

**3rd REVISED FINAL
CITY OF LIVINGSTON TRAFFIC / CIRCULATION MASTER PLAN
Livingston, CA**

Prepared For:

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Livingston3rd Revised Final Master Plan.rpt

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INTRODUCTION

As part of its overall program for identifying long-term infrastructure requirements, the City of Livingston has worked to identify those street and highway improvements that will need to be made to the City's circulation system in order to accommodate the growth planned over the foreseeable future. The goal of this Circulation Master Plan is to confirm the nature of circulation system improvements that will be needed, identify the probable cost of these improvements and to project the share of these costs that will need to be borne by new development on a per residential dwelling or per commercial square footage (sf) basis.

This version of the Circulation Master Plan reflects land use changes included in the pending City of Livingston General Plan Update and supersedes the previous Final Report Dated April 17, 2007.

Overview

The Circulation Master Plan includes five sections. The first section, **EXISTING CONDITIONS/ STANDARDS**, is an assessment of existing conditions based on the volume of traffic on City streets and at major intersections when the master plan process began. This report section also introduces applicable standards for evaluating traffic conditions. This information is needed to identify existing deficiencies that would not be corrected by funds generated by future development. The second section, **FUTURE LAND USE / TRIP GENERATION ASSUMPTIONS**, describes anticipated growth in Livingston over the life of the Master Plan based on assumptions made by City staff. The amount of traffic associated with this growth has been identified. The third report section, **TRAFFIC ANALYSIS: FORECASTS**, identifies long-term future traffic volume forecasts for Livingston based on identified growth. These forecasts were developed using a modified version of the Merced County Association of Governments (MCAG) regional travel demand forecasting model. Section four, **CIRCULATION SYSTEM IMPROVEMENTS**, identifies circulation system improvements needed to accommodate projected traffic volumes and to attempt to deliver Levels of Service satisfying the City of Livingston's Level of Service standard. This section also suggests the cost of circulation system improvements that could be included in the Master Plan program. In the fifth section, **COST ALLOCATION / FEES**, the allocation of Master Plan costs to new development has been suggested and a potential fee towards the cost of improvements that have community-wide benefit has also been identified.

EXISTING CONDITIONS / STANDARDS

Standard Sections / General Plan Circulation System

Current General Plan Designations. The City of Livingston General Plan currently identifies two classifications of major streets, while the City's street improvement standards include five classifications. Arterial Streets are planned as four-lane or six-lane streets with two or three travel lanes in each direction plus a medianized center left turn lane. Collector streets are typically one through lane in each direction, with a center turn lane area available for a median with left turn pockets or for a continuous two way left turn lane. Today the City of Livingston General Plan Circulation Map identifies the location of planned Arterial and Collector Streets.

Proposed Street Sections. For this analysis additional definition has been provided to street sections based on the City's currently adopted Street Sections.

6 lane / 8 lane Major Arterial Streets (134' to 170' ROW) are the largest roads envisioned in the City of Livingston. Major Arterials have three or four travel lanes in each direction plus a landscaped median that includes 1 or 2 left turn lanes. A service lane / bicycle lane is also available in each direction. On street parking is prohibited on Major Arterial Streets.

4 lane Minor Arterial Streets (110' ROW) are intended to provide two travel lanes in each direction, but otherwise the section is similar to the major arterial.

Downtown Arterial Streets (70' ROW) provide one travel lane in each direction and permit on-street parking. While these streets are an important part of the city-wide circulation system, their primary function is to provide access to established commercial areas.

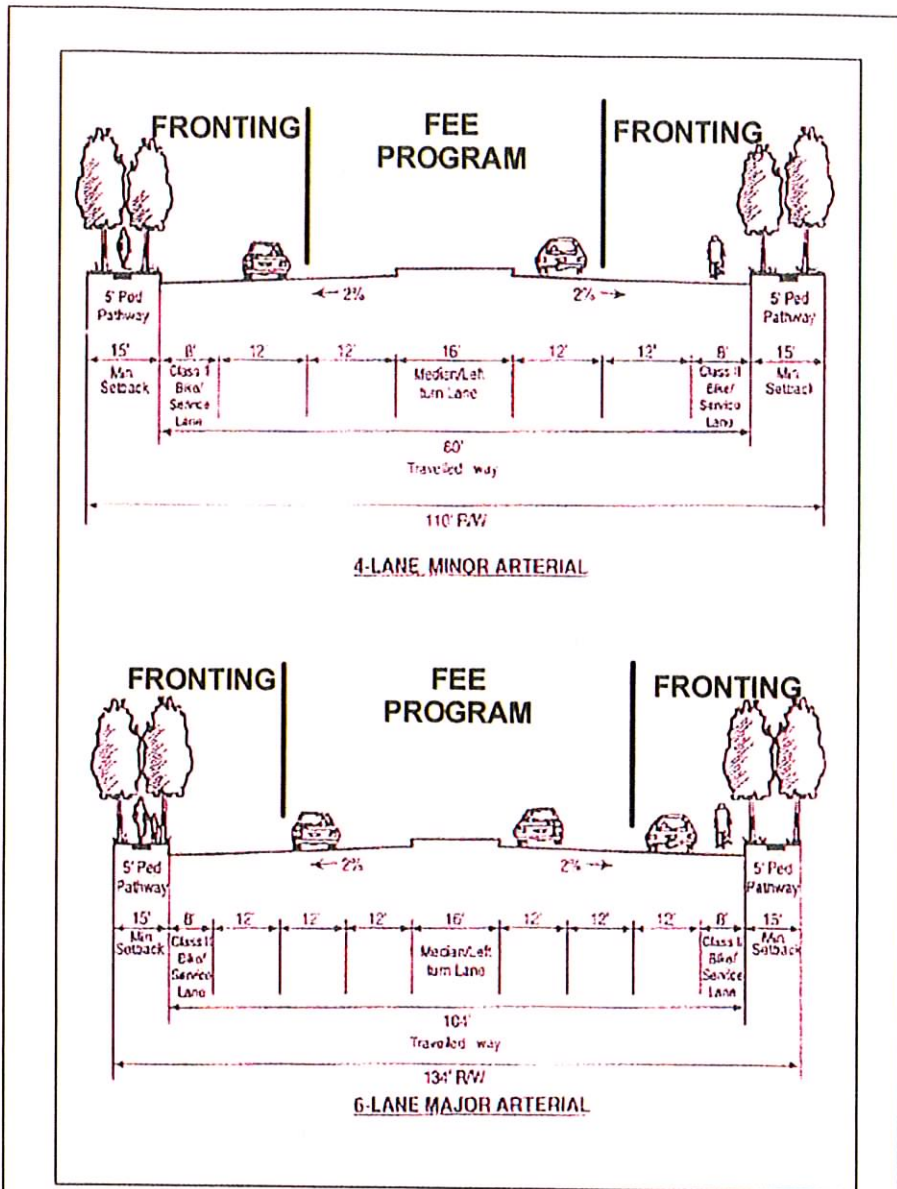
Commercial Collector Streets (96' ROW) provide one through lane in each direction as noted in the General Plan, and a center lane would be striped for turn pockets and/or a continuous two way left turn lane. On-street parking would also be allowed and bicycle lanes would be provided.

Residential Collector Streets (86' ROW) provide one through lane in each direction and a raised median. On-street parking or a bicycle lane can also be accommodated, but not both. The absence of one of these features differentiates commercial and residential collector streets.

Industrial Streets (68' ROW) provide the space needed to accommodate the turning movements of large trucks. These streets feature a through lane in each direction plus a 12' parking area that can accommodate trucks or may be reconfigured to provide a center turn lane.

Local Residential & Cul-de-sac Streets (60' ROW) are intended to provide access to local neighborhoods. Local streets provide a 12' travel lane in each direction and 8' of parking or a bicycle lane.

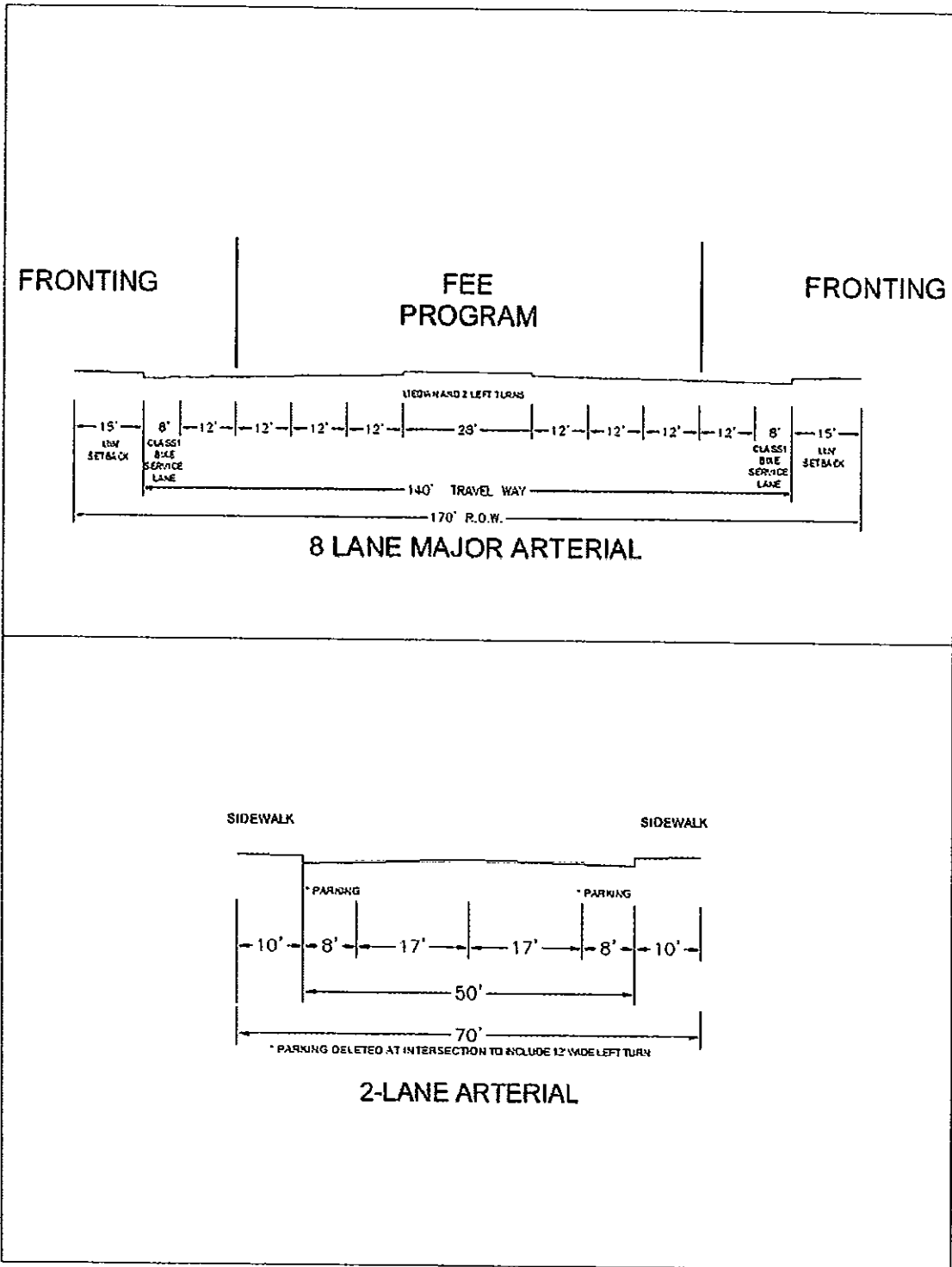
Figure 1 presents the standard street sections.

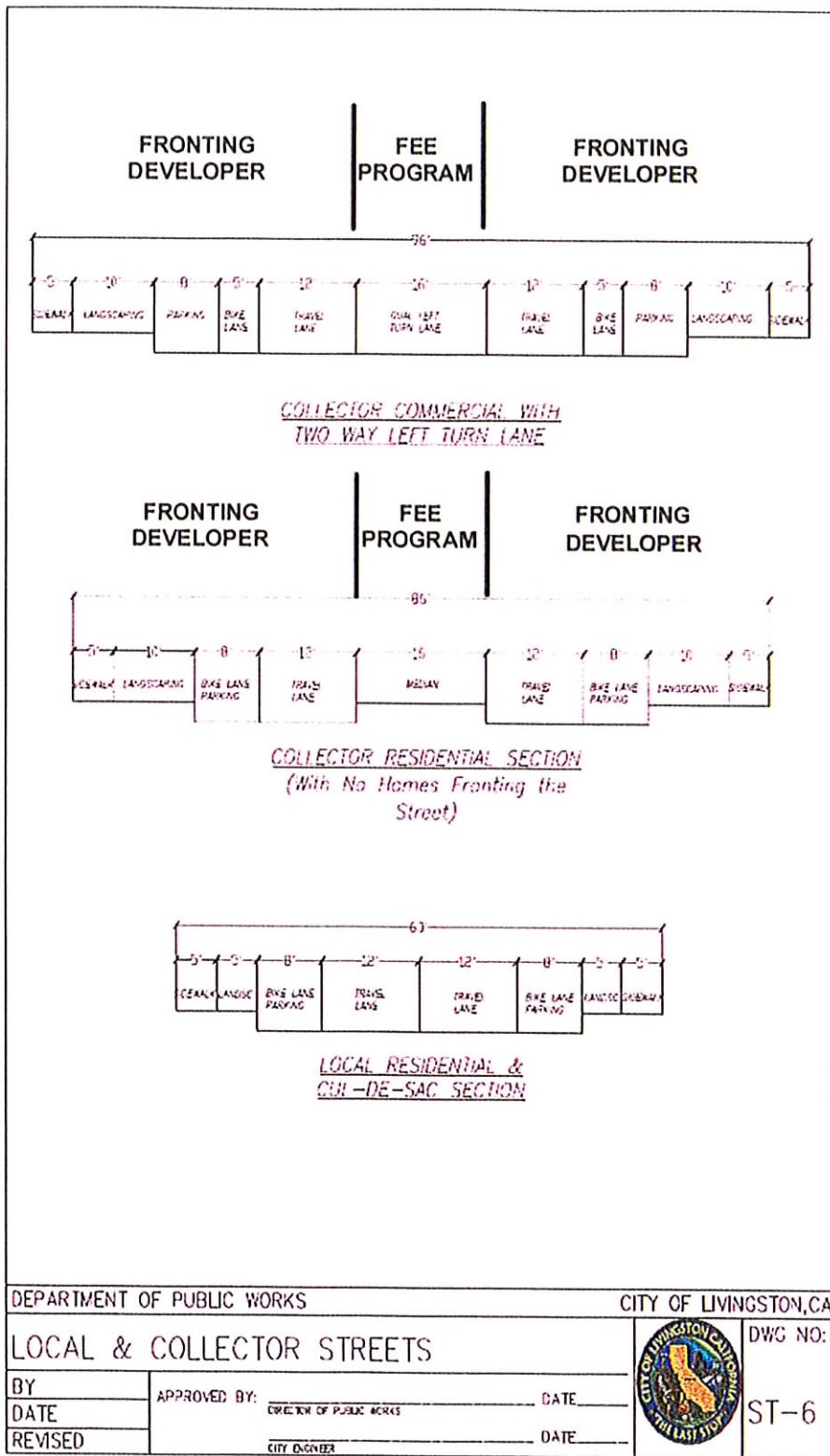


NOTE:

1. 6-Lane Major Arterials include Winton Parkway north of "B" Street and other streets as approved by the City Engineer.
2. 4-lane Minor Arterials include Winton Parkway south of "B" Street, "B" Street.

DEPARTMENT OF PUBLIC WORKS		CITY OF LIVINGSTON, CA.
MAJOR & MINOR ARTERIALS		
BY _____	APPROVED BY: _____	DATE _____
DATE _____	DIRECTOR OF PUBLIC WORKS	
REVISED _____	CITY ENGINEER	DATE _____
		DWG NO: ST-5





KD Anderson & Associates, Inc.
Transportation Engineers

STANDARD STREET SECTIONS

4515-06 FIG 1 REV 9 07.VSD

10/18/2007

figure 1C

Level of Service Thresholds

To describe current traffic conditions and put future traffic volumes into perspective existing traffic volumes and future forecasts were compared to Level of Service thresholds. "Level of Service" (LOS) is a qualitative measure of traffic operating conditions whereby a letter grade, "A" through "F", corresponding to progressively worsening traffic operating conditions, is assigned to an intersection or roadway segment. The City of Livingston General Plan indicates that LOS "D" is the applicable minimum design standard.

Level of Service can be calculated for different types of facilities. Level of Service can be determined for highways and intersections, and published methodologies for determining Level of Service are predicated on hourly traffic volumes on these facilities. The methodology selected by the City of Livingston for signalized intersections is Intersection Capacity Utilization (ICU). For this study, information regarding unsignalized intersection Levels of Service has been developed using the procedures contained in the 2000 Highway Capacity Manual (HCM). Table 1 presents the general characteristics of each level of service grade at intersections and on roadway segments.

**TABLE 1
LEVEL OF SERVICE DEFINITIONS – INTERSECTIONS**

Level of Service	Signalized Intersection	Unsignalized Intersection	Roadway (Daily)
"A"	Uncongested operations, all queues clear in a single-signal cycle. Delay ≤ 10.0 seconds (sec) volume/capacity (v/c) < 0.60	Little or no delay. Delay ≤ 10 seconds/vehicle (sec/veh)	Completely free flow.
"B"	Uncongested operations, all queues clear in a single cycle. Delay > 10.0 sec and ≤ 20.0 sec $0.60 < v/c \leq 0.70$	Short traffic delays. Delay > 10 sec/veh and ≤ 15 sec/veh	Free flow, presence of other vehicles noticeable.
"C"	Light congestion, occasional backups on critical approaches. Delay > 20.0 sec and ≤ 35.0 sec $0.70 < v/c \leq 0.80$	Average traffic delays. Delay > 15 sec/veh and ≤ 25 sec/veh	Ability to maneuver and select operating speed affected.
"D"	Significant congestion of critical approaches but intersection functional. Cars required to wait through more than one cycle during short peaks. No long queues formed. Delay > 35.0 sec and ≤ 55.0 sec $0.80 < v/c \leq 0.90$	Long traffic delays. Delay > 25 sec/veh and ≤ 35 sec/veh	Unstable flow, speeds and ability to maneuver restricted.
"E"	Severe congestion with some long standing queues on critical approaches. Blockage of intersection may occur if traffic signal does not provide for protected turning movements. Traffic queue may block nearby intersection(s) upstream of critical approach(es). Delay > 55.0 sec and ≤ 80.0 sec $0.90 < v/c \leq 1.00$	Very long traffic delays, failure, extreme congestion. Delay > 35 sec/veh and ≤ 50 sec/veh	At or near capacity, flow quite unstable.
"F"	Total breakdown, stop-and-go operation. Delay > 80.0 sec $v/c > 1.00$	Intersection blocked by external causes. Delay > 50 sec/veh	Forced flow, breakdown.
Overall Level of Service for unsignalized intersections is "worst case" of delay experienced by all motorists			
Sources: 2000 <u>Highway Capacity Manual</u> , Transportation Research Board (TRB) Special Report 209			

Levels of Service based on Daily Traffic Volumes. While assessment of peak hour conditions is standard, for planning level traffic studies it is also beneficial to describe Levels of Service based on the average daily traffic volumes occurring on major city streets. Use of daily volumes permits relatively quick assessment of general circulation system needs.

Level of Service thresholds for Livingston streets were developed based on review of several sources. Because there is no uniform national standard to equate daily traffic volumes on urban streets to specific Levels of Service, the City of Livingston General Plan EIR and its background references, the Merced County Congestion Management Plan (CMP) and Caltrans guidelines were considered. We found that Caltrans has no recommendations in this area, and that general thresholds originally developed by the Florida Department of Transportation (FDOT) are most applicable. The Level of Service thresholds developed by FDOT have been used by many California agencies, including MCAG.

Level of Service thresholds were developed in a manner that accounted for the presence of features that affect urban traffic flow. These thresholds account for the effects of traffic signals on overall traffic flow, as well as signal spacing. The FDOT guidelines suggest that the presence of a raised median could increase Level of Service thresholds by about 5%. However, while the presence of wider shoulders and or bicycle lanes will promote overall safety, the general capacity of the street may not be affected by this extra width to a great degree. This, the generalized capacities of Residential and Commercial Collector streets are nearly the same. Resulting LOS thresholds are presented in Table 2.

**TABLE 2
GENERAL LEVEL OF SERVICE THRESHOLDS BASED ON DAILY TRAFFIC VOLUMES**

Street Classification	Lanes	Control	Daily Traffic Volume at LOS		
			C	D	E
Collector	2	Undivided	7,700	11,600	12,900
Residential Collector	2+	Undivided	9,200	13,700	15,450
Commercial Collector	2+	Undivided	9,600	14,400	16,200
Downtown Arterial	2+	Undivided	9,600	14,400	16,200
Minor Arterial	4+	Divided	20,100	30,200	33,200
Major Arterial	6+	Divided	45,000	47,900	50,300
	8+	Divided	53,300	63,800	67,000
Freeway ramp	1	Not applicable	7,500	10,000	15,000
+ includes center turn lane					

Current Traffic Conditions

Daily and peak hour traffic counts were made for this study at locations on major roads in Livingston in 2004. This sample of current traffic volumes is intended to look at those roads which already carry major traffic volumes and which are expected to carry high traffic volumes in the future. The majority of these counts were conducted in July 2004, but some data was taken from other traffic studies prepared before that date. The results of these counts are presented in Table 3, and the Level of Service currently occurring is also noted.

As noted, the current daily traffic volume on most of these roads indicate Level of Service C conditions which fall within the General Plan's minimum Level of Service D standard, indicating that current traffic conditions in the community are good. Of these count locations the highest volume was observed on Winton Parkway immediately south of the SR 99 interchange. The observed volume at this location is still indicative of LOS D conditions on a two-lane road. Similar conclusions can be reached for Hammatt Avenue north of SR 99.

**TABLE 3
YEAR 2004 DAILY TRAFFIC VOLUMES AND LEVELS OF SERVICE**

Road	Location from	To	Year 2004			
			Lanes	General Plan Classification	Volume	LOS
East West Streets						
Olive Avenue	Hammatt Ave	Dwight Way	2	Collector	345	C
	Dwight Way	Sultana Drive	2	Collector	325	C
Walnut Ave	Livingston Cressey	Hammatt Ave	2	Collector	4,160	C
	Hammatt Avenue	Dwight Way	2	Collector	7,115	C
	Dwight Way	Sultana Drive	2	Collector	3,935	C
Campbell Ave	Winton Parkway	Stefani Ave	2	Arterial	6,320	C
	Stefani Ave	Cressey	2	Arterial	4,235	C
	Hammatt Avenue	Dwight Way	2	Arterial	4,420	C
Vinewood Ave	Robin Ave	Winton Parkway	2	Arterial	1,125	C
B Street	Winton Parkway	Main Street	2	Arterial	4,410	C
F Street	Main Street	Hammatt Ave	2	Collector	3,425	C
Peach Avenue	Winton Pkwy	Main Street	2	Arterial	2,005	C
	Main Street	Hammatt Ave	2	Arterial	2,360	C
	Winton Pkwy	Main Street	2	Collector	300	C
	Main Street	Hammatt Ave	2	Collector	290	C
	Winton Pkwy	Main Street	2	Arterial	2,170	C
	Main Street	Sultana Drive	2	Arterial	1,305	C
North South Roads						
Washington Blvd	Vinewood	F Street	2	Collector	360	C
Robin Ave	Vinewood	F Street	2	Collector	2,935	C
	F Street	Peach Ave	2	Collector	1,530	C
Winton Parkway	SR 99 SB ramps	Joseph Gallo Dr	2	Arterial	12,100	D
	Joseph Gallo Dr	B Street	2	Arterial	7,650	C
Livingston Cressey	Eucalyptus Ave	Olive Ave	2	Arterial	1,740	C
	Olive Avenue	Davis Ave	2	Arterial	3,080	C
	Davis Ave	Campbell Ave	2	Arterial	8,075	C
	Campbell Ave	B Street	2	Arterial	7,420	C

**TABLE 3 (CONT'D)
YEAR 2004 DAILY TRAFFIC VOLUMES AND LEVELS OF SERVICE**

Road	Location from	To	Year 2004			
			Lanes	General Plan Classification	Volume	LOS
SR 99 Ramps						
Main Street / Lincoln Blvd	B Street	F Street	2	Arterial	6,825	C
	F Street	Park Street	2	Arterial	4,955	C
	Peach Ave	Magnolia Ave	2	Arterial	2,370	C
	Magnolia Ave	Westside Blvd	2	Arterial	2,200	C
	Westside Blvd		2	Arterial	2,105	C
Hammatt Ave	Walnut Ave	Campbell Ave	4	Arterial	7,495	C
	Campbell Ave	NB SR 99 ramps	2	Arterial	11,365	D
	F Street	Park Street	2	Arterial	8,870	C
	Park Street	Peach Ave	2	Arterial	2,540	C
Dwight Way	Walnut Ave	Campbell Ave	2	Collector	520	C
	F Street	Peach Ave	2	Collector	750	C
	Peach Ave	Magnolia Ave	2	Collector	770	C
Sultana Drive	SB SR 99 ramps	Peach Ave	2	Collector	250	C
Winton Parkway	NB SR 99 off		1	Ramp	875	C
	NB SR 99 on		1	Ramp	4,000	C
	SB SR 99 off		1	Ramp	5,000	C
	SB SR 99 on		1	Ramp	1,125	C
Hammatt Avenue	NB SR 99 off		1	Ramp	2,275	C
	NB SR 99 on		1	Ramp	2,750	C
	SB SR 99 off		1	Ramp	2,175	C
	SB SR 99 on		1	Ramp	2,725	C

Current Peak Hour Levels of Service

A.m. (7:00 to 9:00 a.m.) and p.m. (4:00 to 6:00 p.m.) peak hour Levels of Service were also determined for major intersections in Livingston. Traffic counts for these calculations typically collected in May-June 2004, although recent counts from available traffic studies were re-used where applicable. Levels of Service were calculated using the methodologies presented in the 2000 Highway Capacity Manual, and the results are presented in Table 4. In each case the “overall” Level of Service for all motorists has been determined. Levels of Service at unsignalized intersections is expressed in terms of the length of the overall average delay (seconds per vehicle), while at signalized intersections the Level of Service is predicated on the volume / capacity (v/c) ratio.

As shown, the overall Level of Service at each location is within the City’s LOS D standard.

The extent to which current traffic volumes satisfy Caltrans' peak hour warrant for traffic signals has also been considered. As shown, none of the unsignalized intersections carry volumes that today satisfy the "urban" peak hour warrant. However, the City of Livingston is currently pursuing a project to signalize the Winton Parkway / B Street intersection.

**TABLE 4
CURRENT PEAK HOUR LEVELS OF SERVICE**

Intersection		Control	A.M Peak Hour		P.M. Peak Hour		Signal Warranted?
			Avg Delay or v/c	LOS	Avg Delay or v/c	LOS	
Washington Ave	Vinewood Ave	NB Stop	2.7 sec	A	1.8 sec	A	No
Robin Ave	Vinewood Ave	All-Way Stop	8.8 sec	A	8.1 sec	A	No
Winton Pkwy	Glenwood Ave	All-Way Stop	10.3 sec	B	9.7 sec	A	No
Winton Pkwy	NB 99 ramps	NB Stop	5.5 sec	A	5.7 sec	A	No
Winton Pkwy	SB 99 ramps	SB Stop	16.2 sec	C	10.7 sec	B	No
Winton Pkwy	J Gallo Dr	Signal	v/c = 0.32	A	v/c = 0.45	A	-
Winton Pkwy	B Street	All-Way Stop	8.7 sec	A	10.3 sec	B	No
Briarwood	F Street	SB Stop	3.0 sec	A	3.4 sec	A	No
Prusso St	B Street	All-Way Stop	7.5 sec	A	8.5 sec	A	No
Prusso St	F Street	All-Way Stop	7.2 sec	A	7.7 sec	A	No
Livingston – Cressey Rd	Swan Ave	WB Stop	3.2 sec	A	3.2 sec	A	No
Livingston – Cressey Rd	Davis Ave	Signal	v/c = 0.34	A	v/c = 0.22	A	-
Livingston – Cressey Rd	Campbell Ave	All-Way Stop	13.8 sec	B	12.3 sec	B	No
Main Street	B Street	All-Way Stop	9.2 sec	A	14.2 sec	B	No
Main Street	F Street	All-Way Stop	9.0 sec	A	10.3 sec	B	No
Main Street	Peach Ave	All-Way Stop	9.3 sec	A	8.3 sec	A	No
Hammatt Ave	Walnut Ave	Signal	v/c = 0.20	A	v/c = 0.40	A	-
Hammatt Ave	Campbell Ave	EB/WB Stop	2.9 sec	A	3.9 sec	A	No
Hammatt Ave	NB 99 ramps	NB Stop	9.9 sec	A	4.4 sec	A	No
Hammatt Ave	SB 99 ramps	SB Stop	6.8 sec	A	7.5 sec	A	No
Hammatt Ave	F Street	All-Way Stop	13.1 sec	A	12.2 sec	B	No
Hammatt Ave	Peach Ave	NB/SB Stop	2.4 sec	A	4.4 sec	A	No

Traffic Data collected mid-2004

Transit Facilities

Today the City of Livingston is served by Merced County Transit. Route #7 (Red Route) links the Livingston Library with the communities of Winton, Atwater and Merced. This routes travels on Main Street / Livingston-Cressey Road and Walnut Avenue on two hour headways. Route #6 (North County Shuttle) links Livingston with Hilmar and Delhi and travels on Winton Parkway and B Street. Dial-a-Ride service is also available.

The 2004 Merced Short Range Transit Plan identifies strategies for improving transit service in the County. Recommended actions include adding a bus to Route 7 to decrease headways and eventually converting dial-a-ride systems to flex routes systems as rural communities grow. However, while the city may grow to the point that local transit is an option, development of expanded transit services within the community of Livingston itself is not a recommended action within the short term time frame addressed by the 2004 Transit Plan.

FUTURE LAND USE / TRIP GENERATION ASSUMPTIONS

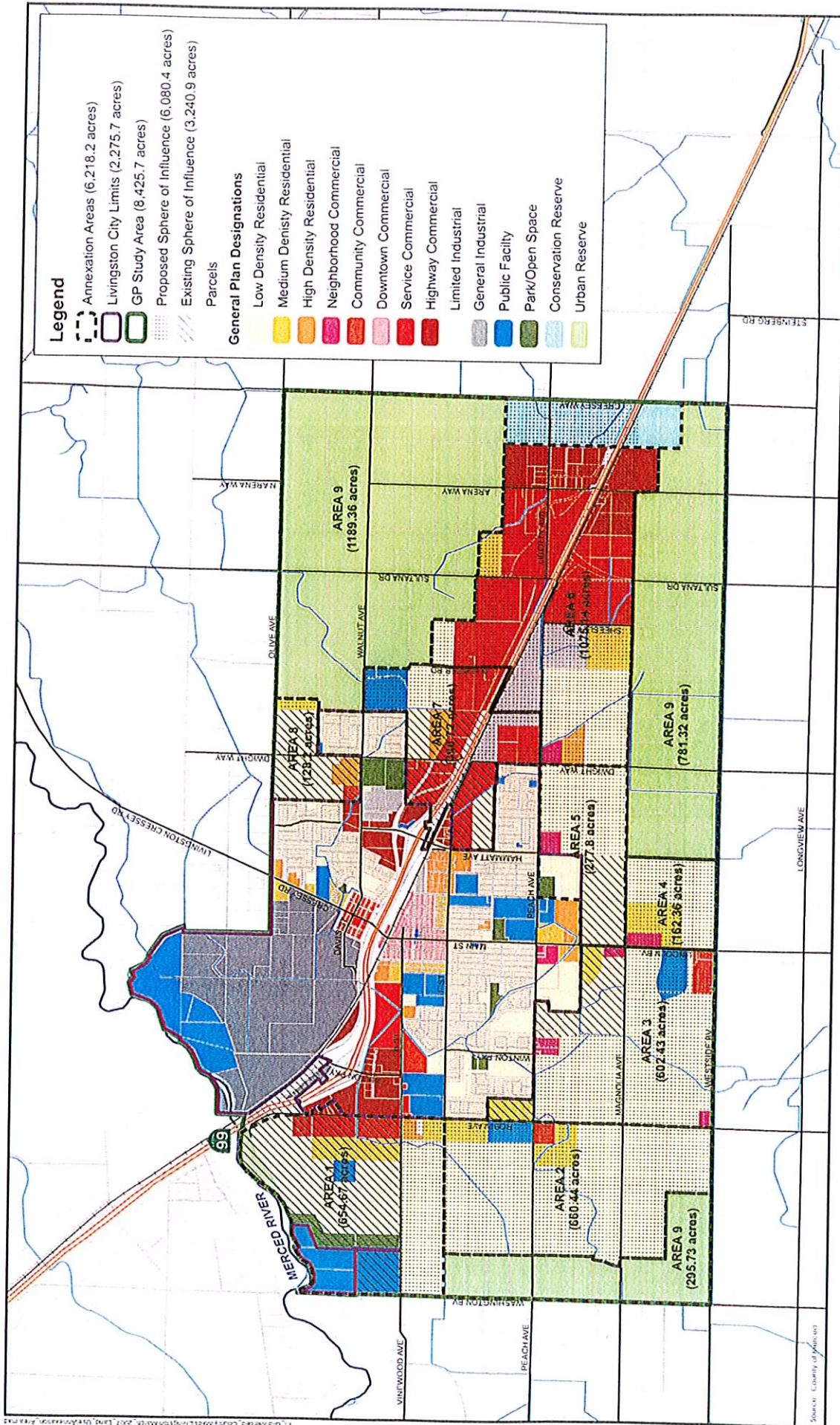
Future development within the area identified under the Master Plan will create demands on the area circulation system and will be asked to pay its fair share towards the cost of the circulation improvements needed to accommodate future traffic volumes.

Land Use Projections

The amount of future development within the limits of the Master Plan area was determined by PMC in consultation with City staff. Table 5 identifies the total amount of growth anticipated in Livingston over the Master Plan Horizon and differentiates between growth anticipated in the eight identified planning areas and growth within the balance of the City within the limits of the Master Plan area. The 20 year horizon represents development within the City's sphere of influence (i.e., 20 year growth boundary).

Residential Development. The assumptions made for the Master Plan assume development of residential uses throughout the community. The total number of new residential dwellings anticipated in Livingston is 5,436 within the next 10 years and 14,395 within a 20 year horizon. Full build out of the Master Plan area yields a total of approximately 23,174 new dwellings.

Non-Residential Development. The Master Plan also assumes that a total of 546.3 acres of new non-residential development will occur within the next ten years. As shown, 15 acres of Neighborhood Commercial, 16 acres of Community Commercial, 34 acres of Service Commercial, 77 acres of Highway Commercial uses and 56 acres of Light Industrial are expected to be developed within 10 years in the existing city limits, exclusive of the 8 planning areas. Within that same 10 year time frame another 353 acres are expected to be developed in the 8 planning areas. Another 863 acres of non-residential development is anticipated in the planning areas within 20 years. Beyond the 20 year horizon, another 867 acres is expected to develop.



**TABLE 5
LIVINGSTON MASTER PLAN AREA GROWTH**

New Land Use	New Development Dwelling Units / Acres of Non-Residential						
	10 years		20 years		Build Out > 20 years		Cumulative Total
	Existing City Limits	Planning Areas (1-8)	Cumulative Total	Planning Areas (1-8)	Cumulative Total	Balance of City Within the Master Plan Build Out Area	
Residential							
Low / Med Density Residential	1,146 du's	3,084 du's	4,230 du's	8,519 du's	12,749 du's (2619 ac)	7,537 du's 1214 ac	20,286 du's 3,833 ac
High Density Residential	560 du's	646 du's	1,206 du's	440 du's	1,646 du's 68 ac	1,242 du 62 ac's	2,888 du's 130 ac
Total New Residential	1,706 du's	3,730 du's	5,436 du's	8,959 du's	14,395 du's 2,687 ac	8,779 du's 1,356 ac	23,174 du's 3,963 ac
Non-Residential							
Neighborhood Commercial (Assumed to be Retail) (Assumed to be Office)	10 ac (6.7 sc) (3.3 sc)	5 ac (3.3 ac) (1.7 ac)	15 ac (10 ac) (5 ac)	41.2 ac (27.5 ac) (13.7 ac)	56.2 ac (37.5 ac) (18.7 ac)	84.3 ac (56.2 ac) (30.2 ac)	140.5 ac (93.7 ac) (48.9 ac)
Community Commercial	16 ac	25.4 ac	41.4 ac	28.1 ac	69.5 ac	0 ac	69.5 ac
Service Commercial	34 ac	131.1 ac	165.1 ac	223.1 ac	388.7 ac	208.9 ac	597.6 ac
Highway Commercial	77 ac	5.0 ac	82.0 ac	382.4 ac	464.4 ac	213.2 ac	677.6 ac
Light Industrial	56 ac	7.0 ac	63.0 ac	121.2 ac	184.2 ac	148.6 ac	332.8 ac
Parks / Public / Open		179.5 ac	179.5 ac	66.8 ac	246.3 ac	135.3 ac	381.6 ac
Total Non-Residential	193 ac	353.3 ac	546.3 ac	862.8 ac	1,409.1 ac	867.2 ac	2,276.3 ac

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Trip Generation

The amount of traffic associated with the identified land uses has been identified as an input to the traffic impact analysis and also as a method for allocating the costs of future circulation system improvements. Traffic engineers describe the level of traffic activity associated with land uses in terms of “trip ends”. Each trip on the street has one trip end at each origin and each destination.

For this analysis, trip generation rates were either taken from the MCAG regional traffic model or developed on a “per acre” basis from data available from the Institute of Transportation Engineers (ITE). MCAG rates were employed for single and multiple family residential development. ITE data was employed directly for many non-residential uses but composite rates were developed for uses with wide variation, such as highway commercial.

As shown in Table 6, the number of automobile and truck trips that would accompany development is dependent on the types of land uses which are developed within each general land use category. For example, within the broad Highway Commercial category, the areas of Livingston that have recently been developing have been high traffic generating convenience uses such as fast food restaurants and gasoline stations. Typically, these uses generate approximately 1,000 daily trips per acre. The category also accommodates major regional commercial uses. Large shopping centers generate approximately 300 daily trips per acre. However, this land use category also accommodates lower generating uses that benefit from highway visibility but do not attract as much traffic. These uses could include mobile home / tractor sales, furniture stores, etc. These uses generate approximately 100 trips per acre.

**TABLE 6
TRIP GENERATION RATES**

Category	Description	Typical Uses	Unit	Daily Trips per Unit
Single Family Residential		Detached homes	Dwelling	7.00
Multiple Family Residential		Attached homes	Dwelling	4.25
Neighborhood Commercial	Retail	Convenience stores, shops, services	Acre	400.00
	Offices	Services	Acre	200.00
Community Commercial	Shopping center	Supermarkets, drug stores services	Acre	400.00
Service Commercial	Business Park	Mix of services, light industrial and retail	Acre	150.00
Highway Commercial	Highway Convenience Commercial Regional Commercial	Fast food restaurants, gasoline stations, motels Large retailers	Acre	400.00
Limited Industrial	Industrial	Light manufacturing	Acre	60.00
	Sales	Automobile sales	Acre	140.00
General Industrial		Warehousing, manufacturing	Acre	60.00

Table 7 presents a summary of the trip generation estimate made for new development in Livingston. As shown in Table 7, within the next ten years the total gross daily trip generation projection for all development assumed under the Master Plan is 117,716 daily trip ends. This total is divided between 34,736 trips generated by residential uses and 82,980 trips generated by non-residential uses.

The relative balance between residential and non-residential development in Livingston is an important factor in the volume of traffic projected on at Livingston's interchanges with State Route 99 (SR 99). Because the trips generated by residential uses generally look to be matched to corresponding non-residential uses, a "balanced" system where the residential and non-residential trip totals are similar tends to reduce the volume of traffic leaving the community on the regional circulation system. Over the next ten years, the number of non-residential trips is higher than the residential total (i.e., net balance is 48,244). This traffic would be expected to be "external" to the community and to be concentrated at the Winton Parkway and Hammatt Avenue interchanges.

The volume of traffic accompanying development over the next twenty years can also be seen in Table 7. Cumulatively, 392,896 new daily trips are forecast. This total is split between residentially generated trips (96,239) and non-residential trips (296,657), with a resulting surplus of 200,418 daily trips. This appreciable imbalance suggests that a very large number of employees and shoppers will be "imported" to the non-residential uses from traffic already on SR 99 and from areas outside of Livingston (i.e., Merced to the South or Turlock to the north).

Eventually the entire master plan area may build out during the time period beyond the plan's 20 year horizon. This study makes land uses assumptions for the balance of the area and suggests that 609,984 daily trips may be generated. Of that total 154,276 would be generated by residential development and 455,708 would be non-residential. Again, the net balance of 301,432 daily trip ends would suggest a large surplus of non-residential trips that would be drawn to Livingston from outside areas.

The end result of this imbalance is very high traffic volumes on the city's three SR 99 ramps and the resulting need to upgrade each location.

**TABLE 7
TRIP GENERATION PROJECTIONS**

New Land Use	New Development Dwelling Units / Acres of Non-Residential								
	10 years				20 years				Build Out > 20 years
	Existing City limits	Planning Areas (1-8)	Cumulative Daily Trip Generation	Planning Areas (1-8)	Cumulative Daily Trip Generation	Balance of City Within the Master Plan Build Out Area	Cumulative Daily Trip Generation	Cumulative Daily Trip Generation	
Residential									
Low / Med Density Residential	1,146 du's	3,084 du's	29,610	8,519 du's	89,243	7,537 du's		142,002	
High Density Residential	560 du's	646 du's	5,126	440 du's	6,996	1,242 du's		12,274	
Total New Residential	1,706 du's	6,202 du's	34,736	7,385 du's	96,239	8,698 du's		154,276	
Non-Residential									
Neighborhood Commercial (Assumed to be Retail) (Assumed to be Office)	10 ac (6.7 sc) (3.3 sc)	5 ac (3.3 ac) (1.7 ac)	4,000 1,000	41.2 ac (27.5 ac) (13.7.0 ac)	11,000 2,740	84.3 ac (56.2 ac) (30.2 ac)		37,480 9,780	
Community Commercial	16 ac	25.4 ac	16,560	28.1 ac	27,800	0 ac		27,800	
Service Commercial	34 ac	131.6 ac	24,840	223.1 ac	58,305	208.9 ac		89,640	
Highway Commercial	77 ac	5 ac	32,800	382.4 ac	185,760	213.2 ac		271,040	
Light Industrial	56 ac	7 ac	3,780	121.2 ac	11,052	148.6 ac		19,968	
Parks / Public / Open		179.5 ac	0	66.8 ac	0	135.3 ac		0	
Total Non-Residential	193 ac	278.8 ac	82,980	862.8 ac	296,657	867.2 ac		455,708	
Total All Uses			117,716		392,896			609,984	
"Net" Balance			48,244		200,418			301,432	

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Circulation System Network

Implementation of the future land uses assumed within the Master Plan study area will be accompanied by construction of new streets, but not every street identified in the Livingston General Plan Circulation Map is expected to be constructed under the Master Plan. For this analysis the following assumptions have been made for conditions occurring in 20 years:

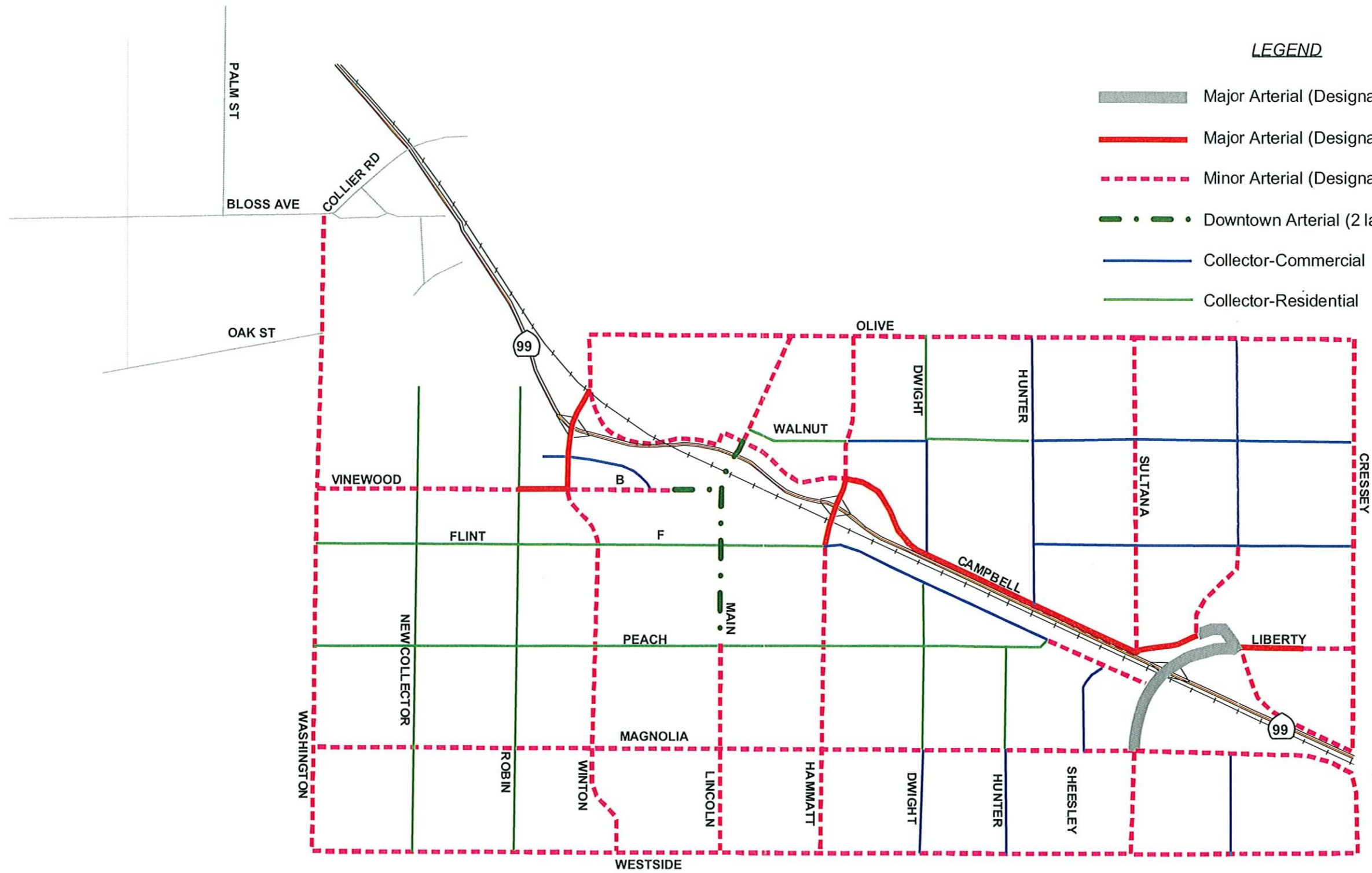
1. All collector and arterial streets within or abutting identified growth areas will be constructed as fronting development occurs with slurry seal required on the nonfronting side.
2. During the development of the Master Plan, Campbell Ave was constructed in 2006 as a two lane road from Hammatt Avenue to the new Sultana Drive / Arena Blvd interchange on SR 99.
3. Magnolia Street will extend from Washington Avenue to Sultana Drive as an arterial street.
4. Winton Parkway will reach to Westside Blvd on the south and will extend north of Campbell Ave to Olive Avenue. Olive Avenue will be constructed from Winton Parkway to Livingston Cressey.
5. Washington Avenue will extend across the Merced River to the SR 99 / Collier Road interchange
6. F Street will be extended to Sultana Drive as a frontage road along SR 99.
7. Joseph Gallo Drive will not extend west to Robin Avenue, due to the problems anticipated at the Winton Parkway / Joseph Gallo Drive intersection.
8. No other SR 99 crossings will be constructed.

The street system of collector and arterial streets envisioned under the Master Plan presented in Figure 2. Minor collectors, local residential streets and local industrial streets that are not a part of the Master Plan area not illustrated.



LEGEND

-  Major Arterial (Designated 8 lanes)
-  Major Arterial (Designated 6 lanes)
-  Minor Arterial (Designated 2-4 lanes)
-  Downtown Arterial (2 lanes)
-  Collector-Commercial
-  Collector-Residential



TRAFFIC ANALYSIS: FORECASTS

Methodology

In order to identify the extent of improvements needed within 20 years under the Master Plan a traffic impact analysis was conducted using a version of the MCAG Year 2030 travel demand forecasting model. The structure of the existing regional model was modified to provide greater detail for the Livingston area, and the number of Traffic Analysis Zones (TAZ's) was increased from ten to 80. New collector and arterial streets identified under the Master Plan were added. Future land uses were identified for each TAZ, and applicable assumptions for access to the adjacent street system were made.

MCAG maintains traffic models for various future horizons reflecting assumed development on a county-wide basis. The Year 2030 traffic model was selected in order to account for development in other locations in Merced County that could be reasonably expected and could affect the origin / destination characteristics of development in Livingston.

Traffic volume forecasts were made for two scenarios. The first scenario assumes the 20 year land use forecast identified previously. This is the traffic volume level that would need to be accommodated by the improvements funded and constructed under the Master Plan. In order to ensure that rights of way will be adequate for the eventual buildout of the Master Plan area, a "buildout" forecast has also been made that assumes all identified land uses are occupied.

Year 2030 Traffic Volumes: Issues

Resulting Year 2030 (20 year growth and Build Out) traffic model forecasts are summarized and compared to the identified Level of Service thresholds, as shown in Table 8.

Street Classifications. As noted, projected traffic volumes have been reviewed to confirm that adequacy of the collector and arterial street system. The table differentiates between different "facilities" type:

8 lane Major Arterials	(MaA-8)
6 lane Major Arterials	(MaA-6)
4 lane Minor Arterials	(MiA-4)
2-Lane Downtown Arterial	(DA-2)
Residential Collectors	(RC-2)
Commercial Collectors	(CC-2)

**TABLE 8
DAILY TRAFFIC VOLUMES AND LEVELS OF SERVICE
20 YEAR PROJECTIONS AND BUILDOUT**

Road	Location From	To	Year 2004			20 Year Forecast			Build Out			
			Daily Volume	Daily Volume	Facility - Lanes	LOS	Daily Volume	Facility - Lanes	LOS	Daily Volume	Facility - Lane	LOS
East West Streets	Livingston Cressey	Hammatt Avenue	-	3,300	MiA - 4	C	11,300	MiA - 4	C	11,300	MiA - 4	C
	Hammatt Avenue	Dwight Way	345	2,250	Mi A - 4	C	11,050	Mi A - 4	C	11,050	Mi A - 4	C
	Dwight Way	Hunter Avenue	325	1,320	MiA - 4	C	10,540	Mi A - 4	C	10,540	Mi A - 4	C
	Hunter Avenue	Sultana Drive	-	1,115	Mi A - 4	C	6,735	Mi A - 4	C	6,735	Mi A - 4	C
	Sultana Drive	Cressey Road	-	1,100	MiA-2	C	6,000	MiA-4	C	6,000	MiA-4	C
	Cressey Road	Central Ave	-	1,050	2 lanes	c	5,125	2 lanes	C	5,125	2 lanes	C
	Foster Farms	Livingston Cressey	-	8,350	RC - 2	C	7,300	RC - 2	C	7,300	RC - 2	C
	Livingston Cressey	Hammatt Avenue	4,160	8,060	RC - 2	C	12,370	RC - 2	D	12,370	RC - 2	D
	Hammatt Avenue	Dwight Way	7,115	12,710	CC - 2	D	18,380	CC - 2	F	18,380	CC - 2	F
	Dwight Way	Hunter Avenue	3,935	7,640	RC - 2	C	14,450	RC - 2	E	14,450	RC - 2	E
	Hunter Ave	Sultana Drive	-	7,120	CC - 2	C	17,850	CC - 2	F	17,850	CC - 2	F
	Sultana Drive	Cressey Road	-	9,615	CC-2	C	15,550	CC-2	F	15,550	CC-2	F
Cressey Road	Central Ave	-	9,250	2 lanes	C	13,125	2 lanes	D	13,125	2 lanes	D	
Winton Parkway	Stefani Avenue	6,320	11,635	MiA - 2	D	14,690	MiA - 2	E	14,690	MiA - 2	E	
Stefani Avenue	Cressey	4,235	11,635	MiA - 2	D	14,690	MiA - 2	E	14,690	MiA - 2	E	
Livingston Cressey	Hammatt Avenue	-	15,740	MiA - 4	C	16,650	MiA - 4	C	16,650	MiA - 4	C	
Hammatt Avenue	Dwight Way	4,420	35,800	Ma A - 6	C	39,780	MaA - 6	C	39,780	MaA - 6	C	
Dwight Way	Hunter Avenue	-	29,400	Ma A - 6	C	32,980	MaA - 6	C	32,980	MaA - 6	C	
Hunter Avenue	Sultana Drive	-	29,075	Ma A - 6	C	30,960	MaA - 6	C	30,960	MaA - 6	C	
Sultana Drive	Arena Avenue	-	28,375	Ma A - 6	C	33,500	MaA - 6	C	33,500	MaA - 6	C	
Arena Avenue	Liberty Avenue	-	28,770	MaA - 8	C	40,450	MaA - 8	C	40,450	MaA - 8	C	
Liberty Avenue	Cressey Road	-	27,750	MiA - 4	D	27,990	MiA - 4	D	27,990	MiA - 4	D	
Cressey Road	Central Ave	-	10,400	2 lanes	D	13,700	2 lanes	D-E	13,700	2 lanes	D-E	
Winton Parkway	Winton Parkway	-	13,435	CC - 2	D	13,180	CC - 2	D	13,180	CC - 2	D	
Winton Parkway	B Street	-	7,450	CC-2	C	7,220	CC - 2	C	7,220	CC - 2	C	
Washingon Avenue	New Collector	-	8,000	MiA - 4	C	9,460	MiA - 4	C	9,460	MiA - 4	C	
New Collector	Robin Avenue	-	13,185	MiA - 4	C	15,670	MiA - 4	C	15,670	MiA - 4	C	
Robin Avenue	Winton Parkway	1,125	28,690	MaA - 6	C	33,115	MaA - 6	C	33,115	MaA - 6	C	
Winton Parkway	Prusso Street	4,410	11,765	Mi A - 4	C	13,950	MiA - 4	C	13,950	MiA - 4	C	
Prusso Street	Main Street	-	11,000	DA - 2	D	12,300	DA - 2	D	12,300	DA - 2	D	
Joseph Gallo Drive	Winton Parkway	-	10,400	2 lanes	D	13,700	2 lanes	D-E	13,700	2 lanes	D-E	
Washingon Avenue	New Collector	-	8,000	MiA - 4	C	9,460	MiA - 4	C	9,460	MiA - 4	C	
New Collector	Robin Avenue	-	13,185	MiA - 4	C	15,670	MiA - 4	C	15,670	MiA - 4	C	
Robin Avenue	Winton Parkway	1,125	28,690	MaA - 6	C	33,115	MaA - 6	C	33,115	MaA - 6	C	
Winton Parkway	Prusso Street	4,410	11,765	Mi A - 4	C	13,950	MiA - 4	C	13,950	MiA - 4	C	
B Street	Main Street	-	11,000	DA - 2	D	12,300	DA - 2	D	12,300	DA - 2	D	

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**TABLE 8 (CONT'D)
DAILY TRAFFIC VOLUMES AND LEVELS OF SERVICE
20 YEAR PROJECTIONS AND BUILDOUT**

Road	Location From	To	Year 2004			20 Year Forecast			Build Out	
			Daily Volume	Daily Volume	Facility - Lanes	LOS	Daily Volume	Facility - Lane	LOS	
Flint Avenue / F Street	Washington Avenue	New Collector	-	515	RC-2	C	2,720	RC-2	C	
	New Collector	Robin Avenue	-	3,425	RC-2	C	6,180	RC-2	C	
	Robin Avenue	Winton Parkway	-	1,745	RC-2	C	4,180	RC-2	C	
	Winton Parkway	Main Street	-	5,885	RC-2	C	6,650	RC-2	C	
	Main Street	Hammatt Avenue	3,425	9,630	RC-2	D	11,725	RC-2	D	
	Hammatt Avenue	Dwight Way	-	10,945	CC-2	D	12,800	CC-2	D	
	Dwight Way	Peach Avenue	-	5,500	CC-2	C	4,890	CC-2	C	
	Peach Avenue	Sultana Drive	-	12,180	MiA-4	C	15,625	MiA-4	C	
	Washington Avenue	New Collector	-	280	RC-2	C	1,125	RC-2	C	
	New Collector	Robin Avenue	-	4,000	RC-2	C	8,375	RC-2	D	
Peach Avenue	Robin Avenue	Winton Parkway	-	8,300	RC-2	C	11,190	RC-2	D	
	Winton Parkway	Main Street	2,005	8,085	RC-2	C	10,035	RC-2	D	
	Main Street	Hammatt Avenue	2,360	9,985	RC-2	D	11,860	RC-2	D	
	Hammatt Avenue	Dwight Way	-	9,920	RC-2	D	11,590	RC-2	D	
	Dwight Way	Hunter Avenue	-	11,175	RC-2	D	14,030	RC-2	D	
	Hunter Avenue	Sheesley Avenue	-	7,875	RC-2	C	10,240	RC-2	D	
	SR 99 SB ramps	SR 99 NB ramps	-	50,950	MaA - 8	C	58,950	MaA - 8	D	
	SR 99 NB ramps	Campbell Avenue	-	45,180	MaA - 8	C	55,865	MaA - 8	D	
	Campbell Avenue	Commercial	-	16,600	MaA - 6	C	19,125	MaA - 6	C	
	Commercial	Cressey Road	-	11,650	CC-2	D	14,800	CC-2	D-E	
Magnolia Ave	Washington Avenue	New Collector	-	1,815	MiA - 4	C	5,130	MiA - 4	C	
	New Collector	Robin Avenue	-	1,125	MiA - 4	C	2,820	MiA - 4	C	
	Robin Avenue	Winton Parkway	-	4,610	MiA - 4	C	6,030	MiA - 4	C	
	Winton Parkway	Main Street	300	9,200	MiA - 4	C	10,330	MiA - 4	C	
	Main Street	Hammatt Avenue	290	6,220	MiA - 4	C	8,640	MiA - 4	C	
	Hammatt Avenue	Dwight Way	-	6,635	MiA - 4	C	9,300	MiA - 4	C	
	Dwight Way	Hunter Avenue	-	7,225	MiA - 4	C	9,590	MiA - 4	C	
	Hunter Avenue	Commercial	-	12,500	MiA - 4	C	15,175	MiA - 4	C	
	Commercial	Sultana Dr	-	25,060	MiA - 4	D	25,700	MiA - 4	D	

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**TABLE 8 (CONT'D)
DAILY TRAFFIC VOLUMES AND LEVELS OF SERVICE
20 YEAR PROJECTIONS AND BUILDOUT**

Road	Location From	To	Year 2004			20 Year Forecast			Build Out	
			Daily Volume	Daily Volume	Facility - Lanes	LOS	Daily Volume	Facility - Lane	LOS	
Magnolia Ave	Sultana Dr	Commercial	-	17,950	MiA-4	C	15,775	MiA - 4	D	
	Commercial	Westside	-	-	-	-	8,680-	CC - 2	D	
Westside Boulevard	Washington Avenue	Washington Avenue		6,580	MiA - 4	C	7,630	MiA - 4	C	
	New Collector	New Collector		5,110	MiA - 4	C	10,350	MiA - 4	C	
	Robin Avenue	Robin Avenue	-	5,400	MiA - 4	C	9,080	MiA - 4	C	
	Robin Avenue	Winton Parkway	-	6,740	MiA - 4	C	10,400	MiA - 4	C	
	Winton Parkway	Main Street	2,170	10,125	MiA - 4	C	14,080	MiA - 4	C	
	Main Street	Hammatt Avenue	1,305	14,150	MiA - 4	C	16,500	Mi A - 4	C	
	Hammatt Avenue	Dwight Way		12,275	MiA - 4	C	15,575	Mi A - 4	C	
	Dwight Way	Hunter Avenue		12,800	MiA - 4	C	16,780	Mi A - 4	C	
	Hunter Way	Sultana Drive		12,225	MiA - 4	C	17,180	Mi A - 4	C	
	Sultana Drive	Cressey Rd		13,700	MiA - 2	D	15,600	MiA - 4	C	
Cressey Road	SR 140		13,780	2 lanes	-	20,500	2 lanes	F		
North South Roads										
Washington Boulevard	Collier	Bridge		9,200	RC - 2	D	11,355	RC - 2	D	
	Bridge	Vinewood		9,200	RC - 2	D	11,355	RC - 2	D	
	Vinewood	F Street	360	2,100	MiA - 4	C	4,950	MiA - 4	C	
	F Street	Peach Avenue		2,290	MiA - 4	C	6,875	MiA - 4	C	
New Collector	Peach Avenue	Magnolia Avenue		2,570	MiA - 4	C	4,750	MiA - 4	C	
	Magnolia Avenue	Westside Boulevard		2,560	MiA - 4	C	4,060	MiA - 4	C	
	Vinewood Drive	F Street		4,110	RC - 2	C	6,570	RC - 2	C	
	F Street	Peach Avenue		5,765	RC - 2	C	8,970	RC - 2	C	
Robin Avenue	Peach Avenue	Magnolia Avenue		3,435	RC - 2	C	6,620	RC - 2	C	
	Magnolia Avenue	Westside Boulevard		1,560	RC - 2	C	3,950	RC - 2	C	
	Vinewood	Vinewood	-	13,340	CC - 2	D	13,250	CC - 2	D	
	F Street	Peach Avenue	2,935	3,320	RC - 2	C	5,990	RC - 2	C	
Peach Avenue	Westside Boulevard		1,530	RC - 2	C	6,370	RC - 2	C		
Peach Avenue	Westside Boulevard		-	RC - 2	C	3,870	RC - 2	C		

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**TABLE 8 (CONT'D)
DAILY TRAFFIC VOLUMES AND LEVELS OF SERVICE
20 YEAR PROJECTIONS AND BUILDOUT**

Road	Location From	To	Year 2004			20 Year Forecast			Build Out		
			Daily Volume	Facility - Lanes	LOS	Daily Volume	Facility - Lanes	LOS	Daily Volume	Facility - Lane	LOS
Winton Parkway	Olive Avenue	Campbell Avenue	-	MiA - 4	C	3,770	MiA - 4	C	9,190	MiA - 4	C
	Campbell Ave	SR 99 NB ramps	-	Mi A - 4	C	15,565	Mi A - 4	C	24,120	MiA - 4	C
	SR 99 NB ramps	SR 99 SB ramps	-	Ma A - 6	C	35,000	Ma A - 6	C	43,450	MaA - 6	C
	SR 99 SB ramps	Joseph Gallo Drive	12,100	Ma A - 6	F	55,120	Ma A - 6	F	62,320	MaA - 6	F
	Joseph Gallo Drive	B Street	7,650	Ma A - 6	C	37,660	Ma A - 6	C	45,375	MaA - 6	D
	B Street	F Street	-	Mi A - 4	D	22,390	Mi A - 4	D	26,160	MiA - 4	D
	F Street	Peach Avenue	-	Mi A - 4	D	22,520	Mi A - 4	D	28,050	MiA - 4	D
	Peach Avenue	Magnolia Avenue	-	Mi A - 4	C	15,765	Mi A - 4	C	20,150	MiA - 4	C
	Magnolia Avenue	Westside Boulevard	-	Mi A - 4	C	3,785	Mi A - 4	C	6,015	MiA - 4	C
	Westside Boulevard	Olive Avenue	1,740	RC - 2	C	4,180	RC - 2	C	4,470	RC - 2	C
Livingston Cressey	Olive Avenue	Davis Avenue	3,080	Mi A - 4	C	7,175	Mi A - 4	C	10,100	MiA - 4	C
	Davis Avenue	Campbell Avenue	8,075	Mi A - 4	C	15,270	Mi A - 4	C	21,070	MiA - 4	D
	Campbell Avenue	B Street	7,420	DA - 2	E	15,770	DA - 2	E	20,400	DA - 2	F
	B Street	F Street	6,825	DA - 2	C	7,540	DA - 2	C	9,985	DA - 2	D
	F Street	Park Street	4,955	DA - 2	C	8,330	DA - 2	C	11,570	DA - 2	D
	Park Street	Peach Avenue	-	DA - 2	C	7,290	DA - 2	C	11,025	DA - 2	D
	Peach Avenue	Magnolia Avenue	2,370	MiA - 4	C	9,765	MiA - 4	C	12,160	MiA - 4	C
	Magnolia Avenue	Westside Boulevard	2,200	MiA - 4	C	6,970	MiA - 4	C	7,750	MiA - 4	C
	Westside Boulevard		2,105	RC - 2	C	6,570	RC - 2	C	7,500	RC - 2	C
	Olive Avenue	Walnut Avenue		MiA - 4	C	3,070	MiA - 4	C	3,570	MiA - 4	C
Hammatt Avenue	Walnut Avenue	Campbell Avenue	7,495	Mi A - 4	C	15,850	Mi A - 4	C	17,100	MiA - 4	C
	Campbell Avenue	NB SR 99 ramps	11,365	Ma A - 6	C	44,340	Ma A - 6	C	47,625	MaA - 6	D
	NB SR 99 ramps	SB SR 99 ramps		Mi A - 6	C	37,265	Mi A - 6	C	41,280	MaA - 6	C
	SB SR 99 ramps	F Street		Mi A - 6	C	32,150	Mi A - 6	C	37,015	MaA - 6	C
	F Street	Park Street	8,870	MiA - 4	C	15,200	MiA - 4	C	17,160	MiA - 4	C
	Park Street	Peach Avenue	2,540	MiA - 4	C	13,000	MiA - 4	C	14,225	MiA - 4	C
	Peach Avenue	Magnolia Avenue		MiA - 4	C	6,060	MiA - 4	C	10,535	MiA - 4	C
	Magnolia Avenue	Westside Boulevard		MiA - 4	C	4,090	MiA - 4	C	6,950	MiA - 4	C
	Westside Boulevard	Walnut Avenue		RC - 2	C	1,270	RC - 2	C	2,765	RC - 2	C
	Walnut Avenue	Campbell Avenue	520	CC - 2	C	3,800	CC - 2	C	5,350	CC - 2	C
Dwight Way	F Street	Peach Avenue	770	RC - 2	C	2,400	RC - 2	C	4,160	RC - 2	C
	Peach Avenue	Magnolia Avenue	-	RC - 2	C	2,650	RC - 2	C	3,560	RC - 2	C
	Magnolia Avenue	Westside Boulevard	-	CC - 2	C	750	CC - 2	C	1,070	CC - 2	C
	Westside Boulevard										

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**TABLE 8 (CONT'D)
DAILY TRAFFIC VOLUMES AND LEVELS OF SERVICE
20 YEAR PROJECTIONS AND BUILDOUT**

Road	Location From	To	Year 2004			20 Year Forecast			Build Out		
			Daily Volume	Facility - Lanes	LOS	Daily Volume	Facility - Lanes	LOS	Daily Volume	Facility - Lane	LOS
Hunter Avenue	Olive Avenue	Walnut Avenue	-	CC-2	C	200	CC-2	C	4,360	CC-2	C
	Walnut Avenue	Campbell Avenue	-	CC-2	C	4,600	CC-2	C	8,400	CC-2	C-D
	Peach Avenue	Magnolia Avenue	-	RC-2	C	5,265	RC-2	C	6,775	RC-2	C
Sheesley Road	Magnolia Avenue	Westside Boulevard	-	CC-2	C	2,820	CC-2	C	8,470	CC-2	C
	Peach Avenue	Magnolia Avenue	-	CC-2	D	13,115	CC-2	D	10,800	CC-2	D
Sultana Drive	Olive Avenue	Walnut Avenue	200	CC-2	C	200	CC-2	C	8,940	CC-2	C
	Walnut Avenue	Commercial	2,450	CC-2	C	2,450	CC-2	C	10,600	MiA-4	C
Cressey Road	Commercial	Campbell Avenue	8,890	MiA-4	C	8,890	MiA-4	C	15,360	MiA-4	C
	SB SR 99 ramps	F Street	250	MaA-8	D	58,985	MaA-8	D	66,015	MaA-8	E-F
	F Street	Magnolia Avenue	35,200	MaA-8	D	35,200	MaA-8	D	39,875	MaA-8	D
	Magnolia Avenue	Westside Boulevard	11,725	MiA-4	C	11,725	MiA-4	C	16,350	MiA-4	C
State Highway Ramps	Westside	Olive Ave	4,670	2 lanes	C	4,670	2 lanes	C	5,340	2 lanes	C
	Olive Avenue	Walnut Ave	2,275	2 lanes	C	2,275	2 lanes	C	4,950	2 lanes	C
	Walnut Avenue	Liberty Ave	2,240	MiA-2	C	2,240	MiA-2	C	4,400	MiA-4	C
	Liberty Avenue	Campbell Ave	2,325	MiA-2	C	2,325	MiA-2	C	10,825	MiA-4	C
Winton Parkway	Liberty Ave	Campbell Ave	2,460	MiA-2	C	2,460	MiA-2	C	6,375	MiA-4	C
	NB SR 99 off ramp		875	2	C	12,270	2	C	12,975	2	C
	NB SR 99 on ramp		4,000	2	E	20,680	2	E	23,365	2	E
	SB SR 99 off ramp		5,000	2	E	20,125	2	E	24,090	2	E
	SB SR 99 on ramp		1,125	2	C	12,820	2	C	13,800	1	E
	NB SR 99 off ramp		2,275	2	C	12,430	2	C	13,815	1	E
	NB SR 99 on ramp		2,750	2	C	13,625	2	C	14,955	2	D
	SB SR 99 off ramp		2,175	2	C	14,060	2	C	14,225	2	D
	SB SR 99 on ramp		2,725	2	C	12,670	2	C	12,600	1	E
	NB SR 99 off ramp			2	C	12,800	2	C	14,435	2	C
Sultana Drive / Arena Way	NB SR 99 on ramp		N.A.	2	C	16,180	2	C	17,300	2	D
	SB SR 99 off ramp			2	C	16,450	2	C	17,100	2	D
	SB SR 99 on ramp			2	C	12,500	2	C	13,925	2	C
	SB SR 99 off ramp			2	C		2	C		2	C

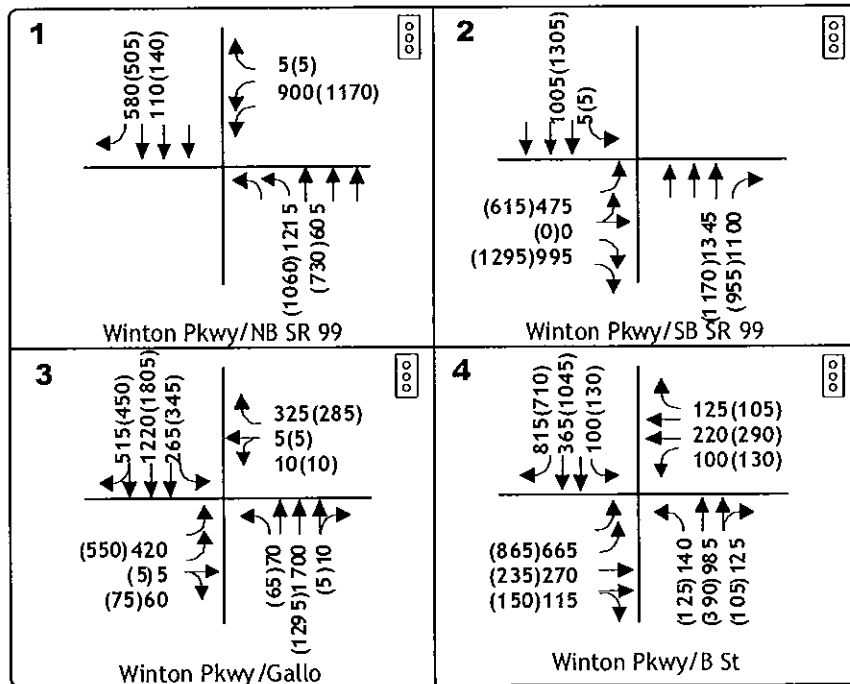
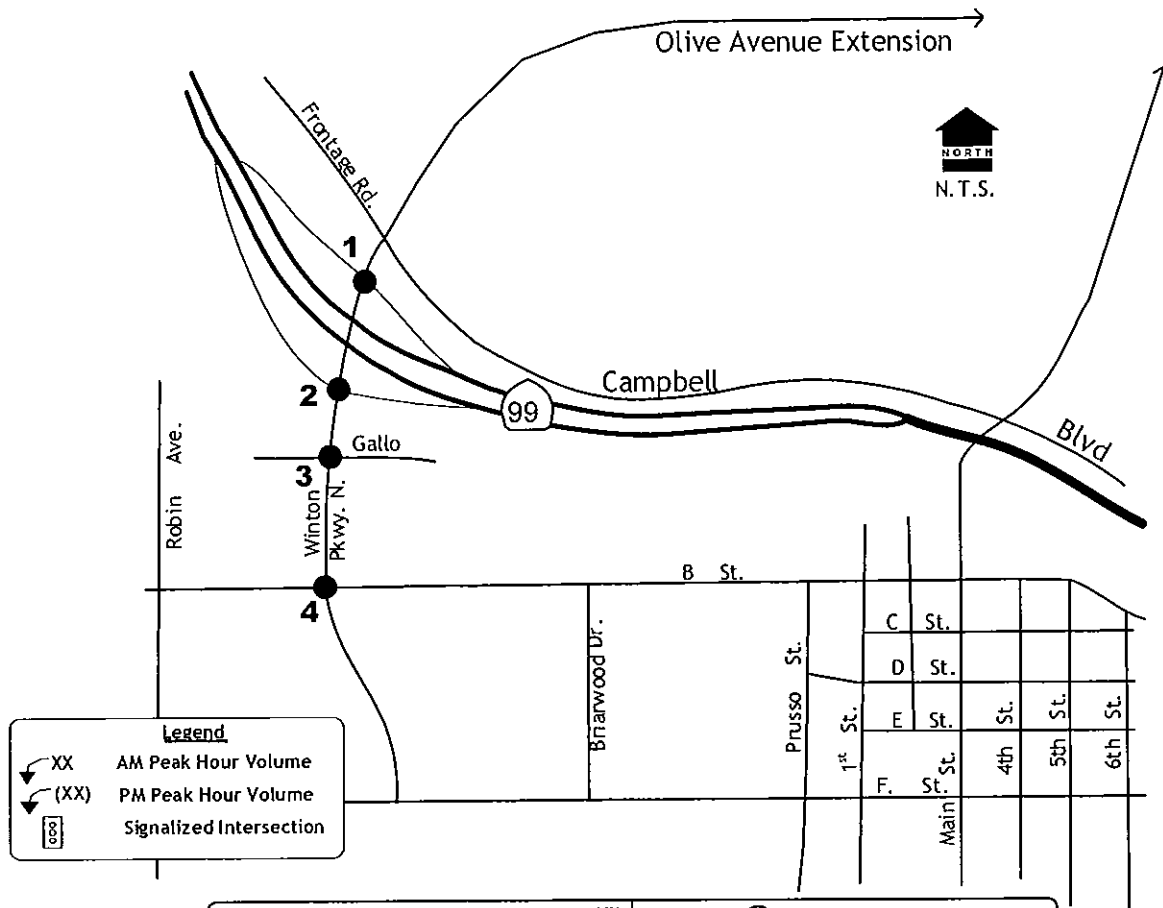


Major Design Issue Locations. The volume of traffic forecast at the City of Livingston's SR 99 interchanges has been reviewed in order to identify the magnitude of improvements that will be needed at these locations. The ramifications of other design decisions are also discussed relative to Hammatt Avenue widening south of F Street and to other major bridge or river crossings.

SR 99 / Winton Parkway Interchange. Previous traffic studies for development proposals in Livingston have acknowledged that major improvements to the SR 99 / Winton Parkway interchange will be needed to accommodate anticipated growth. The Master Plan suggests phased improvements to the interchange in a manner that can be matched to incremental growth.

To determine the extent of needed improvements, future pm peak hour forecasts have been interpolated from year 2030 daily MCAG traffic model data at the interchange and adjoining intersections to the south, as noted in Figure 3. These forecasts have been used to project peak hour Levels of Service assuming widening of the SR 99 crossing to accommodate a six-lane Winton Parkway (i.e., three through lanes in each direction) along with the maximum ramp and intersection turn lane configurations that could be accommodated if the existing diamond interchange concept was retained. If Winton Parkway is widened to a six-lane section, including widening over SR 99, then with right of way acquisition it would be possible to add the lanes noted in Figure 3. Improvements to the southbound off-ramp and northbound on-ramp will be needed (i.e., two lane ramps and auxiliary lanes on SR 99).

Level of Service at the interchanges was calculated using the SYNCHRO-Simtraffic simulation software regularly requested by Caltrans District 10. The results of this Level of Service assessment are summarized in Table 9. As noted, with this level of improvements the two intersections on the interchange would not operate within the City's LOS D standard. With limitations on future Gallo property access to Joseph Gallo Drive, the Joseph Gallo Drive intersection and the B Street intersection would also fail to meet the LOS D threshold. Because of the close spacing between intersections, it may be necessary to provide additional capacity to ensure that the intersections operate adequately. However, to increase capacity at the interchange it would be necessary to install additional improvements beyond those that can be accommodated within the street sections adopted by the City and within the reasonably available right of way within existing businesses near the interchange. This level of additional improvement would involve acquiring right of way from the Chevron / McDonald's on the northwest corner and the other businesses in the area in order to accommodate additional lanes. Alternatively, it may be necessary to implement other features, such as a loop ramp from northbound Winton Parkway onto NB SR99 and a direct connecting ramp from SB SR 99 to the Gallo property. The effects of these additional improvements on Levels of Service are shown, and while the interchange LOS would be acceptable, prioritizing the operation of the interchange would retail Levels of Service in excess of city standard at adjoining intersections. When the Project Study Report (PSR) for interchange improvements is prepared, it will be appropriate to consider alternative geometric concepts, including ramp relocation to create a loop ramp onto NB SR 99, or creation of a southbound auxiliary off ramp to the Gallo Property.

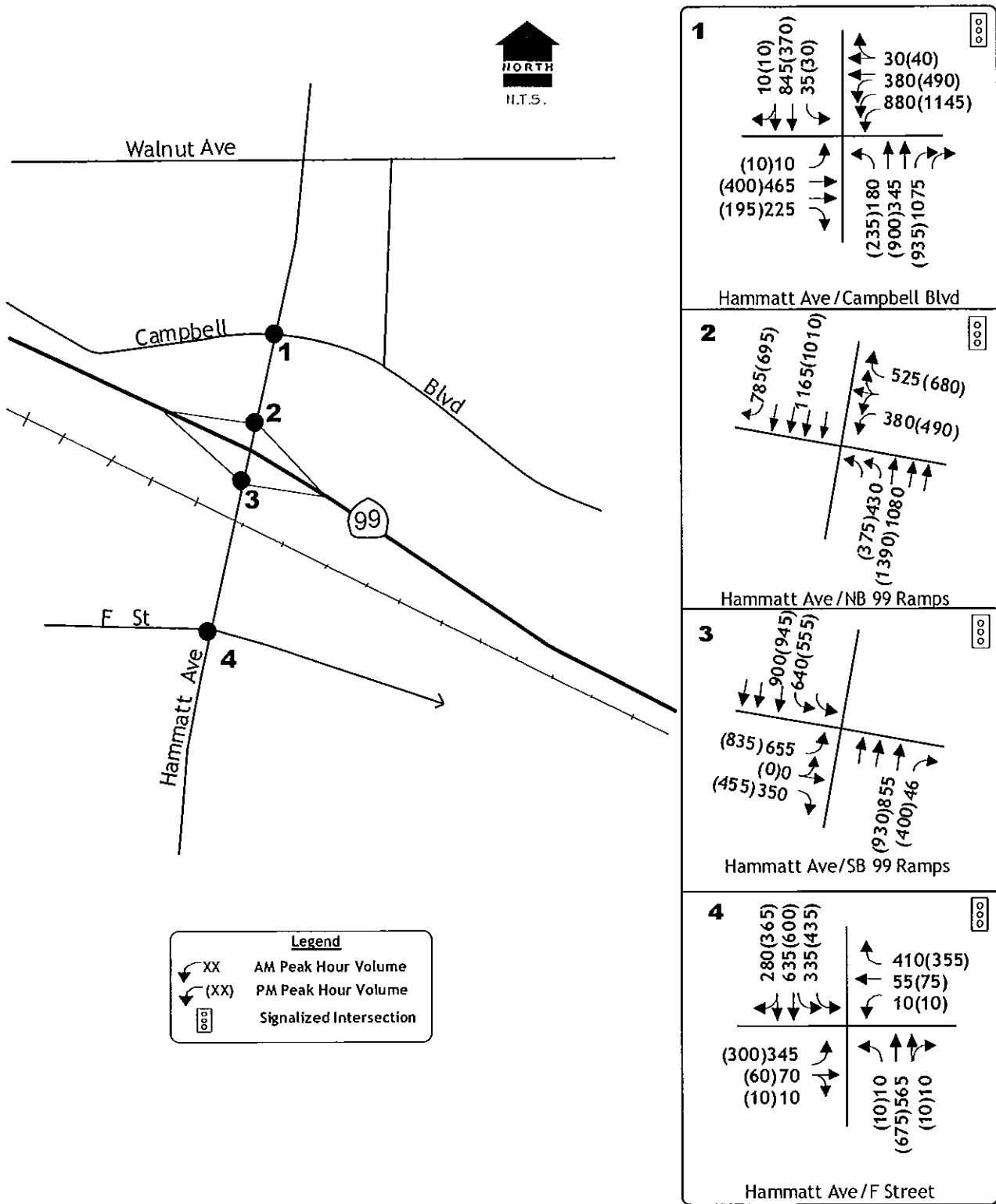


**TABLE 9
YEAR 2030 TRAFFIC CONDITIONS (20 YEAR FORECAST) AT
SR 99 / WINTON PARKWAY INTERCHANGE WITH SIX LANE WINTON PARKWAY**

Location	Level of Improvements	Year 2030 PM Peak Hour Conditions	
		Average Delay	Level of Service
NB SR 99 ramps	6 lanes on Winton Parkway Dual left turns on NB SR 99 off ramp Dual left turn lanes on Winton Parkway onto NB SR 99 Free right turns onto NB on ramp	96.0 sec	F
SB SR 99 ramps	6 lanes on Winton Parkway Dual left turn lanes and dual right turns on SB SR 99 off ramp Free right turn lane onto SB SR 99 on ramp	25.3 sec	C
Joseph Gallo Dr	6 lanes on Winton Parkway 2 left turn plus combined thru+right turn lane on EB Joseph Gallo Drive	78.7 sec	E
B Street	6 lanes on Winton Pkwy with conversion to SB right turn lane 4 lanes on B Street plus dual EB left turn lanes and WB right turn lane	181.9 sec	F

SR 99 / Hammatt Avenue Interchange. A similar peak hour operational evaluation was conducted for the SR 99 / Hammatt Avenue interchange using the procedures prescribed by Caltrans. Resulting year 2030 p.m. peak hour traffic volumes and lane geometry are shown in Figure 4, and resulting Levels of Service are presented in Table 10. To accommodate twenty year traffic volume forecasts the structure itself would need to be widened to provide three through lanes in each direction, dual left turn lanes from Hammatt Avenue onto the freeway ramps, plus auxiliary turn lanes in the area from F Street to Campbell Ave. Triple left turns would be needed on Northbound Campbell Blvd at Hammatt Avenue. As noted, the two ramp intersections would operate at the upper limit of LOS D and could encroach into LOS E. To improve the Level of Service it would be necessary to further widen Hammatt Avenue to provide three through lanes in each direction or provide additional capacity across SR 99 elsewhere. However, this level of improvement is likely infeasible without additional right of way acquisition in the area of the F Street intersection..

The volumes forecast on the SR 99 ramps themselves are also appreciable. Ramp metering will be needed to avoid interfering with mainline SR 99 operations.

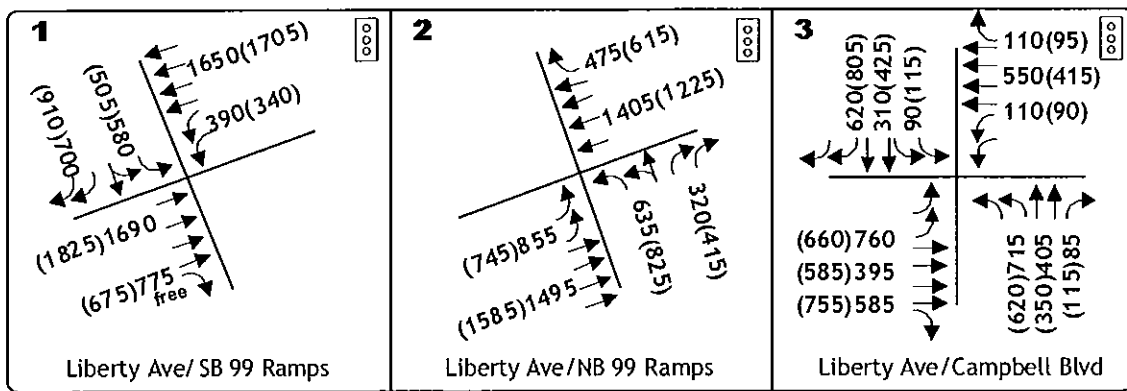
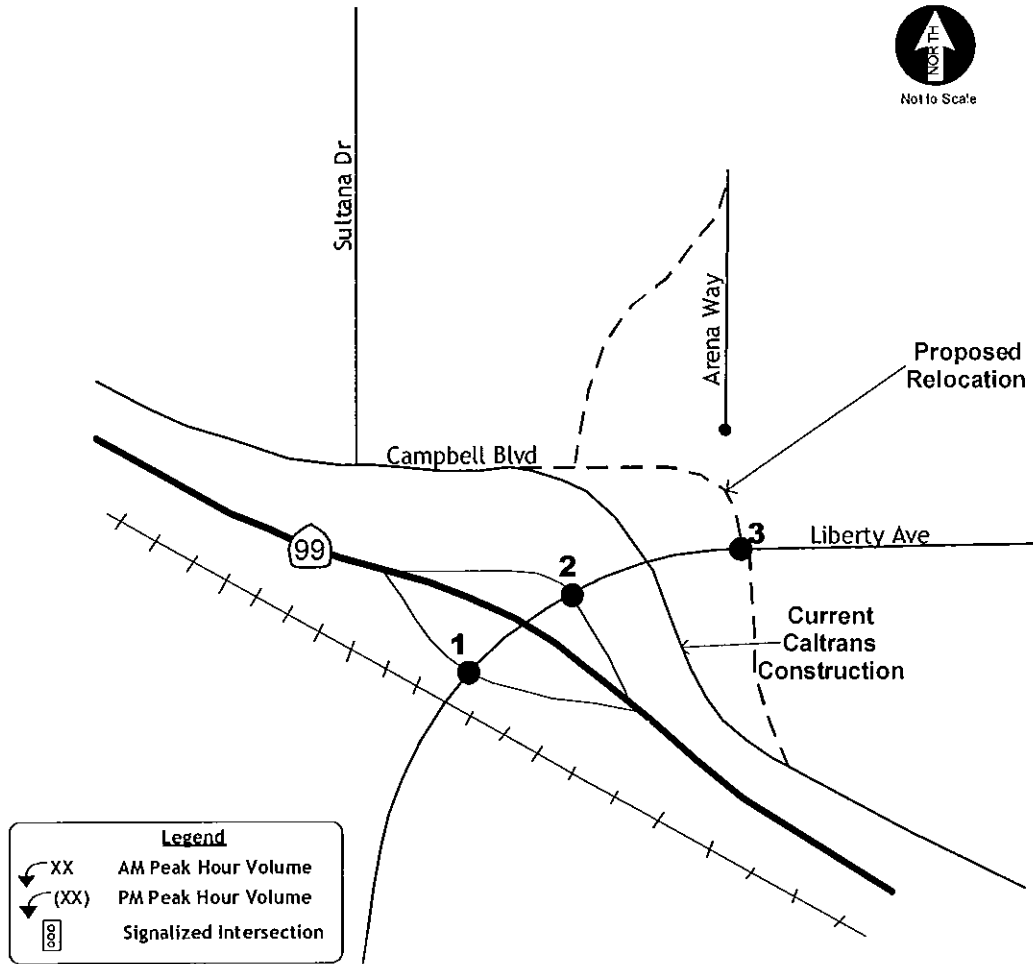


**TABLE 10
YEAR 2030 TRAFFIC CONDITIONS (20 YEAR FORECAST)
ON SR 99 / HAMMATT AVENUE INTERCHANGE**

Location	Level of Improvements	Year 2030 PM Peak Hour Conditions	
		Average Delays	Level of Service
Campbell Ave	4 lanes on Hammatt Avenue with dual northbound right turns 4 lanes on Campbell Ave with triple eastbound left turns	52.1 sec	D
NB SR 99 ramps	6 through lanes on Hammatt Avenue with dual left turn lanes onto SR 99 and free right turn lane onto NB SR 99 Dual left turn –right turn lanes on NB SR 99 off ramp	13.8 sec	B
SB SR 99 ramps	6 lanes on Hammatt Avenue, with dual left turn lanes onto SR 99 and free right turn lane onto SB SR 99 Dual left turn lanes on SB SR 99 off ramp	26.8 sec	C
F Street	4 lanes on Hammatt Ave, with dual SB left turn lanes Separate left turn lanes on other approaches WB right turn lane on F Street	24.2 sec	C

SR 99 / Sultana Drive – Liberty Avenue Interchange. A similar peak hour operational evaluation was conducted for the SR 99 / Sultana Drive / Liberty Avenue. Resulting year 2030 p.m. peak hour traffic volumes are shown in Figure 5, and resulting Levels of Service are presented in Table 11.

To accommodate twenty year traffic volume forecasts the structure itself would need to be widened. However, while the conceptual geometry identified in this report will be adequate, at the traffic volume levels projected for the twenty year horizon, the short distances between the NB SR 99 ramps and Campbell Ave (560 feet) and from Campbell Ave to Arena Avenue (470 feet) will certainly be a problem. It is unlikely that the storage needed for the northbound left turn lanes from the over crossing onto Campbell Ave can be provided. Similarly, it will not be possible to provide room for back to back left turns in the area between the Campbell Ave and Arena Avenue intersection. As the area develops it will be necessary to move the Campbell Ave and Arena Avenue intersections so as to provide at least 800 to 1,000 feet between intersections. As a practical matter, this may involve moving the Campbell Ave approach to align with the existing Arena Blvd and providing alternative access to the commercial development on the north side of Liberty Avenue.



**TABLE 11
YEAR 2030 TRAFFIC CONDITIONS (20 YEAR FORECAST)
ON SR 99 / SULTANA DRIVE / ARENA BLVD INTERCHANGE**

Location	Level of Improvements	Year 2030 PM Peak Hour Conditions	
		Average Delay	Level of Service
Campbell Ave	8 lanes on Liberty Avenue 4 lanes on Campbell Ave Dual left turn lanes on NB / SB Campbell Avenue Dual left turn lanes on NB / SB Liberty Avenue Dual right turn lanes on SB Campbell Ave	54.8 sec	D
NB SR 99 ramps	8 lanes on Liberty Avenue Dual left turn lanes and dual right turn lanes on NB SR 99 off ramp Dual left turn lanes onto NB SR 99 Free right turn lane onto NB SR 99	30.6 sec	C
SB SR 99 ramps	8 lanes on Liberty Avenue Dual left turn lanes and dual right turn lanes on SB SR 99 Off ramp Dual left turn lanes onto SB SR 99 on ramp Free right turn lane onto SB SR 99	35.0 sec	C-D

Washington Avenue Crossing over the Merced River. The Master Plan includes the development of a new crossing over the Merced River along a Washington Avenue alignment to link up with the SR 99 Collier Road interchange south of Delhi. This project is intended to provide relief for the Winton Parkway which without the diversion of traffic would carry another 3,850 ADT within 20 years. If the crossing is not developed, then the volume on Hammatt Avenue would increase and forecast traffic conditions at this location would become incrementally poorer in the future.

However, developing any new river crossing is a major undertaking which must confront environmental and design issues. While the Master Plan assumes completion in 20 years and includes a cost “placeholder” for this project, further analysis is needed to confirm the actual design requirements of this work.

Additional SR 99 Crossings. The Master Plan excludes construction of any additional grade separations over SR 99. Potential routes between the Hammatt Avenue interchange and the Sultana Drive-Liberty Avenue interchange were considered but not incorporated into the final Master Plan. .

Hammatt Avenue Widening from F Street to Peach Avenue. The City General Plan and this Master Plan indicate that Hammatt Avenue is to be a 4 lane minor arterial street. However, numerous homes already exist along Hammatt Avenue, making it difficult to improve the road and without improvements creating appreciable environmental impacts for the residents living along the street. The Master Plan envisions modifying the area circulation system in this area in

an attempt to minimize the volume on Hammatt Avenue. However, even with these changes, Hammatt Avenue in the area between F Street and Peach Street is projected to carry 13,000 to 15,200 ADT within 20 years and 14,200 to 17,200 ADT at buildout. These volumes are commensurate with a 4 lane arterial street.

The City considered the following options:

1. Maintain the current north-south alignment of Hammatt Avenue and acquire the homes on the east side of Hammatt Avenue needed to widen the road to a four-lane arterial. F Street would continue to be the route linking Hammatt Avenue and Dwight Avenue near the Peach Avenue intersection. It is likely that approximately 20 homes would need to be acquired on the east side of the road. This is the option that is included in the costs for the Master Plan.
2. Take actions to minimize the traffic on Hammatt Avenue but do not acquire any homes, keep Hammatt Avenue as a 2 lane road in this area and accept a poor Level of Service forecast for a 2 lane Hammatt Avenue. One minimization option is to make Hammatt Avenue “circuitous” by extending Hammatt Avenue as a new road that would connect to Peach (in lieu of the F Street extension), while making the lower end of Hammatt Avenue “tee” into this new road. The new “tee” intersection would have to be located far enough from F Street to permit construction of turn lanes at each intersection.

However, while the volume of traffic on Hammatt Avenue would be slightly lower, it would remain above City Level of Service standards for a 2 lane collector street with residential frontage. The presence of residential driveways on a road carrying this traffic volume will likely result in safety issues and resident complaints regarding “quality of life”. This option is not incorporated into the Master Plan

CIRCULATION SYSTEM IMPROVEMENTS / COSTS

Having identified the amount of future development that will be paying for circulation system improvements, having identified probable problem locations and having identified potential solutions, it is necessary to summarize improvements and to quantify the cost of those improvements that will be funded through a fee program. The intent in identifying preliminary costs is to confirm that the street master plan can be implemented in an affordable manner. Policy issues are also involved in project identification, including consideration of fronting developer responsibilities, the citywide benefit of some improvements and the potential for improvements by other agencies such as Caltrans.

Description of Improvements

Improvement Categories. Master Plan circulation system improvements will fall into six categories:

1. Roadway frontage improvements that are consistent with the Master Plan that will occur as development proceeds. These improvements would be installed by developers, but most include some work that is of “citywide benefit” and should be included in a citywide fee program.
2. Roadway improvements installed by the City using fee program monies where no adjoining development is planned or is possible, in order to bring a road up to the City standard or to connect widened sections and avoid “zipper” streets where the width varies parcel by parcel.
3. Traffic signals at public street intersections that are assumed to be a citywide benefit,
4. Improvements to SR 99 interchanges at Winton Parkway, Hammatt Avenue and Sultana Drive – Liberty Avenue that are of citywide benefit.
5. Bridges to complete the area circulation system
6. Facilities to help promote long term transit service in Livingston.

Candidate Improvements and Fronting Developer Responsibilities. A mitigation fee program is intended to permit all new development to contribute to the cost of improvements with citywide benefit. By definition, local - residential – industrial streets exist primarily to provide access while regional or city-wide circulation occurs on collector and arterial streets. Thus, new local and industrial streets remain the responsibility of the individual developer. However, while fronting developers should continue to have primary responsibility for the portion of the cost of collector and arterial streets along their property, the fee program recognizes that a portion of the costs of arterial and collector streets is a community-wide benefit. The program will also bear costs where roads are to be widened but no future development is likely or possible. This limitation would exist where adjacent properties are already developed, along existing public uses or at the boundaries of development areas.

The policy inherent to identifying the costs to be included in the fee program will make use of the street sections originally presented in Figure 2. This analysis assumes that a fee program will contribute to the cost of median area and inside travel lanes on Arterial streets and the center turn lane of Collector streets. Fronting developers will be expected to pay for curb, gutter and sidewalks, as well as for the pavement areas devoted to bicycle lanes, parking, bus pull outs and to the curbside lane. The fee program is to pay for the median area, its landscaping, if applicable, and for the second or third travel lane in each direction on major arterial streets.

**TABLE 12
ALLOCATION OF RESPONSIBILITIES
BETWEEN FRONTING DEVELOPERS AND FEE PROGRAM**

Classification	Lanes / ROW	Fee Program	Fronting Development
Major Arterial	8 / 170'	3 travel lanes in each direction plus two lane median width, landscaping, striping	1 travel lane, service lane, bus pull outs, curb, gutter and sidewalk, landscaping, street lighting, drainage, striping
Major Arterial	6 / 134'	2 travel lanes in each direction plus median, landscaping, striping	1 travel lane, service lane, bus pull outs, curb, gutter and sidewalk, landscaping, street lighting, drainage, striping
Minor Arterial	4 / 110'	1 travel lanes in each direction plus median, landscaping, striping	1 travel lane, service lane, bus pull outs, curb, gutter and sidewalk, landscaping, street lighting, drainage, striping
Collector - Commercial	2 / 96'	16' median area pavement, striping	1 travel lane, bike lane, parking lane, curb, gutter and sidewalk, landscaping, street lighting, drainage, striping
Residential Collector	2 / 86'	16' median, landscaping, striping	1 travel lane, combined bike-parking lane, curb, gutter and sidewalk, landscaping, street lighting, drainage, striping

Construction Unit Costs. The rough costs of constructing this work have been identified, as noted in Table 12. As shown, the total construction cost for a new eight lane Major Arterial is \$878 per lineal foot, while a six lane Major Arterial center median is projected at approximately \$750 per lineal foot. The cost of a new 4 lane Minor Arterial is \$666 per lineal foot. The cost of a residential collector street with a landscaped median is approximately \$560 per lineal foot, while a commercial collector costs \$614.

The cost of the middle portion of each facility that would typically be funded through a citywide fee program ranges from approximately \$371 for an eight lane major Arterial, \$243 for a six lane arterial, to \$148 for a minor arterial and approximately \$52 to \$67 for collectors.

“Interim Arterial” and “Limited Arterial” Street Sections. There are locations where one side of a street will be improved by fronting development but no development is anticipated on the other side of the road, either within the 20 year life of the plan or, in the case of development at the edge of the plan area, ever. If an adequate Level of Service can be maintained without this additional widening, and new development will occur beyond the 20 year horizon and widen the road at that time, then an “*interim section*” will be installed under the Master Plan that excludes the second travel lane, sidewalks and landscaping. If an arterial street is designated there is never an anticipated need for a four lane road based on traffic volume and no fronting development will occur, then a “*limited arterial*” has been assumed. The costs for these two alternative arterial sections are also presented.

Because many of the existing streets in future development areas are old county roads of unknown construction, these cost estimates assume that the existing pavement will be replaced. Thus, the allocation for median and center turn lanes costs is the same for new roads and for widening projects.

Right of Way Costs. These construction costs exclude rights of way. In most cases planned widening projects are within new development areas where fronting developers can be required to dedicate the right of way needed to accommodate planned improvements. If these costs are to be included the plan will need to determine if the costs should be for raw, entitled or improved land. The exact nature of existing rights of way will vary by location.

For this analysis the following assumptions have been made relative to right of way.

1. When improvements are part of anticipated frontage improvements along new development, the right of way will be dedicated by the developer.
2. When new collector or arterial roads are created across currently undeveloped properties, it has been assumed that right of way beneath developer frontage improvements will be dedicated but that the right of way beneath the portion of the new road to be in the fee program will be purchased. For example, the program would include the cost of right of way beneath the 16’ wide median area in a residential collector street. This cost would not apply when existing county roads are being widened, as the median area is within the existing right of way.
3. The typical costs for rights of way have increased as land values have risen. A cost of \$3.50 per square foot, or \$150,000 per acre has been assumed.

As noted earlier, specific right of way acquisition will be needed in the following areas:

1. **Hammatt Avenue Widening.** Twenty homes along the east side of Hammatt Avenue south of F Street. The plan assumes that 20 homes will be acquired at a cost of half million dollars each. The total cost is \$10 million.

2. **Right of Way at SR 99 / Winton Parkway interchange.** It is recognized that widening Winton Parkway to 6 lanes north of Joseph Gallo Drive will require right of way from the existing businesses on each side. The Master Plan includes \$2.0 million for this purpose.
3. **Right of Way at SR 99 / Hammatt Avenue interchange.** It is recognized that widening Hammatt Avenue north of F Street will require right of way from the existing businesses on each side. The Master Plan includes \$2.0 million for this purpose.
4. **Right of Way at SR 99 / Sultana Drive interchange.** It is recognized that widening Liberty Avenue, Campbell Avenue and Sultana Drive to 8 lanes will require right of way. No development has occurred in the area of the new interchange. It is expected that the rights of way will be dedicated by fronting developers.
5. **Right of Way for Winton Parkway Extension to Olive Avenue and Olive Avenue Extension to Winton Parkway.** It is unlikely that this new street will be constructed by fronting developers. The cost of all right of way is included in the plan.

Contingencies. The unit construction costs exclude engineering, administration and contingencies. A 40% factor has been applied to construction costs for this purpose. Right of way costs have also been added assuming a unit cost of \$3.50 per square foot.

**TABLE 13
ROADWAY UNIT CONSTRUCTION COSTS**

Description	Cost per Lineal Foot of Road											Total	
	Grading	Pavement @ \$3.75	C&G	Median Curb	18" RCP	Sidewalk	Dry Utilities	Stripe & Sign	Street Lights	Clear & Grub	Erosion Control		Landscaping
Major Arterial – 6 Lane (134' ROW)													
Total Cost	\$15.00	\$330.00	\$30.00	\$28.50	\$65.00	\$45.00	\$140.00	\$5.50	\$30.00	\$6.70	\$3.00	\$52.00	\$750.70
Fronting Development	\$5.80	\$150.00	\$30.00	-	\$65.00	\$45.00	\$140.00	\$2.75	\$30.00	\$2.60	\$1.50	\$34.60	\$507.25
Fee Program	\$9.20	\$180.00	-	\$28.50	-	-	-	\$2.75	-	\$4.10	\$1.50	\$17.40	\$243.45
Minor Arterial – 4 lanes (110' ROW)													
Total Cost	\$12.40	\$240.00	\$30.00	\$28.50	\$65.00	\$45.00	\$140.00	\$4.00	\$30.00	\$5.50	\$3.00	\$52.00	\$666.40
Fronting Development	\$6.20	\$150.00	\$30.00	-	\$65.00	\$45.00	\$140.00	\$2.00	\$30.00	\$2.75	\$1.50	\$34.60	\$507.05
Fee Program	\$6.20	\$90.00	-	\$28.50	-	-	-	\$2.00	-	\$2.75	\$1.50	\$17.40	\$148.35
Interim Arterial – 2 lane (110' ROW)													
Total Cost	\$9.40	\$150.00	\$30.00	\$28.50	\$65.00	-	-	\$3.00	\$30.00	\$4.30	\$3.00	-	\$323.20
Fee Program	\$9.40	\$150.00	\$30.00	\$28.50	\$65.00	-	-	\$3.00	\$30.00	\$4.30	\$3.00	-	\$323.20
Limited Arterial – 2 lane (110' ROW)													
Total Cost	\$9.40	\$150.00	\$30.00	\$28.50	\$65.00	\$45.00	\$140.00	\$3.00	\$30.00	\$4.30	\$3.00	\$52.00	\$560.20
Fee Program	\$9.40	\$150.00	\$30.00	\$28.50	\$65.00	\$45.00	\$140.00	\$3.00	\$30.00	\$4.30	\$3.00	\$52.00	\$560.20
Residential Collector – 2 lane (86' ROW)													
Total Cost	\$9.40	\$150.00	\$30.00	\$28.50	\$65.00	\$45.00	\$140.00	\$3.00	\$30.00	\$4.30	\$3.00	\$52.00	\$560.20
Fronting Development	\$7.40	\$150.00	\$30.00	-	\$65.00	\$45.00	\$140.00	\$2.00	\$30.00	\$2.15	\$1.50	\$34.60	\$507.65
Fee Program	\$2.00	-	-	\$28.50	-	-	-	\$1.00	-	\$2.15	\$1.50	\$17.40	\$52.55
Commercial Collector – 2 lane (96' ROW)													
Three Lane Collector	\$10.40	\$247.50	\$30.00	-	\$65.00	\$45.00	\$140.00	\$4.00	\$30.00	\$4.60	\$2.50	\$35.00	\$614.00
Fronting Development	\$8.40	\$187.50	\$30.00	-	\$65.00	\$45.00	\$140.00	\$2.00	\$30.00	\$2.30	\$1.25	\$35.00	\$546.45
Fee Program	\$2.00	\$60.00	-	-	-	-	-	\$2.00	-	\$2.30	\$1.25	-	\$67.55
Major Arterial – 8 Lane (170' ROW)													
Total Cost	\$19.00	\$420.00	\$40.00	\$28.50	\$65.00	\$45.00	\$140.00	\$7.50	\$30.00	\$9.70	\$4.00	\$69.40	\$878.10
Fronting Development	\$5.80	\$150.00	\$30.00	-	\$65.00	\$45.00	\$140.00	\$2.75	\$30.00	\$2.60	\$1.50	\$34.60	\$507.25
Fee Program	\$13.20	\$270.00	10.00	\$28.50	-	-	-	\$4.75	-	\$7.10	\$2.50	\$34.80	\$370.85

Construction costs excluding right of way. Right of way costs added separately @ \$3.50 per sf.

KDA

Proposed Roadway Widening / New Streets

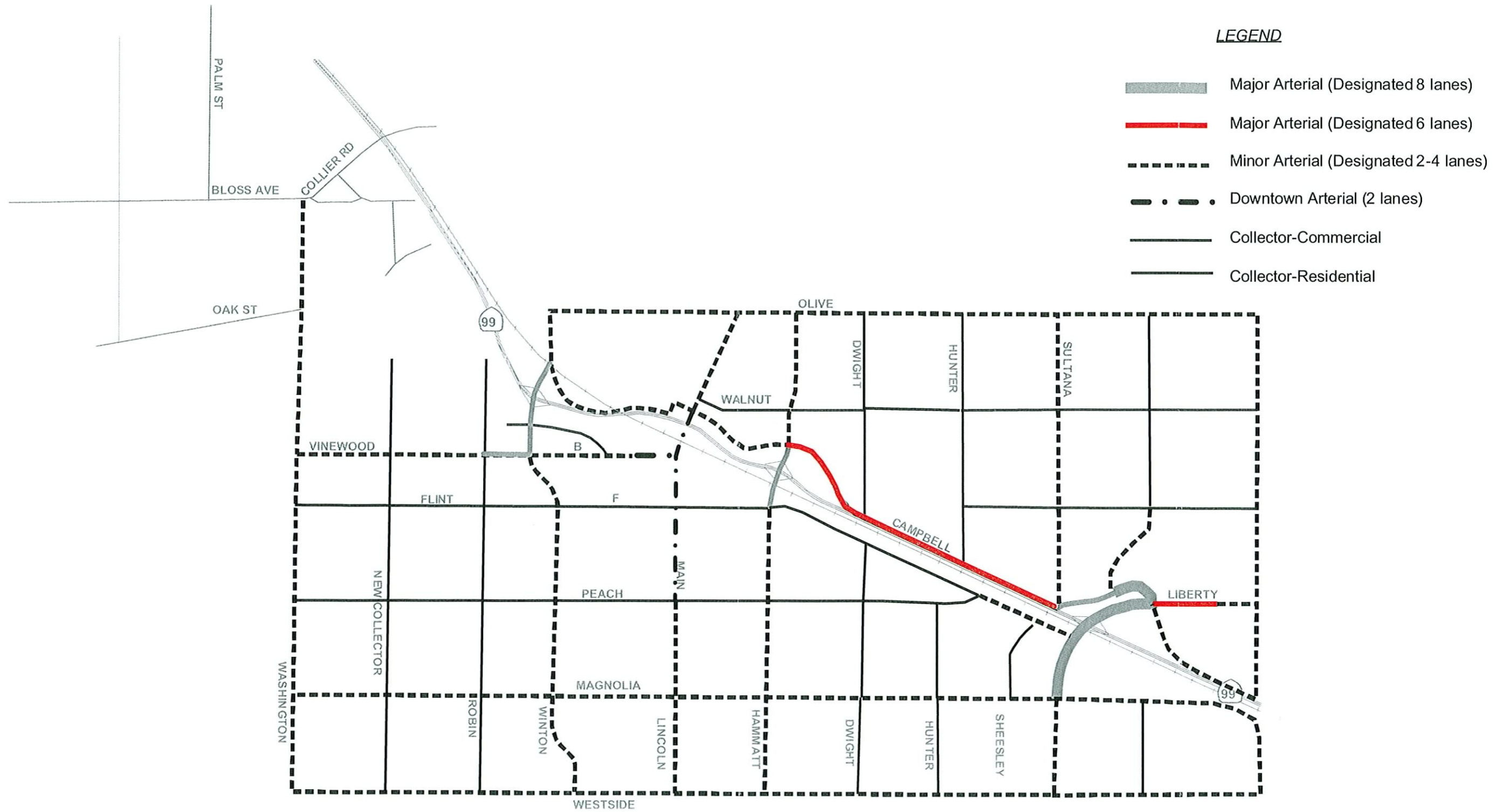
Improvement Locations. This plan assumes that “ultimate” frontage improvement will be made at locations where new development is expected to occur over the next twenty years. However, there are locations where fronting development is not expected to occur and improvements will be made.

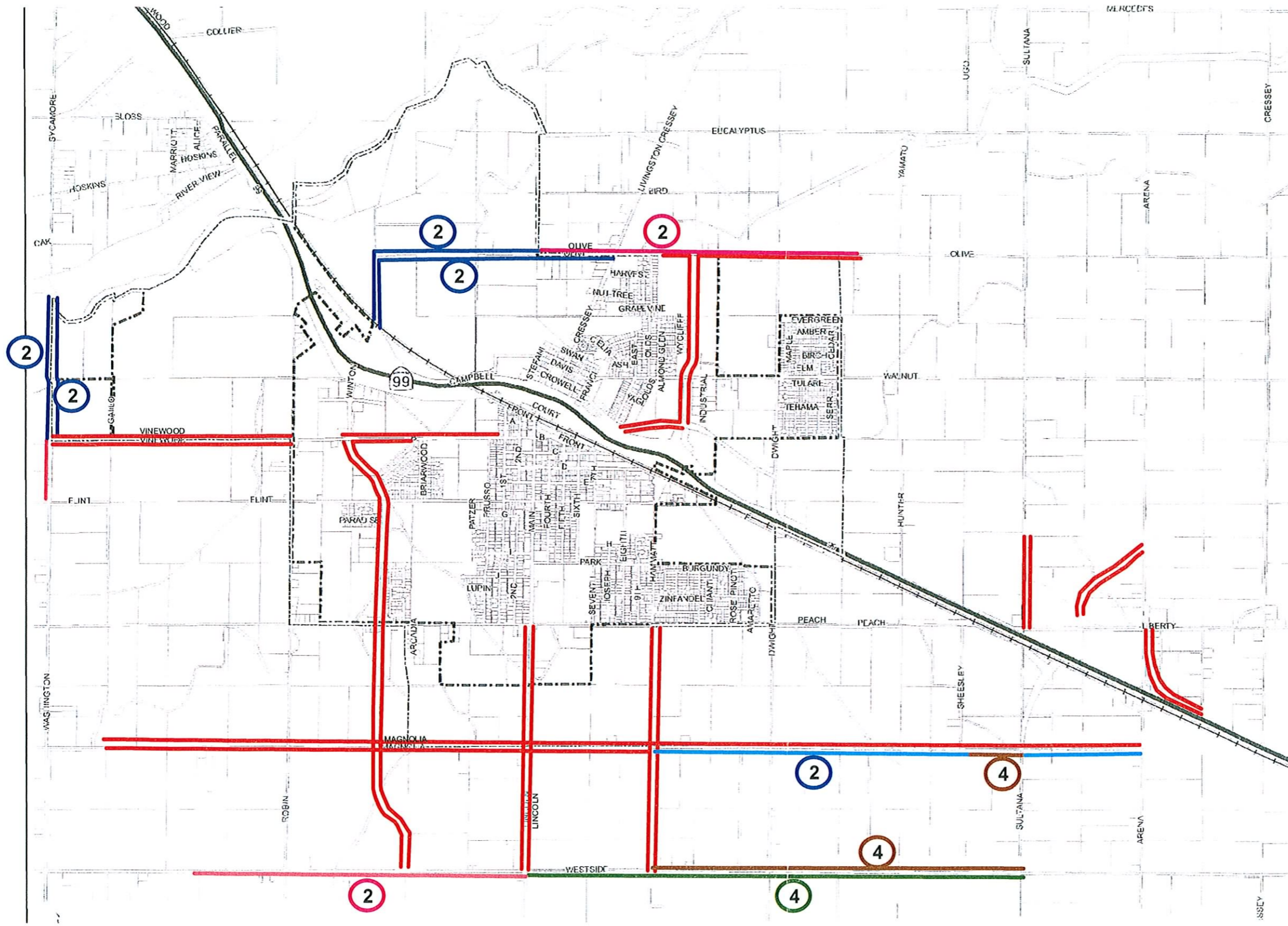
The figures which follow illustrate the locations of improvements that will be made, either by fronting developers or via a comprehensive fee program or by a combination of the two.

Figure 6 illustrates the locations of Major Arterial roads. As noted, these 6 to 8 lane facilities are located on Winton Parkway between B Street and SR 99 and on Sultana Drive from Magnolia Avenue to Arena Avenue.

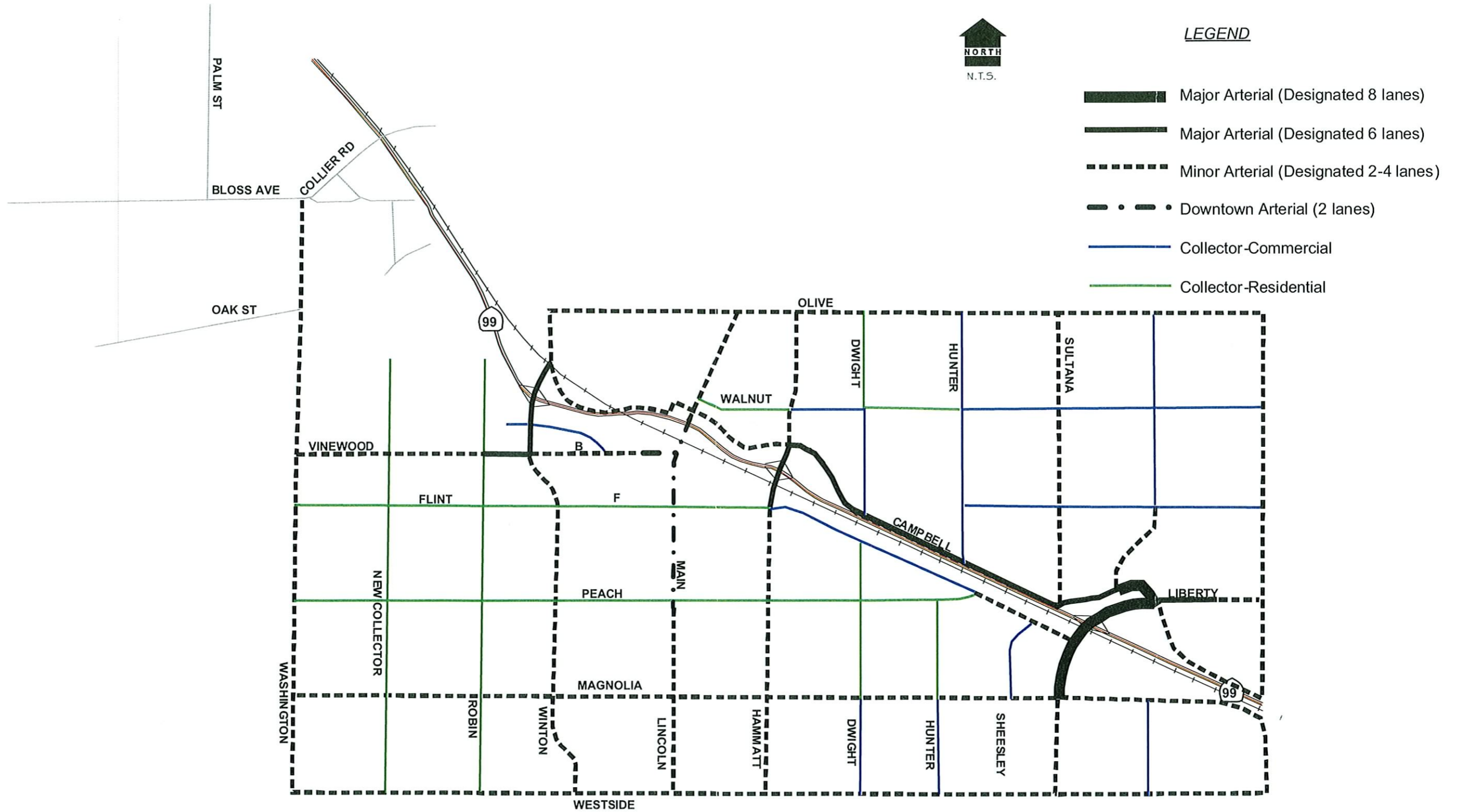
Figure 7 illustrates the locations of Minor Arterials streets and notes those locations where “interim” or “limited” improvements will be made.

Figure 8 differentiates the locations of Commercial and Residential Collector streets.





- LEGEND**
- Minor Arterial by Fronting Developer
 - Minor Arterial-Outside Buildout Area (4 lanes)
 - Minor Arterial-Outside Buildout Area (2 lanes)
 - Minor Arterial No Fronting Development at Buildout (4 lanes)
 - Minor Arterial No Fronting Development at Buildout (2 lanes)
 - Minor Arterial No Fronting Development -20 years (2 lanes)
 - Minor Arterial No Fronting Development -20 years (4 lanes)
 - X Number of Lanes Under interim conditions



The text which follows describes the approach to improving key roads in Livingston.

Olive Avenue: The fee program will pay for development of the Olive Avenue extension from Winton Parkway to Livingston Cressey. While the Master Plan designates this route as a 4 lane minor arterial, projected traffic volumes over the next 20 years can be accommodated by a two lane road. Therefore, the cost allocated within the fee program based on a “limited arterial” in this area.

Similarly, the Master Plan designates the portion of Olive Avenue east of Livingston Cressey to the limits of Area 5 and ultimately to Cressey Road at Build Out as a minor arterial. The projected traffic volume can be accommodated by a two lane road. Thus, the cost estimates assume new development along the south side of Olive Avenue will construct ½ of the four lane minor arterial section, and improvements to the “interim arterial” section on the north side of the road would be funded through the fee program as far east as the limits of Area 5.

Walnut Avenue. The portion of Walnut Avenue west of Sultana Drive will be improved to collector standards within the 20 year growth area.

Campbell Avenue. Because the Olive Avenue extension to Winton Parkway will divert traffic from the northern Livingston area, Campbell Ave will remain a two lane road from Hammatt Avenue to Livingston-Cressey Road, and will be a 4 lane road from that point east to Sultana Drive. The forecast traffic volumes at Build Out indicate that a 6 lane arterial road is needed from Hammatt Avenue to Liberty Avenue. As noted in the discussion of the SR 99 / Sultana Drive interchange, a portion of Campbell Blvd will also need to be relocated to provide greater spacing between the SR 99 ramps and the Campbell Blvd intersection. As the new road constructed by Caltrans is adjacent to SR 99, there will be no fronting developer to widen the south side of the road. This south-side work from about Dwight Way to Liberty Avenue will need to be in the fee program.

F Street Frontage Road. F Street will be extended from its current terminus near Hammatt Avenue as a frontage road to SR 99. The F Street extension will reach to a new intersection on Sultana Drive that is sufficiently distant from the SR 99 ramp intersections (i.e., minimum 1,000 foot separation). The portion of the F Street frontage Road from Peach Avenue to Sultana Drive will need to be 4 lanes.

Peach Avenue. The north side of Peach Avenue between the Arena Canal and Hammatt Avenue has already been developed either as residential development or the High School. A residential collector will be constructed by widening the road to the south in this area.

Magnolia Blvd. The portion of Magnolia Blvd from Hammatt Avenue to Sultana Drive lies along the boundary of development assumed over the next 20 years. Since no fronting developer will be available, the fee program will need to cover the cost of improvements made to the south side of the street. Reimbursement from future development occurring in the post 20 year horizon could be possible. Between Hammatt Avenue and Hunter Road the “interim” two lane section is planned on the south side of the street. Twenty year traffic volumes would warrant the full four lane section between Hunter Road and Sultana Drive.

Westside Blvd. Because it lies on the southern Master Plan boundary, improvements to Westside Blvd will be made by both fronting developers and the area fee program. On the north side of the street, fronting developers will construct half of the ultimate four lane section in the area from the Master Plan limits on the west to Hammatt Avenue. As no development is expected along the Westside Blvd frontage in twenty years east of Hammatt Avenue, the fee program would need to cover the cost of the northern half of the ultimate four lane section from Hammatt Avenue to Sultana Drive. During the 20 year horizon the portion of Westside Blvd east of Sultana Drive will remain 2 lanes

The fee program would also cover the costs of south side improvements. The “interim” two lane section would be adequate based on projected traffic volumes west of Lincoln Blvd. The ultimate four lane section would be needed on the south side from Lincoln Blvd to Sultana Drive.

Washington Blvd. A limited portion of Washington Blvd would be improved in the twenty year horizon. An “interim” arterial section (i.e., 2 lanes) would be constructed by the fee program from the Merced River Bridge to Vinewood Road. Fronting development would install half of the ultimate four lane section on the east side of Washington Blvd between Vinewood and Flint Avenue. The fee program would construct an “interim” half section on the west side of the street.

Winton Parkway. Over a twenty year horizon fronting developers would be expected to complete the portion of Winton Parkway from Joseph Gallo Drive to Westside Blvd when development occurs. The fee program would reimburse developers for a portion of the costs for median area and two travel lanes. The work associated north of Joseph Gallo Drive to Campbell Ave associated with the planned interchange modification would be completed by the fee program. North of Campbell Ave, the fee program will need to fund a two lane “limited arterial” across the railroad to Olive Avenue.

Main Street. The Draft General Plan circulation element describes Main Street as a Downtown Arterial street. Given the developed nature of the community, it is unlikely that the road will ever be widened in the area between Campbell Ave and Peach Avenue. Based on the buildout traffic volumes in this area, the LOS D minimum can be maintained over the next 20 years while retaining a two lane roadway, although under Build Out conditions the main street crossing over SR 99 is projected to operate at LOS F. South of Peach Avenue the standard 4 lane minor arterial section will be developed by fronting development south to Westside Blvd.

Hammatt Avenue. Portions of Hammatt Avenue are designated a four lane Minor Arterial, and the area nears SR 99 will eventually need to be a 6 lane Major Arterial. The portion north of Walnut Avenue has been developed. Between F Street and Campbell Blvd the Build Out traffic volumes are indicative of the need for a 6 lane road. South of the freeway, widening Hammatt Avenue between F Street and Peach Avenue would be problematic due to the presence of fronting residential development along most of the Road. The west side of the road has existing residences along its entire length, and residences have been constructed along a portion of the east side. This cost analysis assumes that fronting developers will be asked to widen the roadway to the ultimate 4 lane minor arterial standard on the east side of the highway that has not been developed, that the

Master Plan will acquire the right of way needed to complete a 4 lane widening project in this area and that the Master Plan will construct the 4 lane road where development already exists. Approximately 20 east side homes will need to be acquired. Fronting developers will be asked to widen Hammatt Avenue to its ultimate minor arterial four lane section between Peach Avenue and Westside Blvd.

Dwight Way. This collector street will be developed to a two lane collector north of Campbell Ave and south of the F Street frontage Road.

Hunter Road. Hunter Road will be developed as a two lane collector street from Olive Avenue to Campbell Avenue and from the F Street frontage road to Westside Blvd.

Sultana Drive. The portion of Sultana Drive north of Walnut Avenue to Olive Avenue will be widened to collector standards by fronting development. South of Walnut Avenue a 4 lane minor arterial will eventually be needed to Campbell Blvd. Improvements to Sultana Drive south of Magnolia Avenue are not a part of the 20 year improvement program.

Cressey Road. The Draft General Plan designates Cressey Road as a Minor Arterial. However, this road is not planned for improvement within the twenty year horizon.

Costs of Roadway Widening. The extent to which the cost of new roads and street widening will need to be funded through the fee program is noted in Table 14. Preliminary estimates of the cost of fee program participation in creating these multi-lane streets are also provided. This analysis also assumes that where a collector or arterial street is on a growth boundary, the fee program will provide the funds to widen the side of the street opposite planned development.

The total cost of all identified new streets and street widening projects is estimated at \$193,08 million. This cost includes \$24.3 million in right of way costs covered by a Master Plan Fee Program and total construction costs and contingency of \$168.79 million. This cost excludes the costs of traffic signals, bridges and interchange modifications. Under the allocation policy suggested herein, fronting developers would contribute \$111.7 million of this cost, while a city-wide fee program would contribute about \$81.4 million of the total.

**TABLE 14
PROJECTED 20 YEAR ROADWAY WIDENING IMPROVEMENT COSTS**

Street	From	To	Description	Length	Projected Cost (\$1,000)		
					Fronting Developer	Fee Program	Total
<i>East – West Streets</i>							
Olive Ave	Winton Parkway	Livingston Cressey	MiA – 4 (limited)	2,640	\$ 0	\$ 2,625	\$ 2,625
	Livingston Cressey	Hammatt Ave	MiA – 4 (interim)	1,600	\$246	\$1,155	\$1,402
	Hammatt Ave	East end of Area 5	MiA – 4	3,600	\$1,276	\$1,375	\$2,651
Walnut Ave	Olds Avenue	Hammatt Ave	Collector - Res	640	\$171	\$29	\$200
	Hammatt Ave	Dwight Ave	Collector - Comm	2,120	\$1,507	\$201	\$1,708
	Dwight Ave	Hunter Road	Collector – Res	2,640	\$469	\$566	\$1,035
Campbell Ave	Winton Parkway	Davis Street	MiA – 2	3,000	-	-	-
	Davis Street	Cressey	Mi A - 2	1,360	-	-	-
	Cressey	Hammatt Ave	MiA – 4	3,200	\$532	\$843	\$1,375
	Hammatt Ave	Dwight Ave	MaA – 6	2,400	\$1,704	\$818	\$2,522
	Dwight Ave	Hunter Road	MaA – 6	2,640	\$937	\$2,392	\$3,329
	Hunter Road	Sultana Drive	MaA – 6	2,640	\$937	\$2,392	\$3,329
	Sultana Drive	Arena Blvd	MaA – 6	1,320	\$937	\$1,196	\$2,133
	Arena Blvd	Liberty Avenue	MaA - 8	1,320	\$936	\$1,708	\$2,644
Joseph Gallo Drive	Robin Ave	Winton Parkway	Collector – Comm	-	-	-	-
	Winton Parkway	B Street	Collector – Comm	1,440	\$765	\$175	\$940
Vinewood Ave / B St	Washington Blvd	Robin Ave	MiA – 4	5,280	\$3,744	\$1,097	\$4,840
	Robin Ave	Winton Parkway	MaA – 6	1,320	\$937	\$1,196	\$2,133
	Winton Parkway	Prusso Street	MiA – 4	2,550	\$1,577	\$530	\$2,107
Flint Ave / F St	Washington Blvd	Robin Ave	Collector – Res	5,280	\$2,985	\$389	\$3,374
	Robin Ave	Winton Parkway	Collector – Res	2,000	\$796	\$147	\$943
	Winton Parkway	Prusso Street	Collector – Res	2,280	\$810	\$168	\$ 978
	Prusso Street	Main Street	Collector – Res	960	-	-	-
	Main Street	Hammatt Ave	Collector – Res	2,680	-	-	-
	Hammatt Ave	Hunter Rd	Collector – Comm	4,000	\$3,060	\$319	\$3,379
	Hunter Ave	Peach Ave	Collector - Comm	800	\$306	\$426	\$733
	Peach Ave	Sultana Drive	Mia-4	3,200	\$2,272	\$844	\$3,115
<i>East – West Streets</i>							
Peach Ave	Limit of Area 8	Robin Ave	Collector – Res	3,960	\$2,814	\$291	\$3,106
	Robin Ave	Winton Parkway	Collector – Res	2,000	\$1,421	\$147	\$1,568
	Winton Parkway	Arena Canal	Collector – Res	2,080	\$1,478	\$153	\$1,631
	Arena Canal	Main Street	Collector – Res	1,200	\$426	\$582	\$1,008
	Main Street	Hammatt Ave	Collector – Res	2,640	\$469	\$1,280	\$1,749
	Hammatt Ave	Dwight Way	Collector – Res	2,640	\$1,059	\$194	\$1,253
	Dwight Way	F Street	Collector - Res	4,000	\$ 2,843	\$246	\$3,089

TABLE 14 (CONT'D)
PROJECTED 20 YEAR ROADWAY WIDENING IMPROVEMENT COSTS

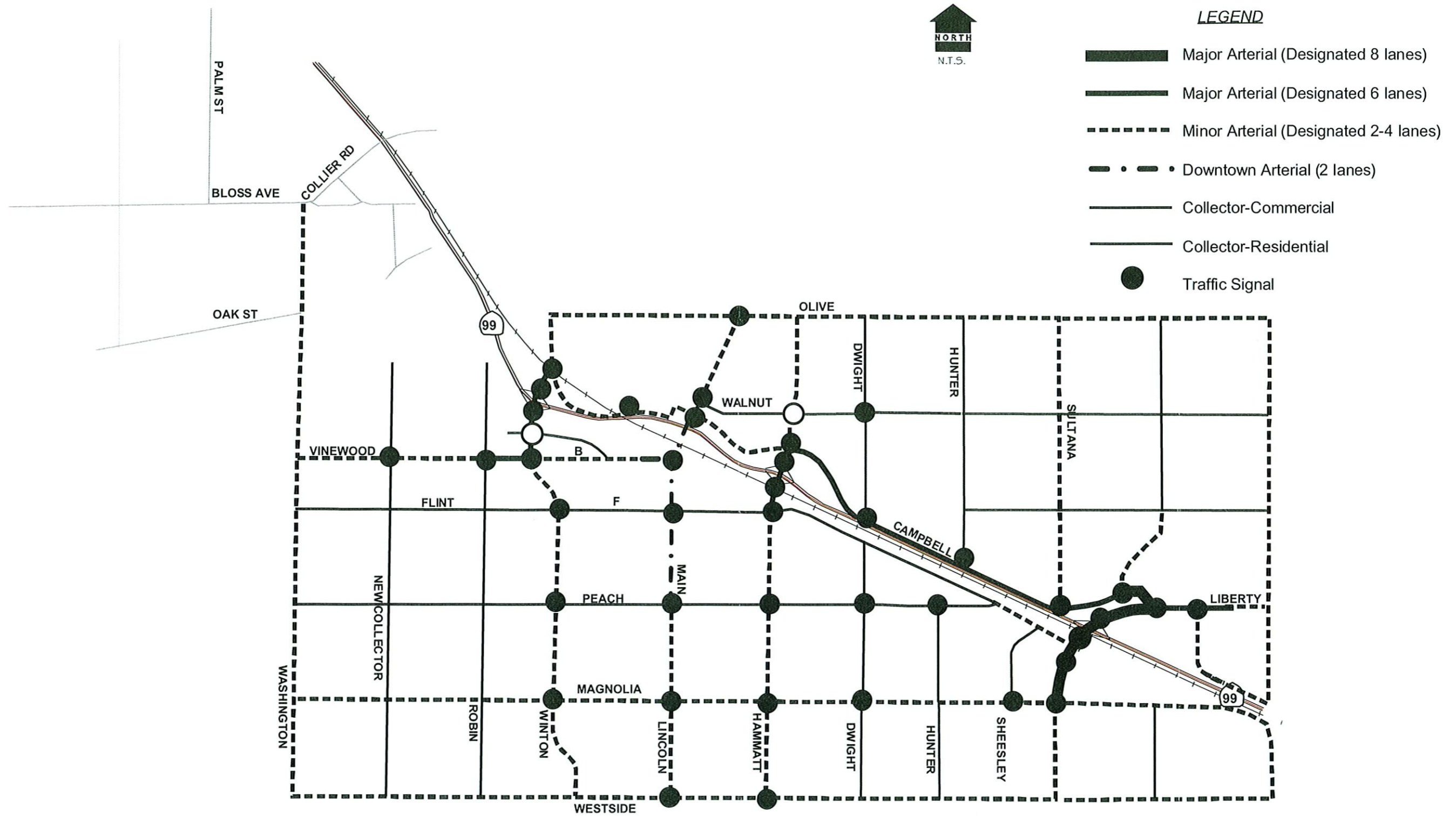
Street	From	To	Description	Length	Projected Cost (\$1,000)		
					Fronting Developer	Fee Program	Total
Magnolia Avenue	Limit of Area 8	Robin Ave	MiA- 4	3,960	\$2,808	\$822	\$3,630
	Robin Ave	Winton Parkway	MiA – 4	2,000	\$1,418	\$415	\$1,833
	Winton Parkway	Lincoln Blvd	MiA – 4	3,280	\$2,326	\$681	\$3,007
	Lincoln Blvd	Hammatt Ave	MiA – 4	2,640	\$1,872	\$548	\$2,420
	Hammatt Avenue	Dwight Way	MiA – 4	2,640	\$936	\$1,008	\$1,944
	Dwight Way	Hunter Road	MiA – 4	4,000	\$1,418	\$1,528	\$2,946
	Hunter Road	Sultana Drive	MiA – 4	1,500	\$532	\$843	\$1,375
	Sultan Drive	Limit of Area 6	MiA – 4	2,640	\$936	\$1,555	\$2,491
Westside Blvd	Limit of Area 8	Robin Ave	MiA – 4	1,900	\$674	\$726	\$1,399
	Robin Ave	Winton Parkway	MiA – 4	2,640	\$936	\$1,008	\$1,944
	Winton Parkway	Lincoln Blvd	MiA – 4	2,640	\$936	\$1,008	\$1,944
	Lincoln Blvd	Hammatt Ave	MiA – 4	2,640	\$936	\$1,484	\$2,420
	Hammatt Ave	Sultana Drive	MiA – 4	7,920	-	\$7,260	\$7,260
<i>North South Roadways</i>							
Washington Blvd	Merced River	Vinewood Ave	MiA – 2	3,400	\$ 0	\$3,095	\$3,095
	Vinewood Ave	Flint Ave	MiA – 4	1,320	\$469	\$506	\$975
New No.-So. Collector	Flint Ave	End of Area 8	Collector – Res	6,600	\$4,691	\$855	\$5,546
	Flint Ave	Vinewood Ave	Collector - Res	1,320	\$938	\$171	\$1,109
	Vinewood Ave	End of Area 1	Collector - Res	2,640	\$1,876	\$342	\$2,218
Robin Avenue	Westside Blvd	Magnolia Ave	Collector - Res	2,640	\$1,876	\$194	\$2,071
	Magnolia Ave	Peach Ave	Collector – Res	2,640	\$1,876	\$194	\$2,071
	Peach Ave	F Street	Collector – Res	2,640	\$1,876	\$194	\$2,071
	F Street	B Street	Collector – Res	1,320	\$697	\$325	\$1,021
	B Street	End of Area 1	Collector – Res	2,640	\$1,876	\$194	\$2,071
Winton Parkway	Westside Blvd	Magnolia Ave	MiA – 4	2,640	\$1,876	\$1,103	\$2,978
	Magnolia Ave	Peach Ave	MiA – 4	2,640	\$1,876	\$1,103	\$2,978
	Peach Avenue	F Street	MiA – 4	2,640	\$1,876	\$1,103	\$2,978
	F Street	B Street	MiA – 4	1,450	\$1,028	\$606	\$1,634
	B Street	Joseph Gallo Dr	MaA – 6	750	\$533	\$256	\$788
	Joseph Gallo Dr	Campbell Ave	Interchange ROW		-	\$2,000	\$2,000
	Campbell Ave	Olive Ave	MiA – 4	1,320	-	\$1,312	\$1,312
Lincoln Blvd	Westside Blvd	Magnolia Ave	MiA – 4	2,640	\$1,872	\$548	\$2,420
	Magnolia Ave	Peach Avenue	MiA - 4	2,640	\$1,872	\$548	\$2,420
Main Street	Peach Avenue	F Street	DA – 2	2,640	-	-	-
	F Street	B Street	DA – 2	1,320	-	-	-
	B Street	Campbell Ave	DA– 2	1,040	-	-	-
Livingston Cressey	Glenwood Blvd	Davis Street	MiA – 4	600	-	-	-
	Davis Street	Olive Avenue	MiA – 4	2,640	-	-	-

**TABLE 14 (CONT'D)
PROJECTED 20 YEAR ROADWAY WIDENING IMPROVEMENT COSTS**

Street	From	To	Description	Length	Projected Cost (\$1,000)		
					Fronting Developer	Fee Program	Total
Hammatt Ave	Westside Blvd	Magnolia Ave	MiA - 4	2,640	\$1,872	\$1,103	\$2,975
	Magnolia Ave	Peach Ave	MiA - 4	2,640	\$1,872	\$1,103	\$2,975
	Peach Ave	F Street	MiA - 4	2,640	\$468	\$11,016	\$11,484
	F Street	SB SR 99 ramps	Interchange ROW	-	-	\$2,000	\$2,000
	SB SR 99 ramps	NB SR 99 ramps	Interchange		-	-	-
	NB SR 99 ramps	Campbell Ave	Interchange		-	-	-
	Campbell Ave	Walnut Ave	MiA - 4	1,000	\$ 208	\$355	\$562
	Walnut Ave	Olive Ave	MiA - 4	3,000	\$2,127	\$1, 253	\$3,380
Dwight Way	Magnolia Ave	Peach Ave	Collector- Res	2,640	\$1,878	\$194	\$2,072
	Campbell Ave	Walnut Ave	Collector Com	3,170	\$2,425	\$477	\$2,903
	Walnut Ave	Olive Ave	Collector- Res	2,640	\$1,878	\$194	\$2,072
NS Collector	Magnolia Ave	Peach Avenue	Collector- Res	2,640	\$1,876	\$342	\$2,218
Hunter Road	Peach Avenue	F Street	Collector Com	2,000	\$1,530	\$301	\$1,831
	Campbell Blvd	Walnut Ave	Collector Com	4,400	\$2,632	\$1,151	\$3,782
Sheesley Rd	Peach Ave	Magnolia Ave	Collector Com	2,640	\$2,020	\$398	\$2,418
Sultana Drive	Campbell Ave	Limit area 6	MiA - 4	2,160	\$1,652	\$449	\$2,101
Liberty	Magnolia Ave	SR 99	MaA - 8	1,950	\$1,385	\$1,012	\$2,397
	SR 99	Campbell Blvd	MaA - 8	2,000	\$1,420	\$1,048	\$2,459
Arena Blvd	Liberty Ave	Limit Area 6	Collector-Com	1,320	\$1,010	\$125	\$1,135
	Liberty Avenue	East limits	MiA - 4	2,000	\$1,760	\$498	\$2,204
Total All Street Widening					\$111,675	\$81,401	\$193,076

Other Costs

Traffic Signals. Year 2030 traffic volume forecasts have been reviewed to identify those locations where traffic signals may eventually become necessary. For this analysis, daily traffic volumes were compared to Caltrans warrants based on daily volume, and those locations that are clear or marginal candidates for signalization were identified. Figure 9 identifies the locations of expected traffic signals. As noted in Table 15, a total of 45 traffic signals are likely to be needed by the year 2030. Four signals already exist and one is pending. At an estimated cost of \$250,000 each, the estimated cost of the remaining 40 signals is \$10,000,000.



**TABLE 15
TRAFFIC SIGNALS WARRANTED IN LIVINGSTON BY YEAR 2030**

	North-South Street	East-West Street	Status
1.	New Collector	Vinewood Avenue	New
2.	Robin Avenue	Vinewood Avenue	New
3.	Winton Parkway	Campbell Ave	New
4.	Winton Parkway	NB Hwy 99 Ramps	New
5.	Winton Parkway	SB Hwy 99 Ramps	New
6.	Winton Parkway	Joseph Gallo Dr	Existing
7.	Winton Parkway	Vinewood/B Street	Pending
8.	Winton Parkway	Flint/F Street	New
9.	Winton Parkway	Park Street	New
10.	Winton Parkway	Peach Avenue	New
11.	Winton Parkway	Magnolia Avenue	New
12.	Stephanie Avenue	Campbell Boulevard	New
13.	Livingston/Cressey Road	Olive Avenue	New
14.	Livingston/Cressey Road	Walnut Avenue	Existing
15.	Livingston/Cressey Road	Davis Avenue	Existing
16.	Livingston/Cressey Road	Campbell Boulevard	New
17.	Main Street	B Street	New
18.	Main Street	Flint/F Street	New
19.	Main Street	Peach Avenue	New
20.	Lincoln Blvd	Magnolia Avenue	New
21.	Lincoln Blvd	Westside Boulevard	New
22.	Hammatt Avenue	Walnut Avenue	Existing
23.	Hammatt Avenue	Campbell Boulevard	New
24.	Hammatt Avenue	NB Highway 99	New
25.	Hammatt Avenue	SB Highway 99	New
26.	Hammatt Avenue	F Street	New
27.	Hammatt Avenue	Peach Avenue	New
28.	Hammatt Avenue	Magnolia Avenue	New
29.	Hammatt Avenue	Westside Boulevard	New
30.	Dwight Way	Walnut Avenue	New
31.	Dwight Way	Campbell Boulevard	New
32.	Robin Avenue	Peach Avenue	New
33.	Hunter Road	Peach Avenue	New
34.	Dwight Way	Peach Avenue	New
35.	Dwight Way	Magnolia Avenue	New
36.	Hunter Road	Campbell Boulevard	New
37.	Sheesley Road	Magnolia Avenue	New
38.	Sultana Drive	Campbell Boulevard	New
39.	Sultana Drive	Magnolia Boulevard	New
40.	Campbell Blvd	Arena Blvd	New
41.	Campbell Blvd	Liberty Avenue	New
42.	Liberty Avenue	Campbell Blvd	New
43.	Sultana Drive – Liberty Avenue	NB SR 99 ramps	New
44.	Sultana Drive – Liberty Avenue	SB SR 99 ramps	New
45.	Sultana Drive – Liberty Avenue	F Street extension	New

Major Improvements. The traffic analysis indicates that major traffic volume increases can be anticipated at the City's Winton Parkway and Hammatt Avenue interchanges on SR 99, and these future traffic volumes will likely necessitate interchange improvements as well. Both the Winton Parkway and Hammatt Avenue interchanges have been the subject of previous City initiated traffic studies which concluded that the existing crossing structures would eventually need to be widened and that auxiliary lanes would need to be created on the approaches to ramp intersections. Another two lane interchange on SR 99 is being constructed today at Sultana Drive, and as noted earlier, this work will need to be replaced over the next 20 years by a larger interchange.

The cost of these projects will be substantial, as shown in Table 16. For this analysis rough “planning level” estimates have been made for the purpose of identifying the overall costs of circulation system improvements. These cost estimates will serve as “place holders” until such time as subsequent design analysis provides better estimates.

SR 99 Interchange Modifications. As shown, it is likely that the Winton Parkway interchange project may cost \$55 million to widen to a six lane facility. It is likely that portions of the businesses that adjoining Winton Parkway would have to be acquired, although the exact nature of the acquisitions can't be determined without more formal design analysis. A bridge will also have to be constructed across the railroad when Winton Parkway is extended north to Olive Avenue. The additional cost of this structure is \$7.5 million. Because the cost of major Winton Parkway interchange reconstruction is high, it is recommended that an “interim project” combining signalization and ramp improvements without structure widening will proceed first. The cost of this interim improvement would be in the range of \$5 million.

A similar approach is suggested at Hammatt Avenue. The cost of widening the facility to a six lane road is estimated at \$55 million. The cost of minor “interim” improvements to the SR 99 / Hammatt Avenue interchange is in the range of \$1.5 million.

Within the 20 year horizon it will be necessary to widen the SR 99 / Sultana Drive interchange to an 8 lane facility to accommodate identified growth. This cost estimates again assumes an interim project that would cost \$5 million would proceed the ultimate widening that may cost \$62.5 million.

Bridges. The plan includes a new two lane bridge extending Winton Parkway north over the UPRR at a cost of \$7.5 million.

Washington Avenue Crossing over the Merced River. The plan includes the development of a new crossing over the Merced River along a Washington Avenue alignment to the SR 99 Collier Road interchange south of Delhi. Due to environmental issues associated with any new river crossing, it is difficult to identify the cost of this improvements and an estimate of \$40 million has been used in this analysis as a “place holder”.

All together, the cost of these major improvements that would be of city-wide benefit is \$224.4 million, including PSR's.

**TABLE 16
MAJOR PROJECTS COSTS**

Improvement	Cost with Engineering contingency @ 40% (million)
SR 99 / Winton Parkway Modification (6 lane)	\$55.0
SR 99 / Hammatt Avenue Modification (6 lane)	\$55.0
SR 99 / Hammatt Avenue Interim Modification	\$1.5
SR 99 / Winton Parkway Interim Modification	\$5.0
SR 99 / Sultana Drive / Liberty Avenue Modification (8 lane)	\$62.5
SR 99 / Sultana Drive / Liberty Avenue Interim Modification	\$5.0
Washington Blvd Bridge over Merced River	\$40.0
Winton Parkway Extension over railroad	\$7.5
PSR's / plan updates	\$2.9
Total	\$234.4

Pedestrian / Bicycle Facilities

The Livingston General Plan suggests that bicycle lanes and sidewalks will be developed as part of all new collector and arterials streets. The General Plan does not denote any separated bicycle paths. As the City's Arterial and Collector standards all include bicycle lanes the Master Plan does not include the additional cost of separate bicycle facilities.

Transit Facilities

While it is unlikely that major changes to the transit services currently provided in Livingston will occur in the short term, it would be appropriate that the planned circulation system include features that could help promote expanded transit use that might be expected in the long term. This policy is noted in the Livingston General Plan, which noted the need to accommodate busses on arterial and collector streets. In general, incorporation of bus stops into the design of arterial streets would be an applicable action.

The standard arterial street sections assumed under the Master Plan include room for an 8' emergency parking / bike lane. While busses could use this area, conflicts would arise when both bikes and busses are present. Ideally, the standard section should be widened slightly in locations where bus stops may be developed in the future. It is recommended that the standard section be widened to provide a separate 4 foot bike lane and a 10 foot wide bus loading lane. This widening should occur on arterial streets "downstream" from arterial and collector street intersections and be extended for 180 feet prior to a 120 foot long transition.

COST ALLOCATION / FEES

Having identified the cost of long-term improvements, it is important to consider the range of funding sources that might reasonably be expected. The City fee program may not be responsible for all of these costs, as the effects of alternative funding sources, commitments from vested future projects and fees that have already been collected should be included.

Other Funding Sources

With regard to other funding sources, the primary source of public money for capacity improvements is the State Transportation Improvement Plan (STIP). These funds are primarily allocated by MCAG based on adopted regional priorities through the Regional Transportation Improvement Program (RTP). Livingston can be expected to continue to receive its share of MCAG's RTP funds, and pending construction of the SR 99 / Sultana Drive interchange made use of these funds. The extent to which any other projects in Livingston should be assumed to be STIP/RTP funded has not yet been discussed with MCAG staff. At other times it has been the opinion of MCAG staff that none of the other major projects identified in this report were likely to be funded in this manner and that all of the identified costs would have to be borne by the City and local development. This fee program analysis has therefore assumed that no STIP/RTP funds would be available for improvements described herein.

Other lesser funding sources are available through Caltrans and other sources, but these funds are primarily dedicated to maintenance work and are not applicable to the capacity improvements targeted by this fee program. It is also possible that a regional sales tax could be enacted to generate additional funds. However, since the prioritization of sales tax revenues would remain on a regional basis and the probability of a sales tax being enacted is unknown, this fee program analysis does not assume any contribution from these sources.

Total Local Funding Responsibilities

Resulting total cost to be borne locally are presented in Table 17. As shown, the total cost of a program combining participation in road widening, traffic signals, major projects and studies is estimated at \$329.2 million.

**TABLE 17
SUMMARY OF FEE PROJECT COSTS**

Improvement Category	Estimated Cost
New City Streets and Improvements	\$81.4
Traffic signals	\$10.5
Subtotal	\$91.9
Major Projects	\$234.4
PSR's and Fee program updates	\$2.9
Subtotal	\$237.3
Total Fee Program Costs	\$329.2
Example Allocations	
Total Daily Trips in 20 years	392,896
Cost per daily trip	\$837.88
Total Dwelling Unit Equivalentents (DUE's)	28,410
Cost Per DUE	\$11,587.47
Construction and right of way costs	

Cost Allocation / Fee Application

Spreading the allocated costs to land use is accomplished by dividing the total cost by the amount of traffic that is projected to be generated in the study area. In this case, a total of 392,896 daily trip ends are forecast. In simple terms, the necessary fee could be determined by dividing the total projected fee program cost (\$329.2 million) by the 392,896, or \$837.88 per daily trip end. Applied to the average daily trip generation rates assumed for single family residences (i.e., 7.0 trips per dwelling unit), a fee of roughly \$5,865 per residence would be applicable. However, application of this rate to the commercial properties generating 400 daily trips per acre suggests a fee of \$335,140 per acre.

Other communities have succeeded in reallocating improvement costs from commercial development and towards residential growth by accounting for additional traffic factors. For example, more sophisticated program account for the average length of peak hour trips and for the share of retail traffic that is drawn from the stream of traffic passing the site in order to suggest a *Dwelling Unit Equivalent (DUE)* for each land use type. Application of this fee to individual development proposals will eventually need to account for the specific characteristics of each land use proposal. Table A, which is included in the appendix, presents peak hour trip generation, trip length and "new" trip factors for a wide variety of land use types. This data is based on ITE research and accounts for the traffic characteristics of each land use during the p.m. peak hour. These DUE rates can be easily applied to estimate the number of DUE's attributed to specific land uses.

Using typical conversion factors, the expected 20 year development could yield approximately 28,410 DUE's. At this rate, the cost per DUE would be roughly \$11,588. This would be the fee per single family residence. Under this approach the fee for retail commercial development generating 400 daily trips per acre but only 17¼ DUE's per acre would drop to \$199,885 per acre.

It is important to recognize that impact fees are only effective when the amount of development expected to pay for planned improvements actually occurs. In this case, the City has made aggressive assumptions regarding the amount of retail commercial development that will occur over the next twenty years. Based on an allocation involving Daily Trips, the non-residential development anticipated over that time frame will pay \$247.4 million, and residential development would pay \$80.3 million.

TEN YEAR IMPROVEMENT PROGRAM

To identify those improvements that would likely be needed in the near term, traffic volume forecasts were made assuming development within the 10 year development area identified under the Master Plan process. In general, the ten year plan assumes buildout within the existing Sphere of Influence, with development levels that were previously identified in Table 7.

Traffic Volume Projections

A new traffic run was made assuming the 10 year development levels, and the results are presented in Table 17. These forecasts assume the availability of the planned street system but assume that the following major projects will not be completed:

1. Washington Avenue Bridge will not be completed
2. Winton Parkway Extension to Olive Avenue will not be constructed
3. Peach Street will connect to Liberty Avenue as currently constructed by Caltrans.
4. Hammatt Ave will not be completed between Magnolia Avenue and Westside Blvd

As noted in Table 18, traffic volume forecasts in the areas where development is anticipated are not substantially different from those projected for the 20 year projections. For example, with build out of the area adjoining the SR 99 / Winton Parkway interchange, the volume of traffic at that location is similar to that projected for the 20 year horizon with development regional improvements. The volume of traffic at the SR 99 / Hammatt Avenue interchange is also similar under 10 year and 20 year future conditions.

Projected traffic volumes in areas where growth is not expected in ten years are much lower than the 20 year forecasts. For example, at the SR 99 / Sultana Drive interchange, projected traffic volumes will remain within the capacity of the two lane street system recently constructed by Caltrans.

**TABLE 18
DAILY TRAFFIC VOLUMES AND LEVELS OF SERVICE
10 YEAR PROJECTION**

Road	Location From	To	Year 2004	10 Year Forecast		
			Daily Volume	Daily Volume	Facility - # of Lanes	LOS
East West Streets						
Olive Avenue	Winton Parkway	Livingston Cressey	-	-	-	-
	Livingston Cressey	Hammatt Ave	-	1,560	MiA - 2	C
	Hammatt Ave	Dwight Way	345	290	Mi A- 2	C
	Dwight Way	Hunter Avenue	325	270	MiA - 2	C
	Hunter Avenue	Sultana Drive	-	250	Mi A- 2	C
Davis Ave	Foster Farms	Livingston Cressey	-	9,115	RC - 2	C
Walnut Ave	Livingston Cressey	Hammatt Ave	4,160	4,450	RC - 2	C
	Hammatt Avenue	Dwight Way	7,115	11,060	CC - 2	D
	Dwight Way	Hunter Avenue	3,935	5,450	RC - 2	C
	Hunter Avenue	Sultana Drive	-	5,570	CC -2	C
Campbell Ave	Winton Parkway	Stefani Ave	6,320	12,255	MiA - 2	D
	Stefani Ave	Cressey	4,235	12,255	MiA - 2	D
	Livingston Cressey	Hammatt Ave	-	12,440	MiA - 2	D
	Hammatt Avenue	Dwight Way	4,420	12,750	Ma A - 6	C
	Dwight Way	Hunter Avenue	-	5,310	MaA - 2	C
	Hunter Avenue	Sultana Drive	-	4,800	Mi A - 2	C
	Sultana Drive	Liberty Ave	-	5,385	Mi A - 2	C
	Liberty Avenue			835	CC - 2	C
Joseph Gallo Drive		Winton Parkway	-	14,600	CC - 2	D-E
	Winton Parkway	B Street	-	7,865	CC-2	C
Vinewood Ave	Washington Ave	New Collector	-	2,215	MiA- 2	C
	New Collector	Robin Ave		12,115	MiA - 2	D
	Robin Ave	Winton Parkway	1,125	28,750	Ma A - 6	C
B Street	Winton Parkway	Russo	4,410	10,985	Mi A - 4	C
	Russo	Main Street	-	10,730	CC - 2	C
Flint Ave / F Street	Washington Ave	New Collector	-	-	-	-
	New Collector	Robin Avenue	-	-	-	-
	Robin Ave	Winton Parkway	-	950	RC -2	C
	Winton Pkwy	Main Street	-	4,500	RC -2	C
	Main Street	Hammatt Ave	3,425	7,745	RC-2	C
	Hammatt Ave	Peach Avenue	-	7,486	CC - 2	C
Peach Avenue	Washington Ave	New Collector	-	-	-	-
	New Collector	Robin Avenue	-	2,640	RC -2	C
	Robin Ave	Winton Pkwy	-	4,335	RC -2	C
	Winton Pkwy	Main Street	2,005	4,020	RC - 2	C
	Main Street	Hammatt Ave	2,360	5,610	RC -2	C
	Hammatt Ave	Dwight Way	-	660	RC -2	C
	Dwight Way	Sultan Drive	-	700	RC- 2	C

**TABLE 18 (CONT'D)
DAILY TRAFFIC VOLUMES AND LEVELS OF SERVICE
10 YEAR PROJECTION**

Road	Location From	To	Year 2004	10 Year Forecast		
			Daily Volume	Daily Volume	Facility Lanes	LOS
Liberty	SR 99 SB ramps	SR 99 NB ramps	-	6,480	Ma A - 2	C
	SR 99 NB ramps	Campbell Ave	-	9,640	Ma A - 2	C
	Campbell Avenue	Commercial	-	6,350	Ma A - 2	C
	Commercial		-	5,515	CC -2	C
Magnolia Ave	Washington Ave	New Collector	-	2,300	MiA - 2	C
	New Collector	Robin Avenue	-	630	Mi-A - 2	C
	Robin Ave	Winton Pkwy	-	480	MiA - 2	C
	Winton Pkwy	Main Street	300	2,480	Mi A - 2	C
	Main Street	Hammatt Ave	290	920	Mi A - 2	C
	Hammatt Avenue	Dwight Way	-	1,730	Mi A - 2	C
	Dwight Way	Hunter Ave	-	1,630	Mi A - 2	C
	Hunter Avenue	Commercial	-	1,630	Mi A - 2	C
	Commercial	Sultana	-	1,630	Mi A - 2	C
Westside Blvd		Washington	-	5,500	MiA - 2	C
	Washington	New Collector	-	2,630	MiA - 2	C
	New Collector	Robin Ave	-	3,200	MiA - 2	C
	Robin Ave	Winton Pkwy	-	4,000	MiA - 2	C
	Winton Pkwy	Main Street	2,170	4,000	MiA - 2	C
	Main Street	Hammatt Ave	1,305	3,800	Mi A - 2	C
	Hammatt Ave	Dwight Way	-	3,800	Mi A - 2	C
	Dwight Way	Hunter Ave	-	3,800	Mi A - 2	C
	Hunter Way	Sultana Drive	-	3,840	Mi A - 2	C
	Sultana Drive		-	3,900	CC -2	C
North-South Streets						
Washington Blvd	Collier	Bridge	-	0	0	-
	Bridge	Vinewood	-	0	0	-
	Vinewood	F Street	360	2,215	MiA - 2	C
	F Street	Peach Avenue	-	2,215	MiA - 2	C
	Peach Avenue	Magnolia Avenue	-	2,500	MiA - 2	C
	Magnolia Avenue	Westside Blvd	-	3,040	MiA - 2	C
New Collector	Vinewood Dr	F Street	-	1,015	RC - 2	C
	F Street	Peach Avenue	-	1,060	RC - 2	C
	Peach Avenue	Magnolia Ave	-	3,400	RC-2	C
	Magnolia Avenue	Westside Blvd	-	-	-	-
Robin Ave		Vinewood	-	16,375	CC - 2	F
	Vinewood	F Street	2,935	860	RC - 2	C
	F Street	Peach Ave	1,530	1,025	RC - 2	C
	Peach Ave	Westside Blvd	-	3,140	RC - 2	C

**TABLE 18 (CONT'D)
DAILY TRAFFIC VOLUMES AND LEVELS OF SERVICE
10 YEAR PROJECTION**

Road	Location From	To	Year 2004	10 Year Forecast		
			Daily Volume	Daily Volume	Facility Lanes	LOS
North-South Streets						
Winton Parkway	Olive Avenue	Campbell Avenue	-	-	-	-
	Campbell Ave	SR 99 NB ramps	-	12,555	Mi A - 2	D
	SR 99 NB ramps	SR 99 SB ramps	-	31,600	Ma A - 4	E
	SR 99 SB ramps	Joseph Gallo Dr	12,100	51,925	Ma A - 6	E
	Joseph Gallo Dr	B Street	7,650	32,865	Ma A - 6	C
	B Street	F Street	-	17,600	Mi A - 4	C
	F Street	Peach Ave	-	13,660	Mi A - 4	C
	Peach Ave	Magnolia Ave	-	4,340	Mi A - 4	C
Livingston Cressey	Magnolia Ave	Westside Blvd	-	-	-	-
		Olive Ave	1,740	4,360	RC - 2	C
	Olive Avenue	Davis Ave	3,080	9,475	Mi A - 4	C
	Davis Ave	Campbell Ave	8,075	16,200	Mi A - 4	C
Main St / Lincoln Blvd	Campbell Ave	B Street	7,420	12,070	CC - 2	D
	B Street	F Street	6,825	3,660	RC - 2	C
	F Street	Park Street	4,955	5,050	RC - 2	C
	Park Street	Peach Ave	-	3,700	RC - 2	C
	Peach Ave	Magnolia Ave	2,370	6,340	MiA - 2	C
	Magnolia Ave	Westside Blvd	2,200	5,220	MiA - 2	C
Hammatt Ave	Westside Blvd		2,105	4,115	RC - 2	C
	Olive Ave	Walnut Ave	-	3,560	MiA - 2	C
	Walnut Ave	Campbell Ave	7,495	14,580	Mi A - 4	C
	Campbell Ave	NB SR 99 ramps	11,365	29,360	Ma A - 6	C
	NB SR 99 ramps	SB SR 99 ramps	-	25,750	Mi A - 4	D
	SB SR 99 ramps	F Street	-	23,550	Mi A - 4	D
	F Street	Park Street	8,870	10,550	MiA - 2	D
	Park Street	Peach Ave	2,540	8,990	MiA - 2	C
Dwight Way	Peach Ave	Magnolia Ave	-	3,665	MiA - 2	C
	Magnolia Ave	Westside Blvd	-	-	-	-
	Olive Ave	Walnut Ave	-	1,250	RC - 2	C
	Walnut Ave	Campbell Ave	520	3,650	CC - 2	C
	Peach Ave	Magnolia Ave	770	55	RC - 2	C
	Magnolia Ave	Westside Blvd	-	-	-	-

**TABLE 18 (CONT'D)
DAILY TRAFFIC VOLUMES AND LEVELS OF SERVICE
10 YEAR PROJECTION**

Road	Location From	To	Year 2004	10 Year Forecast		
			Daily Volume	Daily Volume	Facility Lanes	LOS
North-South Streets						
Hunter Avenue	Olive Ave	Walnut Ave	-	-	-	-
	Walnut Ave	Campbell Avenue	-	-	-	-
	Campbell Ave	Peach Avenue	-	-	-	-
	Peach Avenue	Magnolia Avenue	-	-	-	-
	Magnolia Avenue	Westside Blvd	-	-	-	-
Sheesley Rd	Peach Avenue	Magnolia Avenue	-	650	CC-2	C
Sultana Drive	Olive Avenue	Walnut Avenue	-	165	CC - 2	C
	Walnut Avenue	Commercial	-	585	CC - 2	C
	Commercial	Campbell Ave	-	585	Mi A - 2	C
	SB SR 99 ramps	Peach Ave	250	3,435	Ma A - 2	C
	Peach Avenue	Magnolia Avenue	-	2,775	MiA - 2	C
	Magnolia Avenue	Westside Blvd	-	1,150	MiA - 2	C
SR 99 ramps						
Winton Parkway	NB SR 99 off ramp		875	8,830	1	D
	NB SR 99 on ramp		4,000	21,590	2	D-E
	SB SR 99 off ramp		5,000	21,625	2	D-E
	SB SR 99 on ramp		1,125	10,030	1	E
Hammatt Ave	NB SR 99 off ramp		2,275	11,500	1	E
	NB SR 99 on ramp		2,750	9,040	1	D
	SB SR 99 off ramp		2,175	10,150	1	E
	SB SR 99 on ramp		2,725	11,450	1	D
Sultana Drive / Arena Way	NB SR 99 off ramp		N.A.	3,025	1	C
	NB SR 99 on ramp			2,500	1	C
	SB SR 99 off ramp			2,440	1	C
	SB SR 99 on ramp			2,875	1	C

Improvement Requirements

Under this short term condition, the frontage improvements associated with development within planning areas will need to be completed, and the citywide fee program will need to participate in the cost of those improvements. The following major project will need to be implemented

SR 99 / Winton Parkway Interchange Improvements. If the development anticipated within the next ten years is built out, then major improvements to the interchange will be required in the short term. If identified 10 year development occurs and 10 year improvements proceed quickly then it is possible that the “interim” improvements proposed without widening the structure under the 20 year plan would not be installed, and the City would proceed immediately to develop the six lane modification.

SR 99 / Hammatt Avenue Parkway Interchange Improvements. Similarly, if the development anticipated within the next ten years is built out, then major improvements to the Hammatt Avenue interchange will be required in the short term. If identified improvement proceeds then it is possible that the “interim” improvements proposed without widening the structure would not be installed and the City would proceed immediately to develop the six lane modification.

Roadway Widening. Development within the area identified for completion in the next ten years will make frontage improvements, and fees will be collected to participate in the cost of arterial and collector streets. Table 19 summarizes improvements assumed to be made.

These costs assume that the City of Livingston will elect to widen Hammatt Avenue between F Street and Peach Avenue to 4 lanes within the 10 year horizon.

**TABLE 19
PROJECTED 10 YEAR ROADWAY WIDENING IMPROVEMENT COSTS**

Street	From	To	Description	Length	Projected Cost (\$1,000)		
					Fronting Developer	Fee Program	Total
<i>East – West Streets</i>							
Olive Ave	Livingston Cressey	Hammatt Ave	MiA – 4 (limited)	1,600	\$246	\$1,155	\$1,402
	Hammatt Ave	East end of Area 5	MiA – 4 (interim)	3,600	\$1,276	\$1,375	\$2,651
Walnut Ave	Olds Avenue	Hammatt Ave	Collector – Res	640	\$171	\$29	\$200
	Hammatt Ave	Dwight Ave	Collector– Com	2,120	\$1,507	\$201	\$1,708
	Dwight Ave	Hunter Road	Collector – Res	2,640	\$469	\$566	\$1,035
Campbell Ave	Cressey Street	Hammatt Ave	MiA – 4	3,200	\$532	\$843	\$1,375
	Hammatt Ave	Dwight Ave	MaA – 6	2,400	\$1,704	\$818	\$2,522
	Dwight Ave	Hunter Road	MaA – 6	2,640	\$937	\$2,392	\$3,329
Joseph Gallo Dr	Winton Parkway	B Street	Collector-Com	1,440	\$765	\$175	\$940
Vinewood Ave / B St	Washington Blvd	Robin Ave	MiA – 4	5,280	\$3,744	\$1,097	\$4,840
	Robin Ave	Winton Parkway	MzA – 6	1,320	\$936	\$1,196	\$2,133
	Winton Parkway	Prusso Street	MiA – 4	2,550	\$1,577	\$530	\$2,107
Flint Ave / F St	Washington Blvd	Robin Ave	Collector – Res	5,280	\$2,985	\$389	\$3,374
	Robin Ave	Winton Parkway	Collector – Res	2,000	\$796	\$147	\$943
	Winton Parkway	Prusso Street	Collector – Res	2,280	\$810	\$168	\$978
	Hammatt Ave	Hunter Rd	Collector - Com	4,000	\$3,060	\$319	\$3,379
	Hunter Road	Sultana Drive	Mi-A- 4 (interim)	4,000	\$0	\$1,293	\$1,293

**TABLE 19(CONT'D)
PROJECTED 10 YEAR ROADWAY WIDENING IMPROVEMENT COSTS**

Street	From	To	Description	Length	Projected Cost (\$1,000)		
					Fronting Developer	Fee Program	Total
<i>East – West Streets</i>							
Peach Ave	Robin Ave	Winton Parkway	Collector - Res	2,000	\$1,421	\$147	\$1,568
	Winton Parkway	Arena Canal	Collector – Res	2,080	\$1,478	\$153	\$1,631
	Arena Canal	Main Street	Collector - Res	1,200	\$426	\$582	\$1,008
	Main Street	Hammatt Ave	Collector - Res	2,640	\$469	\$1,280	\$1,749
	Hammatt Ave	Dwight Way	Collector – Res	2,640	\$1,059	\$194	\$1,253
Magnolia Avenue	Robin Ave	Winton Parkway	MiA – 4	2,000	\$1,418	\$415	\$1,833
	Winton Parkway	Lincoln Blvd	MiA – 4	3,280	\$2,326	\$681	\$3,007
	Lincoln Blvd	Hammatt Ave	MiA – 4	2,640	\$1,872	\$548	\$2,420
	Hammatt Avenue	Dwight Way	MiA – 4	2,640	\$936	\$1,008	\$1,944
Westside Blvd	Robin Ave	Winton Parkway	MiA – 4	2,640	\$936	\$1,008	\$1,944
	Winton Parkway	Lincoln Blvd	MiA – 4	2,640	\$936	\$1,008	\$1,944
<i>North South Roadways</i>							
Washington Blvd	Vinewood Ave	Flint Ave	Min A – 4	1,320	\$469	\$506	\$975
Robin Avenue	Westside Blvd	Magnolia Ave	Collector – Res	2,640	\$1,876	\$194	\$2,071
	Magnolia Ave	Peach Ave	Collector – Res	2,640	\$1,876	\$194	\$2,071
	Peach Ave	F Street	Collector – Res	2,640	\$1,876	\$194	\$2,071
	F Street	B Street	Collector – Res	1,320	\$697	\$325	\$1,021
	B Street	End of Area 1	Collector - Res	2,640	\$1,876	\$194	\$2,071
Winton Parkway	Westside Blvd	Magnolia Ave	MiA – 4	2,640	\$1,876	\$1,103	\$2,978
	Magnolia Ave	Peach Ave	MiA – 4	2,640	\$1,876	\$1,103	\$2,978
	Peach Avenue	F Street	MiA – 4	2,640	\$1,876	\$1,103	\$2,978
	F Street	B Street	MiA – 4	1,450	\$1,028	\$606	\$1,634
	B Street	Joseph Gallo Dr	MaA – 6	750	\$533	\$256	\$788
	Joseph Gallo Drive	Campbell Ave	Interchange	-	-	\$2,000	\$2,000
Lincoln Blvd	Westside Blvd	Magnolia Ave	MiA – 4	2,640	\$1,872	\$548	\$2,420
	Magnolia Ave	Peach Avenue	MiA - 4	2,640	\$1,872	\$548	\$2,420
Hammatt Ave	Magnolia Ave	Peach Ave	MiA – 4	2,640	\$1,872	\$1,103	\$2,975
	Peach Ave	F Street	MiA – 4	2,640	\$468	\$11,016	\$11,484
	F Street	SB SR 99 ramps	Interchange	-	-	\$2,000	\$2,000
	SB SR 99 ramps	NB SR 99 ramps	Interchange	-	-	-	-
	NB SR 99 ramps	Campbell Ave	Interchange	-	-	-	-
	Campbell Ave	Walnut Ave	MiA – 4	1,000	\$ 208	\$355	\$562
	Walnut Ave	Olive Ave	MiA – 4	3,000	\$2,127	\$1,253	\$3,380
Dwight Way	Magnolia Ave	Peach Ave	Collector-Res	2,640	\$1,878	\$194	\$2,072
	Campbell Ave	Walnut Ave	Collector-Com	3,170	\$2,425	\$477	\$2,903
	Walnut Ave	Olive Ave	Collector-Res	2,640	\$1,878	\$194	\$2,072
Total 10 Year Street Widening					\$65,251	\$45,183	\$110,434

Traffic Signals. Based on projected traffic volumes, the following 19 new traffic signals will likely be warranted within 10 years if development proceeds as assumed. At \$250,000 per signal, the cost of these signals would be \$4,750,000.

**TABLE 20
TRAFFIC SIGNALS WARRANTED IN LIVINGSTON WITHIN 10 YEAR HORIZON**

North-South Street	East-West Street	Status
Gallo Access	Vinewood Avenue	New
Robin Avenue	Vinewood Avenue	New
Winton Parkway	Campbell Ave	New
Winton Parkway	NB Hwy 99 Ramps	New
Winton Parkway	SB Hwy 99 Ramps	New
Winton Parkway	Joseph Gallo Dr	Existing
Winton Parkway	Vinewood/B Street	Pending
Winton Parkway	Flint/F Street	New
Winton Parkway	Park Street	New
Winton Parkway	Peach Avenue	New
Winton Parkway	Magnolia Avenue	New
Livingston/Cressey Road	Walnut Avenue	Existing
Livingston/Cressey Road	Davis Avenue	Existing
Livingston/Cressey Road	Campbell Boulevard	New
Main Street	B Street	New
Main Street	Peach Avenue	New
Lincoln Blvd	Westside Blvd	New
Hammatt Avenue	Walnut Avenue	Existing
Hammatt Avenue	Campbell Boulevard	New
Hammatt Avenue	NB Highway 99	New
Hammatt Avenue	SB Highway 99	New
Hammatt Avenue	F Street	New
Hammatt Avenue	Peach Avenue	New
Campbell Ave	Liberty Avenue	New

Total 10 Year Improvement Costs. Table 21 summarizes the forecast 10 year improvement costs that would be borne by a fee program under the assumptions made herein. As shown total commitments are \$168.8 million. As a comparison, it is possible to estimate the total amount of fees that could be collected from development occurring in the next ten years. Assuming approximately 117,716 daily trips and the “per trip” fee of \$837.88 noted earlier, the fees total \$98.6 million. The identified development also yields 9,098 DUE’s. Assuming the “per DUE” fee of \$11,587.47 then the fees generated could total roughly \$105.4 million. This would suggest that the fee program would have a deficit of \$63.4 to \$70.2 million at the end of the 10 year horizon.

**TABLE 21
SUMMARY OF 10 YEAR PROJECT COSTS**

Improvement Category	Estimated Cost (\$millions)
City Street Improvements	\$45.18
Traffic signals	\$4.75
Subtotal	\$49.93
SR 99 / Winton Parkway Modification (6 lane)	\$55.0
SR 99 / Hammatt Avenue Modification (6 lane)	\$55.0
SR 99 / Hammatt Avenue Interim Modification	\$1.5
SR 99 / Winton Parkway Interim Modification	\$5.0
Subtotal	\$116.50
PSR's & Fee Program Updates	\$2.40
Total Fee Program Costs	\$168.83
Example Allocations	
Total Daily Trips in 10 years	117,716 trips
Fees generated based on trips @ \$837.88 per daily trip	\$98.631 million
Total DUE's in 10 years	9,098 DUE's
Fees generated based on DUE's @ \$11,587.47	\$105.42 million

Ramifications of 10 Year Deficit. The presence of a deficit could have ramifications. As a practical matter, if no adjustments are made the most likely City response would be to delay reimbursements to fronting developers for any the fee program's contribution to improvements they install. Alternatively, the City may elect to delay implementation of selected projects within the 10 year horizon. For example, delaying Hammatt Avenue improvements between F Street and Peach Avenue would move roughly \$11 million out of the short term deficit. Another option would be add a financing cost to the fee program that would develop addition funds within the 10 year period but would be paid back by development occurring in years 10 to 20. This option would increase the overall costs of the program, although the exact nature of the increase is unknown.

APPENDIX

KDA

SAMPLE DWELLING UNIT EQUIVALENTS

EXHIBIT C DUE (Dwelling Unit Equivalent) and Fee Calculations						
Fee Formula: \$/DUE (from Ex. B) x DUE per Unit (from Ex. C) x Units (from project) = fee						
Land Use Category	Unit	P.M. Peak Hour Trip Rate Per Unit	Trip Length (miles)	% New Trips	VMT per Unit	DUE per Unit
*Residential						
Single-family	DU	1.005	5.0	100	5.02	1.00
Multi-family	DU	0.630	5.0	100	3.15	0.63
Mobile Home	DU	0.559	5.0	100	2.80	0.56
Retirement	DU	0.280	5.0	100	1.40	0.28
Hotel/Motel	Room	0.760	6.4	71	3.45	0.69
Medical Office	1,000 s.f.	4.080	5.1	77	16.02	3.19
Office	1,000 s.f.	1.870	5.1	92	8.77	1.75
Retail						
Low						
Mini-storage	1,000 s.f.	0.258	3.1	91	0.72	0.14
Furniture	1,000 s.f.	0.391	3.6	78	1.10	0.22
Lumber yard	1,000 s.f.	3.271	1.7	36	1.99	0.40
Nursery	1,000 s.f.	3.730	1.7	36	2.26	0.45
Hardware	1,000 s.f.	4.867	1.7	36	2.95	0.59
Auto Dealer	1,000 s.f.	2.620	2.4	76	4.77	0.95
Medium						
Neighborhood	1,000 s.f.	6.560	1.8	59	6.93	1.38
Regional center	1,000 s.f.	2.970	3.6	78	8.34	1.66
Supermarket	1,000 s.f.	10.340	1.7	48	8.52	1.69
Factory outlet	1,000 s.f.	3.120	3.6	78	8.76	1.74
Specialty	1,000 s.f.	3.661	3.6	78	10.29	2.05
High						
Restaurant	1,000 s.f.	7.660	2.5	79	15.16	3.02
Convenient market	1,000 s.f.	53.730	1.5	22	17.52	3.49
Discount club	1,000 s.f.	7.790	3.6	78	21.88	4.36
Coffee shop	1,000 s.f.	16.260	1.9	76	23.42	4.66
Fast food	1,000 s.f.	36.530	1.7	49	30.71	6.11
Bank	1,000 s.f.	43.630	1.6	57	39.50	7.86
Gas station	pump	15.180	1.9	20	5.77	1.15
Industrial						
Light Industrial	1,000 s.f.	0.980	5.1	92	4.60	0.92
Heavy Industrial	1,000 s.f.	0.749	5.1	92	3.51	0.70
Warehouse	1,000 s.f.	0.740	5.1	92	3.47	0.69
Hospital	1,000 s.f.	1.050	6.4	77	5.17	1.03
Convalescent Home	1,000 s.f.	0.350	2.8	75	0.73	0.15
Golf Course	hole	3.360	7.1	90	21.47	4.27

*A secondary dwelling with a floor area of 850 square feet or less shall be considered a multi-family residence for the purposes of this Ordinance; a secondary dwelling with a floor area greater than 850 square feet shall be considered a single-family residence for the purposes of this Ordinance.

SimTraffic Performance Report
Baseline 8/1/2007
2030 PM Winton

2: B Street & Winton Parkway N Performance by approach

Approach	EB	WB	NB	SB	All
Delay / Veh (s)	535.4	70.7	134.1	18.6	181.9
Stop Delay (hr)	134.4	8.3	20.9	5.6	169.1
St Del/Veh (s)	481.9	58.6	122.4	12.2	161.4

3: SR 99 NB Ramps & Winton Parkway N Performance by approach

Approach	WB	NB	SB	All
Delay / Veh (s)	232.3	24.3	29.5	96.0
Stop Delay (hr)	57.8	6.5	4.8	69.1
St Del/Veh (s)	195.5	16.2	27.4	79.4

6: SR 99 SB Ramps & Winton Parkway N Performance by approach

Approach	EB	NB	SB	All
Delay / Veh (s)	26.7	29.8	17.1	25.3
Stop Delay (hr)	9.0	10.6	4.1	23.6
St Del/Veh (s)	20.6	22.2	12.5	19.1

9: Gallo & Winton Parkway N Performance by approach

Approach	EB	WB	NB	SB	All
Delay / Veh (s)	264.3	184.3	70.5	20.1	78.3
Stop Delay (hr)	38.5	13.8	18.1	9.0	79.4
St Del/Veh (s)	238.2	180.2	62.7	14.6	69.5

Lanes and Geometrics

2: B Street & Winton Parkway N 10/25/2007

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SEL	SBT	SBR
Lane Configurations	2	2>	0	1	2	1	1	2>	0	1	2	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Storage Length (ft)	500		0	200		150	500		0	200		0
Storage Lanes	2		0	1		1	1		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	0.95	0.95	1.00	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor												
Frt	0.942			0.850		0.850	0.968					0.850
Flt Protected	0.950			0.950		0.950	0.950			0.950		0.950
Satd. Flow (prot)	3335	3239	0	1719	3438	1538	1719	3328	0	1719	3438	1538
Flt Permitted	0.950			0.950		0.950	0.950			0.950		0.950
Satd. Flow (perm)	3335	3239	0	1719	3438	1538	1719	3328	0	1719	3438	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		132				114		30				82
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		5455			5170			5107			467	
Travel Time (s)		106.3			100.7			77.4			7.1	

Volume

2: B Street & Winton Parkway N 10/25/2007

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SEL	SBT	SBR
Volume (vph)	865	235	150	130	290	105	125	390	105	130	1045	710
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)												
Adj. Flow (vph)	940	255	163	141	315	114	136	424	114	141	1136	772
Lane Group Flow (vph)	940	418	0	141	315	114	136	538	0	141	1136	772

Lanes and Geometrics
 3: SR 99 NB Ramps & Winton Parkway N 10/25/2007

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	0	0	0	2	1>	0	2	3	0	0	3	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	-3%			3%			0%			0%		
Storage Length (ft)	0	0	0	300	0	0	500	0	0	0	0	300
Storage Lanes	0	0	0	2	0	0	2	0	0	0	0	1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)				50	50		50	50		50	50	50
Trailing Detector (ft)				0	0		0	0		0	0	0
Turning Speed (mph)	15	9	9	15	0	9	15	0	9	15	0	9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor					0.850							0.850
Flt Protected				0.950			0.950					0.850
Satd. Flow (prot)	0	0	0	3285	1515	0	3335	4940	0	0	4940	1538
Flt Permitted				0.950			0.950					1538
Satd. Flow (perm)	0	0	0	3285	1515	0	3335	4940	0	0	4940	1538
Right Turn on Red			Yes		Yes			Yes				Yes
Satd. Flow (RTOR)				156	156			45			45	549
Headway Factor	0.98	0.98	0.98	1.02	1.02	1.02	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30	30	30	30	30	30	45	45	45	45	45	45
Link Distance (ft)	1050	1050	1050	2368	2368	2368	670	670	670	670	670	537
Travel Time (s)	23.9	23.9	23.9	53.8	53.8	53.8	10.2	10.2	10.2	10.2	10.2	8.1

Volume
 3: SR 99 NE Ramps & Winton Parkway N 10/25/2007

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph)	0	0	0	1170	0	5	1060	730	0	0	140	505
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	0	0	0	1272	0	5	1152	793	0	0	152	549
Lane Group Flow (vph)	0	0	0	1272	5	0	1152	793	0	0	152	549

Lanes and Geometrics

6: SR 99 SB Ramps & Winton Parkway N 10/25/2007

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	<1	2	0	0	0	0	3	1	1	3	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	3%	3%		-3%			3%			0%		
Storage Length (ft)	300		300	0		0	0		300	300		0
Storage Lanes	1		1	0		0	0		1	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50				50	50	50	50	50	
Trailing Detector (ft)	0	0	0				0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.95	0.95	0.88	1.00	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor			0.850						0.850			
Flt Protected	0.950	0.950								0.950		
Satd. Flow (prot)	1609	1609	2666	0	0	0	0	4866	1515	1719	4940	0
Flt Permitted	0.950	0.950								0.950		
Satd. Flow (perm)	1609	1609	2666	0	0	0	0	4866	1515	1719	4940	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			10						1038			
Headway Factor	1.02	1.02	1.02	0.98	0.98	0.98	1.02	1.02	1.02	1.00	1.00	1.00
Link Speed (mph)	30	30		30			45			45		
Link Distance (ft)	592	592		1302			456			670		
Travel Time (s)	13.5	13.5		29.6			6.9			10.2		

Volume

6: SR 99 SB Ramps & Winton Parkway N 10/25/2007

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph)	615	0	1295	0	0	0	0	1170	955	5	1305	0
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)							0%					0%
Adj. Flow (vph)	668	0	1408	0	0	0	0	1272	1038	5	1418	0
Lane Group Flow (vph)	334	334	1408	0	0	0	0	1272	1038	5	1418	0

Lanes and Geometrics
 9: Gallo & Winton Parkway N

10/25/2007

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	2	1>	0	0	<1	1	1	3>	0	1	3>	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%	0%	0	0	0%	0	0%	0%	0	-3%	-3%	0
Storage Length (ft)	300		0	0		300	300		200	300		0
Storage Lanes	2		0	0		1	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	1.00	0.91	0.91
Ped Bike Factor												
Frnt		0.859				0.850		0.999			0.970	
Flt Protected	0.950				0.967		0.950			0.950		
Satd. Flow (prot)	3335	1554	0	0	1750	1538	1719	4935	0	1745	4864	0
Flt Permitted	0.950				0.967		0.950			0.950		
Satd. Flow (perm)	3335	1554	0	0	1750	1538	1719	4935	0	1745	4864	0
Right Turn on Red			Yes			Yes		Yes	Yes			Yes
Satd. Flow (RTOR)	82				5			77				
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.98	0.98
Link Speed (mph)	25				25			45		45		
Link Distance (ft)	4447				1286			388		456		
Travel Time (s)	121.3				35.1			5.9		6.9		

Volume
 9: Gallo & Winton Parkway N

10/25/2007

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph)	550	5	75	10	5	285	65	1295	5	345	1805	450
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)	0%				0%			0%			0%	
Adj. Flow (vph)	598	5	82	11	5	310	71	1408	5	375	1962	489
Lane Group Flow (vph)	598	87	0	0	16	310	71	1413	0	375	2451	0

Lanes and Geometrics

12: Campbell Blvd & Winton Parkway N 10/25/2007

	WBL	WBT	WBR	SEL	SET	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Group	1		1>	<1		1	1	1	2	1	1>	0
Lane Configurations												
Ideal Flow (vphpl)	1900		1900	1900		1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12		12	12		12	12	12	12	12	12	12
Grade (%)	0%			0%				0%			0%	
Storage Length (ft)	300		0	300		0	300		0	0		0
Storage Lanes	1		0	0		1	1		0	1		0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00		1.00	1.00		1.00	1.00		0.88	1.00		1.00
Ped Bike Factor												
Frnt												
Flt Protected												
Satd. Flow (prot)	1810		1810	1810		1810	1810		3185	1810		1810
Flt Permitted												
Satd. Flow (perm)	1810		1810	1810		1810	1810		3185	1810		1810
Headway Factor	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Link Speed (mph)	35			35					45			45
Link Distance (ft)	2616			2126					537			2688
Travel Time (s)	51.0			41.4					8.1			40.7

Volume

12: Campbell Blvd & Winton Parkway N 10/25/2007

	WBL	WBT	WBR	SEL	SET	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Group	0		0	0		0	0	115	0	0	160	0
Volume (vph)												
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92		0.92	0.92		0.92	0.92		0.92	0.92		0.92
Growth Factor	100%		100%	100%		100%	100%		100%	100%		100%
Heavy Vehicles (%)	5%		5%	5%		5%	5%		5%	5%		5%
Bus Blockages (#/hr)	0		0	0		0	0		0	0		0
Parking (#/hr)												
Mid-Block Traffic (%)	0%			0%					0%			0%
Adj. Flow (vph)	0		0	0		0	0		125	0		174
Lane Group Flow (vph)	0		0	0		0	0		125	0		174

SimTraffic Performance Report
Baseline 7/31/2007

3: F St & Hammatt Ave Performance by approach

Approach	EB	WB	NB	SB	All
Delay / Veh (s)	57.8	22.2	37.2	24.2	31.4
Stop Delay (hr)	4.9	2.3	5.1	7.4	19.7
St Del/Veh (s)	47.2	18.8	26.1	19.2	24.4

6: SB 99 Ramps & Hammatt Ave Performance by approach

Approach	EB	NB	SB	All
Delay / Veh (s)	43.5	26.8	12.3	26.8
Stop Delay (hr)	9.2	8.0	2.5	19.7
St Del/Veh (s)	25.3	21.5	6.0	17.1

9: SR 99 NB Ramps & Hammatt Ave Performance by approach

Approach	NB	SB	NW	All
Delay / Veh (s)	11.6	9.8	23.4	13.8
Stop Delay (hr)	2.6	2.1	5.9	10.6
St Del/Veh (s)	5.3	4.5	18.4	8.2

12: Campbell Blvd & Hammatt Ave Performance by approach

Approach	EB	WB	NB	SB	All
Delay / Veh (s)	28.7	105.7	19.3	31.7	52.1
Stop Delay (hr)	3.9	33.3	8.1	2.8	48.1
St Del/Veh (s)	22.9	71.3	14.2	24.3	36.3

Lanes and Geometrics
 3: F St & Hammatt Ave

10/25/2007

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	1>	0	1	1	1	1	2>	0	2	2>	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%	0%	0	0%	0%	0	0%	0%	0%	0%	0%	0
Storage Length (ft)	300	0	0	300	300	300	300	0	0	300	0	0
Storage Lanes	1	0	0	1	1	1	1	0	0	2	0	0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turning Speed (mph)	15	9	9	15	9	9	15	9	9	15	9	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.97	0.95	0.95
Ped Bike Factor												
Flt Protected	0.950	0.978		0.950		0.850		0.998			0.943	
Satd. Flow (prot)	1719	1770	0	1719	1810	1538	1719	3431	0	3335	3242	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1719	1770	0	1719	1810	1538	1719	3431	0	3335	3242	0
Right Turn on Red		Yes	Yes			Yes		Yes	Yes			Yes
Satd. Flow (RTOR)		11				386		2			177	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			45			45	
Link Distance (ft)		3232			1156			3751			429	
Travel Time (s)		63.0			22.5			56.8			6.5	

Volume

10/25/2007

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph)	300	60	10	10	75	355	10	675	10	435	600	365
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	326	65	11	11	82	386	11	734	11	473	652	397
Lane Group Flow (vph)	326	76	0	11	82	386	11	745	0	473	1049	0

Lanes and Geometrics
6: SB 99 Ramps & Hammatt Ave

10/25/2007

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	1	<1	1	0	0	0	0	3	1	2	3	0
Lane Configurations	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	12	12	12	12	12	12	12	12	12	12	12	12
Lane Width (ft)	3%	3%	3%	-3%	-3%	-3%	0%	0%	0%	0%	0%	0%
Storage Length (ft)	300	300	300	0	0	0	0	0	300	450	0	0
Storage Lanes	1	1	1	0	0	0	0	1	1	1	0	0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turning Speed (mph)	15	9	9	15	9	9	15	9	9	15	9	9
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.91	1.00	0.97	0.91	1.00
Ped Bike Factor			0.850						0.850			
Flt Protected	0.950	0.950								0.950		
Satd. Flow (prot)	1609	1609	1515	0	0	0	0	4940	1538	3335	4940	0
Flt Permitted	0.950	0.950								0.950		
Satd. Flow (perm)	1609	1609	1515	0	0	0	0	4940	1538	3335	4940	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			81						435			
Headway Factor	1.02	1.02	1.02	0.98	0.98	0.98	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30	30	30	30	30	30	45	45	45	45	45	45
Link Distance (ft)	2847	2847	2847	1479	1479	1479	333	333	333	543	543	543
Travel Time (s)	64.7	64.7	64.7	33.6	33.6	33.6	5.0	5.0	5.0	8.2	8.2	8.2

Volume

6: SB 99 Ramps & Hammatt Ave 10/25/2007

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	835	0	455	0	0	0	0	930	400	555	945	0
Volume (vph)												
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Adj. Flow (vph)	908	0	495	0	0	0	0	1011	435	603	1027	0
Lane Group Flow (vph)	454	454	495	0	0	0	0	1011	435	603	1027	0

Lanes and Geometrics

9: SR 99 NB Ramps & Hammatt Ave 10/25/2007

	EBL	EBT	EBR	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWT	NWR
Lane Group	0		0	2	3	0	0	4	1	1	<1>		1
Lane Configurations	1900		1900	1900	1900	1900	1900	1900	1900	1900	1900		1900
Ideal Flow (vphpl)	12		12	12	12	12	12	12	12	12	12		12
Lane Width (ft)	-3%		0	0	0%	0	0	0%	0	0	3%		0
Grade (%)	0		0	300		0	0		300	600			0
Storage Length (ft)	0		0	2		0	0		1	1			1
Storage Lanes	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0
Total Lost Time (s)				50	50	50	50	50	50	50	50		50
Leading Detector (ft)				0	0	0	0	0	0	0	0		0
Trailing Detector (ft)	15		9	15	9	9	15	9	9	15	15		9
Turning Speed (mph)	1.00		1.00	0.97	0.91	1.00	1.00	0.86	1.00	0.95	0.95		0.95
Lane Util. Factor													
Ped Bike Factor													
Frt													
Flt Protected				0.950		0.850				0.889			0.850
Satd. Flow (prot)	0		0	3335	4940	0	0	6225	1538	1609	1486		1439
Flt Permitted				0.950						0.950	0.987		
Satd. Flow (perm)	0		0	3335	4940	0	0	6225	1538	1609	1486		1439
Right Turn on Red						Yes			Yes				Yes
Satd. Flow (RTOR)									748		29		29
Headway Factor	0.98		0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.02	1.02		1.02
Link Speed (mph)	30			45	45			45		30			
Link Distance (ft)	919			543	543			453		931			
Travel Time (s)	20.9			8.2	8.2			6.9		21.2			

Volume

9: SR 99 NB Ramps & Hammatt Ave 10/25/2007

	EBL	EBT	EBR	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWT	NWR
Lane Group	0		0	375	1390	0	0	1010	695	490	0		680
Volume (vph)													
Confl. Peds. (#/hr)													
Confl. Bikes (#/hr)													
Peak Hour Factor	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		0.92
Growth Factor	100%		100%	100%	100%	100%	100%	100%	100%	100%	100%		100%
Heavy Vehicles (%)	5%		5%	5%	5%	5%	5%	5%	5%	5%	5%		5%
Bus Blockages (#/hr)	0		0	0	0	0	0	0	0	0	0		0
Parking (#/hr)													
Mid-Block Traffic (%)	0%		0%	0%	0%	0%	0%	0%	0%	0%	0%		0%
Adj. Flow (vph)	0		0	408	1511	0	0	1098	755	533	0		739
Lane Group Flow (vph)	0		0	408	1511	0	0	1098	755	414	463		395

Lanes and Geometrics

12: Campbell Blvd & Hammatt Ave 10/25/2007

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	1	2	1	3	2>	0	1	2	2	1	2>	0
Lane Configurations	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	12	12	12	12	12	12	12	12	12	12	12	12
Lane Width (ft)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Grade (%)	300		300	500		0	300		300	300		0
Storage Length (ft)	1		1	3		0	1		1	1		0
Storage Lanes	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost Time (s)	50	50	50	50	50	50	50	50	50	50	50	50
Leading Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Trailing Detector (ft)	15		9	15		9	15		9	15		9
Turning Speed (mph)	1.00	0.95	1.00	0.94	0.95	0.95	1.00	0.95	0.88	1.00	0.95	0.95
Lane Util. Factor												
Ped Bike Factor			0.850		0.989				0.850		0.996	
Flt Protected	0.950		0.950		0.950		0.950		0.950		0.950	
Satd. Flow (prot)	1719	3438	1538	4848	3400	0	1719	3438	2707	1719	3424	0
Flt Permitted	0.950		0.950		0.950		0.950		0.950		0.950	
Satd. Flow (perm)	1719	3438	1538	4848	3400	0	1719	3438	2707	1719	3424	0
Right Turn on Red			Yes		Yes				Yes		Yes	
Satd. Flow (RTOR)	1.00	1.00	212	1.00	12	1.00	1.00	1.00	284	1.00	3	1.00
Headway Factor			1.00		1.00		1.00		1.00		1.00	
Link Speed (mph)	35		35		35		45		45		45	
Link Distance (ft)	2336		2336		3337		453		3518		3518	
Travel Time (s)	45.5		45.5		65.0		6.9		53.3		53.3	

Volume

12: Campbell Blvd & Hammatt Ave 10/25/2007

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	10	400	195	1145	490	40	235	900	935	30	370	10
Volume (vph)	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Confl. Peds. (#/hr)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Confl. Bikes (#/hr)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Peak Hour Factor	0	0	0	0	0	0	0	0	0	0	0	0
Growth Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Bus Blockages (#/hr)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Parking (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Mid-Block Traffic (%)												
Adj. Flow (vph)	11	435	212	1245	533	43	255	978	1016	33	402	11
Lane Group Flow (vph)	11	435	212	1245	576	0	255	978	1016	33	413	0

SimTraffic Performance Report
Baseline 7/31/2007
2030 PM Liberty

1: Liberty Ave & Cambell Blvd Performance by approach

Approach	EB	WB	NB	SB	All
Delay / Veh (s)	36.4	34.7	47.5	102.6	54.8
Stop Delay (hr)	14.6	4.6	10.7	29.0	59.0
St Del/Veh (s)	25.5	27.7	36.0	86.5	43.0

10: SR 99 NB & Liberty Ave Performance by approach

Approach	NW	NE	SW	All
Delay / Veh (s)	44.1	23.7	30.1	30.6
Stop Delay (hr)	10.1	8.6	11.1	29.9
St Del/Veh (s)	28.7	13.1	22.6	19.8

12: SR 99 SB & Liberty Ave Performance by approach

Approach	EB	NE	SW	All
Delay / Veh (s)	41.3	50.4	11.2	35.0
Stop Delay (hr)	10.0	21.8	3.7	35.5
St Del/Veh (s)	24.4	31.1	6.7	21.3

Lanes and Geometrics
 10: SR 99 NB & Liberty Ave 10/25/2007

	EBL	EBT	EBR	NWL2	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Group	0		0	1	<1		2	2	4	0	0	4	1
Lane Configurations	1900		1900	1900	1900		1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	12		12	12	12		12	12	12	12	12	12	12
Lane Width (ft)	0%		0%	0%	0%		0%	0%	0%	0%	0%	0%	0%
Storage Length (ft)	0		0	500	500		500	400	0	0	0	0	500
Storage Lanes	0		0	1	1		2	2	0	0	0	0	1
Total Lost Time (s)	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)			50	50	50		50	50	50	50	50	50	50
Trailing Detector (ft)			0	0	0		0	0	0	0	0	0	0
Turning Speed (mph)	15		9	15	15		9	15	9	9	15	15	9
Lane Util. Factor	1.00		1.00	0.95	0.95		0.88	0.97	0.86	1.00	1.00	0.86	1.00
Ped Bike Factor							0.850						0.850
Flt Protected				0.950	0.950			0.950					
Satd. Flow (prot)	0		0	1633	1633		2707	3433	6225	0	0	6225	1583
Flt Permitted				0.950	0.950			0.950					
Satd. Flow (perm)	0		0	1633	1633		2707	3433	6225	0	0	6225	1583
Right Turn on Red							Yes		Yes				Yes
Satd. Flow (RTOR)							34						610
Headway Factor	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	35		35	35	35		45	45	45	45	45	45	45
Link Distance (ft)	1318		1318	3129	3129		864	864	864	864	1495	1495	1495
Travel Time (s)	25.7		25.7	61.0	61.0		13.1	13.1	13.1	13.1	22.7	22.7	22.7

Volume
 10: SR 99 NB & Liberty Ave 10/25/2007

	EBL	EBT	EBR	NWL2	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Group	0		0	825	0		415	745	1585	0	0	1225	615
Volume (vph)	0.92		0.92	0.92	0.92		0.92	0.92	0.92	0.92	0.92	0.92	0.92
Confl. Peds. (#/hr)	100%		100%	100%	100%		100%	100%	100%	100%	100%	100%	100%
Confl. Bikes (#/hr)	2%		2%	2%	2%		5%	2%	5%	2%	5%	2%	2%
Peak Hour Factor	0		0	0	0		0	0	0	0	0	0	0
Growth Factor	0		0	0	0		0	0	0	0	0	0	0
Heavy Vehicles (%)	0%		0%	0%	0%		0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0		0	897	0		451	810	1723	0	0	1332	668
Parking (#/hr)	0		0	449	448		451	810	1723	0	0	1332	668
Mid-Block Traffic (%)	0		0	0	0		0	0	0	0	0	0	0
Adj. Flow (vph)	0		0	0	0		0	0	0	0	0	0	0
Lane Group Flow (vph)	0		0	0	0		0	0	0	0	0	0	0

