Circulation Master Plan

and

Roadway Impact Fee Program Update

Prepared for:
City of Winters

November 2018

RS16-3469

FEHR & PEERS

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DOCUMENT ORGANIZATION

This document contains the following chapters:

- Chapter 1, an introduction of the document.
- Chapter 2, a discussion of existing roadway conditions in the City of Winters.
- Chapter 3, a discussion of the travel demand forecasting process, including the update to the City of Winters travel demand model.
- Chapter 4, a discussion of future roadway conditions and necessary roadway improvement projects under General Plan buildout conditions.
- Chapter 5, a description of the methodology for updating the City's roadway impact fee program.

1. INTRODUCTION

The City of Winters *General Plan* details a future vision for citywide residential and economic development throughout the City of Winters. At buildout, the *General Plan* includes provisions for approximately 14,200 residents, a near doubling of the current City population. Most residential growth is planned to occur in the northern portion of the City, while commercial and industrial land use growth areas are concentrated around the Grant Avenue corridor near the Interstate 505 (I-505) interchange.

The continued development of the City would require an expanded circulation system in order to adequately serve the growing mobility needs of the community. Therefore, the primary purpose of the City of Winters *Circulation Master Plan* is to identify the roadway improvements necessary to ensure the on-going functionality of the citywide circulation system as the City continues to develop.

This document serves as an update to the *Circulation Master Plan* originally developed in 1992. Since the original plan's adoption, Winters has added more than 2,500 residents and undergone multiple revisions to the City's future land use plan. Moreover, the incremental development of the citywide circulation system has resulted in a road network that partially deviates from that outlined in the original plan. This *Circulation Master Plan* update provides an opportunity to enhance the City's original network framework in response to the demographic and transportation system changes that have transpired over the past 25 years.

Data Collection

In order to understand current operations of the local roadway system, peak hour intersection traffic counts and daily roadway segment counts were collected throughout the City of Winters in Fall 2016.

Intersections

Fehr & Peers conducted morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM) peak period traffic counts in October 2016 at nine major intersections. Weather conditions during the traffic counts were dry and sunny.

1. Grant Avenue / Valley Oak Drive
2. Grant Avenue / Main Street
3. Railroad Avenue / Niemann Street
4. Grant Avenue / Railroad Avenue
5. Railroad Avenue / Main Street
6. Grant Avenue / East Main Street
7. Grant Avenue / CR-90 (Matsumoto Lane)
8. Grant Avenue / I-505 SB Ramps
9. Grant Avenue / I-505 NB Ramps

Figure 1

Existing Roadway Facilities

Roadway Segments

Daily traffic volume counts were also conducted in October 2016 for a two-day (48-hour) period at the following 12 roadway segments:

1. Grant Avenue west of Valley Oak Drive
2. Valley Oak Drive north of Grant Avenue
3. Main Street south of Grant Avenue
4. Main Street north of Grant Avenue
5. Niemann Street west of Railroad Avenue
6. Railroad Avenue north of Niemann Street
7. Grant Avenue west of 1st Street
8. Railroad Avenue north of Grant Avenue
9. Railroad Avenue north of Putah Creek Road
10. Grant Avenue west of East Main Street
11. East Main Street south of Grant Avenue
12. Grant Avenue east of East Main Street

Methodology

This study analyzes traffic operating conditions using level of service (LOS) as the primary measure of operational performance. Motorized vehicle LOS is a qualitative measure of traffic flow from the perspective of motorists and are an indication of the comfort and convenience associated with driving. Typical factors that affect motorized vehicle LOS include speed, travel time, traffic interruptions, and freedom to maneuver. Empirical LOS criteria and methods of calculation have been documented in the *Highway Capacity Manual* (HCM) published by the Transportation Research Board of the National Academies of Science (Transportation Research Board, 2010). The HCM defines six levels of service ranging from LOS A (representing free-flow vehicular traffic conditions with little to no congestion) to LOS F (oversaturated conditions where traffic demand exceeds capacity resulting in long queues and delays). The LOS definitions and calculations contained in the HCM are the prevailing measurement standard used throughout the United States and are used in this study. Motorized vehicle LOS definitions for signalized intersections, unsignalized intersections, and roadway segments are discussed below.

Signalized Intersection Analysis

The LOS at signalized intersections is based on the average control delay (i.e., delay resulting from initial deceleration, queue move-up time, time stopped on an intersection approach, and final acceleration) experienced per vehicle traveling through the intersection. **Table 1** describes the delay range for each LOS category for signalized intersections as presented in Chapter 18 of the HCM 2010.

Table 1:
Level of Service Criteria – Signalized Intersections

Level of Service	Description	Average Control Delay[1]
A	Volume-to-capacity ratio is low and either progression is exceptionally favorable or cycle length is very short. Most vehicles arrive during the green phase and travel through the intersection without stopping.	≤ 10
B	Volume-to-capacity ratio is low and either progression is highly favorable or the cycle length is short. More vehicles stop than with LOS A.	>10 to 20
C	Progression is favorable or the cycle length is moderate. Individual cycle failures (i.e., one or more queued vehicles are not able to depart as a result of insufficient capacity during the cycle) may begin to appear at this level. The number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.	>20 to 35
D	Volume-to-capacity ratio is high and either progression is ineffective or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.	>35 to 55
E	Volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.	>55 to 80
F	Volume-to-capacity ratio is very high, progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.	>80

Notes: [1]Average control delay presented in seconds per vehicle. Delay values are rounded to the nearest second and evaluated for LOS based on the above thresholds (i.e., 10 seconds per vehicle = LOS A)
Source: *Highway Capacity Manual 2010*, Transportation Research Board, 2010.

Unsignalized Intersection Analysis

Similar to signalized intersections, the HCM 2010 methodology for unsignalized intersections reports the LOS based on the control delay experienced by motorists traveling through the intersection. **Table 2** presents the LOS criteria for unsignalized intersections per Chapter 19 and Chapter 20 of the HCM 2010.

Table 2:
Level of Service Criteria – Unsignalized Intersections

Level of Service	Control Delay[1]
A	≤ 10
B	>10 to 15
C	>15 to 25
D	>25 to 35
E	>35 to 50
F	>50

Notes: [1]Control delay presented in seconds per vehicle. Delay values are rounded to the nearest second and evaluated for LOS based on the above thresholds (i.e., 10 seconds per vehicle = LOS A)
Source: *Highway Capacity Manual 2010*, Transportation Research Board, 2010.

As shown in Table 2, the LOS criteria for unsignalized intersections are slightly different from signalized intersections. The HCM anticipates that motorists expect signalized intersections to carry higher traffic volume that result in greater delay than an unsignalized intersection. Unsignalized intersections are associated with more uncertainty as delays are less predictable, which can reduce users' delay tolerance.

As described in Chapter 20 of the HCM 2010, the LOS for all-way stop controlled intersections is based on the average control delay for the entire intersection.

For side-street stop-controlled intersections, the LOS is determined separately for each minor-street movement (or shared movement) as well as major-street left turn movements, per Chapter 19 of the HCM 2010.

Roadway Segment Analysis

Roadway segments were analyzed by comparing PM peak hour (two-way total) traffic volumes to roadway capacities for different roadway classifications. These roadway capacities were developed using the Highway Capacity Software (HCS) 2000 (Patch E), which applies the HCM 2000 methodologies.

Citywide, the PM peak hour experiences the highest hourly volume during a typical weekday, and therefore represents a 'worst-case' scenario for the purposes of this analysis. This peak hour volume is used to design future roadways because of its regular weekday occurrence. Using a higher or lower volume hour could lead to inadequate designs or designs that are underused.

Table 3 summarizes the peak hour roadway segment capacities by functional classification for two- and four-lane roadways.

Table 3:
Level of Service Criteria – Roadway Segments

Type	Lanes	Separation	Peak Hour Roadway Capacity				
			LOS A	LOS B	LOS C	LOS D	LOS E
Arterial	4	Raised	-	-	1,000	3,470	3,730
		TWLTL	-	-	940	3,290	3,550
		Undivided	-	-	770	2,740	2,980
	2	Raised	-	-	440	1,640	1,860
		TWLTL	-	-	420	1,550	1,760
		Undivided	-	-	340	1,270	1,480
Collector	4	TWLTL	-	-	940	3,290	3,550
		Undivided	-	-	770	2,740	2,980
	2	TWLTL	-	-	420	1,550	1,760
		Undivided	-	-	340	1,270	1,480

Source: Fehr & Peers and *Highway Capacity Manual 2000*, Transportation Research Board, 2000.

It should be noted that this methodology used to analyze the roadway system is a simple comparison of vehicle throughput and roadway capacity and does not account for potential operational improvements resulting from traffic control at intersections. As such, roadway segment LOS is often reported as being worse than adjacent intersection LOS where traffic signals, roundabouts, and other traffic control devices facilitate vehicular movement. Therefore, at locations where both roadway segment LOS and intersection LOS analyses are conducted, intersection LOS supersedes roadway segment LOS, as it more accurately portrays actual roadway operating conditions.

Signal Warrants

The study analyzes peak hour signal warrants at unsignalized intersections using the *California Manual on Uniform Traffic Control Devices* (MUTCD) peak hour warrant criteria (California State Transportation Agency, 2017).

The peak hour signal warrant is one of nine warrants included in the MUTCD to determine whether the installation of a traffic signal is appropriate at a particular location. As stated in the MUTCD, the satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal. For purposes of this study, the peak hour signal warrant is used as an indicator of whether peak hour traffic conditions may warrant a signal. However, a full engineering study of traffic conditions, pedestrian characteristics, and physical characteristics of a specific intersection would be necessary to fully determine if a traffic signal is an appropriate traffic control option.

Level of Service Standards

City of Winters

Existing LOS Policy

The City of Winters *General Plan* (City of Winters, 1992) establishes LOS standards for City-owned roadway facilities. Currently, two policies address LOS standards in the City:

Policy III.A.1. The City shall endeavor to maintain a Level of Service "C" or better, as defined by the *1985 Highway Capacity Manual* or subsequent revisions, on all streets and intersections within the City.

Policy III.A.8. The City shall comply with and implement the programs and policies of the Yolo County *Congestion Management Plan* (CMP).

According to these policies, currently, LOS C is identified as the acceptable service level throughout the City, except at intersections located along Grant Avenue (SR-128) where LOS D conditions are acceptable as specified in the Yolo County CMP.

Recommended LOS Policy

The City of Winters Circulation Master Plan provides an opportunity to update and refine the future roadway network vision and desired level of operation consistent with the City's current mobility and livability goals. Given this opportunity, the City determined that a review of the current LOS policy is warranted in order to determine if LOS C is still appropriate for planning purposes.

Several factors were considered in this review:

- The boundary between LOS E and LOS F represents full utilization of peak hour roadway capacity. Setting a peak hour threshold of LOS C means that the network will not be fully utilized during the peak hour and other hours of the day will operate well below capacity.
- Maintaining LOS C conditions may create the need to expand the roadway network or to allocate more green time at signals for drivers. Either modification to the network could crate conflicts with bicyclists and pedestrians by creating longer crossing distances or wait times at intersections.
- LOS C will generally require a larger roadway network footprint than allowing LOS D, E, or E/F conditions. A larger network footprint creates higher costs for roadway operations and maintenance.

Based on this review, the following modifications (in *italics*) to Policy III.A.1. are recommended to identify future roadway facility needs on the City circulation network.

Policy III.A.1. The City shall endeavor to maintain a Level of Service *"D"* or better, as defined by the *Highway Capacity Manual 2010* or subsequent revisions, on all streets and intersections within the City.

Caltrans

Caltrans' *Draft Transportation Corridor Concept Report State Route 128* (Caltrans, June 2017) identifies future roadway improvements and LOS targets for SR-128 over a 20-year planning horizon. For SR-128 within the limits of the City of Winters, the 20-Year Future LOS is specified as LOS E and the 20-Year Concept LOS is specified as LOS D.

Circulation Master Plan LOS Criteria

Based on the LOS thresholds identified above, operational deficiencies for the purposes of the *Circulation Master Plan* are identified under the following conditions:

- On City of Winters roadway facilities:
  - For signalized and all-way stop-controlled intersections, locations with peak hour intersection operations of LOS E or worse.
  - For side-street stop-controlled intersections, locations where the worst-case movement (or shared movement) operates at LOS E or worse and that meet the California Manual on Uniform Traffic Control Devices (CAMUTCD) peak hour signal warrant.
  - For roadway segments, locations with peak hour roadway segment operations of LOS E or worse (except where superseded by intersection LOS).

- On Grant Avenue (SR-128):
  - For signalized and all-way stop-controlled intersections, locations with peak hour intersection operations of LOS E or worse.
  - For side-street stop-controlled intersections, locations where the worst-case movement (or shared movement) operates at LOS E or worse and that meet the California Manual on Uniform Traffic Control Devices (CAMUTCD) peak hour signal warrant.
  - For roadway segments, locations with peak hour roadway segment operations of LOS E or worse (except where superseded by intersection LOS).

2. EXISTING CONDITIONS

This chapter describes the existing traffic conditions in Winters.

Roadway Network

Figure 1 illustrates the existing roadway network serving the City of Winters. Primary roadways serving the City include Interstate 505 (I-505), State Route 128 (SR-128), and Railroad Avenue.

Regional Roadways

I-505 is a four-lane divided freeway running north-south between Vacaville and Dunnigan. I-505 is the primary regional route serving Winters, with local access available via Grant Avenue and Putah Creek Road. According to Caltrans average daily traffic (ADT) data from 2015, I-505 carries approximately 23,000 daily trips within the vicinity of the Grant Avenue interchange.

SR-128 is a two-lane arterial running east-west through Winters. Within the City of Winters, SR-128 is referred to as Grant Avenue. SR-128 transitions into Russell Boulevard as it runs east of Winters towards Davis. West of Winters, SR-128 travels past Lake Berryessa and eventually into the Napa Valley. SR-128 is owned, operated, and maintained by Caltrans.

Local Roadways

Grant Avenue is the major east-west roadway through the City. Local motorists utilize Grant Avenue as the primary route to I-505, as well as Davis and other regional destinations along the I-80 corridor. Grant Avenue serves as a major route for local and regional motorists traveling west to Lake Berryessa. Through trips generated by regional recreational travelers result in heightened traffic volumes during the peak summer months.

Railroad Avenue is the primary north-south roadway through the City. This two-lane arterial bisects the City, beginning at the Solano County line, crossing Putah Creek, and traveling north through Winters towards Esparto. Local motorists utilize Railroad Avenue for access to the downtown Winters business district.

Main Street is a two-lane collector utilized for local access to downtown Winters and the adjacent residential neighborhoods. Currently a 'half-loop' through the southern portion of the City, Main Street has long been planned to provide a complete loop through Winters.

Niemann Street and **Anderson Avenue** are two-lane east-west collectors located in the northern portion of the City, providing local motorists with access to Winters Middle School and Shirley Rominger Intermediate School. **Valley Oak Drive, Taylor Street, Hemenway Street, Dutton Street**, and **Walnut Lane** are north-south roadways connecting residential neighborhoods to Grant Avenue. **Matsumoto Lane**, or **County Road 90 (CR-90)**, is north-south collector beginning at Grant Avenue and traveling north as a frontage road along the west side of I-505. Matsumoto Lane is the primary access route for highway commercial uses concentrated near the I-505 / Grant Avenue interchange.

Existing Roadway Operations

This section describes the existing operations of roadway facilities within the City.

Average Daily Traffic

Figure 2 illustrates existing average daily traffic volumes (two-way total) for roadways within Winters. Currently, Grant Avenue is the most heavily utilized roadway within the City, carrying approximately 13,800 daily vehicles near the City's eastern limits. Daily vehicle trips decrease substantially on Grant Avenue towards the west, with 7,780 and 3,030 daily vehicles traveling on Grant Avenue west of Railroad Avenue and west of Valley Oak Drive, respectively.

Daily vehicles on Railroad Avenue increase from 1,650 daily vehicles near the City's northern limits to 5,690 daily vehicles south of Grant Avenue.

Elsewhere within the City, average daily traffic volumes generally measure fewer than 3,000 vehicles

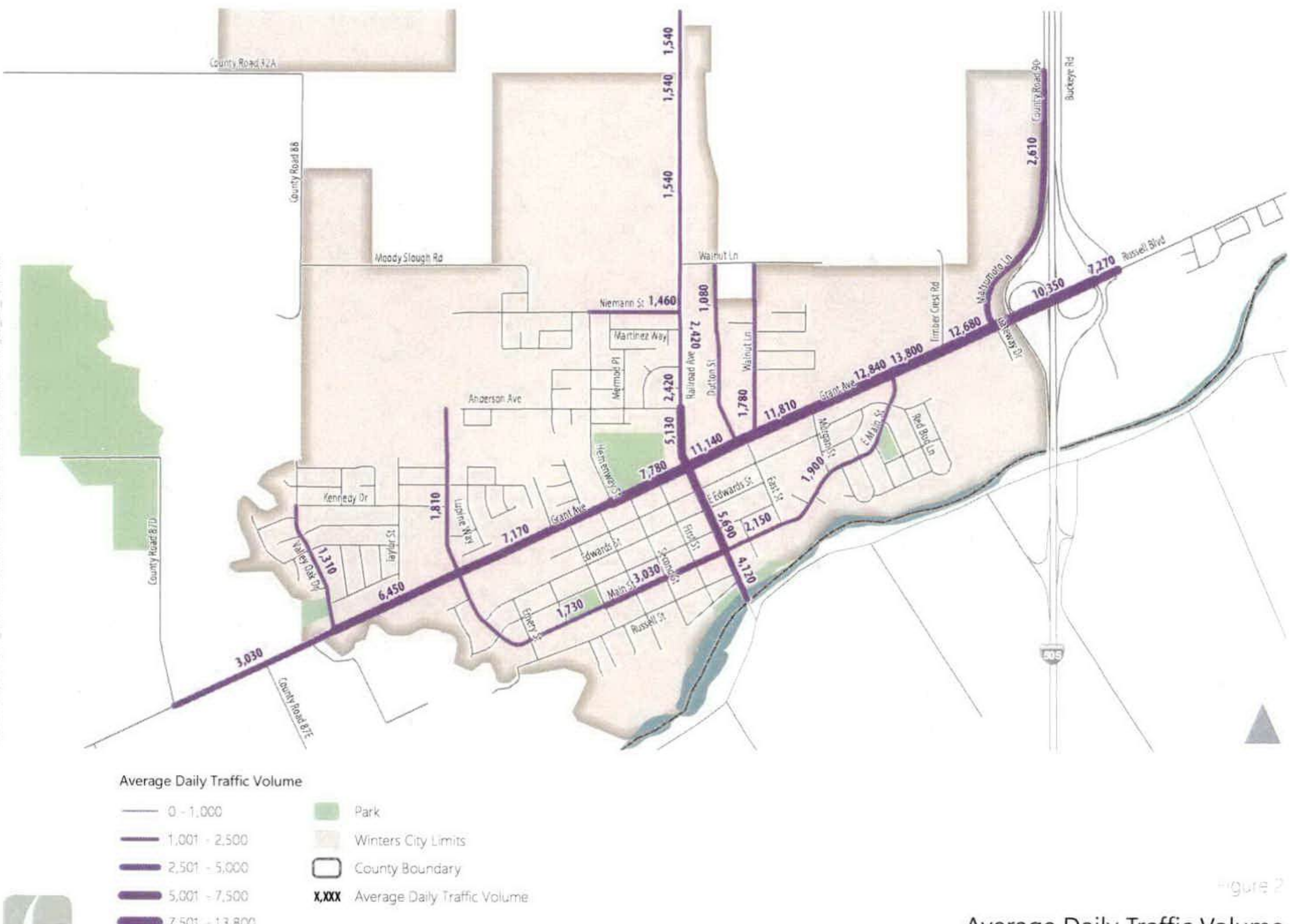


Figure 2

Average Daily Traffic Volume
Existing Conditions

Level of Service

Table 4 summarizes the existing AM and PM peak hour LOS results for the nine study intersections. All study intersections currently operate acceptably based on their respective LOS standards.

Table 4: Existing Level of Service – Study Intersections

Intersection	Control Type	AM Peak Hour		PM Peak Hour	
		LOS	Delay (sec)	LOS	Delay (sec)
Grant Ave. / Valley Oak Dr.	SSSC[1]	B	10.2	B	11.5
Grant Ave. / Main St.	Signal	B	11.4	A	6.2
Railroad Ave. / Niemann St.	SSSC	B	10.5	A	9.4
Grant Ave. / Railroad Ave.	Signal	B	19.2	B	15.5
Railroad Ave. / Main St.	AWSC[2]	A	8.4	A	9.1
Grant Ave. / E Main St.	SSSC	C	20.7	D	29.8
Grant Ave. / Matsumoto Ln.	Signal	A	6.1	A	7.5
Grant Ave. / I-505 SB Ramps	SSSC	C	17.5	C	20.7
Grant Ave. / I-505 NB Ramps	Signal	A	5.8	A	7.0

Notes: [1]SSSC = Side Street Stop Control.
[2]AWSC = All Way Stop Control
Source: Fehr & Peers, 2017.

Figure 3 illustrates existing PM peak hour traffic volumes and level of service for roadways within Winters. As shown in Figure 3, during the PM peak hour, all roadway segments operate acceptably at LOS D or better.

Based on existing LOS results, no deficiencies currently exist on local or State roadway facilities in the City.

Signal Warrants

Peak hour signal warrant analyses were conducted for critical unsignalized intersections throughout the City. None of the unsignalized intersections meet the peak hour signal warrant under existing conditions.

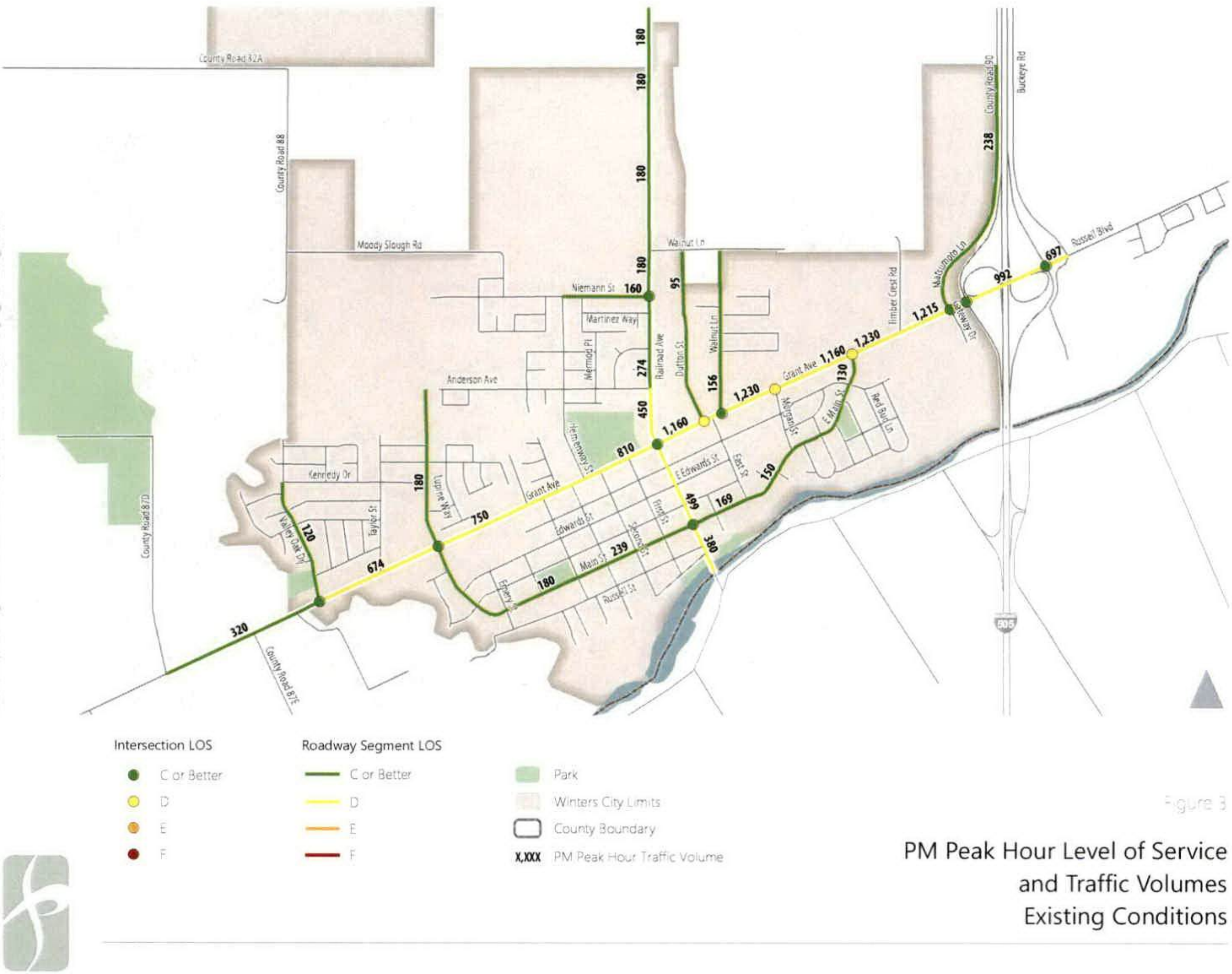


Figure 3

PM Peak Hour Level of Service and Traffic Volumes Existing Conditions

3. TRAVEL DEMAND FORECASTING

The City of Winters travel demand forecasting (TDF) model was utilized to forecast traffic volumes associated with anticipated population and employment growth throughout the City. Traffic volume forecasts serve as the basis for identifying future roadway network needs for the City.

Fehr & Peers updated the City's TDF model as part of the broader *Circulation Master Plan* update process. The TDF model update included the following model improvements from the prior TDF model, which had been developed in 2001:

- Updated street network data to reflect existing roadway conditions throughout the City;
- Updated land use inputs to reflect current land use allocations throughout the City;
- Updated trip generation rates to reflect the most recent rates recommended by the Institute of Transportation Engineers and to capture City-specific trip generation characteristics surveyed in Fall 2016; and
- Refined traffic analysis zone (TAZ) structure to isolate travel characteristics of neighborhoods that have developed since 2001.

Figure 4 displays the refined TDF model TAZ boundaries.

Model Scenarios

The updated TDF model includes the following scenarios:

- Existing Conditions, which represents the land use and roadway network present as of Fall 2016
- General Plan Buildout, which represents the full buildout of the City of Winters *General Plan*

The General Plan Buildout scenario was developed to assist with roadway sizing and to establish a buildout roadway system for the City. The General Plan Buildout scenario was also developed to identify necessary roadway improvement projects for inclusion in the City's impact fee program.

Figure 4

Traffic Analysis Zones (TAZ)

Model Inputs

This section summarizes the roadway network, land use, and trip generation inputs in the TDF model.

Roadway Network

The existing roadway network included in the TDF model reflects the current circulation system serving the City of Winters, including roadway classification, speed, and capacity.

The roadway network changes included in the future TDF model scenarios incorporates elements of the circulation framework envisioned in the original 1991 *Circulation Master Plan*. Key elements of this framework, such as the Main Street loop, were preserved in the TDF model. Modifications were made where actual development has deviated from the original circulation framework (e.g. the truncation of East Street south of Grant Avenue).

Figure 5 illustrates the future roadway network included in the TDF model. Key elements of the future roadway network include:

- Completion of Main Street loop road
- Northern extension of Valley Oak Drive, Taylor Street, Hemenway Street, Dutton Street, Walnut Lane, and Timber Crest Road.
- Western extension of Niemann Street.
- Creation of new east-west roadways, including Moody Slough Road and CR-32A.

All new roadways identified in the future network are intended to be two-lane collector roads. No new arterials are included in the future roadway network. The updated TDF model does not include granular network detail for subdivisions such as Winters Highlands, but does include centroid connectors linking TAZs to adjacent collector roadways.

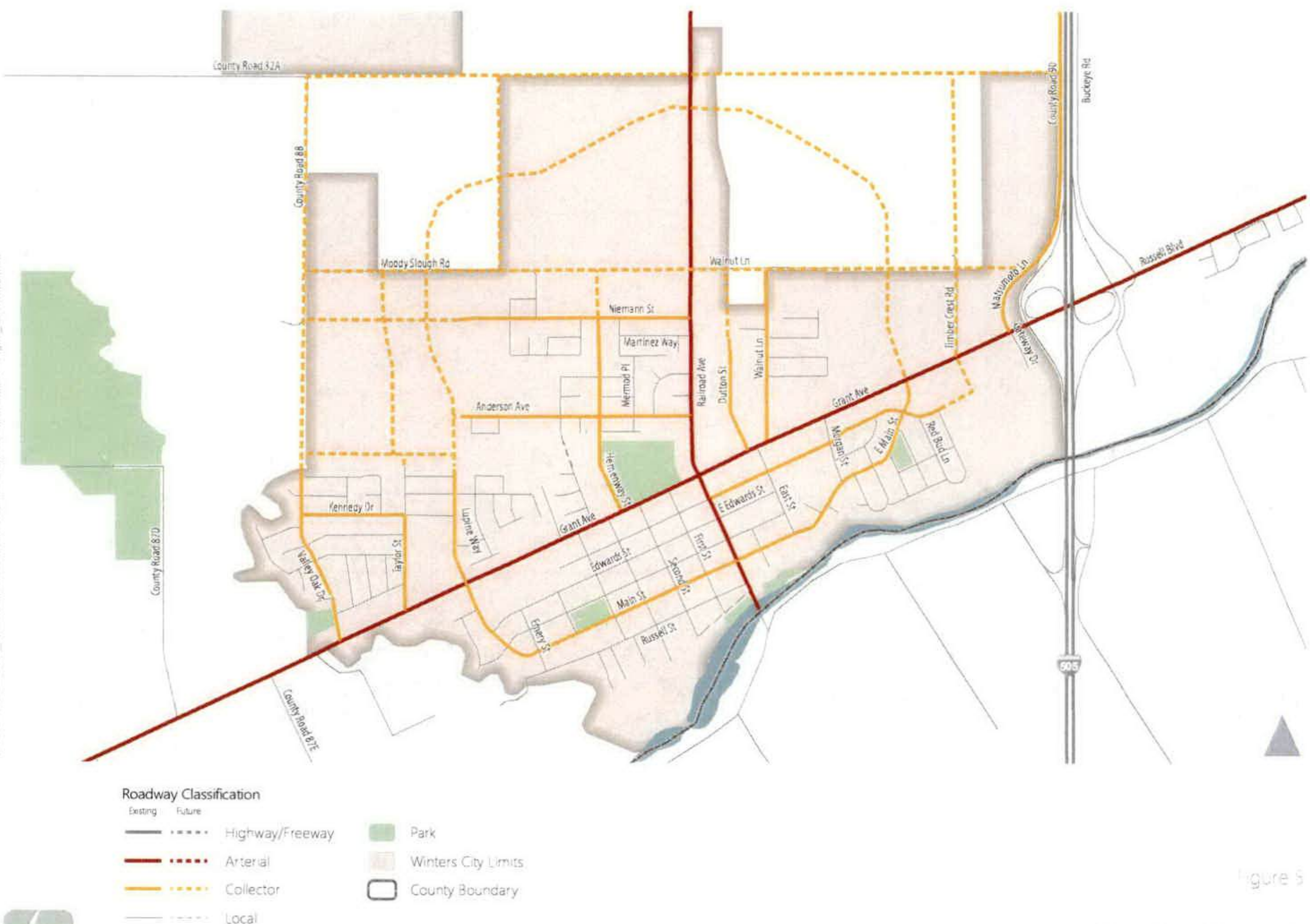


Figure 5

Roadway Network
General Plan Buildout

Land Use

Table 5 summarizes the land use inputs for each TDF model scenario.

Table 5: TDF Model Land Use Inputs

Land Use Classification				
ID	Type	Unit	Existing Conditions	General Plan Buildout
	Population	Persons	7,000	14,200
RR	Rural Residential	DU	2	38
R-1	Single Family Residential	DU	587	1,182
R-2	1 & 2 Family Residential	DU	1,399	1,939
R-3	Multifamily Residential	DU	169	1,060
R-4	High Density Residential	DU	257	575
C-1	Neighborhood Commercial	ksf	43	279
C-2	Central Business District	ksf	218	260
CH	Highway Service Commercial	ksf	3	39
OF	Office	ksf	47	264
M-1	Light Industrial	ksf	3	614
M-2	Heavy Industrial	ksf	386	757
G	Gas Station	Pump	36	36
H	Hotel	Room	-	212

The Existing Conditions scenario reflects the City's land use allocations and distribution as of Fall 2016. Both future scenarios include reasonably foreseeable land development projects approved by the City of Winters, such as the PG&E Technical Operations Training Center, Blue Mountain Senior Housing, and Hotel Winters.

The remaining growth in the General Plan Buildout scenario includes unconstrained development of all areas zoned for residential development according to City floor area ratio (FAR) standards. Non-residential growth was proportionally distributed throughout the City based on the geographic size of areas zoned for commercial, office, and industrial land uses. Absorption rates for commercial, office, and industrial land uses were applied based on retail and non-retail jobs per capita projections for Winters derived by SACOG.

Trip Generation

Table 6 summarizes the City of Winters TDF model daily trip generation rates by land use category.

Table 6: TDF Model Trip Generation Inputs

Land Use Classification			
ID	**Type**	**Unit**	**Daily Trip Rate**
RR	Rural Residential	DU	9.79
R-1	Single Family Residential	DU	9.79
R-2	1 & 2 Family Residential	DU	9.79
R-3	Multifamily Residential	DU	6.84
R-4	High Density Residential	DU	6.84
C-1	Neighborhood Commercial	ksf	91.75
C-2	Central Business District	ksf	42.70
CH	Highway Service Commercial	ksf	496.12
OF	Office	ksf	11.42
M-1	Light Industrial	ksf	6.97
M-2	Heavy Industrial	ksf	3.82
G	Gas Station	Pump	162.78
H	Hotel	Room	8.17

Source: Fehr & Peers, 2016.

Trip generation rates were derived from the recommended rates included in the Institute of Transportation Engineers *Trip Generation Manual, 9th Edition*. Rates for single-family residential and neighborhood commercial land uses were refined based on field surveys and traffic counts conducted in Winters.

4. GENERAL PLAN BUILDOUT

This chapter describes the anticipated traffic conditions and necessary roadway improvements under the General Plan Buildout scenario, which anticipates growth to approximately 14,200 residents.

General Plan Buildout Roadway Operations

Average Daily Traffic

Figure 6 shows average daily traffic volumes (two-way total) based on the General Plan Buildout land use and roadway network inputs discussed in Chapter 3. Under these conditions, average daily traffic on Grant Avenue near the I-505 interchange would increase from 13,800 vehicles to approximately 32,000 vehicles. Immediately west and east of Railroad Avenue, Grant Avenue is projected to carry approximately 20,000 and 22,400 daily vehicles, respectively, compared with 7,780 and 11,140 daily vehicles today.

Average daily traffic volume on Railroad Avenue would increase due to the buildout of the northern portion of the City. North of Moody Slough Road, Railroad Avenue would carry 5,800 daily vehicles, compared to 1,500 daily vehicles today. Through downtown Winters, Railroad Avenue would carry approximately 9,800 daily vehicles, up from 5,700 daily vehicles today.

In this scenario, Moody Slough Road serves a critical role in providing east-west parallel capacity to Grant Avenue, allowing motorists to travel between the I-505 interchange and neighborhoods in the northern portion of the City. Moody Slough Road is projected to carry more than 10,000 daily vehicles that would otherwise rely on Grant Avenue for east-west access. East Main Street, Timber Crest Road, and Matsumoto Lane would all provide connections to the I-505 interchange from Moody Slough Road.

Level of Service

Figure 7 illustrates General Plan Buildout PM peak hour traffic volumes and level of service for roadways within Winters. Most of the future circulation network would operate at acceptable LOS, except for the following locations:

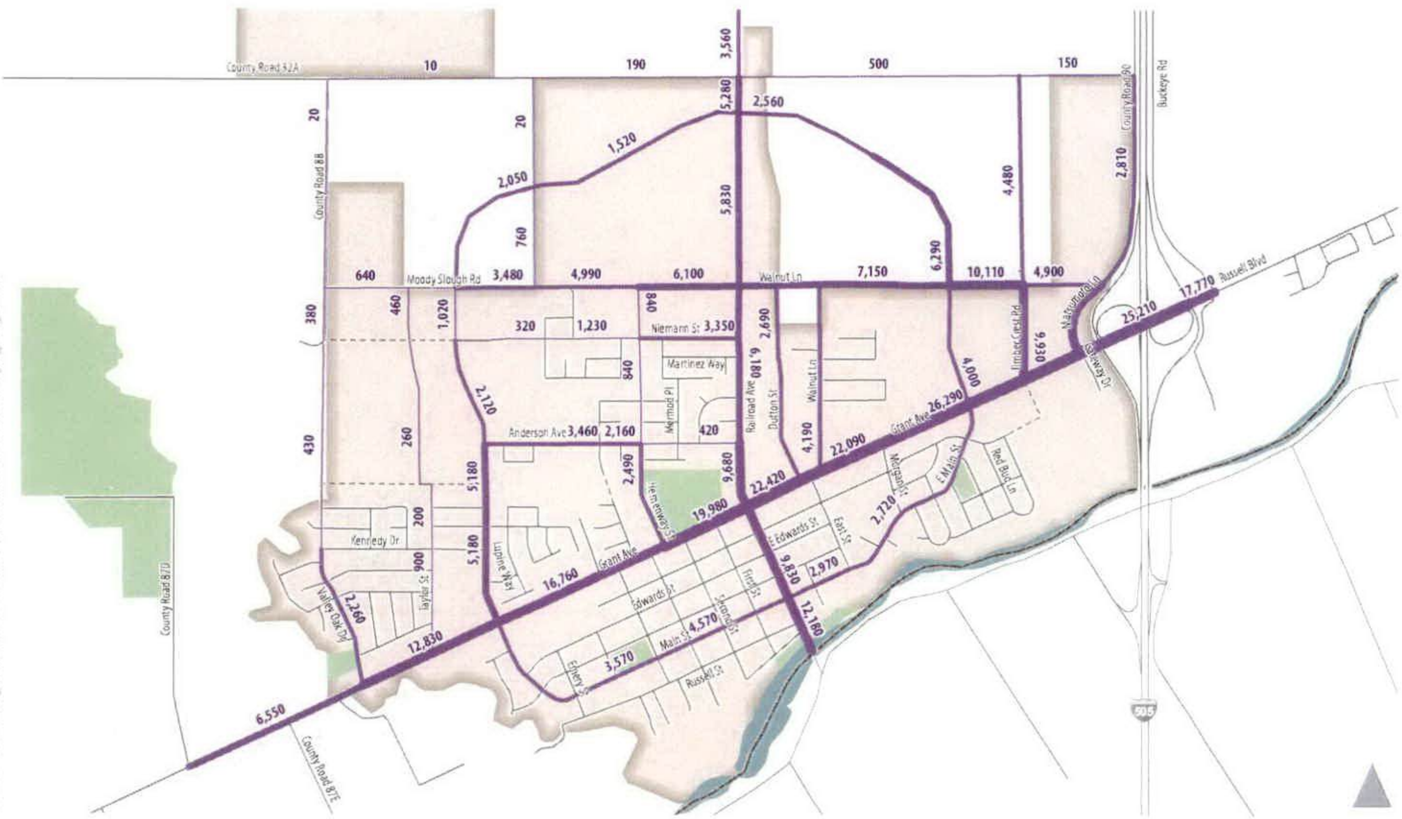
- Roadway Segments
  - Grant Avenue – Morgan Street to I-505 NB Ramps (LOS E/F)
- Intersections
  - Grant Avenue / Dutton Street (LOS F)

- Grant Avenue / Morgan Street (LOS F)
- Grant Avenue / East Main Street (LOS F)
- Grant Avenue / I-505 SB Ramps (LOS E)
- Moody Slough Road / East Main Street (LOS E)
- Moody Slough Road / Timber Crest Road (LOS E)

Signal Warrants

The following unsignalized intersections meet the peak hour signal warrant under General Plan Buildout conditions:

- Grant Avenue / Morgan Street
- Grant Avenue / East Main Street
- Grant Avenue / I-505 SB Ramps
- Railroad Avenue / Moody Slough Road
- Moody Slough Road / East Main Street
- Moody Slough Road / Timber Crest Road



Average Daily Traffic Volume

- 0 - 1,500
- 1,501 - 5,000
- 5,001 - 8,000
- 8,001 - 18,000
- 18,001 - 32,260
- Park
- Winters City Limits
- County Boundary
- X,XXX Average Daily Traffic Volume

Figure 6

Average Daily Traffic Volume
General Plan Buildout

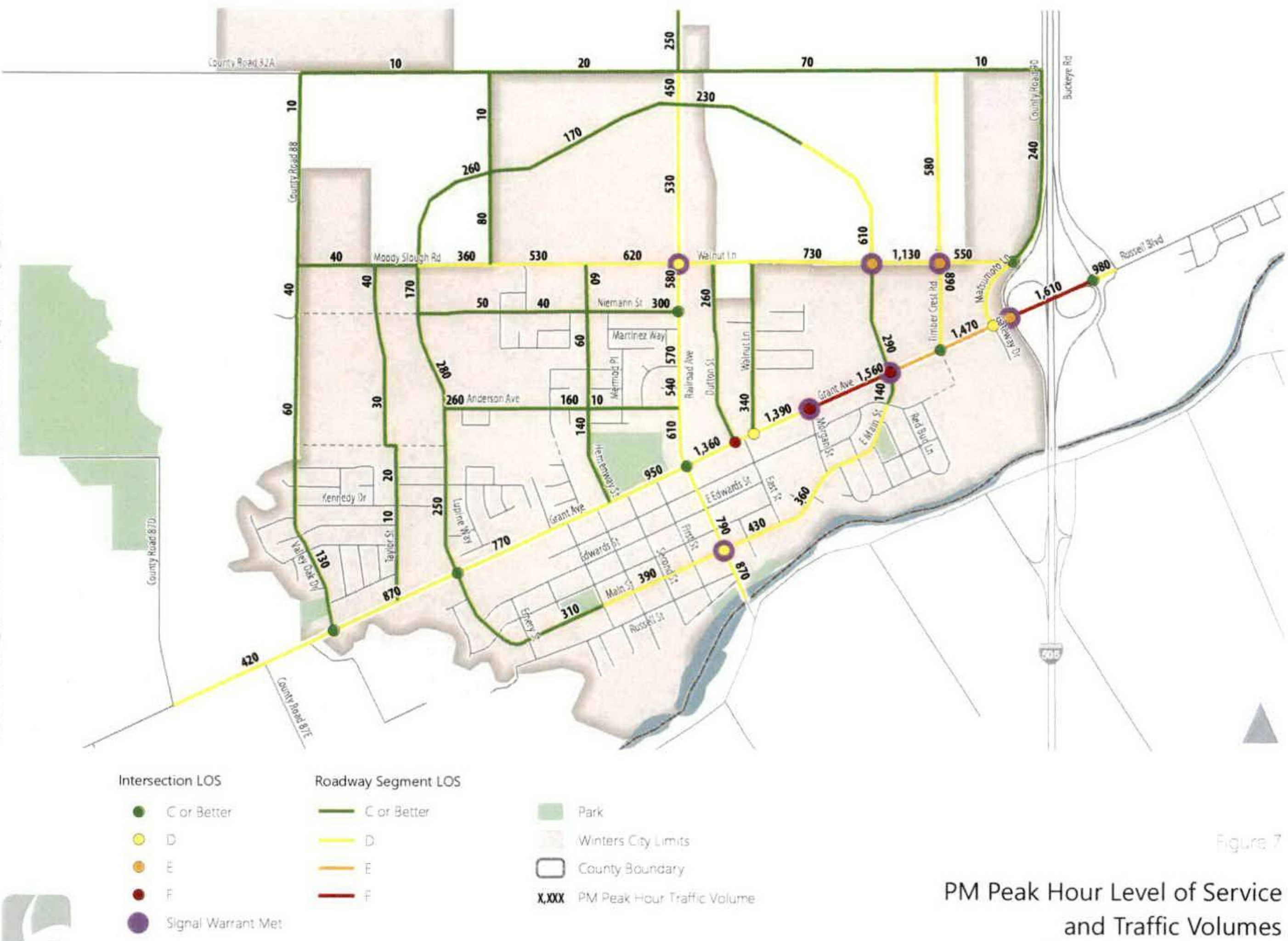


Figure 7

PM Peak Hour Level of Service and Traffic Volumes General Plan Buildout

General Plan Buildout Roadway Improvements

Figure 8 illustrates the proposed roadway and intersection improvements that are needed between existing conditions and General Plan Buildout conditions to provide acceptable traffic operations. These include:

- Traffic Signal
  - Grant Avenue / East Main Street
  - Grant Avenue / I-505 SB Ramps
  - Moody Slough Road / East Main Street
  - Moody Slough Road / Timber Crest Road
- Roundabout
  - Grant Avenue / Dutton Street
  - Grant Avenue / Morgan Street
- Roadway Widening
  - Grant Avenue – East Main Street to I-505 SB Ramps – two- to four-lane widening

The implementation of these projects, in addition to the development of the future circulation framework, would improve roadway operations to acceptable conditions. **Figure 9** illustrates the PM peak hour traffic volume and level of service with the proposed improvement projects under General Plan Buildout conditions.

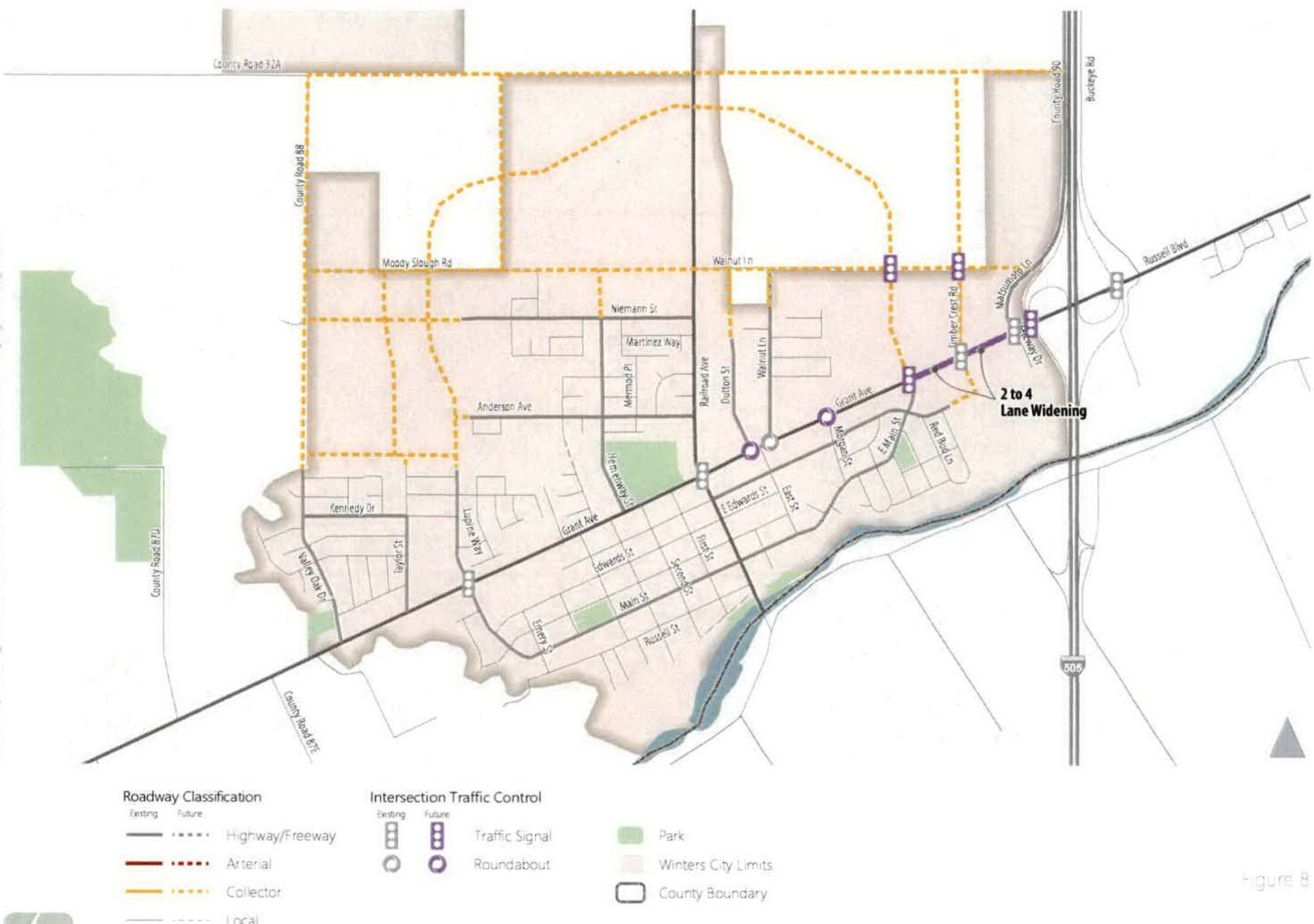
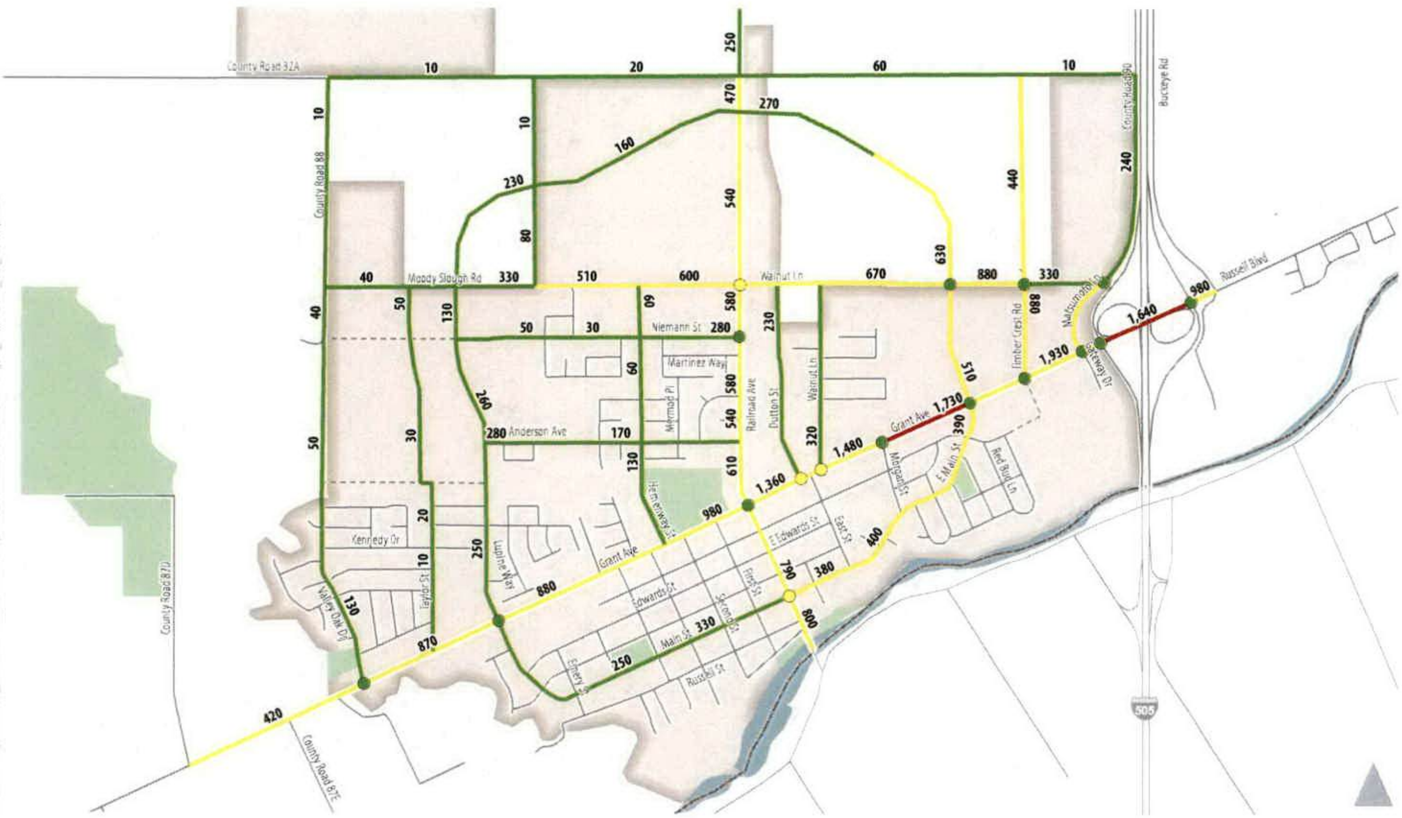


Figure 8

Roadway Improvements
General Plan Buildout



Intersection LOS
- C or Better
- D
- E
- F
- Signal Warrant Met

Roadway Segment LOS
- C or Better
- D
- E
- F

- Park
- Winters City Limits
- County Boundary
- X,XXX PM Peak Hour Traffic Volume

Figure 9

PM Peak Hour Level of Service and Traffic Volumes General Plan Buildout with Improvements

5. ROADWAY IMPACT FEES

This section summarizes the roadway impact fee calculation methodology, presents the impact fee for new development, and presents a methodology for calculating impact fees for different development types.

Impact Fee Introduction

Assembly Bill 1600 (AB 1600) created a mechanism for assessing new development for the cost of infrastructure investment needed to serve new residents and businesses. Sections 66000-66008 of the California Government Code, which are based on AB 1600, stipulate that a local government must take the following steps to establish an impact fee:

- Identify the purpose of the fee.
- Identify the use to which the fee is to be put.
- Determine how there is a reasonable relationship between the fee's use and the development type on which it is imposed.
- Determine how there is a reasonable relationship between the need for the facility and the type of development on which the fee is imposed.
- Determine how there is a reasonable relationship between the amount of the fee and the cost of the public facility or portion of the public facility attributable to the development on which the fee is stipulated.

Purpose of the Impact Fee

The purpose of the impact fee is to mitigate the effect of future development on traffic conditions. The fees will help to fund improvements needed to maintain the target level of service in response to higher traffic volumes brought on by developments in the City.

Use of the Impact Fee

AB 1600 requires that the local government identify the public facilities that are to be financed through the use of the impact fee. One of the purposes of this document is to satisfy this requirement by determining where and what type of improvements will be needed to serve future increases in traffic.

Determining the "Reasonable Relationships"

AB 1600 requires the local government to determine how there are "reasonable relationships" between:

1. The use of the impact fee and the development type on which it is imposed;
2. The need for the facility and the type of development on which the fee is imposed; and
3. The amount of the impact fee and the facility cost attributable to the development project.

To determine the "use" relationship, the development being assessed an impact fee must be reasonably shown to derive some use or benefit from the facility being built using the fee. Most drivers in the new developments can be expected to use the facilities identified in this study, and those that do not would benefit because new roadways would keep drivers from diverting to other roads and causing congestion in other parts of the City. Even residents or workers in the new developments who do not drive at all would benefit from access to goods and services made possible in part by the serviceability of the road.

To determine the "need" relationship, the facilities to be financed must be shown to be needed at least in part because of the new development. In the case of this document, the roadway improvements are consistent with those necessary for the buildout of the future General Plan Buildout Scenario described in Chapter 4. This scenario was chosen for the purposes of deriving impact fees because it represents a reasonably foreseeable growth scenario as anticipated by City staff over a 20-year planning horizon.

The "amount" relationship requires that there be a reasonable proportionality between the fee charged to each type of development and the cost of the facility being financed. In the case of the City of Winters, the traffic using the facility will come from a number of sources, including existing land uses, new residential and non-residential development, and sources outside the City. Because there are no existing roadway deficiencies within the City, new development will bear the full cost of necessary roadway improvement projects in the fee program.

Commercial Fee Adjustments

During the process of calculating roadway impact fees, non-residential land uses (e.g., retail, office, etc.) are typically at a disadvantage due to their high trip generation characteristics compared to residential land uses. This results in relatively high per unit commercial fees, which can deter potential commercial development. This is a particular concern for jurisdictions where retail sales represent a significant source of revenue.

To address this issue, the roadway impact fee calculation methodology described below shifted a portion of the fees from commercial development to residential development, by demonstrating that the need for commercial development (or a portion thereof) is the result of new residential development. This is the basis for demonstrating a reasonable relationship between the fee's use and the development type on which it is imposed, a requirement of AB 1600. With this approach, overall roadway fee program revenue is maintained.

Information from the U.S. Census Bureau was used in the calculation of this adjustment. Specifically, data regarding the types of jobs located in the City of Winters according to the 2015 American Community Survey (ACS) was extracted to understand the share of 'locally serving' employment versus 'non-locally serving' employment within the City. Locally serving employment such as retail trade and educational services typically cater to local residents, and therefore correspond with the number of residents and amount of residential development in a jurisdiction. Non-locally serving employment such as manufacturing and agriculture typically produce goods that are exported outside of a jurisdiction, and therefore are not directly correlated with the number of local residents.

As summarized in **Table 7**, 58 percent of jobs within the City are considered locally serving. Therefore, 58 percent of the roadway fee program costs initially allocated to commercial land uses can be reasonably shifted to residential land uses. This shift is reflected in the fee calculations described in detail below.

Table 7:
City of Winters Jobs Summary

Industry	Job Category	Number of Jobs	Percentage of Jobs
Retail trade	Locally Serving	246	8%
Information	Locally Serving	42	1%
Finance and insurance, and real estate and rental leasing	Locally Serving	182	6%
Prof., scientific, and mgmt., and admin. and waste mgmt. services	Locally Serving	378	12%
Educational services, and health care and social assistance	Locally Serving	781	24%
Other services, except public administration	Locally Serving	106	3%
Public administration	Locally Serving	170	5%
Locally Serving Jobs Subtotal		**1,905**	**58%**
Agriculture, forestry, fishing and hunting, and mining	Non-Locally Serving	166	5%
Construction	Non-Locally Serving	209	6%
Manufacturing	Non-Locally Serving	380	12%
Wholesale trade	Non-Locally Serving	179	5%
Transportation and warehousing, and utilities	Non-Locally Serving	252	8%
Arts, entertainment, and rec., and accommodation and food services	Non-Locally Serving	177	5%
Non-Locally Serving Jobs Subtotal		**1,363**	**42%**

Source: American Community Survey, 2015.

Roadway Impact Fee Calculation Methodology

The following steps outline the methodology used to compute the roadway impact fees. This methodology relies on PM peak hour vehicle miles traveled (VMT) as the basis of dwelling unit equivalent (DUE) calculations, since roadway systems are typically designed to accommodate peak traffic volumes that occur during this time period.

1. Identify roadway improvements necessary to address future roadway deficiencies.
2. Determine roadway improvements that are to be included in the citywide roadway impact fee program and improvements that would be fully funded by specific development projects.
3. Calculate the cost of proposed roadway improvements that are to be included in the citywide roadway impact fee program.
4. Calculate the total cost that is to be used for the roadway impact fee program by subtracting existing funding allocated to proposed roadway improvements.
5. Determine the number of units of each land use type that are anticipated to be developed.
6. Determine the number of new PM peak hour VMT by individual units of each land use type using the trip generation rates from the City of Winters TDF model, average trip lengths from the City of Winters TDF model, and typical primary trip percentages for each land use type from the ITE Trip Generation Manual.
7. Determine a preliminary DUE factor for each land use type by dividing the respective PM peak hour VMT by the PM peak hour VMT for the single family dwelling unit land use type.
8. Determine a revised DUE factor for each land use type by shifting a portion of the commercial land use fee burden to residential land use types commensurate with the amount of locally serving jobs present in the City of Winters.
9. Determine a final DUE factor for each land use type by dividing the revised DUE factors for each land use type by the revised DUE factor for the single family dwelling unit land use type.
10. Divide the total cost of the proposed roadway improvements by the total final DUE for all new land uses to calculate the improvement cost per single family DUE.
11. Multiply the improvement cost per single family DUE by the final DUE factor for each land use type to determine the improvement cost per unit for each land use type.

Impact Fee Calculations

This section describes the roadway impact fee calculations.

Impact Fee Program Roadway Improvements

Figure 10 displays the roadway improvement projects included in the fee program. As discussed previously, these projects are necessary based on the estimated growth under the future General Plan Buildout Scenario. The fee program excludes future roadway improvement projects that are fully funded. The fee program also excludes projects that the City would require to be incorporated into individual land development projects.

Individual roadway improvement projects in the fee program include:

- Traffic Signal
    - Grant Avenue / East Main Street
    - Grant Avenue / I-505 SB Ramps
- Roundabout
    - Grant Avenue / Morgan Street
- Roadway Widening
    - Grant Avenue – East Main Street to I-505 SB Rams – two- to four-lane widening

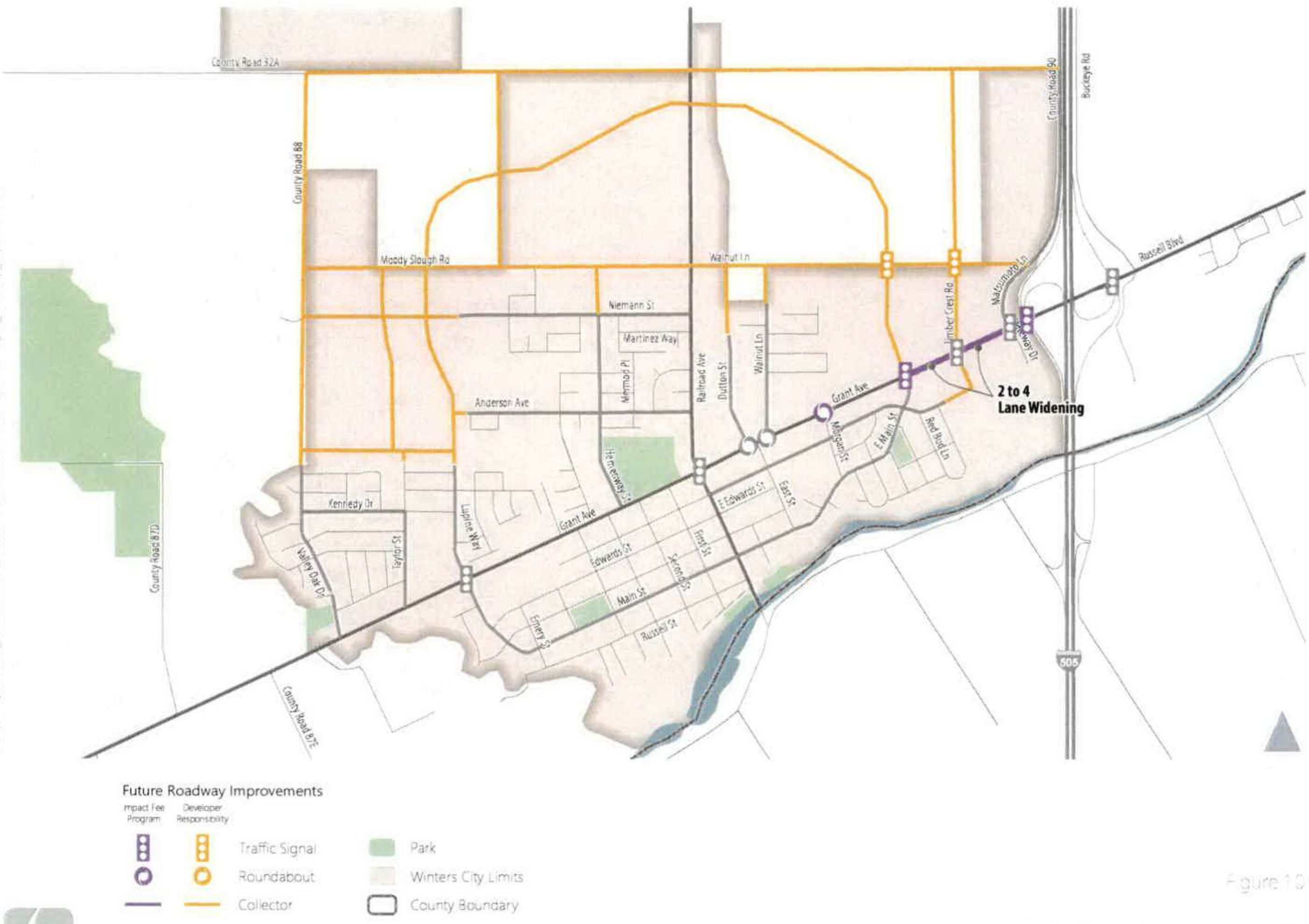


Figure 10

Roadway Improvements
Impact Fee Program

Roadway Improvement Cost Estimates

Table 8 summarizes the estimated improvement costs for the roadway fee program.

Table 8:
Roadway Improvement Project Cost Estimates

Project Type	Location	Cost
Traffic Signal	Grant Ave. / East Main St.	$1,860,625
Traffic Signal	Grant Ave. / I-505 SB Ramps	$2,232,750
Roundabout	Grant Ave. / Morgan St.	$2,275,000
2 to 4 Lane Widening	Grant Ave. – East Main St. to I-505 SB Ramps	$1,799,120
	Total	**$8,167,495**

Note: Costs estimates include construction, design, and administrative expenses related to each specific project.
Source: Laugenour & Meikle and Fehr & Peers, 2017.

Roadway Impact Fee Calculation

Table 9 summarizes the calculation of the roadway impact fees per DUE based on the land use growth under the General Plan Buildout Scenario and the total roadway improvement cost attributable to new development. The fee schedule includes DUE rates per unit of development for several land use categories based on PM peak hour VMT using average trip lengths and trip generation rates from the City of Winters TDF model. This method for calculating impact fees creates a better nexus between land use developments and their impact on traffic operations, because it considers the specific trip generation characteristics of different land uses as they relate to pass-by trips and trip length.

To estimate the roadway impact fee for a particular development, multiply the impact fee per unit in the second-to-last column by the total amount of land use included in a proposed development project.

Table 9:
Detailed Roadway Impact Fee Calculations

Land Use Category	Land Use Growth	PM Peak Hour Trip Rate per Unit	Avg. Trip Length	% New Trips	New PM Peak Hour VMT per Unit	Prelim. DUE Factor per Unit	Prelim. DUE	DUE Shift for Local Business[1]	Revised DUE	Revised DUE Factor per Unit	Final DUE Factor per Unit	Impact Fee per Unit	Total Fee Contribution
Rural Residential	36 DU	0.95	1.14	100%	1.08	1.00	36	24	60	1.67	1.00	**$3,142 per DU**	$113,109
Single Family Residential	595 DU	0.95	1.14	100%	1.08	1.00	595	397	992	1.67	1.00	**$3,142 per DU**	$1,869,444
1 & 2 Family Residential	540 DU	0.95	1.14	100%	1.08	1.00	540	360	900	1.67	1.00	**$3,142 per DU**	$1,696,639
Multifamily Residential	891 DU	0.66	1.14	100%	0.76	0.70	622	415	1,038	1.16	0.70	**$2,195 per DU**	$1,955,501
High Density Residential	318 DU	0.66	1.14	100%	0.76	0.70	222	148	370	1.16	0.70	**$2,195 per DU**	$697,923
Neighborhood Commercial	236 ksf	10.82	0.98	50%	5.32	4.90	1,157	671	486	2.06	1.24	**$3.88 per sf**	$916,135
Central Business District	42 ksf	5.05	0.98	50%	2.48	2.29	96	56	40	0.96	0.58	**$1.81 per sf**	$76,158
Highway Service Commercial	36 ksf	60.24	0.97	10%	5.84	5.38	194	112	81	2.26	1.36	**$4.26 per sf**	$153,430
Office	217 ksf	1.35	1.04	80%	1.12	1.04	225	130	94	0.43	0.26	**$0.82 per sf**	$177,839
Light Industrial	611 ksf	0.82	1.04	80%	0.68	0.63	385	223	162	0.26	0.16	**$0.50 per sf**	$304,508
Heavy Industrial	371 ksf	0.45	1.04	80%	0.37	0.35	128	74	54	0.14	0.09	**$0.27 per sf**	$101,336
Hotel	212 rooms	1.02	0.96	70%	0.68	0.63	133	77	56	0.26	0.16	**$498 per room**	$105,473
Residential Subtotal							**2,016**	**1,344**	**3,360**				**$6,332,616**
Non-Residential Subtotal							**2,318**	**1,344**	**974**				**$1,834,879**
Grand Total							**4,333**		**4,333**				**$8,167,495**

Note: 1. 58% of non-residential preliminary DUE shifted to residential land use types, per Winters locally serving jobs from ACS 2015.
Source: Fehr & Peers, 2017 and American Community Survey, 2015.