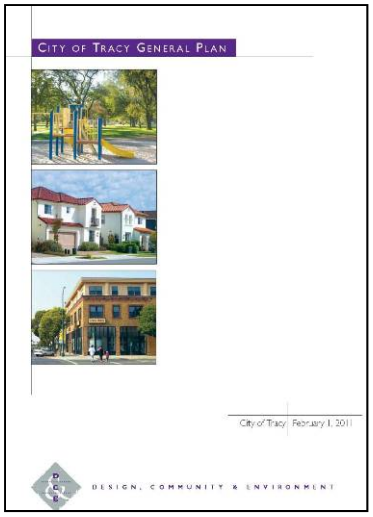
3. HORIZON YEAR FORECAST

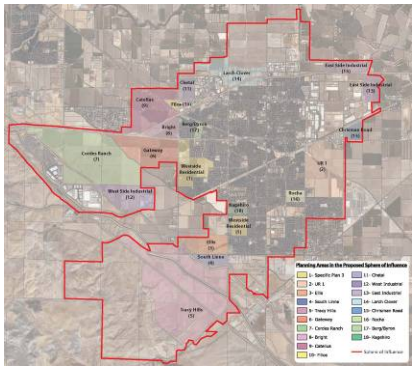
3.1 INTRODUCTION

This chapter presents the traffic forecasting methodology that was used to develop the roadway network requirements for the Tracy Transportation Master Plan (TMP). This is the first step in the process of defining the physical and operational improvements that will be needed to serve development under the Tracy *General Plan*. The resulting plan-line roadway network is based on roadway-level volume forecasts and a roadway volume-based assessment of the network's performance in Horizon Year in terms of volume-to-capacity ratios.

3.2 OVERVIEW OF TRANSPORTATION MASTER PLAN DEVELOPMENT PROCESS



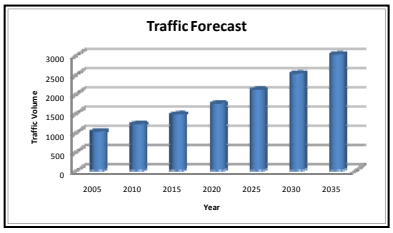
The TMP will guide the development of transportation infrastructure and services as growth occurs under the General Plan. While the General Plan Update and EIR forecasts traffic conditions to the year 2030, the TMP looks out another five years, to Horizon Year, in order to provide the maximum possible infrastructure planning. The Horizon Year was chosen because it is practically possible to estimate Tracy land use growth patterns to that year, and because the San Joaquin Council of Governments is planning to update its travel demand model to the year 2035. Note that neither the 2030 nor the Horizon Year forecasts represent full build-out of all the development capacity in the General Plan areas, but rather the residential and non-residential growth that is expected under the growth management ordinance (for residential uses) and based on market trends (for non-residential uses). The TMP development steps for developing the Horizon Year travel demand model volumes are listed below; this chapter documents the results of step 3.



1. Prepare the Tracy Travel Demand Model to project conditions to Horizon Year, including the addition of a component that can model the effect of sustainable land use and transportation strategies (the "Ds")
2. Obtain Horizon Year and build-out land uses for each future service in the General Plan Update from the City
3. Develop Horizon Year and build-out plan-line roadway networks (classification and number of lanes), based on the model link volume forecasts, incorporating the effects of the sustainability strategies
4. Develop Horizon Year detailed intersection forecasts at the 65 TMP Tier 1 intersections.

3.3 TRAFFIC FORECASTING METHODOLOGY

This section gives an overview of the Tracy Travel Demand Model, including the current validation years in use (2004 and 2006), the preparation of the Horizon Year and Build-Out models, and the incorporation of a new model component to assess the effects of sustainability strategies on vehicle trip generation and VMT. **Section 3.4** describes the land uses and trip generation assumed within the Tracy Sphere of Influence (SOI), for the Horizon Year and Build-Out scenarios.



As discussed later in this chapter, the Build-Out scenario reflects a time horizon that is well beyond Horizon Year Conditions and contains speculative assumptions regarding land uses and development.

3.3.1 TRACY TRAVEL DEMAND MODEL VALIDATION YEARS

The Tracy Travel Demand Model was developed by Fehr & Peers and has been updated and re-validated several times. It underwent a full validation to 2004 conditions, as described in Fehr & Peers' Technical Memorandum, *Tracy Citywide Model Documentation* (March 27, 2006). In late 2009, the model was validated to 2006 conditions to support the development of baseline transportation information (vehicle trips and vehicle-miles traveled) for the *Sustainability Action Plan* (SAP). The year 2006 was chosen for the SAP baseline year because it is the most recent year for which the City has comprehensive input data for the greenhouse gas baseline calculations. Fehr & Peers Technical Memorandum, *Tracy Sustainability Plan Transportation Inputs* (January 22, 2010) describes the 2006 validation.

Table 3.1 shows the 2004 and 2006 employment and housing totals for the 2004 and 2006 models, within the Tracy SOI boundary. The 2006 land uses were developed by adding all approved, constructed and occupied projects to the 2004 land use data set, using a list compiled by City staff.

It is important to note that 2004 remains the Setting (i.e., baseline year) for the General Plan Update EIR and the Transportation Master Plan/EIR, even though the SAP's baseline year is 2006. However, for purposes of forecasting the TMP's future (Horizon Year and Build-Out) conditions, Fehr & Peers is using the 2006 validated model, because it is the most recent validation available.

Table 3.1: Land uses in the Tracy Travel Demand Model: 2004 and 2006

Scenario	SF	MF	SF+MF	Retail	Service	Other	Total Employment
2004 Validation	18,578	6,594	25,172	3,512	9,298	10,850	23,660
2006 Validation	20,195	6,594	26,789	3,610	9,644	10,850	24,104

1. Residential (SF and MF) is presented in units of dwelling units
2. Non-residential is presented in units of employees
Source: Fehr & Peers, March 2010.

3.3.2 HORIZON YEAR – EXTRAPOLATION FROM GENERAL PLAN 2030 CASE

The Horizon Year model was developed by beginning with the 2030 network and land uses that were developed for the General Plan Update EIR, and adjusting the land uses in the 18 future services to represent reasonable expectations for development to Horizon Year. The land use assumptions were derived from the General Plan by City staff. The model was run iteratively, testing network adjustments (adding new connections and widening roadways where needed) with the goal of achieving volume-to-capacity ratios under 1.0, and ideally under 0.9 where the capacity of roadways is as defined in the Tracy General Plan. This process represents an initial screening of network adjustments. The intersection level analysis determined the necessity of infrastructure improvements. The land use growth within the Tracy SOI for this scenario is discussed in **Section 3.4**. The land uses outside the Tracy SOI were retained at the 2030 levels.

3.3.3 BUILD OUT – LONG RANGE FORECAST

The Build-Out model was developed as described for Horizon Year, but using the full build-out potential for all 18 future services. The land use growth within the Tracy SOI at build-out is discussed in **Section 3.4**. The land uses outside the Tracy SOI, which includes the following regions/counties of San Joaquin, Bay Area, Stanislaus, Mountains/Foothills (Amador/Calaveras/Tuolumne), and SACOG regions, were factored up to represent 2050 levels, using Department of Finance population and employment projections. This was done to bring the regional land uses closer to the actual build-out horizon for Tracy, which based on the land uses, is well beyond the year Horizon Year. The land uses for Horizon Year and 2050, outside the Tracy SOI, are shown in **Table 3.2**.

As indicated earlier, the Build-Out scenario reflects a time horizon that is well beyond Year Horizon Year Conditions and contains speculative assumptions regarding land uses and development. Thus, the recommendations in the TMP are based upon the Horizon Year scenario.

Table 3.2: Land uses outside Tracy SOI: Horizon Year and 2050

Scenario	SF	MF	SF+MF	Retail	Service	Other	Total Employment
Horizon Year	3,164	1,573	4,737	1,123	2,944	3,005	7,072
2050	3,829	1,830	5,659	1,375	3,505	3,567	8,447

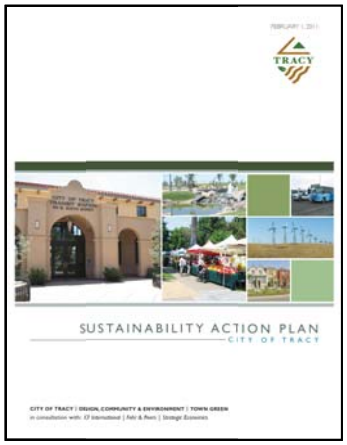
1. Residential (SF and MF) is presented in thousands of dwelling units

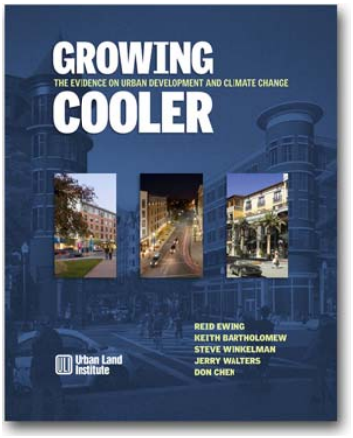
2. Non-residential is presented in units of thousands of employees

3. Horizon Year data is extrapolated from 2030 Tracy Travel Demand Model. 2050 data is taken from California Department of Finance projections.

Source: Fehr & Peers, March 2010.

3.3.4 SUSTAINABILITY STRATEGIES ASSESSMENT





Fehr & Peers developed a new component of the Tracy Travel Demand Model that allows the model to more accurately reflect the benefits of the sustainability strategies being developed for the SAP and the TMP. The 4D's adjustments, named for the variables of land use Density, Diversity, Design, and access to regional Destinations that affect vehicle trip generation and internalization, are based on nationally validated elasticities as documented in the publication *Index 4D Method: A Quick-Response Method of Estimating Travel Impacts from Land-Use Changes* (U.S. EPA/Criterion/Fehr & Peers, October 2001). The adjustments allow the travel demand model trip generation to reflect the reductions that can be achieved when the land use reflects an increase in smart growth characteristics (denser, more diverse, designed with more connectivity, or in a location with good access to regional destinations) compared to the typical development in a given area, such as a new future service. The model was also adjusted to allow the benefits of the other sustainability strategies developed for the SAP to be quantified. **Appendix C** contains a more detailed description of these model adjustments.

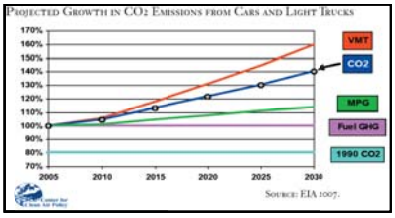
The strategies are shown in **Table 3.3**, along with the VMT reductions on a daily basis in 2020 for each strategy. A more detailed discussion of the SAP strategies is presented in Appendix B of Fehr & Peers' Technical Memorandum, *Tracy Sustainability Plan* (SAP) – 2020 VMT and GHG Estimates (January 29, 2010). The VMT reductions shown in **Table 3.3** come from a combination of reduced trip generation, reduced trip lengths, and fuel efficiency improvements. The Horizon Year traffic volume projections discussed in the next section incorporate the same strategies as analyzed for 2020 for the SAP, and reflect corresponding reductions in vehicle trips and VMT.

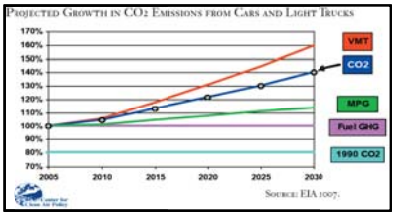
Table 3.3: Reduction Summary – Daily VMT in 2020

Measure	VMT Reduction per day in 2020	GHG (metric tons CO2) Reduction per day in 2020
Density	4,463	2.31
Diversity	21,415	11.09
Design	76,089	39.39
Charge for Downtown Parking	825	0.4
Bicycle Amenities	799	0.38
Park and Ride Lot Master Plan	1,189	0.62
Car-Sharing	9,368	4.55
Inter-City Bus Coordination	258	0.14
ACE Altamont Route Upgrades	5,827	3.14
Parking Cash-Out	718	0.37
Low-Carbon Fuel[1]	-	32.75
Expand Local Bus Service	7,053	3.42
Congestion Relief	-	1.85
School Programs	3,016	1.45
Remote Offices	1,140	0.61
Transit Subsidy	1,570	0.8
Live/Work Units	3,537	0.8
TOTAL	137,267	104.07

1. This GHG reduction is assumed in all of the 2020 scenarios to reflect planned county-wide improvements in fleet and fuels

Source: Fehr & Peers, January 2010.





3.4 TMP LAND USE AND TRIP GENERATION

3.4.1 LAND USE ASSUMPTIONS – HORIZON YEAR AND BUILD OUT

The Horizon Year development assumptions were derived from the General Plan by City staff, with the Growth Management Ordinance controlling total residential growth, and recent development trends guiding the estimation of non-residential growth. City staff allocated the growth to the various future services shown in **Figure 3.1** based on a combination of considerations, including how advanced each area is in the entitlement process, existing or expected conditions of approval, and anticipated environmental or jurisdictional constraints.

Build-out development assumptions were also provided by City staff, and were developed based on consultations with each of the land owners.

Table 3.4 shows the Existing (2006), Horizon Year and Build-Out citywide land use totals. These are shown in the shaded rows, along with the 2030 General Plan (SOI Update) scenario, and the 1994 Roadway Master Plan land use assumptions, for comparative purposes.

The Horizon Year housing and employment totals represent growth of about 51 percent and 167 percent, respectively, over 2006 conditions. Relative to the 2030 General Plan SOI Update land uses, the housing grows by an additional 1,600 units, and employment grows by about 15,600 jobs.

Build-Out population and employment totals represent growth of 63 percent and 663 percent, respectively, over 2006 conditions. While the Build-Out case includes modest housing growth over Horizon Year conditions, at about 3,000 units, the employment growth is much greater, at an additional 120,000 jobs, approximately.

Table 3.4: Transportation Master Plan Land Use Assumptions Within Tracy SOI

Scenario	SF	MF	SF+MF	Retail	Service	Other	Total Employment
Existing (2006)	20,195	6,594	26,789	3,610	9,644	10,850	24,104
2030 GP SOI[1]	29,068	9,858	38,926	11,500	15,276	21,777	48,553
Horizon Year	27,229	13,297	40,506	15,091	18,751	30,340	64,182
Buildout	29,214	14,343	43,557	35,189	59,915	88,928	184,033
1994 RMP—"Development Capacities"[4]			46,300				116,000
1994 RMP – Horizon Year[4]			46,300				70,000 – 82,000[5]

1. 2030 General Plan with Updated Sphere of Influence

2. Residential (SF and MF) is presented in units of dwelling units

3. Non-residential is presented in units of employees

4. From 1994 Roadway Master Plan land use assumptions -- not including Mountain House, which adds 12,750 dus (using 3.45 pop/hhld) and 20,000 jobs

5. 90,000 total; three out of four Horizon Year scenarios included 8,000 jobs at MH; the fourth included 20,000 jobs at MH

Source: Fehr & Peers, March 2010.

3.4.2 TRIP GENERATION CHARACTERISTICS

Table 3.5 shows the floor area ratios and employee densities that were used to convert raw acreages of non-residential development to employees, which is the variable the Tracy Travel Demand model uses.

Table 3.6 shows the raw vehicle trip generation rates used in the Tracy Travel Demand Model. These rates are based on local trip generation surveys, and are thus locally validated Tracy rates. The vehicle trip generation reductions discussed in **Section 3.4.3** effectively reduces the vehicle trip generation indicated by these rates, in the areas where the various sustainability strategies apply. The citywide effect of these reductions is discussed in **Section 3.4.3**.

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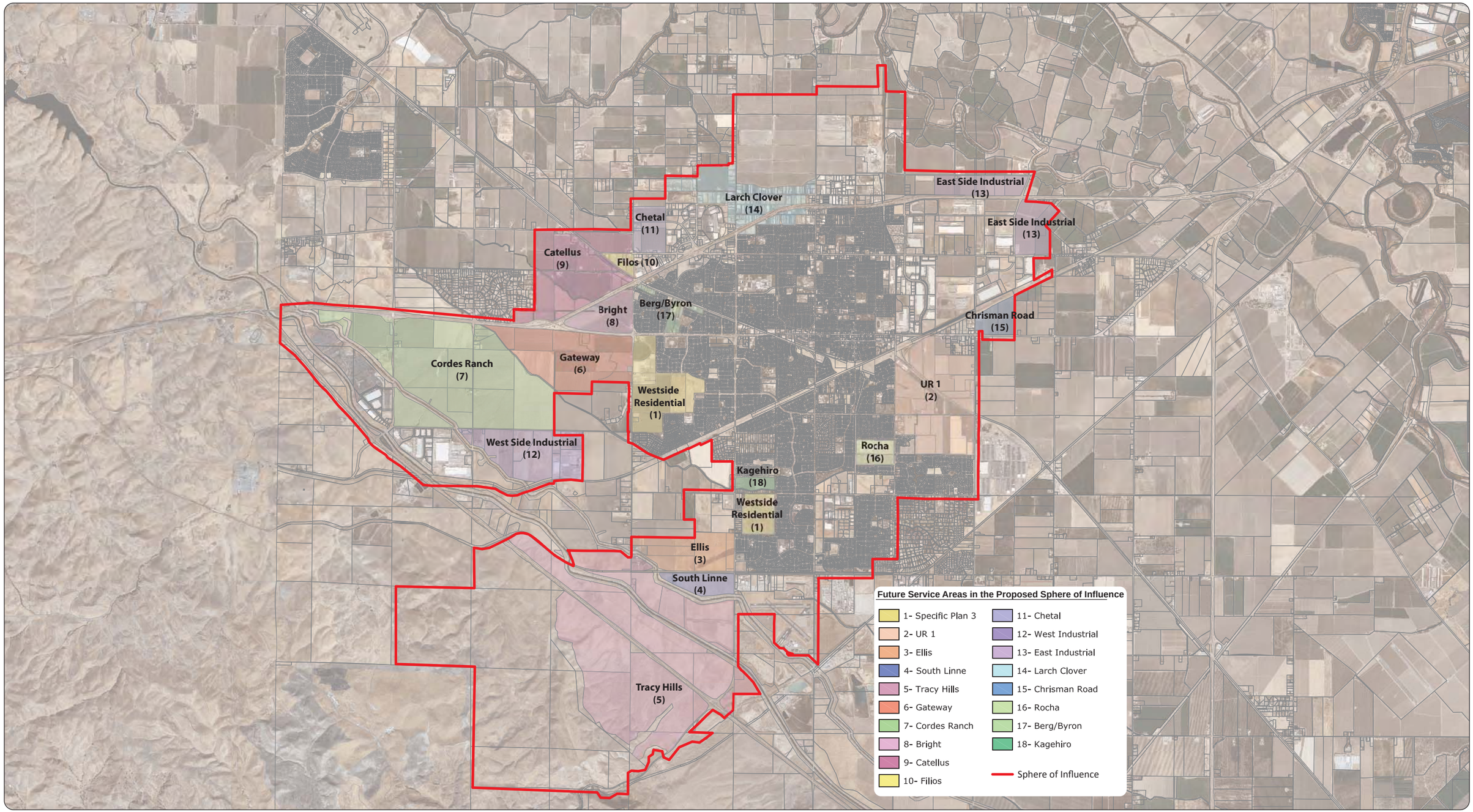

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Figure 3.1: Tracy Future Service Areas

City of Tracy Transportation Master Plan

Table 3.5: FARs and Employment Densities

	Retail	Office	Other
Employees / KSF[1]	2	3	1
Floor Area Ratio (FAR)	0.30	0.45	0.50

1. KSF = 1,000 square feet

Source: Fehr & Peers, March 2010.

Table 3.6: Tracy Model Approximate Peak Hour Vehicle Trip Generation Rates

Lane Use Type	Units	AM Model	AM ITE	PM Model	PM ITE
Single Family	Dwelling Units	0.55	0.75	1.05	1.01
Multi Family[1]	Dwelling Units	0.31	0.51	0.59	0.62
Retail[2]	Employees	1.90	1.00	3.46	3.73
Office[3]	Employees	0.22	0.48	0.42	0.46
Other[4]	Employees	0.17	0.51	0.33	0.59

The above rates are approximate because the actual rates depend on the individual trips' origins and destinations.

Other employment is mostly comprised of industrial employment

1. Land Use Code 220 (Apartment)
2. Land Use Code 820 (Shopping Center)
3. Land Use Code 710 (General Office Building)
4. Land Use Code 150 (Warehousing)

Source: Fehr & Peers, March 2010; Tracy Travel Demand Model.

3.4.3 TRIP GENERATION REDUCTIONS DUE TO SUSTAINABILITY STRATEGIES

Table 3.7 presents the trip reductions due to the SAP transportation measures for the future services and for Tracy as a whole. The future services achieve a greater reduction in trips than Tracy as a whole because many of the SAP transportation measures address only new developments – most of which occur in the future services.

Table 3.7: Trip Reductions Due to SAP Measures – Horizon Year

Area	Trip Reduction %
Future Services	5.8%
Tracy Citywide (SOI)	4.4%
Source: Fehr & Peers, March 2010.	

3.4.4 TRIP GENERATION BY FUTURE SERVICE

Table 3.8 shows the AM and PM peak hour trip generation for each future service, at Horizon Year and Build-Out. The Horizon Year trip generation for the 18 future services represents growth of about 125 percent compared to existing citywide trip generation. Build-out trip generation for the future services represents growth of 385 percent compared to existing citywide trip generation.

In Horizon Year, the future services with the highest trip generation growth are Tracy Hills, Cordes Ranch, and Gateway, all with between 7,000 and 10,000 PM peak hour trips. Westside Residential, Bright Triangle, Catellus, and Filios all have between 3,000 and 5,000 PM peak hour trips.

At Build-Out, the Larch-Clover Planning area has the highest trip growth, at about 45,000 PM peak hour trips. Tracy Hills and Cordes Ranch have between 22,000 and 26,000 trips, Gateway has about 17,500 trips, and Bright Triangle and Catellus have 9,000 – 10,000 trips.

Table 3.8: Tracy Model Estimated Peak Hour Vehicle Trip Generation for Service Areas

Service Area	Horizon Year		Buildout	
	AM Trips	PM Trips	AM Trips	PM Trips
Service Area 1 (Westside Residential)	1,800	3,400	1,800	3,400
Service Area 2 (Urban Reserve 1)	900	1,700	1,900	3,650
Service Area 3 (Ellis)	1,150	2,150	1,150	2,150
Service Area 4 (South Linne)	0	0	450	850
Service Area 5 (Tracy Hills)	5,250	9,850	14,150	26,150
Service Area 6 (Gateway)	3,850	7,100	9,300	17,450
Service Area 7 (Cordes Ranch)	4,800	8,950	11,650	22,100

Service Area	Horizon Year		Buildout	
	AM Trips	PM Trips	AM Trips	PM Trips
Service Area 8 (Bright Triangle)	2,450	4,500	5,600	10,250
Service Area 9 (Catellus)	1,650	3,100	4,750	8,950
Service Area 10 (Filios)	1,900	3,450	1,900	3,450
Service Area 11 (I-205 Expansion)	1,550	2,850	4,500	8,150
Service Area 12 (West Side Industrial)	0	0	1,800	3,500
Service Area 13 (East Side Industrial)	0	0	1,350	2,650
Service Area 14 (Larch Clover)	1,000	1,800	24,750	45,050
Service Area 15 (Chrisman)	900	1,650	1,950	3,650
Service Area 16 (Rocha)	50	100	300	550
Service Area 17 (Berg/Byron)	100	150	200	350
Service Area 18 (Kagehiro)	150	250	150	250
Service Area Totals	27,500	51,000	87,650	162,550
Existing (2006) Citywide Total for Comparison	24,000	45,200	24,000	45,200
Source: Fehr & Peers, March 2010. Tracy Travel Demand Model.				

3.4.5 TRIP DISTRIBUTION

Table 3.9 shows the trip distribution for the City of Tracy for both the existing year (2006) and the Horizon Year scenario. The addition of jobs in the city increases the internal capture of trips, from 62 percent in 2006 to 64 percent in Horizon Year. There is still a large trip interaction with San Joaquin County because the increase in jobs attracts trips from residents in the County. However, trips between Tracy and the Bay Area drop from 13 percent in 2006 to 7 percent in Horizon Year.

Graphic plots that illustrate the model's trip assignment for each future service are included in the **Appendix D**. These plots do not represent the final trip accounting that will be used for proportional share calculations, but can be viewed as illustrative of the individual future services' trip paths and regional distribution.

Table 3.9: Citywide Trip Distribution

	Tracy	North Valley	South Valley	Bay Area	San Joaquin County
Existing (2006)	62%	8%	3%	13%	14%
Future (Horizon Year)	64%	4%	4%	7%	21%
Source: Fehr & Peers, March 2010.					

3.5 HORIZON YEAR FORECASTS, NETWORK SIZING AND PERFORMANCE

Figure 3.2 shows the recommended Horizon Year roadway network. This network was developed in consultation with City staff and based on iterative Tracy Travel Demand Model runs, incorporating the effects of the SAP strategies. Some of the guiding principles that underlie this network are:

- Consistency with the San Joaquin County Expressways Study
- Preservation of 4-lane maximum arterial widths where possible, to promote a more walkable, bikeable environment, particularly in new areas of future development where sustainable practices can be applied in an equitable manner
- Consistency with the roadway plans in entitled project areas (Ellis Specific Plan and Gateway)

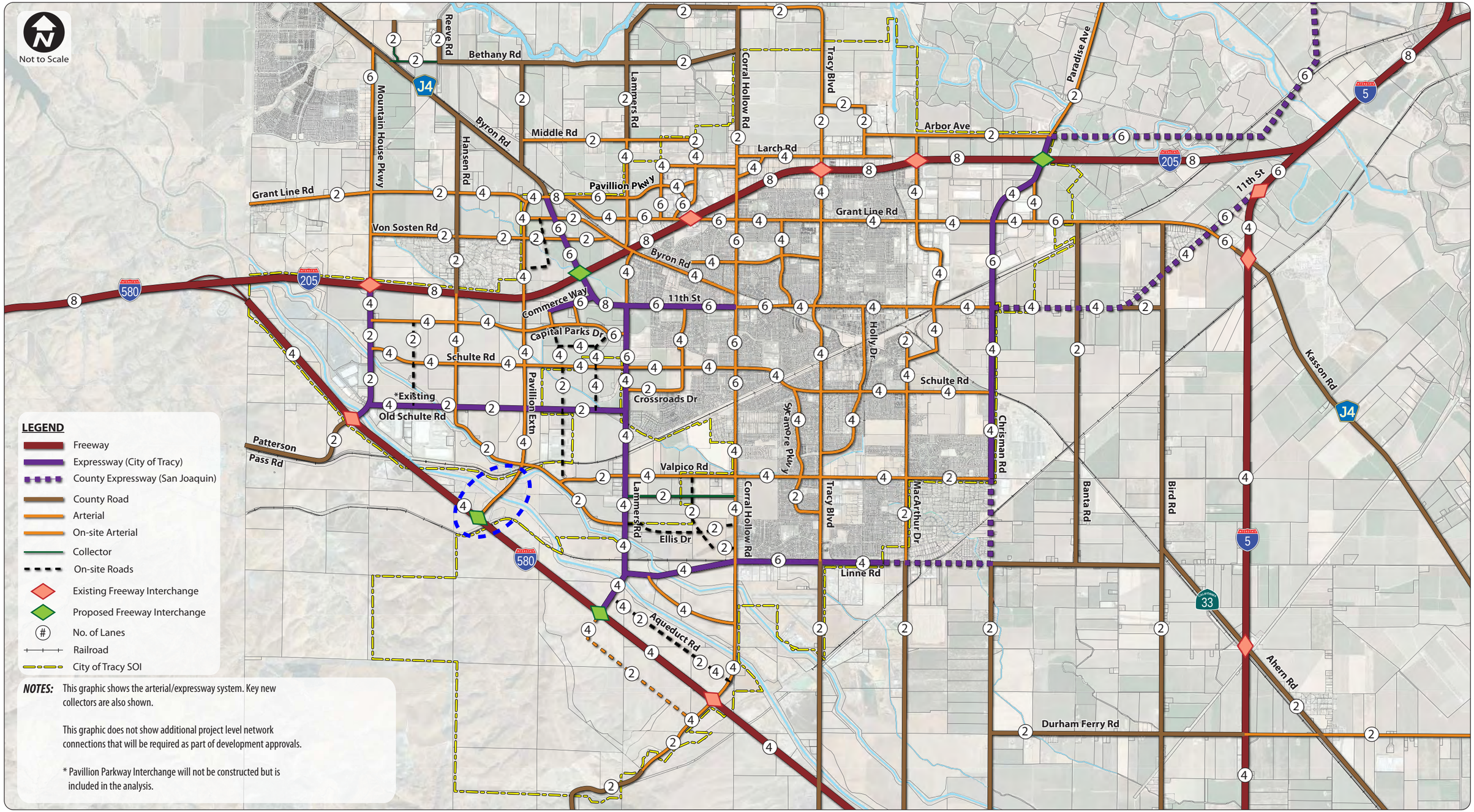

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Figure 3.2: Horizon Year Roadway Network

City of Tracy Transportation Master Plan

- Provision of maximum v/c ratios of 0.8 – 0.9 (roughly corresponding to a LOS D - E operation on a link-volume basis) to the maximum extent possible
- Provision of key roadway connections and freeway interchanges that are needed to serve substantial traffic volumes by Horizon Year, even if full use of those roadway connections and interchanges is not projected until beyond Horizon Year

It is very important to note that the link-based v/c ratios provide a general guide to how the major roadway segments would function in Horizon Year. A more accurate assessment of roadway capacity will be available when intersection turn movement forecasts are developed and service level calculations are performed, following this link-level forecasting step.

Figures 3.3A and **3.3B** present roadway segment forecasts for the AM and PM peak hours, respectively. For segments where existing peak hour counts are available, growth on the link was recorded between the existing (2006) model and the future (Horizon Year) model.[1] This growth was added to the existing counts to represent a Horizon Year estimate of volume on each link. This method of forecasting is called the difference method. These forecasted volumes were then compared to the capacity of the links based on the Tracy General Plan roadway capacities, and a volume-to-capacity ratio was calculated. The v/c ratios are shown in **Figures 3.4A** and **3.4B** for the AM and PM peak hours, respectively.

The volumes presented on **Figures 3.3A** and **3.3B** do not represent the final volumes used for the intersection level analysis. Adjustments based on current and expected future travel patterns were performed after the raw model forecasts were reviewed. The volumes on these figures represent an order of magnitude estimate of volumes on major roadways in Tracy.

[1] Existing counts from 2006, corresponding to the base model year, and 2009 were used. The link forecasts that pivot off 2009 counts may thus be slightly off, since theoretically traffic growth between 2006 and 2009 would be double-counted; however, this error is likely to be small due to the relatively low traffic growth in the last three years. The intersection volumes to be developed will better-account for the different count years.

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Not to Scale

LEGEND

- Freeway
- Expressway (City of Tracy)
- County Expressway (San Joaquin)
- County Road
- Arterial
- On-site Arterial
- Collector
- On-site Roads
- Existing Freeway Interchange
- Proposed Freeway Interchange
- (#) No. of Lanes
- Railroad
- City of Tracy SOI

NOTES: This graphic shows the arterial/expressway system. Key new collectors are also shown.

This graphic does not show additional project level network connections that will be required as part of development approvals.

* Pavillion Parkway Interchange will not be constructed but is included in the analysis.

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Figure 3.3a: Horizon Year AM Peak Hour Volunes

City of Tracy Transportation Master Plan

Not to Scale

LEGEND

- Freeway
- Expressway (City of Tracy)
- County Expressway (San Joaquin)
- County Road
- Arterial
- On-site Arterial
- Collector
- On-site Roads
- Existing Freeway Interchange
- Proposed Freeway Interchange
- (#) No. of Lanes
- Railroad
- City of Tracy SOI

NOTES: This graphic shows the arterial/expressway system. Key new collectors are also shown.

This graphic does not show additional project level network connections that will be required as part of development approvals.

* Pavillion Parkway Interchange will not be constructed but is included in the analysis.

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Figure 3.3b: Horizon Year PM Peak Hour Volunes

City of Tracy Transportation Master Plan

Not to Scale

LEGEND

- Freeway
- Expressway (City of Tracy)
- County Expressway (San Joaquin)
- County Road
- Arterial
- On-site Arterial
- Collector
- On-site Roads
- Existing Freeway Interchange
- Proposed Freeway Interchange
- (#) TMP Buildout V/C Ratios
- Railroad
- City of Tracy SOI

NOTES: This graphic shows the arterial/expressway system. Key new collectors are also shown.

This graphic does not show additional project level network connections that will be required as part of development approvals.

\+ Pavillion Parkway Interchange will not be constructed but is included in the analysis.

* V/C calculation is based on 2 lanes per direction

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Figure 3.4a: Horizon Year AM Peak Hour V/C Ratios

City of Tracy Transportation Master Plan

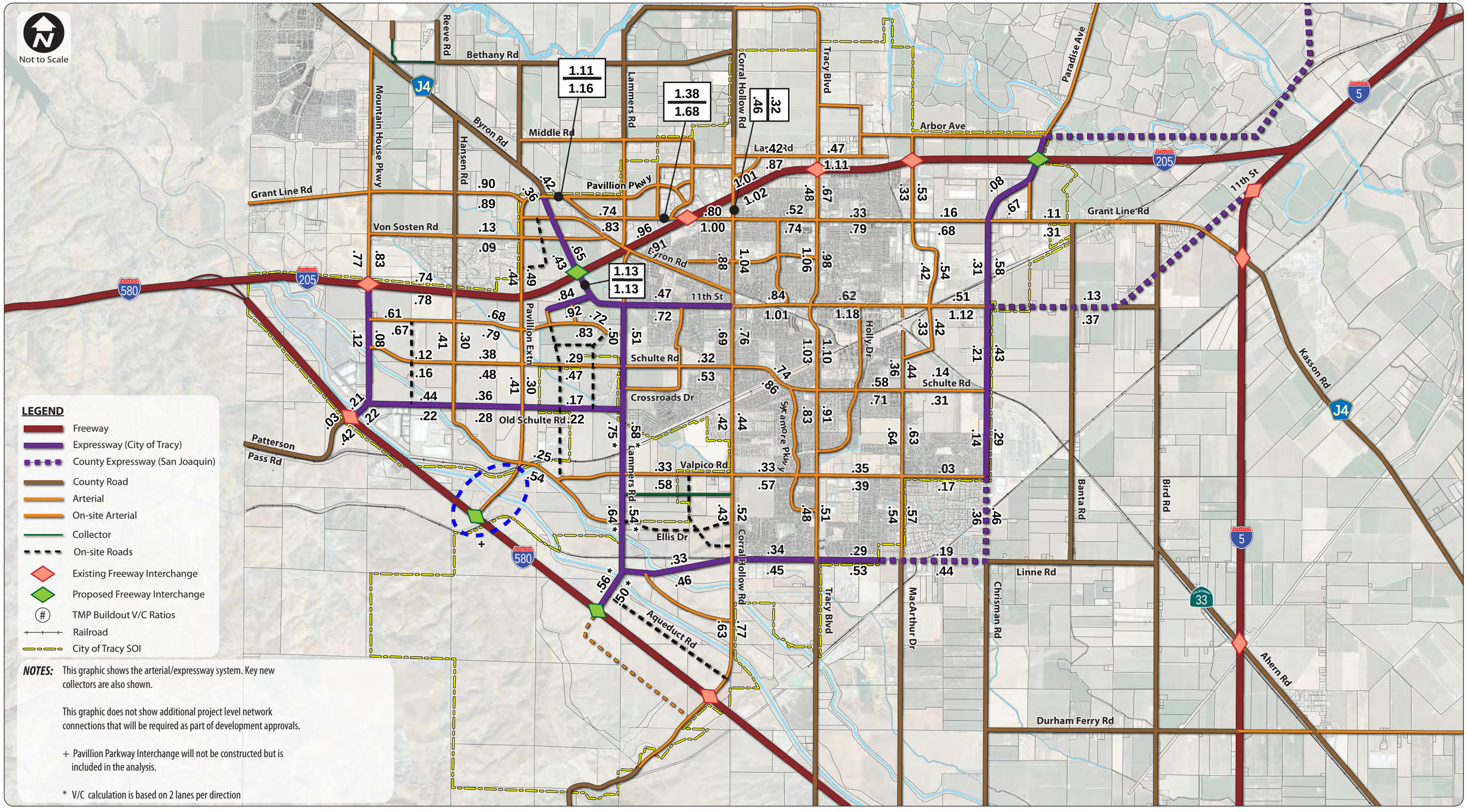

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Figure 3.4b: Horizon Year PM Peak Hour V/C Ratios

City of Tracy Transportation Master Plan

3.6 BUILD-OUT PLAN LINES

Figure 3.5 shows the Build-Out plan lines. Relative to the Horizon Year network, this network upgrades certain roadways from collector to arterial classification, and widens roadways where feasible (primarily in the western and northern development areas). This network does not provide sufficient capacity to serve the build-out land use plan; many additional connecting roadways and roadway widenings would be needed to serve the traffic generated by the additional residential development, and significantly higher employment levels, in the Build-Out case. Given the long-range horizon for the Build-Out case, and the corresponding unknowns as to how certain future services will ultimately develop, a complete and adequate Build-Out network cannot be designed. However, **Figure 3.5** provides the recommended core facilities on which to plan for growth beyond Horizon Year levels. Further study will be necessary to plan for the Build-Out condition.

Figure 3.6a and **Figure 3.6b** presents the AM and PM peak-hour volume-to capacity ratios for the roadway segments.

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Not to Scale

LEGEND

- Freeway
- Expressway (City of Tracy)
- County Expressway (San Joaquin)
- County Road
- Arterial
- On-site Arterial
- Collector
- On-site Roads
- Existing Freeway Interchange
- Proposed Freeway Interchange
- (#) No. of Lanes
- Railroad
- City of Tracy SOI

NOTES: This graphic shows the arterial/expressway system. Key new collectors are also shown.

This graphic does not show additional project level network connections that will be required as part of development approvals.

* Pavillion Parkway Interchange will not be constructed but is included in the analysis.

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Figure 3.5: TMP Right Of Way Map

City of Tracy Transportation Master Plan

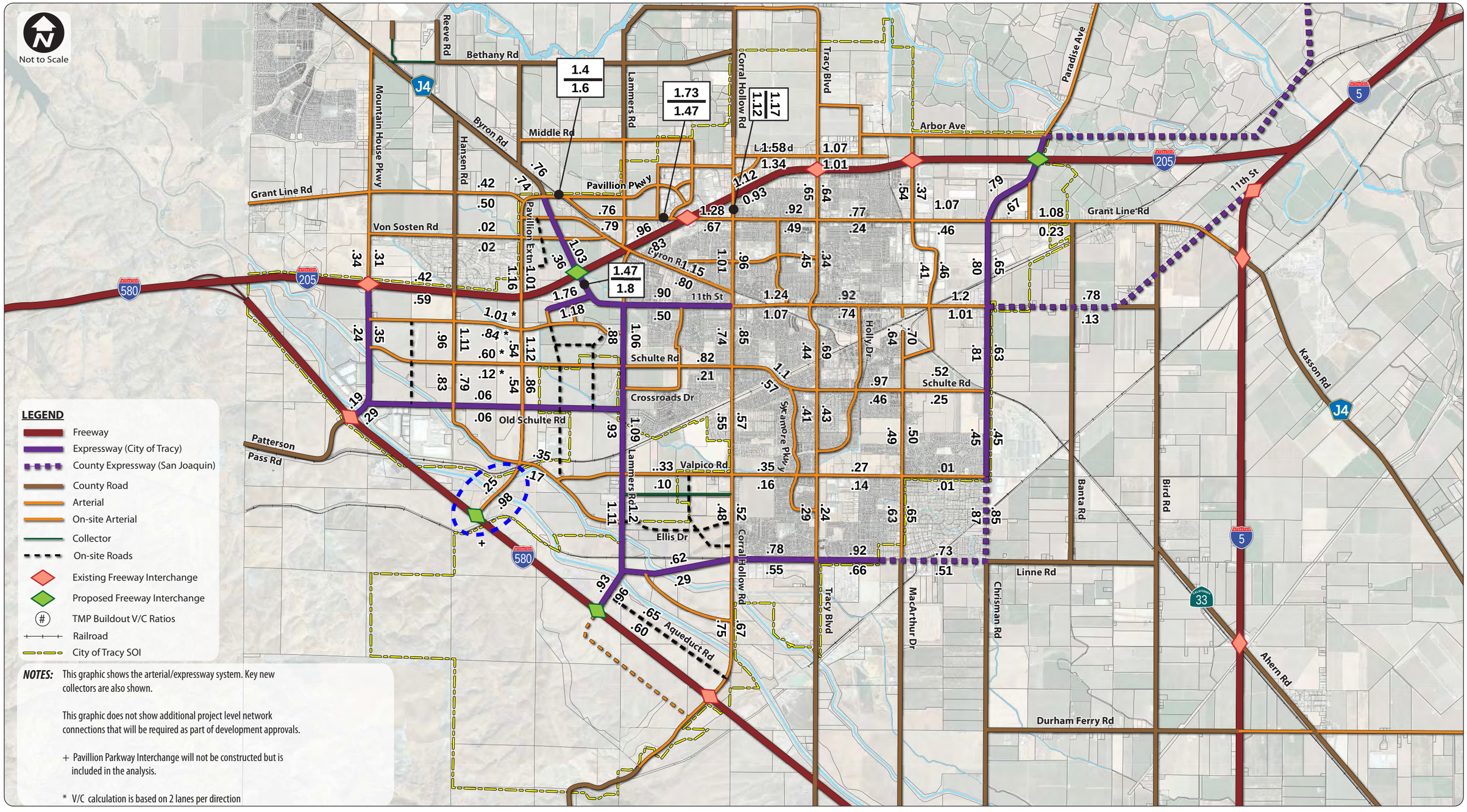

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Figure 3.6a: Buildout AM Peak Hour V/C Ratios

City of Tracy Transportation Master Plan

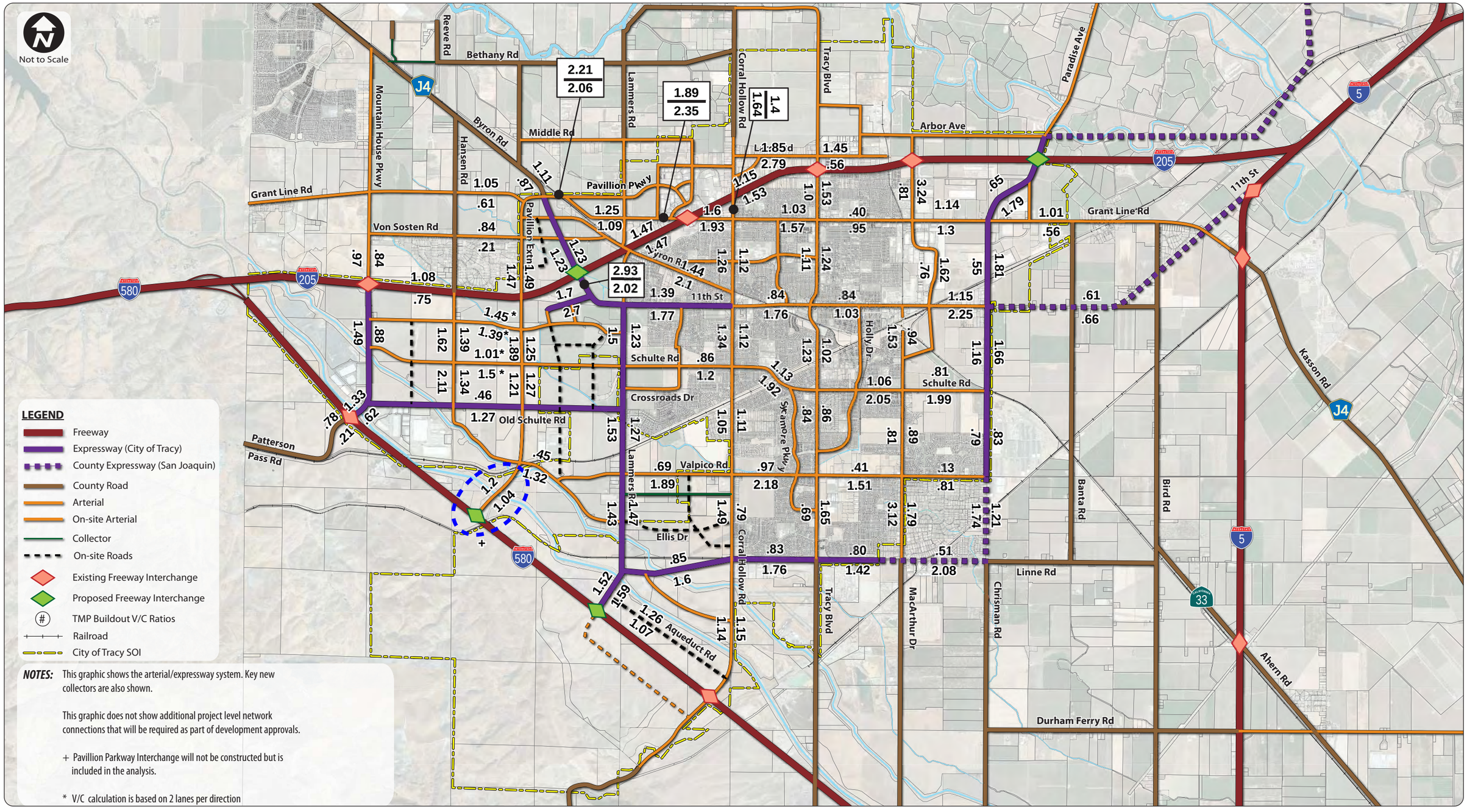

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Figure 3.6b: Buildout PM Peak Hour V/C Ratios

City of Tracy Transportation Master Plan