4. HORIZON YEAR TRANSPORTATION MASTER PLAN

4.1 INTRODUCTION

This chapter of the TMP presents recommendations to support the Horizon Year network as it relates to the railroad crossings, intersections, bicycle and pedestrian facilities, bridges and culverts, the roadway classification system, park and ride facilities, ITS facilities, and truck routing system. Recommended actions to support the Circulation Element of the General Plan are included along with transportation strategies, principles, and design elements to work towards meeting sustainability and green house gas emission reduction goals. Elements of smart growth design elements are included in the TMP.

4.2 GOALS, OBJECTIVES, POLICIES, AND ACTIONS

4.2.1 INTRODUCTION

The City of Tracy *General Plan* provides the foundation for the goals, objectives, policies and actions for the Transportation Master Plan (TMP). The TMP brings overlap with policies and goals regarding a "complete streets" policy, context-sensitive design, mode split targets, vehicle miles traveled (VMT) and per capita reduction goals. The TMP provides further clarification on specific policies and actions to meet the goals and objectives of the City's General Plan.

Each of the four Circulation Element goals from the General Plan are listed below along with their respective objectives. Recommended actions for future transportation planning, design and implementation, supplements each objective and are provided to meet the goals, objectives, and policies.

4.2.2 RECOMMENDED ACTIONS FOR CIRCULATION ELEMENT GOAL 1

Goal 1 of the circulation element states: A roadway system that provides access and mobility for all of Tracy's residents and businesses while maintaining the quality of life in the community.

Objective Cir-1.1 - Implement a hierarchical street system in which each street serves a specific, primary function and is sensitive to the context of the land uses served.

Actions: Implement a complete streets policy for new and retrofitted roads that ensures that adequate right-of-way is provided to enable safe access for all users (motorists, pedestrians, bicyclists, transit vehicles and users). Include flexibility in the policy to balance the function and users for various roadway classifications. Include amenities such as street lighting, landscaping, and transit stops that contribute to the complete street concept.

Incorporate context sensitive design features to improve mobility for all users. Refer to the cross sections presented in **Section 4.7** for details on travel lane widths, median widths, shoulders, bicycle and pedestrian facilities, and landscaping and public utility easements.

Objective CIR-1.2 Provide a high level of street connectivity.

Actions: Utilize access management techniques to provide appropriate spacing of access points on parkways, arterials, and collectors. Utilize context sensitive design principles from *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach* (Institute of Transportation Engineers, 2010) such as:

- Building network capacity and redundancy through a dense, connected network rather than through an emphasis on high levels of vehicle capacity on individual arterial facilities

- Minimizing direct property access onto parkways, arterials through design of a connected network of closely spaced arterial and collector thoroughfares and local street connections.

- Providing closer spacing of roadways and shorter blocks for areas with higher pedestrian and bicycle activity.

- Provide a well connected road system that encourages walking and cycling and maintains a quality of life for all Tracy residents.

Objective CIR-1.3 Adopt and enforce LOS standards that provide a high level of mobility and accessibility, for all modes, for residents and workers.

Actions: The City shall strive for LOS D on all streets and intersections. The following locations are exempt from the City's LOS D standard:

- Any intersections or roadways within ¼ mile of any freeway where LOS E is allowed to discourage interregional traffic from using City streets.

- Any intersections or roadways located in the Downtown and Bowtie area where LOS E shall be allowed.

- At intersections where construction of physical improvements would be infeasible prohibitively expensive, significantly impact adjacent properties or the environment, or have a significant adverse effect on the character of the community, including pedestrian mobility, crossing times, and comfort/convenience, the LOS may fall below the City's LOS standard.

- During construction of intersection improvements, the LOS may temporarily fall below the City's LOS standard.

- Caltrans facilities where Caltrans endeavors to maintain a target LOS at the transition between LOS C and LOS D on all State Highway facilities (i.e., freeway segments, signalized intersections, on- or off-ramps, etc.), however, Caltrans recognizes that it may not always be feasible. For Caltrans intersections, City of Tracy impact criteria applies. For freeway segments, LOS D or better is considered acceptable.

- County of San Joaquin facilities where LOS D is the minimum acceptable LOS for roadway and intersection operations.

- Develop multi-modal LOS analysis procedures and standards to evaluate other facilities (bicycle, pedestrian, and transit) in addition to roads.

Objective CIR-1.4 Protect residential areas from commercial truck traffic.

Actions: Erect signs providing notice of adopted truck routes (see **Section 4.10** for map of existing and future truck routes) and enforce the use of designated truck routes except for the purpose of pick-up or delivery of materials or merchandise. Provide the heavy vehicle roadway system to encourage commercial growth.

Objective CIR-1.5 Protect residential areas from through traffic and high travel speeds by facilitating free flow of traffic on major streets.

Actions: Utilize sustainable transportation system operation elements (see the sustainability matrix **Tables 4.1** and **4.2** at the end of this section) to improve system efficiency. For example, implementation of ITS technologies such as corridor signal timing plans and traffic signal interconnect enhance the flow of traffic.

Objective CIR-1.6 Maximize traffic safety for automobile, transit, bicycle users, and pedestrians.

Actions: Implement traffic calming on residential or collector streets as appropriate in accordance with the city's traffic calming program. Construct roadways to discourage speeding.

Objective CIR-1.7 Minimize traffic-related impacts such as noise and emissions on adjacent land uses.

Actions: Utilize rubberized asphalt in roadway projects to reduce roadway noise. Implement ITS technologies, such as signal coordination, to manage traffic progression and to lower speeds.

Consider implementation of roundabouts, instead of traffic signals or stop-control, to reduce delays and emissions.

Objective CIR-1.8 Minimize transportation-related energy use and impacts on the environment.

Actions: As indicated in **Table 4.2**, utilize sustainable materials such as recycled materials, permeable surfaces, non-toxic, and bio-degradable materials for roadway projects.

Utilize LED (light emitting diodes) or solar panels for traffic signals and street lights to lower operating and maintenance costs and to decrease energy consumption.

4.2.3 RECOMMENDED ACTIONS FOR CIRCULATION ELEMENT GOAL 2

Goal 2 is: Adequate interregional access.

Objective Cir-2.1 - Support regional planning and implementation efforts to improve interregional highways and interregional travel efficiency.

Actions: Coordinate between adjacent municipalities and jurisdictions along arterials, crossing borders and at interchanges with freeways.

Objective CIR-2.2 Discourage interregional travel from diverting from freeways onto Tracy streets.

Actions: In conjunction with actions under Objective Cir-1.5, utilize ITS technologies to manage the flow of traffic onto city streets.

4.2.4 RECOMMENDED ACTIONS FOR CIRCULATION ELEMENT GOAL 3

Goal 3 is: Safe and convenient bicycle and pedestrian travel as alternative modes of transportation in and around the city.

Objective CIR-3.1 Achieve a comprehensive system of citywide bikeways and pedestrian facilities.

Actions: Consistent with the cross sections standards in **Section 4.7**, provide Class I bike trails on parkways and arterials and Class II bike lanes on collectors. Class III bike routes shall be considered on roadways where sufficient width for a dedicated lane is not provided.

Implement a comprehensive Safe Routes to School Program.

Seek funding opportunities at all levels to implement pedestrian improvements and projects.

Provide pedestrian enhancements at intersections, where feasible. Enhancements include high visibility crosswalks, pedestrian countdown timers, and adequate crossing times, median refuge islands for wide streets, smaller curb radii, and shorter cycle lengths.

Consider preparation of a streetscape plan to define & coordinate design elements (street furniture, lighting, landscaping, width of pedestrian path, and buffer zones) when planning a walkable thoroughfare.

Create a pedestrian and bicycle safety action plan to identify steps to reducing the number of pedestrian and bicycle crashes. The plan will present existing deficiencies, identify appropriate improvements to address these deficiencies, and include implementation strategies. This plan should include public education programs to educate pedestrians, bicyclists, and motorists.

4.2.5 RECOMMENDED ACTIONS FOR CIRCULATION ELEMENT GOAL 4

Goal 4 is: A balanced transportation system that encourages the use of public transit and high occupancy vehicles.

Objective CIR-4.1 Promote public transit as an alternative to the automobile.

Actions: Utilize sustainable transportation system operation elements (see **Tables 4.1** and **4.2** at the end of this section) to encourage and improve transit usage. For example, implementation of measures such as transit signal priority, queue jump lanes, dedicated bus lanes, and improved shelter facilities will provide faster service, increased rider satisfaction and ridership.

Require new employment centers to participate in trip reducing strategies such as Transportation Demand Management program and to provide incentives for their participation.

Provide transit service/connections to major pedestrian generators such as major employment and retail centers and transit-oriented developments.

Consider changes to the Zoning Ordinance to allow a reduced parking supply that is less than code requirements thus encouraging use of alternative modes of transportation.

Objective CIR-4.2 Work to achieve connectivity between all modes of transportation.

Actions: Seek reconstruction opportunities on thoroughfares to provide and improve multi-modal access and circulation.

Measure T-5 of the City's *Sustainable Action Plan* – February 1, 2011 (SAP) lists several smart growth, urban design and planning measures including amendments to the zoning ordinance to require adequate pedestrian access, closure of sidewalk gaps, establishment of walkability standards, and amendment or creation of subdivision design standards to address spacing and connectivity. These goals must be implemented in the development of all specific plans in the city and where roads and intersections are reconstructed.

4.2.6 SUSTAINABILITY POLICIES, STANDARDS, AND PERFORMANCE MEASURES

In addition to the transportation and land use measures discussed in the SAP, a sustainability benefits matrix table was developed that lists various methods in which the TMP can achieve a more sustainable transportation system. The methods run the vertical range from specific physical roadway design elements, to planning document elements, to city policy shifts. **Tables 4.1** and **4.2** present the various methods in four areas: transportation system operations (motorized and non-motorized transport), land use integration, performance measures, and transportation infrastructure.

Transportation System Operations – This area include system operations and maintenance elements that will guide how the physical infrastructure – the roadway network and off-street paths/trails – are utilized. Intelligent Transportation System (ITS) technologies including Transit Signal Priority, Corridor Signal Timing, Traveler Information Systems, Ramp Metering Systems, Pedestrian and Bicycle Signalized Intersection Enhancements, and others will be effective ways for the city to maximize efficiency of the physical system.

Land Use Integration - Research is clear that land use design, density, mix, and related elements are directly linked to traveler mode choice and the efficiency of the surrounding transportation system. In Tracy, the land use design elements that are most likely to influence mode choice and improve efficiency are High Density Mixed Use Development, Development Within ¼-Mile of Transit (Amtrak station and primary bus routes), and Connectivity Between Land Uses. Even in specific plan areas located on the edge of the developed city, these principles can be employed to move the city toward a less vehicle-dependent and more sustainable transportation system.

Performance Measures - As the city conducts periodic reviews of both its own performance – TMP updates, General Plan updates, signal performance reviews, CMP compliance, etc. – and of development project impacts, it has more options than before in methods of assessing performance. Where once there was only peak hour vehicle Level of Service (LOS), now there are multi-modal assessment methods, system-wide as opposed to "spot" assessment methods, and methods that acknowledge the transportation -- energy use -- land use -- quality of life connection. The city should consider incorporating evaluation methodologies that are more in line with the city's ultimate desired system, possibly one that does not elevate vehicle service over service and performance of other modes, or that considers the system-wide or larger-area performance along with, or instead of, individual intersection performance.

Transportation Infrastructure - The ultimate size of the roadway system, including allocation of space to autos, buses, bicyclists, pedestrians and heavy vehicles, is defined in the TMP. This sizing and allocation, more than any subsequent implementation steps, will drive the success of the Plan in reducing auto dependence, vehicle-miles traveled, and greenhouse gas impacts. Matrix elements such as Constrain Roadway (Auto) Capacity, Infrastructure/Smart Streets, Bus Lanes, Complete Bike Routes, and Citywide Pedestrian Connectivity directly lead to the width and allocation of space in the TMP roadway element.

Sustainable Policies	Transportation System	Transportation Elements	Sustainability Benefits[1]											Costs/Impacts/Risks[2]			
(a)	(b)	(c)	(d)											(e)			
			VMT	GHG	VHD	VF	VTL	PH	MC	EFF	EQ	LE	ACC	VHD	COST	IMP	LEG
SB 375	**Motorized Transport**																
AB 32	Passenger Vehicles	Constrain Roadway Capacity (Design /Roundabout /Lanes /Parking Supply)		✓				✓	✓		✓	✓		✓			✓
Smart Streets		Vehicle Technology		✓				✓		✓					✓	✓	
New Urbanism		ITS		✓	✓	✓		✓		✓					✓		
Complete Streets		Rideshare	✓	✓	✓	✓				✓						✓	
AB 1358		Infrastructure (Smart Streets /Roundabout)	✓	✓	✓	✓				✓					✓		✓
SAFETEA-LU		Shared Parking Management		✓					✓	✓		✓					✓
DD 64		Roadway Pricing		✓	✓	✓				✓						✓	✓
		Increase Transit		✓													
	Heavy Vehicles	Vehicle Technology		✓				✓		✓					✓	✓	
		Routes and Management	✓	✓	✓	✓	✓	✓	✓	✓				✓			✓
		Truck Lanes		✓	✓	✓				✓					✓	✓	
		Truck Parking Management		✓													✓
		Facilities (Truck Stops)		✓		✓				✓					✓		✓
	Transit	Education/Outreach	✓	✓	✓	✓		✓		✓			✓		✓		
		Bus Lanes	✓	✓	✓	✓		✓		✓	✓		✓	✓	✓	✓	✓
		Signal Priority	✓	✓	✓	✓				✓	✓			✓			✓
		BRT	✓	✓	✓	✓		✓		✓	✓		✓	✓	✓	✓	✓
		Safety															
		Park and Ride Facilities and Safety	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓		
		Transportation System Management		✓											✓	✓	
		Smart Technology (ITS)	✓	✓	✓	✓		✓		✓	✓		✓		✓		
		Fleet Management		✓				✓	✓	✓					✓	✓	
		Vehicle Technology		✓				✓		✓					✓	✓	
		Incentives for Transit Use	✓	✓	✓	✓		✓					✓				
		Transit Promotion		✓													
		Safety and Comfort		✓													
		Information & Operation		✓													
		Traveler Preference		✓													
		Multimodal connectivity		✓													
		Bike racks facilities @ station	✓	✓	✓	✓		✓		✓	✓		✓				
	Non-Motorized Transport																
	Bicycles	Complete Bike Route Network	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓
		Safe Route to Schools Plan	✓	✓	✓			✓			✓		✓				
		Education/Outreach		✓						✓	✓				✓		
		Short and Easy Connectivity to Land Use and Transit	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓		
		Ample Bike Parking	✓	✓							✓		✓				
		Signal Detectors		✓						✓	✓		✓	✓	✓	✓	
		Incentives	✓	✓	✓	✓		✓			✓		✓				
		Bike Technology and Safety Programs		✓				✓		✓			✓		✓		
		Showers /lockers at employment sites	✓	✓							✓						✓
		Increase commuting by bike	✓	✓													
		Recreation		✓													
	Pedestrians	Site Pedestrian Access		✓				✓		✓	✓	✓	✓				
		City-wide Pedestrian Connectivity	✓	✓	✓	✓		✓		✓	✓	✓	✓		✓	✓	
		Safe Route to Schools Plan	✓	✓				✓			✓		✓				
		ADA Upgrades		✓							✓		✓		✓		
		Education/Outreach	✓	✓				✓		✓	✓				✓		
		Safety		✓													
		Pedestrian preference	✓	✓													
		Technology/Lighting		✓						✓	✓				✓		
	Performance Measures																
	LOS	Multi-modal LOS Standards - physically facility-based						✓		✓	✓	✓	✓	✓	✓	✓	✓
		Multi-modal LOS Standards - person-delay based						✓		✓	✓	✓	✓	✓	✓	✓	✓
		Lower Vehicle LOS Standard								✓	✓	✓	✓	✓			✓
		Tiered Vehicle LOS Standards								✓	✓	✓	✓	✓		✓	✓
		Drop Vehicle LOS Standard								✓	✓		✓	✓			✓
		Exempt certain streets from vehicle LOS standard								✓	✓	✓	✓	✓		✓	✓
		Replace intersection LOS standard with system-wide LOS measurement								✓	✓	✓	✓		✓	✓	✓
	Smart Mobility	Accessibility and Connectivity		✓						✓	✓	✓	✓		✓	✓	✓
		Multi-modal Quality of Service		✓				✓		✓	✓	✓	✓	✓	✓	✓	✓
		Pedestrian & Bicycle Mode Share		✓				✓			✓	✓	✓		✓	✓	✓
		Climate and Energy Conservation	✓	✓				✓				✓			✓	✓	✓
		Network Performance Optimization	✓	✓	✓	✓				✓	✓				✓	✓	✓
	Land Use Integration																
	Policies and Requirements	Incentives for Developers									✓	✓	✓				✓
		Transit Orientated Development (TOD)	✓	✓			✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
		4-D Principles	✓	✓			✓	✓		✓	✓	✓	✓			✓	✓
		Accessible transit within ¼ mile.	✓	✓			✓	✓		✓	✓	✓	✓		✓	✓	
		High density mixed use	✓	✓			✓	✓	✓	✓		✓	✓			✓	
		Infill / Redevelopment	✓	✓			✓	✓	✓	✓		✓	✓		✓	✓	
		High FAR		✓			✓		✓	✓		✓	✓				
		Connectivity between Land Use that does not require vehicles.	✓	✓				✓	✓	✓	✓	✓	✓				
		New Urbanism	✓	✓			✓	✓	✓	✓	✓	✓	✓		✓	✓	
		Open space management / proximity		✓				✓									

Notes:

1. VMT = Vehicle Miles of Travel, GHG = Green House Gas Emmissions, VHD = Vehicle Hours of Delay, VF = Vehicle Flow, VTL = Vehicle Trip Length, PH = Public Health, MC = Maintenance Cost, EFF = System Efficiency, EQ = System Equity, LE = Land Use Efficiency,
2. VHD = Vehicle Hours of Delay, COST = Higher Costs To Implement, IMP = Complexity/Difficulty to Implement, LEG = Potential for Legal Challenge

Source: Input from Fehr & Peers

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Table 4.1: Transportation Operations Sustainability Benefits

Sustainable Policies	Transportation System	Transportation Elements	Sustainable Benefits
(a)	(b)	(c)	(f)
SB 375	**Infrastructure**		
AB 32	Roads	Street design (Smart Streets)	Reduced Street Widths increases opportunities for permeable pavements,
Smart Streets		Sustainable materials	Use of recycled materials , permeable surfaces, non-tixic, bio degradable materials
New Urbanism		Hierarchy in transportation elements	Provides opportunity for reducing street widths where lower capacity is needed
Complete Streets		Roundabouts/Intersection control	Reduction in GHG Emmissions (CO_2, CO, HC, NO_x), noise, particulates, impervious surfaces.Increases walkability, safety, green areas
AB 1358		Manage delay	Manage traffic flow to promote transit ridership and non-motorized transportation
SAFETEA-LU	Transit	Station/Stop Location and amenities	Increase in transit usage will reduce private vehicle trips
DD 64		Routes	Distribution na dlocation of routes close to origins and destinations will improve ridership and decrease automobile use
		Signal priority	Increase transit usage by providing efficient/faster transit service through signal priority control
		Dedicated Lanes/Turnouts/Pass Lanes	Increase transit usage by providing efficient/faster transit service through dedicated bus lanes during peak hours and at intersections
	ITS	Infrastructure - backbone	Efficient transportation management, reduce delay, reduce roadway improvements, reduce GHG
		ATMS	Efficient transportation management, reduce delay, reduce roadway improvements, reduce GHG
		CMS	Efficient transportation management, reduce delay, reduce roadway improvements, reduce GHG
		CCTV	Efficient transportation management, reduce delay, reduce roadway improvements, reduce GHG
		TMC	Efficient transportation management, reduce delay, reduce roadway improvements, reduce GHG
		511	Efficient transportation management, reduce delay, reduce roadway improvements, reduce GHG
		Signal Coordination	Efficient transportation management, reduce delay, reduce roadway improvements, reduce GHG
		Parking Management	Efficient transportation management, reduce delay, reduce roadway improvements, reduce GHG
	Bicycles	Bicycle network (commute and recreation)	Increased ono-motorized transport, increased health
		Bicycle racks & lockers	User acilities to promote bicycle usage
		Signal detection	Improved bike travel times
	Pedestrians	Sidewalk connectivity	Improve access, pedestrian health and safety
		Pedestrian Crossings	Improve pedestrian health and safety
		Safety	Improve pedestrian health and safety
	Heavy Vehicles	Routes	Efficient delivery of goods
		Facilities	Eliominates on-street parking, pollution
	Parking	Shared facilities	Efficient use of parking, lees parking spaces/non permaeble surfaces
		Standards	Promotes alternative forms of transportation
		On-street and on-site parking	An effective use of on-street parking spaces may reduce off street requirements

Source: Input from Fehr & Peers

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Table 4.2: Transportation Infrastructure Sustainability Benefits

4.3 RAILROAD FACILITIES

4.3.1 INTRODUCTION

This section documents infrastructure related to Railroad Crossing facility planning. The existing Railroad Crossings are presented in **Chapter 2**, Existing Conditions. The City of Tracy Railroad Crossings was integrated into the TMP to develop a comprehensive circulation system that minimizes conflict and delay points between railroad traffic and automobile, transit, pedestrian, and bicycle traffic within the City. Graphics are provided to illustrate existing and future Railroad Crossing facilities. Planning for at-grade and grade separated facilities is based on review of forecast local and regional trains, vehicular, bicycle and pedestrian traffic, and coordination between City of Tracy, the California Public Utilities Commission (CPUC), and Union Pacific Railroad (UPRR). Discussion is provided regarding existing and future railroad crossings, facility design, and resource documents.

4.3.2 PLANNING RAILROAD CROSSING FACILITIES

Planning for Railroad Crossings where roadways currently or will cross the railroad has been coordinated between City staff, traffic engineers and representatives from the CPUC, and UPRR. Consideration was given to the frequency of use for each railroad, the type of trains using each line, and the current and forecast vehicular traffic crossing each railroad, and taking cognizance of pedestrian and bicycle travel needs. Balancing the needs between railroad traffic and automobile traffic is important to determine where at-grade crossings are adequate, and where grade separations are required. The railroad industry provided the impetus for creating the community of Tracy and therefore, multiple rail lines are embedded in the community, often traversing diagonally across the roadway network. Typically, at-grade crossings can accommodate 4-lane roadways, however 6-lane roadways may require grade separation between the railroad and the automobile roadway. Additionally, the CPUC requires no new at-grade railroad crossings unless a crossing is relocated from another location and merited. Discussion and review of new and relocated crossings requires discussion with the CPUC to confirm expectations and establish a transportation network serving operational and safety needs for both rail and non-rail traffic. The TMP establishes a platform from which design and continued discussions with CPUC and UPRR can occur. It should be noted that several locations have been earmarked as possible grade separated facilities. In calculating future traffic impact fees, the facilities are regarded as being grade separated.

4.3.3 FUTURE RAILROAD CROSSING FACILITIES

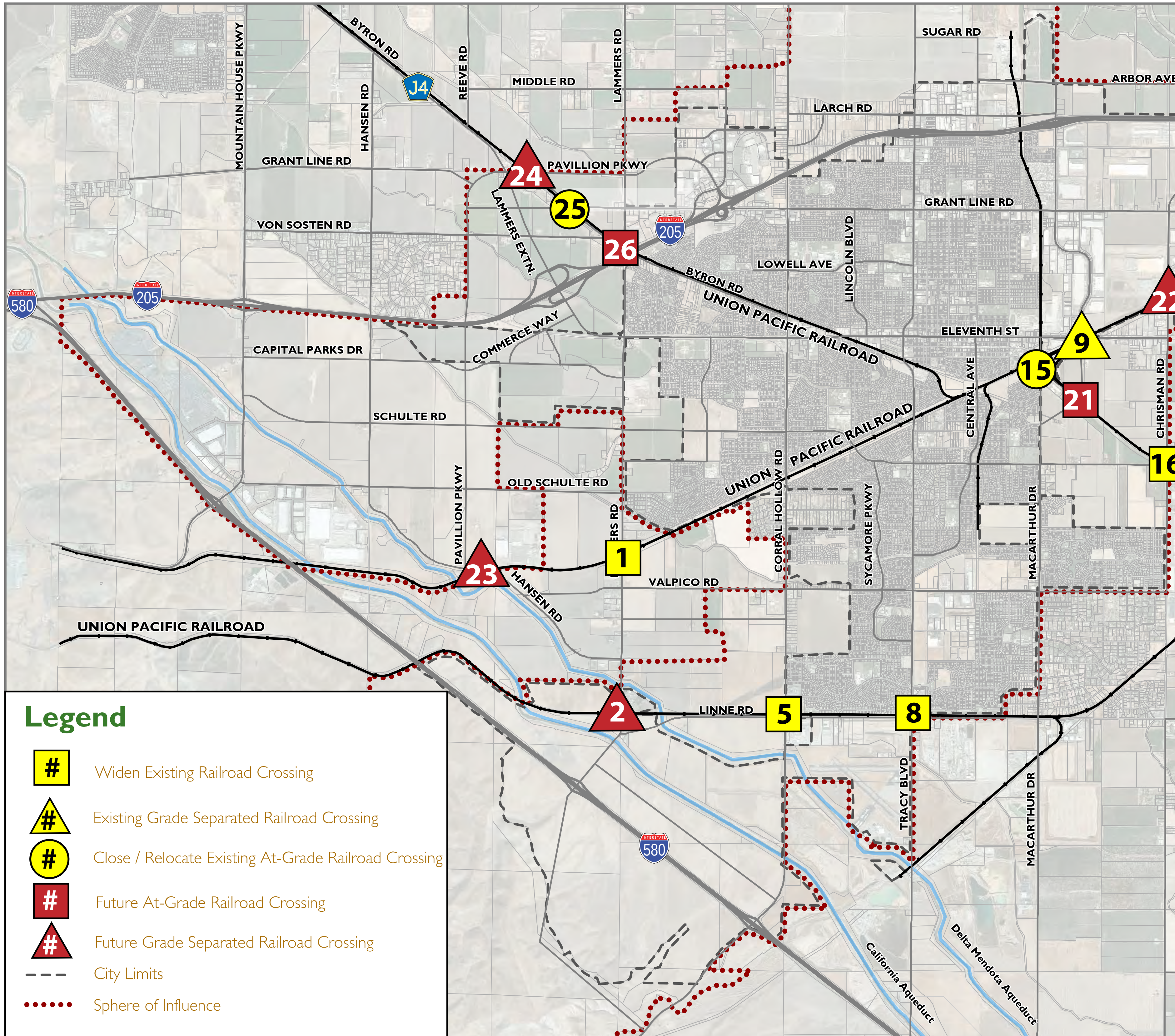
Figure 4.1 shows the City of Tracy Railroad Crossing Facility Plan, which includes the existing and future facilities identifying widening of existing crossings, future at-grade crossings, and future grade separated crossings.

As identified in **Figure 4.1** and based on meetings with the CPUC and UPRR, the following improvements to the railroad crossings are recommended to address Horizon Year forecasted demand:

Maintain At-Grade Crossings:

- **#1: Lammers Road north of Valpico Road.** Lammers Road future widening will increase roadway from 2 lanes to consist of 4 lanes to accommodate Horizon Year traffic volumes. The 4-lane roadway/railroad crossing may remain at-grade. Future roadway improvements should accommodate pedestrian and bicycle crossings per standard designs.
- **#5: Corral Hollow Road north of Linne Road.** Coral Hollow Road future widening will increase roadway from 2 lanes to consist of 4 lanes to accommodate Horizon Year traffic volumes. The 4-lane roadway/railroad crossing will remain at-grade. Future roadway improvements should accommodate pedestrian and bicycle crossings per standard designs.
- **#8: Tracy Boulevard north of Linne Road.** Tracy Boulevard widening will increase roadway from 2 lanes to consist of 4 lanes to accommodate Horizon Year traffic volumes. The 4-lane roadway/railroad crossing will remain at-grade. Future roadway improvements should accommodate pedestrian and bicycle crossings per standard designs.

- **#16: Chrisman Road at Schulte Road.** Chrisman Road widening will increase roadway from 2 lanes to consist of 4 lanes to accommodate Horizon Year traffic volumes. The 4- lane roadway/railroad crossing will remain at-grade. Future roadway improvements should accommodate pedestrian and bicycle crossings per standard designs.
- **#21: MacArthur Drive Extension.** MacArthur Dive extension will consist of 4 lanes to accommodate Horizon Year traffic volumes. The 4-lane roadway/railroad crossing will remain at-grade. Future roadway improvements should accommodate pedestrian and bicycle crossings per standard designs.



#	Existing Locations	Existing Crossing Type	Future Crossing Type	Existing Lanes	2035 Lanes
1	Lammers Road north of Valpico Road	At-Grade	At-Grade	2	4
2	Lammers Road north of Linne Road	At-Grade	Grade Separated	2	4
5	Corral Hollow Road north of Linne Road	At-Grade	At-Grade	2	4
8	Tracy Boulevard north of Linne Road	At-Grade	At-Grade	2	4
15	MacArthur Dr south of 6th Street	At-Grade	Close	2	Maintain Ped & Bike Access Only
16	Chrisman Road at Schulte Road	At-Grade	At-Grade	2	4
25	Grant Line Road at Byron Road	At-Grade	Relocate to 26	2	No Crossing
#	**Future Locations**	**Existing Crossing Type**	**Future Crossing Type**	**Existing Lanes**	**2035 Lanes**
9	North MacArthur Drive at 11th Street (N-S)	Grade Separated	Grade Separated	4	4
21	MacArthur Drive Extension	No Crossing	At-Grade	0	4
22	Chrisman Road north of 11th Street	No Crossing	Grade Separated	0	4
23	Hansen Road east of Pavillion Parkway Ext.	No Crossing	Grade Separated	0	4
24	Pavillion Parkway east of Lammers Road	No Crossing	Grade Separated	0	8
26	Lammers Road at Byron Road	No Crossing	Relocate from 25	0	2

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North

0 0.5 1 2 Miles (Approximate)

Figure 4.1: Railroad Crossings - Improvements and Future Locations

Provide Grade-Separated Crossings:

- **#2: Lammers Road north of Linne Road.** Lammers Road widening will increase roadway from 2 lanes to consist of 4 lanes to accommodate Horizon Year traffic volumes. The 6-lane roadway/railroad crossing will change from at-grade to a grade separated crossing. Currently private Lammers Road will become a public roadway. Future roadway improvements should accommodate pedestrian and bicycle crossings per standard designs.

- **#9: Eleventh Street at re-aligned MacArthur Drive.** Eleventh Street future improvements will modify grade separated bridge to a 4-leg intersection accommodating MacArthur Road Extension. Automobile traffic will remain grade separated from the railroad. The improved roadway/intersection will remain grade separated. Preliminary engineering design is underway at this location, and should accommodate pedestrians and bicycles per standard designs. The existing railroad crossing on MacArthur Drive just south of 11th Street will be eliminated for vehicular traffic, but pedestrian and bicycle traffic may have access across the rail road tracks per the standard crossing design criteria.

- **#22: Chrisman Road north of 11th Street.** Chrisman Road construction will consist of 4 lanes to accommodate Horizon Year traffic volumes. The 4-lane roadway/railroad crossing will be grade separated. Future roadway improvements should accommodate pedestrian and bicycle crossings per standard designs.

- **#23: Hansen Road east of Pavilion Parkway.** The future Hanson Road improvements will provide 4-lane roadways intersecting over railroad in grade separated crossing. Future roadway/intersection improvements should accommodate pedestrian and bicycle crossings per standard designs.

- **#24: Pavillion Parkway east of Lammers Extension.** The future Pavillion Parkway roadway improvements will include an 8-lane roadway intersecting over the railroad in grade separated crossing. Future roadway/intersection improvements should accommodate pedestrian and bicycle crossings per standard designs.

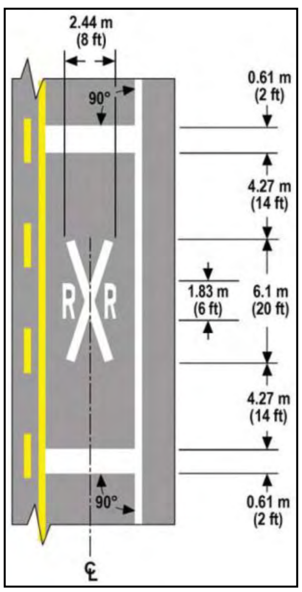
Close or Relocate Crossings:

- **#15: MacArthur Drive south of 6th Street.** This vehicular roadway crossing will be eliminated once the 11th Street/MacArthur railroad crossing is re-constructed and MacArthur Drive realigned. The City plans to retain the pedestrian and bicycle crossing at crossing #15.

- **#25: Grant Line Road at Byron Road.** Grant Line Road will be eliminated along with its intersection at Byron Road. The crossing will be relocated to #26, Lammers Road, at Byron Road.

- **#26: Lammers Road at Byron Road.** The current Grant Line Road at-grade crossing will be eliminated and replaced with a 2-lane at-grade crossing at Lammers Road just north of the I-205 under crossing to accommodate Horizon Year traffic volumes. Based on meetings with the CPUC and UPRR, the 2-lane roadway/railroad crossing may remain at-grade since the crossing is being relocated only. Future roadway improvements should accommodate pedestrian and bicycle crossings per standard designs.

4.3.4 RAILROAD CROSSING FACILITY DESIGN PLANNING



To obtain grant funding from State and Federal resources, railroad crossing facilities are required to adhere to applicable design standards such as required by the CPUC or Federal Railroad Administration (FRA). At-grade railroad crossings should accommodate all users, including traffic from automobiles, buses, pedestrians, and bicyclists. Design standards and guidance for automobile, pedestrian, and bicyclist traffic crossing railroads at-grade is provided through the following documents:

- *Pedestrian-Rail Crossings in California* (California Public Utilities Commission, May 2008)
- *Highway Design Manual*, Chapter 1000 Bikeway Planning and Design (Caltrans, September 2006);
- *California Manual on Uniform Traffic Control Devices*, Part 9 Traffic Controls for Bicycle Facilities (2010);
- *Rails-with-Trails: Lessons Learned, Literature Review, Current Practices, Conclusions* (Federal Highway Administration, August 2002); and
- *Railroad-Highway Grade Crossing Handbook* (Federal Highway Administration, September 1986).

Consideration of the safety of pedestrians at at-grade crossings is important during project planning and design, to ensure adequate right-of-way for the approach and crossing. The CPUC pedestrian-rail compendium provides discussion on design principles, design elements, and examples for review. Examples of design elements include swing gates, detectable warnings, signage, crossing surfacing, channelization, pavement markings, and in-roadway lights.

Consideration of the safety of bicyclists at at-grade crossings is important during project planning and design, to ensure adequate right-of-way for the approach and crossing. As identified in the Caltrans *Highway Design Manual* (HDM), the bikeway crossing should be at least as wide as the approaches of the bikeway, and the crossing should be straight and at right angles to the rails. If a skew is unavoidable, the shoulder/Class II bike lane should be widened. Safety for cyclists can be accommodate through provision of adequate right-of-way, warning signage, pavement delineations, pavement material design and markings of obstacles such as cattle guards. An example of hazard prevention is incorporation of timber planks at crossings to avoid asphalt cement concrete (ACC) deformation/ridge buildup.

4.3.5 SMART GROWTH DESIGN ELEMENTS

The following Smart Growth design elements are relevant to railroad crossing planning:

- Provide safe and efficient crossings for all modes across railroads to enhance connectivity between land uses and amenities.

4.4 LEVEL OF SERVICE

4.4.1 INTRODUCTION

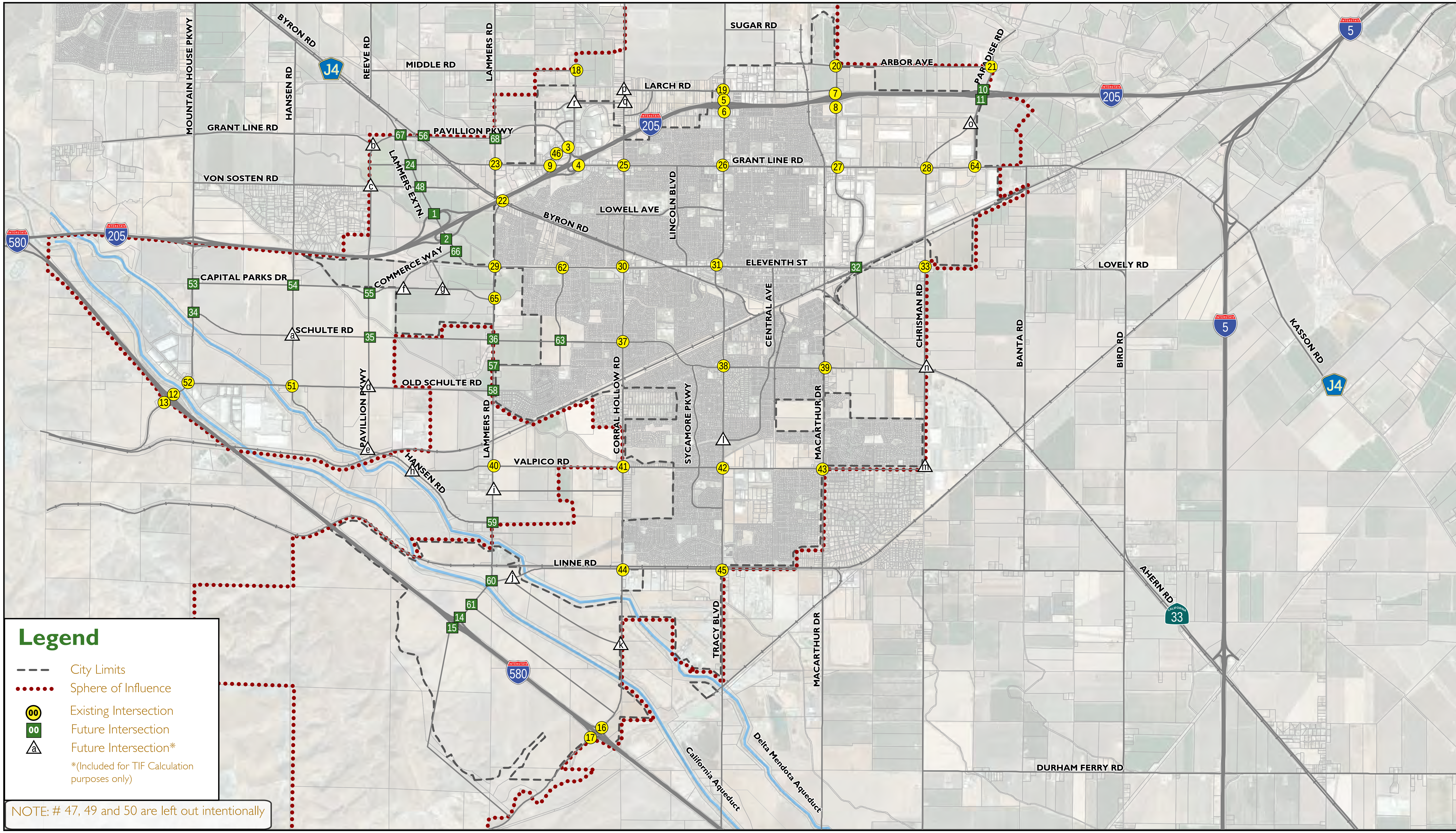
The roadway network forms the backbone for the City of Tracy transportation system. Tracy's future Horizon Year vision demands extensive improvements to the existing transportation system. Several entities and agencies provide transportation facilities and services to accommodate travel to and from, and within the City. Tracy's transportation network is envisioned as a multi-modal network of roads, bicycle lanes and paths, transit services, and pedestrian facilities that will support the planned land uses in the City by providing mobility to residents and visitors alike.

Based on the City's visioning as discussed in **Chapter 3**, the Horizon Year housing and employment represent growth of about 51 percent and 167 percent respectively, over 2006 conditions. As such, the City's roadway system must be continually maintained and improved to keep pace with development. This presents a unique and fortunate situation for the City of Tracy because it provides an opportunity to develop the transportation system to modern standards and implement transportation improvements as growth occurs. This TMP incorporates several Smart Growth principles to facilitate sustainable provision of transportation infrastructure to accommodate future growth.

This section provides insight on transportation within the City to establish policies and priorities to maintain and improve the transportation system. By implementing an improved transportation network the City can proactively enhance the system, accommodate future growth, and maintain the quality of life in Tracy. City policies established in this document are intended to be comprehensive, but also dynamic, and will be revised as needed to adapt to the changing needs of the region. City officials and staff will use these policies to guide ongoing development, use of City resources and implementation of projects and programs. This section defines a vision and sets overall policy.

4.4.2 HORIZON YEAR INTERSECTION TRAFFIC VOLUMES

Figure 4.2 shows the location of the study intersections. Based on the Horizon Year traffic modeling and forecast volumes discussed in **Chapter 3**, forecast volumes from the model were post-processed to obtain intersection traffic volumes for Horizon Year future traffic volumes. Post-processing of the model data to provide peak hour intersection volumes was conducted in accordance with industry standards which included review of existing traffic volumes for consistency on major corridors within the City. **Figures 4.3a** and **4.3b** show the forecasted AM and PM peak hour intersection traffic volumes for the major study intersections in the City.



North
0 0.5 1 2 Miles (Approximate)

Figure 4.2: Study Intersection Locations

City of Tracy Transportation Master Plan

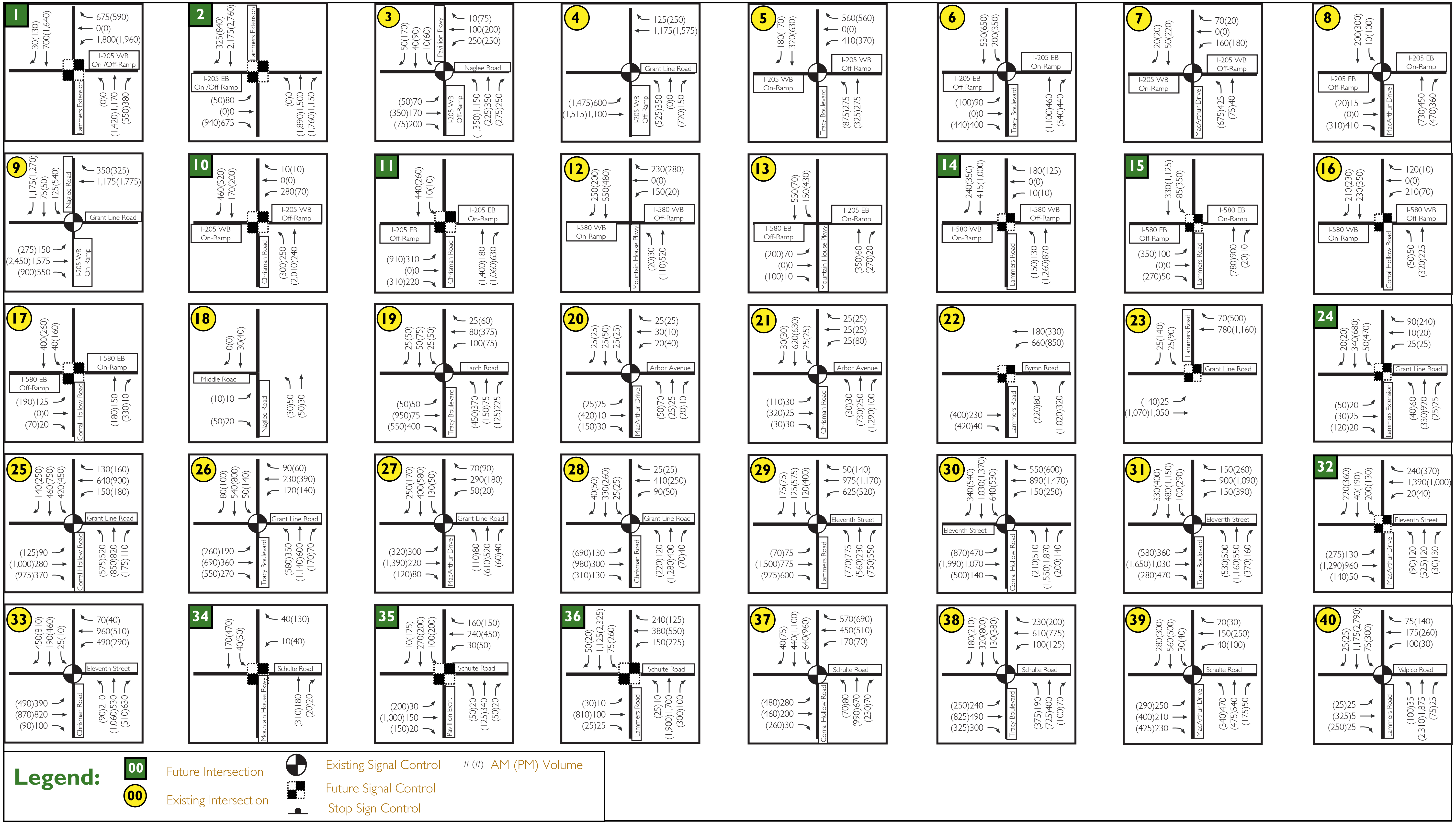


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Figure 4.3a: Horizon Year AM (PM) Peak Hour Traffic Volumes

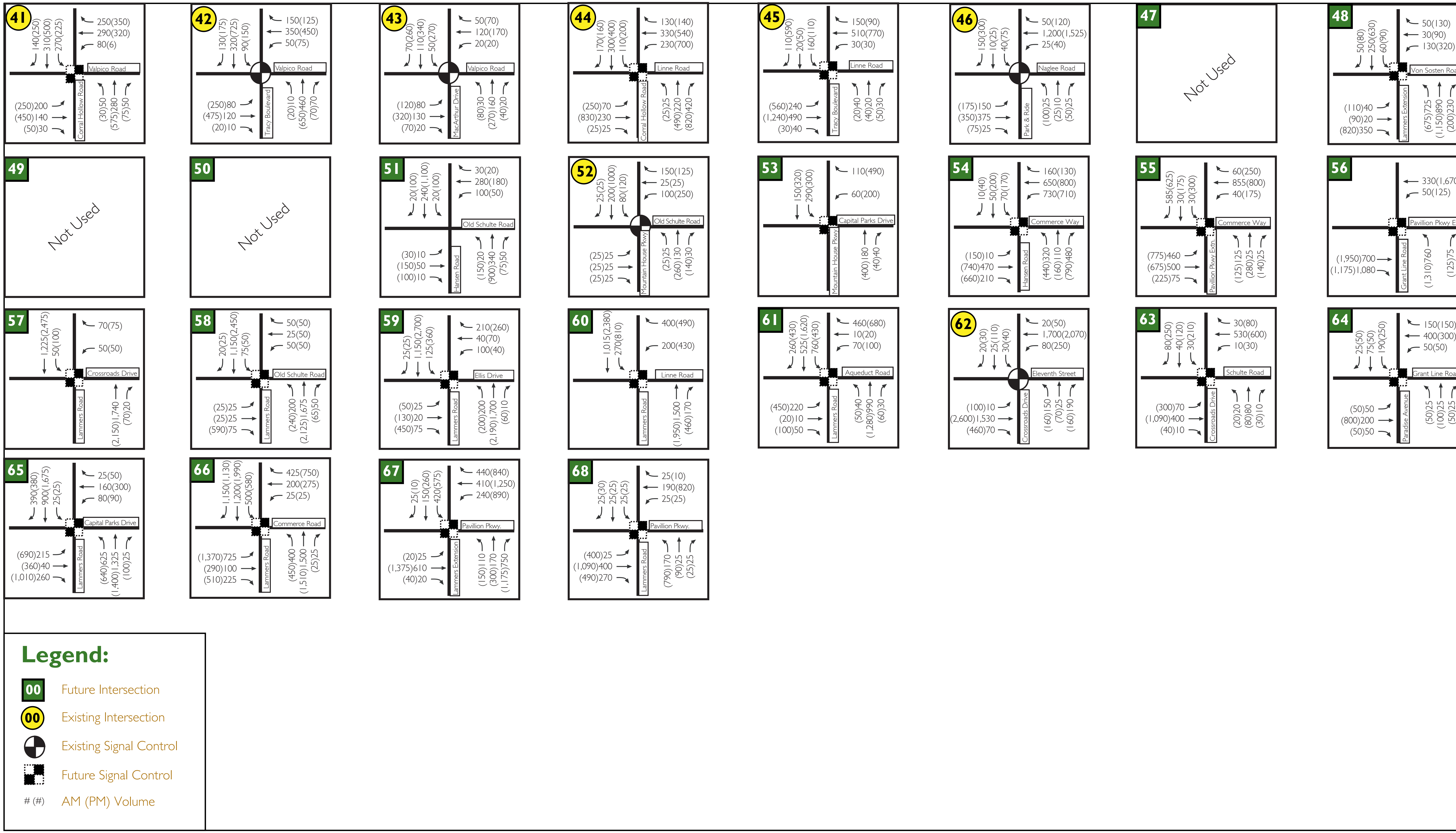

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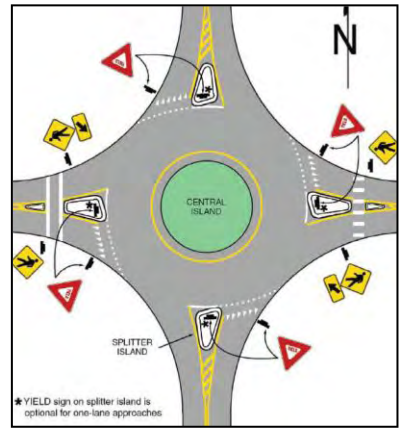
Figure 4.3b: Horizon Year AM (PM) Peak Hour Traffic Volumes

4.4.3 HORIZON YEAR INTERSECTION CONFIGURATION AND OPERATION

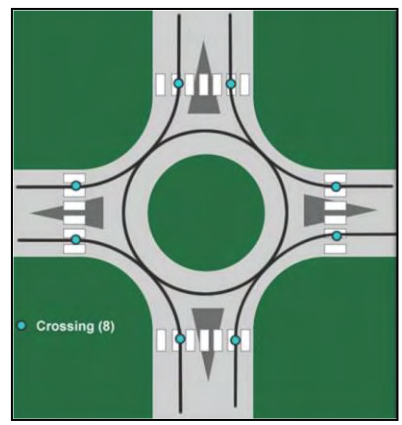
This section presents an assessment of the forecasted Horizon Year traffic conditions and the recommended transportation system improvements to support this growth.



4.4.3.1 TRAFFIC OPERATION EVALUATION METHODOLOGIES AND LEVEL OF SERVICE STANDARDS

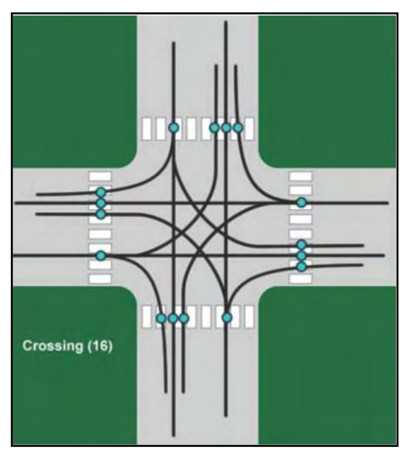
Chapter 2 provides an overview of traffic operation evaluation methodologies and level of service standards for study intersections. Intersection control for existing conditions includes signalized and stop-controlled intersections. The following provides discussion for analysis of intersections controlled through implementation of roundabouts which is planned at two future study intersections.

4.4.3.2 LEVEL OF SERVICE CRITERIA FOR ROUNDABOUTS



The standardized analysis methodology identified by Federal Highway Association (FHWA) is the Volume to Capacity (V/C) analysis methodology. Typical roundabout traffic analysis does not assign an LOS performance grade; instead, the V/C ratio is identified to determine acceptable or deficient operation. The V/C ratio of a roundabout provides a direct assessment of the demand at the roundabout entry to the capacity at the entry. A V/C ratio of 0.85 or less corresponds to acceptable roundabout operation and a V/C ratio greater than 0.85 corresponds to deficient roundabout operation. Roundabout analysis was prepared utilizing the Synchro software package which includes roundabout analysis parameters such as vehicular traffic volumes, lane geometry, and approximate dimensions of roundabouts.

4.4.4 LANE CONFIGURATION/LEVEL OF SERVICE



Figures 4.4a and **4.4b** show the lane configuration by approach and intersection control for both existing and future intersections. The lane configuration figures identify where improvements are recommended to accommodate future Horizon Year traffic demand. It should be noted that the improvements shown are identified to maintain level of service threshold per the City of Tracy and Caltrans level of service standards as appropriate.

Level of service calculations were conducted using the Synchro software program to determine the weekday Future AM and PM peak-hour operations at the study intersections. **Figure 4.5** presents the Horizon Year AM and PM peak-hour intersection LOS, and **Table 4.3** summarizes the delay and LOS results. As shown in **Table 4.3**, all the study intersections are forecast to operate at LOS D or better during the future conditions weekday AM and PM peak hours except for the following intersections:

- Corral Hollow Road/Eleventh Street
- Tracy Boulevard/Eleventh Street
- Corral Hollow Road/Schulte Road
- Tracy Boulevard/Schulte Road
- Lammers Road/Commerce Way

The Synchro output calculations are provided in **Appendix B**.

Analysis with Lammers-Byron Connector

A connection from Grant Line Road along a Lammers Road alignment to Byron Road via a new railroad over crossing immediately north of the Byron Road under crossing of the I-205 has been added to the TMP at a late stage in the project study. This connection is also dependant on the approval of a relocated railway crossing.

Lammers-Byron Connector

The construction of the link will alleviate traffic conditions at all the intersections for the north and the west of the project site, since trips will be diverted from those streets to the Byron connector. The intersections of Byron Road/Lammers Road, Byron Road /Grant Line Road and Lammers Road /Eleventh Street are expected to increase in delay. This roadway connection is the City's preferred alternative.

To determine required improvements related to this planned extension, three intersections were selected based on the potential worsening of operating conditions that would occur. These intersections were analyzed only for weekday AM and PM peak period. The analysis was performed for the Horizon Year TMP conditions, consistent with SJCOG regional transportation model. Traffic forecast for this scenario is prepared by Fehr and Peers using the TMP Travel Demand Model (TDM), which was updated in 2010 to be consistent with the current San Joaquin County Council of Governments (SJCOG) regional TDM.

The analysis results indicate that the additional improvements are required for the intersection to operate at acceptable LOS. These improvements include:

Intersection # 22: Lammers Road / Byron Road (S):
Northbound: Add a second northbound left turn lane.

Intersection # 23: Lammers Road / Grant Line Road

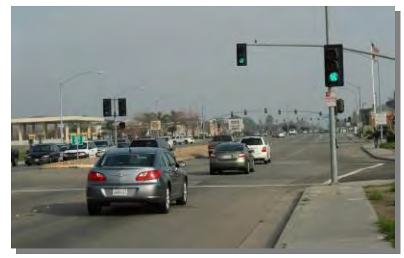
Westbound: Add a second westbound left turn lane.
Eastbound: Provide a eastbound right turn lane
Northbound: Add a second northbound left turn lane. Add a separate northbound right turn lane.

Intersection # 69: Lammers Road / Byron Road (N):

The intersection is constrained due to railroad crossing, and thus, the City should allow a lower LOS threshold.

Table 4.3: Horizon Year Intersection Level of Service

Number	Intersection	Control Type	Delay		LOS	
			AM	PM	AM	PM
1	I-205 WB Ramps/Lammers Extension	Signal	15	18	B	B
2	I-205 EB Ramps/Lammers Extension	Signal	3	5	A	A
3	I-205 WB Ramps/Naglee Road	Signal	23	28	C	C
4	I-205 EB Ramps/Grant Line Road	Signal	10	14	B	B
5	I-205 WB Ramps/Tracy Boulevard	Signal	25	23	C	C
6	I-205 EB Ramps/Tracy Boulevard	Signal	28	23	C	C
7	I-205 WB Ramps/MacArthur Drive	Signal	15	15	B	B
8	I-205 EB Ramps/MacArthur Drive	Signal	21	19	C	B
9	Naglee Road (I-205 WB Ramps) /Grant Line Road	Signal	7	20	A	B
10	I-205 WB Ramps/Chrisman	Signal	16	8	B	A
11	I-205 EB Ramps/Chrisman	Signal	11	16	B	B
12	I-580 WB Ramps/Mountain House Parkway	RAB	0.58	0.77	*	*
13	I-580 EB Ramps/Patterson Pass Road	RAB	0.55	0.67	*	*
14	I-580 WB Ramps/Lammers Road	Signal	7	14	A	B
15	I-580 EB Ramps/Lammers Road	Signal	9	18	A	B
16	I-580 WB Ramps/Corral Hollow Road	Signal	9	7	A	A
17	I-580 EB Ramps/Corral Hollow Road	Signal	8	14	A	B
18	Naglee Road/Middle Road	SSS	9	9	A	A
19	Larch Road/Tracy Boulevard	Signal	19	23	B	C
20	MacArthur Drive/Arbor Avenue	SSS	11	19	B	C



Number	Intersection	Control Type	Delay		LOS	
			AM	PM	AM	PM
21	Paradise Road / Arbor Avenue	Signal	12	16	B	B
22	Lammers Road/Byron Road	Signal	15	17	B	B
23	Lammers Road/Grant Line Road	Signal	7	10	A	B
24	Byron Extension/Lammers Extension	Signal	12	20	B	B
25	Corral Hollow Road/Grant Line Road	Signal	29	30	C	D
26	Tracy Boulevard/Grant Line Road	Signal	27	47	C	D
27	MacArthur Drive/Grant Line Road	Signal	27	35	C	C
28	Chrisman Avenue/Grant Line Road	Signal	21	32	C	C
29	Lammers Road/Eleventh Street	Signal	32	44	C	D
30	Corral Hollow Road/Eleventh Street	Signal	59	82	E	F
31	Tracy Boulevard/Eleventh Street	Signal	39	108	D	F
32	MacArthur Drive/Eleventh Street (North)	Signal	28	31	C	C
33	Chrisman Avenue/Eleventh Street (South)	Signal	33	30	C	C
34	Mountain House Parkway/ New Schulte Road	SSS	10	13	A	B
35	Pavillion Extension/New Schulte Road	Signal	21	28	C	C
36	Lammers Road/New Schulte Road	Signal	19	54	B	D
37	Corral Hollow Road/New Schulte Road	Signal	38	88	D	F
38	Tracy Boulevard/New Schulte Road	Signal	29	63	C	E
39	MacArthur Drive/ New Schulte Road	Signal	34	34	C	C
40	Lammers Road/Valpico Road	Signal	19	36	B	D
41	Corral Hollow Road//Valpico Road	Signal	25	32	C	C
42	Tracy Boulevard/Valpico Road	Signal	19	27	B	C
43	MacArthur Drive/Valpico Road	Signal	33	51	B	D
44	Corral Hollow Road/Linne Road	Signal	18	50	B	D
45	Tracy Boulevard/Linne Road	Signal	27	38	C	D

Number	Intersection	Control Type	Delay AM	Delay PM	LOS AM	LOS PM
46	Naglee Road/Park and Ride	Signal	5	21	A	C
48	Lammers Extension/Van Sosten	Signal	23	31	C	C
51	Hansen Road/Old Schulte Road	Signal	14	22	B	C
52	Mountain House Parkway/Old Schulte Road	Signal	14	14	B	B
53	Mountain House Parkway/Capital Parks Drive	Signal	5	10	A	A
54	Hansen Road/Capital Parks Drive	Signal	24	45	C	D
55	Pavillion Extension/Capital Parks Drive	Signal	17	42	B	D
56	Pavillion Extension/Grant Line Extension	Signal	12	29	B	C
57	Lammers Road/Crossroads Drive	Signal	5	6	A	A
58	Lammers Road/Old Schulte Road	Signal	13	15	B	B
59	Lammers Road/Ellis Drive	Signal	20	44	B	D
60	Lammers Road/Linne Road	Signal	13	24	B	C
61	Lammers Road/South Aqueduct Road	Signal	19	34	B	C
62	Crossroads Drive/Eleventh Street	Signal	16	44	B	D
63	Crossroads Drive/New Schulte Road	Signal	9	16	A	B
64	Paradise Road/Grant Line Road	Signal	17	20	B	B
65	Lammers Road/Capital Parks Drive	Signal	23	55	C	D
66	Lammers Road/Commerce Way	Signal	28	60	C	E
67	Pavillion Parkway/Lammers Extension	Signal	24	45	C	D
68	Pavillion Parkway/Lammers Road	Signal	22	42	C	D
CONDITIONS WITH PLANNED LAMMERS -BYRON CONNECTOR						
	Lammers Road / Byron Road (S) (City)	Signal	23	48	C	D
	Lammers Road / Grant Line Road (County)	Signal	22	33	C	C
	Lammers Road / Byron Road (N) (City)	Signal	21	51	C	D

Note: (*) Intersection analyzed as roundabout; operates acceptably since V/C ratio less than 0.86.
Note: 47, 49, and 50 are not used in this table.

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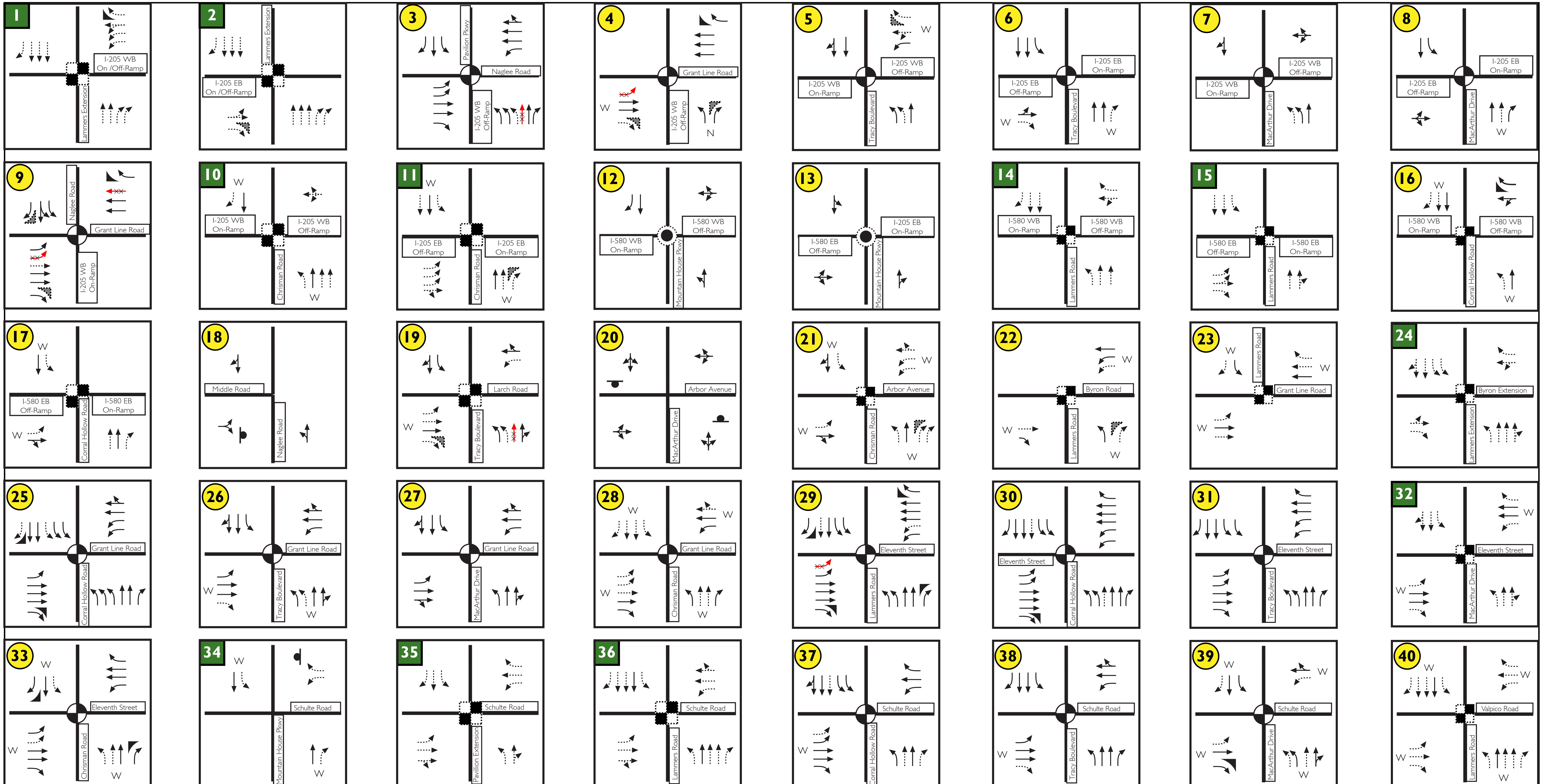

Legend:

- 00 Future Intersection
- 00 Existing Intersection
- Existing Signal Control
- Future Signal Control
- Stop Sign Control
- Existing Lanes
- Future Lanes
- Remove Lanes
- "Existing Free" Right-Turn
- Future "Free" Right-Turn
- Future Roundabout Control
- "W" Widen Approach

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Figure 4.4a: Horizon Year Intersection Lane Configuration

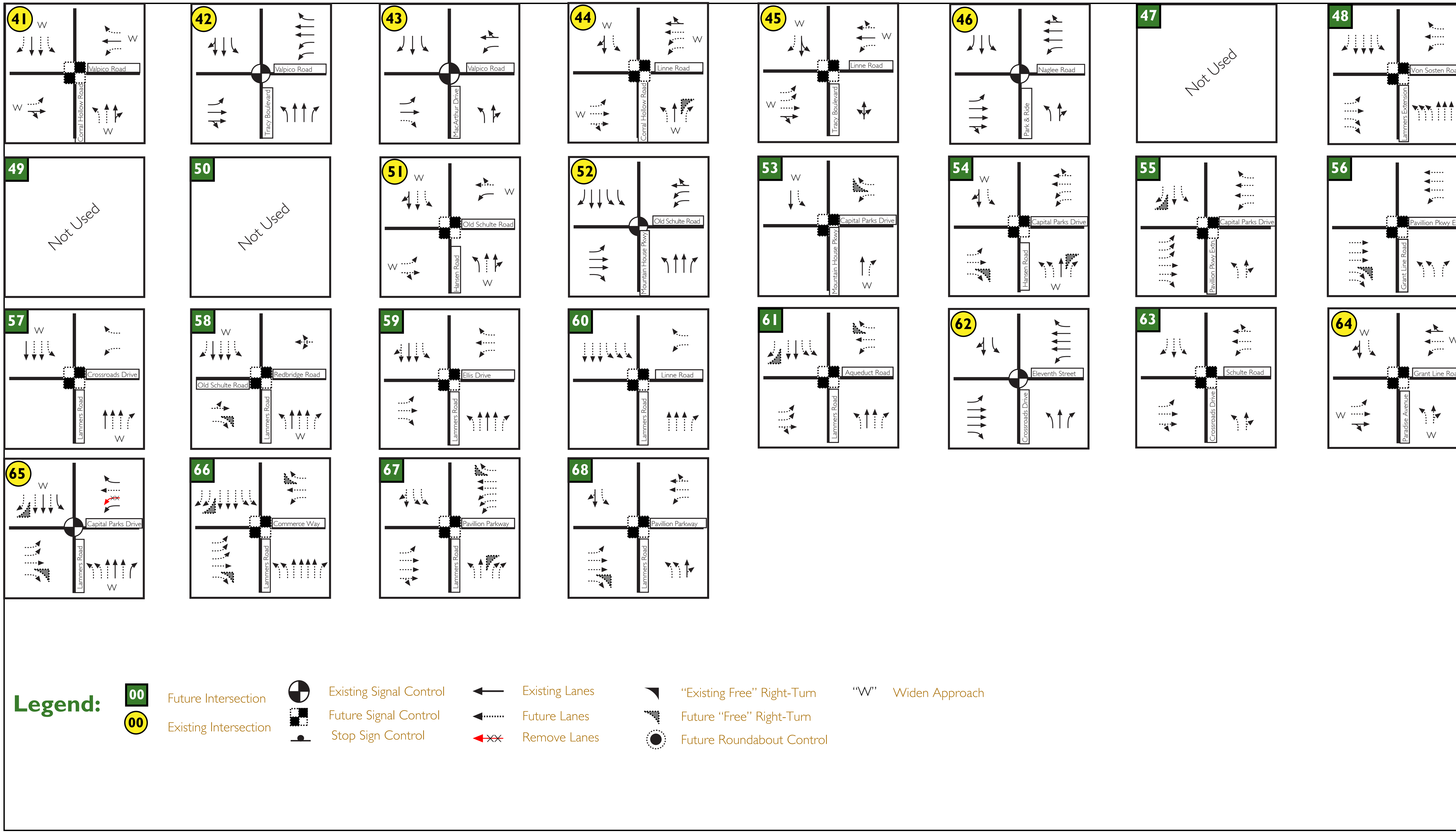

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Figure 4.4b: Horizon Year Intersection Lane Configuration

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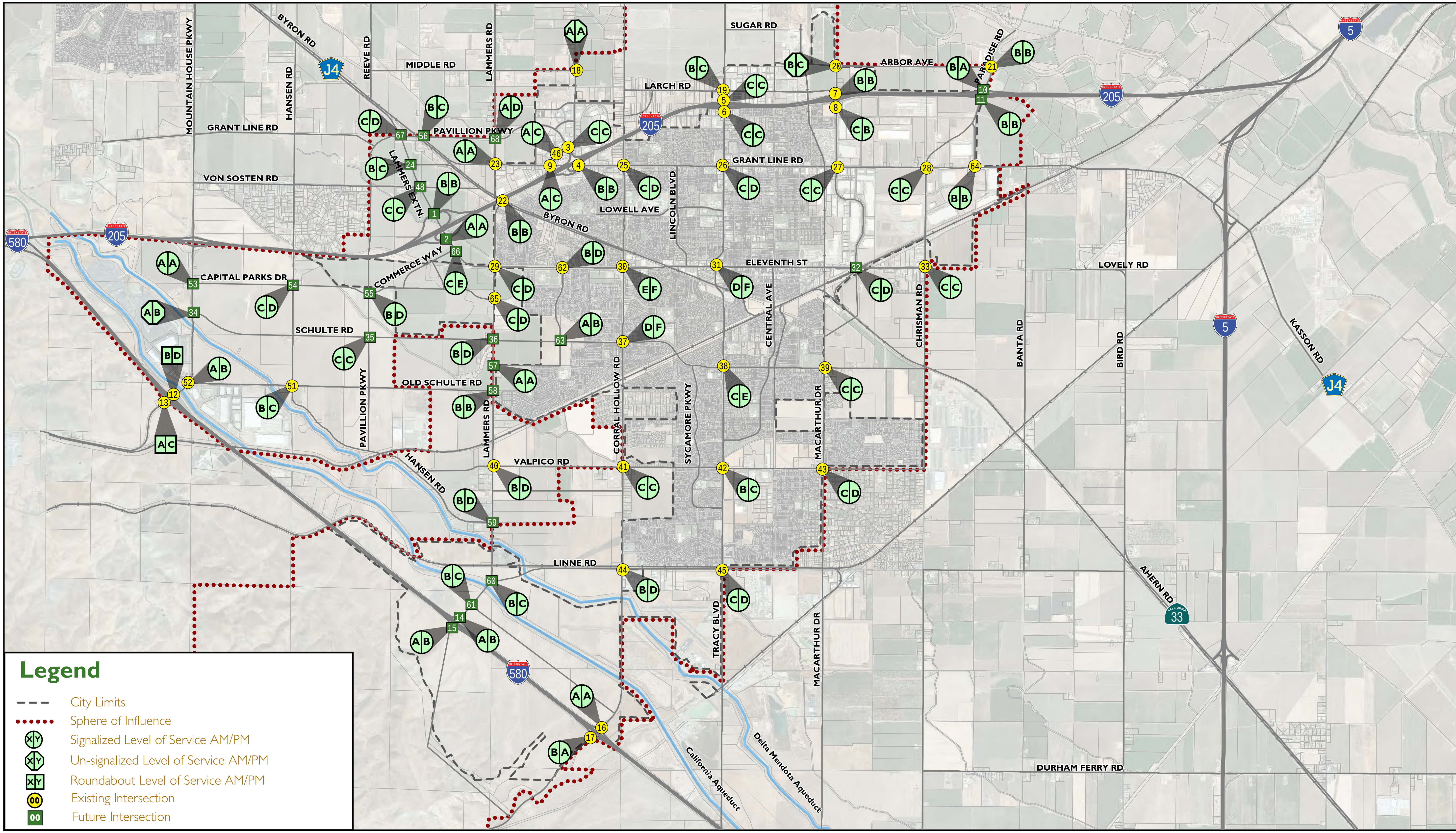

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North

0 0.5 1 2 Miles (Approximate)

Figure 4.5: Horizon Year AM (PM) Level of Service

City of Tracy Transportation Master Plan

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4.5 BICYCLE AND PEDESTRIAN CIRCULATION

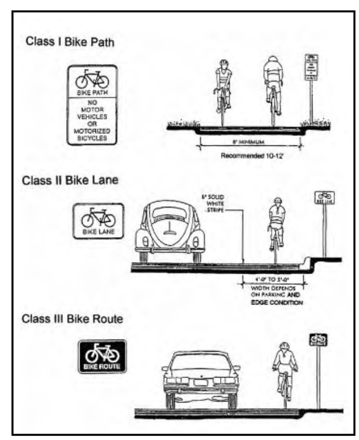
4.5.1 INTRODUCTION

Bicycle travel is anticipated to increase significantly in the future. Recreational cycling and more avid cyclist activities are growing. Funding sources for providing and improving bicycle facilities are available from State and Federal resources. The provision of bicycle and pedestrian facilities that connect people and places is therefore the primary goal of this section in the TMP.

The existing bicycle infrastructure is described in **Chapter 2**, Existing Conditions. The City of Tracy Bicycle and Pedestrian Plan was integrated with the TMP to develop a comprehensive Bicycle and Pedestrian system that ensures a multimodal infrastructure development network. Graphics are provided to illustrate existing and future bicycle trails and sidewalks. Additionally, discussion is provided relative to current innovations for bicycle facilities such as bicycle detection, colored bike lanes, bicycle racks and bicycle lockers and other design elements to enhance the bicycle environment and raise prominence of bicyclists within the transportation system. It should be noted that bicycle facilities will be provided on every proposed parkway (expressway), arterial and collector road network segment in the TMP. It will also be expected that every new commercial and office development provides bicycle facilities on-site per new zoning standards.

4.5.2 FEDERAL HIGHWAY ADMINISTRATION FOUR E'S

The Federal Highway Administration has identified four design components to make bicycling and walking more viable and attractive. The "4-E" program emerged since the 1960's when communities' emphasis in bicycle use needed expanded perspective beyond only the provision of bicycle facilities. The 4-E's are defined below:



- Engineering: Design bicycle facilities to the "best available practices" and beyond.
- Education: Tailor education programs to adult and student bicyclists and to motorists to inform on safe cycling and driving.
- Enforcement: Establish routine enforcement measures to enforce rules design for the safety of the rider.
- Encouragement: Offer encouragement activities and events that are fun, safe, and easy to entice would-be cyclists and reward children to ride effectively and safely.

4.5.3 BICYCLE FACILITIES AND USERS

As identified in **Chapter 2**, bike facilities are defined into three categories:

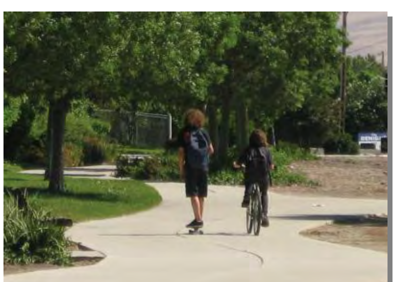
- Class I Bikeway
- Class II Bikeway
- Class III Bikeway

To obtain grant funding from State and Federal resources, bicycle facilities are required to adhere to design standards. The Caltrans standards applicable to bicycle facilities include the following:

- Caltrans *Highway Design Manual*, Chapter 1000 Bikeway Planning and Design (September 2006); and
- *California Manual on Uniform Traffic Control Devices, Part 9 Traffic Controls for Bicycle Facilities* (2010).

Bicycle facilities should encompass a system of interconnected routes, paths and on-street bicycle lanes that provide for safe and efficient bicycle travel. As discussed in *Selecting Roadway Design Treatments to Accommodate Bicyclists* (FHWA, 1994), there exist three distinct types of cyclists, each with different needs:

- Advanced or experienced bicyclists who require facilities for directness and speed and are comfortable riding in traffic and shared lanes.
- Basic or casual bicyclists who require comfortable and direct routes on lower-speed and lower-volume roadways and prefer separated and delineated bicycle facilities.
- Children who require adult supervision and typically only travel on separated paths or very low-volume and low-speed residential streets.



4.5.4 DESIGNING FUTURE ROADWAY RELATED INFRASTRUCTURE TO COMPLEMENT BICYCLE INFRASTRUCTURE

The infrastructure to support bicycle use within the City of Tracy is composed of roadways, intersections, grade separations over/under railroad crossings, freeway crossings, river crossings, and dedicated bicycle trails. Overcoming barriers such as freeways, rivers, channels, railroads and other obstacles is critical to provide continuous facilities to support bicycle usage. Thus every structure that will be constructed in Tracy in the future will include pedestrian and bicycle facilities in order to improve connectivity for these modes of travel. If the approaching roadway segments do not include pedestrian and bicycle facilities, these should still be provided on the structure, to provide for safe and efficient crossings where no other crossing options exist.

Figure 4.6 shows the City of Tracy Bicycle and Pedestrian Plan, which includes future bikeways within the City of Tracy/Sphere of Influence, identifying Class I, Class II, and Class III facilities. This Plan is being expanded upon in the TMP to further provide overall connectivity and the selection of appropriate streets for the provision of bicycle lanes. Potential bicycle routes were evaluated based on the following criteria.

- Street Classification – higher functional classification route was given higher preference.
- Destinations – special consideration was given to routes that provide a direct connection to major destinations, for e.g. park and ride lots, schools and shopping centers.
- Transit – consideration was given to transit routes to enhance transit use by bicyclists.

The further development of bicycle lanes and facilities in specific future development areas will complement the bicycle system included in the TMP and the City's *Bicycle and Pedestrian Plan.* Inclusion of bicycle and pedestrian facilities will enhance the multimodal nature of development within the City. The new roadway network in the TMP indicates primarily major roadway facilities. These facilities include Class I and II facilities. However, roadway cross sections for all roadways, including collectors and residential streets, do however indicate the expansion of bicycle facilities into Specific Plan areas as Class II and III facilities.

Implementation of bicycle lanes can address many community objectives, including accessibility, connectivity between destinations, transit access, mobility and increased system capacity. The following observations relative to **Figure 4.6** are provided:

- Crossings of I-205 are limited to Lammers Road Extension (future), Byron Road (future), Grant Line Road (future), Corral Hollow Road (future), Central Avenue, and Chrisman Road (future).
- Crossings of I-580 include two future crossings at Lammers Road and Corral Hollow Road.
- Class I and Class II facilities exist and are planned throughout the City.
- Most Class III facilities are east of Corral Hollow Road and already exist.
- All Parkways include Class I bicycle facilities
- All Arterials include Class I or II bicycle facilities
- All Collectors include Class II bicycle facilities
- All Residential streets include bicycle facilities

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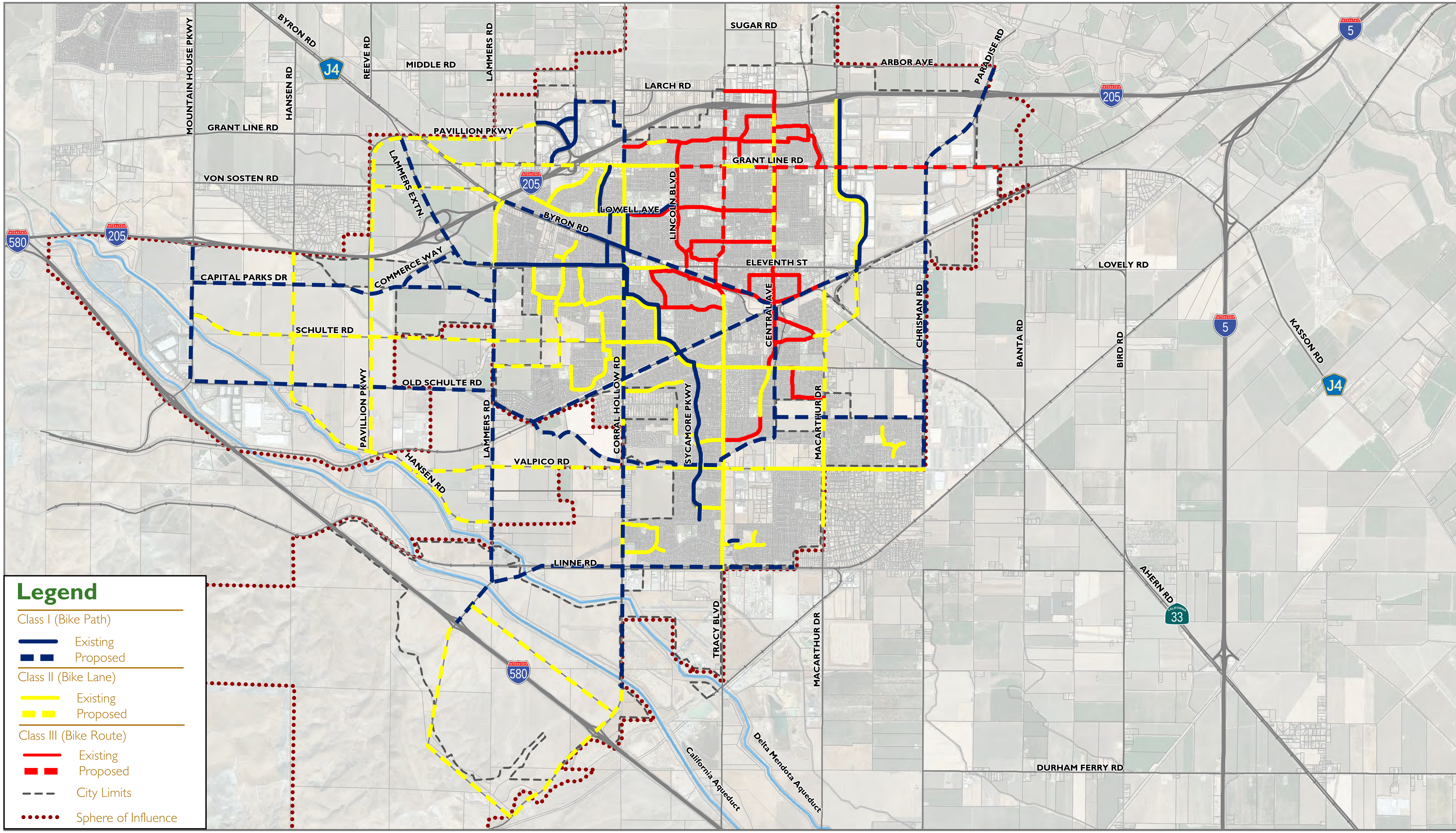

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North

0 0.5 1 2 Miles (Approximate)

Figure 4.6: Existing & Future Bike Routes

City of Tracy Transportation Master Plan

4.5.4.1 BICYCLE TRANSPORTATION PLAN

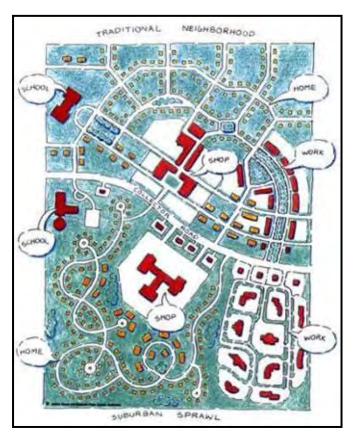
Cities often attempt to increase bicycle usage and formalize plans to improve cycling citywide through preparation of a Bicycle Transportation Plan (BTP). Cities are not required to prepare a BTP; however, if one is prepared, the *State of California Streets and Highways Code Article 3*, Section 891.2 requires inclusion of the following items:

- Current and forecast bicycle commuters.
- A map and description of key existing and proposed land uses.
- A map and description of existing and proposed bikeways.
- A map and description of existing and proposed end-of-trip bicycle parking facilities.
- A map and description of existing and proposed bicycle transport and parking facilities for connections with and use of other transportation modes.
- A map and description of existing and proposed facilities for changing and storing clothes and equipment.
- A description of bicycle safety and education programs conducted in the area, law enforcement activities related to bicycle operation, and resulting effects on accidents involving bicyclists.
- A description of how the bicycle transportation plan has been coordinated and is consistent with key regional transportation, air quality, or energy plans.
- A description of past and future financial allotments for bicycle facilities and projects to improve safety and convenience for bicycle commuters.

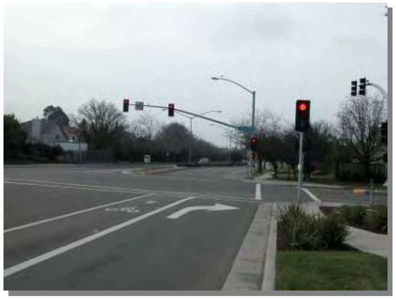
It is recommended as part of the TMP, that the next update of the Bicycle Master Plan include a Bicycle Transportation Plan.

4.5.4.2 BIKEWAYS CONNECTIONS TO LAND USE & TRANSIT

Provision of strong bikeways linkages and connections within land use development projects not only increases the bicycle network, but leads to many secondary benefits. As identified in the Tracy BMP, a maximized multi-modal system with bicycle facilities integrated with transit facilities encourage higher transit and bicycle use. Connections to key nodes of activity should be prioritized, such as bikeways links to schools, parks, and community centers that cater to non-driving users. By coordinating community design to enhance access to bikeways, the following benefits are achieved:



- Improved quality of life for residents.
- Reduction in automobile dependency and automobile trips.



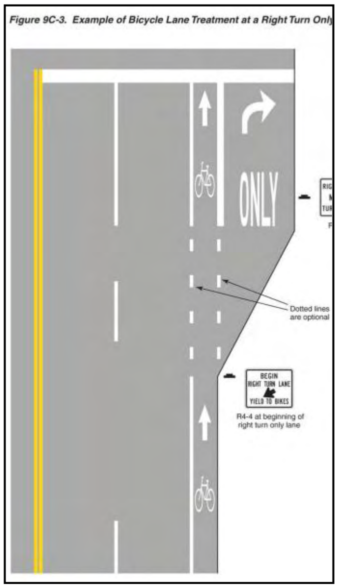
- Reduction of traffic congestion.
- Improved air quality.
- Increased connections to transit.
- Increase in safe travel by multiple user groups.

Integration of bicycle facilities within new land use development areas is not limited to right-of-way dedication or construction of facilities. Bicycle supportive programs can be incorporated into development projects, such as bike to work day and Travel Demand Management (TDM) programs.

4.5.4.3 BICYCLE LANE TREATMENT AT INTERSECTIONS

Uniform design is encouraged for bicycle lanes at intersections to provide consistency in expectations for both motorists and bicyclists. Design aspects related to bicycle lanes include facility design, signs and pavement markings.

Figure 9C-3. Example of Bicycle Lane Treatment at a Right Turn Only



Bicycle lane design treatments at conventional stop-controlled and signalized intersections is generally standardized, and is governed by the Caltrans *Highway Design Manual* Chapter 1000 and *MUTCD* Part 9.

Treatment at roundabouts includes careful balancing of motorist and bicyclists travel. Provision of dedicated bike lanes through roundabouts is discouraged as identified in *Roundabouts: An Informational Guide* (FHWA, 2000). At single-lane roundabouts, bicyclists have the option of either mixing with traffic or using the roundabout like a pedestrian, thus exiting the roadway via a ramp prior to entering the roundabout, utilizing the pedestrian crosswalk and then entering the bike lane on the downstream side of the roundabout via an onramp. Providing bicyclists two choices helps accommodate both experienced and less-experienced users within roundabouts. At two-lane roundabouts, a bicycle path separate and distinct from the circulatory roadway is preferable, such as a shared bicycle-pedestrian path of sufficient width and appropriately marked to accommodate both types of users. Experienced bicyclists may prefer provision of an alternative route along another street or path that avoids the roundabout instead of crossing the multi-lane roundabout as a pedestrian. Provision of safe routes through roundabouts for bicyclists should be incorporated into roundabout planning and design regardless of provision of alternate routes.

4.5.4.4 BICYCLE PATH PAVEMENT MATERIAL

Determination of Class I Path construction material includes multiple criteria, such as upfront and maintenance costs, heat retention, and type of user anticipated. Bicycle trails are typically constructed with new or recycled Asphalt Cement concrete (ACC); however, Portland Cement Concrete (PCC) may be utilized to reduce heat retention. PCC may cost more initially, but has lower maintenance costs, while Decomposed Granite (DG) with stabilizer has lower initial costs with high maintenance costs. Preparation of a lifecycle cost analysis and other key metrics can help rank material type.

The Caltrans *Highway Design Manual* (HDM) identifies pavement structure for bikeways consisting of ACC; therefore, state or federal funding of bicycle facilities may require use of asphalt. Design exceptions can be prepared and submitted to Caltrans for review to change standards as identified in the HDM.

4.5.5 SMART GROWTH DESIGN ELEMENTS

The following Smart Growth design elements are relevant to bicycle master planning.

- Width of on-street bike lanes is recommended at 5 feet with a desired width of 6 feet. However, wider bike lanes also encourage vehicular speeding when cyclists are not present. The TMP recommends 5 feet bicycle lanes where the lane is adjacent to a curb and 4 feet where the travel lane is adjacent to on-street parking. Off-street bicycle paths can be 8 feet for bicycle only facilities and 10 feet for shared (multi-use) facilities accommodating both cyclists and pedestrians.
- Driveway access management varies by roadway type with frequent driveways on lower speed roadways and residential streets, and infrequent driveways on motorist thoroughfares.
- Limit bicycle use on sidewalks to avoid conflicts with streetscape and pedestrians.
- Provide bicycle detection traffic control devices consistent with the California *MUTCD* for Class II facilities.
- Provide shared roadway bicycle marking consistent with the California *MUTCD* for Class III facilities.
- Incorporating bicycle facilities for new and retrofitted roads to meet complete streets design principles which ensure adequate right-of-way is provided to enable safe access for all users (motorists, pedestrians, bicyclists, transit vehicles and users).

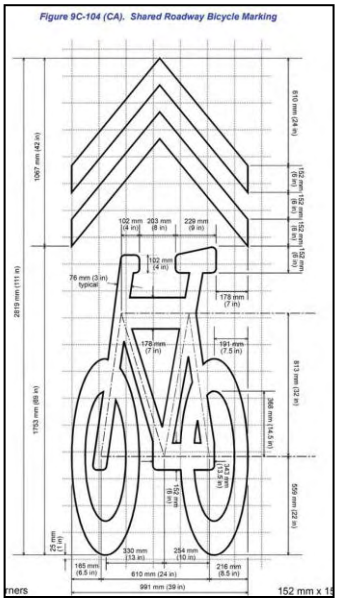
4.5.5.1 INNOVATIVE DESIGN ELEMENTS

The following innovative bicycle facility design elements are being tested nationwide to enhance bicycle operations, support increased bicycling, and accommodate increased user groups.

- While provision of bike lockers and storage is identified throughout the BMP, private sector vendors have worked with many jurisdictions to provide enhanced bike parking. Bike parking at centralized facilities typically serve to elevate the storage of bicycles through membership, providing security, showers, changing facilities, valet parking, retail sales, and/or maintenance services. Provision of bike station facilities are expected to expand over time to accommodate many other modes such as car sharing, electric vehicle rentals, segway rentals, neighborhood electric vehicle rentals, and other non-polluting modes of transport.

- Incorporation of Bike Boxes at signalized intersections with green roadway striping is used to move cyclists in front of automobiles where high volume bicycle traffic occurs. The Bike Box is intended to cluster bicyclists at the stop line in front of automobiles while waiting for a red traffic signal to change to green. When the traffic signal changes to a green light, the bicyclists proceed forward along the edge of the roadway using a Class II on-street bike lane. Clustering the bicyclists helps raise prominence of bicyclists and provides more opportunity for motorists to turn right at the signal without conflicting with a long queue of bicyclists proceeding straight.

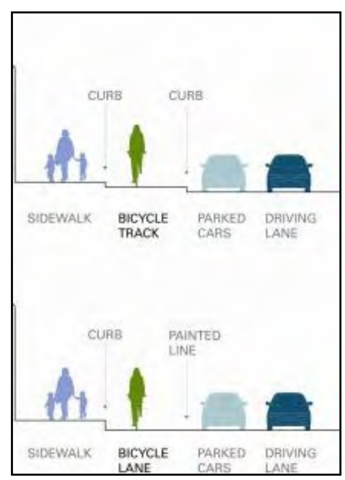
Figure 9C-104 (CA). Shared Roadway Bicycle Marking



- As identified in the Caltrans *HDM*, shared roadway marking stencils are an accepted treatment for Class III facilities. The Tracy BMP discusses the shared roadway concept and identifies the following benefits; increased motorist awareness of bicyclists in the lane, illustrate the direction of travel for bicyclists, discourage cycling on sidewalks, and improved positioning by bicyclists away from collisions with opening of doors from parked cars (termed "dooring"). The shared lane marking is commonly referred to as a "Sharrow" and is typically centered 11 feet from the curb where on-street parking is provided. The City of Long Beach utilizes Sharrows and supplements the stenciling with Modified W11-1 and Modified W16-1 signs to define the meaning of the stencils on the roadway to motorists and bicyclists.
- Often coordinated with sharrows are coloring of Class II bikeways on roadways to help raise motorists awareness of bicyclists. Bike lane coloring is typically green, however, the increased amount of paint required suggests application at specific locations only.
- While the Tracy BMP discusses bike corrals to park bicycles for temporary events, some cities have instituted conversion of on-street parallel parking

spaces to dedicated permanent bike corrals. Where one automobile could park before, within the same space a bike corral can accommodate parking for 8-12 bicycles. Bike racks are installed within the roadway and protected from automobile traffic using bollards and removable curbs. By placing the bike parking within a protected roadway zone, the bicycles are removed from the sidewalk, maintaining space for pedestrian traffic and commercial space. Within some cities, commercial businesses have begun requesting conversion of on-street parking in front of their business to bike corrals to gain higher turnover and capture more retail foot traffic by cyclists. Since bicycles have lower sightlines, inclusion of bike corrals in no-parking zones may be possible without compromising parking for automobiles.

- Similar to bike corrals is the "bike oasis" concept which provides for bike parking on curb extensions or dedicated spaces supplemented with shelter providing cover and information panels and maps.
- Bicycle boulevards as discussed in the Tracy BMP, can be used to promote bicycle circulation where traffic volumes are low and physical constraints limit separate facilities. Application of bicycle boulevards can provide a through route for bicyclists where automobile through traffic may not be desired. In some cases, application of bicycle boulevards has been coordinated with bicycle only traffic signal crossings of high vehicular traffic roadways. Bicycle boulevards can more easily accommodate turns and diversions to maintain ease in riding despite a potentially more circuitous route. Incorporation of small roadway markings to direct cyclists along the bicycle boulevard is being tested, but is not yet formalized. Coordination of bicycle boulevards with stormwater runoff management practices may provide increased funding opportunities.



- Utilized in Copenhagen, Cologne, and a demonstration project in Portland, Oregon is testing the CycleTrack concept to switch the physical location of on-street parking and a Class II bike lane. In the Portland example, on-street parking is moved away from the curb by 8-10 feet and the Class II bike lane is moved between the parking area and the curb edge. By moving the bike lane closer to the curb, bicyclists are further separated from moving traffic and can more easily access the sidewalk for amenities, destinations, and parking areas. The horizontal separation between motorists and bicyclists can be facilitated through on-street parking, landscaping, or other means. When the separation is occupied by on-street parking, a pedestrian buffer zone is required to allow for entering and exiting parked vehicles. Accommodating bus stops and activity requires careful planning when incorporating a CycleTrack design.

4.5.6 SIDEWALKS

Figure 4.7 shows the existing and future sidewalks within the City of Tracy/Sphere of Influence, identifying sidewalks on both sides of major streets. The following observations relative to **Figure 4.7** are provided:

- Crossings of I-205 are limited to Pavillion Parkway (future), Lammers Road Extension (future), Byron Road (future), Grant Line Road, and Chrisman Road (future).
- Crossings of I-580 include two future crossings at Lammers Road and Corral Hollow Road.

- All Parkways include pedestrian facilities
- All Arterials include pedestrian facilities
- All Collectors include pedestrian facilities
- All Residential streets include pedestrian facilities

All pedestrian facilities must meet the American with Disabilities Act requirements, including minimum grades, ramps and detectable surfaces at intersections and where walkways lead pedestrians onto traveled ways.

4.6 BRIDGE AND CULVERT FACILITIES

4.6.1 INTRODUCTION

This section documents infrastructure related to Bridges and Culverts facility planning for the Tracy Transportation Master Plan (TMP). The existing Bridges and Culverts crossings are indicted in Chapter 2, Existing Conditions. The City of Tracy Bridges and Culverts Facilities was integrated into the TMP to develop a comprehensive circulation system that identifies crossings to minimize traffic conflicts and preserve open space and preservation areas. Graphics are provided to illustrate existing and future Bridge and Culvert facilities. Planning for Bridge and Culvert facilities is based on the planned circulation system at buildout conditions, long-range traffic forecasts, the need for separation of various transportation modes (cars/railroads), location of canals, rivers, and creeks, and open space/preservation areas. Discussion is provided regarding existing and future Bridge and Culvert crossings, facility design, and resource documents.

4.6.2 PLANNING BRIDGE AND CULVER FACILITIES

For the purposes of this report, an over or underpass is described as a freeway-related crossing of another roadway or railroad, bridges are defined as crossings over water bodies, and culverts are enclosed conduits for water to pass under roadways. Consideration was given to the current and forecast vehicular traffic crossing, the need for freeway crossings to serve local traffic, and accounting for canals, sloughs, and aqueducts. The TMP establishes a platform from which design and continued discussions with the Department of Fish and Game (DFG) can occur.

4.6.3 FUTURE BRIDGE AND CULVERT FACILITIES

Figure 4.8 shows the City of Tracy Bridge and Culvert Facility Plan, which includes the existing and future Bridges and Culverts facilities. **Table 4.4** summarizes the over/underpass facilities including existing locations where widening is required.

As shown in **Table 4.4**, fifteen over/underpasses are planned at buildout of the City transportation plan, with widening expected at three locations.

Table 4.5 summarizes the bridge facilities including existing locations where widening is required.

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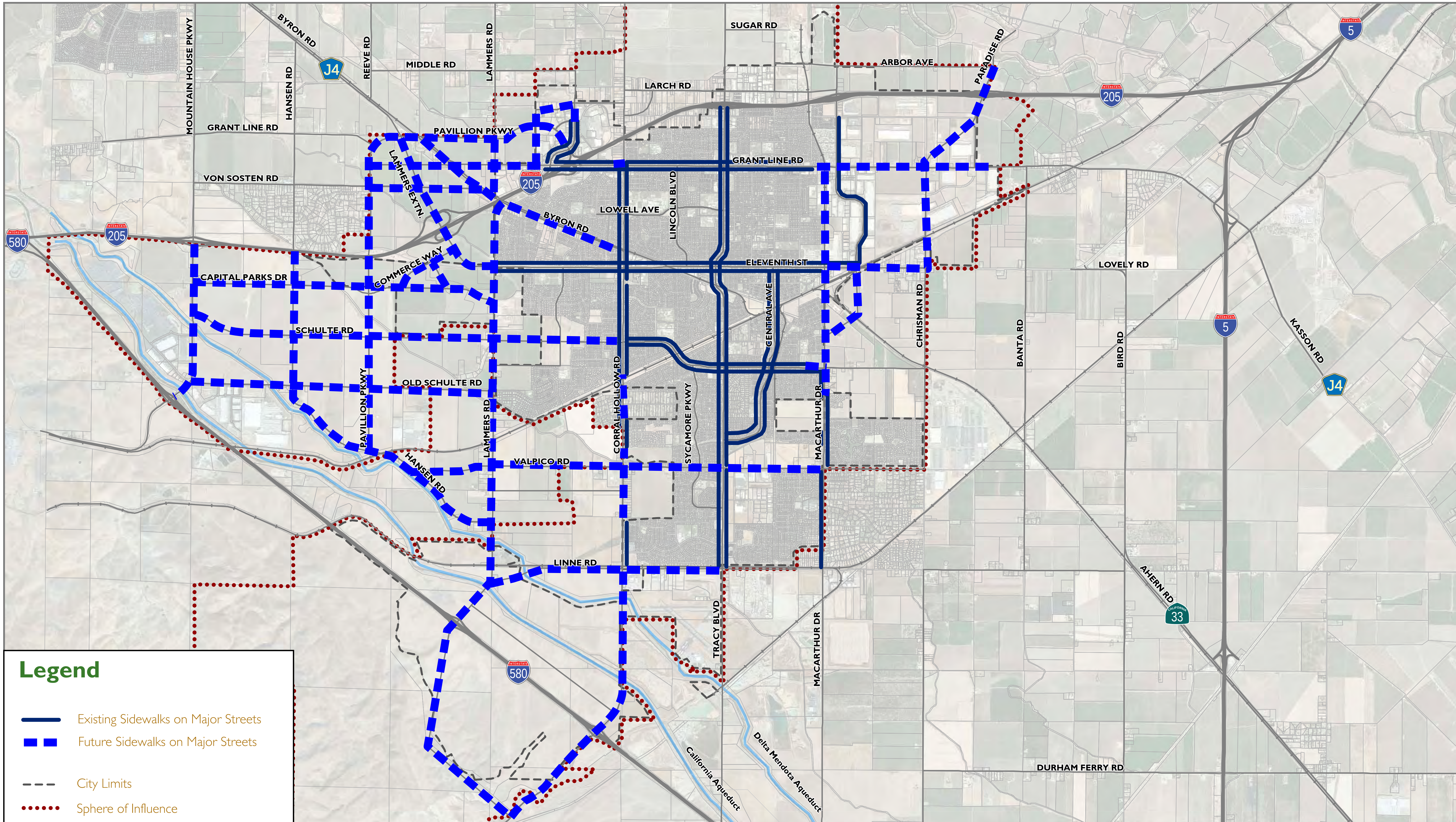

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North

0 0.5 1 2 Miles (Approximate)

Figure 4.7: Existing and Future Sidewalks

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Table 4.4: Over/Underpass Facilities Summary

#	Location	Status	Widening /Replacement Required?
1	I-205/Mountain House Parkway	Existing	No
2	I-205/Hansen Road	Existing	No
3	I-205/Pavillion Parkway West	Future	N/A
4	I-205/Eleventh Street	Existing	No
5	I-205/Lammers Road Extension	Future	N/A
6	I-205/Lammers Road-Byron Road	Existing	No
7	I-205/Pavillion Parkway East	Existing	No
8	I-205/Corral Hollow Road	Existing	No
9	I-205/Tracy Boulevard	Existing	No
10	I-205/Holly Drive	Existing	No
11	I-205/MacArthur Drive	Existing	No
12	I-205/Paradise Road	Existing	Yes
13	I-580/Mountain House Parkway-Patterson Pass Road	Existing	No
14	I-580/Lammers Road	Existing	Yes
15	I-580/Corral Hollow Road	Existing	Yes
Note: N/A = Not Applicable.			

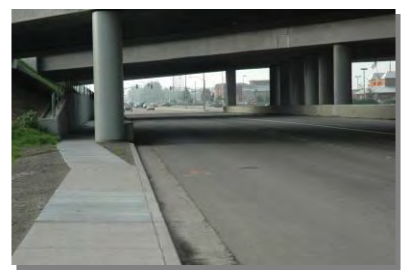
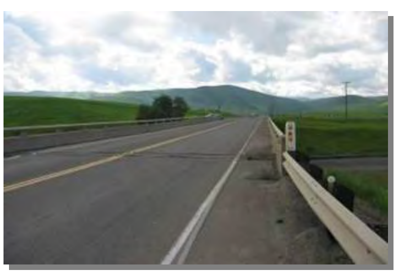
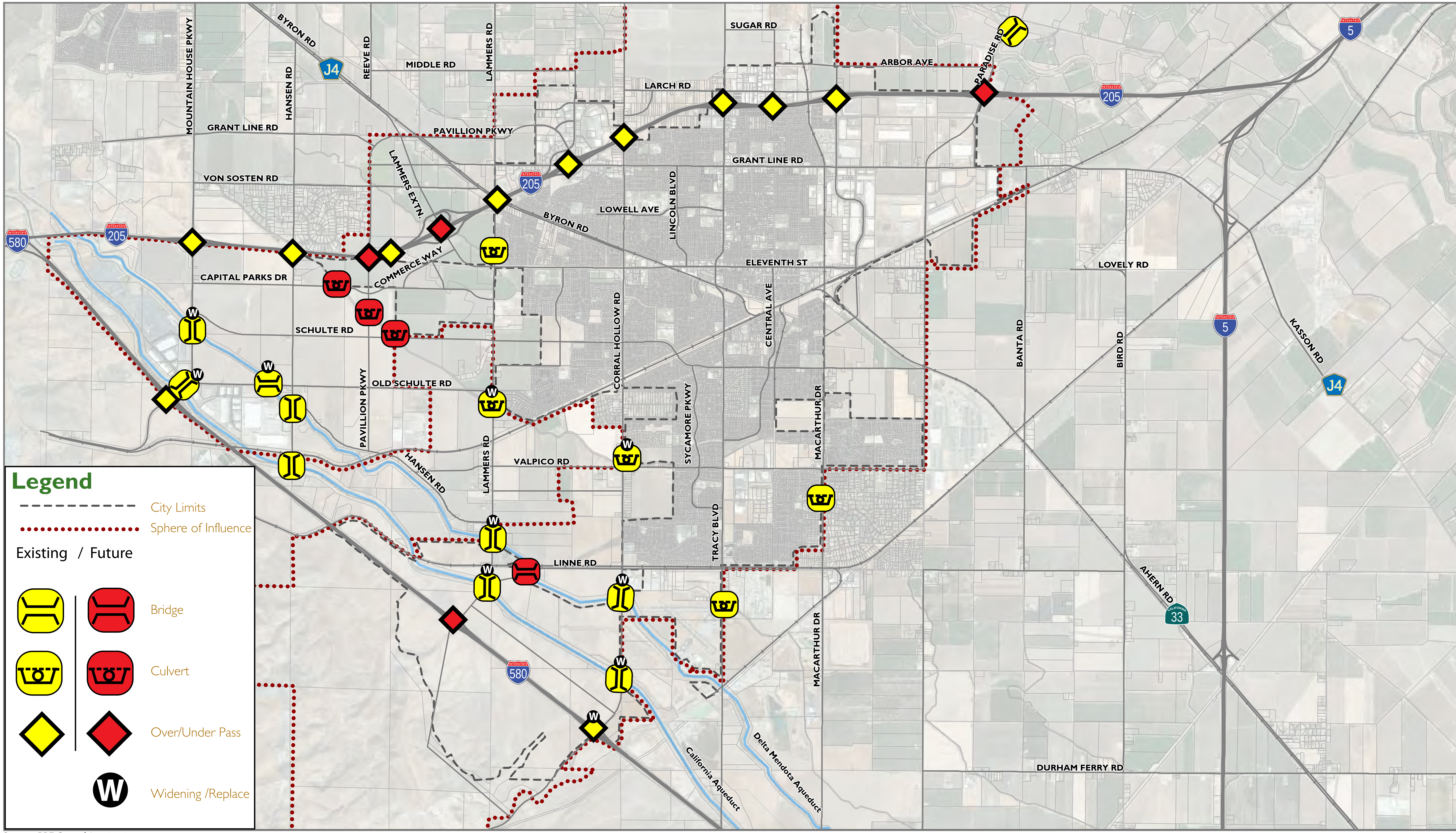


Table 4.5: Bridge Facilities Summary

#	Location	Status	Widening /Replacement Required?
1	Delta Mendota Canal/Mountain House Parkway	Existing	Yes
2	California Aqueduct/Mountain House Parkway	Existing	Yes
3	Delta Mendota Canal/Old Schulte Road	Existing	Yes
4	Delta Mendota Canal/Hansen Road	Existing	No
5	California Aqueduct/Hansen Road	Existing	No
6	Delta Mendota Canal/Lammers Road	Existing	Yes
7	California Aqueduct/Lammers Road	Existing	Yes
8	Delta Mendota Canal/Linne Road	Future	N/A
9	Delta Mendota Canal/Corral Hollow Road	Existing	Yes
10	California Aqueduct/Corral Hollow Road	Existing	Yes
11	Tom Paine Slough/Paradise Road	Existing	No
Note: N/A = Not Applicable.			



As shown in **Table 4.5**, eleven bridge crossings are planned at buildout of the City transportation plan, with widening expected at six existing bridges (crossing Delta Mendota Canal and California Aqueducts).



Source: RBF Consulting 2010

RBF CONSULTING

North

0 0.5 1 2 Miles (Approximate)

Figure 4.8: Bridges and Culverts (Excluding Railroad Crossings)

Table 4.6 summarizes the culvert facilities including existing locations where widening is required. As shown in **Table 4.6**, eight culverts are planned at buildout of the City transportation plan, with widening expected at two existing culverts (crossing Upper Main Canal).

Table 4.6: Culvert Facilities Summary

#	Location	Status	Widening /Replacement Required?
1	Lower Main Canal/Lammers Road	Existing	No
2	Upper Main Canal/Capital Parks Drive	Future	N/A
3	Upper Main Canal/Pavillion Parkway	Future	N/A
4	Upper Main Canal/Schulte Road	Future	N/A
5	Upper Main Canal/Lammers Road	Existing	Yes
6	Upper Main Canal/Corral Hollow Road	Existing	Yes
7	Lateral East Aqueduct/Tracy Boulevard	Existing	No
8	Upper Main Canal/MacArthur Drive	Existing	No
9	Upper Main Canal/Old Schulte Road	Existing	No
Note: N/A = Not Applicable.			

4.6.4 BRIDGE AND CULVERT FACILITIES DESIGN PLANNING

To obtain grant funding from State and Federal resources, Bridges and Culverts facilities are required to adhere to applicable design standards such as required by the relevant Authorities. Bridges, over/underpasses, and culvert crossings should accommodate all users, including traffic from automobiles, buses, pedestrians, and bicyclists. Design standards and guidance for bridges and culverts is provided in the Caltrans *Highway Design Manual*.

4.6.5 SMART GROWTH DESIGN ELEMENTS

The following Smart Growth design elements are relevant to Bridge and Culvert facilities planning:

- Provide safe and efficient crossings for all modes across bridges to enhance connectivity between land uses and amenities.

- Since bridges, culverts, and over/underpasses often are spanning major obstacles within the community, when planning right-of-way, planning and design of facilities, consider opportunities to incorporate trails and bikeways within crossings.

4.7 Roadway Classification and Cross Sections

4.7.1 INTRODUCTION

The roadway system serves to provide consistent information and guidance to road users in a manner that improves vehicular and pedestrian operations and safety, yet maintain quality of life for Tracy road users. The roadway classification includes strategies making existing streets work better, and applying technology to improve traffic flow. The Transportation Master Plan brings overlap with policies and goals regarding a "complete streets" policy, context-sensitive design, mode split targets, vehicle miles traveled (VMT) and per capita reduction goals.

Tracy's street network is the primary transportation system and serves a variety of modes and vehicular types, including automobile, truck, transit, bicycles, and pedestrians. Many new development areas are included in the General Plan. Existing areas are built out and roadways are constrained to their maximum right-of-way requirements thus reducing the ability to implement smart growth and context-sensitive designs.

This section documents the road hierarchy, its functionality, operations and typical cross sections for various types of roadways for the Tracy Transportation Master Plan (TMP).

These standards are designed to accommodate the existing and future needs of the circulation network. Smart Growth principles have been incorporated into to road hierarchy. Graphics are provided to illustrate lane widths, sidewalks, Public Utility Easements, bicycle facilities, medians, landscaping, and right-of-way requirements. A discussion of the various types of roadway classifications and their standard cross sections is provided below.

The design standards and roadway cross sections are guidelines for inclusion in specific plans and tentative map applications. As such, the City may deviate from these guidelines on a case by case basis to accommodate site specific requirements.

4.7.2 ROADWAY CLASSIFICATION

The roadways in the Tracy TMP are defined using a hierarchical classification system. The classification system defines a roadway according to function, capacity, and size. The categories range from parkways (highest capacity) to arterials, collectors, residential streets, and alleys (lowest capacity). Industrial streets are categorized separately. **Figure 4.9a** illustrates the roadway classification for the existing and future roadways in Tracy. **Figure 4.9b** illustrates the recommended CMP network map in Tracy. A representative cross section for each classification type is illustrated below (**Figures 4.10** to **4.14**) and detailed cross sections are contained in **Figures 4.15a** to **4.15f**.

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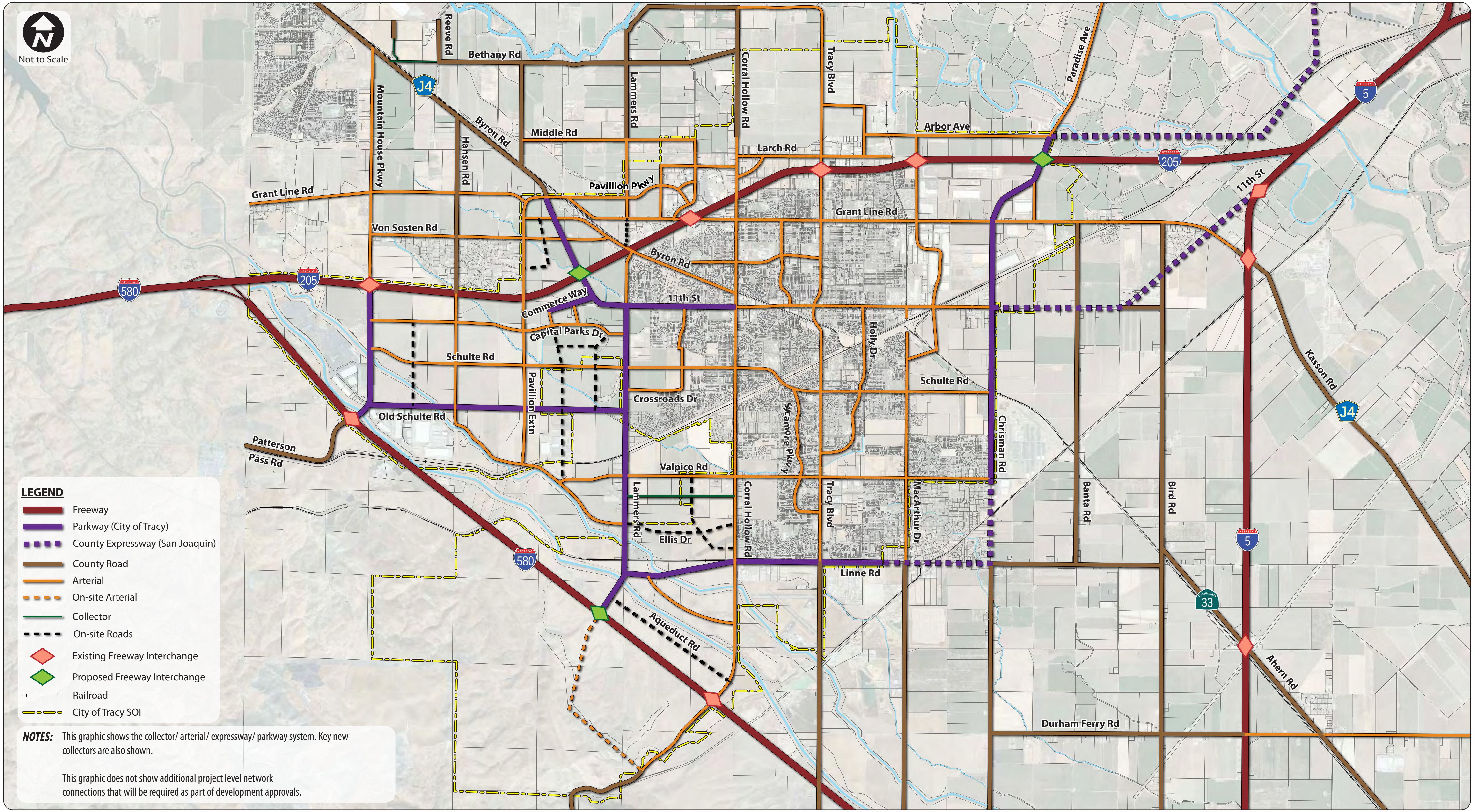

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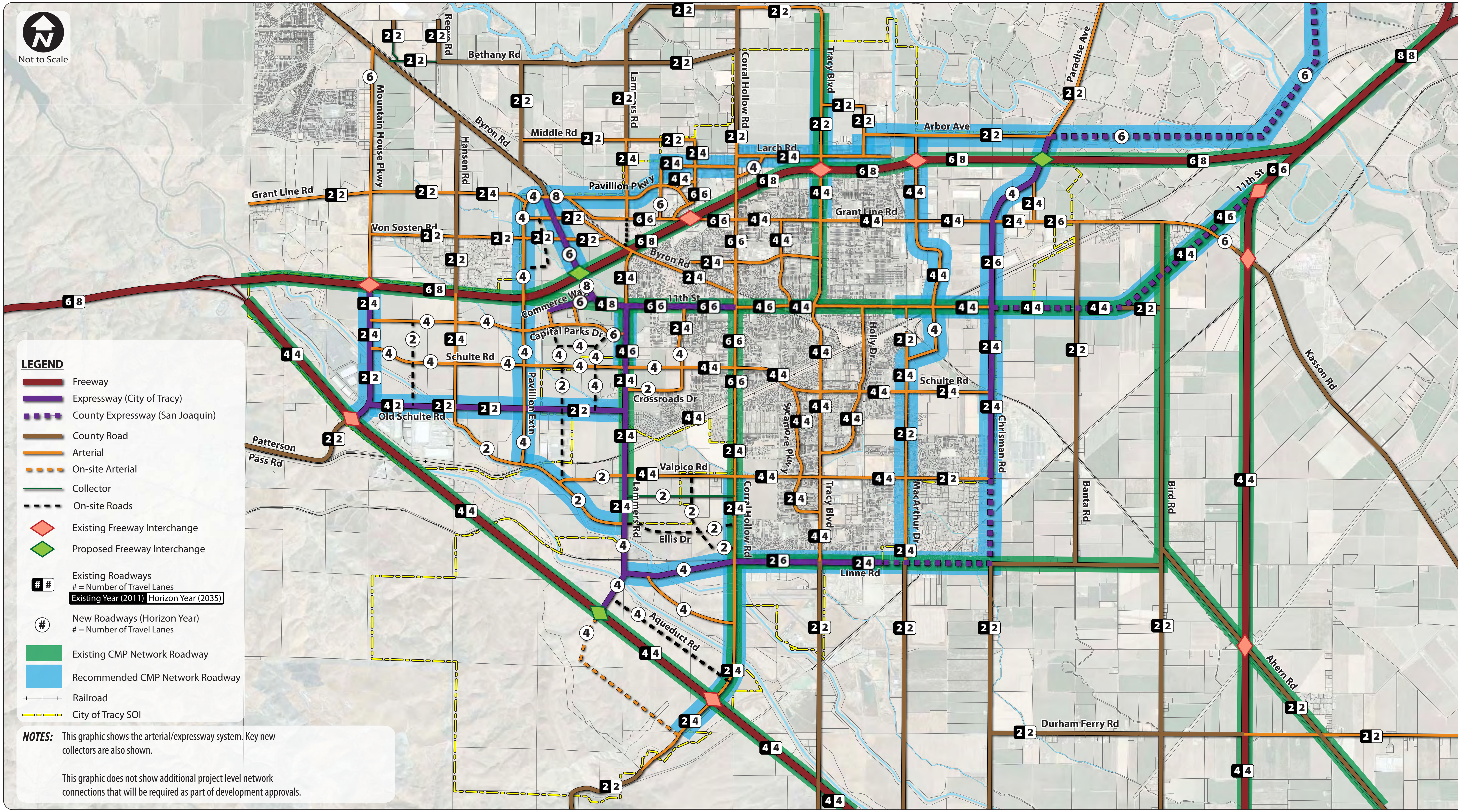
Figure 4.9a: Future Roadway Classification Map



Fehr & Peers
TRANSPORTATION CONSULTANTS

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CONSULTING

Figure 4.9b: Recommended CMP Network Map

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4.7.2.1 PARKWAYS (EXPRESSWAYS)

As discussed in Chapter 2, expressways provide connections to regional roadways such as freeways and are usually designed to accommodate through traffic with limited access to adjacent land uses. For the Tracy TMP, the expressway roadway classification will be relabeled as a parkway. Travel speeds vary between 45 miles per hour and 55 miles per hour. Class 1 bikeways are provided on all parkways.

Figure 4.10: Typical 6-Lane Parkway

4.7.2.2 ARTERIALS (MAJOR AND MINOR)

Arterials are designed to carry traffic between neighborhoods, central business districts, and major destinations. Arterials provide connections from collectors to parkways and freeway interchanges. Access to adjacent land uses on arterials is limited. Arterials can be divided or undivided and include two to six travel lanes. For 6-lane arterials, shoulders are not provided, thus intermittent pullouts (8 feet wide and 75 feet long with appropriate tapers) should be located every 1,000 feet to accommodate vehicle breakdowns and police vehicles. Vehicular speeds are typically lower than parkways as more access points per mile are provided. Arterials generally serve high traffic volumes (up to 50,000 average daily trips for major arterials). Travel speeds vary between 35 miles per hour and 45 miles per hour. Similar to parkways, Class I bikeways are provided on arterials.

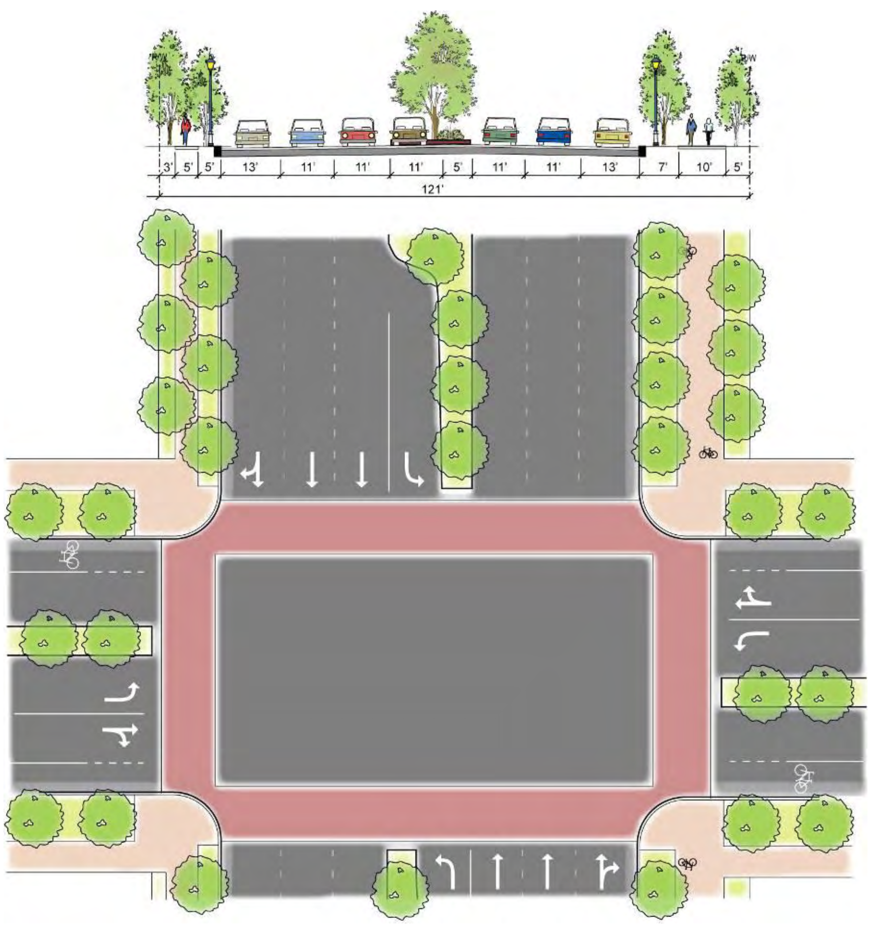

Figure 4.11: Typical 6-Lane Arterial

4.7.2.3 COLLECTORS

Collectors are smaller sized and undivided roadways (two lanes) that link residential roads with arterial roads. Collectors have travel speeds that vary between 25 miles per hour and 35 miles per hour. Class II bike lanes are provided on collectors. High travel speeds are discouraged on collector roads since they provide access to abutting land uses and to neighborhood streets. Collectors shall not include driveways to residential properties.

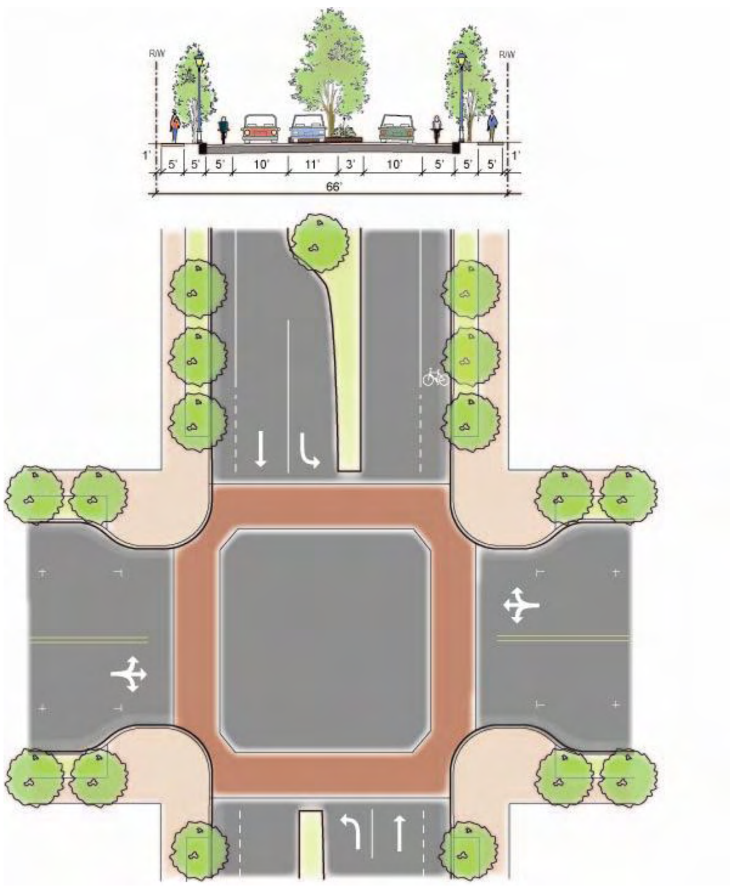

Figure 4.12: Typical 2-Lane Major Collector

4.7.2.4 RESIDENTIAL STREETS AND ALLEYS

These roadways serve residential neighborhoods and emphasize multi-modal (pedestrians, bicyclists, and motorists) use. These roadways may provide one-way or two-way travel and may include parking on one side, both sides, or no parking. Travel speeds on residential streets should be 30 miles per hour or less.

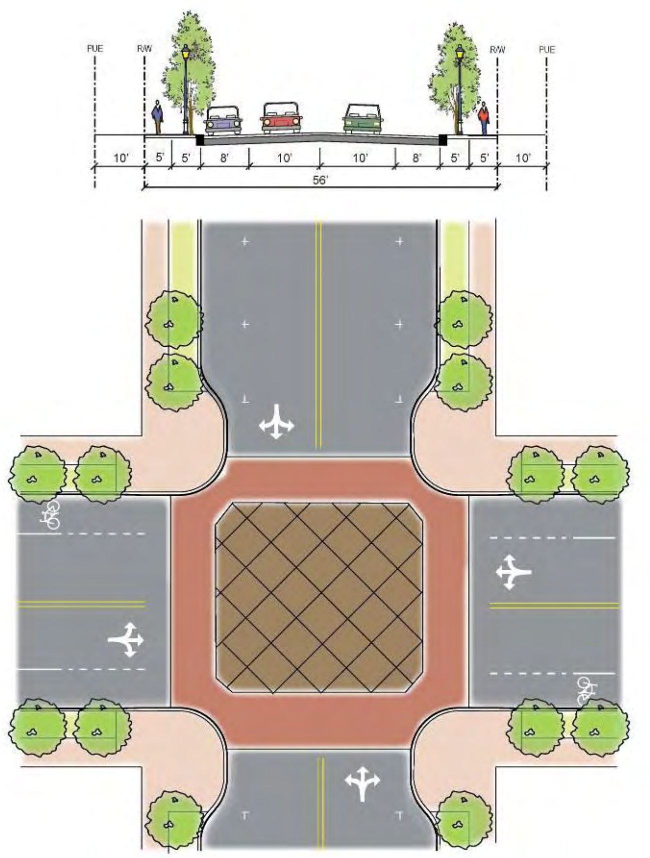

Figure 4.13: Typical 2-Lane Residential Street With Parking on Both Sides

(1,500 to 2,500 Vehicles Per Day)

4.7.2.5 INDUSTRIAL STREETS

These roadways provide access to industrial and commercial uses and therefore require wider travel lanes to accommodate trucks and larger vehicles. Shoulders or two-way left turn lanes are provided. Standard 5-foot sidewalks are provided, however, bicycle facilities are typically not included.

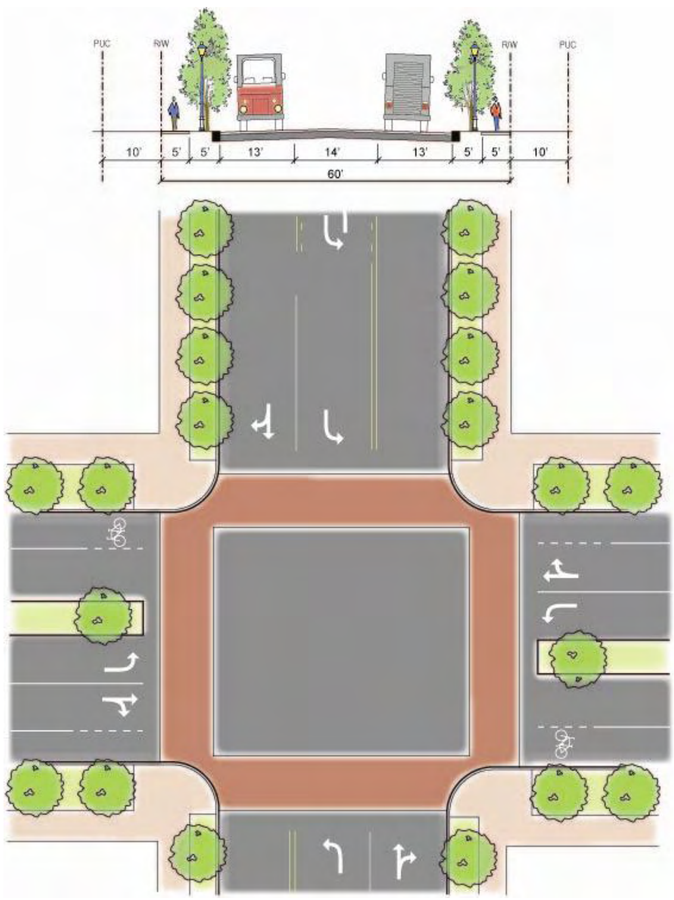

Figure 4.14: Typical Industrial Street with Two-Way Left-Turn Lane

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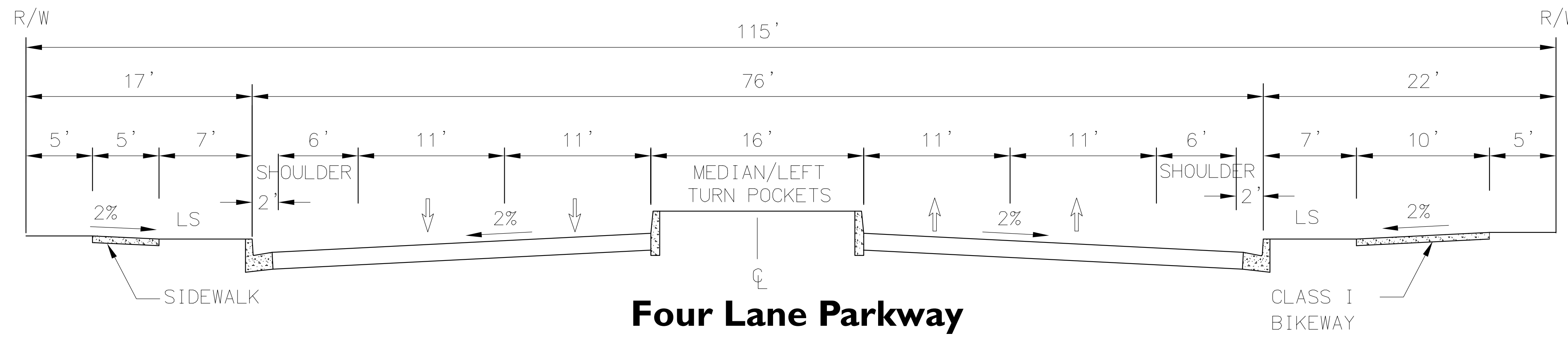
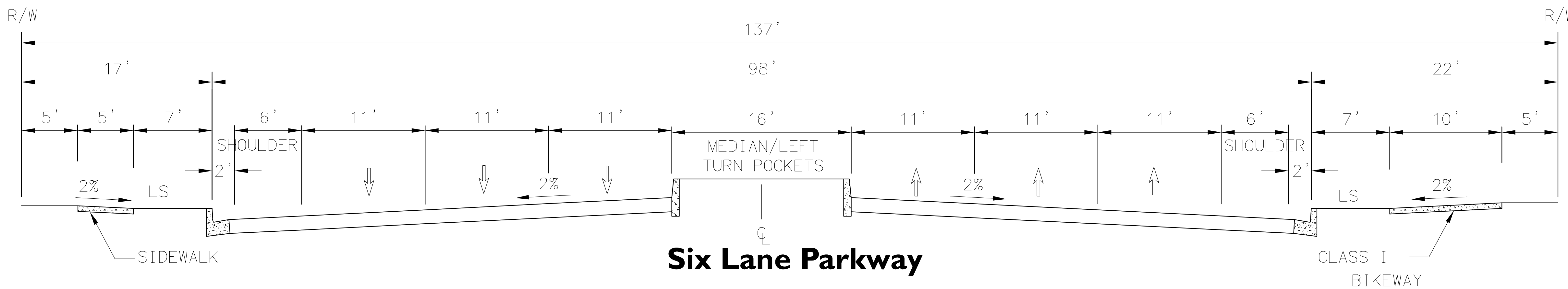
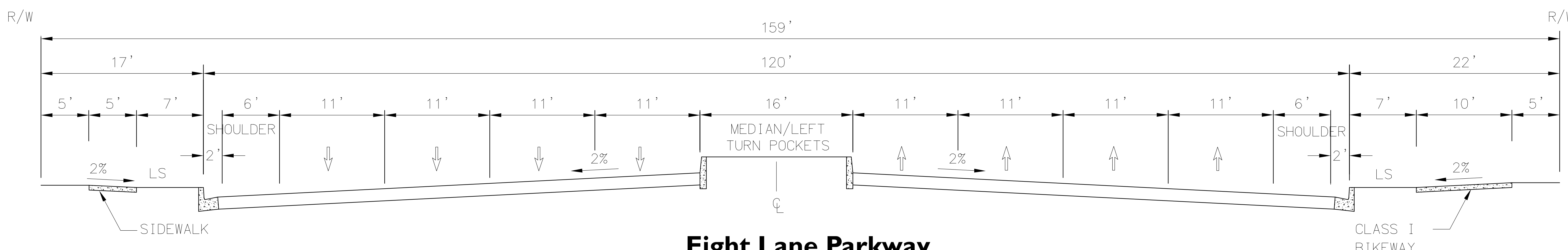


Four Lane Parkway



Six Lane Parkway



Eight Lane Parkway

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Figure 4.15a: Parkway Roadway Cross Sections

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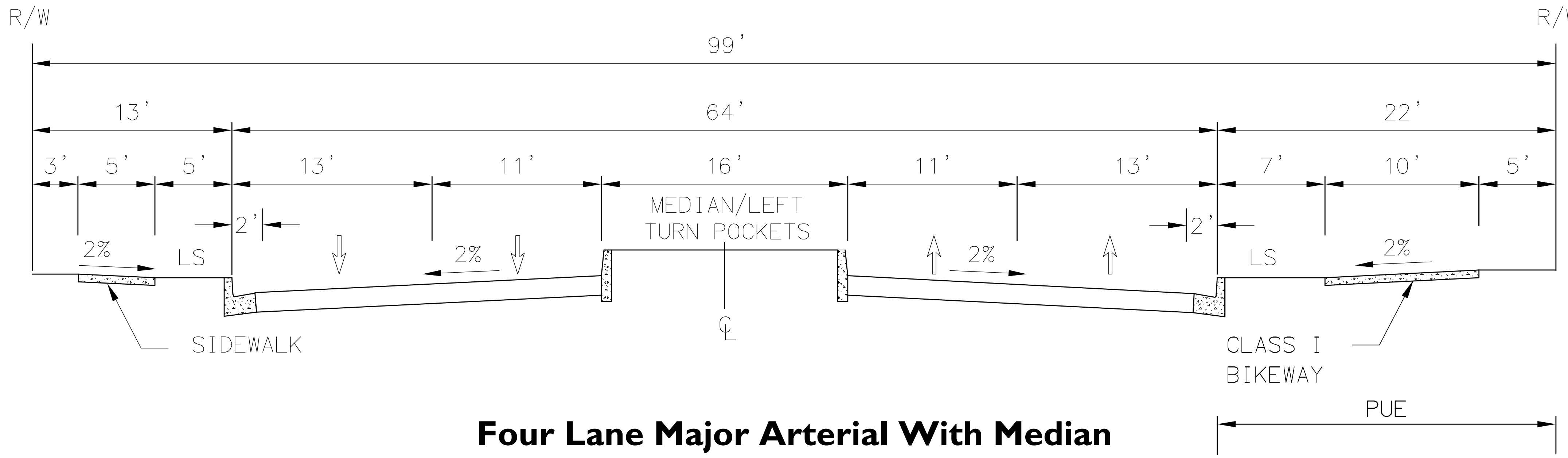
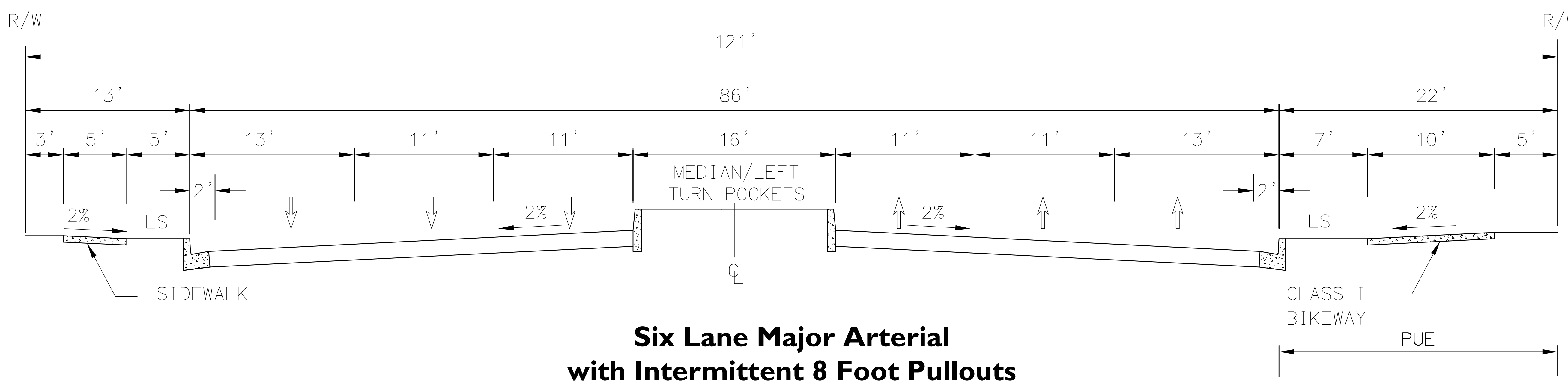


Four Lane Major Arterial With Median



Six Lane Major Arterial
with Intermittent 8 Foot Pullouts

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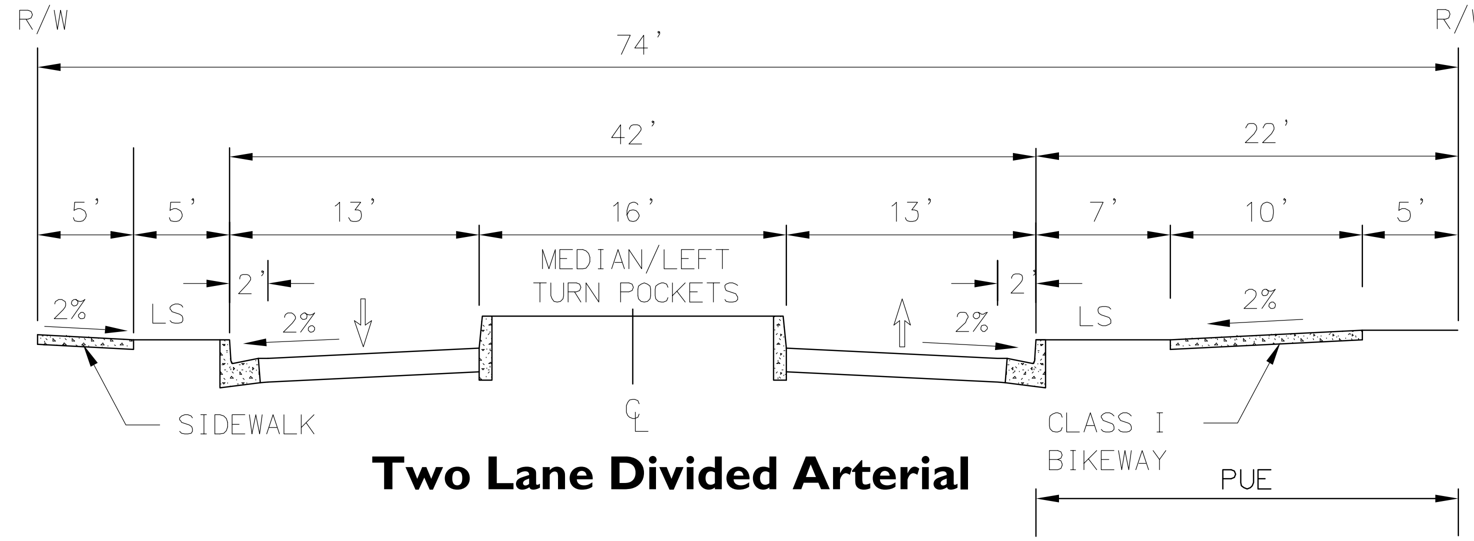
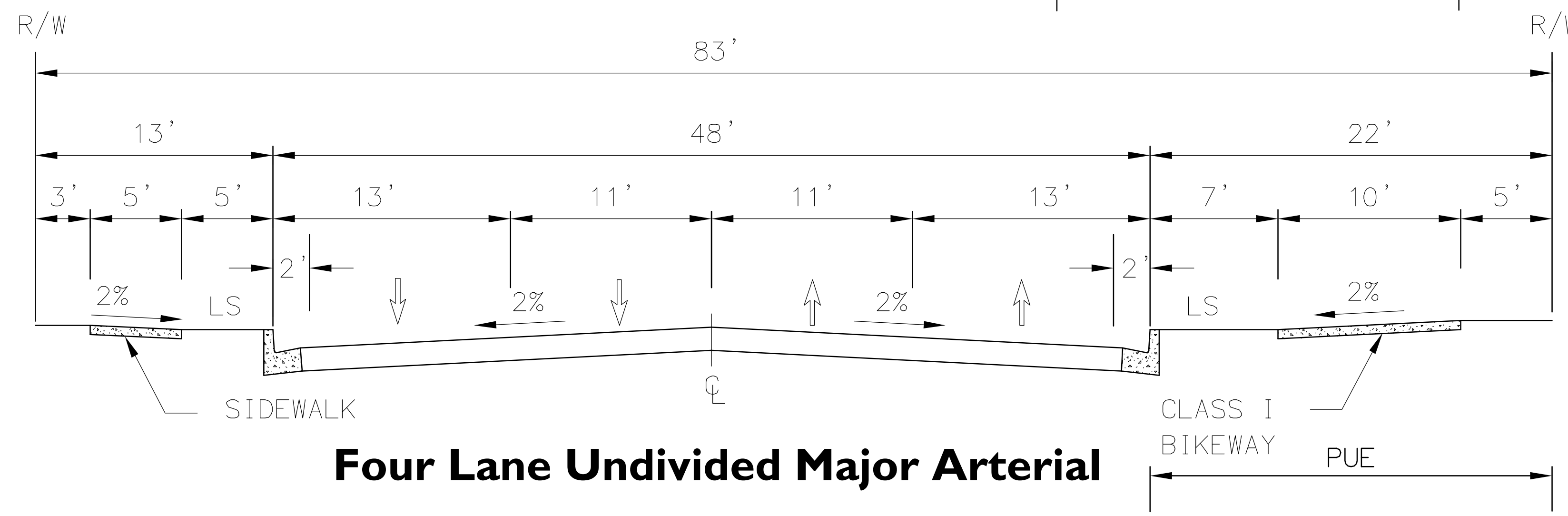
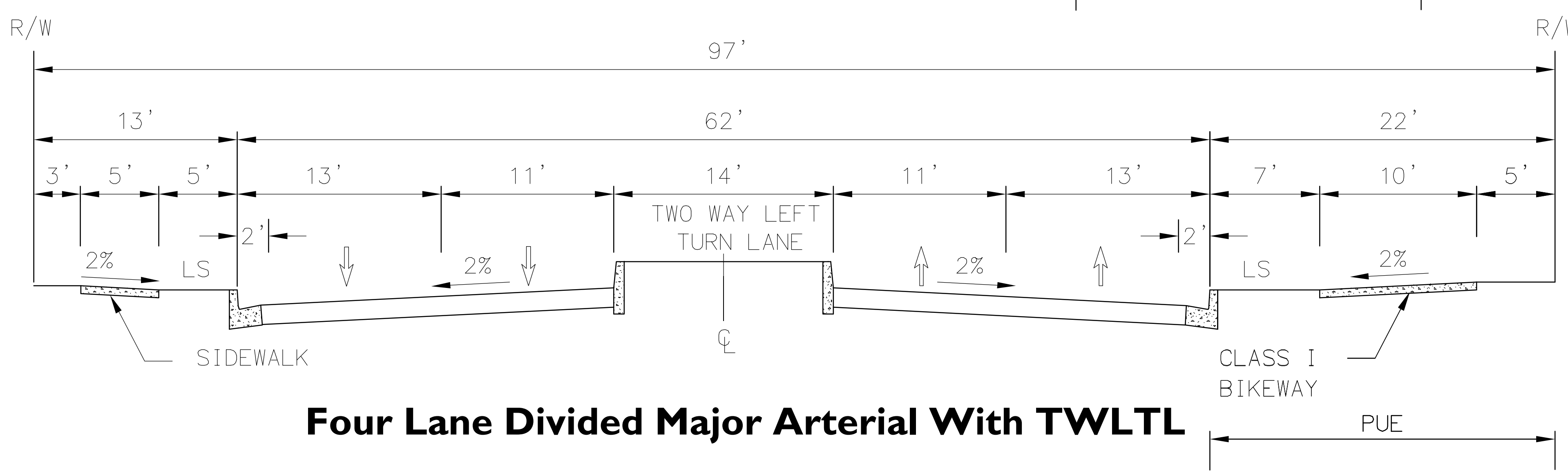
Figure 4.15b: Arterial Street Roadway Cross Sections



Two Lane Divided Arterial



Four Lane Undivided Major Arterial



Four Lane Divided Major Arterial With TWLTL

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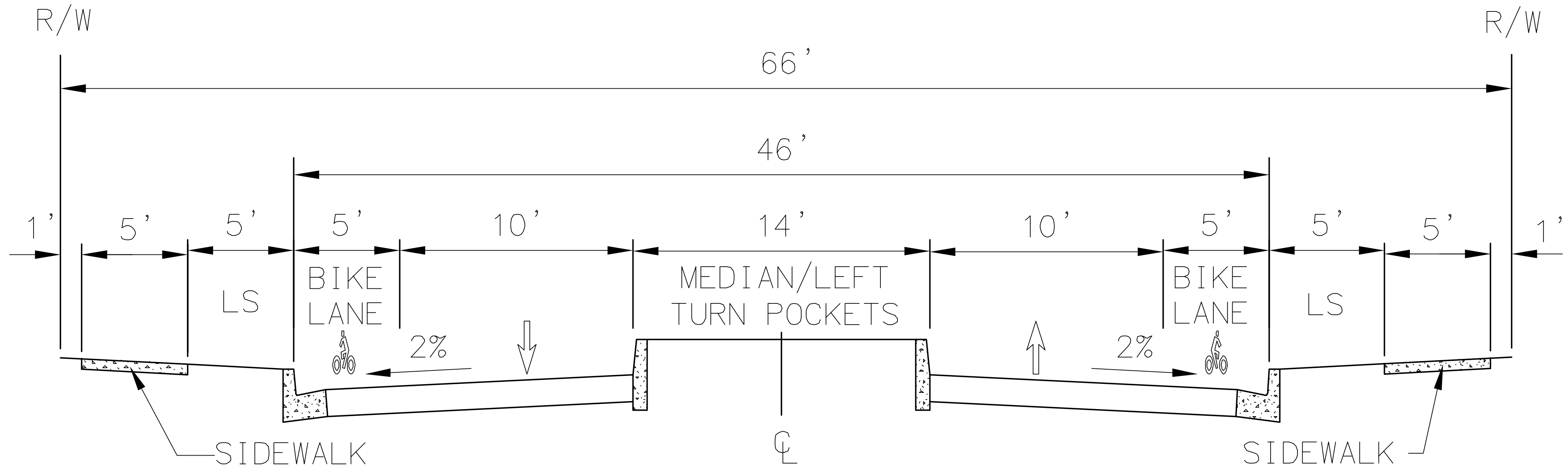
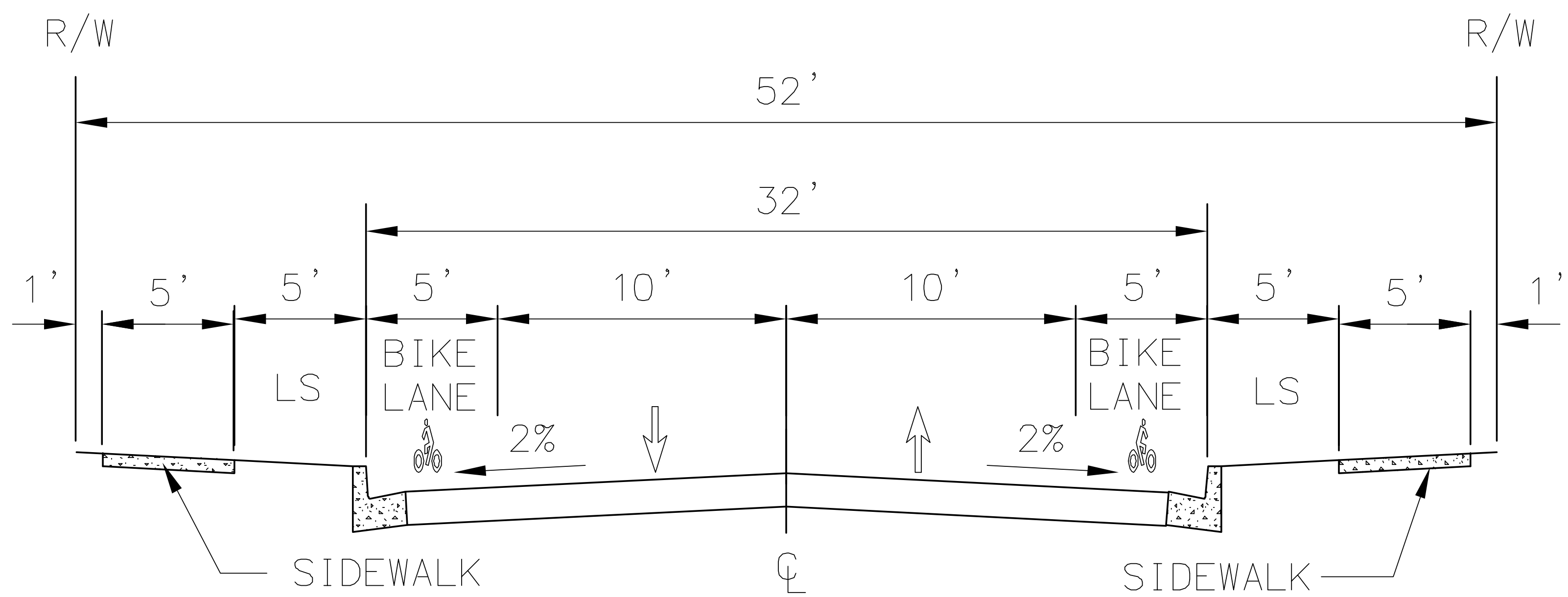
Figure 4.15c: Arterial Street Roadway Cross Sections



Two Lane Major Collector
2,000 to 5,000 Vehicles Per Day



Two Lane Collector
< 2,000 Vehicles Per Day

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Figure 4.15d: Collector Street Roadway Cross Sections

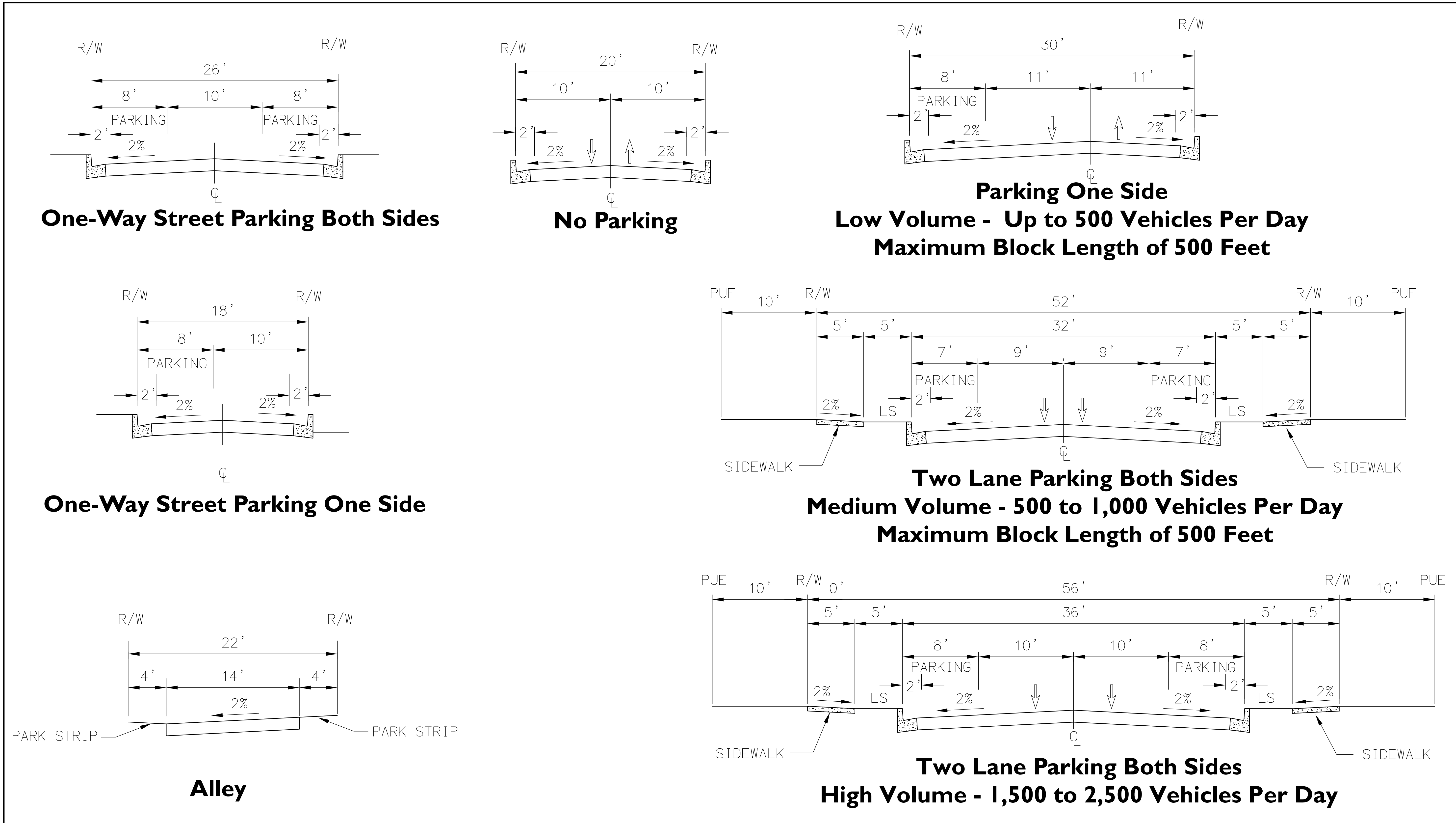

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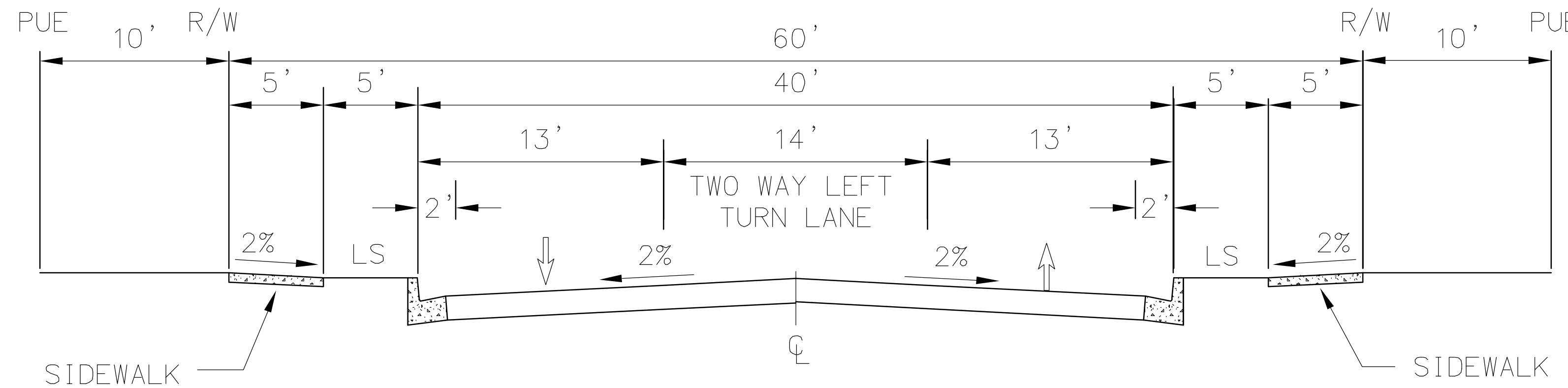
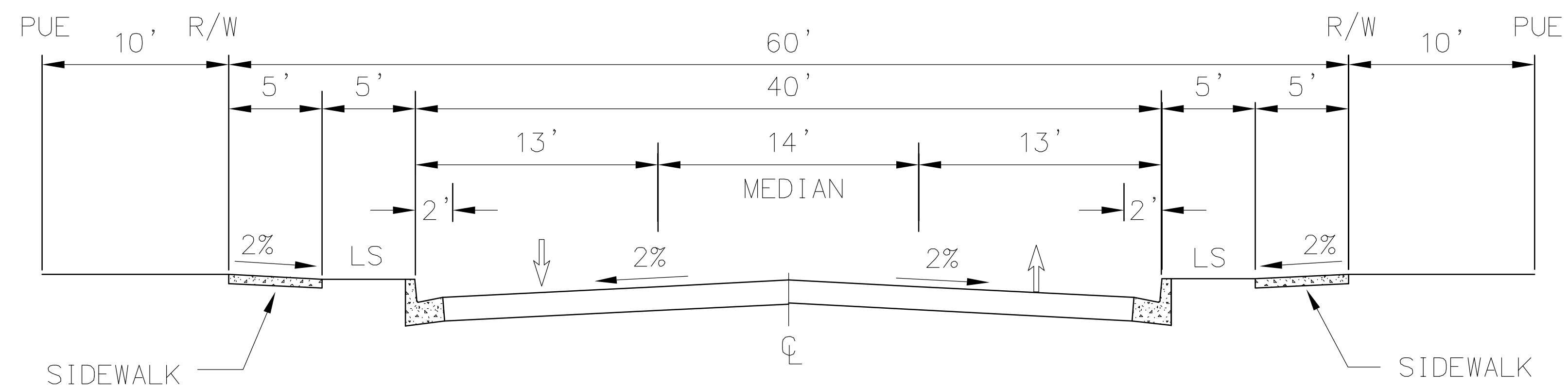
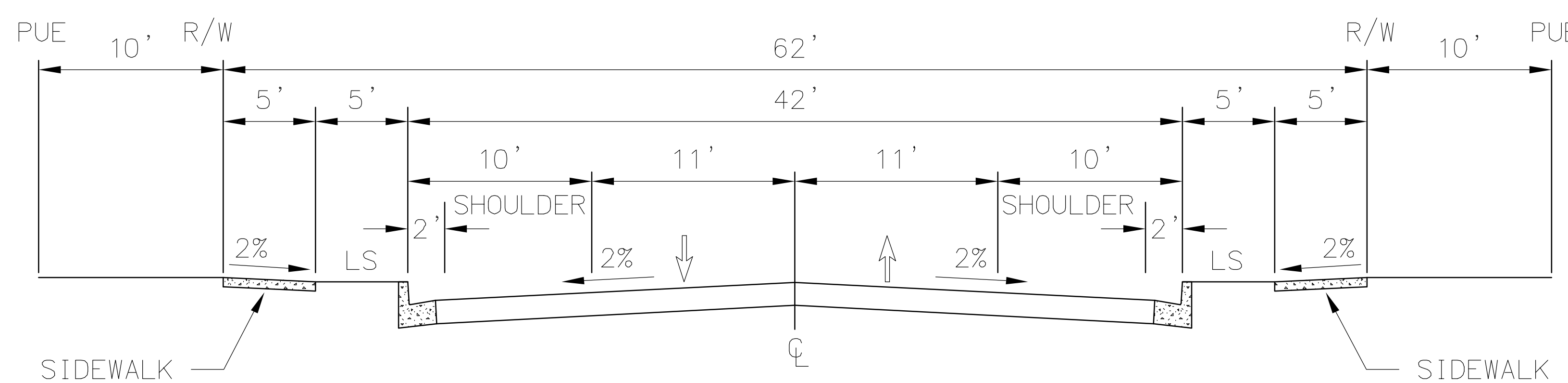
Figure 4.15e: Residential Streets Roadway Cross Sections



Industrial Street with TWLTL



Industrial Street with Median



Industrial Streets

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Figure 4.15f: Industrial Roadway Cross Sections

4.7.3 CROSS SECTIONS

Table 4.7 summarizes the key recommended cross section characteristics for the illustrations that were presented above:

Table 4.7: Recommended Cross Section Characteristics

Street Type	Right-Of-Way	Lanes	Bike Facility	Sidewalk
Parkway	115' to 159'	4 to 8	Yes (Class I Bike Path)	Yes
Arterial	74' to 121'	2 to 6	Yes (Class I Bike Path)	Yes
Collector	52' to 66'	2	Yes (Class II Bike Lane)	Yes
Residential/Alley	18' to 56'	1 to 2	No	Yes (2 lanes only)
Industrial	60' to 62'	2	No	Yes

4.7.3.1 ELLIS SPECIFIC PLAN

Cross sections were developed specifically for the Ellis Specific Plan as part of the development process and were approved prior to initiation of the Tracy Transportation Master Plan. Therefore, these cross sections are different from those recommended in the Tracy TMP. Refer to **Appendix E** for the Ellis Specific Plan cross sections.

4.7.3.2 BUS STOPS, UTILITY CABINETS, AND PIPELINES

Sufficient right-of-way may not be provided in these recommended cross sections to accommodate a bus stop or pull-out where the bus moves completely out of the traveled way. For those locations, additional ROW must be provided to meet San Joaquin Regional Transit standards for a bus stop or turnout.

In locations where utility cabinets or other obstructions (e.g. poles, signs, etc.) may be placed within the right-of-way designated for sidewalks and Class I bikeways, the sidewalks and bikeway are to meander around the obstructions. Additional ROW may also be required to implement these meandering paths per the utility company standards.

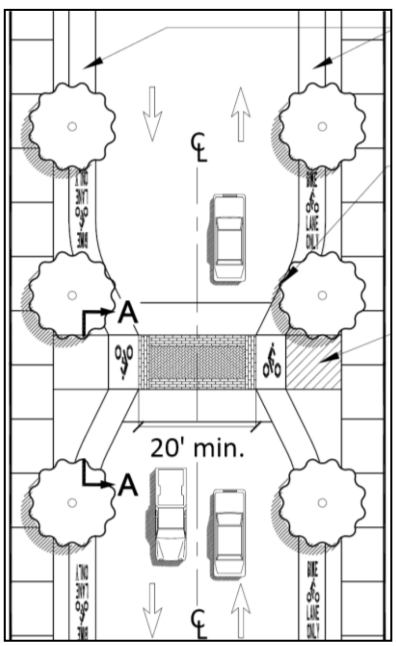
Portions of the former Old Valley Pipeline (OVP) and Tidewater Associated Oil Company (TAOC) pipelines existed in Tracy. These historic pipelines were constructed in the early 1900s and carried crude oil from the southern San Joaquin Valley to the Bay Area. Operations for the OVP ceased in the 1940s, and in the 1970s for the TAOC pipelines. Figures 1 through 3 in **Appendix G** illustrate the location of the ROW of these pipelines.

4.7.3.3 LIGHT RAIL OR STREETCARS

Additional right-of-way is required should light-rail or streetcar systems be planned. Approximately 25 to 30 feet is needed to accommodate two rail tracks in the median. An additional 10 feet, beyond the 25 to 30 feet, is required for stations to account for platforms, waiting areas, ticket machines, and other station amenities.

4.7.4 TRAFFIC CALMING

The use of traffic calming devices is intended to reduce vehicle speeds, alter driver behavior, and improve safety for all users. One of the policy statements from the City of Tracy's *Traffic Calming Program* (September 2009) is that "the primary focus of the traffic calming program is residential neighborhoods. Therefore, installation of traffic calming devices will only be considered on local two-lane residential streets with a posted speed limit of 25 mph. These devices shall not be used on arterial or non-residential streets." Thus, the collector or residential street cross sections are likely candidates for traffic calming measures.



The City's traffic calming toolbox includes three tiers: Tier 1 consists of targeted speed enforcement speed monitoring radar trailers, neighborhood speed watch, speed limit signs, restricted turn movements; Tier 2 consists of speed feedback signs, speed lumps, all-way stop signs; and Tier 3 includes neighborhood identification island, median islands, neckdowns or curb extensions, chokers, chicanes, traffic circles, or raised islands.

Future specific plans shall incorporate planning level traffic calming measures. The exact traffic calming measures will be determined at the design phase of the project in conjunction with the procedures outlined in the city's traffic calming program. All residential streets must include traffic calming measures, as appropriate. Collector streets may include traffic calming measures on a case by case basis, which will also be included in the design phase of the project.

4.7.5 TRAFFIC CIRCLES (MINI-ROUNDABOUTS) AND ROUNDABOUTS

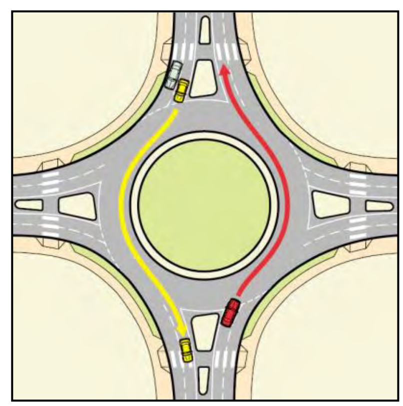
The TMP includes traffic circles and roundabouts as an alternative form of traffic control to standard intersection layouts. In addition, traffic circles (mini-roundabouts) are typically provided on residential street and commercial properties as a way to calm traffic and reduce speeds. Roundabouts are typically located on larger streets and can be used to accommodate heavy merge and weaving maneuvers. Roundabouts provide superior benefits to reducing delay, noise sustainability, and greenhouse gas emissions compared to all-way stop and signalized intersections. **Table 4.8** presents key fundamental and operational elements for various types of traffic circles and roundabouts. This information is obtained from *Roundabouts: An Informational Guide* (Federal Highway Administration, June 2000). The design of the traffic circle and roundabout will vary upon the actual site location and layout; however the values provided in **Table 4.8** can be utilized as a planning tool to size an appropriate facility. Conceptual sketches of the various types of traffic circles and roundabouts, also obtained from *Roundabouts: An Informational Guide*, are included in **Appendix F**.

Table 4.8: Comparison of Traffic Circles and Roundabouts Design and Operational Elements

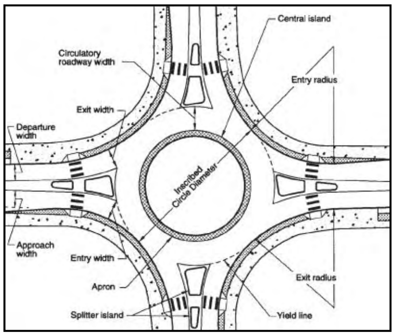
Design Element	Mini-Roundabout	Urban Compact	Urban Single Lane	Urban Double Lane	Rural Single Lane	Rural Double Lane
Recommended maximum entry design speed (mph)	15	15	20	25	25	30
Maximum # of entering lanes per approach	1	1	1	2	1	2
Typical inscribed circle diameter (feet)[1]	45 - 80	80 - 100	100 - 130	150 - 180	115 - 130	180 - 200
Splitter island treatment	Raised if possible, crosswalk cut if raised	Raised, with crosswalk cut	Raised, with crosswalk cut	Raised, with crosswalk cut	Raised and extended, with crosswalk cut	Raised and extended, with crosswalk cut
Typical daily volumes on 4-leg roundabout (veh/day)	10,000	15,000	20,000	Refer to Ch. 4 of the source	20,000	Refer to Ch. 4 of the source

[1] Assumes 90-degree entries and no more than four legs

Source: *Roundabouts: An Informational Guide* (Federal Highway Administration)



The following illustration, **Figure 4.16**, below shows a typical cross-section for a roadway that includes a roundabout.



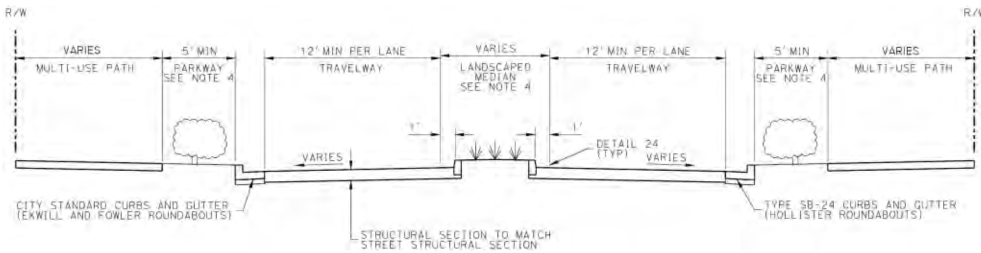
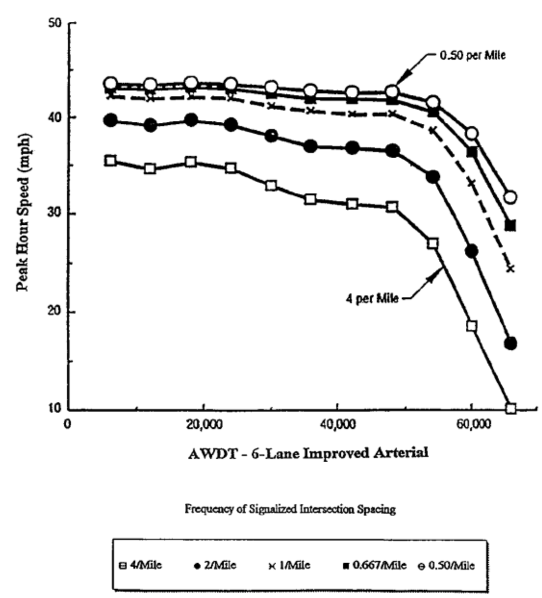


Figure 4.16: Typical Roundabout Approach

4.7.6 ACCESS MANAGEMENT

According to U.S. Department of Transportation Federal Highway Administration, access management is the proactive management of vehicular access points to properties on various types of roadways. The spacing of signals impacts traffic flow operations and travel speeds. The figure below from *NCHRP 420, Impacts of Access Management Techniques Transportation Research Board* indicates the reduction in travel speeds with the increase of signals per mile. Access spacing can affect the efficient movement of goods and traffic: spacing of roadways, spacing of signals and driveways, type of median openings, turn lanes, and right-of-way management. Existing or future roadway networks in specific plans need to consider the impacts of these design variables on reducing congestion, preserving capacity on key roadways, and allowing safe and efficient access to local properties.



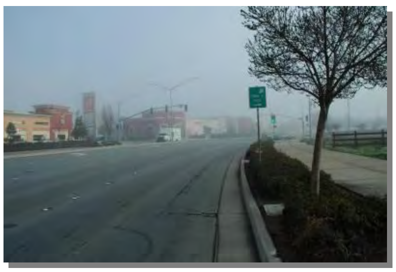
4.7.7 CONTEXT-SENSITIVE DESIGN AND SMARTH GROWTH PRINCIPLES

The recommended cross sections incorporate Context Sensitive and Smart Growth design principles to improve mobility for all users (bicyclists, pedestrians, transit vehicles, and motorists) and to achieve several other purposes including reduced maintenance costs, reduced environmental impacts, slower vehicle speeds, and improved pedestrian safety. These cross sections include narrower street widths (10 and11 feet versus 12 feet) which reduces the amount of right-of-way (ROW) required and reduces the cost of construction. Narrower roads also help to reduce vehicle speeds and reduce the crossing distances for pedestrians at intersections. Furthermore, HCM 2010 indicates that narrow lane has no reduction in saturation flow rate and thus the level of service has no effect. Narrower lanes reduce the capacity of certain roads and care was taken as to minimize the reduction of capacity below acceptable standards. The reduction in ROW provides more space for other uses such as additional landscaping for beautification and for water treatment, wider sidewalks to promote walkability, and room for utility corridors.

4.8 PARK AND RIDE FACILITIES

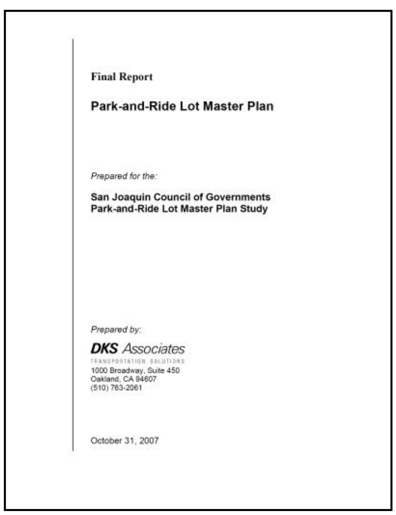
4.8.1 INTRODUCTION

This section documents infrastructure related to Park and Ride lot facility planning for the Tracy Transportation Master Plan (TMP). The existing Park and Ride infrastructure is indicated in **Chapter 2**, Existing Conditions. The City of Tracy Park and Ride facilities was integrated into the TMP to develop a comprehensive Park and Ride system that supports resident transit usage or carpooling to commute from the City. Graphics are provided to illustrate existing and future Park and Ride facilities. Planning for the Park and Ride facilities is based on the San Joaquin Council of Governments prepared *Park-and-Ride Lot Master Plan (DKS Associates, October 31, 2007)*. One additional Park and Ride location is recommended in the vicinity of the future Interstate 580/Lammers Road interchange. Discussion is provided relative to advanced planning for Park and Ride facilities such as connectivity to land use and transit, and design components.



4.8.2 PLANNING PARK AND RIDE FACILITIES

The *Park-and-Ride Lot Master Plan (DKS Associates, October 31, 2007)* determined locations for new Park and Ride facilities based on observed demand, location and source of funding for new facilities during new housing and commercial development projects, utilization of vacant land opportunity sites, availability of Caltrans right-of-way and location of future interchange improvement projects. Traffic modeling forecasts provide a key insight to the potential number of Park and Ride users. Based on citywide traffic modeling prepared in August 2010, approximately 36 percent of trips will leave the City in Horizon Year for destinations in San Joaquin County (21%), the Bay Area (7%), the North Valley (4%), and the South Valley (4%).



Final Report

Park-and-Ride Lot Master Plan

Prepared for the:

San Joaquin Council of Governments
Park-and-Ride Lot Master Plan Study

Prepared by:

DKS Associates
TRANSPORTATION SOLUTIONS
1000 Broadway, Suite 450
Oakland, CA 94607
(510) 763-2061

October 31, 2007

Consideration of opportunity and applicability of Park and Ride facilities is recommended during large land use planning efforts such as the General Plan Update, Specific Plan preparation, and community planning efforts. Additionally, consideration of Park and Ride facilities should be coordinated with bicycle route planning, transit planning, and roadway circulation system planning to provide convenient, efficient, and safe linkages and interoperability between transportation modes. By providing multiple transportation services at one intermodal center, residents and employees within the City can have increased opportunities to use transit and alternative transportation, minimizing single-occupancy vehicles and reducing the financial, environmental, and infrastructure burden placed on the City of Tracy. Early consideration of the Park and Ride facilities as a potential solution to first mile/last mile challenges to transit usage can help identify solutions for a higher utilized and more efficient transportation system.

4.8.3 FUTURE PARK AND RIDE FACILITIES

Figure 4.17 shows the City of Tracy Park and Ride Facility Plan, which includes the existing and future facilities including facilities near interchanges with Interstate 205 (I-205), Interstate 580 (I-580), and Interstate 5 (I-5).

As identified in **Figure 4.17**, the following five Park and Ride facilities serving residents in and around the City of Tracy are planned or recommended:

- In vicinity of I-205/Mountain House Parkway interchange
- In vicinity of I-205/Lammers Road Extension interchange
- In vicinity of I-580/Lammers Road interchange
- In vicinity of Chrisman Road/Lovely Road intersection
- In vicinity of I-205/I-5

While most of the Park and Ride facilities planned or recommended for future construction are outside the City of Tracy jurisdiction, they will be heavily utilized by residents of the City. The *Park-and-Ride Lot Master Plan (DKS Associates, October 31, 2007)* did not recommend the new Park and Ride facility location along I-580, however, based on discussions with City staff this location is recommended for inclusion in the TMP.

4.8.4 PARK AND RIDE FACILITY DESIGN PLANNING

During design of Park and Ride facilities consider environmental concepts to illustrate the City's dedication to sustainability and minimizing resource use. Design measures with co-benefits for consideration include canopy structures with photovoltaics to provide shade and generate energy on-site, native and drought tolerant landscaping to reduce water demand, bioswales to provide landscaping while reducing pollutant discharge. Utilization of decomposed granite (DG), or recycled asphalt cement concrete (ACC) are examples of recycling materials to exemplify a reduced environmental burden at the facility.

Provide incentives for vehicles with reduced pollution or non-polluting engines consistent with Best Management Practices (BMPs) to address Senate Bill 375 and Assembly Bill 32 requirements to reduce greenhouse gas (GHG) emissions. Examples of incentives for non-GHG emitting vehicles may include electric charging stations, sheltered parking, premium location parking, provision of wider parking spaces than typical, and bicycle amenities such as lockers and parking racks.

Consider the quality of services at each Park and Ride facility to determine how to increase comfort for users by provision of amenities such as enclosed and safe shelters, information panels, carpooling networking, restrooms, showers, seating, park like landscaping, etc.

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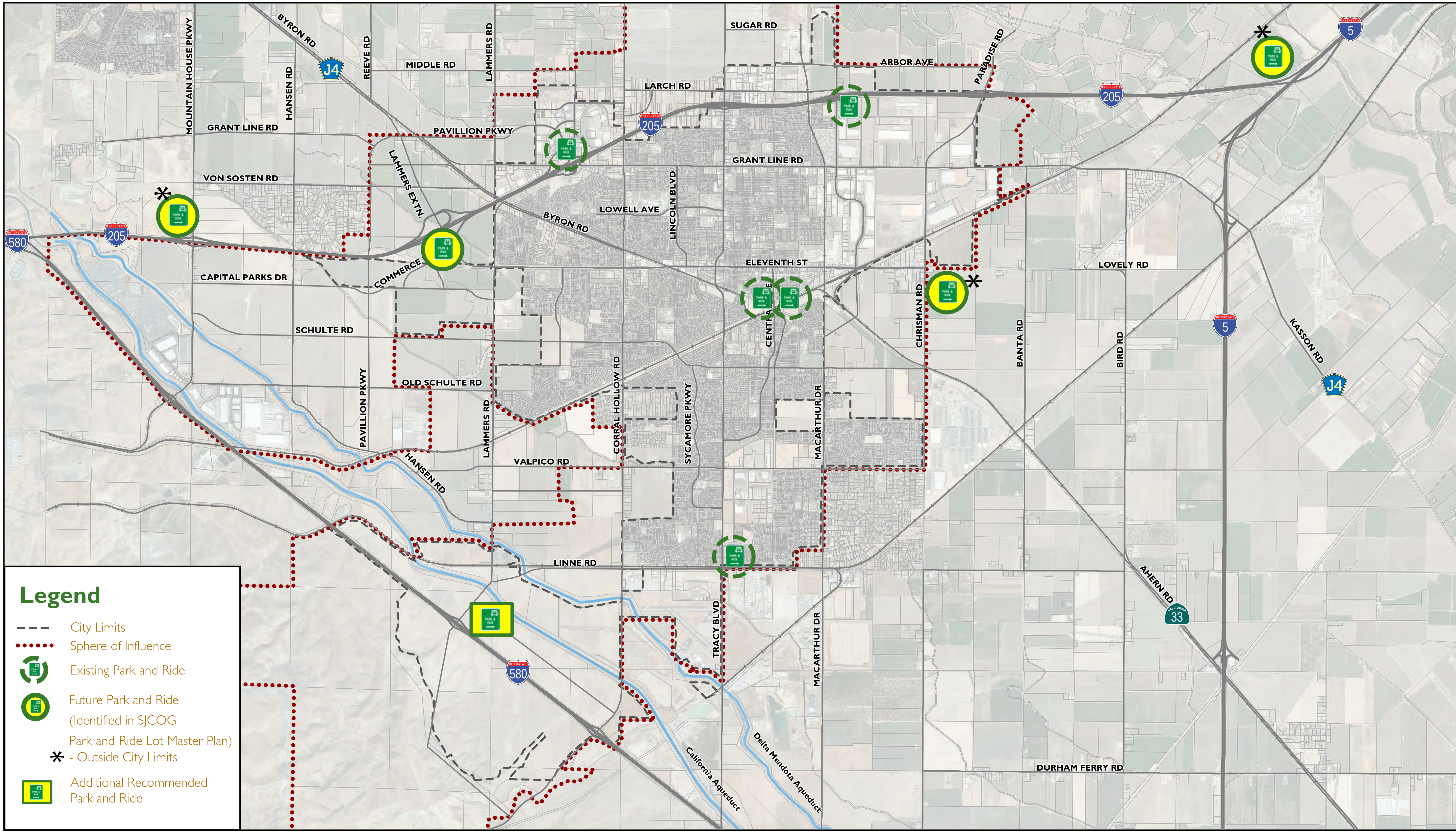

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Figure 4.17: Existing and Future Park and Ride Facilities

4.8.5 SMART GROWTH DESIGN ELEMENTS

The following Smart Growth design elements are relevant to Park and Ride planning:

- Continue to consider opportunities to share parking facilities for Park and Ride use where parking operations provide complimentary peak demands. Examples of opportunities to utilize parking facilities for dual purpose includes theater or shopping center uses that have peak parking demands during the evening or weekend when a Park and Ride facility would otherwise be in low demand.
- Provide high level of connectivity, beyond typical design expectations for land use to connect to alternative transportation systems such as transit, bicycle, and park and ride facilities. With enhanced efforts to strengthen connectivity, a higher quality of life is provided through provision of multiple transportation options.

4.9 INTELLIGENT TRANSPORTATION SYSTEM

4.9.1 INTRODUCTION

This section documents the infrastructure related to the Intelligent Transportation System (ITS) planning for the Tracy Transportation Master Plan (TMP). This section was integrated into the TMP to develop a comprehensive overview of the development and deployment of the City of Tracy's proposed ITS infrastructure and includes the City of Tracy's ITS vision, existing system inventory and evaluation, ITS strategies, assessment of intelligent transportation systems, and recommendations for City of Tracy's ITS infrastructure.

4.9.2 CITY OF TRACY INTELLIGENT TRANSPORTATION VISION

The City of Tracy Intelligent Transportation System (ITS) vision is to bring the benefits of an enhanced multi-modal transportation system that collect and disseminate traffic information from various modes of transportation in order to provide operational effectiveness along the signalized intersections and project corridors and thereby increasing mobility and reducing travel times to the motorists.

It is envisioned that the City of Tracy will have a citywide state-of the-art reliable and consistent ITS infrastructure that uses the latest technology that will assist them in managing the traffic at intersections and roadway segments; enhance staff efficiency through remote monitoring; provide troubleshooting capabilities, and system adjustments; compliment the City's existing traffic signal surveillance, control and monitoring program; and provide traveling information to the public.

It is also envisioned that the City of Tracy will participate in regional transportation management and share travel information with adjacent local agencies including Caltrans, and San Joaquin County in order to enhance mobility throughout the region.

4.9.3 CITY OF TRACY INTELLIGENT TRANSPORTATION (ITS) STRATEGIES

ITS provides numerous strategies that can be incorporated to the City of Tracy future ITS infrastructure. The City of Tracy shall adopt some of the ITS strategies based on their current and future needs. It should be noted that as technology continues to change rapidly, the City should evaluate these ITS strategies on an annual basis.

ITS strategies are included in the following categories:

- Communication network
- Advanced Transportation Management Systems (ATMS)
- Advanced Traveler Information Systems (ATIS)
- System integration

4.9.3.1 COMMUNICATION NETWORK

The communication network provides communication support from ITS field elements including traffic signal systems, Closed Circuit Television (CCTV) systems, and Dynamic Message Signs (DMS) to a centralized system such as the City's Traffic Management Center (TMC).

The communication network shall be a robust system that provides real-time data and video communications between the ITS field elements and the centralized system. Different communication methods are available including fiber optic cable, twisted pair copper wire signal interconnect cable (SIC), wireless communications, and leased communication lines.

The City of Tracy's traffic signal systems are primarily communicating to the City's TMC via twisted pair copper wire signal interconnect cable. This communication method has been the most common system deployed by many agencies in the past. It provides low-speed, low-data transmission over short distances. This system is subject to electromagnetic and radio frequency interference and it has bandwidth limitations.

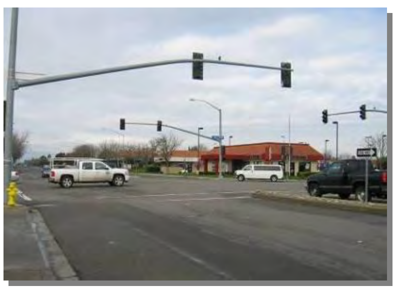
Part of the City's future ITS infrastructure is to provide a solid communication network that will provide real-time information to City staff and other stakeholders with minimum disruptions to the system. Currently, the most reliable communication network is a network that's primarily built using fiber optic cable. It can accommodate very large amounts of data and/or video at very high speeds with lower error rates.

Therefore, the City of Tracy's ITS infrastructure communication network shall be built using a fiber optic communication system.

4.9.3.2 ADVANCED TRANSPORTATION MANAGEMENT SYSTEMS (ATMS)

Advanced Transportation Management Systems (ATMSs) can be as basic as the upgrade or deployment of a new traffic control system or it can be expanded to include an integrated system where data and/or video can be shared among agencies. Some of the key ATMS strategies for the City of Tracy are described below.

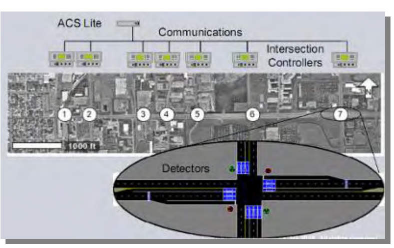
TRAFFIC SIGNAL SYSTEM



The traffic signal system consists of the traffic signal controllers and the traffic signal central software called the traffic control system where it can provide remote control of the traffic signal controllers from a centralized location to manage, monitor, and control traffic operations. The City of Tracy currently operates a QuicNet traffic control system and type 170 controllers at the signalized intersections.

In the future, more advanced commercial-of-the-shelf (COT) traffic control systems and signal controllers will be available in the market with more advanced features and tools to integrate other ITS field elements.

Some agencies are testing or deploying new generation of a traffic control system, known as adaptive signal control systems. The systems coordinate control of traffic signals across a signal network, adjusting the lengths of signal phases based on prevailing traffic conditions.



Adaptive Control Software Lite (ACS–Lite) is an example of adaptive signal control technology. ACS–Lite was specifically designed to be deployed using conventional control equipment, communications, and traffic sensors on arterial streets, making it a cost– effective alternative to other signal timing adjustment technologies.

As the City continues to implement their future ITS infrastructure, the City should look for opportunities to implement new and more advanced COT traffic control system and signal controllers where both systems can co-exist as new signalized intersections are deployed. As funds are available, the existing signalized intersections can be upgraded to interface with the new traffic control system.

VEHICLE DETECTION SYSTEM

Vehicle detection system provides vehicle data from the city's roadway network including vehicle volume, speeds, and occupancy. Most vehicle detection systems consist of loop detectors and video detection system. Recent deployments on arterials and freeways include wireless vehicle detection systems.

CLOSED CIRCUIT TELEVISION (CCTV) SURVEILLANCE SYSTEM

Closed circuit television (CCTV) surveillance cameras provide video images to City staff so they can monitor traffic conditions at intersections and roadway segments, troubleshoot, and fine-tune intersection operations in real-time. The surveillance images can be shared with other stakeholders including other City departments (e.g., police department, fire department, community centers, etc.), other agencies, and the public via the City's website.

TRAFFIC MANAGEMENT CENTER (TMC)

The traffic management center (TMC) integrates traffic operations, maintenance, and communication in a centralized command and communication center. The TMC provides the infrastructure for communications and surveillance necessary to manage in real-time the transportation system throughout the City.

The TMC serves as the major communication hub of the ATMS/ATIS system that collects and manages all the data and surveillance from the field elements. The TMC has the ability to share selected information with other internal departments, local agencies, and the public.

The TMC has the ability to control signalized intersections, CCTV surveillance cameras, DMS, and other field devices via a communication network. Critical functions of the TMC will include:

- Monitoring traffic signal operations
- Monitoring traffic conditions via CCTV cameras
- Monitoring and programming data for the DMS
- Provide incident management and disseminate information to the media and public
- Provide incident verification and response
- Collect and process traffic data generated by detection systems

The ATMS will provide the City of Tracy with the following benefits:

- Increase safety
- Reduced fuel consumption
- Improved air quality
- Reduced delays
- Improved mass transit operations
- Improved incident response and management
- Improved transportation system capacity
- Improved regional transportation integration and information sharing

4.9.3.3 ADVANCED TRAVELER INFORMATION SYSTEMS (ATIS)

Advanced Traveler Information Systems (ATIS) disseminate transportation related information to the traveling public. ATIS automates the integration of incident data, traffic and roadway conditions, and multimodal bus, rail, and airport conditions. It can also provide video feeds to the media or commercial entities, who can distribute it via broadcast television and radio, internet, satellite radio, fleet subscription services, in-dash navigation systems, and others to the traveling public. Public agencies use 511 telephone/internet (phone and web source for up-to-the-minute transportation information), other internet resources/websites, dynamic message signs (DMS), and other means to reach the traveling public.

An ATIS can be integrated in the City's ATMS as a means of improving safety and relieving congestion on City streets. It can provide travelers real-time access to information on which to base their decisions of mode, route, and travel time. It provides travelers information to avoid congested routes and change modes or time of travel if necessary. Key ATIS strategies for the City of Tracy are described below.

DYNAMIC MESSAGE SIGNS (DMS)

Dynamic message signs (DMS) provide real-time traffic information to the traveling public including travel time to nearest destination or major routes, roadway conditions, roadway incidents, roadway construction, traffic management for special events, and provides alternate route selection to facilitate motorist decisions and minimize traffic impacts on freeways and local roads. This TMP includes the use of DMS signs on trailers on an "as needed" basis. Future updates may reassess the use of standard DMS signs.

HIGHWAY ADVISORY RADIO (HAR)

Highway Advisory Radio (HAR) is another mode of communications between the TMC and the motorists. The HAR systems are typical installed with roadside signs alerting motorists to tune to an appropriate radio station, typically an AM station. The HAR broadcast information related to weather conditions, roadway conditions, incident conditions, and traffic congestion.

WEBPAGE

Another form of disseminating traveling/traffic information to the public is over the internet. Travel data (occupancy and speeds) and selected video feeds can be provided to the public via the City's internet web page or other private transportation/media web pages. The public is able to download traffic conditions via their computer or cellular phones.

4.9.3.4 SYSTEM INTEGRATION

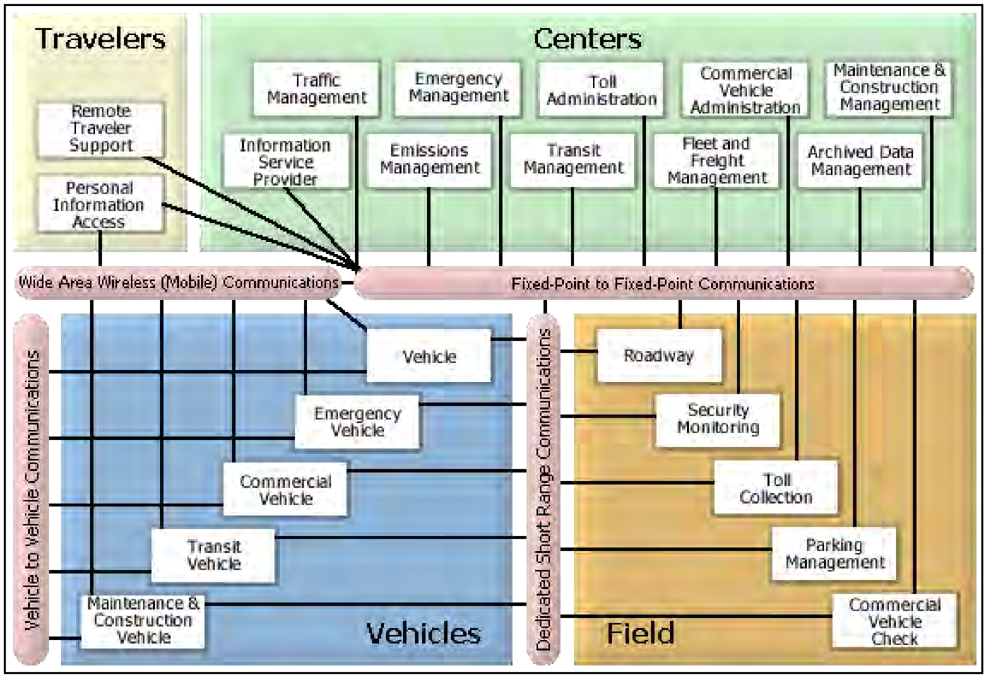
System integration is an important key component that allows the integration of all the field elements in order to facilitate data transmission and data sharing with other city's departments and other public agencies.

4.9.4 ASSESSMENT OF INTELLIGENT TRANSPORTATION SYSTEMS

The City of Tracy assessment of ITS needs and opportunities shall be based on Na*tional and Regional ITS Architecture* and shall be based primarily on current and future ITS needs.
The assessment of ITS needs and opportunities process includes the following key elements.

- Review of High Level Architectural Diagram
- Select Applicable/Priority System, Sub-System, and Communication
- Understanding of Regional Architecture

The National ITS Architecture provides a common structure for the design of ITS. It defines the functions that must be performed by components or subsystems, where these functions reside (e.g., field, traffic management center, or in-vehicle), the interfaces and information flows between subsystems, and the communications requirements for the information flows in order to address the underlying user service requirements. Since the National ITS Architecture is also the foundation for much of the ongoing ITS standards work, consideration of the interface and information exchange requirements established by the Architecture today will likely facilitate or ease the transition to incorporating standards-compliant interfaces in the future.



The City of Tracy shall evaluate the high level architecture and based on the City's and region's future needs, the City of Tracy shall select other applicable/priority system, sub-systems and communication requirements. The selection of some of the applicable/priority systems and sub-systems shall be based on the region's goals and objective to improve mobility and provide an enhanced transportation management system in the region.

Potential strategies that will improve transportation system efficiencies and mobility in the region shall be identified as an initial step of the ITS strategic deployment planning process. In the strategy identification process, some of the key program areas shall be initially identified including arterial management, transit management, and traveler information as identified in **Figure 4.18.**

In addition to these focus areas, the strategy identification process can also be extended to cover strategies in other ITS areas, including: Emergency Management, Commercial Vehicle Operations, Maintenance and Construction Operations and Advanced Safety Systems. The summary listing of potential strategies for recommendation as part of this strategic planning process are indicated in **Figure 4.19.** It contains eight ITS functional areas as provided by the National ITS Architecture.

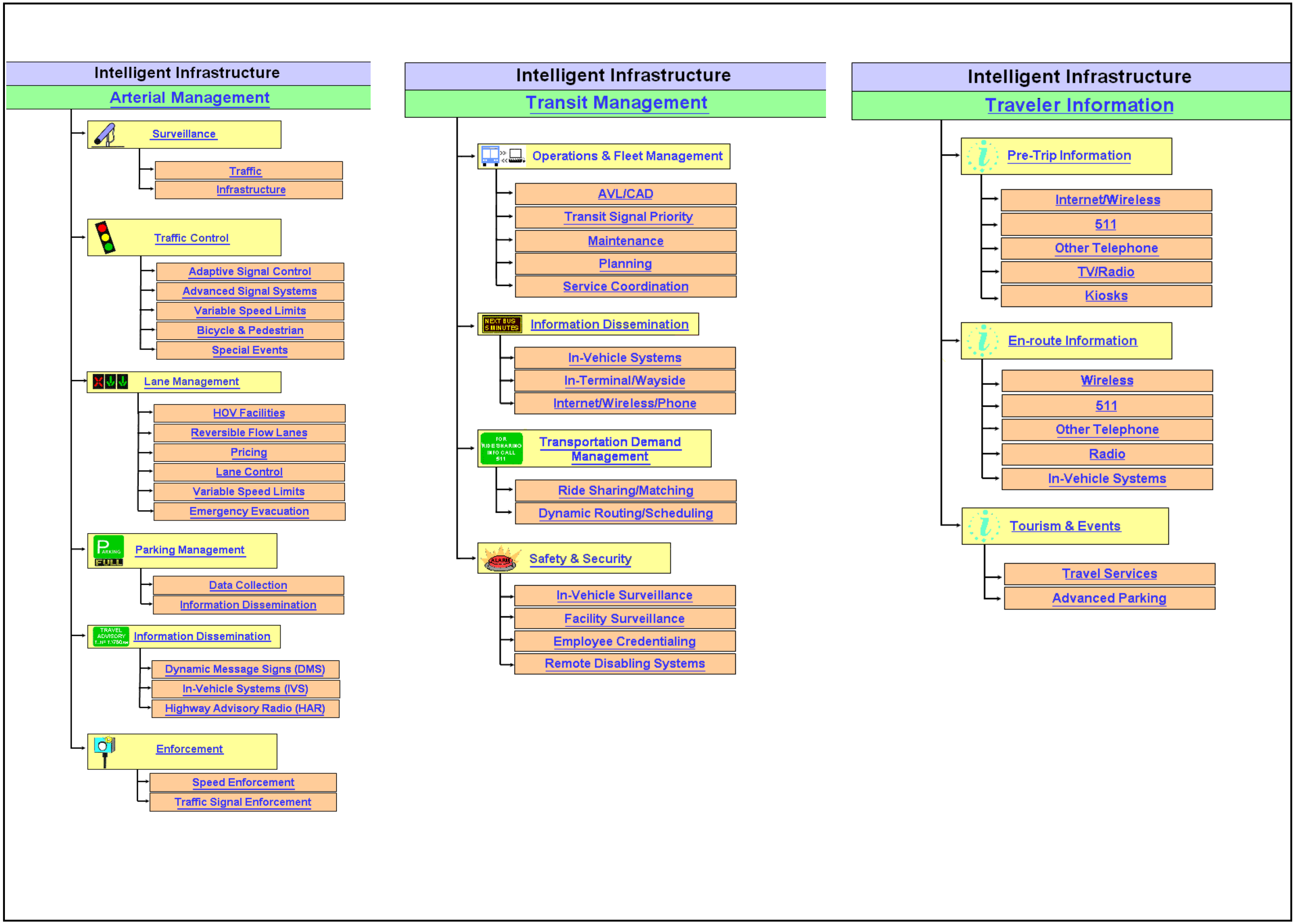


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Figure 4.18: Key Program Areas of ITS Strategies

ARCHIVE DATA MANAGEMENT
Archive Data Management System

TRAFFIC MANAGEMENT
Network Surveillance
Traffic Probe Surveillance
Surface Street Control
Freeway Control
HOV Lane Management
Traffic Information Dissemination
Regional Traffic Management
Traffic Incident Management System
Traffic Decision Support and Demand Management
Electronic Toll Collection
Emissions Monitoring and Management
Roadside Lighting System Control
Standard Railroad Grade Crossing
Advanced Railroad Grade Crossing
Railroad Operations Coordination
Parking Facility Management
Regional Parking Management
Reversible Lane Management
Speed Monitoring
Drawbridge Management
Roadway Closure Management

PUBLIC TRANSPORTATION
Transit Vehicle Tracking
Transit Fixed-Route Operations
Demand Response Transit Operations
Transit Fare Collection Management
Transit Security
Transit Fleet Management
Multi-modal Coordination
Transit Traveler Information
Transit Signal Priority
Transit Passenger Counting

COMMERCIAL VEHICLE OPERATIONS
Fleet Administration
Freight Administration
Electronic Clearance
CV Administrative Processes
International Border Electronic Clearance
Weigh-In-Motion
Roadside CVO Safety
On-Board CVO and Freight Safety and Security
CVO Fleet Maintenance
HAZMAT Management
Roadside HAZMAT Security Detection and Mitigation
CV Driver Security Authentication
Freight Assignment Tracking

EMERGENCY MANAGEMENT
Emergency Call-Taking and Dispatch
Emergency Routing
MAYDAY and Alarms Support
Roadway Service Patrols
Transportation Infrastructure Protection
Wide-Area Alert
Early Warning System
Disaster Response and Recovery
Evacuation and Reentry Management
Disaster Traveler Information

TRAVELER INFORMATION
Broadcast Traveler Information
Interactive Traveler Information
Autonomous Route Guidance
Dynamic Route Guidance
ISP Based Trip Planning and Route Guidance
Transportation Operations Data Sharing
Yellow Pages and Reservation
Dynamic Ridesharing
In Vehicle Signing
VII Traveler Information

ADVANCED SAFETY SYSTEMS
Vehicle Safety Monitoring
Driver Safety Monitoring
Longitudinal Safety Warning
Lateral Safety Warning
Intersection Safety Warning
Pre-Crash Restraint Deployment
Driver Visibility Improvement
Advanced Vehicle Longitudinal Control
Advanced Vehicle Lateral Control
Intersection Collision Avoidance
Automated Vehicle Operations
Cooperative Vehicle Safety Systems

MAINTENANCE AND CONSTRUCTION OPERATIONS
Maintenance & Construction Vehicle and Equipment Tracking
Maintenance & Construction Vehicle Maintenance
Road Weather Data Collection
Weather Information Processing and Distribution
Roadway Automated Treatment
Winter Maintenance
Roadway Maintenance and Construction
Work Zone Management
Work Zone Safety Monitoring
Maintenance & Construction Activity Coordination
Environmental Probe Surveillance
Infrastructure Monitoring

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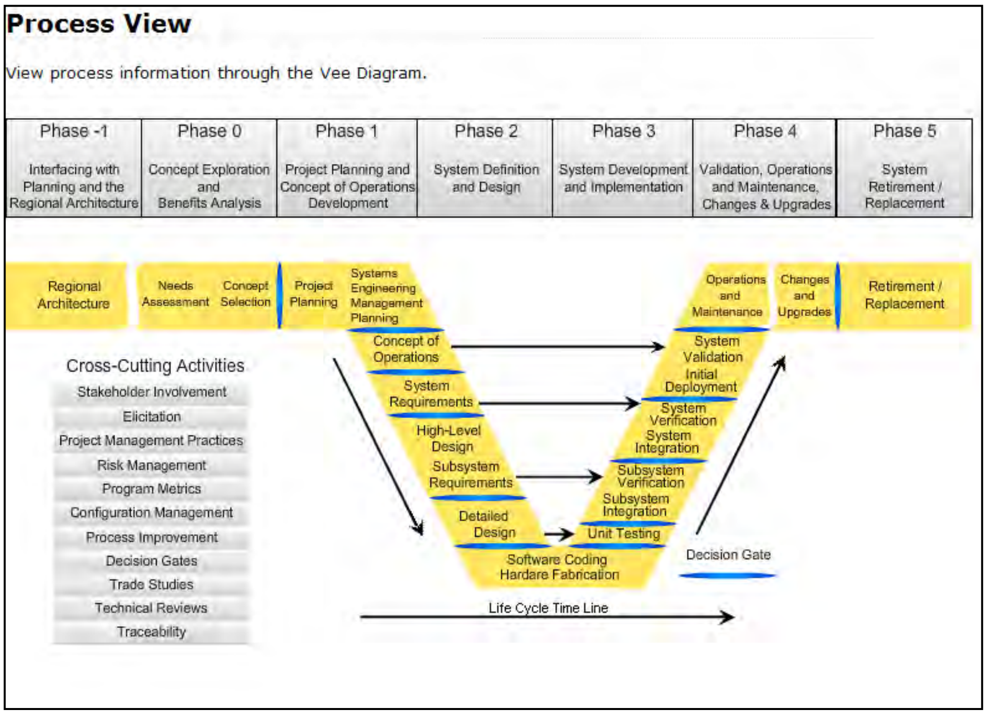
North

Figure 4.19: Areas of ITS Strategies

The City of Tracy ITS Infrastructure planning, design, deployment, maintenance, and operations shall follow latest guidelines provided in the National Intelligent Transportation System (ITS) Architecture using the System Engineering Process approach as indicated in the System Engineering "V" diagram.

The City of Tracy ITS Infrastructure system shall be based on COT hardware and software components and it shall be a scalable and expandable system.



4.9.5 RECOMMENDATION OF INTELLIGENT TRANSPORTATION SYSTEM INFRASTRUCTURE

The recommended Intelligent Transportation System (ITS) infrastructure is based on the assessment of ITS opportunities that will best suit City of Tracy's needs including, but not limited to the following conditions:

- Existing and future traffic signal systems
- Existing and future communication infrastructure
- Existing and future roadway networks
- Future land uses
- Future closed circuit television (CCTV) system locations
- Future dynamic message sign (DMS) system locations
- Future communications to public facilities that will help the system operator(s) to facilitate and manage the influx/outflow of traffic data and

video feeds from a centralized location via the City's Traffic Management Center (TMC)

This section will discuss the following topics related to the recommended Intelligent Transportation System (ITS) Infrastructure planning including:

- Communication architecture
- Communication network
- Communication hubs
- Closed Circuit Television (CCTV) Systems
- Dynamic Message Sign (DMS) Systems
- Traffic Management Center (TMC)
- Other ITS components
- Development of City's ITS Master Plan

In addition, the following topics shall also be considered during the Intelligent Transportation System (ITS) infrastructure planning stages:

- Inter-agency coordination/integration
- Other agency coordination/integration
- Public's Website
- Signal Coordination
- Current Technology
- Future Technology
- Operations and Maintenance

4.9.5.1 COMMUNICATION ARCHITECTURE

The proposed City of Tracy's system communication architecture plan shall be used as a high level tool in order to map the citywide communication network. This includes internal and external links between the City's TMC, TMC control room, existing/future field elements, City's website, and connectivity to workstations and/or control rooms within the Public Works Department/Other departments, Police Department, and Park Facilities. The proposed system communication architecture plan shall be used as a working document and shall be expanded as other elements, technologies, and connectivity to other departments/facilities and/or other agencies are introduced to the network.

Figure 4.20 shows the proposed ITS System Communication Architecture Plan.

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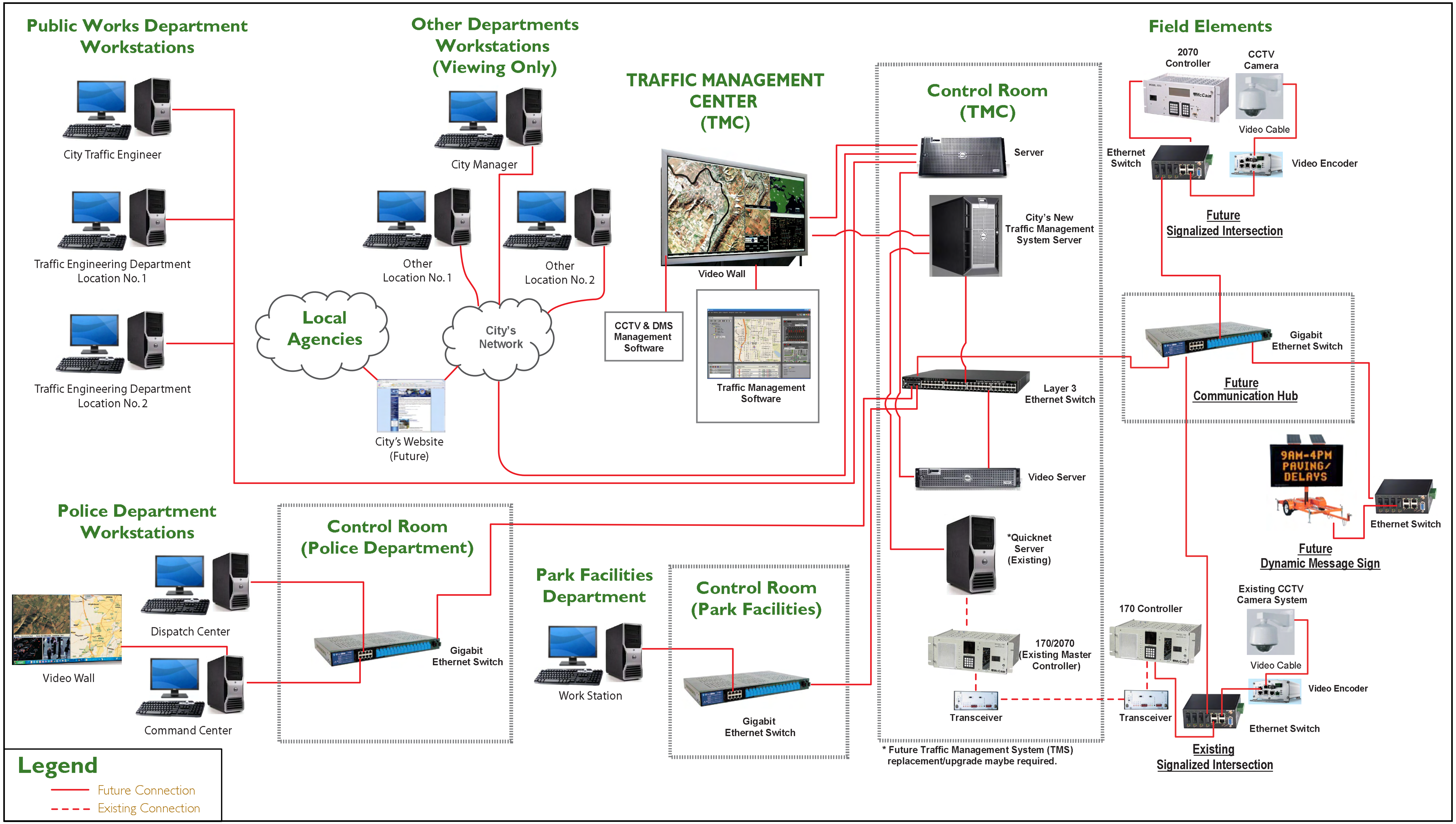

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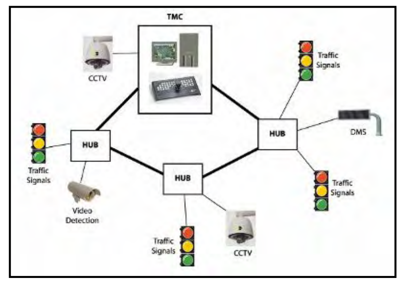
Figure 4.20: Intelligent Transportation System (ITS) - Proposed System Architecture

4.9.5.2 COMMUNICATION NETWORK

The recommended City of Tracy's system communication network consists of providing fiber optic cable/conduit along designated existing and future corridors in order to facilitate communications from the City's TMC to the field elements (i.e. traffic signal controllers, CCTV camera systems, DMS, and communication hubs) and other departments/facilities/agencies. Where ever possible, it is recommended that the fiber optic communication alignments shall be routed to provide "closed loops" in order to provide dual path redundant communications. The benefit of having dual path redundant communications is to maintain communication to the field elements in the event that a communication line is severed or disconnected along the closed loop. The communication equipment will recognize the break in primary link and will redirect communications to the secondary link; therefore, it minimizes disruption to the system, maintains communications, and allows time for repairs and maintenance.



4.9.5.3 COMMUNICATION HUBS

Communication hubs shall be placed at strategic locations throughout the City of Tracy, typically at major signalized intersections. The communication hubs act as a major data and video collection point. The communication hubs provide communication linkage between the field elements to the City's TMC. In addition, communications from the field hubs shall be bidirectional (two-way); therefore, they can be linked to other field communications hubs as well as the TMC, which facilitates and supports the proposed dual path redundant communication topology. The placement of the communication hubs shall be determined by analyzing the roadway network and defining "groups" of ITS elements (i.e. signalized intersections, CCTV, DMS and other ITS components) that will be linked together as well as to the proposed communication hub. *For example: A communication hub will be provided for field elements located in the southeast quadrant of the City*. Field communication hubs consist of Type 332 cabinet assemblies and typically house Ethernet switches and fiber distribution units. Also, the City's TMC is considered as the primary communication hub in the network.

4.9.5.4 CLOSED CIRCUIT TELEVISION SYSTEMS

Closed Circuit Television (CCTV) systems shall be placed at strategic locations in the field, typically at freeway interchanges, at signalized intersections that intersect major roadways/crossing arterials, at major trip generating land uses and/or to monitor DMS displays. Along major roadway segments or freeway segments, CCTV cameras are installed at ¼ of a mile or ½ mile apart. If the line-of-sight is obstructed by horizontal and/or vertical roadway curvature, buildings, landscaping/trees, monuments, etc. alternative CCTV camera locations shall be considered, as necessary. In addition, the type of future development or developments with major traffic generators may require additional CCTV camera at minor and major project intersections. These locations shall be evaluated on a case by case basis.

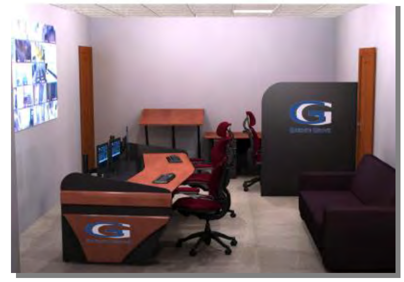
To determine the placement of CCTV cameras it is recommended to conduct a line-of-sight and path analysis using a bucket truck in order to select a location where the coverage area can be optimized. The line-of-sight and path analysis shall be conducted prior to construction to reduce or eliminate complications that may arise during construction. In addition, CCTV cameras are typically mounted to traffic signal poles under the luminaire mast arm or on stand alone poles.

4.9.5.5 DYNAMIC MESSAGE SIGN SYSTEMS

Dynamic message sign (DMS) systems on mobile trailers shall be placed at strategic locations, typically along major corridors entering the City of Tracy and/or at locations within the City directing motoring travelers to major events and/or land uses. Future heavy traveled corridors may require additional DMS to enhance the capacity along the roadways segments. These locations shall be evaluated on a case by case basis.

To determine the placement of the trailer-based DMS, a sign visibility study and site analysis shall be prepared showing potential line-of-sight impacts to the public and right-of-way due to the installation of the DMS and cabinets. The analysis shall include showing the proposed location of each DMS and controller/service cabinets, sidewalks, right-of-way, curb, gutter, roadway, travel lanes, driveways, adjacent buildings boundary and other above ground obstructions that may have an impact to the visibility of the sign.

TRAFFIC MANAGEMENT CENTER



The City of Tracy's Traffic Management Center (TMC) shall be the primary hub of the transportation management system communications, where information from the transportation communication network is collected and combined with other operational, video, and control data to manage the transportation network and produce traveler information. It is the focal point for communicating transportation-related information to the City's website, the media, the motoring public, and a place where agencies can coordinate their responses to traffic situations and conditions. The TMC links various ITS elements within the City such as traffic signals, CCTV systems, DMS systems, field communication hubs, and other ITS elements enabling decision makers to identify and react to an incident in a timely manner based on real time data.

The City of Tracy's proposed Traffic Management Center (TMC) shall consist of state-of-the-art technology and shall be designed as a scalable and expandable system for integration of future ITS components, future signalized intersections, and inter-agency coordination. Planning for a new TMC shall include determining the TMC room location, the TMC environment-controlled equipment control room, and an evaluation of the latest TMC equipment and technology. It shall include the preparation of conceptual plans illustrating the potential video wall/location, TMC operator workstations and furniture, equipment rack, and TMC equipment control hardware and software.

City's existing TMC equipment/technology/traffic management system shall be evaluated and a transition plan shall be developed in order to migrate from the current traffic management system to the selected centralized traffic management system that can be integrated with minimum disruption to the existing signalized intersections and can be maintained concurrently with the City's signalized intersections.

4.9.5.6 OTHER ITS ELEMENTS

As the part of the planning for the City's ITS system infrastructure, other ITS elements should be considered and the City's ITS system infrastructure shall have the capacity to operate and manage these systems, including, but not limited to:

- Transit Signal Priority (TSP) Systems
- Emergency Vehicle Pre-Emption Systems
- Construction Work Zone ITS Management Systems
- Parking Management ITS Systems
- Advanced Traveler Information Systems
- Transit Traveler information Systems
- Incident Response Systems
- Incident Detection Systems
- Additional System Detection

These aforementioned systems shall be evaluated, prioritized, and deployed based on the City's needs and funding resources.

4.9.5.7 DEVELOPMENT OF CITY'S ITS MASTER PLAN – ROADMAP FOR DEPLOYMENT OF ITS INFRASTRUCTURE

Based on analyzing and applying the principles from the aforementioned topics, the City of Tracy's proposed future ITS infrastructure plan has been developed. **Figure 4.21** shows the proposed Horizon Year Intelligent Transportation System Infrastructure Plan. It provides an overview of the City's recommended ITS infrastructure under Horizon Year build-out conditions and shall be considered as a high level planning tool in order to develop the City's ITS Master Plan, which shall be utilized to provide the City with a roadmap for the deployment of proposed ITS infrastructure.

The City of Tracy's ITS Master Plan should be prepared as a separate document, which consists of analyzing and applying in more detail the principles from the aforementioned topics to determine the following:

- Communication architecture
- Communication network
- Communication hubs
- Closed Circuit Television (CCTV) Systems
- Dynamic Message Sign (DMS) Systems
- Other ITS components

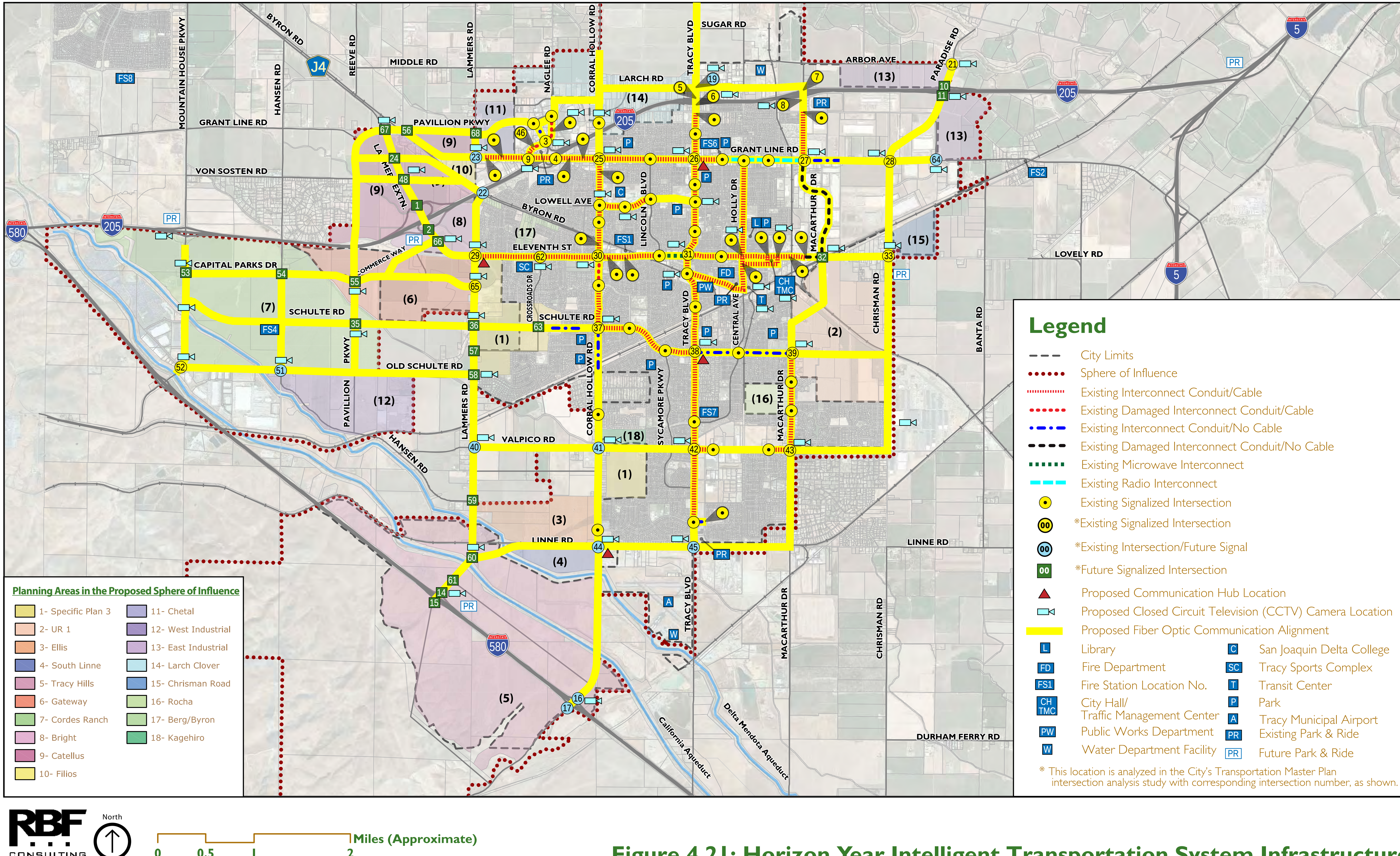
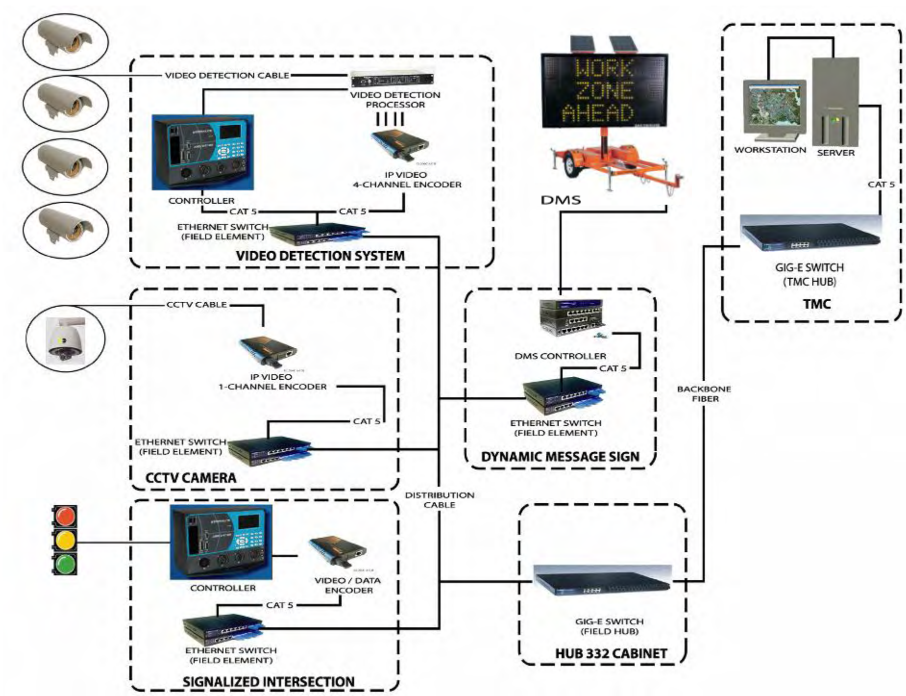


Figure 4.21: Horizon Year Intelligent Transportation System Infrastructure

In addition, the ITS Master Plan shall include the following sections.

MASTER PLAN DEPLOYMENT

This section should provide the system level communications design for the City of Tracy. It should provide detailed communication requirements for the field devices, hub locations, and TMC. It should include the City's recommended ITS architecture. This section will identify the recommended technology at each intersection, hub and TMC based on recommendations developed. This section shall provide the deployment strategies, deployment priorities, deployment schedule, implementation phasing plan, and integrating new systems and technologies.



OPERATIONS AND MAINTENANCE

This section provides the needs for the operations and maintenance of the ITS elements including funds that should be allocated annually for operations and maintenance.

FUNDING

The requirements for many federal funding opportunities require that ITS be planned consistent with the guidelines provided in the National ITS Architecture. This section should identify funding sources for future ITS deployment.

4.10 TRUCK ROUTES

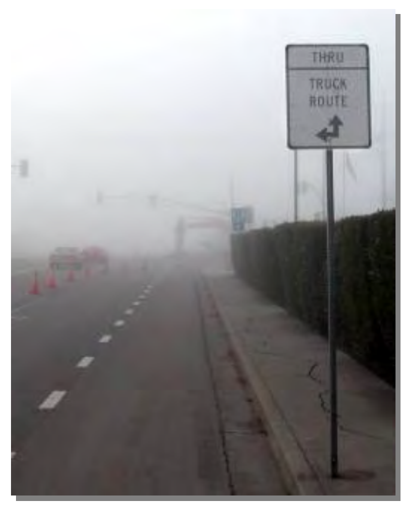
4.10.1 INTRODUCTION

This section documents the truck routes for designation on the circulation system for the Tracy Transportation Master Plan (TMP). The existing truck routes are indicted in **Chapter 2**, Existing Conditions. The City of Tracy Truck Routes Map was integrated into the TMP to identify roadways for enhanced pavement structure, accommodate design, and consider sound and noise impacts relative to land use development. Graphics are provided to illustrate existing and future truck routes. Planning for truck routes is based on the planned circulation system at buildout conditions, long-range traffic forecasts, the need to designate roadways for enhanced design elements, and consideration of land use development and sensitive land uses. Discussion is provided regarding existing and future truck routes, design elements, and resource documents.

4.10.2 PLANNING TRUCK ROUTES

As indicated in **Chapter 2**, three distinct truck routes are identified

- STAA Route
- Through Truck Route
- Local Truck Route



Identification of truck routes within the City of Tracy is based on the following criteria:

- Accounting for high volume routes utilized extensively by large vehicles currently or in the future;
- Routes with limited or no restrictions precluding use by trucks and combination vehicles;
- Routes with adequate geometrics for safe operation;
- Size of roadway lane widths;
- Routes already part of Interstate System (or National Network);
- Consideration of roadways with potentially unusual design characteristics or clearance limitations;
- Parallel roadway opportunities and access to freeway system.

Some local agency designated truck routes provide truck weight restrictions between routes, differentiate for example between 3 or 7 ton trucks.

4.10.3 FUTURE TRUCK ROUTES

Figure 4.22 shows the City of Tracy Truck Routes, which includes existing and future routes. As shown in **Figure 4.22**, truck route planning in the western portion of the City is planned to accommodate future development of heavy industrial, logistics, distribution center, and warehousing land uses. Truck routes are minimized through the existing developed areas to reduce impacts upon sensitive land uses and reduce trucking activity mixed with other modes of transportation.

4.10.4 TRUCK ROUTES DESIGN PLANNING

Design standards and guidance for roadway designs to accommodate trucks is provided through the following documents:

- *Code of Federal Regulations* Title 23 Part 658 (Federal Highway Administration)
- *A Policy on Geometric Design of Highway and Streets* (American Association of State Highway and Transportation Officials (AASHTO), 2004)
- *Highway Design Manual* (Caltrans, September 2010)

The Federal Highway Administration (FHWA) regulations identified above provides standards for STAA trucks, which includes the minimum truck sizes that all states must allow on the National Network

4.10.5 SMART GROWTH DESIGN ELEMENTS

The following Smart Growth design elements are relevant to truck route facilities planning:

- Maximum lane widths are 11 feet for all new roadway cross sections.
- Minimize truck route designation in areas where high levels of pedestrian, bicycle, and transit usage are desired since truck routes require increased curb returns at intersections increasing crossing distances for pedestrians and bicyclists.
- Where heavy trucking activity is proposed, consider provision of parallel Class I bicycle routes over the designation in the road hierarchy and consider the accommodation of pedestrians and bicyclists concurrent with truck turn analysis during design review.

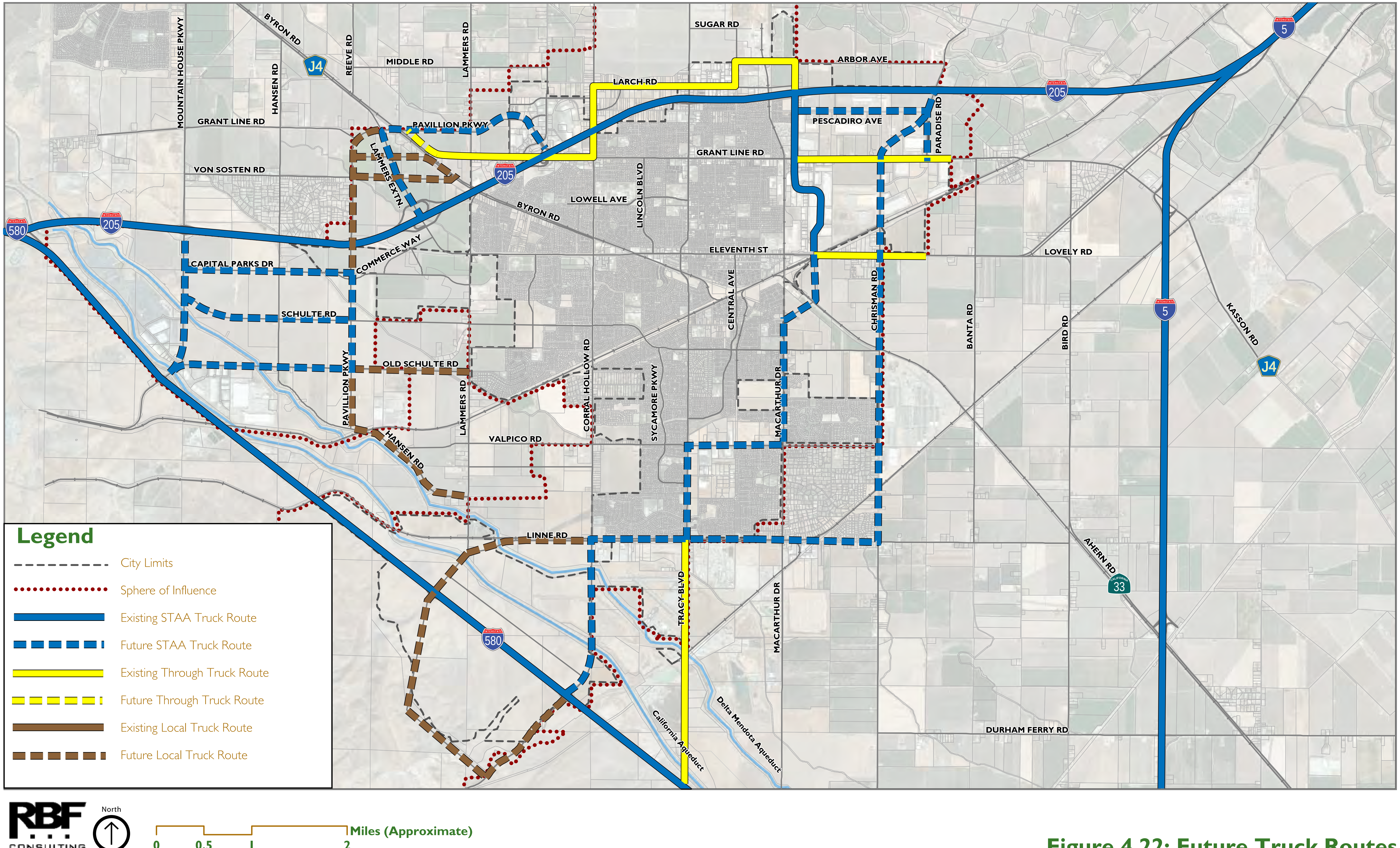


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Figure 4.22: Future Truck Routes

City of Tracy Transportation Master Plan

4.11 Air Quality and Smart Growth Design Elements

4.11.1 INTRODUCTION

San Joaquin County is required to monitor air pollutants in accordance with federal and state standards. Per the California Clean Air Act, air quality plans to work towards attainment of meeting of these standards must be submitted to the California Air Resources Board if regional standards are not satisfied. State legislation, SB 375, seeks to control urban sprawl by setting emission reduction goals for Years 2020 and Horizon Year and provides incentives for local agencies and developers to plan smart growth communities that encourage alternative modes of transportation.

Table 4.15-3 of the City of Tracy's *Draft Recirculated Supplement EIR* (July 2010) indicates that region is not projected to meet state and federal standards for various pollutants. The proposed General Plan is anticipated to increase the population in Tracy which will lead to an increase in vehicle trips and vehicle miles traveled (VMT). The General Plan includes a Sustainability Action Plan (SAP) that included feasible measures to achieve sustainability in multiple sectors and to reduce greenhouse gas (GHG) emissions. These measures include policies and measures to increase transit usage and opportunities, to improving traffic flow in the city, to support development of new bicycle and pedestrian facilities, and other land use policies. Even with the measures outlined in the SAP, the proposed General Plan is anticipated have a cumulative and significant impact to air quality and to greenhouse gas (GHG) emissions.

The City of Tracy's Transportation Master Plan seeks to build upon the foundation and strategies identified in the General Plan and in the SAP. This section discusses strategies, principles, and design elements in the area of transportation to work towards meeting sustainability and GHG emission reduction goals. Smart Growth design elements as it relates to various types of facilities are also discussed..

4.11.2 ROADWAY NETWORK

Measure T-5 of the SAP lists several smart growth, urban design and planning measures including amendments to the zoning ordinance to require adequate pedestrian access, closure of sidewalk gaps, establishment of walkability standards, and amendment or creation of subdivision design standards to address spacing and connectivity.

The Roadway Classification and Cross Section section discusses context-sensitive and smart growth principles that were used to develop the roadway cross sections. The use of narrow lanes improves mobility for all users thus promoting alternative modes of transportation other than single occupant vehicles. The primary benefit would be reduction in GHG emissions and increased mobility for non-motorists. The reduction in right-of-way requirements allows for additional landscaping to be provided which improves air quality.

The TMP includes policies to address spacing of access points and roadways and includes policies to maintain traffic flow and to reduce congestion which will improve air quality and to reduce GHG.

The TMP also allows for implementation of roundabouts which provide superior benefits to all-way stop and signalized intersections in terms of reducing delay, noise sustainability, and greenhouse gas emissions. Based upon a cursory evaluation of Horizon Year PM peak-hour volumes, approximately ¼ of the study intersections could be converted into a one-lane or two-lane roundabout as opposed to stop sign or traffic signal control (additional detailed operations and design will be required prior to implementation of a roundabout). The candidate locations for a roundabout are:

- Lammers Road & I-580 WB Off*
- Lammers Road & I-580 EB Off*
- Corral Hollow Road & I-580 WB Off
- Corral Hollow Road & I-580 EB Off
- Naglee Road & Middle Road
- Tracy Boulevard & Larch Road*
- MacArthur Drive & Arbor Avenue
- Chrisman Road & Arbor Avenue*
- Mountain House Parkway & Schulte Road
- Pavillion Parkway & Schulte Road*
- MacArthur Drive & Schulte Road*
- Hansen Road & Old Schulte Road*
- Mountain House Parkway & Capital Parks Drive
- Crossroads Drive & Shulte Road*

*Potential two-lane roundabout

A review of literature research (*Environmental Impact of Kansas Roundabouts*, Kansas State University, September 2003; *Use of Roundabouts in the City of Hamilton*, Hamilton Public Works Department, June 2008; *Modern Roundabouts, Global Warming, and Emissions Reductions*, Tony Redington) indicates that emission reductions of 20 to 60 percent were achieved based on case studies across the US.

4.11.3 BICYCLE AND PEDESTRIAN FACILITIES

Consistent with the policies in the General Plan and the Sustainability Action Plan, the TMP seeks to increase bicycle and pedestrian facilities. Bicycle and pedestrian facilities are provided on nearly all roadway classification types (except for industrial streets, one way streets, and alleys).

The policies and measures in the TMP will also be integrated with the Bike Master Plan. The following bicycle and pedestrian Smart Growth design elements are specified in the TMP:

- Since bridges, culverts, and over/underpasses often are spanning major obstacles within the community, when planning right-of-way, planning and design of facilities, consider opportunities to incorporate trails and bikeways within crossings.

- Width of on-street bike lanes is recommended at 5 feet with a desired width of 6 feet. However, wider bike lanes also encourage vehicular speeding when cyclists are not present. The TMP recommends 5 feet bicycle lanes where the lane is adjacent to a curb and 4 feet where the travel lane is adjacent to on-street parking. Off-street bicycle paths can be 8 feet for bicycle only facilities and 10 feet for shared (multi-use) facilities accommodating both cyclists and pedestrians.

- Limit bicycle use on sidewalk to avoid conflicts with streetscape and pedestrians.

- Provide bicycle detection traffic control devices consistent with the California MUTCD for Class II facilities.

4.11.4 PARK AND RIDE FACILITIES

As indicated in the Park and Ride Facilities section, future park and ride lots have been identified in the TMP. This strategy is consistent with Measure T-7 of the SAP: Implement San Joaquin's County's Park and Ride Lot Master Plan. Also, the TMP includes the two following Smart Growth design strategies as it relates to Park and Ride facilities:

- Consider opportunities to share parking facilities for Park and Ride use where parking operations provide complimentary peak demands. Examples of opportunities to utilize parking facilities for dual purpose includes theater or shopping center uses that have peak parking demands during the evening or weekend when a Park and Ride facility would otherwise be in low demand.

- Provide high level of connectivity, beyond typical design expectations for land use to connect to alternative transportation systems such as transit, bicycle, and park and ride facilities. With enhanced efforts to strengthen connectivity, a higher quality of life is provided through provision of multiple transportation options.

4.11.5 RAILROAD CROSSINGS

The following Smart Growth design elements are relevant to railroad crossing planning:

- Provide safe and efficient crossings for all modes across railroads to enhance connectivity between land uses and amenities.

4.11.6 TRUCK FACILITIES

The following Smart Growth design elements are relevant to truck route facilities planning:

- Maximum lane widths are 11 feet for all new roadway cross sections.
- Minimize truck route designation in areas where high levels of pedestrian, bicycle, and transit usage are desired since truck routes require increased curb returns at intersections increasing crossing distances for pedestrians and bicyclists.
- Where heavy trucking activity is proposed, consider provision of parallel Class I bicycle routes over the designation in the road hierarchy and consider the accommodation of pedestrians and bicyclists concurrent with truck turn analysis during design review.

4.11.7 SUSTAINABILITY POLICIES, STANDARDS, AND PERFORMANCE MEASURES

The sustainability policies and list of transportation elements in the Goals, Objectives, Policies, and Action section will further compliment the General Plan and the SAP. As indicated in the **Tables 4.1** and **4.2**, transportation elements are listed in these four categories to reduce GHG emissions and vehicle miles traveled:

- Transportation System Operations
- Land Use Integration
- Performance Measures
- Transportation Infrastructure

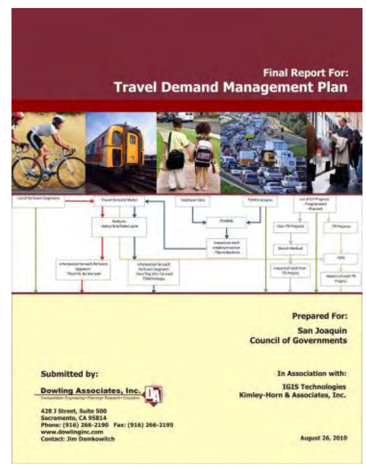
4.12 Transportation Demand Management

4.12.1 INTRODUCTION

A Transportation Demand Management (TDM) Plan is a set of strategies, measures and incentives to encourage residents and employees to walk, bicycle, use public transportation, carpool, or use other alternatives to driving alone. TDM measures encourage a shift to other modes of travel, boost economic efficiency of the transportation infrastructure, improve air quality, save energy, and reduce traffic congestion. The TDM measures discussed below will help the City of Tracy achieve the trip reduction and greenhouse gas emission targets outlined in the city's Sustainability Action Plan. A City TDM program will tier off the San Joaquin Council of Governments (SJCOG) TDM Plan.

4.12.2 TDM TOOLKIT

An effective TDM toolkit will contain measures that can be tailored and customized for various land uses. For example, measures that work effectively for office land uses may not generate a meaningful reduction in vehicle trips for retail or residential land uses.



San Joaquin Council of Governments (SJCOG) recently released a Travel Demand Management Plan (August 26, 2010) which identified a list of potential TDM strategies that may be used in the development of a TDM plan. The strategies are bundled into three incentive categories (financial, system, and demand) and are listed below:

Financial Incentives:

- Roadway pricing – charging motorists tolls for use of a roadway
- Area-wide pricing – charging motorists a toll to enter an area
- Parking pricing – charging motorists for parking
- Parking cash-out – providing a financial incentive for employees or residents in exchange for the parking space
- Employee travel allowance – providing a financial incentive for employees to carpool/vanpool or to use alternative modes of travel
- Transit pass – providing free or discounted transit passes to employees and residents

System Incentives:

- Provision of HOV lanes – providing high occupancy vehicle lanes to encourage carpooling
- Park and Ride lots – providing park and ride lots near transit hubs or central areas
- Transit service – expanding transit services
- Bicycle facilities – expanding bicycle facilities

Demand Incentives:

- Rideshare programs – services that matches riders interested in carpools and vanpools

- Carpool preferential parking – designated parking spaces for carpools
- Vanpool programs – vanpools or shuttles that transport employees to work and to transit centers
- Flexible work schedule – flexible work schedules that allow employees to travel during non-commute times
- Telecommuting – allowing employees to work remotely (e.g. home)
- Car sharing – providing car sharing service for residents and employees
- Bike sharing – providing use of bikes for short term use
- Guaranteed ride home – program that enables commuting employees to utilize taxi services in case of an emergency
- Information and guidance – resource information on TDM programs and measures
- TDM manager – designated person that assists in the management or implementation of a TDM program

SJCOG also operates a program, called Commute Connection that provides commute assistance. This program assists commuters with carpooling, vanpooling, and other rideshare options (bicycling, walking, and public transit). Commute Connection also offers ride matching services, Guaranteed Ride Home, and educational materials to employers.

4.12.3 TDM MEASURES

To relieve congestion and achieve the trip reduction and greenhouse gas emission targets outlined in the city's Sustainability Action Plan, the City of Tracy will require residential, commercial, and industrial developments to incorporate and implement the TDM measures in **Table 4.9**. The TDM measures are separated into two categories: base and additional. The base TDM measures are to be implemented by all developers. Additional TDM measures are measures that could be implemented by developers or required by City staff to mitigate or reduce impacts.

Table 4.9: City of Tracy TDM Measures

TDM Measure/Program	Developer Implements	Developer as Tenant or Employer Implements
Base TDM Measures		
Preferential carpool/vanpool parking spaces	X	X
Electrical/hybrid parking spaces	X	X
Sidewalk/trail improvements (consistent with recommendations in **Section 4.5**) along project frontage	X	

TDM Measure/Program	Developer Implements	Developer as Tenant or Employer Implements
Bicycle improvements (consistent with recommendations in **Section 4.5**) along project frontage	X	
Bicycle parking	X	X
Transit improvements (consistent with recommendations in **Section 4.13**) along project frontage		
Educational/Promotional materials		X
Additional TDM Measures		
Employee travel allowance		X
Transit passes		X
Carpool/vanpool programs		X
Flexible work schedule/tele-commuting		X
Car or bicycle sharing		X
Guaranteed ride home		X
TDM coordinator	X	X
Annual or Bi-annual monitoring/report	X	X

These measure will reduce traffic on the roadways system and is also required for obtaining future funding grants. It is a very important element to the success of ensuring mobility for Tracy residents.

4.13 Transit Facilities

4.13.1 INTRODUCTION

Future roadway capacity for private vehicle travel will be severely constrained as is evident in this Master Plan. A focus to shift trips from the private to the public system will have to occur to ensure mobility of the future generations. Tracy will be a hub for local and regional transit connections through the BART extension, the California Hi-Speed Rail system, and expansion of bus services internal and external to the City. This section documents infrastructure related to transit facility planning for the Tracy Transportation Master Plan (TMP). The existing transit facilities are described in **Chapter 2**, Existing Conditions.

As indicated on **Figure 3.1**, substantial growth is anticipated in the western, southern, and eastern portions of the city. This growth will add new residents and employees and result in new and increased demand for transit services.

4.13.2 PLANNED TRANSIT IMPROVEMENTS

This section describes new or planned transit service anticipated to be implemented over the next 20 years within the City of Tracy onm a Master Plan Level. A detailed service plan will have to be developed based on future travel demand. This Master Plan obliges the City and developers to provide transit infrastructure as part of the street system to promote transit usage. The provision of infrastructure cannot be pinned down until Spefici Plans and tentative maps for the individual developers are submitted, at which stage driveway access, walkability, connection to sidewalks and bicycle facilities will be detailed.

4.13.2.1 LOCAL FIXED-ROUTE BUS SERVICE (TRACER)

According to the City of Tracy's *Short Range Transit Plan* (SRTP) (December 2009), Tracer existing routes A, B, and C will be restructured to Routes 1 and 2 in FY 2012-13. Tracer service will be expanded to the Sycamore Parkway Area and east of Tracy Boulevard to new residential developments in southeast Tracy.

By FY 2017/2018, the new Route 3 will serve continue community growth anticipated in South Tracy along Valpico Road and south Tracy Boulevard and along Corral Hollow Road. **Figure 4.23** illustrates the new Tracer routes.

4.13.2.2 REGIONAL INTERCITY FIXED-ROUTE BUS SERVICE

According to the SRTP, a bus rapid transit (BRT) master plan was completed in 2006 by the San Joaquin Council of Governments and the San Joaquin Regional Transit District. This study identified and discussed potential rural and intercity bus rapid transit among several corridors. **Figure 4.23** identifies the one of the adopted corridors for possible future BRT service along the I-5/I-205/I-580 corridor.

4.13.2.3 BART EXTENSION

Bay Area Rapid Transit (BART) is currently constructing an extension to East Contra Costa County called eBART. eBART will allow riders to board a train in Antioch and connect to the Pittsburg/Bay Point BART station. A 50-year vision for transit improvements were presented in the SRTP and this vision included an eBART connection to the Tracy Transit Station as shown in **Figure 4.23**.

4.13.2.4 ALTAMONT COMMUTER EXPRESS/HIGH SPEED RAIL

The California High Speed Rail Authority is proposing high speed rail service between Sacramento and San Diego. The Altamont Corridor Rail project would provide a connection between San Joaquin Valley and the San Francisco Bay Area via the Altamont Pass and utilize the Altamont Commuter Express as a feeder to the California High Speed train system. The project is currently in the alternatives evaluation stage and the one of the two proposed alignment alternatives follows the Union Pacific railroad tracks through downtown Tracy as indicated in **Figure 4.23**. The 2nd alignment alternative follows the existing ACE alignment.

4.13.3 FUTURE TRANSIT FACILITIES ON TRACY ROADWAYS

Goal 4 of the City's Circulation Element is "A balanced transportation system that encourages the use of public transit and high occupancy vehicles." To strive towards meeting this goal, all existing and future roadways must consider transit improvements, as appropriate. Thus, all parkways/expressways, arterials, and collectors within the City's limits, as indicated in **Figure 4.23**, are to be designated "transit priority roadways." This would require property owners along these roadways to provide improvements to the transit infrastructure system when new or redevelopment is proposed. Improvements will consist of providing right-of-way at the far side of intersections and at development driveways to accommodate sheltered bus turnouts. In addition, coordination with the city and appropriate transit agency may be required to determine if improvements are warranted. Transit services will be closely linked the City ITS system for obtaining bus system information. Transit services will be better integrated and parallel services provided between the various operators. Standard Plans for bus shelters and turnouts are provided in the City of Tracy Standard Plans and will also be available from the City transit operator, TRACER.. The provision of bus pull-outs/shelters/stops shall be such to minimize walking distance to destinations, be provided on the far side of intersections. More design practices for on-street transit stops are provided in the APTA's Draft " Design on ON-Street Transit Stops and Access from Surrounding Areas".

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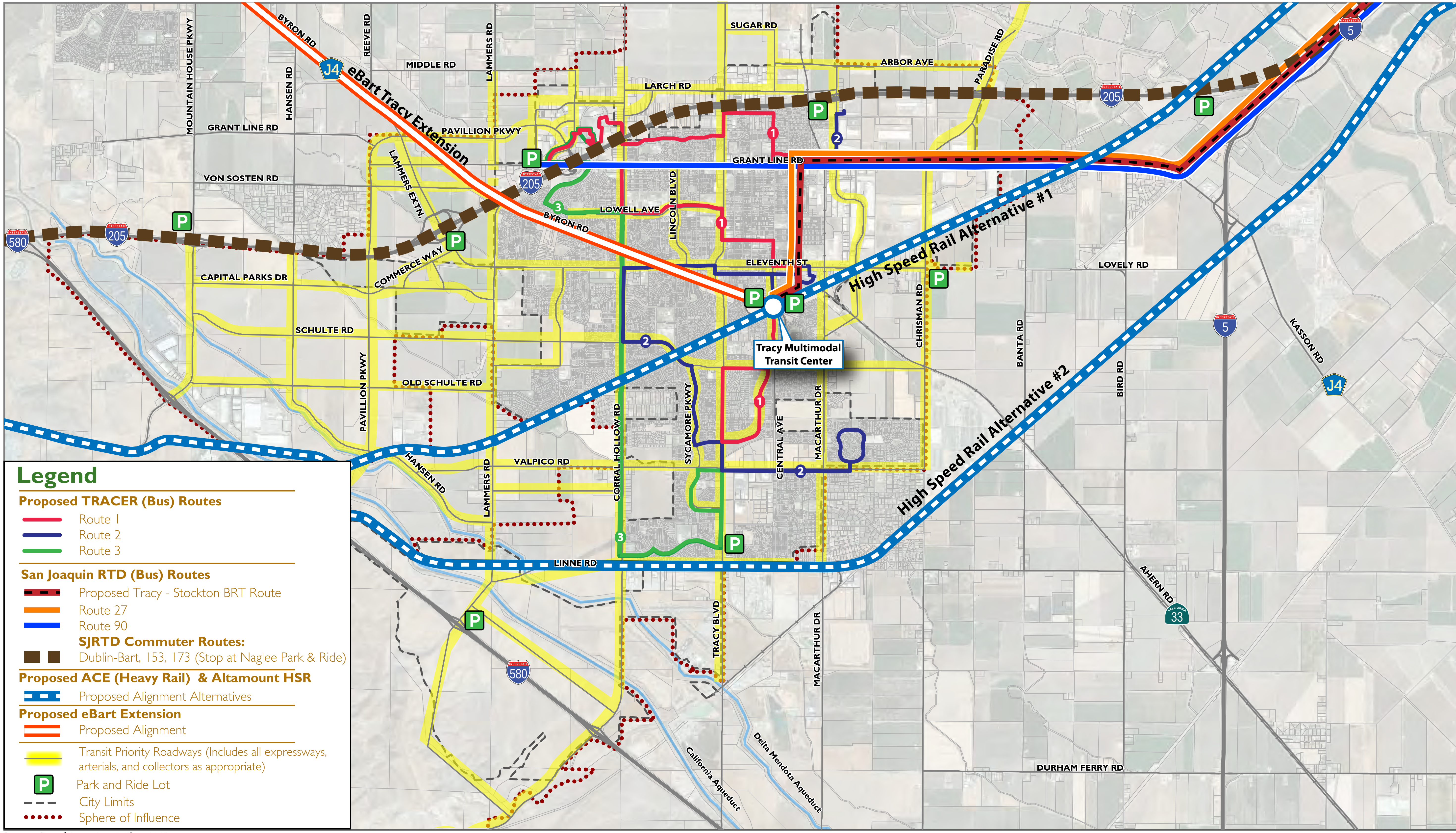

Source: City of Tracy Transit Plan, 2009

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North

0 0.5 1 2 Miles (Approximate)

Figure 4.23: Long Term Transit Service Plan

City of Tracy Transportation Master Plan

5. HORIZON YEAR TRANSPORTATION MASTER PLAN-COST ESTIMATES

5.1 INTRODUCTION

This chapter of the TMP presents an opinion of probable cost estimates for the proposed Horizon Year roadway network improvements as recommended in the previous sections. These cost estimates are based upon initial planning and should be further refined at a later date when additional studies and design of the improvements commence. Cost estimates were provided for the following facilities:

- Overpasses/Underpasses/Bridges/Culverts
- Intersections
- Roadway Segments
- Intelligent Transportation System
- Railroad Crossings

The total cost for all of these improvements is estimated at approximately $910 million as indicated in **Table 5.1**. The assumptions and methodology used to prepare these costs estimates for each individual category are discussed below.

Table 5.1: Total Preliminary Cost Estimates for Horizon Year TMP Infrastructure

Description	Preliminary Cost Estimate
Overpasses/Underpasses/Bridges/Culverts	$188,536,000
Intersections	$216,815,397
Roadway Segments (Program Costs)	$323,627,344
Intelligent Transportation System	$19,226,275
Total[2]	**$748,205,017**

[1]Program costs refer to the portion of roadway segment improvements that will be funded by the city.

[2]Total includes funding from Capital Improvement Program (CIP) or other funding sources.

5.2 OVERPASS/UNDERPASS/BRIDGE/CULVERT

Section 4.6 identified the overpasses, underpasses, bridges, and culverts that needed to be widened to accommodate Horizon Year growth. These locations are identified in **Tables 4.4 through 4.6**.

The cost estimates in **Table 5.2** assume that either the existing facility will be widened or a new replacement facility will be provided. The estimate takes into account the following factors:

- Length of structure including tapers and transitions
- Future width of facility based upon:
  - Horizon Year roadway classification
  - Future roadway cross sections
- Provision of pedestrian and bicycle facilities
- Other required design elements (K-rail and separation barriers)
- Right-of-way acquisition cost of $150,000 per acre
- Construction easement cost of $50,000 per acre
- Fees (20% contingency, 10% engineering and design, 15% construction management and administration)

A unit cost was applied to the area of the proposed widening or entire bridge replacement to determine the projected cost.

The average unit cost for constructing a new bridge ranges between $250 to 400 per square foot (s.f.) which includes both the superstructure and substructure. The lower end of the price range is for low structure height, no environmental constraints or aesthetic issues, dry conditions, no bridge skews, spread footings, and no stage construction. The higher end of price range is for long spans, high structure height, environmental constraints, aesthetic issues, wet conditions, skewed bridges, pile footings, and stage construction. For this analysis, an average unit cost of $300 per s.f. was used for a new bridge and a unit cost of $350 was used for widening of an existing bridge.

As indicated in **Table 5.2**, the resulting grand total to improve the overpasses, underpasses, bridges, and culverts is estimated at approximately $188.5 million which includes costs for contingencies, design and engineering, construction management, and right-of-way acquisition (see **Appendix I** for additional information regarding the cost estimates). This total includes CIP funding (funds from existing fee programs) for two projects at approximately $20 million.

Table 5.2: Preliminary Cost Estimates for Overpass/Underpass/Bridge/Culvert

	Replace or		Existing	Water Channel/	Future (BUILDOUT)						BO/Horizon Year	Future	Structure and	ROW	ROW/Easement	CIP Funding		Total	CIP Funding	
Type/Location	Widen	Length (ft)	Width (ft)	Freeway Length (ft)	Travel Width	# Lanes	Sidewalks	Bike Facility	Bike Width	K rail & Sep	Total Width	Area (ft^2)	Earthwork Cost	Area (ft^2)	Cost	Project #	Amount (c)	Cost	Project #	Amount (c)
Overpass/Underpass																				
I-580/Corral Hollow Road	Replace Bridge	350	34	155	52	4	5	lanes	10	4	80	28,000	$ 12,600,000	8,970	$ 31,000			$ 12,631,000		
I-580/Lammers Road	New Overcrossing	350	0	0	86	6	5	path	10	6	107	37,450	$ 16,853,000	37,450	$ 129,000			$ 16,982,000		
I-205 Pavilion Parkway overcrossing	New Overcrossing	350	0	155	52	4	5	path	10	6	80	28,000	$ 12,600,000	15,600	$ 54,000			$ 12,654,000		
I-580/Mountain House overcrossing	New Overcrossing	350	0	155	52	4	5	path	10	6	80	28,000	$ 12,600,000	15,600	$ 54,000			$ 12,654,000		
I-205/Paradise Road	Replace Bridge	290	34	155	52	4	5	path	10	6	80	23,200	$ 10,440,000	6,210	$ 21,000			$ 10,461,000		
Railroad Crossings																				
Lammers Road Railroad Crossing #2	New Bridge	100	0	100	86	6	5	path	10	6	107	10,700	$ 6,420,000	10,700	$ 37,000			$ 6,457,000		
11th Street/MacArthur Drive #9	New Bridge																	$ 29,000,000		$ 20,000,000
Chrisman Road Railroad Crossing at #22	New Bridge	100	0	100	86	6	5	path	10	6	107	10,700	$ 6,420,000	10,700	$ 37,000			$ 6,457,000		
Hansen Road Railroad Crossing #23	New Bridge	100	0	100	86	6	5	path	10	6	107	10,700	$ 6,420,000	10,700	$ 37,000			$ 6,457,000		
Lammers Road at Valpico Road #1	Widen from 2-4 lanes																	$ 300,000		
Corral Hollow Road north of Linne Road # 5	Widen from 2-4 lanes																	$ 300,000		
Tracy Boulevard north of Linne Road #8	Widen from 2-4 lanes																	$ 300,000		
MacArthur Drive south of 6th Street #15	Close, keep bike, ped																	$ 150,000		
Chrisman Road at Schulte Road #16	Widen from 2-4 lanes																	$ 300,000		
MacArthur Drive Extension #21	New 4 lane crossing																	$ 500,000		
Lammers Road at Byron Road #26 relocate: Grant L	Relocate 2 Lane Crossing																	$ 300,000		
Bridges																				
Delta Mendota Canal/Mountain House Parkway	Widen	335	36	115	64	4	0	path	10	4	78	14,070	$ 4,925,000	14,070	$ 16,000			$ 4,941,000		
California Aqueduct/Mountain House Parkway	Widen	350	72	115	86	6	0	path	10	4	100	9,800	$ 2,940,000	6,580	$ 23,000			$ 2,963,000		
Delta Mendota Canal/Old Schulte Road	Widen	325	49	110	71	4	0	path	10	4	85	11,700	$ 4,095,000	11,700	$ 13,000			$ 4,108,000		
Delta Mendota Aqueduct/Lammers Road	Replace	130	26	105	86	6	0	path	10	4	100	13,000	$ 3,900,000	9,620	$ 11,000			$ 3,911,000		
California Aqueduct/Lammers Road	Replace	170	24	130	86	6	0	path	10	4	100	17,000	$ 5,100,000	12,920	$ 15,000			$ 5,115,000		
Delta Mendota Canal/Corral Hollow Road	Replace	130	29	105	52	4	0	path	10	4	66	8,580	$ 2,574,000	4,810	$ 6,000			$ 2,580,000	73PP-054	$ 446,000
California Aqueduct/Corral Hollow Road	Replace	220	35	150	52	4	0	path	10	4	66	14,520	$ 4,356,000	6,820	$ 8,000			$ 4,364,000		
Culvert																				
Upper Main Canal/Lammers Road	Widen	65	93	30	86	4	0	path	10	4	100	455	$ 239,000	455	$ 1,000			$ 240,000		
Upper Main Canal/Corral Hollow Road	none	60	0	0	0	4	0	path	0	0	0	-	$ -	0	$ -			$ -		
Subtotal													**$ 112,482,000**		**$ 493,000**			**$ 144,125,000**		**$ 20,446,000**
Contingencies (20%)																		$ 28,825,000		
Engineering Design and Planing (10%)																		$ 14,413,000		
Construction Management (10%)																		$ 14,413,000		
Program Administration (5%)																		$ 7,206,000		
Grand Total																		**$ 208,982,000**		
Grand Total (With CIP Funding)																		**$ 188,536,000**		

Notes:
RR Bridge crossing : include 100% of bridge cost for earthwork estimate.
RR Crossing #24, Pavilion Parkway east of Lammerss cost included in intersection improvements.
RR Crossing #9, MacArthur Drive at 11th RR crossing included in Overpass.
Freeway overpasses and Lammer canal widening include 50% cost for earthwork/approaches
Length includes tapers/transition to main roadway
ROW cost of $150,000/acre assumed for overpass/underpass. Construction easement cost of $50,000/acre assumed for bridges and culverts.
New structure cost of $300/s.f. includes includes both the superstructure and substructure and assumes low structure height, no environmental constraints or aesthetic issues, dry conditions, no bridge skews, spread footings, and no stage construction.
Widening structure cost of $350/s.f.

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5.3 INTERSECTIONS

Figures 4.4a and **4.4b** identify the recommended Horizon Year lane geometry at the 65 study intersections plus intersections not analyzed that are required to accommodate the future demand and to maintain the level of service threshold per the City of Tracy and Caltrans level of service standards.

A per lane unit cost was derived to estimate the cost of widening an intersection leg to accommodate a through, left- or right-turn lane assuming a 250-foot lane or pocket. The unit cost included the following cost factors:

- Right-of-way (ROW) acquisition of 12 feet at $150,000 per acre
- Construction easement
- Structural section (concrete pavement, asphalt base, curb)
- Signing and striping
- Traffic signal installation or modification
- Fees (20% contingency, 10% engineering and design, 15% construction management and administration)

The per lane unit cost was multiplied by the number of additional lanes required under Horizon Year conditions. A more detailed cost estimate was prepared for the following key intersections due to unusual site constraints or because substantial earthwork/construction is required:

- #24 Byron Extension/Lammers Extension
- #44 Corral Hollow Road/Linne Road
- #45 Tracy Boulevard/Linne Road
- #56 Pavillion Parkway Extension/Grant Line Road Extension
- #67 Pavillion Parkway/Lammers Road

Appendix H contains concept plans for the above five intersections.

Unit costs were also developed for the following improvements:

- Traffic signal installation
- Roundabout
- Right-turn islands

The cost estimate for the I-205/Lammers Extension ramp intersections were obtained from the *I-205/Lammers Road Project Study Report* (Rajappan & Meyer Consulting Engineers, Inc., January 2006).

Table 5.3 summaries the proposed intersection cost estimates. The grand total for the intersection improvements is estimated at approximately $216 million (see **Appendix I** for additional information regarding the cost estimates). This total includes CIP funding in the total amount of approximately $19 million.

Table 5.3: Preliminary Cost Estimates for Intersections

Number	Intersection	Preliminary Cost Estimate	CIP #	CIP Funding	Amount Funded by TIF
1	I-205 WB Ramps/Lammers Extension	See Int #2			
2	I-205 EB Ramps/Lammers Extension	$ 58,340,000			$ 58,340,000
3	I-205 WB Ramps/Naglee Road	$ 45,000			$ 45,000
4	I-205 EB Ramps/Grant Line Road	$ 20,000,000			$ 20,000,000
5	I-205 WB Ramps/Tracy Boulevard	$ 369,000	72PP-064	$ 303,171	$ 65,499
6	I-205 EB Ramps/Tracy Boulevard	$ 327,000			$ 326,802
7	I-205 WB Ramps/MacArthur Drive	$ 14,441,000		$ 14,441,311	$ -
8	I-205 EB Ramps/MacArthur Drive	See Int #7			
9	Naglee Road (I-205 WB Ramps) /Grant Line Road	$ 426,000			$ 425,799
10	I-205 WB Ramps/Chrisman	$ 24,000,000			$ 24,000,000
11	I-205 EB Ramps/Chrisman	See Int #10			
12	I-580 WB Ramps/Mountain House Parkway	$ 515,000			$ 515,000
13	I-580 EB Ramps/Patterson Pass Road	$ 595,000			$ 595,000
14	I-580 WB Ramps/Lammers Road	$ 2,977,000			$ 2,977,004
15	I-580 EB Ramps/Lammers Road	$ 2,734,000			$ 2,733,603
16	I-580 WB Ramps/Corral Hollow Road	$ 327,000	72PP-030	$ 479,862	$ (153,060)
17	I-580 EB Ramps/Corral Hollow Road	$ 490,000			$ 490,203
18	Naglee Road/Middle Road	N/A			$ -
19	Larch Road/Tracy Boulevard	$ 792,000			$ 792,203
20	MacArthur Drive/Arbor Avenue	N/A			$ -
21	Paradise Road / Arbor Avenue	$ 1,119,000			$ 1,119,207
22	Lammers Road/Byron Road	$ 786,000			$ 785,603
23	Lammers Road/Grant Line Road	$ 900,000			$ 900,405
24	Byron Extension/Lammers Extension	$ 5,451,000			$ 5,451,000
25	Corral Hollow Road/Grant Line Road	$ 45,000	72PP-017	$ 319,200	$ (274,200)
26	Tracy Boulevard/Grant Line Road	$ 327,000	72018		$ 326,802
27	MacArthur Drive/Grant Line Road	N/A			$ -
28	Chrisman Avenue/Grant Line Road	$ 1,317,000	72PP-040	$ 385,400	$ 932,010
29	Lammers Road/Eleventh Street	$ 253,000	72024/7205	$ 200,000	$ 53,401
30	Corral Hollow Road/Eleventh Street	$ 45,000		$ 122,750	$ (77,750)
31	Tracy Boulevard/Eleventh Street	N/A			$ -
32	MacArthur Drive/Eleventh Street (North)	See Table 5.2			$ -
33	Chrisman Avenue/Eleventh Street (South)	$ 577,000			$ 577,004
34	Mountain House Parkway/ Schulte Road	$ 334,000			$ 333,603
35	Pavillion Extension/Schulte Road	$ 1,401,000			$ 1,400,810
36	Lammers Road/Schulte Road	$ 2,548,000	72068	$ 361,800	$ 2,186,217
37	Corral Hollow Road/Schulte Road	$ 417,000	72016	$ 167,053	$ 249,749
38	Tracy Boulevard/Schulte Road	$ 163,000			$ 163,401
39	MacArthur Drive/Schulte Road	$ 817,000			$ 817,004
40	Lammers Road/Valpico Road	$ 1,818,000			$ 1,817,815
41	Corral Hollow Road//Valpico Road	$ 1,234,000	72PP-053	$ 1,230,721	$ 3,288
42	Tracy Boulevard/Valpico Road	N/A	72038		$ -
43	MacArthur Drive/Valpico Road	$ 163,000	72037		$ 163,401
44	Corral Hollow Road/Linne Road	$ 8,945,000		$ 422,132	$ 8,522,868
45	Tracy Boulevard/Linne Road	$ 3,544,000		$ 178,291	$ 3,365,709
46	Naglee Road/Park and Ride	N/A			$ -
48	Lammers Extension/Van Sosten	$ 2,485,000			$ 2,485,022

Table 5.3 (Cont.): Preliminary Cost Estimates for Intersections

Number	Intersection	Preliminary Cost Estimate	CIP #	CIP Funding	Amount Funded by TIF
51	Hansen Road/Old Schulte Road	$ 900,000			$ 900,405
52	Mountain House Parkway/Schulte Road	N/A			$ -
53	Mountain House Parkway/Capital Parks Drive	$ 786,000			$ 785,603
54	Hansen Road/Capital Parks Drive	$ 1,421,000			$ 1,421,410
55	Pavillion Extension/Capital Parks Drive	$ 2,370,000			$ 2,370,220
56	Pavillion Extension/Grant Line Extension	$ 19,865,000			$ 19,865,000
57	Lammers Road/Crossroads Drive	$ 1,317,000			$ 1,317,410
58	Lammers Road/Schulte Road	$ 1,536,000			$ 1,536,211
59	Lammers Road/Ellis Drive	$ 1,818,000			$ 1,817,815
60	Lammers Road/Linne Road	$ 2,151,000			$ 2,151,418
61	Lammers Road/South Aqueduct Road	$ 2,151,000			$ 2,151,418
62	Crossroads Drive/Eleventh Street	N/A			$ -
63	Crossroads Drive/Schulte Road	$ 1,818,000			$ 1,817,815
64	Paradise Road/Grant Line Road	$ 1,151,000			$ 1,150,608
65	Lammers Road/Capital Parks Drive	$ 1,755,000			$ 1,755,013
66	Lammers Road/Commerce Way	$ 3,308,000			$ 3,308,229
67	Pavillion Parkway/Lammers Extension	$ 18,172,000			$ 18,172,000
68	Pavillion Parkway/Lammers Road	$ 1,568,000			$ 1,567,612
a	Hansen Road/Schulte Road	$ 483,000			$ 483,401
b	Pavillion Parkway/Grant Line Road	$ 567,000			$ 566,802
c	Pavillion Parkway/Von Sosten Road	$ 734,000			$ 733,603
d	Pavillion Parkway/Old Schulte Road	$ 650,000			$ 650,203
e	Pavillion Parkway/Hansen Road	$ 650,000			$ 650,203
f	Commerce Way (West)/Capital Parks Drive	$ 817,000			$ 817,004
g	Commerce Way (East)/Capital Parks Drive	$ 734,000			$ 733,603
h	Hansen Road/Valpico Road	$ 734,000			$ 733,603
i	Lammers Road/Connector Road(South Valpico)	$ 984,000			$ 983,806
j	Linne Road/Delta Mendota Link Road	$ 984,000			$ 983,806
k	Corral Hollow Road/Delta Mendota Link Road	$ 817,000			$ 817,004
l	MacArthur Drive/MacArthur Drive (North)	$ 734,000			$ 733,603
m	Chrisman Road/Valpico Road	$ 167,000		$ 241,071	$ (74,269)
n	Chrisman Road/Shulte Road	$ 900,000			$ 900,405
o	Chrisman Road/Paradise Road	$ 584,000			$ 583,806
p	Corral Hollow Road/Larch Road	$ 734,000			$ 733,603
q	Corral Hollow Road/Auto Plaza Drive	$ 984,000			$ 983,806
r	Naglee Road/Auto Plaza Drive	$ 567,000		$ 309,008	$ 257,794
	Total	**$ 235,978,000**		**$ 19,161,770**	**$ 216,815,397**
Notes:	Ints 1 & 2 costs obtained for Alternative 6 from I-205/Lammers Road PSR (January 2006)				

5.4 ROADWAY SEGMENTS

Similar to the process undertaken to estimate the intersection costs, a unit cost was developed for the various roadway types. The cost factors used for the intersections were also used in the roadway segments. In addition, costs to provide streetlights and to coordinate with utility companies were included.

Table 5.4 presents the list of new roadways that will be constructed or existing roadways that will be widened under Horizon Year and for certain roadways, SOI Buildout Conditions. Program costs were calculated based upon right-of-way acquisition and roadway improvements costs. Right-of-way acquisition costs were based upon SOI buildout conditions. ROW and Improvement costs were based upon SOI Buildout conditions for Mountain House Parkway and Lammers Road. Horizon year costs were calculated based on the frontage policy described below.

Included in the roadway segment cost estimates are costs to construct temporary sidewalks or bike paths. Temporary sidewalks or paths would be constructed to provide a continuous connection between adjacent developed and undeveloped parcels. The cost of temporary sidewalks and paths were estimated at 1/3 of the total cost to construct all sidewalks and bike paths in the TMP.

5.4.1 FRONTAGE POLICY

A frontage policy was developed as part of this TMP to identify the basic roles and responsibilities of the City and the Developers with respect to future roadway cross-sections within the City of Tracy.

Figure 5.1 illustrates responsibility of the City and the Developer based on roadway type, 2-lane, 4-lane and 6-lane facilities. The interim roadway section may include a 2-lane design segment or a 4-lane design segment depending on the type of roadway. In general, the City shall be responsible for construction of inside lanes including median and streetlights (roadway with four or more lanes). The developer shall be responsible for completing the remaining improvements for the cross-section, including outside lanes (roadway with four or more lanes), shoulders, landscaping, sidewalks, bike lanes /bikeways, and streetlights (roadway with two lanes). The City's responsibility is referred to as "Program Costs." It is recognized that construction of these roadways may occur in phases based upon available funding and development demands. Under the scenario where a roadway would be constructed prior to development in the area, responsibilities of the City and the Developer are illustrated in **Figure 5.1**. However, the roadway corridor should be preserved to accommodate the ultimate cross-section, including shoulders, sidewalks, landscaped, curb and gutter, a raised median, and storm sewer per the Horizon Year Roadway Network. Paved trails /bike lanes may be included on one or both sides.

The TMP indicates ROW requirements for Horizon Year and SOI Buildout.. However, due to the uncertainty of long term future development, these ROW requirements may change. To accommodate a change in potential future ROW, the following requirements are established for all future development.

1. If a Specific Plan or Development Project requires additional roadway travel lanes than indicated in this TMP for SOI Buildout conditions, the project shall mitigate its impact through implementation sustainable development policies by: (1) improving transit usage by employees, and (2) implementing TDM measures, as prescribed by the City and the SJCOG. If the project cannot demonstrate adequate mitigation, additional ROW and roadway improvements would be provided and funded solely by the applicant.
2. If a Specific Plan and Development Project require less ROW than indicated in the Traffic Analysis Study for the project for SOI Buildout conditions, the applicant shall provide an Irrevocable Offer of Dedication (IOD) to the City for the future ROW needs beyond the project ROW requirements. This ROW will remain under ownership and be maintained by the project applicant and only relinquished at the City request. The applicant will then be reimbursed for the subject property. The applicant shall not develop any improvements on the subject property described in the IOD, without prior approval from the City. Any improvements by the applicant will be constructed at the applicant's risk without reimbursement. The City may also relinquish the IOD, in which case ROW costs may be reimbursed to the applicant..

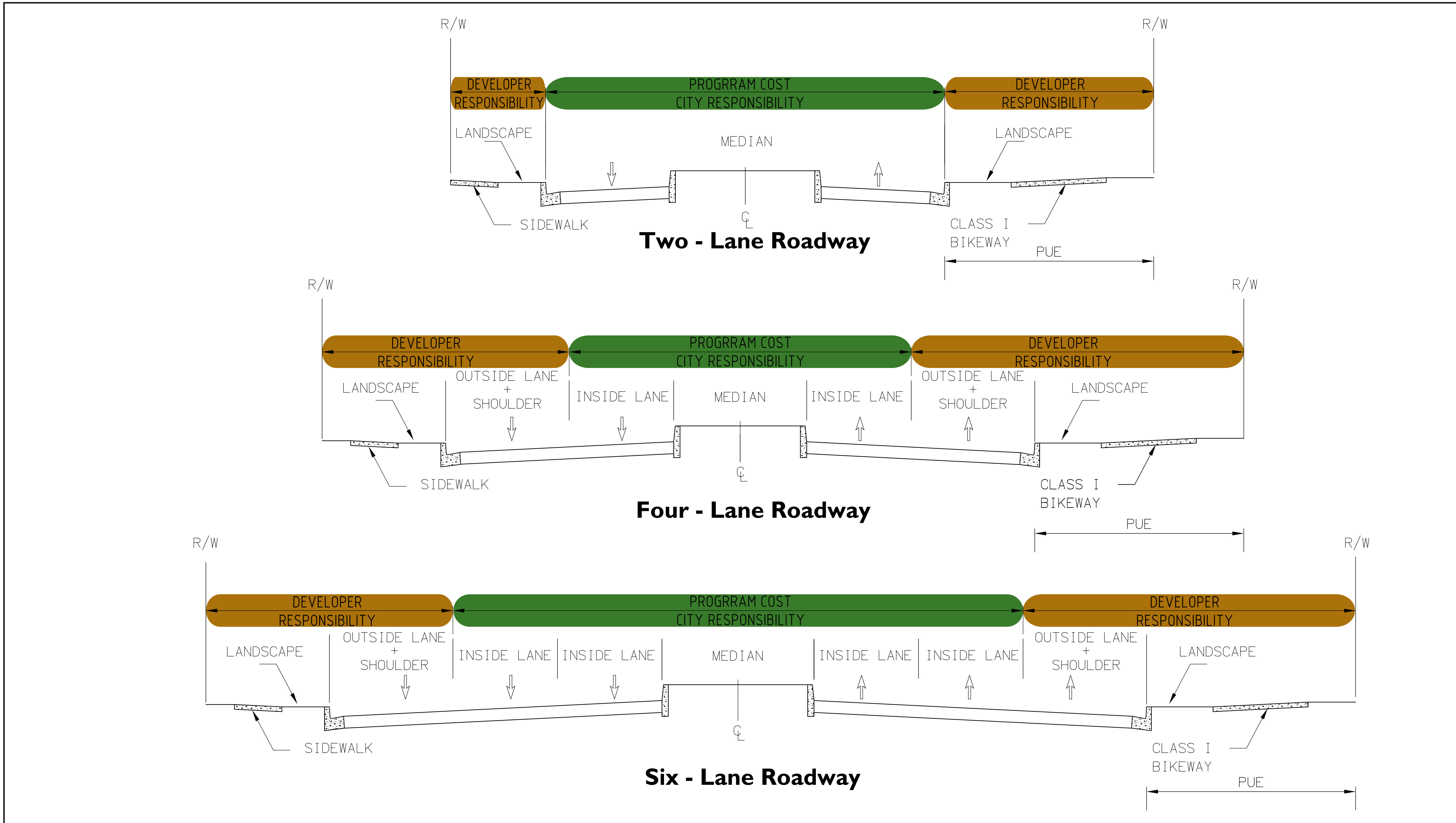

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Figure 5.1: Roadway Improvement Cross Section Responsibility Per Frontage Policy

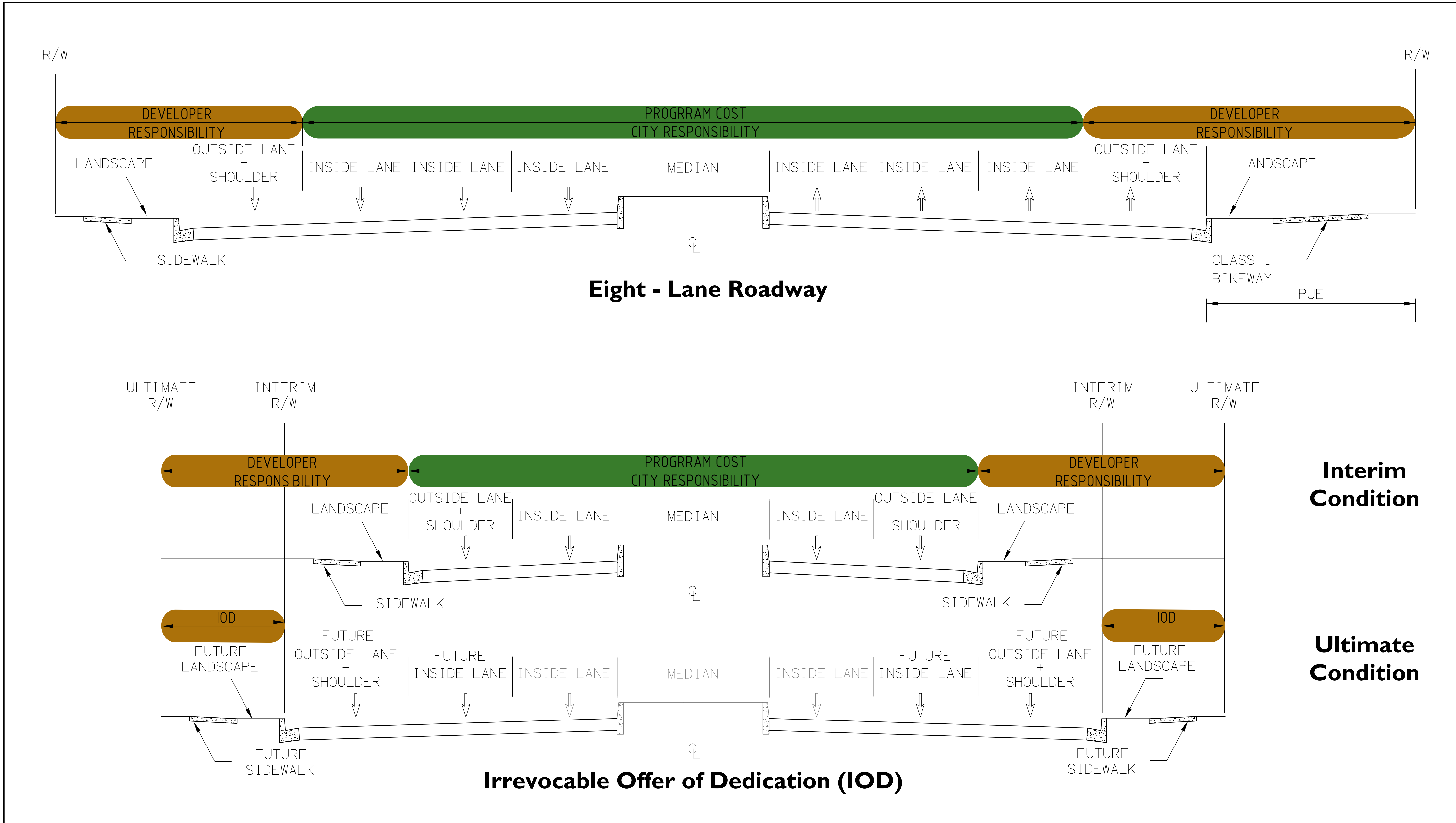

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Figure 5.2: Irrevocable Offer of Dedication (IOD) and Roadway Improvement Responsibility Per Frontage Policy

5.4.2 PROGRAM COSTS

The cost estimates in **Table 5.4** were based upon the City's responsibility as outlined in the Frontage policy section discussed above. As indicated in **Table 5.4**, the Program Costs for the roadway segments costs is estimated at approximately $340 million (see **Appendix I** for additional information regarding the cost estimates). This total includes CIP funding in the total amount of approximately $35 million.

Table 5.4: Preliminary Cost Estimates for Roadway Segments

Segment	From	To	Roadway Type	Program Cost	CIP Project #	CIP Funding
Construction of New Roadways						
Capital Parks Dr	Mountain House Pkwy	New Street	new 4L undiv Arterial	$ 2,710,000		
Capital Parks Dr	New Street	Hansen Rd	new 4L undiv Arterial	$ 2,650,000		
Capital Parks Dr	Hansen Rd	Pavillion Ext	new 4L undiv Arterial	$ 4,040,000		
Capital Parks Dr	Pavillion Ext	New Street	new 4L undiv Arterial	$ 1,900,000		
Capital Parks Dr	New Street	New Street	new 4L undiv Arterial	$ 2,370,000		
Capital Parks Dr	New Street	New Street	new 4L undiv Arterial	$ 1,920,000		
Capital Parks Dr	New Street	Lammers Rd	new 6L Arterial	$ 1,750,000		
Schulte Rd	Mountain House Pkwy	New Street	new 2L Arterial	$ 6,340,000		
Schulte Rd	New Street	Hansen Rd	new 2L Arterial	$ 2,850,000		
Schulte Rd	Hansen Rd	Pavillion Ext	new 4L undiv Arterial	$ 4,770,000		
Schulte Rd	Pavillion Ext	New Street	new 4L undiv Arterial	$ 2,820,000		
Schulte Rd	New Street	New Street	new 4L undiv Arterial	$ 1,330,000		
Schulte Rd	Lammers Rd	Crossroads Dr	new 4L undiv Arterial	$ 3,440,000	73PP-049	$ 283,427
Schulte Rd	Crossroads Dr	Edge of Development	new 4L undiv Arterial	$ 1,190,000		
New E-W Street (south of Valpico)	Wilkinson Wy	Corral Hallow Rd	new 2L Collector	$ 1,370,000		
Linne Rd	Lammers Rd	Light Industrial Rd	new 4L Parkway	$ 1,110,000		
Linne Rd	Light Industrial Rd	Corral Hallow Rd	new 4L Parkway	$ 10,750,000		
Light Industrial Rd	Linne Rd	Corral Hallow Rd	new 4L undiv Arterial	$ 7,240,000		
Pavillion Pkwy	Grant Line Rd	Byron Rd/11th St	new 4L Arterial	$ 620,000		
Pavillion Pkwy	Grant Line Rd/RR	Lammers Rd	new 6L Arterial	$ 7,320,000		
Pavillion Pkwy	Lammers Rd	Power Rd	new 4L Arterial	$ 5,100,000		
Byron Rd	Pavillion Ext	Byron Rd/11th St	new 2L Arterial	$ 1,130,000		
Byron Rd	Byron Rd/11th St	Byron Rd	new 2L Arterial	$ 3,130,000		
New Street	Property Line	Larch Rd	new 4L undiv Arterial	$ 1,080,000		
Power Rd	Pavillion Pkwy	Grant Line Rd	new 6L Arterial	$ 4,550,000		
Chrisman Rd	Grant Line Rd	Paradise Rd	new 6L Parkway	$ 5,520,000		
Auto Plaza Ext	Power Rd	Naglee Rd	new 4L undiv Arterial	$ 2,350,000		
Auto Plaza Ext	Naglee Rd	Corral Hallow Rd	new 4L undiv Arterial	$ 3,000,000		
Lammers Ext	Byron Rd	Pavillion Pkwy		$ -		
Lammers Ext	Pavillion Pkwy	Byron Rd	new 6L Parkway	$ 2,590,000		
Lammers Ext	Byron Rd	Von Sosten Rd	new 6L Parkway	$ 1,890,000		
Lammers Ext	Von Sosten Rd	I-205 On/Off Ramps	new 6L Parkway	$ 2,580,000		
Lammers Ext	I-205 On/Off Ramps	I-205 On/Off Ramps		$ -		
Lammers Ext	I-205 On/Off Ramps	Commerce Wy	new 6L Parkway	$ 490,000	Ellis	$ 506,190
Lammers Ext	Commerce Wy	11th St	new 6L Parkway	$ 2,810,000		
Pavillion Ext	Grant Line Rd	Byron Rd	new 4L Arterial	$ 2,270,000		
Pavillion Ext	Byron Rd	Von Sosten Rd	new 4L Arterial	$ 2,450,000		
Pavillion Ext	Rancho Ramon Dr	I-205	new 4L Arterial	$ 2,850,000		
Pavillion Ext	I-205	Capital Parks Dr	new 4L Arterial	$ 3,640,000		
Pavillion Ext	Capital Parks Dr	Schulte Rd	new 4L Arterial	$ 3,860,000		
Pavillion Ext	Schulte Rd	Old Schulte Rd	new 4L Arterial	$ 5,250,000		
Pavillion Ext	Property Line	Hansen Rd	new 4L Arterial	$ 2,790,000		
Commerce Wy	Byron Rd/11th St	New Street	new 6L Parkway	$ 3,120,000		
Commerce Wy	New Street	Capital Parks Dr	new 4L undiv Arterial	$ 590,000		
New Street	Commerce Wy	Capital Parks Dr	new 4L undiv Arterial	$ 1,800,000		
Crossroads Dr	Lammers Rd	Curve	new 2L Arterial	$ 5,610,000		
Crossroads Dr	Curve	Schulte Rd	new 2L Arterial	$ 1,630,000		
Crossroads Dr	Schulte Rd	Property Line	new 4L Arterial	$ 2,000,000		
MacArthur Dr	11th St	Curve	new 4L undiv Arterial	$ 2,530,000		
MacArthur Dr	Curve	MacArthur Dr	new 4L undiv Arterial	$ 2,380,000		
Lammers Rd	I-580 EB Ramp	Old Schulte Road	new 4L Parkway	$ 23,110,000		$ 3,632,177
Larch Rd	Corral Hollow Rd	Tracy Blvd	new 4L undiv Arterial	$ 5,730,000		
Larch Rd	Tracy Blvd	east terminus	new 4L undiv Arterial	$ 4,660,000		
Mountain House Parkway	I-205	Capital Parks Dr	new 8L Parkway	$ 2,940,000		
Mountain House Parkway	Capital Parks Dr	Schulte Rd	new 6L Parkway	$ 2,560,000		
Mountain House Parkway	Schulte Rd	Old Shulte Rd	widen to 4L Parkway	$ 2,970,000		

Table 5.4 (Cont.): Preliminary Cost Estimates for Roadway Segments

Segment	From	To	Roadway Type	Program Cost	CIP Project #	CIP Funding
Widening of Existing Roadways						
Hansen Rd	I-205 Overpass	Old Schulte Road	widen 2L to 4L undiv Arterial	$ 7,010,000		
Lammers Rd	s/o Middle	Grant Line Rd	widen 2L to 4L undiv Arterial	$ 3,300,000		
Lammers Rd	school	Old Schulte Rd	widen 2L to 6L Parkway	$ 6,590,000	73PP-047	$ 1,641,613
Corral Hollow Rd	I-205	Grant Line Rd	widen 2L to 6L Arterial	$ 1,950,000		
Corral Hollow Rd	Grant Line Rd	11th St	widen 4L to 6L Arterial	$ 9,510,000		
Corral Hollow Rd	11th St	Schulte Rd	widen 4L to 6L Arterial	$ 6,440,000	73103	$ 2,323,100
Corral Hollow Rd	Schulte Rd	RR	widen 2L to 6L Parkway	$ 2,560,000		
Corral Hollow Rd	RR	Valpico Rd	widen 2L to 4L Arterial	$ 5,970,000	73PP-046	$ 4,652,275
Corral Hollow Rd	Valpico Rd	Linne	widen 2L to 4L Arterial	$ 7,020,000		
Corral Hollow Rd	Linne Rd	I-580 WB Ramp	widen 2L to 4L Arterial	$ 10,910,000		
Corral Hollow Rd	I-580 EB Ramp	Southern City Limit	widen 2L to 4L Arterial	$ 2,900,000		
Holly Dr	11th St	First St	restripe only	$ 640,000		
Chrisman	Grant Line Rd	11th St	widen 2L to 6L Parkway	$ 5,990,000		
Chrisman	11th St	Schulte Rd	widen 2L to 4L Parkway	$ 7,860,000		
Chrisman	Schulte Rd	Valpico	widen 2L to 4L Parkway	$ 7,860,000		
Grant Line	Byron Rd	Lammers Rd	widen 2L to 4L Arterial	$ 2,810,000		
Grant Line	Lammers Rd	Naglee Rd	widen 4L to 6L Arterial	$ 3,440,000		$ 633,620
Grant Line	Parker Dr	Holly St	widen 2L to 4L undiv Arterial	$ -	73052	
Grant Line	w/o Chrisman Rd	Chrisman Rd	widen 2L to 4L undiv Arterial	$ 2,910,000		
Grant Line	Chrisman Rd	Paradise Rd	widen 2L to 4L undiv Arterial	$ 2,150,000	73048	$ 14,995,020
Grant Line	Paradise Rd	Banta Rd	widen 2L to 6L Arterial	$ 4,340,000		
Lowell Dr	w/o Orchard	Corral Hollow Rd	widen 2L to 4L undiv Arterial	$ 2,550,000		
Schulte Rd	MacArthur Dr	Chrisman Rd	widen 2L to 4L undiv Arterial	$ 4,570,000		
Valpico Rd	east of Wikinson Wy	Corral Hollow Rd	widen 2L to 4L Arterial	$ 3,760,000	73PP-051	$ 545,175
Valpico Rd	Corral Hollow Rd	w/o Sycamore Parkway	widen 2L to 4L Arterial	$ 4,640,000		$ 81,211
Valpico Rd	Tracy Blvd	Glenbriar Dr	widen 2L to 4L Arterial	$ 4,580,000	73061 & 73095	$ 4,709,785
MacArthur Dr	New Street	Schulte Rd	widen 2L to 4L Arterial	$ 2,130,000		
Linne Rd	Corral Hollow Rd	Tracy Blvd	widen 2L to 6L Parkway	$ 7,940,000	73PP-097	
Linne Rd	Tracy Blvd	w/o MacArthur Dr	widen 2L to 4L Parkway	$ 5,450,000		$ 744,671
Old Schulte Rd	Mountain House Pkwy	Hansen Rd	construct new 2L parkway	$ 1,420,000		
Old Schulte Rd	Hansen Rd	Pavillion Ext	Reconstruct 2L Parkway	$ 7,810,000		
Segments Outside SOI Limits						
Schulte Rd	New Street	Lammers Rd	new 4L undiv Arterial	$ 2,650,000		
Valpico Rd	New Street	Lammers Rd	new 2L Arterial	$ 6,770,000		
Valpico Rd	Lammers	east of Wikinson Wy	widen 2L to 4L Arterial	$ 7,380,000		
New East-West Street (south of Valpico)	Lammers Rd	Wilkinson Wy	new 2L Collector	$ 390,000		
Hansen Rd	Pavillion Ext	Valpico Rd	new 2L Arterial	$ 4,530,000		
Hansen Rd	Valpico Rd	Lammers Rd	new 2L Arterial	$ 7,950,000		
New North-South Rd	Schulte	Old Schulte	new 2L Collector	$ 20,000		
New North-South Rd	north of Schulte	Old Schulte	new 4L undiv Arterial	$ 590,000		
Commerce Wy	north of Valpico Rd	Valpico Rd	new 2L Collector	$ 400,000		
			Subtotal New and Widening (Including Segments Outside SOI)	**$ 367,140,000**		**$ 34,748,264**
			Temporary Sidewalks/Bike Paths	**$ 9,891,680**		
			Other Funding Contribution (Gateway development)	**$ (2,373,197)**		
			CIP Funding	**$ (34,748,264)**		
			Total To Be Funded by TIF	**$ 339,910,219**		

Note: Structural costs (e.g. retaining walls) are not included. Traffic control systems and traffic signals are included in intersection or ITS costs.
Costs include streetlight costs ($16,000 per 250 ft) and utility coordination costs ($20,000 for segments less than 2,500' or $40,000 for segments > 2,500').

5.5 Intelligent Transportation System

Section 4.9 identified the future Horizon Year Intelligent Transportation System (ITS) infrastructure improvements. **Table 5.5** presents an estimate of the costs to implement these improvements. The projected ITS costs are estimated at approximately $19 million.

Table 5.5: Preliminary Cost Estimates for Intelligent Transportation System Infrastructure

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
	FIBER OPTIC COMMUNICATION SYSTEM INSTALLATION (TRAFFIC MANAGEMENT IMPROVEMENTS ONLY)				
1	Furnish and Install 3" Conduit (Including Pull Boxes)	LF	212,500	$35	$7,437,500
2	Furnish and Install 144 Strand Singlemode Fiber Optic Cable	LF	413,000	$4	$1,652,000
3	Signalized Intersection Upgrades (Includes Splice Vault/Enclosure/Communication Equipment/Controller & Cabinet Modifications)	EA	109	$20,000	$2,180,000
4	Furnish and Install CCTV Camera System (includes CCTV Camera, Cables, Mounting and Video Encoder)	EA	53	$15,000	$795,000
5	Furnish and Install DMS System (Including Display/Sign Structure/Pole/Foundation/Splice Vault/Cabinet/Communication Equipment). This TMP includes the use of DMS signs on trailers on an "as needed" basis. Future updates may reassess the use of standard DMS signs.	EA	0	$130,000	$0
6	Furnish and Install Field Communication Hub (Including Splice Vault/Enclosure/Communication Equipment/Cabinet)	EA	4	$30,000	$120,000
	SUBTOTAL				**$12,184,500**
	FIBER OPTIC COMMUNICATION SYSTEM INSTALLATION (PUBLIC WORKS DEPARTMENT)				
7	PUBLIC WORKS DEPARTMENT Furnish and Install Two (2) Workstations (Including Fiber Optic Cable/Conduit/Spice Vault-Enclosure and Communication Equipment/Equipment Rack/Ethernet Switch/Fiber Distribution Unit/Miscellaneous)	LS	1	$50,000	$50,000
	SUBTOTAL				**$50,000**
	FIBER OPTIC COMMUNICATION SYSTEM INSTALLATION (WATER DEPARTMENT)				
8	WATER TREATMENT PLANT Furnish and Install One (1) Workstation (Including Fiber Optic Cable/Conduit/Spice Vault-Enclosure and Communication Equipment/Equipment Rack/Ethernet Switch/Fiber Distribution Unit/Miscellaneous)	LS	1	$45,000	$45,000
	SUBTOTAL				**$45,000**
	FIBER OPTIC COMMUNICATION SYSTEM INSTALLATION (PARKS/LIBRARY)				
8	TRACY SPORTS COMPLEX Furnish and Install One (1) Workstation (Including Fiber Optic Cable/Conduit/Spice Vault-Enclosure and Communication Equipment/Equipment Rack/Ethernet Switch/Fiber Distribution Unit/Miscellaneous)	LS	1	$50,000	$50,000
9	EL PESCADERO PARK Furnish and Install One (1) Workstation (Including Fiber Optic Cable/Conduit/Spice Vault-Enclosure and Communication Equipment/Equipment Rack/Ethernet Switch/Fiber Distribution Unit/Miscellaneous)	LS	1	$50,000	$50,000
10	TRACY BALL PARK Furnish and Install One (1) Workstation (Including Fiber Optic Cable/Conduit/Spice Vault-Enclosure and Communication Equipment/Equipment Rack/Ethernet Switch/Fiber Distribution Unit/Miscellaneous)	LS	1	$50,000	$50,000
11	POWERS PARK Furnish and Install One (1) Workstation (Including Fiber Optic Cable/Conduit/Spice Vault-Enclosure and Communication Equipment/Equipment Rack/Ethernet Switch/Fiber Distribution Unit/Miscellaneous)	LS	1	$50,000	$50,000

Table 5.5 (Cont.): Preliminary Cost Estimates for Intelligent Transportation System Infrastructure

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
12	LINCOLN PARK Furnish and Install One (1) Workstation (Including Fiber Optic Cable/Conduit/Spice Vault-Enclosure and Communication Equipment/Equipment Rack/Ethernet Switch/Fiber Distribution Unit/Miscellaneous)	LS	1	$50,000	$50,000
13	TRACY PUBLIC LIBRARY Furnish and Install One (1) Workstation (Including Fiber Optic Cable/Conduit/Spice Vault-Enclosure and Communication Equipment/Equipment Rack/Ethernet Switch/Fiber Distribution Unit/Miscellaneous)	LS	1	$50,000	$50,000
	SUBTOTAL				**$300,000**
	FIBER OPTIC COMMUNICATION SYSTEM INSTALLATION (FIRE DEPARTMENT/STATIONS)				
14	TRACY FIRE DEPARTMENT BUILDING Furnish and Install One (1) Workstation (Including Fiber Optic Cable/Conduit/Spice Vault-Enclosure and Communication Equipment/Equipment Rack/Ethernet Switch/Fiber Distribution Unit/Miscellaneous)	LS	1	$40,000	$40,000
15	TRACY FIRE STATION NO. 1 Furnish and Install One (1) Workstation (Including Fiber Optic Cable/Conduit/Spice Vault-Enclosure and Communication Equipment/Equipment Rack/Ethernet Switch/Fiber Distribution Unit/Miscellaneous)	LS	1	$40,000	$40,000
16	TRACY FIRE STATION NO. 6 Furnish and Install One (1) Workstation (Including Fiber Optic Cable/Conduit/Spice Vault-Enclosure and Communication Equipment/Equipment Rack/Ethernet Switch/Fiber Distribution Unit/Miscellaneous)	LS	1	$40,000	$40,000
17	TRACY FIRE STATION NO. 7 Furnish and Install One (1) Workstation (Including Fiber Optic Cable/Conduit/Spice Vault-Enclosure and Communication Equipment/Equipment Rack/Ethernet Switch/Fiber Distribution Unit/Miscellaneous)	LS	1	$40,000	$40,000
	SUBTOTAL				**$160,000**
	CITY HALL - TRAFFIC MANAGEMENT CENTER				
18	TRAFFIC MANAGEMENT CENTER (TMC) Furnish and Install TMC (Including Fiber Optic Cable/Conduit/Spice Vault-Enclosure and Video Wall/Communication Equipment & Sofware/Furniture)	LS	1	$400,000	$400,000
	SUBTOTAL				**$400,000**
	OTHER COSTS ASSOCIATED WITH INTELLIGENT TRANSPORATION SYSTEM				
19	Testing	LS	1	$50,000	**$50,000**
20	Training	LS	1	$20,000	**$20,000**
21	System Integration	LS	1	$50,000	**$50,000**
	SUBTOTAL				**$120,000**
	TOTAL - (ALL SUBTOTALS)				**$13,259,500**
	45% CONTINGENCIES				**$5,966,775**
	TOTAL - (ALL SUBTOTALS WITH CONTINGENCIES)				**$19,226,275**

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