during FY 2021. Data has shown that the express lane has successfully improved travel speeds, reduced congestion, increased traffic throughput and provided overall improved traffic operations in the corridor.

The Silicon Valley Express Lanes program includes additional express lane projects under development in Santa Clara County, including US 101 and SR 85.

PARK AND RIDE LOTS

VTA maintains 41 park and ride lots in 12 different cities throughout Santa Clara County. The lots allow commuters to park their car and connect with VTA's light rail system, Caltrain, Capitol Corridor, Altamont Commuter Express and several Express Bus routes. These makes transit more attractive to residents not within walking or biking distant to transit.

SMARTPASS

The Smart Pass program allows employers, developers, educational institutions, property management companies or homeowners associations to purchase annual VTA transit passes at a deeply discounted rate to encourage employees, students or residents to use transit. SmartPasses are good for unlimited use of VTA Bus and Light Rail services, seven days a week. The program also includes an "Emergency Ride Home" component that allows SmartPass holders to take a taxi or ridesharing service home if they need to leave work in the middle of the day.

VANPOOL SUBSIDY PROGRAM

To further explore the realm of mobility options VTA can provide to its commuters, VTA implemented a vanpool subsidy program to further incentivize vanpooling in Santa Clara County. Vanpools can involve between five and 15 members who share a large SUV or van to commute to work and are a great option for commuters who do not live within close proximity of VTA's fixed route transit network. The pilot program, which launched in mid-2021, supplements the Metropolitan Transportation Commission's (MTC's) regionwide vanpool subsidy program, which provides a $350 monthly subsidy for every vanpool that registers with MTC and meets its criteria.

VTA's Pilot Vanpool Subsidy Program provides an additional $350 monthly subsidy for MTC vanpools who start and end in Santa Clara County, bringing the total subsidy to Santa Clara County vanpools to $700 per month. This subsidy amount is discounted from the monthly cost to lease a vehicle through MTC's program, which could cost between $1,000 and $1,575 per month.

FUTURE TDM PROGRAMS THAT VTA WILL IMPLEMENT

VTA is exploring ways to formalize its role in advancing TDM practices throughout the County. Ideas around incorporating TDM expertise throughout the agency have been discussed, including:

- Offering TDM coordination-type services to small and medium-sized companies who would not otherwise be able to hire their own TDM coordinator
- Hiring a TDM specialist/planner to be the main liaison that works with TDM managers/coordinators of employers, organizations, etc. throughout the County
- Hiring a TDM coordinator to develop a TDM Program for VTA employees and/or the entire County

Before identifying which of these or other roles VTA should take on in the TDM realm, VTA will pursue a TDM assessment study that will include hiring a TDM consultant to assist VTA in developing options for a TDM program for the County. The study would help define a vision and set of goals and objectives for the TDM Program that VTA wants to implement.

The County of Santa Clara and recently hired a consultant to develop a TDM Implementation Guide for County employees. VTA could apply this model similarly – have the consultant develop a TDM guide/study that identifies main points for commuters and identifies TDM roles and responsibilities VTA could implement. As part of this assessment, VTA is pursuing development of an internal TDM program that will help formally establish programs, marketing campaigns and staff support to encourage employees to choose sustainable forms of transportation.

FUNDING FOR TDM PROGRAMS

TDM programs are funded by a wide variety of public and private sources in Santa Clara County, some of which require VTA's involvement or coordination. VTA administers several funding programs that support TDM and alternative modes of transportation, described below.

2016 Measure B Program — In November 2016, Santa Clara County voters approved 2016 Measure B, a 30-year, half-cent countywide sales tax to enhance transit, highways, expressways and active transportation (bicycles, pedestrians and complete streets).

During August and September 2019, VTA staff worked with the Technical Advisory Committee's Capital Improvement Program Working Group to develop criteria and the details of the competitive grant program. The candidate projects must provide new first and last mile connections to transit and be implemented within one year of grant award.

Congestion Mitigation and Air Quality Program (CMAQ) — CMAQ funds implement the transportation provisions of the 1990 Federal Clean Air Act. These funds are only available to areas designated as non-attainment areas. Santa Clara County is currently in non-attainment. Programming is coordinated at the County level by the CTAs and TDM projects are fundable as system management projects. However, the MTC has final

programming authority over CMAQ funds.

One Bay Area Grant (OBAG) Program — The program guides how MTC distributes its share of federal transportation funds from the Federal Highway Administration. Its aim is to strengthen the connection between transportation investments and regional goals for focused growth in Priority Development Areas (PDA), affordable housing and greenhouse gas emissions reduction.

The program consists of Surface Transportation Block Grant Program (STBGP) and Congestion Mitigation and Air Quality (CMAQ) funds. As county administrator of the OBAG program, VTA manages the competitive complete streets program, as well as the subprograms - PDA and VERBS. Two cycles of OBAG distributed $177.7M for various bicycle, pedestrian, complete street, safe routes to school and road improvement projects. The next call-for-projects is anticipated in late 2021/early 2022.

Priority Development Area (PDA) Program — The OBAG program sets aside funding for local agencies to do planning work designed to promote growth within their PDAs. These competitive grants are only for planning projects. As the County Transportation Agencies (CTA) in Santa Clara County, VTA is tasked with programming these funds. Each CTA was directed to design its PDA planning program to emphasize and support growth in housing, employment and transportation within its PDAs.

Transportation Development Act (TDA), Article 3 Projects — The State's Transportation Development Act Article 3 funds pedestrian and bicycle facilities. TDA funds are derived from a quarter-cent gas tax, returned to the County of origin. In Santa Clara County, approximately 70% of the annual TDA Article 3 allocation is distributed to Member Agencies on a prorated basis according to population. The remaining 30% is distributed as discretionary funding on a countywide competitive basis. Potential projects are evaluated and prioritized by VTA, the Bicycle & Pedestrian Advisory Committee, the Technical Advisory Committee, the Policy Advisory Committee and VTA Board of Directors. VTA must submit the TDA Article 3 priority list of projects to MTC for their approval.

Transportation Fund for Clean Air — The Transportation Fund for Clean Air (TFCA) grant program is funded by a surcharge on vehicle registrations. Assembly Bill (AB) 434 (Sher, 1991), added Section 44241 to the California Health and Safety Code and gave the BAAQMD the authority to collect a surcharge of up to four dollars on motor vehicle registration fees within its jurisdiction. These funds are administered by BAAQMD and used for programs that will reduce motor vehicle emissions.

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Sixty percent of TFCA monies are retained by BAAQMD and distributed on a regional, competitive basis. The maximum project award is one million dollars. The remaining forty percent, also known as "Program Manager Funds," are returned to the county of origin for allocation within the county on a discretionary basis. VTA is the designated program manager for Santa Clara County. Santa Clara County generally receives about two million dollars per year for the entire program.

Vehicle Emissions Based at Schools (VERBS) Program — VERBS is an OBAG competitive grant program that funds infrastructure improvements that encourage K-12 students to safely walk, bike, carpool and ride transit to school. The program was initiated through MTC's Climate Initiative Program, with a focus on reducing greenhouse gases by shifting travel behavior. Originally, the county-wide program included non-infrastructure projects, but with the passing of 2016 Measure B it focuses solely on infrastructure projects. VTA has released three cycles of funding.

OTHER POTIENTAL FUNDING FOR TDM PROGRAMS

Benefit Assessment Districts — A benefit assessment is a charge levied against a property owner in order to pay for local improvements, which directly benefit the property with assessments. The jurisdiction can issue bonds that are paid for the beneficiaries over a specific time. The beneficiary's charge remains the same throughout the time of the assessment.

Developers — Local agencies can require developers to contribute fees that address the transportation impacts of new development, which may be in part directed to TDM programs. These fees may fall within the context of a Multimodal Improvement Plan prepared by the local agency, or they may be tied to a separate transportation impact fee. In addition, developers may include facilities or infrastructure that supports TDM efforts (such as bike lockers or racks, or alternative transportation information kiosks) as part of a development project.

Express Lane Revenue – Revenue from Express Lane implementation could also potentially fund some TDM related elements. The fee charged for using the lanes would first be used for operations and maintenance of the express lane infrastructure and could also be used to pay for all or a portion of the cost of the additional lanes or the lane conversions. Any additional revenue could be used to pay for transit services serving the corridor or other alternative transportation improvements in the corridor.

Mello-Roos Communities Facilities District — The Mello-Roos Act allows for the formation of a Community Facilities District (CFD) that is contained within legally defined boundaries. Within the CFD, eligible voters can, with two-thirds approval, authorize a government entity to issue bonds and collect taxes for construction and operation of public improvements. Tax formulas for the CFD are developed on a general benefit basis and a maximum tax rate is approved annually by City Council resolution. The tax may vary each year, but distributions cannot exceed the maximum tax rate.

Transportation Impact Fee – Another method of funding these TDM programs could be fees resulting from the collection of fees related to traffic impacts. Various cities within Santa Clara County have implemented impact fee programs to collect money for road improvements. Although legislation states that an impact fee program must include a project list, a TDM – related element may be included.

Vehicle License Fee — Increasing the vehicle license fee by a flat rate is another way to acquire funds to support transportation related improvements on the road network. In 2004, Santa Clara County voted on a bill that would increase the existing vehicle license tabs five dollars annually in an effort

to fund projects that help manage traffic congestion. Some of the transportation improvement projects will incorporate TDM related improvements.

COMPLIANCE AND CONFORMANCE

VTA does not require local jurisdictions to implement TDM programs to be in conformance with the CMP. However, VTA encourages local agencies to work with developers to identify TDM measures when new projects are proposed and provides a framework for documenting TDM-related trip reductions through the VTA CMP TIA Guidelines. In addition, the VTA Multimodal Improvement Plan process encourages TDM-oriented actions in cases where a CMP facility has fallen or is forecasted to fall below the CMP standard and where it is infeasible or undesirable to mitigate the impact by increasing capacity.

CHAPTER 6 | TRANSPORTATION MODEL AND DATABASE ELEMENT

6. TRANSPORTATION MODEL AND DATABASE ELEMENT

This chapter describes the VTA CMP Countywide Transportation Model and Database Element, including its development, regional requirements and a discussion of the models and their maintenance.

BACKGROUND

Transportation models are analytical tools to assess the impacts of land use and policy decisions on the transportation system, such as the relationship between changes in gasoline prices and the number of vehicle miles traveled. Transportation models project future transportation conditions to determine the need for transportation projects and infrastructure improvements and their effectiveness.

The CMP transportation database consists of data that describes existing and future transportation network conditions and socioeconomic characteristics. The databases are updated when regional socioeconomic data sets are updated (provided by the Metropolitan Transportation Commission (MTC) and Association of Bay Area Governments (ABAG)) and when transportation networks are updated (found in by long-range transportation plans)

The databases are a basic input of the VTA Countywide Model (CMP Model). The CMP Model serves several purposes:

1. To evaluate the transportation impacts of major capital improvements on the countywide CMP System.

2. To establish transportation system characteristics for use by Member Agencies in performing transportation impact analyses, developing local transportation models and preparing Multimodal Improvement Plans.

3. To provide roadway volume and transit ridership forecasts to support planning studies, environmental analysis, project engineering and design.

4. To understand the relationship between land use decisions throughout the county and the CMP transportation system.

CMP TRANSPORTATION MODEL AND DATABASE REQUIREMENTS

The CMP Statute requires VTA to develop a uniform database and model for evaluating transportation impacts. The statute specifies the following three requirements for the CMP database and model:

1. VTA must develop a uniform database and model for use throughout the County.

2. VTA must approve computer models used by local jurisdictions to determine the transportation impacts of land use decisions on the CMP System.

3. The CMP database and model must be consistent with the MTC regional transportation databases and model.

Each of the three requirements are detailed in the following paragraphs.

UNIFORM DATABASE AND MODEL

The legislation requires a uniform countywide model and database to support the overall CMP. A uniform database is important because the countywide CMP Model is used for a variety of projects, including assisting in the land use impact analysis program, helping evaluate projects for inclusion in the Capital Improvement Program; evaluating system-level improvements to the CMP System due to Multimodal Improvement Plans and assisting with VTA service and project planning.

Since its development, the CMP Model has been refined to expand its functionality. Past updates include:

- Expanding the number of internal zones from 385 to 1,490 to add more detail in the Traffic Analysis Zones,
- Adding zones from neighboring counties,
- Updating travel patterns and socioeconomic data with the most recent Census,
- The addition of a new transit mode in the mode choice model,
- Adding a toll module to analyze toll facilities and
- Including a bike module to estimate route choice of biking trips.

LOCAL MODEL CONSISTENCY

The CMP Statute requires that models developed by Member Agencies to project local transportation conditions must be consistent with the CMP Model and database. This requirement helps assure that all Member Agencies are using uniform methodologies to evaluate the impacts of development projects.

Local models serve a similar purpose as the CMP Model but operate on a different scale. In general, local transportation models provide more detailed city-specific information than a countywide model. For example, a countywide model may be able to predict future traffic volumes on a roadway, a local model may be capable of predicting the number of vehicles that turn left at a specific intersection.

To help jurisdictions develop or modify their transportation models to be consistent with the CMP Model, VTA developed the Local Transportation Model Consistency Guidelines within the CMP Technical Standards. They identify characteristics required of local models and the relationship of transportation models to traffic impact analyses.

REGIONAL TRANSPORTATION MODEL AND DATABASE CONSISTENCY

The CMP Model must be consistent with the regional transportation model (MTC Regional Transportation Model) and database (ABAG Database).

MTC Regional Transportation Model — MTC is responsible for developing the Bay Area's regional transportation model since the mid-1960s. They have converted the regional models from trip-based to activity-based models (MTC Travel Model One) and is expected to finish the development of the second generation of the activity-based models (Travel Model Two) in the near future. The current CMP Model is based on the previous version of the MTC transportation planning models known as BAYCAST-90.

ABAG Database — The MTC travel models (both current and past) use input socioeconomic data prepared by ABAG. ABAG projections provide estimates of employment, land use, housing, population and household income at regional, county and traffic analysis zone levels. ABAG updates its socioeconomic forecasts every four years. These growth forecasts are developed using an economic model (REMI) and

a land-use model (UrbanSim), which consider the supply and demand for land, regional and local land use and development policies, as well as revised national, state and regional economic forecasting assumptions.

The most recent version of ABAG's officially adopted database for congestion management application is Projections 2017 (P2017). The P2017 series provide forecasts at five-year intervals from year 2010 to the year 2040. MTC and ABAG are planning to adopt a new set of economic and demographic forecast in the fall of 2021, when Plan Bay Area 2050 is scheduled to be adopted

The CMP Model currently uses the P2017 data set. The P2017 ABAG socioeconomic data at the MTC model zones were sub-allocated to the smaller CMP zones based on locations of approved development projects, local development characteristics and to reflect the most recently adopted long-range plans throughout Santa Clara County. CMP worked with local jurisdictions in a 6-month land-use data review process facilitated by web-based interactive maps, teleconferences and in-person meetings. The comments from jurisdictions were incorporated into the final dataset that formed the basis of the current CMP Model forecasts.

CMP Model and Database Consistency — The CMP Model and database are consistent with the MTC BAYCAST-90 model equations and the ABAG P2017 databases. MTC has recently updated consistency requirements for the CMP in 2019. Summaries of the checklist outputs are provided to MTC in a separate submittal. More details regarding specific consistency issues are described in the following sections.

The next section provides a general overview of the CMP Model and describes several basic modeling characteristics that are shared between the models.

OVERVIEW OF THE CMP TRANSPORTATION MODELS

The original CMP Model was developed by the Santa Clara County Center for Urban Analysis (CUA) in 1991. Since then, the it has undergone revisions and enhancements.

Between 2003 and 2005, the CMP Model was completely restructured with the 1,454 zone MTC BAYCAST-90 regional model as the foundation. The CMP Model restructuring created more internal zones, expanded the model region to include four addition counties of Santa Cruz, Monterey, San Benito and San Joaquin and included transit sub-modes in the mode choice models.

Since the major restructuring, the CMP Model has undergone improvements to more accurately capture markets not modeled in the MTC BAYCAST-90 models, including air-passenger trips, truck vehicle trips and bicycle assignments. It also reflects the Federal Transit Administration (FTA) recommendations for purposes of New Starts ridership forecasting.

The CMP model has many important characteristics. The major characteristics are detailed in the section below.

Transportation Analysis Zones (TAZs) — The current CMP Model has a more refined zone system in Santa Clara County and San Mateo County than the MTC regional models. An additional 1,122 zones were added in Santa Clara County and 156 zones were added in San Mateo County. These additional zones more accurately reflect the roadway network and provide more detail in transit rich corridors and dense central business districts. The new model maintains MTC's zone system in the remaining seven Bay Area counties but also includes Santa Cruz, San Benito, Monterey and San Joaquin Counties to the full model region and zones.

Highway, Transit and Bicycle Network — The roadway network used by the CMP model includes additional detail in both Santa Clara and San Mateo Counties. The current CMP Model includes stop, station and route detail in the transit networks for Santa Clara and San Mateo Counties and maintains the MTC roadway and transit networks in the remaining Bay Area counties. Roadway networks in Monterey, San Benito, Santa Cruz and San Joaquin are provided by their respective Metropolitan Planning Organization.

Express lane facilities were coded in the network with a toll facility indicator based on the highway corridor segment and the direction of travel. Differential toll facility codes were required in order to apply specific toll rates to optimize utilization of the express lanes to preserve level-of-service for free carpool users.

A recent enhancement added to the CMP Model is the explicit assignment of bicycle trips to the bicycle subnetworks. Bicycle travel speeds are a function of observed speeds collected using GPS-enabled devices and the mode choice models were revised to directly consider changes to bicycle travel times based on bicycle infrastructure improvements.

Capacities and Speed — The current CMP Model incorporates the area type and assignment group classification system published by MTC in BAYCAST-90. Input free-flow speeds for expressways are slightly lower in the CMP Model to match the travel time more accurately for the expressway segments during model validation and improve the assignment match of estimated to observed expressway volumes.

Trip Purposes — The current CMP Model uses the same trip purposes used in the BAYCAST-90 model and includes additional trip purposes not modeled by MTC. CMP Model trip purposes include the following:

- Home-based work trips
- Home-based shop and other trips
- Home-based social/recreation trips
- Non-home-based trips
- Air-passenger trips to SFO, San Jose Mineta and Oakland International airports (not included in the MTC model)
- Home-based school: grade school, high school and college trips
- Light, medium and heavy-duty truck trips (from internal to internal zone, (not included in the MTC model)

Market Segments — The CMP Model adopts the BAYCAST-90 disaggregate travel demand model four income group market segments for the home-based work trip purpose in trip generation, distribution and mode choice. In addition, the CMP Model also maintains the three workers per household (0, 1 and 2+ workers) and three auto ownership markets (0, 1 and 2+ autos owned) used in the MTC worker/auto ownership models. Trips by peak and off-peak time period are also stratified in the trip distribution, mode choice and highway and transit assignment models.

External Trips — The CMP Model uses a different approach for incorporating inter-regional commuting estimates than MTC. For external zones coincident with the MTC model, MTC interregional vehicle volumes were applied for base year 2000 and adjusted to the future by assuming a one percent growth rate per year. For external gateways from San Joaquin, Santa Cruz, Monterey and San Benito Counties, the incorporation of those counties as internal modeled areas obviated the development of external vehicle volumes for those areas of the CMP Model.

Pricing — The CMP Model uses MTC pricing assumptions for transit fares, bridge tolls, parking charges and auto operating costs as assumed in the current 2017 MTC Plan Bay Area 2040. All prices are expressed in year 1990-dollar values in

the model. The CMP Model also uses regional express lane toll charges for the AM and PM peak periods that are based on optimizing the level-of-service in the carpool lanes through an iterative process in the highway assignments. Depending on the level of utilization, these toll charges vary by direction, time of day and by specific corridor.

Auto Ownership — The current CMP Model applies BAYCAST-90 for auto ownership models to estimate the number of households with 0, 1 and 2+ autos by four income groups in each traffic analysis zone. Walk-to-transit accessibility measures were incorporated in the auto ownership models consistent with MTC BAYCAST-90 to more logically associate low auto ownership households with transit services. The auto ownership models were last calibrated to match 2017 American Community Survey workers per household and auto ownership by county.

Mode Choice — The mode choice models for BAYCAST-90 include the use of nested structures for most trip purposes, however, explicit estimation of nested structures to consider transit submodes were not included in the model specification. The CMP Model adds a nesting structure for transit submodes of local bus, express bus, Bus Rapid Transit (BRT), light rail, heavy rail and commuter rail underneath the MTC BAYCAST-90 nested structures. Consistent with the BAYCAST-90, mode choice coefficients are preserved by constraining the model to the BAYCAST-90 parameters, except those in transit submode structure. While the CMP Model includes a transit submode nest for Bus Rapid Transit (BRT), which is an emerging transit technology in the region, BRT is treated as a local bus mode primarily due to limitations from the combined frequency process in the transit travel time builder used in the CMP Model.

Peak Hour and Peak Periods for Highway Assignments — The CMP Model uses a three-hour peak period (6 AM to 9 AM) as the basis for determining drive alone, shared-ride and transit travel times for input to the trip distribution and mode choice models. This was assumed since peak hour travel volumes tend to produce extremely congested conditions for forecast years, producing unrealistic volume-to-capacity ratios and travel times, thus significantly overestimating forecast transit probabilities. The highway assignments produce AM and PM peak hour volumes, AM and PM peak period volumes (5 AM to 9 AM and 3 PM to 7 PM, respectively – each coincident with the time periods of operation for carpools), midday volumes (9 AM to 3 PM) and evening volumes (7 PM to 5 AM). The four time period volumes are then added together to develop daily vehicle volumes.

Vehicle and Transit Assignments — The current CMP Model incorporates a methodology analogous to the MTC "layered," equilibrium assignment process, which distinguishes standard mixed-flow lanes from high-occupancy-vehicle (HOV) lanes. The equilibrium assignment process used in the current CMP Model is functionally equivalent to the MTC methodology. The CMP Model includes additional vehicle classes in the highway assignments for park-and-ride vehicles and drive-alone and carpool toll vehicles. Drive-alone and carpool toll vehicles for AM and PM peak periods are estimated using a toll model post-processor that estimates toll volumes based on a comparison of the non-toll and toll travel times and costs. This procedure assumes that toll choice occurs after the decision to choose auto versus transit has already been considered and therefore does not influence transit mode choice.

A toll choice constant for drive-alone and carpool modes was developed based on a calibration of toll volumes estimated by application of the toll model to the I-680 Express Lane and SR 237 Express Lane facilities and a comparison of estimated to observed express lane volumes. It should be noted that by 2025, in order to maintain the operational feasibility of implementing regional express toll lanes, it was assumed

that only 3+ occupant carpools would be allowed to travel in the carpool lanes for free. This was assumed for all carpool facilities in the model region, regardless of the presence of express lanes.

In the current CMP Model, transit passengers are assigned with a methodology analogous to that used by MTC, with separate assignments for each transit submode and access mode. Assignments are also performed separately for peak and off-peak conditions. A total of eighteen separate transit assignments are run to cover the full combination of transit submode and access modes as well as to estimate transit ridership for air-passengers and external home-based work transit trips from the San Joaquin (ACE, BART and San Joaquin SMART bus) and AMBAG (Caltrain and Monterey Express) model regions.

Model Validation with 2015 Traffic and Transit Volumes — The current CMP Model is validated to year 2015 traffic volumes for screen lines in the model region, with a focus on Santa Clara County and San Mateo County. Operating speeds county-level vehicle-miles stratified by facility type. Four time periods are validated: AM peak hour and peak period (5 AM to 9 AM) and PM peak hour and peak period (3 PM to 7 PM). Daily transit boardings were validated for the year 2015 at the system level for major regional transit operators (Caltrain, BART, MUNI, VTA and AC Transit) and at the route level for VTA light rail, local bus and express bus routes.

TRANSPORTATION MODEL AND DATABASE MAINTENANCE

It is critical to maintain and update a transportation model and database on a regular basis to create the most accurate model. Elements of the CMP Model are updated on an annual basis if data is available. For example, with the release of ABAG P2017 socioeconomic data in 2018, VTA has updated the base year of the model (2015). The model updates utilized the most recent household travel survey data available, the most recent transit on-board surveys and 2015 traffic counts. This section describes the local data sources that are used in updating the model.

LOCAL DATA

The CMP annual monitoring process provides a significant amount of local data that is used to update the CMP Model. The two main sources of local data are observed traffic volumes and land use trip assumptions.

Observed Traffic Volumes — The VTA CMP and Member Agencies prepare regular reports of actual traffic volumes at CMP System intersections for the PM peak hour conditions. The CMP also reports traffic volumes at selected freeway locations for both AM and PM peak period (3-hour) conditions. VTA has recently started to collect bicycle and pedestrian data at CMP intersections for the PM peak hour, which will be used to validate the CMP Model. MTC and Caltrans also provide observed data on freeways and state highway for total volumes as well as carpool volumes. These datasets are used to update the countywide database of observed traffic conditions and help verify relationships and parameters included in the CMP Model.

Land Use Trip Assumptions — As part of the Land Use Impact Analysis Program, Member Agencies provide a summary of approved projects and major planning decisions, such as General Plan Amendments, made during the past year. Annual data for the Land Use Impact Analysis Program is submitted in terms of housing and development square feet by use. This data is used by the CMP to develop population

and employment changes used in the socioeconomic data allocations ABAG provides at the census tract level.

REGIONAL DATABASE AND MODELING UPDATES

CMP Statute requires that the CMP Model remain consistent with the ABAG regional database and MTC model. To achieve this, the CMP Model is updated on an on-going basis to remain consistent with the regional database and model. Six specific update efforts are described below.

Santa Clara County Land Use Database — To facilitate future planning, Member Agencies and VTA staff have developed an independent, locally generated and managed land use database. This database provides information for the CMP as well as helps make future ABAG projections more accurate. The database was initialized from parcel data from the Santa Clara County Assessor and was improved as Member Agencies review and verify their existing land use data.

As Member Agencies complete their verification, the land use database represents the most accurate and consistent database for current and near-term land use. The database also assists ABAG by providing accurate inputs to floor area, housing and acreage inventories for their projections. This database is available in the CMP's Geographic Information System (GIS).

Census Data Analysis — The Census Bureau, through the American Community Survey, has released 2013-2017 data that was used to update the CMP Model for auto ownership, trip distribution and mode choice. The recent recalibration of the CMP Model reflects data from the 2013-2017 American Community Survey, which is still the most recent survey with the relevant transportation data

MTC Transportation Model Changes — MTC periodically issues data, analysis and projections of information pertinent to the CMP Model and assumptions, such as auto operating costs and parking costs. The CMP Model and database are modified as needed to remain consistent with those developed by MTC for its model system. This is typically performed when the MTC Regional Transportation Plan is updated.

ABAG Data and Projections — As discussed above, the most recent ABAG projections, P2017, has been updated and incorporated into the CMP Model databases. ABAG expects that new projections will be adopted in the fall of 2021.

Parking Facilities and Pricing Inventory — MTC maintains an inventory of peak and off-peak parking charges at the zone level. A current and complete inventory of parking facilities and pricing is required for the internal zone system for the CMP Model. The CMP Model is consistent with the most recent MTC parking charges used in the RTP 2040 update, Plan Bay Area 2040.

GEOGRAPHIC INFORMATION SYSTEMS MAINTENANCE

VTA maintains model database information in Geographic Information System (GIS) layers. Layer information includes roadway and transit networks, bus stops, transit station locations, land-use information, General Plan information, key production and attraction features such as schools, shopping centers, government offices, major employers and employment centers and parks. These GIS layers are periodically updated and refined.

COMPLIANCE AND CONFORMANCE

To be in conformance with the Congestion Management Program, Member Agencies must ensure that their models are consistent with the CMP Model using the CMP Local Model Consistency Guidelines. VTA encourages the use of the CMP Model by its Member Agencies in order to ensure consistency; however, Member Agencies are free to develop their own local models that demonstrate consistency with the CMP Model.

VTA must also ensure that the CMP Model is consistent with the MTC regional models. To demonstrate compliance and conformance, MTC has developed a checklist of outputs that are to be produced from the CMP Model and compared to the MTC regional forecast year model run. CMP has prepared the checklist outputs from the most recent 2040 model runs and will provide the results in a separate submittal to MTC.

CHAPTER 7 | LAND USE IMPACT ANALYSIS ELEMENT

7. LAND USE IMPACT ANALYSIS ELEMENT

This chapter describes VTA's CMP Land Use Impact Analysis Program, including its Development Review Program and 2014 TIA Guideline Update. It also explores VTA's CMP Land Use Impact Analysis Program's relationship to VTA's Sustainability Program and Transit-Oriented Development Program, as well as to regional initiatives.

BACKGROUND

Integrating land use and transportation decision-making has been one of VTA's key focus areas since the development of the first CMP in 1991. The Community Design and Transportation (CDT) Program was created and adopted by the VTA Board of Directors in 2002 as its primary program for integrating transportation and land use. VTA works with its Member Agencies to track and minimize land use impacts on the transportation system.

The CDT Program developed a CDT Manual as a comprehensive toolkit for Member Agencies to use in all aspects of transportation and land use planning and in developing both public and private development projects. It includes a foundation of key concepts, guiding principles and specific practices and actions that Member Agencies can use to improve community form and the operation of transportation systems.

In January 2019, The VTA Board of Directors adopted a Land Use and Development Review Policy to formalize the way VTA engages in local land use and development processes.


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DEVELOPMENT OF THE CMP LAND USE PROGRAM

Local jurisdictions have the legal authority to make land use decisions, but the CMP Statute holds them accountable for the impact land use decisions have on transportation facilities.

Under the CMP Statute, if local land use decisions degrade a CMP

roadway below LOS E, then the Member Agency must take corrective action or they will be found in nonconformance with the CMP. One potential problem with a strict interpretation of the CMP Statute is that it could encourage new development in outlying areas with large tracts of undeveloped land and an underutilized transportation system. Developments in these areas are unlikely to have LOS violations and likely would not trigger mitigation measures. This would add to urban sprawl and more dependency on single-occupancy vehicles.

Recognizing this as a potential impediment for focusing growth and infill development in major transportation corridors and cores, the State Legislature amended the CMP Statutes to allow the preparation of Multimodal Improvement Plans and designation of Infill Opportunity Zones (IOZs). These provided steps to improve transportation facilities that degraded below LOS E and encouraged infill development.

LONG-RANGE OBJECTIVES

The long-term objective of the CMP Land Use Element is to develop land use and transportation initiatives that improve transportation conditions, community livability and air quality while supporting community goals. Many of Santa Clara County's larger cities are largely built out, so their emphasis has shifted from developing new land to developing infill land, adaptive-reuse, renewal and mixed-use development.

In addition to land use planning efforts, VTA and its Member Agencies have proactively built new transportation facilities near high density areas to create transit-orientated development (TOD) that helps achieve the CMP's long-range objectives. The integration of land use and transportation is emphasized throughout VTA's plans and polices.

VTA's objectives for integrating transportation and land use are:

- **Building Effective Partnerships** – By establishing common ground with jurisdictions to maximize synergy between land use and transportation.
- **Increasing Ridership and Support Fast Frequent, Safe and Reliable Transit Service** – By making it safe and more comfortable to access VTA services.
- **Supporting Transit-Supportive Development in Close Proximity to Transit** – By maximizing transit access, incentivizing ridership and improving communications with local jurisdictions.
- **Prioritizing Sustainable Travel Behavior** – By promoting active transportation as a strategy to reduce solo diving, VMT and supporting public health.

A key strategy to achieve these objectives is working closely with local jurisdictions to help ensure that both long-range plans and specific development projects help expand mobility options in sustainable locations, such as by promoting growth in close proximity to VTA's Frequent Network and within Priority Development Areas identified by MTC/ABAG. These objectives and strategies will create high-quality built environments that enable multimodal access, support fast and efficient transit operations and create transit ridership.

ELEMENTS OF THE CMP LAND USE PROGRAM

The Land Use Impact Analysis Program was first implemented in the 1991 CMP. Since then it has been modified in subsequent CMPs and has been revised with the Community Design and Transportation Program. From 1991 to the present, Member Agencies have worked with VTA to fulfill the Land Use Impact Analysis Program annually, through Development Review Program, 2014 TIA Guideline Update and Community Design

and Transportation (CDT) Program.

DEVELOPMENT REVIEW PROGRAM

In the Development Review Program, VTA reviews and comments on development and transportation projects and long-range land use and transportation policies (such as General and Specific Plans) in and adjacent to Santa Clara County. VTA's role in this review is to encourage multimodal/transit-integrative planning. VTA reviews and may comment on a project that:

1. Generate a hundred or more trips (per TIA Guidelines);
2. Is 50,000+ square feet of non-residential use;
3. Is within a hundred feet of a bus stop, light rail station, or frequent route;
4. Is within 1,500 feet of a transit facility (such as a VTA yard or transit center);
5. Is a transportation-related project (up to the discretion of staff);
6. Is a long-range or specific plan;
7. Is within 200 feet of BART Silicon Valley 2 footprint;
8. Is within a hundred feet of other future transportation projects; or
9. Is a project deemed relevant for VTA to review.

VTA's review occurs under one of three tracks:

1. Projects that require a TIA Report per CMP Guidelines, but do not require environmental clearance. For this type of project, VTA receives a TIA from the Member Agency and reviews the document based on the VTA CMP standards.
2. Projects undergoing environmental clearance per the California Environmental Quality Act (CEQA) and requires a TIA Report. For this type of project, the public notification and review requirements are defined by CEQA, Member Agency and VTA standards. A TIA is typically prepared during the environmental process and is usually included in the environmental document's appendix.
3. Additional referrals sent to VTA at the discretion of the Member Agency, such as a site plan review or an administrative draft of a planning document. For these referrals, the process and deadlines are established by agreement between VTA and Member Agency staff. VTA staff has worked hard since 2019 to be included in advanced referrals as it embodies early coordination and better overall land use outcomes.

2014 TIA GUIDELINES UPDATE AND RELATIONSHIP TO DEVELOPMENT REVIEW

VTA requires that Member Agencies analyze the potential transportation impacts of their land use decisions that generate a hundred or more net new A.M. or P.M. peak-hour trips on the CMP System by using the TIA Guidelines. As part of these analyses, Member Agencies must evaluate project impacts and effects on the multimodal transportation, including roadways, transit and pedestrian and bicycle facilities.

Two important goals of the 2014 TIA Guidelines Update were to

1. Emphasize the reduction of automobile trips and
2. Improve the analysis of alternative modes.

The complete TIA process is described in the CMP TIA Guidelines.

COMMUNITY DESIGN AND TRANSPORTATION (CDT) PROGRAM

The Community Design and Transportation (CDT) Program was developed to provide a unified framework for VTA's various land use activities. In 2002, the VTA Board of Directors adopted the CDT Program as its primary program to integrate transportation and land use. They adopted the CDT Manual of Best Practices for Integrating Transportation and Land Use in 2003. Within the next two years, every VTA Member Agency formally endorsed the CDT Program through Board or Council action, pledging to work to implement the guidelines laid out in the CDT Manual in future development. The CDT Program has since been folded into other funding programs and the Land Use Program.

As part of the original CDT Program, VTA staff developed the CDT Manual, a toolkit of best practices for integrating land use and transportation in Santa Clara County. VTA is currently updating the CDT Manual to reflect the most recent research and best practices including multi-modality, emerging technologies and equitable outcomes that build community. This effort is being undertaken in coordination with Member Agencies and other VTA stakeholders to ensure that the Manual is useful and effective for our partners.

CMP LAND USE DATA

An important aspect of the Land Use Program is gathering information on existing and planned land uses throughout the county to analyze their impact on congestion. VTA maintains a database of planning- level land use information, which is revised annually by Member Agencies as part of the annual CMP monitoring process.

In order to maintain the land use database, Member Agencies are required to provide VTA with data on two categories of land use decisions:

1. **Approved Projects** – Site-specific land use actions that have been approved by their jurisdiction; and
2. **Major Land Use Planning Changes** – Changes in general land use designations, such as General Plan Amendments, specific plans, area plans and major zoning revisions.

The CMP land use database also assists Member Agencies in their efforts to revise land use forecasts produced at the regional level. These regional forecasts are used in MTC's Regional Transportation Model and must be used in the CMP countywide transportation model. The CMP land use database structure has been designed to be consistent with the regional agency database to facilitate improved information exchange. It should be noted that VTA's database is only reflective of the projects that are referred to VTA.

OTHER VTA PROGRAMS AND INITIATIVES RELATED TO LAND USE

VTA SUSTAINABILITY PROGRAM

The Sustainability Program was approved by VTA's Board of Directors in 2008 with the goal "to strengthen VTA's commitment to the environment by reducing the consumption of natural resources, the creation of greenhouse gases and the generation of pollution in the provision of public transportation services." In 2020, VTA's Board of Directors adopted a resolution declaring a climate emergency and approved the Sustainability Plan 2020 to serve as a roadmap to achieve

sustainability targets based on existing VTA policies, State regulations and regional and local plans on climate and the environment.

VTA's sustainability targets focus on the following key performance indicators:

- Greenhouse gas (GHG) emissions including carbon dioxide, methane and nitrous oxide.
- Criteria air pollutants including ozone, carbon monoxide, nitrogen oxide, sulfur dioxide, particulate matter and lead.
- Energy used to power buildings and facilities including electricity, natural gas and propane.
- Energy used to operate VTA's bus and light rail fleet including fuel and electricity.
- Water including potable water used for indoor and outdoor purposes.
- Waste diverted from landfills by increasing the amount of materials that are reused, recycled and composted.

VTA's actions in these areas include:

- Reducing GHG emissions in compliance with the California Air Resources Board's Innovative Clean Transit regulation (California Code of Regulations Title 13, Section 2023.1) and SB 32, which targets a statewide reduction of GHG emissions to 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.
- Reducing the emission of criteria air pollutants from all sources, including transit vehicles.
- Reducing electricity and natural gas consumption in compliance with SB 350.
- Reducing fuel consumption and transitioning VTA's bus fleet to zero-emission vehicles by 2040.
- Reducing the consumption of potable (drinking) water and encouraging the use of non-potable (recycled) water for outdoor uses.
- Increasing the diversion of waste from landfills by encouraging sustainable procurement practices and improving recycling and composting programs.
- Supporting local government agencies and partners to make Silicon Valley a more sustainable region that is resilient and prepared for long-term climate impacts.
- Promoting policies and development that integrates land use and transportation to create, active, sustainable communities.
- Protecting, conserving and enhancing natural resources.
- Incorporating green building principles to ensure projects meet the highest standards for energy efficiency, use renewable or carbon-free sources of energy, minimize water use, reduce stormwater runoff and improve air quality.

VTA TRANSIT-ORIENTED DEVELOPMENT PROGRAM

VTA envisions its station areas and transit corridors as vibrant, prosperous community assets that create a strong sense of place for transit, pedestrians and the surrounding community. Its station areas and transit corridors will not only be a means to travel to destinations but will be a destination themselves. Transit-Oriented Development on VTA property and Transit-Oriented Communities in the surrounding station areas promote ridership growth, improved access to transit and reinvestment in aging infrastructure with new opportunities for placemaking, as well as public art, open space and safety enhancements at station areas.

VTA's Joint Development Program was originally adopted by the VTA Board in January 2005. It was designed to secure private and public sector development of VTA-owned property at or adjacent to transit stations and corridors. The VTA Board

later revised the Joint Development Policy and Implementation Plan in April 2009, in 2016 to add an affordable housing policy and a 2019 refresh to address parking policy. The ultimate goals for the TOD Program are to maximize ridership growth, leverage private development in station areas into equitable Transit-Oriented Communities and develop long term stable revenues for VTA.

The Transit-Oriented Development Policy provides a framework for creating the best opportunities for community building of mixed-use, mixed-income placemaking development around station areas and corridors and to optimize station access and ridership. VTA partners with local jurisdictions in station areas or Transit-Oriented Communities to promote holistic development patterns reflecting the global movement to "15 Minute Cities," transitioning station areas into destinations that enhance transit access and use.

A number of recently passed State laws intend to streamline TOD. In place through 2024, Senate Bill 330 expedites application review, prevents fee or exaction increases during permit review and generally prohibits down-zoning of sites designated for housing. In addition, Senate Bill 35 (updated in 2020 with the passage of Assembly Bill 1485) essentially requires local jurisdictions to approve housing projects with 20 percent of units for moderate- and/or low-income households.

RELATIONSHIP TO REGIONAL INITIATIVES

VTA's efforts regarding land use and transportation integration work together with and reinforce initiatives at the regional level in the Bay Area.

GROWTH GEOGRAPHIES

MTC and ABAG, established the FOCUS Program in 2006 and 2007 to encourage a shift towards higher density growth patterns, protecting the environment, reducing vehicle miles traveled and encouraging investment in transit. FOCUS established Priority Development Areas (PDAs) with incentives for transit-oriented development and provided a bridge between local land use decisions and regional development.

Beginning in May 2012, MTC and ABAG adopted the One Bay Area Grant (OBAG) program to distribute federal funds for transportation projects directly benefitting PDAs. It included a requirement that at least 70% of OBAG investments must be directed to PDAs for projects located either in or serving the PDAs

As part of the most recent update to the Bay Area's Regional Transportation Plan, MTC and ABAG expanded their PDA Framework and renaming them Growth Geographies. Growth Geographies are geographic areas used to guide where future growth in housing and jobs would be focused under the plan's strategies over the next 30 years.

The four categories of Growth Geographies are:

- Priority Development Areas (PDAs)
- Priority Production Areas (PPAs);
- Transit-Rich Areas (TRAs); and
- High-Resource Areas (HRAs).

PPAs are locally identified places for job growth in middle-wage industries like manufacturing, logistics or other trades. An area must be zoned for industrial use or have a predominantly industrial use to be a PPA.

TRAs are areas near rail, ferry or frequent bus service that were not already identified as PDAs. Specifically, these are areas

where at least 50% of the area is within 1/2 mile of either an existing rail station or ferry terminal (with bus or rail service), a bus stop with peak service frequency of 15 minutes or less, or a planned rail station or planned ferry terminal (with bus or rail service).

HRAs are State-identified places with well-resourced schools and access to jobs and open space, among other advantages, that may have historically rejected more housing growth. This designation only includes places that meet a baseline transit service threshold of bus service with peak headways of 30 minutes or better.

MTC has requested all CTAs to craft a PDA Investment & Growth Strategy within their respective counties. This monitored housing and transportation growth within these locations. As of summer 2021, VTA has developed three such reports between 2013 and 2016.

PLAN BAY AREA AND SB 375

In July 2017, MTC and ABAG adopted 'Plan Bay Area 2040,' which is the region's Sustainable Communities Strategy and Regional Transportation Plan. Plan Bay Area meet the requirements of California's 2008 Senate Bill 375 (Steinberg), which requires region to develop a Sustainable Communities Strategy or Alternative Planning Strategy that promotes compact, mixed-use development that is walkable and bikeable and close to mass transit.

The land use distribution of Plan Bay Area was developed to meet the following performance targets with guidance from SB 375:

- Help the region achieve its GHG emissions reduction target of reducing per-capita carbon dioxide emissions from cars and light-duty trucks by 7 percent by 2020 and by 15 percent by 2035; and
- House 100% of the region's projected 25-year population growth by income level (very-low, low, moderate, above-moderate) without displacing current low-income residents.

To help achieve these goals, Plan Bay Area 2040 envisions 80% of all new housing and 66% of all new jobs to be located in PDAs.

VTA was actively involved in the development of Plan Bay Area 2040 and served as a liaison between the regional agencies and VTA's Member Agencies. Through VTA's own initiatives including the CDT Program and Joint Development Program (now TOD Program), VTA has long supported the goal of integrating land use and transportation planning emphasized in Plan Bay Area 2040. VTA is committed to supporting local and regional efforts intended to create more transportation choices, develop more livable communities and reduce energy consumption and the pollution that causes climate change.

MTC RESOLUTION 3434 – REGIONAL TRANSIT EXPANSION PROGRAM AND TOD POLICY

As part of the 2001 update to the Regional Transportation Plan (RTP), MTC developed an associated Regional Transit Expansion Program (RTEP) to identify a list of high-priority rail and express/rapid bus improvements to improve mobility and enhance connectivity throughout the Bay Area. MTC adopted a Transportation and Land Use Platform in Resolution 3434 that calls for land use plans and policies that support transit expansions. In 2005, MTC amended Resolution 3434 to include a Transit-Oriented Development (TOD) Policy that establishes specific housing thresholds for these transit extensions, requires station area plans and establishes corridor working groups.

Each transit extension project must accommodate new housing along the corridor, with the required numbers of units based on transit mode, potential for increased ridership, case study station sites in the Bay Area, local general plans, predicted market demand for TOD and feasible development potential.

One transit extension project in Santa Clara County identified in the MTC Resolution 3434 TOD Policy is the BART Silicon Valley Project. VTA actively works with the cities along the corridor and other stakeholders to plan for future housing and employment intensification, station access needs, pedestrian- and bicycle-friendly design and infrastructure improvements in the vicinity of the six stations in the BART Silicon Valley extension.

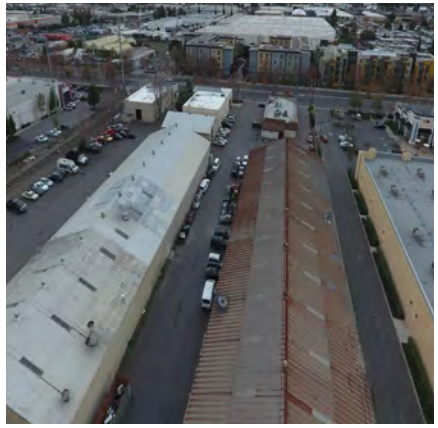
MTC's 2005 Transit-Oriented Development (TOD) Policy is currently being updated and a revised policy is anticipated to be released in 2022. It will reflect changes in regional transportation and land use trends since 2005, as well as information from the Regional Transportation Plan update.

AB 1358 - COMPLETE STREETS ACT

The California Complete Streets Act of 2008 requires counties and cities include plans for a balanced, multimodal transportation network that meets the needs of all users of the roadways in the circulation element of their General Plans. The intent of Complete Streets is to provide multimodal networks that are safe, convenient and well maintained with the goals of reducing greenhouse gas emissions, lowering vehicle miles traveled and improving public health.

VTA and its Member Agencies support this initiative. VTA oversees a variety of Complete Streets efforts that will complement the update of the CDT Manual. These efforts will assist Member Agencies in planning, designing and implementing projects that include the following key elements:

- **Multimodal design** – Incorporating street designs that accommodate all feasible travel modes.
- **Capacity/Continuity** – Maximizing efficient use of the roadway and implementing consistent street designs on corridors that travel through multiple cities.
- **Technology** – Using technology to improve safety and roadway operations.
- **Connectivity** – Improving access for all transportation modes to major destinations.
- **Maintenance** – Including plans for preserving the multimodal networks.


Peninsula Land

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South Bay Construction

COMPLIANCE AND CONFORMANCE

Member Agencies provide data to VTA annually for the CMP Monitoring Report. The data includes all approved development projects and major land use planning changes made during the past year. The data is then used to update the CMP countywide transportation model.

When VTA's cumulative analysis of all approved projects produces a finding of potential nonconformance on the CMP System, the Member Agency will be advised that nonconformance on an intersection or road segment is highly probable in the future. As a result, the Member Agencies may be required to identify strategies to maintain conformance

If the analysis of a land use planning decision shows that the proposed land use changes may contribute to a future violation of Auto LOS standards, subsequent reports must demonstrate that future land use plans and transportation improvements will prevent LOS violations or that an approved Multimodal Improvement Plan will be applied to achieve systemwide improvements.

CHAPTER 8 | CAPITAL IMPROVEMENT PROGRAM ELEMENT

8. CAPITAL IMPROVEMENT PROGRAM

This chapter describes Santa Clara County's CMP Capital Improvement Program (CIP). It provides an overview of the program and its funding sources.

BACKGROUND

The Capital Improvement Program (CIP) is a list of capital projects designed to improve transportation conditions and air quality in Santa Clara County. The CIP describes major transportation projects proposed by Member Agencies, VTA and Caltrans and is funded by a variety of sources.

The CMP statute requires that the CMP contain a Capital Improvement Program that accomplishes the following objectives:

- Maintains or improves the performance of the multimodal system for the movement of people and goods.
- Mitigates the impacts of land use decisions on the Regional Transportation System.
- Conforms to air quality mitigation measures included in state and federal air quality plans.
- Preserves the investment in existing facilities.

LOCAL POLICIES FOR CIP DEVELOPMENT

In 1992, the Santa Clara County CMA Governing Board adopted several specific policies to guide the development of the Capital Improvement Program along with regional criteria for project selection. The VTA Board of Directors revised these policies around November 2001 to the following:

- Future discretionary Federal and State programming is limited to pedestrian, bicycle and roadway projects
- Santa Clara County's STIP submittal will be formulated to be


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consistent with the adopted long-range Countywide Transportation Plan.
- All projects submitted for funding must be on or benefit the adopted CMP System.
- Transportation improvements should support higher density development around transit stations, thus promoting the use of transit and other alternatives to the single-occupant vehicle in Santa Clara County.
- Improvements that make existing developments more pedestrian and bicycle-friendly, support HOV and transit users and improve passenger safety and convenience are encouraged.
- Transportation improvements should support land-use policies that encourage well-designed infill and mixed-use development.
- Whenever possible, roadway projects shall improve, or at least not reduce, outside lane widths (or bicycle lanes) to provide for safe bicycle travel.

CAPITAL IMPROVEMENT PROGRAM FUNDING

VTA implements the Valley Transportation Plan (VTP) on a periodic basis. The VTA Board previously adopted the Valley Transportation Plan 2040 (VTP 2040) in October 2014. VTP 2040 addressed transportation-related projects and actions in Santa Clara County that involve VTA and its Member Agencies, impact inter-jurisdictional travel or are regional in nature. These investments are location-specific improvements for four modes of travel:

- Roadway (including High-Occupancy Vehicle and Intelligent Transportation System),
- Transit,
- Bicycle and Pedestrian.

For the update to Plan Bay Area 2050, VTA updated their project list to be more in line with the requirements of the Regional Transportation Plan. In 2022, VTA plans to revisit the VTP to develop a complete transportation picture for Santa Clara County. The following sections describe funding programs for the 2021 CIP.

SURFACE TRANSPORTATION BLOCK GRANT PROGRAM / CONGESTION MITIGATION - AIR QUALITY PROGRAM

The Surface Transportation Block Grant Program (STBGP) federal funds are used to address congestion problems by funding planning, rehabilitating and improving projects across all transportation modes. Congestion Mitigation – Air Quality Program (CMAQ) federal funds are used to implement the transportation provisions of the 1990 Federal Clean Air Act and are allocated only to areas designated as non-attainment areas. Santa Clara County is currently in a non-attainment area.

Both funding programs are part of the Fixing America's Surface Transportation (FAST) Act, which was signed into law in December 2015. The FAST Act was the first federal law in over a decade to provide long-term funding certainty for surface transportation infrastructure planning and investment. It authorized $305 billion over fiscal years 2016 through 2020 for highway and motor vehicle safety, public transportation, motor carrier safety, hazardous materials safety, rail and research, technology and statistics programs. The FAST Act maintains the focus on safety, keeps intact the established structure of the various highway-related programs US DOT manages, continues efforts to streamline project delivery and provides a dedicated source of federal dollars for freight projects.

The main vehicle to distribute STBGP and CMAQ funds to county agencies is through the One Bay Area Grant (OBAG)

program, created by MTC and administered locally by the nine regional county transportation agencies. OBAG Cycle 2 awarded $104 million to Santa Clara County projects that support implementation of the region's Plan Bay Area Sustainable Communities Strategies. The types of awarded projects included local streets and roads maintenance, streetscape enhancements, bicycle and pedestrian improvements, Safe Routes to School projects, transportation planning and priority development area (PDA) planning and implementation. Cycle 2 terminates in 2022 while Cycle 3 is currently in development.

STATE TRANSPORTATION IMPROVEMENT PROGRAM

The State Transportation Improvement Program (STIP) is the biennial five-year plan adopted by the California Transportation Commission (CTC) for future allocations of certain state transportation funds for state highway improvements, intercity rail and regional highway and transit improvements. State law requires the CTC to update the STIP biennially, in even- numbered years, with each new STIP adding two new years to prior programming commitments.

Caltrans is responsible for developing the STIP Fund Estimate, which sets the target of available programming capacity for each county. By State statute, the CTC first determines how much of the funding will be directed to the State Highway Operations and Protection Program (SHOPP) with the remaining balance going to the STIP. The most recent STIP was adopted in 2020 and development of the 2022 STIP begins in 2021.

The STIP has two subcomponents: (1) Regional Transportation Improvement Program (RTIP); and (2) Interregional Transportation Improvement Program (ITIP):

State statute directs that 75% of the funds are prioritized by the Regional Transportation Planning Agencies (RTPAs), MTC is Santa Clara County's RTPA. Each county receives a "County Share" or a Regional Improvement (RIP) fund based on of the county's population and lane mileage.

The program of projects selected by each RTPA is called the region's Regional Transportation Improvement Program (RTIP). MTC has delegated RIP programming priorities to each county's respective CTA. RIP funds may be used for roadway and transit capacity expansion projects. Once the VTA Board has taken its programming actions, VTA staff submits the program of projects with supporting documentation to MTC. MTC bundles the priorities from all nine Bay Area counties and adopts them as the MTC RTIP. The CTC consolidates and approves RTIPs

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from all of the State's RTPAs.

The remaining 25% are the Interregional Improvement Program (IIP) funds. Caltrans sets the priorities for this program and submits the ITIP to the CTC for approval at the same time as the RTIPs. IIP funds may be used for projects to improve state highways, the intercity passenger rail system and interregional movement of people, vehicles and goods. VTA does not have a direct role in the administration of the ITIP program.

REGIONAL MEASURE 2 AND REGIONAL MEASURE 3

In 2004, voters passed Regional Measure 2 (RM2), raising the toll on the seven state-owned toll bridges in the San Francisco Bay Area by a dollar. This extra dollar funds various transportation projects within the region to reduce congestion or to make improvements to travel in the toll-bridge corridors as identified in Senate Bill 916 (Chapter 715, Statutes of 2004). This was expanded in June 2018 when voters passed Regional Measure 3 (RM3) to increase bridge tolls up to three dollars to fund congestion relief projects and improve mobility in the bridge corridors.

SENATE BILL 1

Senate Bill 1, the Road Repair and Accountability Act of 2017, was signed into law in April 2017. This legislative package invests $54 billion over the next decade to fix roads, freeways and bridges in communities across California and puts more dollars toward transit and safety. These funds will be split equally between state and local investments. Programs funded under SB 1 include Solutions for Congested Corridors, Trade Corridor Enhancement, Local Streets and Roads, Local Partnership, with augmented funding to the Active Transportation Program, State Highway Operations and Protection Program and State Transportation Improvement Program. Additional details can be found at https://catc.ca.gov/programs/sb1.

2000 MEASURE A, 2008 MEASURE B AND 2016 MEASURE B SALES TAX FUNDS

In November 2000, the voters of Santa Clara County approved Measure A, a 30-year countywide a-half-cent sales tax to be collected by VTA to fund specific transit projects and programs. 2000 Measure A took effect in April 2006, immediately after the expiration of the 1996 Measure B half-cent sales tax and will sunset in 2036.

In November 2008, the voters of Santa Clara County approved Measure B, a 30-year eighth–cent sales tax to fund the operations and maintenance of the 16.1 mile BART extension into Santa Clara County and help fund VTA's contributions to BART's system wide capital reserve. This measure took effect in 2012 and will sunset in 2042.

In November 2016, the voters of Santa Clara County approved Measure B. Revenues will fund various transportation projects in Santa Clara County. These projects range from local streets and roads repair, bicycle and pedestrian improvements, building Caltrain grade separations to funding Phase II of the BART extension.

TRANSPORTATION FUND FOR CLEAN AIR

The Transportation Fund for Clean Air (TFCA) grant program is funded by a surcharge on vehicle registrations. Assembly Bill (AB) 434 (Sher, 1991), added Section 44241 to the California Health and Safety Code and gave the Bay Area Air Quality Management District (BAAQMD) the authority to collect a surcharge of up to four dollars on motor vehicle registration fees within its jurisdiction. These funds are administered by

BAAQMD and used for programs that will reduce motor vehicle emissions.

BAAQMD returns 40% of TFCA funds to the county in which they are collected for allocation by a "County Program Manager." This fund is called the TFCA County Program Manager (CPM) Fund. The VTA is the county program manager for Santa Clara County and project sponsors apply directly to VTA for funding. The VTA Board of Directors allocates these funds to projects, subject to review by BAAQMD. To qualify for funding, all TFCA projects must conform to BAAQMD's board-adopted policies and procedures.

The remaining 60% of TFCA funds are retained by BAAQMD and distributed directly to sponsors on a regional, competitive basis. VTA is not involved in this process.

SANTA CLARA COUNTY EXPRESS LANES REVENUE

In 2004, the State passed AB 2032, giving VTA the authority to implement express lane operations in two routes in Santa Clara County. After completing an Express Lane Study that identified candidate routes, VTA opened the first express lane in Santa Clara County on the SR 237/I-880 connector ramp in 2012. During FY 2013, the express lane produced toll revenues of $1,049,000, almost double the projected revenue. In 2019, VTA extended the SR 237 Express Lanes westward towards US 101. During FY 2021, the SR 237 Express Lanes generated about $1.6 million during the pandemic period. VTA's express lanes program revenues are used for expenses related to operations and maintenance, enforcement, repayment of loan financing and other transportation improvements in the express lanes corridors.

2010 MEASURE B VEHICLE REGISTRATION FEE

In 2010, the voters of Santa Clara County approved a ten dollar increase in the motor vehicle registration fee (VRF) for transportation-related projects and programs.

The VTA Board of Directors adopted an expenditure plan allocating the revenue to be eligible transportation-related programs. The expenditure plan dedicates 80% of the VRF revenues to the Local Road Improvement and Repair Program, in which the revenue is returned directly to VTA Member Agencies based on each city/town's population and the County of Santa Clara's road and expressway lane mileage.

Another 15% of the revenue is directed to the "Countywide Program." Eligible projects are programmed by the VTA Board every three years. The remaining 5% of the VRF revenue is reserved for Program Administration. Unused administration funds and leftover funds from under-budget projects, return to the "Countywide Program" and are available for future Countywide Program programming.

CIP PROJECT LIST

The Capital Improvement Program is developed in accordance with the regionally adopted multimodal criteria for project selection. The criteria emphasizes maintaining and sustaining the existing transportation system, improving its efficiency and effectiveness through congestion relief, safety improvements and consideration of freight movement, expanding the system and accounting for external impacts on land use and air quality.

The CMP Statute requires that capital improvement programs be submitted to MTC for inclusion in Plan Bay Area 2050 and, when funded, the Transportation Improvement Program (TIP). The statute then specifies that the regional agency shall:

- Evaluate the consistency between the program and the regional transportation plans pursuant to Section 65080.
- Find the program to be consistent and incorporate it into the regional transportation improvement program as provided for in Section 65082. If the regional agency finds the program is inconsistent, it may exclude any project in the CMP from inclusion in the regional transportation improvement program.

Appendix G contains the project lists constituting the Capital Improvement Program. Additional information about a specific project can be found by entering the TIP ID on MTC's Fund Management System on MTC's website at https://fms.mtc.ca.gov/fms/home.ds.


VTA


VTA

VTA

CHAPTER 9 | MONITORING AND CONFORMANCE ELEMENT

9. MONITORING AND CONFORMANCE ELEMENT

This chapter explores VTA's Monitoring Program by detailing its elements, responsible agency and frequency.

BACKGROUND

The CMP Statute states that CTAs must monitor the level of service on the CMP roadway network and the impacts of land use changes to determine whether Member Agencies are conforming to the CMP. It also states that CTAs must ensure that its Member Agencies are meeting transportation impact analysis submittal requirements. Failure to conform to the CMP may result in the withholding of Member Agency Proposition 111 gas tax revenue. VTA exceeds the monitoring program outlined in the CMP Statute.

Monitoring findings are released each spring in the Monitoring and Conformance Report after receiving months of input from VTA's Systems Operations and Management Working Group and other Member Agency staff. The Report is reviewed by VTA's Advisory and Standing Committees and is ultimately approved by the Board of Directors.

SCOPE OF THE MONITORING PROGRAM, RESPONSIBILITY AND METHODOLOGY

Some sections and methodology of VTA's monitoring program is mandated by the CTA legislation, while others are added by Member Agencies and VTA input. More information about the methodology for data collection in the monitoring program is included in the most recent Monitoring and Conformance Report released in 2018.

FREEWAYS

VTA Responsibility, Undertaken Annually

Generally, VTA collects AM and PM peak period data for the freeways in the CMP network each fall with the last set of data collected in 2019. Due to the COVID-19 pandemic, it was recommended that no data be collected in 2020, with VTA resuming efforts in 2021.

VTA uses big data to collect a comprehensive set of data for every freeway segment. Big data is used to measure traffic speed, which forms the basis to calculate LOS as well as density and flow rates based on a density-speed curve. VTA uses the data source INRIX to provide location-based data and analytics, such as traffic and parking.

Using big data helps to improve the Monitoring Program by providing more data for a lower cost and by widening the scope of transportation analysis in Santa Clara County. Over the coming years VTA staff will continue to use big data to conduct research and look at other data sources that can contribute to the development of the report.

LAND USE APPROVALS

Member Agency Responsibility, Undertaken Annually

Each summer Member Agencies are requested to submit land use approval data for the prior fiscal year to VTA. The data submittal identifies the parcel number, traffic analysis zone (TAZ), zoning designation/change, number of residential units added and removed and the number of commercial and

industrial square feet added and removed.

VTA tallies the annual change in residential units and commercial/industrial square footage on a city and countywide basis, identifies development trends and undertakes a geographic analysis of land use changes.

TRANSPORTATION IMPACT ANALYSIS

Member Agency Responsibility, Continually As Appropriate

Member Agencies are required to undertake a Transportation Impact Analysis (TIA) when a project is expected to produce more than a hundred net new peak hour trips during the AM or PM peak hour (weekdays) or the peak hour (weekends). TIAs are required to be submitted to VTA for review and comment at least 20 calendar days before the project is considered for approval or recommended for approval.

CMP INTERSECTIONS

Member Agency Responsibility Performed By VTA, Undertaken Biennially

The operation of principal arterials and state highways located within urbanized Santa Clara County is measured by the level of service at CMP Intersections.

CMP intersections are select, generally high-volume intersections located along these thoroughfares. 252 CMP intersections are currently monitored. Every other fall, the PM peak period vehicle volume data for each CMP Intersection is collected and analyzed. VTA did not collect intersection data in 2020, as recommended by the Member Agencies. Traditionally, data collection for CMP intersection monitoring has been a Member Agency responsibility. However, based on an agreement between VTA and the Member Agencies in 2011, data collection for CMP intersections is currently performed by VTA.

For CMP Intersections level of service is calculated in terms of Average Control Delay, which is the average number of seconds a vehicle must wait at the intersection, as outlined in the 2000 Highway Capacity Manual.

RURAL HIGHWAYS

VTA Responsibility, Undertaken Biennially

Every other fall, VTA uses hose counters to conduct three-day counts at 12 locations along Santa Clara County's rural highways. Automatic hose counters are used to measure vehicle counts by the number of times the hose is depressed by traveling vehicles. Counts are recorded in 15-minute intervals with the one- hour period that shows the greatest combined vehicle volume considered the peak period. The LOS procedure in the 2010 Highway Capacity Manual is used to measure the percent time-spent following and average travel speed, with appropriate inputs for peak hour and peak 15 minute traffic volumes, the percentage split between the two directions of traffic, the percentage of trucks in the traffic flow and the type of terrain. Rural highway data was last collected for the 2018 monitoring cycle and will be collected again in 2021.

MULTIMODAL IMPROVEMENT PLAN MONITORING

Member Agency Responsibility, Undertaken Annually

Multimodal Improvement Plans are prepared by Member Agencies when the CMP Traffic Level of Service standard is below LOS E or is likely to become below LOS E in the future. The requirements for preparing Multimodal Improvement Plans are set forth in Multimodal Improvement Plan Requirements, which were most recently updated in September 2010.

Member Agencies with approved Multimodal Improvement Plans are responsible for preparing an Implementation Status Report that documents progress on the implementation of all the improvements and actions included in the Plan. These are generally collected in the year the intersection data is tallied. As part of its monitoring process, VTA reviews Member Agencies' Implementation Status Reports to determine conformance with the CMP.

MONITORING AND CONFORMANCE PROCESS

The following is a brief summary of the steps in the VTA CMP Monitoring and Conformance Process over the course of the fiscal year.

July – VTA alerts Member Agencies of monitoring requirements and deadlines for data submittal. The notification contains paper and electronic versions of the annual monitoring and conformance requirements, land use approval worksheet, certification form and supporting documents.

Fall – Member Agencies assemble land use approval data and TIA submittals. VTA collects all data for the CMP Monitoring Program between Labor Day and the Thanksgiving Holiday week. Every year, freeway data, land use data and Implementation Status Reports for Multimodal Improvement Plans, if applicable, are collected. Biennially, CMP Intersections, rural highways and bicycle and pedestrian volumes are collected.

Winter – VTA staff receives and analyzes monitoring data. Monitoring data is presented to the Systems Operations & Management Working Group (SOMWG) for review and discussion.

Spring – VTA presents the Draft Monitoring and Conformance Report and conformance findings to the SOMWG, select advisory and standing committees and the Board of Directors for adoption.

If a Member Agency is found in non-conformance with the CMP, the agency will be notified by VTA in writing and will have 90 days to achieve conformance. If a Member Agency finds flaws with a finding of non-conformance, the agency has 60 days to submit a written response either disputing the finding by documenting any errors or the Member Agency must detail how the agency will respond to the violation, for instance by developing a Multimodal Improvement Plan. Written responses must be signed by the city manager, town manager or county executive.

If a Member Agency found to be non-conforming has not achieved conformance within the 90 days following written notice, the VTA Board of Directors will make a finding of non-conformance and will notify the State Controller. The State Controller will then withhold gas tax subventions from the non-conforming jurisdiction.

Summer – Following adoption by the Board of Directors, a final version of the Monitoring Report is released incorporating feedback, if any, from the Committees and the Board.

RELEVANT TECHNICAL GUIDELINES

The following Technical Guidelines of the VTA Congestion Management Program are relevant to the Monitoring and Conformance process. The versions and dates listed are the most current as of summer 2021.

- Traffic Level of Service Analysis Guidelines (adopted June 2003)

- Transportation Impact Analysis Guidelines (adopted October 2014)
- Deficiency Plan Requirements (adopted September 2010)
- Annual Monitoring Requirements (revised April 2004)

CHAPTER 10 | MULTIMODAL IMPROVEMENT PLAN ELEMENT

10. MULTIMODAL IMPROVEMENT PLAN ELEMENT

This chapter describes the Congestion Management Program Multimodal Improvement Plan Element. It summarizes VTA's Multimodal Improvement Planning approach, requirements, evaluation and monitoring.

BACKGROUND

The Congestion Management Program (CMP) Statute requires a deficiency plan when a roadway segment or intersection falls below the standard LOS. For Santa Clara County, the roadway segment or intersection threshold is at LOS E, unless the roadway facility is grandfathered into LOS F.

VTA now uses the term "Multimodal Improvement Plan" (MIP) instead of "Deficiency Plan" to show that multimodal improvements and measures are appropriate to address a LOS deficiency, especially when expanding automobile capacity is infeasible or undesirable. Prior to August 2013, VTA used the term "Deficiency Plan," so this term still occurs in two "Deficiency Plans" adopted prior to August 2013.

To be consistent with CMP Statute, MIPs must include a list of improvements, programs or actions that measurably improve multimodal performance and contribute to significant improvements in air quality. If a CMP System facility falls below the LOS standard and does not have an approved MIP, then the local jurisdiction is at risk of losing gas tax revenues provided from Proposition 111.

In some situations, meeting the LOS standards may be infeasible or undesirable - for example, in dense infill areas near transit. As a result, MIPs allow local jurisdictions to approve development projects even if it causes a CMP facility to fall below LOS E. They allow local jurisdictions to adopt innovative and comprehensive transportation strategies for improving system-wide multimodal transportation rather than strictly adhering to an auto LOS standard that may contradict other community goals. MIPs allow Member Agencies to trade off increased congestion on one CMP facility for transportation system improvements to other facilities or services (e.g., transit, bicycling, walking, or transportation demand management).

VTA APPROACH TO THE PREPARATION OF MULTIMODAL IMPROVEMENT PLANS

MIPs are prepared by Member Agencies, in consultation with VTA and neighboring jurisdictions and agencies. VTA's overall approach is to create a clear set of guidelines so that congestion issues and multimodal, off-setting improvements can be addressed in advance and development projects are not delayed by the process. Since the establishment of the Congestion Management Program, VTA has been proactive in the development of guidelines and standards for MIPs.

1991 – The Technical Advisory Committee (TAC) began developing guidelines.
1992 – The first Requirements for Deficiency Plans were adopted by the VTA Board.
2010 – Revised Deficiency Plan Requirements were adopted by the VTA Board after consultation with Member Agencies.
2021 – VTA is exploring potential updates to the Requirements document to reflect the renaming of

Deficiency Plans to MIPs, provide clearer guidance for how MIPs can be updated over time and provide a framework for possible retirement of MIPs in the future.

The 2010 Revised Deficiency Plan Requirements set forth three levels of plans, which are intended to provide greater flexibility to Member Agencies:

Mini Multimodal Improvement Plan – Prepared to address a single CMP Intersection or roadway facility, typically in conjunction with a Transportation Impact Analysis (TIA) Report for a single development project.

Specific Area Multimodal Improvement Plan – Prepared for a CMP roadway segment or set of intersections within a localized specific area such as a downtown or special district.

Areawide Multimodal Improvement Plan – Prepared to address all the CMP System roadways or intersections included in an identified area such as an entire city or an area that covers multiple jurisdictions and/or cities.

VTA recommends that Member Agencies prepare Areawide Multimodal Improvement Plans whenever possible. This will reduce the number of Multimodal Improvement Plans prepared and will create comprehensive solutions to transportation problems.

MULTIMODAL IMPROVEMENT PLAN REQUIREMENTS

VTA's current document addressing the policies and procedures for MIPs is the Deficiency Plan Requirements, adopted September 2010.

The CMP Statute states that "The deficiency plan shall include the following elements (summarized from California Government Code Section 65089.4):

1. Analysis of the cause of the deficiency;
2. Analysis of the improvements needed to maintain the CMP auto LOS standard on the deficient facilities and the cost of those improvements;
3. A list of alternative improvements, programs or actions that will improve multimodal performance and improve air quality; and
4. An action plan for implementing the improvements outlined in (2) or the alternative actions outlined in (3).

The CMP Statute requires that County Transportation Agencies use the action items from the Deficiency Action List developed by the local air quality management district. For Santa Clara County, the Bay Area Air Quality Management District (BAAQMD) adopted its Deficiency Plan Action List in November 1992, based on the Transportation Control Measures (TCMs) in the Bay Area Clean Air Plan. The most recent Bay Area Clean Air Plan was adopted in April 2017 and contains an updated list of TCMs that can guide the development of MIPs. Therefore, MIPs can be a significant means of implementing TCMs and working towards improved air quality in Santa Clara County.

VTA's Deficiency Plan Requirements include the BAAQMD Deficiency Plan action list, as Appendix C of the document. Where appropriate, VTA's requirements contain edits that have been made to the Air District's action list to reflect current standards and practices applicable to Santa Clara County.

MULTIMODAL IMPROVEMENT PLAN EVALUATION

Member Agencies must prepare MIPs and adopt them at a noticed public hearing. The Multimodal Improvement Plan is

then submitted to VTA within 12 months of the identification of a deficiency and must be adopted at a noticed public hearing.

The VTA Deficiency Plan Requirements define the criteria that will be used to approve or reject Member Agency MIPs. VTA staff will analyze MIPs submitted by Member Agencies using the adopted criteria and present a report to the VTA Board that documents staff's findings and contains a recommendation to approve or reject the MIP.

MULTIMODAL IMPROVEMENT PLAN CRITERIA

The following criteria, detailed in VTA Deficiency Plan Requirements, are currently used when evaluating MIPs:

1. Are all actions on the most current version of the Deficiency Plan Action List that are applicable and feasible included in the MIP? Are the reasons why any actions found to be inapplicable or infeasible adequate?
2. Are sufficient actions included in the MIP to compensate for the deficient facility's unacceptable LOS? Are these actions on the Deficiency Plan Action List or have they been approved by the BAAQMD? Is the technical analysis of physical improvements included in the MIP adequate?
3. Does the MIP include a workable program to guarantee implementation of all actions and improvements included in the MIP?
4. Are the costs for implementation of the MIP actions reliably estimated? Does the MIP include an adequate method for financing the actions and improvements;
5. Are the MIP actions and improvements consistent with all appropriate regional and local plans (e.g., the Regional Clean Air Plan, the Regional Transportation Plan, the Regional Transportation Improvement Program, the BAAQMD's Deficiency Plan Action List and any subsequent requirements and applicable General Plans)?
6. Did the local jurisdiction consult with all appropriate neighboring jurisdictions and agencies when preparing the MIP?
7. Did the MIP include a monitoring program that will assess whether MIP actions and improvements have been implemented?
8. Did the Member Agency prepare an adequate environmental analysis of the MIP?

In accordance with CMP Statute, VTA will consider MIPs at a noticed public hearing. If an MIP is rejected, VTA will provide a written report that documents its reasons for rejecting the MIP.

MULTIMODAL IMPROVEMENT PLAN MONITORING

MIPs must be monitored as part of the CMP Monitoring and Conformance Program. Member Agencies will monitor implementation of MIP actions by preparing an MIP Implementation Status Report. This status report will be based on the action list and implementation schedule included in the MIP.

If a Member Agency is not meeting the implementation schedule it set forth in a MIP, VTA may require the Member Agency to expedite the implementation of their MIP, or the Member Agency could be found in nonconformance with the CMP and lose gas tax revenues generated by Proposition 111.

As part of its CMP Monitoring and Conformance Program and travel demand modeling activities, VTA performs an evaluation of the multimodal performance of the CMP Transportation System. This helps evaluate the overall effectiveness of VTA and Member Agency efforts to improve the system. It must be emphasized that it will be difficult to measure quantitatively the effect of individual actions or even of individual MIPs,

especially since most of the actions are designed to achieve maximum effectiveness over the long term. VTA uses several types of quantitative data to analyze overall CMP effectiveness. The data may include LOS data, pedestrian and bicycle count data collected as part of the CMP monitoring program or submitted in TIA reports and modeling data, such as Vehicle Miles Traveled (VMT) and mode shares, gathered from VTA's Countywide Transportation Model.

LOCAL MULTIMODAL IMPROVEMENT PLANS

To date, four MIPs have been developed by cities and approved by the VTA Board of Directors, shown in Table 10.1 below.

Other cities in Santa Clara County such as San Jose are considering developing MIPs to address LOS deficiencies associated with development projects or land use plans. Further information about specific MIPs in Santa Clara County, including progress on implementing MIP actions, is provided in the CMP Monitoring and Conformance Report.

MULTIMODAL IMPROVEMENT PLAN UPDATES

MIPs should be updated when transportation and/or development projections change significantly from the assumptions in place during the development of the MIP. As noted above, VTA is exploring potential updates to its Requirements document, in part to provide clearer guidance for how MIPs can be updated over time and to provide a framework for possible retirement of MIPs in the future.

As of summer 2021, the City of San Jose is in discussions with VTA and neighboring jurisdictions about potential updates to the North San Jose Deficiency Plan to reflect anticipated changes to the North San Jose Area Development Policy, which triggered the preparation of the Deficiency Plan. VTA staff will continue to coordinate with City of San Jose staff regarding this potential update and will bring this update to VTA working groups, Committees and Board as appropriate.

Table 10.1 | Approved Multimodal Improvement Plans (Formerly Called Deficiency Plans)

City	Type of Multimodal Improvement Plan	Date Approved by VTA Board of Directors
Sunnyvale	Citywide Deficiency Plan	January 2006
San Jose	Specific Area North San Jose Deficiency Plan	January 2007
Mountain View	Citywide Multimodal Improvement Plan	November 2018
Santa Clara	Specific Area Multimodal Improvement for northern Santa Clara, associated with the related City Place development project	November 2018

COMPLIANCE AND CONFORMANCE

In order to be in conformance with the Congestion Management Program, Member Agencies must:

- Prepare MIPs for facilities that fall below the CMP auto LOS standard or that are projected to fall below the LOS standard, using the adopted VTA Deficiency Plan Requirements.
- Work towards the implementation of MIP actions according to the implementation schedule included in the MIP and submit MIP Implementation Status Reports as part of the CMP Monitoring process.

APPENDIX A | GLOSSARY

2000 Measure A: A 30-year countywide half cent sales tax collected to fund specific transit projects and programs that took effect in April 2006.

2008 Measure B: A 30-year 1/8–cent sales tax to fund the operations and maintenance of the 16.1 mile BART extension into Santa Clara County and help fund VTA's contributions to BART's system wide capital reserve, approved November 2008.

2016 Measure B: A 30-year, half-cent countywide sales tax to enhance transit, highways, expressways and active transportation (bicycles, pedestrians and complete streets) adopted in November 2016.

ABAG: Association of Bay Area Governments. The regional planning agency for the nine counties and 101 cities and towns of the San Francisco Bay region.

Automobile Level of Service: Automobile Level of Service (commonly shortened to "auto LOS") qualitatively describes the operations of roadway segments or intersections in terms of vehicle speed, volume and capacity, and traffic delay. Auto LOS measurements are given by letter designations, from A (least congested) to F (most congested).

BAAQMD: Bay Area Air Quality Management District. The regional agency created by the state legislature for the Bay Area air basin that develops, in conjunction with MTC and ABAG, the air quality plan for the region. BAAQMD has an active role in approving the TCM (see definition below) plan for the region, as well as in controlling stationary and indirect sources of air pollution.

Baseline LOS: 1991 CMP level of service. Traffic volumes used to calculate the baseline LOS include existing 1991 intersection volumes, and new trips generated from projects approved as of April 17, 1991 and funded transportation improvements.

Caltrans: California State Department of Transportation. As the owner and operator of the state highway system Caltrans is responsible for the safe operation and maintenance of the highway system.

Capital Priorities: A process used by MTC to evaluate and prioritize transit projects in the region. All sources of transit funding, including FTA grants, state programs, and other sources are considered. This process involves all of the transit operators in the region, including bus, rail, and ferries.

CEQA: California Environmental Quality Act. This act sets environmental standards designed to enhance environmental quality and to control environmental pollution throughout the state of California.

CIP: Capital Improvement Program. A seven year program established by CMP to create projects to maintain or improve the auto level of service and transit performance standards and to mitigate regional transportation impacts identified by the CMP Land Use Analysis Program, which conforms to transportation-related vehicle emissions air quality mitigation

measures.

CMA: Congestion Management Agency. The CMA is a countywide organization responsible for preparing and implementing the county's Congestion Management Program. In Santa Clara County, VTA is the designated CMA.

CMP: Congestion Management Program. A multi-jurisdictional program to manage traffic congestion. required for every county in California that has urbanized areas of at least 50,000 people. Unless specified, CMP will mean the Santa Clara Valley Transportation Authority's Congestion Management Program.

CTC: California Transportation Commission. A state agency that sets state spending priorities and allocates funding for highways and transit. The Governor of California appoints CTC members.

Deficiency Plan: See Multimodal Improvement Plan.

Express Lanes: High-occupancy toll lanes that combine the characteristics of HOV lanes and toll roads by allowing carpools, vanpools, and buses free access, while charging for single-occupant vehicles. In other areas outside Santa Clara County, Express Lanes may be called high-occupancy toll (HOT) or managed lanes.

HCM: Highway Capacity Manual. A manual published by the Transportation Research Board that contains concepts, guidelines, and equations to calculate the level of service on highways and intersections. In 2010 the manual was updated to include new level of service/quality of service measures for transit, pedestrians, and bicycles.

HOV: High Occupancy Vehicle Lane. A lane on a street or highway reserved for the use of high occupancy vehicles, including buses, carpools, and vanpools, either all day or during specified periods, such as during rush hours.

HSR: High Speed Rail. The project which is an intra-state high-speed rail link currently being planned by the California High Speed Rail Authority to help meet the anticipated increase in travel demand between the Bay Area and Southern California.

IIP: Interregional Improvement Program. This is a state funded program created by SB 45. IIP funds may be awarded to projects outside of the urbanized areas and for interregional projects. All IIP funds are programmed by Caltrans, via the Interregional Transportation Improvement Plan (ITIP) process, with final approval by CTC.

ISTEA: Intermodal Surface Transportation Efficiency Act. In 1991, Federal legislation passed a bill that restructured the way funding was allocated to highway projects and included funding transit projects in urban areas. Key ISTEA components included increased flexibility in the programming of projects and a level playing field between highway and transit projects with a consistent matching ratio of 80% to 20%, respectively. There were ties to the Federal Clean Air Act and the Americans with Disabilities Act, and some major New Rail Starts (Section

3) funds earmarked for the Bay Area Region. ISTEA funding expired in 1997, and was followed by TEA-21, and then SAFETEA LU.

ITIP: Interregional Transportation Improvement Program. The ITIP is a four-year planning and expenditure program adopted by the CTC and updated in even numbered years. The ITIP covers rural highways and key interregional improvements including intercity rail.

Member Agency: A local jurisdiction that is a signatory of the CMA's Joint Powers Agreement. This includes all cities and towns within the county, Santa Clara County, and the Santa Clara Valley Transportation Authority.

MPO: Metropolitan Planning Organization. A federally required transportation planning body responsible for the Regional Transportation Plan (RTP) and the Transportation Improvement Program (TIP) in its region. The governor designates an MPO in every urbanized area with a population of over 50,000.

MTC: Metropolitan Transportation Commission. The metropolitan planning organization for the nine-county San Francisco Bay Area.

Multimodal Improvement Plan: VTA terminology for "Deficiency Plan" as defined by CMA statute. Multimodal Improvement Plans are plans that identify measures to improve transportation conditions on CMP facilities in lieu of making physical traffic capacity improvements, such as widening an intersection or roadway.

Parking Management Program: In the workplace context, parking policies that favor carpools and vanpools, including creating established parking charges for commuter parking, and preferential parking for carpool or vanpool vehicles.

PDA: Priority Development Area. These locations were identified for concentrated development as part of Plan Bay Area, the Metropolitan Transportation Commission's 2040 Regional Transportation Plan for the nine-county Bay Area.

Peak Hour: The highest morning or evening hour of travel reported on a transportation network or street.

Quality of Service (QOS): A metric used to evaluate how well a transportation facility serves its users. Several different QOS methodologies are currently used by transportation professionals, often with a focus on bicyclists, pedestrians or transit passengers.

RTIP: Regional Transportation Improvement Program. A list of proposed transportation projects submitted to the CTC by the regional transportation-planning agency , as a request for state funding. The individual projects are first proposed by local jurisdictions, and then submitted by the regional agency for submission to the CTC. The RTIP has a four-year planning horizon and is updated every two years.

RTP: Regional Transportation Plan. A multimodal blueprint to guide the region's transportation development for a 25-year period. Updated every four years, it is based on projections of growth and travel demand coupled with financial assumptions. Required by state and federal law.

SCS: Sustainable Communities Strategy. A requirement of all California MPO's as set forth by SB 375. The SCS is a document that outlines the region's long-range plan for integrating transportation, housing, and land use in order to reduce greenhouse gas emissions.

SIP: State Implementation Plan. A compilation of the federal air quality plans from around the state produced by the state Air Resources Board.

SOV: Single Occupancy Vehicle. A motor vehicle occupied by one employee for commute purposes.

STIP: State Transportation Improvement Program. The STIP is a four-year planning and expenditure plan adopted by the CTC for the State Transportation System and is updated in biannually. The STIP is composed of the approved RTIPs, and Caltrans' ITIP.

STP: Surface Transportation Program. A new flexible funding program established by ISTEA. Many mass transit and highway projects are eligible for funding under this program. Ten percent of the projects in this program must be transportation enhancement projects, and 10% must be safety projects.

TCM: Transportation Control Measure. A measure intended to reduce pollutant emissions from motor vehicles. Examples of TCMs include programs to encourage ridesharing or public transit usage, city or county trip reduction ordinances, and the use of cleaner burning fuels in motor vehicles. MTC has adopted specific TCMs, in compliance with the federal and state Clean Air Acts.

TDM: Transportation Demand Management. This is a term used to describe policies and programs to reduce the number of cars on the road. Examples of transportation demand management include flextime, ridesharing, and telecommuting.

TFCA: Transportation Fund for Clean Air. TFCA Funds are generated by a $4 surcharge on vehicle registrations. The funds generated by the fee are used to implement projects and programs to reduce air pollution from motor vehicles. Health and Safety Code Section 44241 limits expenditure of these funds to specified eligible transportation control measures (TCMs) that are included in BAAQMD's 1991 Clean Air Plan, developed and adopted pursuant to the requirements of the California Clean Air Act of 1988. BAAQMD manages 60% of the funds via a regional discretionary program. The remaining 40% are returned to each county based on annual vehicle registrations.

TIP: Transportation Improvement Program. A federally required document produced by the regional transportation planning agency that states investment priorities for transit and transit related improvements, mass transit guideways, general aviation and highways. The TIP is the MTC's principal means of implementing long-term planning objectives through specific

projects.

Transit Priority Area: an area within one-half mile of a major transit stop [see definition above] that is existing or planned, if the planned stop is scheduled to be completed within the planning horizon included in a Transportation Improvement Program adopted pursuant to Section 450.216 or 450.322 of Title 23 of the Code of Federal Regulations. (California Government Code 21099 (7))

VMT: Vehicle Miles Traveled. A measure of the extent of automobile use within a specific geographic area over a given period of time. Travel demand forecasting (modeling) is typically used to analyze VMT at the project, countywide and regional levels, although other methods such as spreadsheet analysis may be used for individual projects in some circumstances.

APPENDIX B | CMP SYSTEM ROADWAYS

TABLE B.1 | CMP SYSTEM NETWORK: HIGHWAYS

Highway	Length (in miles)
State Route 82	26.4
U.S. 101	52.6
Interstate 280	20.6
Interstate 680	9.9
State Route 237	11.1
State Route 17	13.9
Interstate 880	10.5
State Route 87	9.2
State Route 85	23.8
State Route 9	11.4
State Route 35	17.1
State Route 152	35.2
State Route 156	0.6
State Route 25	2.5
State Route 130	22.5
Total	**267.3**

TABLE B.2 | CMP SYSTEM NETWORK: EXPRESSWAYS

Expressway	Length (in miles)
Almaden Expressway	8.9
Capitol Expressway	8.7
Central Expressway	9.8
Foothill Expressway	7.1
Lawrence Expressway	5.9
Oregon Page Mill Expressway	4.6
San Tomas Montague Expressway	13.7
Total	**58.7**

TABLE B.3 | CMP SYSTEM NETWORK: PRINCIPAL ARTERIALS

Roadway Segment	Length (in miles)
Calaveras Boulevard between SR 237 and I-680	1.8
Alum Rock Road (SR 130) between US 101 and Mount Hamilton Road	3.6
Bascom Avenue between I-280 and SR 85	4.6
Bernal Road between Santa Teresa Boulevard and US 101	1.3
Berryessa Road between US 101 and I-680	2.0
Blossom Hill Road (SR 82) between Almaden Expressway and US 101	4.5
Brokaw Road between US 101 and Old Oakland Road	0.5
Camden Avenue between SR 17 and SR 85	2.6
Campbell Avenue between Hamilton Avenue and Saratoga Avenue	0.2
Caribbean Drive at Mathilda Avenue/SR 237 to Blazingwood Drive	3.9
Coleman Avenue from De La Cruz to I-880	1.4
Curtner Avenue between SR 87 and Monterey Highway	0.9
De Anza Boulevard between Bollinger Road and I-280	1.5
De La Cruz Boulevard between US 101 and Coleman Avenue	1.3
El Camino Real (SR 82) from Palo Alto city limits to the Alameda	16.0
Great America Parkway between SR 237 and US 101	2.1

Roadway Segment	Length (in miles)
Hamilton Avenue between Campbell Avenue and Bascom Avenue	3.3
Central Coast Highway between Santa Clara County line and Saratoga-Sunnyvale Road	7.2
Hillsdale Avenue between Camden Avenue and Almaden Expressway	2.5
Hostetter Road to I-680	0.9
Lark Avenue between Los Gatos Boulevard and SR 17	0.2
Los Gatos Boulevard between SR 85 and Lark Avenue	0.5
Mathilda Avenue between El Camino Real (SR 82) and Caribbean Drive	2.4
Monterey Road between San Carlos Street and Blossom Hill Road	7.0
Montgomery Avenue between Santa Clara Street and San Carlos Street	0.5
Murphy Avenue between Old Oakland Road and Hostetter Road	0.6
Prospect Avenue between Saratoga Avenue and Lawrence Expressway	0.3
San Antonio Boulevard between US 101 and El Camino Real (SR 82)	2.1
San Carlos Street between Montgomery and Monterey Highway	0.9
Santa Teresa Boulevard between SR 85 and Bernal Road	5.8
Saratoga Avenue between San Tomas Expressway and SR 85	4.2
Saratoga-Los Gatos Road between Saratoga-Sunnyvale Road and SR 17	3.9
Saratoga-Sunnyvale Road between Central Coast Highway (SR 9) and Bollinger Road	3.7
Stevens Creek Boulevard between SR 85 and I-880	6.0
Sunnyvale-Saratoga Road between I-280 and El Camino Real (SR 82)	2.5
The Alameda from El Camino Real (SR 82) to Montgomery Avenue	2.1
Trimble Road between US 101 and Montague Expressway	1.7
Tully Road between Capitol Expressway and US 101	1.4
Wolfe Road between Stevens Creek Boulevard and I-280	0.5
Total	**108.4**

APPENDIX C | CMP SYSTEM TRANSIT NETWORK

TABLE C.1 | CMP TRANSIT NETWORK: RAIL LINES

Transit Service	Area Served
Caltrain	Gilroy to San Francisco
VTA Light Rail Line 900	Almaden Station to Ohlone/Chynoweth Station
VTA Light Rail Line 901	Santa Teresa Station to Alum Rock Station
VTA Light Rail Line 902	Mountain View Station to Winchester Station
VTA's BART Silicon Valley Phase I	The existing BART Network in San Francisco and Alameda County to Berryessa/North San Jose

TABLE C.2 | CMP TRANSIT NETWORK: BUS ROUTES

Bus Route	Area Served
Route 20	Milpitas BART - Sunnyvale Transit Center
Route 21	Stanford Shopping Center - Santa Clara Transit Center
Route 22	Palo Alto Transit Center - Eastridge
Route 23	De Anza College - Alum Rock Station via Stevens Creek
Route 25	De Anza College - Alum Rock Station via Valley Medical
Route 25L	Valley Medical Center - De Anza College
Route 26	West Valley College - Eastridge
Route 26L	West Valley College - Westgate
Route 27	Winchester Station - Kaiser San Jose via Downtown Los Gatos
Route 31	Evergreen Valley College - Eastridge
Route 37	West Valley College - Capitol Station
Route 39	Eastridge - The Villages
Route 40	Foothill College - Mountain View Transit Center via North Bayshore
Route 42	Evergreen Valley College - Santa Teresa Station
Route 44	Milpitas BART - McCarthy Ranch via Tasman & Alder
Route 47	Milpitas BART - McCarthy Ranch via Park Victoria
Route 51	Moffett Field / Ames Center - West Valley College
Route 51H	Moffett Field / Ames Center - De Anza College
Route 52	Foothill College - Mountain View Transit Center via El Monte
Route 53	Sunnyvale Transit Center - Santa Clara Transit Center
Route 55	Old Ironsides Station - De Anza College
Route 56	Lockheed Martin - Tamien Station
Route 57	Old Ironsides Station - West Valley College
Route 59	Valley Fair - Baypointe Station via Alviso
Route 60	Milpitas BART - Winchester Station via SJC Airport
Route 61	Sierra & Piedmont - Good Samaritan Hospital
Route 64A	McKee & White - Ohlone-Chynoweth Station

Bus Route	Area Served
Route 64B	McKee & White - Almaden Expressway & Camden
Route 66	North Milpitas - Kaiser San Jose
Route 68	San Jose Diridon Station - Gilroy Transit Center
Route 70	Milpitas BART - Eastridge via Jackson
Route 71	Milpitas BART - Capitol Station
Route 72	Downtown San Jose - Senter & Monterey via McLaughlin
Route 73	Downtown San Jose - Senter & Monterey via Senter
Route 77	Milpitas BART - Eastridge via King
Route 83	Almaden & McKean - Ohlone-Chynoweth Station
Route 84	Gilroy Transit Center - Saint Louise Hospital via Gilroy Outlets
Route 85	Gilroy Transit Center - Saint Louise Hospital via west Gilroy
Route 86	Gavilan College - Gilroy Transit Center
Route 87	Morgan Hill Civic Center - Burnett Avenue
Route 89	California Avenue Caltrain - Palo Alto VA Hospital
Express Route 101	Camden & Highway 85 - Stanford Research Park
Express Route 102	South San Jose - Stanford Research Park
Express Route 103	Eastridge - Stanford Research Park
Express Route 104	Milpitas BART - Stanford Research Park
Express Route 168	Gilroy / Morgan Hill - San Jose Diridon
Rapid Route 500	San Jose Diridon Station - Berryessa BART
Rapid Route 522	Palo Alto Transit Center - Eastridge

Bus Route	Area Served
Rapid Route 523	San Jose State University - Lockheed Martin via De Anza College

APPENDIX D | LEVEL OF SERVICE DESCRIPTIONS

TABLE D.1 | LEVEL OF SERVICE DESCRIPTIONS: SIGNALIZED INTERSECTIONS

Level of Service	Description
LOS A	At LOS A, delays at the intersection are less than or equal to 10.0 seconds per vehicle. Progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all.
LOS B	At LOS B, intersection delays range from great than 10.0 to less than or equal to 20.0 seconds per vehicle. Good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher average delays.
LOS C	At LOS C intersection delays range from greater than 20.0 to less than or equal to 35.0 seconds per vehicle. Higher delays result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many vehicles still pass through the intersection without stopping.
LOS D	At LOS D, intersection delays range from greater than 35.0 and less than or equal to 55.0 seconds per vehicle. The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume to capacity (V/C) ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
LOS E	At LOS E, intersection delays range from greater than 55.0 and less than or equal to 80.0 seconds per vehicle. This is considered to be the limit of capacity delay. These high delay values generally indicate poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences.
LOS F	At LOS F intersection delays exceed 80.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition occurs with over-saturation (i.e. when arrival flow rates exceed the capacity of at an intersection). Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Source: Based on *Highway Capacity Manual 2000*, Transportation Research Board

TABLE D.2 | LEVEL OF SERVICE DESCRIPTIONS: FREEWAYS

LOS	Description
LOS A	LOS A describes free flow conditions. Average density is no greater than 11 passenger cars per mile per lane. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream. The effects of incidents or point breakdowns are easily absorbed at this level of service.
LOS B	LOS B represents free-flow speeds. Average density is greater than 11 but less than or equal to 18 passenger cars per mile per lane. The ability to maneuver within the traffic stream is only slightly restricted, and the general level of physical and psychological comfort provided to drivers is still high. The effects of minor incidents and breakdown points are still easily absorbed at this level of service.
LOS C	LOS C provides for stable traffic flow; however, flows are approaching the range where small increases in traffic flows will cause substantial deterioration in traffic service. Average density is greater than 18 but less than or equal to 26 passenger cars per mile per lane. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver. Minor incidents may still be absorbed, but the local deterioration in traffic service will be substantial. Queues may be expected to form behind any significant blockage.
LOS D	LOS D provides for unstable flows; traffic is at the level where a small increase in traffic flows causes substantial deterioration in traffic service. Average density is greater than 26 but less than or equal to 46 passenger cars per mile per lane. Freedom to maneuver within the traffic stream is severely limited, and the driver experiences reduced physical and psychological comfort levels. Even minor incidents can be expected to create queuing, because the traffic stream has little space to absorb disruptions.
LOS E	LOS E describes traffic conditions operating at capacity. The average density is greater than 46 but less than or equal to 58 passenger cars per mile per lane. Operations at this level are extremely unstable because there are virtually no usable gaps in the traffic stream. Any incident on the highway can be expected to produce serious breakdown in traffic with extensive queuing.
LOS F	LOS F describes breakdowns in vehicular flow. Average density is greater than 58 passenger cars per mile per lane. Such conditions generally exist within queues forming behind breakdown points. Breakdowns occur for a number of reasons: a temporary reduction in capacity caused by a traffic incident, or a recurring point of congestion caused by a merge, a weave segment, or lane drop.

Source: Based on *Highway Capacity Manual 2000,* Transportation Research Board, with Santa Clara County specific densities for LOS D, E and F per *CMP Traffic Level of Service Analysis Guidelines*, adopted June 2003.

TABLE D.3 | LEVEL OF SERVICE DESCRIPTIONS: RURAL HIGHWAYS

LOS	Description
LOS A	LOS A allows motorists to travel at their desired speed of 55 mph or more on a Class I two-lane highway. Drivers spend 35 or less of their time following other vehicles. The passing frequency requited to maintain these speeds has not reached a demanding level, so that passing demand is well below passing capacity, and platoons of three or more vehicles are rare.
LOS B	LOS B characterizes traffic flow with speeds of greater than 50 mph or slightly higher on a Class I level terrain highway. Drivers spend more than 35 to 50 percent of their time following other vehicles. The demand for passing to maintain desired speeds becomes significant and approximates the passing capacity at the lower boundary of LOS B. Drivers are delayed in platoons up to 50 percent of the time.
LOS C	LOS C describes situations when the average speed still exceeds 45 mph on a Class I level-terrain highway, even though unrestricted passing demand exceeds passing capacity. Drivers spend more than 50 to 65 percent of their time following other vehicles. Further increases in traffic flow exist, resulting in noticeable increases in platoon formation, platoon size, and frequency of passing impediments. Unresitricted passing demand exceeds passing capacity. At higher volumes, the chaining of platoons and significant reductions in passing capacity occur. Although traffic flow is stable, it is susceptible to congestion due to turning traffic and slow-moving vehicles.
LOS D	LOS D describes unstable traffic flow. The average travel speed remains at or slightly above 40 miles per hour. Drivers spend more than 65 to 80 percent of their time following other vehicles. The two opposing traffic streams begin to operate separately at higher volume levels, and passing becomes extremely difficult. Passing demand is high, but passing capacity approaches zero. Mean platoon sizes of 5 to 10 vehicles are common.
LOS E	LOS E represents traffic conditions where speeds drop below 40 mph (under base conditions, and may be as low as 25 mph with less than ideal roadway conditions such as steep grades). Drivers spend more than 80 percent of their time following other vehicles, making it virtually impossible to pass other vehicles. Traffic platoons become intense, as slower vehicles or other interruptions are encountered.
LOS F	LOS F represents heavily congested flow conditions, where traffic demand exceeds capacity. Average traffic speeds are highly variable and there are no opportunities available to pass other vehicles.

Source: Based on *Highway Capacity Manual 2000*, Transportation Research Board, for Class I two-lane highways

APPENDIX E | CMP FACILITIES AT LOS F DURING THE 1991 AM AND PM BASELINE PEAK PERIOD

TABLE E.1 | Baseline LOS F AM and PM Peak

CMP ID	Facility	Direction	Road From	Road To	Distance (Miles)	LOS F at AM	LOS F at PM
1	I-880	NB	SR 237	Dixon Landing	1.99		x
2	I-880	NB	Great Mall Parkway	SR 237	0.72		x
3	I-880	NB	Montague Expressway	Great Mall Parkway	0.98		x
5	I-880	NB	US 101	E. Brokaw Road	1.29	x	
6	I-880	NB	North 1st Street	US 101	0.49	x	
7	I-880	NB	SR 87	North 1st Street	0.4	x	
8	I-880	NB	Coleman Avenue	SR 87	0.51	x	
9	I-880	NB	The Alameda	Coleman Avenue	0.59	x	
10	I-880	NB	North Bascom Avenue	The Alameda	0.82	x	
11	I-880	NB	Stevens Creek Boulevard	North Bascom Avenue	0.84	x	
12	I-880	NB	I-280	Stevens Creek Boulevard	0.41	x	
16	I-880	SB	Montague Expressway	East Brokaw Road	1.35		x
17	I-880	SB	East Brokaw Road	US 101	1.29	x	x
18	I-880	SB	US 101	North 1st Street	0.49		x
19	I-880	SB	North 1st Street	SR 87	0.4		x
20	I-880	SB	SR 87	Coleman Avenue	0.51		x
29	SR 17	NB	Saratoga Avenue	Lark Avenue	1.81	x	
30	SR 17	NB	Bear Creek	Saratoga Avenue	2.9	x	
39	I-680	SB	King Road	US 101	0.4	x	
40	I-680	SB	Capitol Expressway	King Road	1	x	
77	SR 237	EB	McCarthy Boulevard	I-880	0.4		x
79	SR 237	EB	North First Street	Zanker Road	1.61		x
81	SR 237	EB	Lawrence Expressway	Great America Parkway	1.27		x
85	SR 237	EB	Maude Avenue	US 101	0.71		x
89	SR 237	WB	I-880	McCarthy Boulevard	0.4	x	
90	SR 237	WB	McCarthy Boulevard	Zanker Road	0.94	x	
122	I-280	WB	Saratoga Avenue	Lawrence Expressway	1.19	x	
123	I-280	WB	Winchester Boulevard	Saratoga Avenue	1.37	x	

CMP ID	Facility	Direction	Road From	Road To	Direction (Miles)	LOS F at AM	LOS F at PM
124	I-280	WB	I-880	Winchester Boulevard	0.55	x	
125	I-280	WB	Meridian Avenue	I-880	1.4	x	x
135	I-280	EB	Foothill Expressway	SR 85	0.7		x
136	I-280	EB	SR 85	De Anza Boulevard	1.31		x
137	I-280	EB	De Anza Boulevard	Wolfe Road	1.06	x	x
138	I-280	EB	Wolfe Road	Lawrence Expressway	1.24	x	x
139	I-280	EB	Lawrence Expressway	Saratoga Avenue	1.19		x
140	I-280	EB	Saratoga Avenue	Winchester Boulevard	1.37		x
166	SR 85	NB	Central Expressway	US 101	1.24	x	
168	SR 85	NB	El Camino Real	SR 237	0.41		x
169	SR 85	NB	West Fremont Avenue	El Camino Real	1.89		x
170	SR 85	NB	West Homestead Road	West Fremont Avenue	1	x	
171	SR 85	NB	I-280	West Homestead Road	0.34	x	
253	US 101	SB	Story Road	Tully Road	1.46		x
254	US 101	SB	I-280	Story Road	0.38		x
256	US 101	SB	McKee Road	Santa Clara Street	0.39		x
257	US 101	SB	Oakland Road	McKee Road	1.58		x
258	US 101	SB	I-880	Oakland Road	0.57		x
259	US 101	SB	Old Bayshore Highway	I-880	0.5		x
260	US 101	SB	North First Street	Old Bayshore Highway	0.49		x
261	US 101	SB	Guadalupe Parkway	North First Street	0.64		x
262	US 101	SB	De La Cruz Boulevard	Guadalupe Parkway	0.77		x
263	US 101	SB	Montaque Expressway/Santa Tomas Expressway	De La Cruz Boulevard	1.28		x
264	US 101	SB	Bower Avenue/Great American Parkway	Montaque Expressway/ Santa Tomas Expressway	0.75		x
271	US 101	SB	North Shoreline Boulevard	SR 85	0.38	x	x
272	US 101	SB	Rengstorff Avenue	North Shoreline Boulevard	1.01	x	x
273	US 101	SB	San Antonio Avenue	Rengstorff Avenue	0.71	x	x
274	US 101	SB	Oregon Expressway	San Antonio Avenue	1.85	x	x

CMP ID	Facility	Direction	Road From	Road To	Distance (MIles)	LOS F at AM	LOS F at PM
275	US 101	SB	Embarcadero Road	Oregon Expressway	0.15	x	x
289	US 101	NB	I-280	Santa Clara Street	0.88	x	
290	US 101	NB	Santa Clara Street	McKee Road	0.39	x	
291	US 101	NB	McKee Road	Oakland Road	1.58	x	
292	US 101	NB	Oakland Road	I-880	0.57	x	
293	US 101	NB	I-880	Old Bayshore Highway	0.5	x	
294	US 101	NB	Old Bayshore Highway	North First Street	0.49	x	
295	US 101	NB	North First Street	Guadalupe Parkway	0.64	x	
305	US 101	NB	SR 85	North Shoreline Boulevard	0.38	x	
306	US 101	NB	North Shoreline Boulevard	Rengstorff Avenue	1.01	x	
308	US 101	NB	San Antonio Avenue	Oregon Expressway	1.85		x
309	US 101	NB	Oregon Expressway	Embarcadero Road	0.15		x

TABLE E.2 | Intersections Operating at Los F in the 1991 Baseline PM

ID	CMP System Roadway	Cross Street	Location	Jurisdiction
104	Highway 17 (SB)	Hamilton Avenue	Campbell	State
5432	Highway 17 (SB)	San Tomas Expressway/Camden Avenue	Campbell	Santa Clara County
5430	San Tomas Expressway	Campbell Avenue	Campbell	Santa Clara County
213	Highway 280 NB Ramps	De Anza Boulevard	Cupertino	Cupertino
702	Calaveras Boulevard (SR 237)	Milpitas Boulevard	Milpitas	Milpitas
5803	Montague Expressway	Capitol Avenue	Milpitas	Santa Clara County
5804	Montague Expressway	Milpitas Boulevard	Milpitas	Santa Clara County
5801	Montague Expressway	Main Street/Old Oakland Road	Milpitas/San Jose	Santa Clara County
5809	Montague Expressway	McCarthy Boulevard/O'Toole Avenue	Milpitas/San Jose	Santa Clara County
5802	Montague Expressway	Trade Zone Boulevard/McCandless	Milpitas/San Jose	Santa Clara County
5205	Page Mill/Oregon Expressway	Foothill Expressway	Palo Alto	Santa Clara County
5513	Almaden Expressway	Blossom Hill Road	San Jose	Santa Clara County
5512	Almaden Expressway	Branham Lane	San Jose	Santa Clara County
5516	Almaden Expressway	Coleman Road	San Jose	Santa Clara County
3083	Brokaw Road	First Street	San Jose	San Jose
3090	Campbell Avenue	Saratoga Avenue	San Jose	San Jose
5724	Capitol Expressway	Aborn Road	San Jose	Santa Clara County
5734	Capitol Expressway	Excalibur Drive (Capitol Avenue)	San Jose	Santa Clara County
5720	Capitol Expressway	Senter Road	San Jose	Santa Clara County
5723	Capitol Expressway	Silver Creek Road	San Jose	Santa Clara County
5732	Capitol Expressway	Story Road	San Jose	Santa Clara County
3101	Guadalupe Parkway	West Taylor Street	San Jose	San Jose
3026	Highway 237	First Street (North)	San Jose	State
3027	Highway 237	First Street (South)	San Jose	State
3029	Highway 237	Great America Parkway (South)	San Jose	State
3030	Highway 237	Zanker Road (North)	San Jose	State
3031	Highway 237	Zanker Road (South)	San Jose	State
5640	Lawrence Expressway	Saratoga Avenue	San Jose	Santa Clara County
5807	Montague Expressway	First Street	San Jose	Santa Clara County

ID	CMP System Roadway	Cross Street	Location	Jurisdiction
3028	Highway 237	Great America Parkway (North)	San Jose	State
5808	Montague Expressway	Trimble Road	San Jose	Santa Clara County
3095	Monterey Highway	Curtner Avenue	San Jose	San Jose
3098	Trimble Road	First Street	San Jose	San Jose
3108	Tully Road	McLaughlin Avenue	San Jose	San Jose
5805	Montague Expressway	Mission College Boulevard	Santa Clara	Santa Clara County
5416	San Tomas Expressway	El Camino Real (SR 82)	Santa Clara	Santa Clara County
5419	San Tomas Expressway	Homestead Road	Santa Clara	Santa Clara County
5408	San Tomas Expressway	Scott Boulevard	Santa Clara	Santa Clara County
5405	San Tomas Expressway	Stevens Creek Boulevard	Santa Clara/San Jose	Santa Clara County
5625	Lawrence Expressway	Homestead Road	Sunnyvale	Santa Clara County

APPENDIX F | CMP MULTIMODAL PERFORMANCE MEASURES

INTRODUCTION

The following set of 12 CMP Multimodal Performance Measures are included in the 2021 Congestion Management Program (CMP):

- Auto LOS
- Vehicle Miles Traveled
- Modal Split
- Pedestrian and Bicycle Quality of Service
- Transit Vehicle Delay
- Transit Accessibility
- Air Quality
- Duration of Congestion
- Hours of Delay/Person Trip
- Travel Time Index
- Transit Service Guidelines
- Travel Pattern (in Person Trips)

These measures can be used in a variety of analyses. Some may be used in the development of the countywide long-range transportation plan (VTP), in the CMP monitoring process, in analyses of the impacts and effects of specific development projects, or in more targeted efforts such as corridor studies, transit or roadway capital projects. The Development of the CMP Multimodal Performance Measures and further detail about each measure are provided in Chapter 4.

Throughout this document, reference is made to measurements that are to be made system-wide, for selected links, or travel markets. The travel markets to be used with multimodal performance measures may vary based on the measure or type of analysis. The travel markets consist of typical travel origins and destinations for the County and can be developed from review of existing travel patterns and the expected future travel patterns.

VTA CMP PERFORMANCE MEASURES

This appendix provides further detail for ten of the twelve current VTA CMP multimodal performance measures. Each subsection is divided into four parts:

1. A general description of the measure;
2. A synopsis of how the measure can be implemented;
3. A summary of the measure's application to an evaluation of system performance; and
4. An example of the measure's results from the travel demand model, GIS, or other analytic tools or process.

AUTO LOS

DESCRIPTION

Auto level of service (LOS) measures the interrelationship between travel demand (volume) and supply (capacity) of the roadway system. LOS is used to qualitatively describe the operating conditions of a roadway based on factors such as speed, travel time, maneuverability, and delay. LOS is categorized into six levels, A through F, with LOS A representing free-flow travel and LOS F representing congested flow.

IMPLEMENTATION

Appendix D shows the definitions and thresholds for auto Level of Service for Intersections, Freeways, and Rural Highways used in the VTA CMP. This section outlines specific auto LOS methodologies used in VTA's CMP. The Traffic LOS Analysis Guidelines of the CMP Technical Standards and Procedures include more technical information on auto LOS measurement.

Urban Arterials — The 2000 HCM intersection analysis

operations methodology, which is based on Average Control Delay, is used to monitor LOS on urban arterials (this includes expressways and principal arterials).

Freeway Segments — Freeway segments are evaluated based on the procedures of the 2000 HCM. Beginning in June 2003, VTA adopted density as the standard for monitoring traffic conditions and traffic impacts due to new developments. Prior to 2003, the CMP used travel speed as the criteria for monitoring traffic conditions.

Rural Highways — Procedures described in Chapter 20 of the 2000 HCM are used to measure the percent time spent following and average travel speed, with appropriate inputs for peak hour and peak 15 minute traffic volumes, the percentage split between the two directions of traffic, the percentage of trucks in the traffic flow, and the type of terrain.

APPLICATION

LOS is a good diagnostic indicating any imbalance between capacity and demand on the transportation system. It is a vehicle-based performance measure and can be affected by changes in capacity (supply) and changes in volume (demand). Adding additional lanes, improving intersections, increasing transit infrastructure on parallel routes, and using ITS strategies such as signal synchronization show affects the capacity of the roadway or intersection. Mode shifts, time of day shifts, or changes in travel patterns, such as changing origins or destinations impacts the volume of the roadway or intersection.

LOS is a widely accepted measure of roadway and intersection performance. LOS alone is a good indicator of trouble spots for congestion in the roadway network. Used in conjunction with other performance measures such as passenger throughput it becomes a strong performance measure for the overall transportation system. Nevertheless, LOS has significant shortcomings. Even significant increases in the capacity of a roadway, intersection, or interchange may not change LOS because the pent-up demand from drivers who have avoided traveling during peak periods will now move from the shoulders of the peak period and into the peak period, or travelers may alter other travel patterns to produce what is called "induced demand." Thus, other performance measures must be relied upon to assess the performance of the transportation system and the success of mitigation measures. Furthermore, LOS is usually insensitive to transit, bicycle, pedestrian or land use improvements. Finally, it is not applied currently to arterial roadway segments for forecasting purposes.

EXAMPLE OUTPUT

Table F.1 shows the traffic level of service and miles of roadway at LOS F for a hypothetical 2030 base case and alternative.

VEHICLE MILES TRAVELED

DESCRIPTION

Vehicle Miles Traveled (VMT) is a measure of the total amount of vehicle travel on the roadway network. VMT is calculated by multiplying the total number of automobile trips by the average distance of each trip. VMT can be normalized to reflect travel efficiency, such as measuring VMT per capita, employee or person-trip. Normalization is an important step to understand the meaning of a given change in VMT. For example, an absolute increase in VMT could indicate a greater number of single-occupant vehicle trips; however, if the rise in VMT is slower than the rise in population (showing an overall

Table F.1 | Levels of Service For The Morning Peak Hour

Roadway	From	To	Direction	Hypothetical Base Case for 2040 LOS	Hypothetical Alternative 2040 LOS
I-680	County Line	Jacklin	SB	F	F
I-680	Berryessa	McKee	NB	F	
I-680	Capitol Expwy	U.S. Hwy 101	NB	F	F
I-880	County Line	Dixon Landing	SB		F
I-880	Montague Expwy	Brokaw	NB	F	
I-880	Montague Expwy	Brokaw	SB	F	
Total LOS F (Miles)				89.7	76.3

decrease in VMT/capita), it would indicate that the usage of the transportation network is becoming more efficient over time.

During the development of the 1995 CMP, the CMA Board selected VMT per Person-Trip (VMT/P-T) as one of the CMP Multimodal Performance Measures. VTA will be revisiting the VMT performance measure in the coming years in response to the implementation of Senate Bill 743 (see further discussion in Chapters 2 and 3) and will include additional details on VMT metrics in this Appendix in future updates of the CMP.

VMT/person trip (P-T) is the quotient of these two measures: a single number indicator that increases or decreases according to changes in VMT and/or person trips. It measures the intensity of the population's demand for vehicle travel. As the trend in population and job growth continues VMT will naturally increase. By using VMT/P-T, rather than VMT alone, the effect of population growth on the measure is normalized.

IMPLEMENTATION

VMT/P-T can be measured system-wide during the P.M. peak hour. The CMP model estimates the measure, which is reported as a single number for all modes. The model generates a VMT/P-T for a base year and forecasts future VMT/P-T estimates for a base case investment scenario and other investment alternatives. The change between the base year VMT/P-T and the future year VMT/P-T shows the improvement or decline in the efficiency of the countywide transportation system as a whole (across all modes).

The current VMT are only those VMT inside the county and do not include the VMT for trips originating or terminating outside the county. This measure can report two VMT/P-T values. The first includes all internal (I-I) trips plus the internal-external (I-X) trips. The second shows the total VMT/P-T for all trips within (I-I) out of (I-X) and into (X-I) the county. Both of these measurements require breaking up the external zones in the CMP model in order to account completely for an external

trip's final origin or destination.

APPLICATION

VMT/P-T identifies the number of roadway vehicle miles of travel required to satisfy the mobility demand, measured in person trips. Vehicle miles of travel per person trip (VMT/P-T) is a compound performance measure, taking account of the intensity of the population's demand for vehicle travel. When monitored over time, it is an indicator of development density or urban sprawl. In addition, this measure may indicate the level of utilization for high-occupancy modes: the lower the value of this measure, the greater the reliance on high-occupancy vehicle travel.

If VMT decreases relative to person trips, it may be an indication that developing land use patterns are becoming more conducive to shorter trips. This would also be true if person trips were increasing while VMT remained the same. Conversely, an increase in VMT without an increase in person trips could indicate increasing urban sprawl.

VMT/P-T will increase if:

- Jobs and housing continue to decentralize, and people take longer trips to access their worksites and other activities.
- There is a reduction in transit or HOV mode share and more people rely on the private automobile as their primary mode.

VMT/P-T will decrease if:

- There is increasing density in an existing developed area.
- Transit use increases.
- HOV use increases.

The difference between VMT/P-T for I-I and I-X and Total VMT/P-T (I-I, I-X, and X-I) will increase if:

- The share of workers who are commuting from outside the county increases, thus people take longer trips to access their worksites and other activities.

Although VMT/P-T is not a good measure of congestion, it is a useful measure of mobility because it indicates the extent to which people must travel in vehicles to satisfy their travel needs. It is also a good measure for air quality, since it relates vehicle usage, mileage, and trip length. In other words, it indicates travel intensity and trip length, which LOS cannot measure. Thus, it can evaluate travel demand management (TDM) measures such as transit and carpool incentives, VMT fees and other private auto disincentives, and land use measures, such as improving the jobs-housing balance, which result in more concentrated trip patterns.

EXAMPLE OUTPUT

Figure F.1 shows the system-wide VMT/P-T for a hypothetical alternative over time.

MODAL SPLIT

DESCRIPTION

Modal split measures the extent to which travelers use the various available modes. It is measured as the proportion of people making a trip on a given mode.

IMPLEMENTATION

Modes accounted for in the VTA CMP model are all monitored

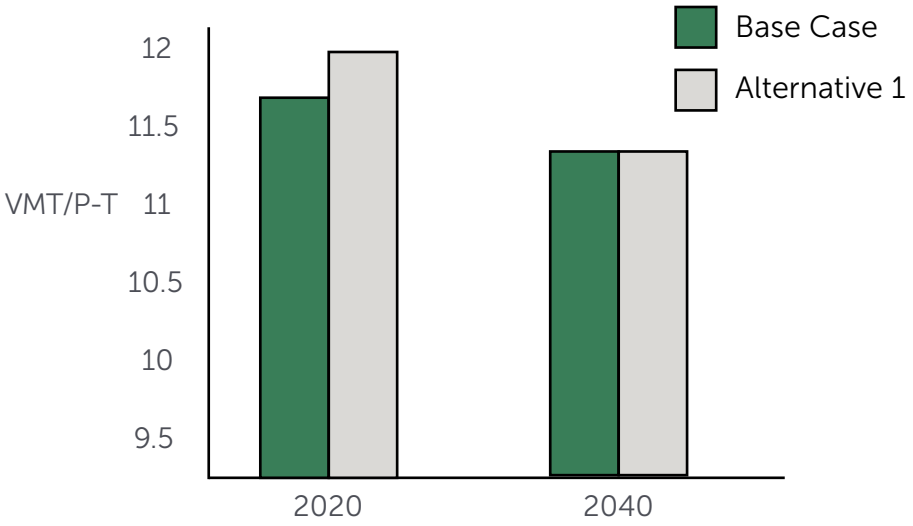


Figure F.1 | VMT/PT for Hypothetical Alternative

and reported in a modal split table. As of this writing the modes are:

- Drive alone/single occupant vehicles (SOV);
- Shared ride (HOV-2);
- Shared ride (HOV-3+);
- Transit (bus and rail); and
- Walk, bicycle, and "work at home."

Transit can be split further into sub-modes including local bus, express bus, Caltrain, light rail transit (LRT), and Bus Rapid Transit (BRT). With updates to the CMP and regional travel demand models in recent years, the CMP model now has the capability of estimating walk and bicycle trips separately. Work at home, i.e., telecommuting is not estimated in the CMP model. Mode split can be measured for the A.M. and P.M. peak hour both system-wide and for the travel markets. At the travel market level, mode split can be measured exclusively for facilities on the CMP network within that travel market. System-wide mode split can be estimated using all facilities within the CMP system.

APPLICATION

Modal split is a direct measure of all the trips made on all modes. If specific mode split goals are established, trade-offs between highway, HOV, and transit improvements can be identified for programming decisions.

Modal split measures the effects of such projects as HOV improvements, rail or BRT capital projects, improvements to bus service, and various transportation control measures (TCMs). For example, mode share can measure the effectiveness of increasing parking rates at San Jose Airport or employment sites or other transit use incentives. When analyzed in conjunction with LOS, modal split provides valuable information on the state of the transportation system. If LOS improves, mode shares indicate if the change in LOS is due to the greater use of HOV modes. However, modal split does not specifically identify locations where problems may exist; therefore, it must be combined with other measures of system performance.

EXAMPLE OUTPUT

Table F.2 shows an example of mode split estimated by the CMP model. This table shows the 2000 baseline and 2030 projected mode shares for home based work trips. In this example, the number of transit riders is expected to more than triple, but the transit share of home-based work trips will only increase by four percentage points.

PEDESTRIAN AND BICYCLE QUALITY OF SERVICE (QOS)

As part of the 2014 update of the VTA TIA Guidelines, VTA established a requirement for land use development projects proposing changes to existing roadway or intersection geometry or changes to signal operations to include a Quality of Service (QOS) analysis for bicyclists and pedestrians. A QOS analysis is also recommended for other projects and for documenting existing conditions. QOS methodologies typically measure features of the environment that affect the comfort and safety of bicyclists and pedestrians from the user's perspective, such as the presence and width of sidewalks and bicycle lanes, intersection crossing distance and delay, lateral separation from auto traffic, auto volumes, and the presence of landscaping or trees.

A comparison of QOS methodologies is provided below in Table F.2 (an excerpt from the 2014 VTA TIA Guidelines)

TRANSIT VEHICLE DELAY

As part of the 2014 update of the VTA TIA Guidelines, VTA established a requirement to disclose project effects on transit vehicle delay. The analysis shall include a quantitative estimate of additional seconds of transit vehicle delay resulting from automobile congestion caused by the project and any changes to signal operations proposed by the project, and a qualitative assessment of additional transit vehicle delay cause by any changes to roadway or intersection geometry proposed by the project, taking into account unique considerations of transit vehicles compared to autos (e.g. pulling into and out of stops, longer gaps needed for left turns). The transit vehicle delay analysis may utilize information from the auto LOS analysis to derive an estimate of additional seconds of delay to transit resulting from auto congestion.

A hypothetical example of a Transit Vehicle Delay analysis results is provided below in Table F.3.

Table F.2 | Mode Split Estimated by the CMP Model

	Drive Alone	HOV2	HOV3+	Transit	Bike	Walk	Total
2000	1,304,872	196,066	62,208	48,288	14,784	28,059	1,654,277
Percent of 2000	78.9%	11.9%	3.8%	2.9%	0.9%	1.7%	100%
2030	1,832,353	302,604	96,031	153,632	21,735	35,964	2,442,319
Percent of 2030	75%	12.4%	3.9%	6.3%	0.9%	1.5%	100%
Percent Change 2000-2030	40.4%	54.3%	54.4%	218.2%	47%	28.2%	47.6%

Table F.3 | Example of Transit Vehicle Delay Analysis Results

		Additional Transit Delay (seconds)						
Corridor	**Peak Hour**	**Existing Plus Project**		**Background Plus Project**		**Cummulative Plus Project**		**Affected Transit Routes**
		NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB	
Saratoga Avenue	AM	0.5	1.0	2.3	1.9	4.3	3.8	58
	PM	0.4	0.6	0.5	8.2	0.2	11.6	
Quito Road	AM	0.1	0.5	0.2	0.3	0.2	0.3	57
	PM	0.5	0.3	0.4	0.2	0.4	0.2	
Prospect Road	AM	0.1	0.0	0.3	0.0	1.1	0.0	26
	PM	0.0	0.0	0.2	0.0	0.7	0.0	

TRANSIT ACCESSIBILITY

DESCRIPTION

Transit service performance can be measured using a local transit accessibility index, which disaggregates transit performance, by geographic zone. In contrast to the traditional mobility-based approach for the measurement of transit service performance that emphasizes the supply side of the transit service and underrates the interaction between land use and transit use, accessibility provides a place-based approach for understanding how transit service is divided between areas in Santa Clara County while accounting for demographic variation. This understanding can facilitate the development of integrated transit and land use plans and policy, as well as grant insights on locations with the most intense transit service or lack thereof.

IMPLEMENTATION

Transit accessibility can mean different things from various perspectives. Viewed from the production end of a transit trip, it refers to people's ability to reach opportunities, be it goods, service, recreations, or jobs, via transit. From the attraction end, the transit accessibility instead refers to the magnitude of the labor force or the size of the market area accessible via transit. The attraction end measure is especially meaningful for an urban center where parking is very restricted. Both being valuable, and with distinct policy implications, the accessibility measures from the perspectives of both ends are evaluated.

The accessibility measure for a zone is derived by aggregating values in a certain demographic field for all zones on the other end of transit trips and satisfying a defined transit travel time threshold. For the calculation of the production end measure, the employment at all the qualified attraction zones get aggregated to each corresponding production zone in question; while, for the attraction end measure, it is the households at all the qualified production zones that

Table F.4 | QOS Methodologies Comparison

Methodology	Analysis Level		Project Type		Mode		Data Required	Reference
	Intersection	Street Segment	Development	General Plan	Pedestrian	Bicycle		
Charlotte Bicycle and Pedestrian LOS	X		X	*	X	X	Mediium	City of Charlotte Urban Street Design Guidelines, Appendix B
Pedestrian/Bicycle Environmental Quality Index	X	X	X	*	X	X	High	San Francisco Dept of Public Health, Bicycle and Pedestrian Environmental Quality Index
HCM 2010 Bicycle and Pedestrian LOS	X	X	X	*	X	X	High	HCM 2010: Highway Capacity Manual
Layered Network Approach		X		X	X	X	Varies	LA Street Classification and Benchmarking System, 2010.
Level of Traffic Stress	X	X	X	X		X	Medium	Mekuria, Furth and Nixon, 2012. Low Stress Bicycling and Network Connectivity
Built Environment Factors	X	X	X	X	X	X	Varies	Fort Collins, Colorado, Pedestrian Plan, 2011. Level of ServiceBurien, Washington, Transportation Master Plan, 2012. Table 4, Pedestrian LOS Checklist.

* This methodology is appropriate for General Plan level goal setting, but evaluating an entire street network would involve a substantial effort.

get aggregated. The transit travel time derived from the VTA Countywide Transportation Model is used to determine whether the value of a zone should be included for the aggregation or not. The transit time is calculated based on model inputs such as the transit service schedule, route coverage, street network connectivity etc, including time components such as walk time from origin to transit stop, wait time at stop, in-vehicle travel time, wait time at transfer interchanges, and time spent walking to the destination.

Besides traffic analysis zones, the access measures can be derived for other geographical units as well. However, by tying to traffic analysis zones, the measures can quickly analyze and incorporate both travel model and demographic data into any accessibility analysis. The measures derive from travel model data, so the outputs are in line with the travel model estimations and assumptions to a certain degree. Furthermore, it encourages a system approach to accessibility analysis through the combined estimation of multiple transit operator performance.

APPLICATION

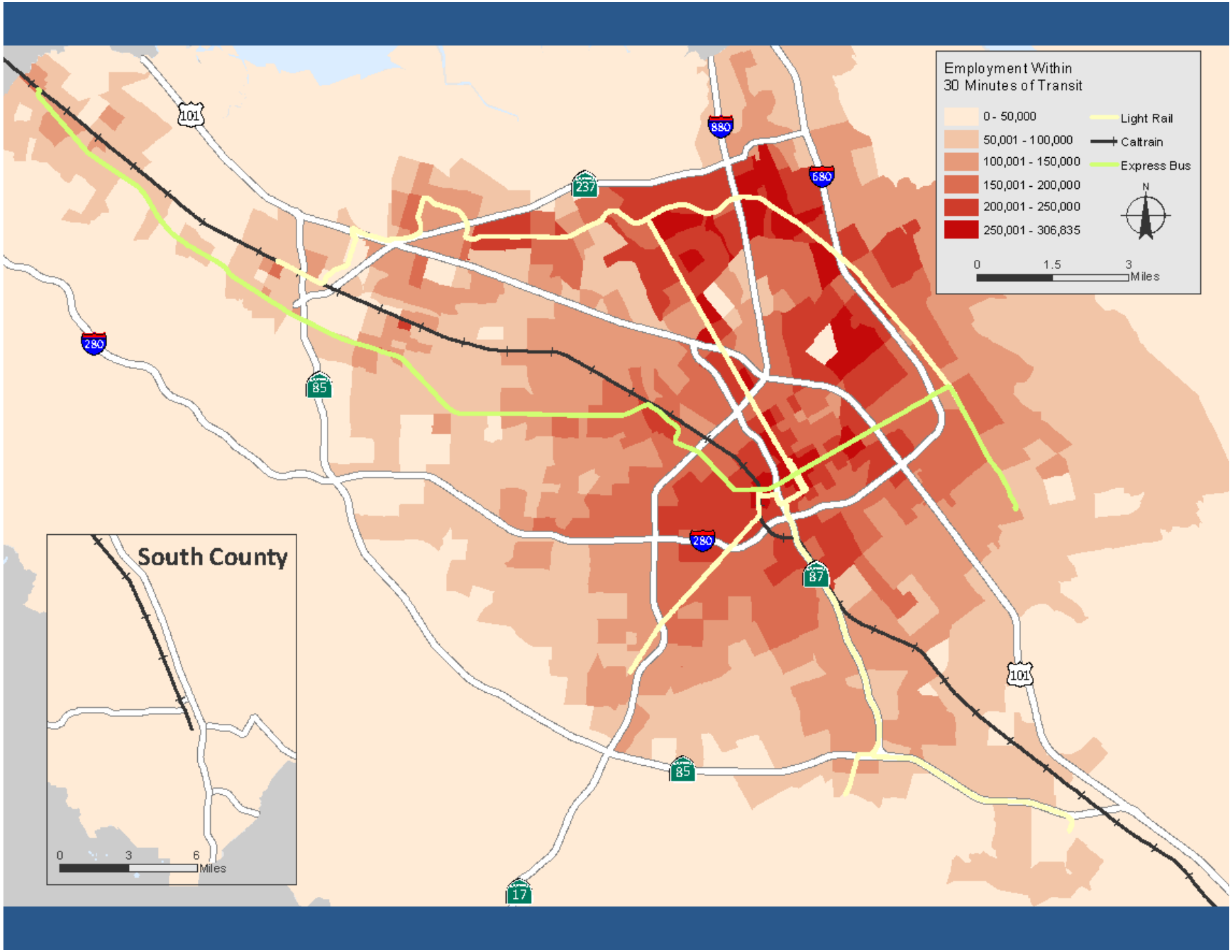
The transit accessibility measures can indicate how well transit service serves the residents and businesses in Santa Clara County. These measures can indicate required changes in transit service parameters (such as headway and frequency) and highlight areas for new service through the addition or deletion of routes and stops. Due to the balance it strikes between zonal travels and demographic data, the accessibility measures also provide a sophisticated tool for measuring the effects of changing land uses and densities. In addition, the juxtaposition of the production end measure with the attraction end measure can expose the zones with high transit accessibility to job opportunities but low in residential units, or zones with high transit accessibility to workers or customers but lack of business or job opportunities.

Due to the large size of the VTA transit service network relative to the likely amount of route and service changes, the measure may show only small marginal effects of some transit improvements. However, due to the straightforward nature of the calculation, the resulted measures are still ratio data which make the comparison or calculation of interval still meaningful. The change in the measures can be captured with a simple subtraction.

EXAMPLE OUTPUT

Figures F.2 shows an example outputs of this measure. It presents the relative access to employment by transit in Santa Clara County. The thematic maps are generated using the standard deviation categorizing method. The map show sthe deviation of each zone from the median value of the whole county. The dark reds represent highest accessibility (near downtown San Jose), the medium reds indicate moderate accessibility (most corridors), and the light reds represent lower accessibility (in outlying parts of the county). This sort of output gives a concrete realization of the effects of transit improvements as well as a visual analytic tool for route location and alignment.

It should be noted that the transit travel time used in the calculation is based on the transit service and the roadway congestion level during the peak commute hours. Thus, the measures are more appropriate in evaluating accessibility for home-based work trips than for the trip purposes usually carried out during off-peak hours. Nevertheless, off-peak measures can be derived easily in the similar way by substituting the transit travel time with the off-peak one and employment attribute with a demographic attribute more appropriate to represent the off-peak activity.



Figures F.2 | Relative Access to Employment by Transit

AIR QUALITY

DESCRIPTION

Vehicle emissions of air pollutants are measured in tons of pollutants and are related to several factors. These factors include cold and hot starts and stops, speed changes, and idling time. The air quality performance measure is necessary for conformance with state CMP guidelines for consideration of air quality impacts.

IMPLEMENTATION

Air quality is measured systemwide by pollutant type for the A.M. and P.M. peak hours using the CMP model. The pollutants measured include carbon monoxide (CO), hydrocarbons (HC), oxides of nitrogen (NOx), and particulate matter (PM).

APPLICATION

Improvements in air quality may indicate the benefits of an efficient multimodal transportation system, although it can be degraded by other performance measures (e.g., an improvement in the VMT per person trip measure is sometimes accompanied by a degradation in air quality due to an increase in cold starts). It is difficult to know whether improvements in air quality are due to efficient modal use or other factors. Air quality is a good measure of overall external impacts of transportation system operation, but it seldom diagnoses specific problems (as an individual measure). Since traffic speed and the amount of stopping and starting affect emissions, actions which improve traffic flow generally, reduce emissions. However, NOx tends to increase as speeds increase.

EXAMPLE OUTPUT

Table F.5 presents an example output for the air quality performance measure for a hypothetical Base Case and alternative.

DURATION OF CONGESTION

DESCRIPTION

Duration of congestion measures the length of time that particular links are subject to congested conditions. This is a measure of peak spreading and it provides a good way of showing the length of time over which congested traffic conditions persist. When travel demand begins to exceed capacity, travelers have four adaptive responses, they either: 1) shift modes; 2) choose not to travel (e.g., telecommute); 3) take alternative routes, or 4) travel at less congested times. If travelers adapt by any of the first three responses, the duration of congestion will not necessarily increase. If travelers choose

Table F.5 | Example Air Quality Performance Measure

Type	Time	Base Case	Alternative 1
Carbon Monoxide (CO)	A.M.	10.57	10.65
	P.M.	13.09	12.93
Hydrocarbons (HC)	A.M.	0.96	0.97
	P.M.	1.14	1.13
Nitrous Oxides (NOX)	A.M.	3.72	3.76
	P.M.	4.2	4.17
Particulates (PM)	A.M.	4.53	4.58
	P.M.	5.1	5.03

to shift the time that they travel, then the congested period will spread.

IMPLEMENTATION

The CMP model is able to report volume and capacity on a link by link basis. A series of links can be selected and monitored for congested conditions. The monitoring can be done during the P.M. peak hour and the peak period. A curve depicting the peak spread can be estimated by evaluating the peak hour level of congestion relative to the peak period level of congestion. The method for estimating this measure is currently under development.

APPLICATION

Several of the performance measures already discussed measure the intensity of activity on the transportation system. As with Level of Service (LOS), duration of congestion is a highway and auto oriented performance measure and is typically measured on highway links in mixed-flow and high occupancy vehicle lanes and on arterials. Duration of congestion can be affected by changes in travel demand or changes in transportation capacity: such as adding highway lanes, improving intersections, increasing transit infrastructure, and using ITS strategies. Changes in travel demand include congestion pricing, land use policies that result in shorter trip patterns, and mode shifts.

EXAMPLE OUTPUT

Figure F.3 shows an estimated curve representing the P.M. peak duration of congestion for a hypothetical alternative. V/C in the y-axis refers to the volume over the capacity on the roadway.

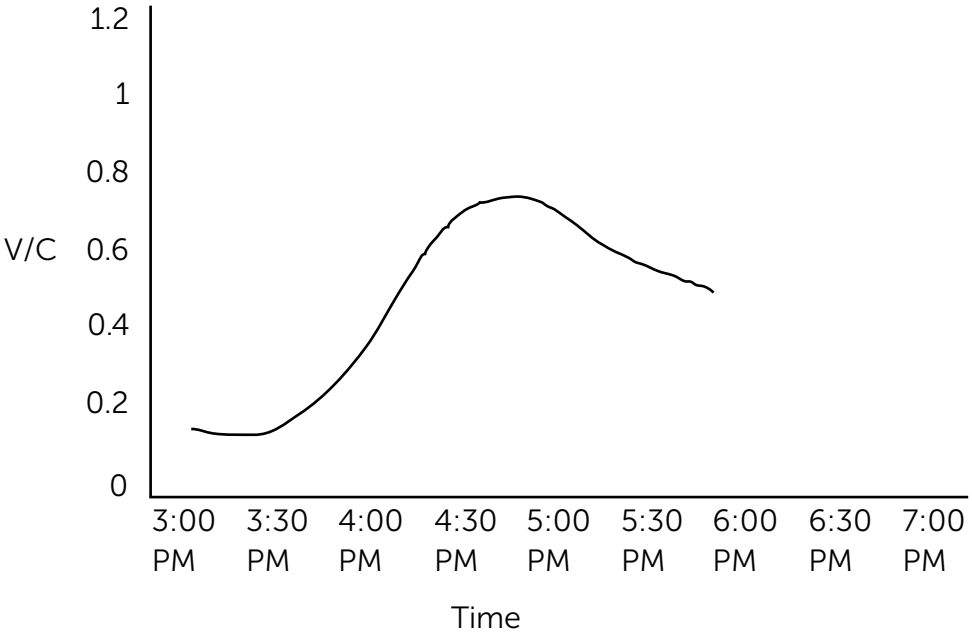


Figure F.3 | Estimated Duration of Congestion

HOURS OF DELAY/PERSON-TRIP

DESCRIPTION

This measure identifies the system-wide delay (in hours) due to congestion experienced by transportation system users. It measures the change in congestion and mobility. Increases in delay are typically due to increases in congestion, which represent a loss of mobility. It is generally measured for private vehicle users (SOV and HOV) but can also be measured for transit or other modal usage. Delay is generally determined by comparing travel time on the roadway facilities during peak congested conditions with off-peak uncongested conditions. In this case, delay is considered the difference in travel time between peak and off-peak conditions. Dividing by the number of person trips accounts for the changes associated with

population and job growth.

IMPLEMENTATION

The CMP travel model can assess hours of delay system-wide during the P.M. peak hour.

APPLICATION

Delay tends to be more sensitive to mitigation efforts than LOS. For example, an intersection is currently operating at LOS F with a delay of 100 seconds. An action (or group of actions) improves the delay measure to a value of 85 seconds, but the LOS value remains at F, despite the reduction. Hours of delay/person trip is a good supporting performance measure for freeway/expressway ramp and intersection improvements since most of the delays are felt in queuing and stop-and-go situations. Hours of delay can be a good indicator of the effectiveness of adding roadway and transit capacity to a travel market or system-wide. It is also a good indicator for system management projects such as ramp metering and signal timing.

EXAMPLE OUTPUT

Figure F.4 presents hours of delay per person trip for a hypothetical alternative.

TRAVEL TIME AND TRAVEL TIME INDEX

DESCRIPTION

Travel time is measured for the selected travel markets for a base year and some future year. The difference indicates the

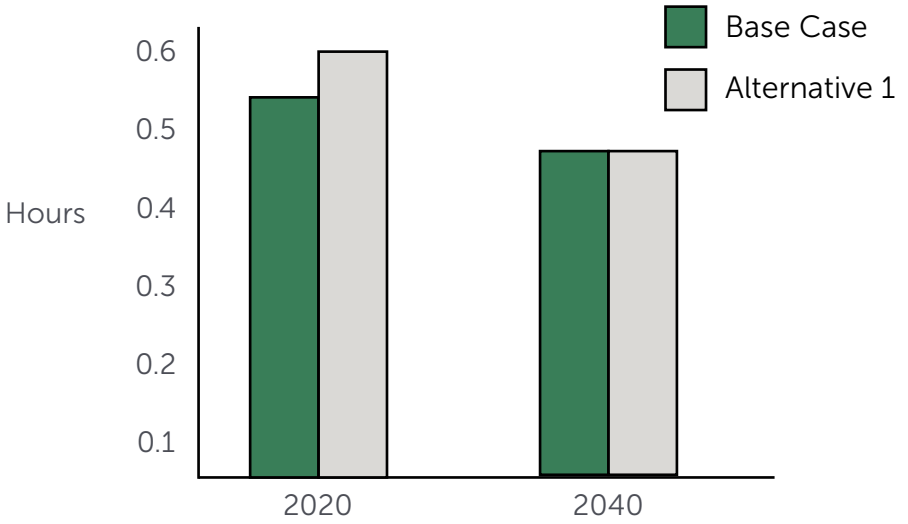


Figure F.4 | Example Of Delay Per Person Trip

change in congestion over time. Travel time can be a more intuitive measure of mobility than delay, because the traveling public thinks more about how long a trip takes than comparing actual travel time to the hypothetical minimum under free flow conditions. This time differential can be converted into an index by normalizing it to a base year. The index facilitates the comparison of travel time over different years, between different alternatives and between different modes.

IMPLEMENTATION

The CMP model estimates travel times for a given base year and forecasts future travel times under alternative scenarios. The model estimates an aggregate travel time system-wide by mode. Travel time savings and loss are calculated by comparing the travel time of each trip with the baseline travel time for the same trip. A trip that is faster in the baseline than it is in an alternative will show a loss. A trip that is faster in the alternative will show a savings. The travel time index employs a set of origin and destination (O-D) pairs that are monitored

over time. Once the O-D pairs are determined, a weighted average travel time is created.

To graphically display the O-D trip time information in a concise, easy-to-understand fashion, the trip times for the selected O-D pairs are aggregated into a trip time index. This index is generated by summing the travel times for all of the selected O-D pairs with an appropriate weighting factor (e.g., total peak hour person trip volume), and then normalizing the resulting value to 100 for a selected base year. As compared to measures based on LOS or delay, using a travel time index allows VTA to compare the travel time performance of different modes. This measure can be monitored for the A.M. and P.M. peak hours.

APPLICATION

The travel time index reports an average travel time (across modes). The strength of this measure is in its ability to show the differences in point to point travel times by mode. Thus, it is an effective measure for transit projects as well as roadway improvements.

EXAMPLE OUTPUT

Output from this measure can be presented in two ways. The trip times by mode for the alternatives can be presented in bar charts as in Figure F.5.

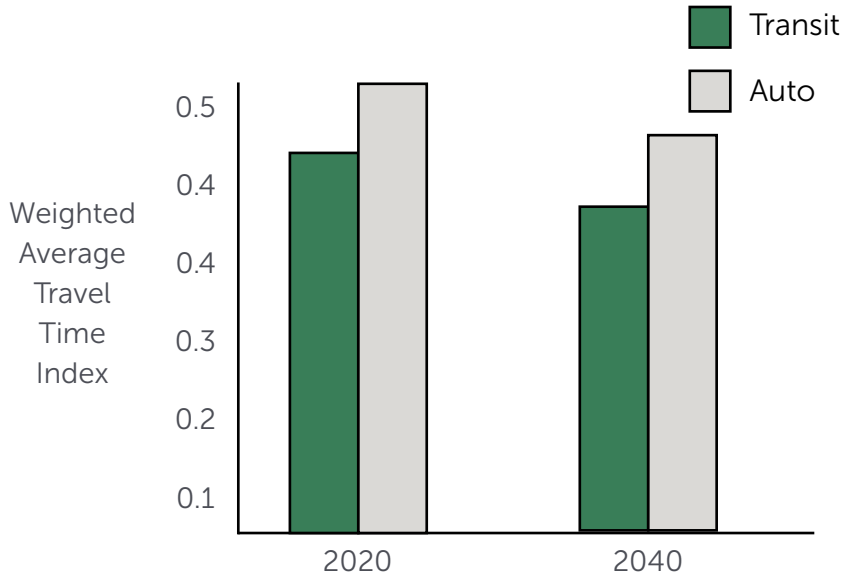


Figure F.5 | Example Travel Time By Mode

APPENDIX G | 2021 TIP LISTING OF PROJECTS

Sponsor	Project Name	TIP ID
Caltrans	SCL-SM I-280 Pavement Preserv. and HOV Extension	SCL190034
Campbell	Harriet Avenue Sidewalk Improvements	SCL190042
Campbell	SR 17 Southbound/Hamilton Ave. Off-Ramp Widening	SCL210003
Cupertino	McClellan Road Separated Bikeways (Phase 3)	SCL190036
Los Altos	Los Altos: Fremont Ave Pavement Preservation	SCL170038
Los Gatos	Los Gatos Creek Trail to Hwy 9 Trailhead Connector	SCL170028
Los Gatos	Shannon Road Complete Streets	SCL190033
Milpitas	Street Resurfacing 2020 & 2021	SCL170039
Morgan Hill	Dunne Avenue Pavement Rehabilitation	SCL170063
Mountain View	US 101/Shoreline Boulevard IC Improvements	SCL210004
MTC	Regional Planning Activities and PPM - Santa Clara	SCL170001
Palo Alto	Palo Alto-El Camino Real Ped Safety & Streetscape	SCL170051
Palo Alto	Waverley, E. Meadow & Fabian Enhanced Bikeways	SCL170053
San Jose	US 101/Blossom Hill Interchange Improvements	SCL030006
San Jose	Bay Trail Reach 9 & 9B	SCL050082
San Jose	Coyote Creek Trail (Hwy 237-Story Rd)	SCL050083
San Jose	San Jose - Autumn Street Extension	SCL110006
San Jose	San Jose: Los Gatos Creek Reach 5 Underpass	SCL110029

Sponsor	Project Name	TIP ID
San Jose	Tully Road Safety Improvements	SCL170029
San Jose	McKee Road Safety Improvements	SCL170030
San Jose	Mt Pleasant Ped & Bike Traffic Safety Improvements	SCL170031
San Jose	San Jose Pavement Maintenance	SCL170044
San Jose	W San Carlos Urban Village Streets Improvements	SCL170061
San Jose	US 101/Old Oakland Road Interchange improvements	SCL190001
San Jose	Willow-Keyes Complete Streets Improvements	SCL190028
San Jose	Better Bikeway San Jose - San Fernando Street	SCL190029
Santa Clara	Saratoga Creek Trail Phase 1	SCL170045
Santa Clara	San Tomas Aquino Creek Trail Underpass	SCL170052
Santa Clara	Hetch-Hetchy Trail Phase 1	SCL170055
Santa Clara	Santa Clara School Access Improvements	SCL170056
Santa Clara County	Montague Expwy Widening - Trade Zone-Great Mall	SCL090017
Saratoga	Saratoga Village Crosswalks and Sidewalk Rehab	SCL170054
Sunnyvale	Sunnyvale SNAIL Neighborhood Improvements	SCL170017
Sunnyvale	Bernardo Avenue Bicycle Underpass	SCL170020
Sunnyvale	Java Dr Road Diet and Bike Lanes	SCL170022
Sunnyvale	Peery Park "Sense of Place" Improvements	SCL170023
Sunnyvale	East Sunnyvale Area "Sense of Place"	SCL170024
Sunnyvale	Fair Oaks Avenue Bikeway - Phase 2	SCL170025

Sponsor	Project Name	TIP ID
Sunnyvale	Lawerence Station Area Sidewalks & Bike Facilities	SCL170026
Sunnyvale	Sunnyvale Traffic Signal Upgrades/ Replacements	SCL170027
Sunnyvale	Homestead Rd at Homestead High School Improvements	SCL170043
Sunnyvale	Sunnyvale Ped and Bike Infrastructure Improvements	SCL170057
Sunnyvale	Sunnyvale Safe Routes to School Improvements	SCL170059
VTA	SR 152 New Alignment	SCL090016
VTA	SR 85 Express Lanes	SCL090030
VTA	Santa Clara County - US 101 Express Lanes	SCL110002
VTA	SR 237/US 101/Mathilda Interchange Modifications	SCL130001
VTA	I-880 Stevens Creek Landscaping	SCL130044
VTA	I-680 Soundwalls - Capitol Expwy to Mueller Ave	SCL150001
VTA	I-280/Winchester Blvd Interchange Improvement	SCL150014
VTA	I-280 Soundwalls - SR-87 to Los Gatos Creek Bridge	SCL170064
VTA	IDEA Cat 2: Valley Transportation Authority	SCL170065
VTA	Hwy. Transp Operations System/FPI Phase 1 & 2	SCL190003
VTA	I-280 HOV - San Mateo County line to Magdalena Ave	SCL190004
VTA	SR 237 WB Auxiliary Lane fr McCarthy to North 1st	SCL190005

Sponsor	Project Name	TIP ID
VTA	US 101/Zanker Road-Skyport Drive-N. Fourth St. Imp	SCL190007
VTA	US 101/De L Cruz Blvd - Trimble Road I/C Imp	SCL190008
VTA	Calaveras Boulevard Widening	SCL190009
VTA	US 101/Buena Vista Avenue Interchange Improvement	SCL190010
VTA	I-280/Wolfe Road Interchange Improvement	SCL190011
VTA	US 101/San Antonio Rd/Charleston/ Rengstorff IC Imp	SCL190012
VTA	US 101/SR 25 Interchange - Phase 1	SCL190013
VTA	SR 17 Congestion Relief in Los Gatos	SCL190014
VTA	I-280/Saratoga Avenue Interchange Improvement	SCL190015
VTA	I-280 NB Braided Ramps btw Foothill Expwy & SR 85	SCL190016
VTA	I-680/ Alum Rock/ McKee Road Interchange Imp	SCL190017
VTA	Santa Clara Countywide Noise Abatement Program	SCL190031
VTA	SR 87/Charcot Ave On-Ramp HOV Bypass	SCL210001
VTA	US 101/SR 152/10th Ramp and Intersection Imp.	SCL210002