Exhibit G

Traffic Operational Analysis Report

Veterans Boulevard
at
Grantland-Gettysburg Avenues

In the City of Fresno, California

Prepared for:

Granville Homes
1306 W. Herndon Avenue, Suite #101
Fresno, CA 93711

November 22, 2024

Project No. 004-229

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Traffic Engineering, Transportation Planning, & Parking Solutions

Traffic Operational Analysis Report

For the intersection of Veterans Boulevard at Grantland-Gettysburg Avenues

In the City of Fresno, CA

November 22, 2024

This Traffic Operational Analysis Report has been prepared under the direction of a licensed Traffic Engineer. The licensed Traffic Engineer attests to the technical information contained therein and has judged the qualifications of any technical specialists providing engineering data from which recommendations, conclusions and decisions are based.

Prepared by:

Jose Luis Benavides, PE, TE

President

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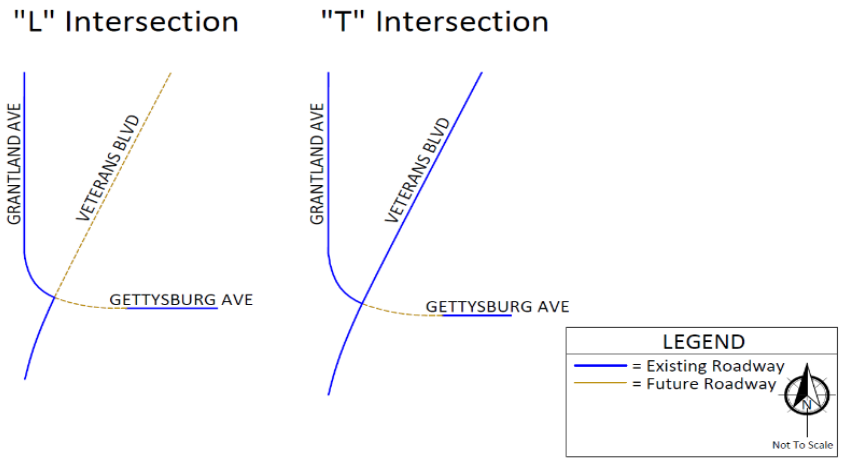
Introduction and Summary

Introduction

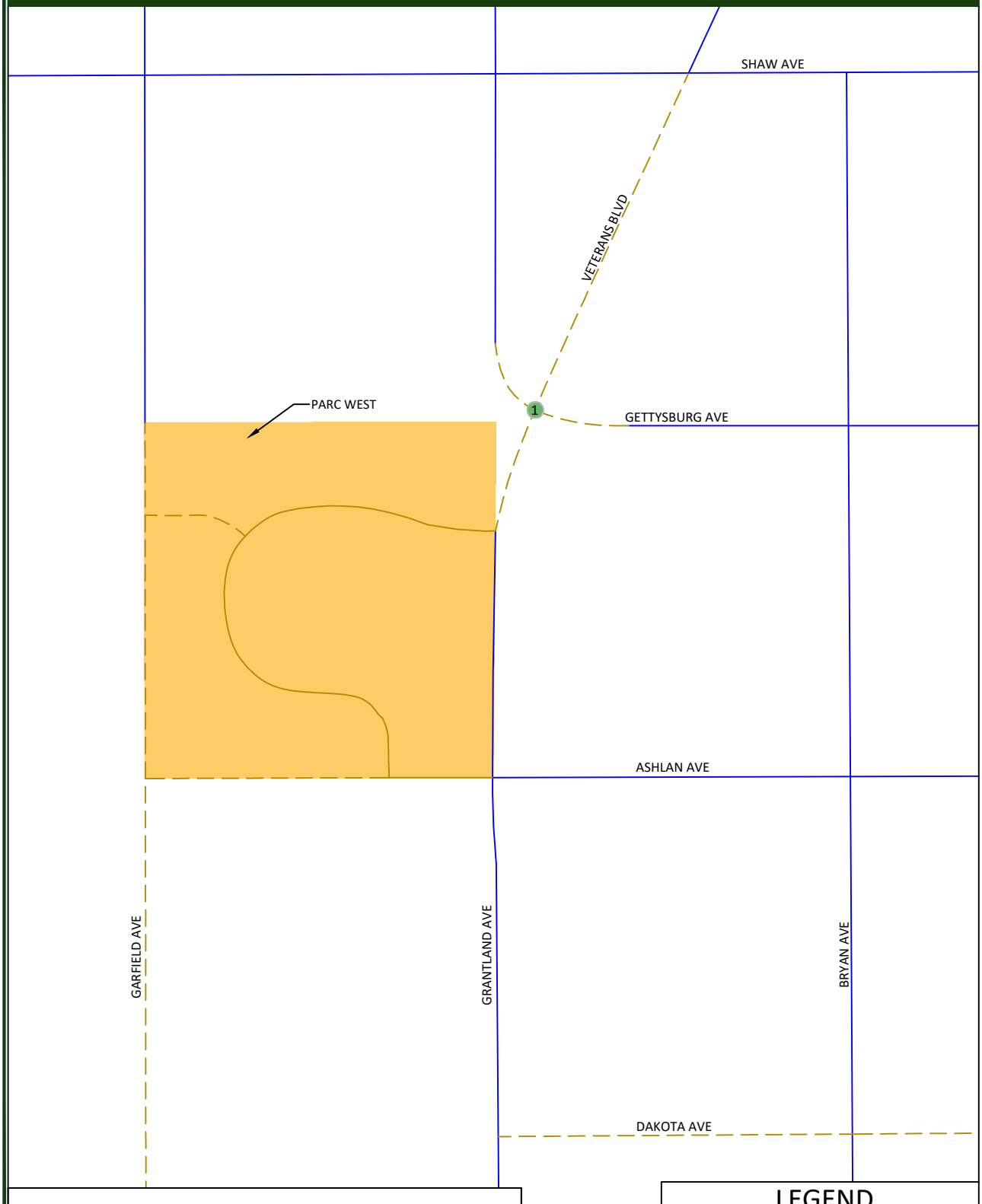
This Report describes a Traffic Operational Analysis (TOA) prepared by JLB Traffic Engineering, Inc. (JLB) for the intersection of Veterans Boulevard at Grantland-Gettysburg Avenues in the City of Fresno. The Parc West development has been conditioned to construct several traffic signals and roadway improvements at different points of development. One of these conditions includes the construction of a traffic signal at the future intersection of Veterans Boulevard at Grantland-Gettysburg Avenues prior to occupancy of the 450th dwelling unit. Another of these conditions includes the construction of Veterans Boulevard between the Grantland-Gettysburg Avenues alignment and Shaw Avenue prior to occupancy of the 650th dwelling unit. As the current Parc West conditions stand, the intersection of future Veterans Boulevard at Grantland Avenue and future Gettysburg Boulevard would be built as an "L" intersection prior to occupancy of the 450th dwelling unit and as a "T" intersection prior to occupancy of the 650th dwelling unit. The "L" and "T" intersections are depicted in the image below. Figure 1 shows the location of the Parc West site relative to the surrounding roadway network.



The purpose of the TOA is to evaluate the intersection of Veterans Boulevard at Grantland-Gettysburg Avenues, identify short-term and long-term roadway needs and determine potential roadway improvement measures. The Scope of Work was prepared via consultation with City of Fresno staff.

Veterans Boulevard at Grantland-Gettysburg Avenues
City of Fresno
Vicinity Map

Figure 1



LEGEND

= STUDY INTERSECTION

- - - = FUTURE ROADWAY

N

Not To Scale

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004-229 - 11/21/24 - DC/AB

Summary

The potential traffic impacts at the study intersection of Veterans Boulevard at Grantland Avenue were evaluated in accordance with the standards set forth by the Level of Service (LOS) policies of the City of Fresno.

Existing plus 450 Dwelling Units Traffic Conditions

- Under this scenario, Parc West is estimated to generate approximately 4,244 daily trips, 315 AM peak hour trips and 423 PM peak hour trips.
- An "L" intersection configuration cannot be analyzed for LOS operations given the lack of interaction between the traffic entering the intersection. As a result, the intersection was not able to be analyzed in this scenario. Given this information, it is safe to assume that Veterans Boulevard at Grantland Avenue as the an "L" intersection configuration will operate at an acceptable LOS during both peak periods.
- Therefore, it is recommended that the traffic controls for this intersection utilize a one-way stop sign that serves the southbound approach of Grantland Avenue.

Short Term plus 450 Dwelling Units Traffic Conditions

- The total trip generation for the Short Term Projects is 6,226 daily trips, 581 AM peak hour trips and 639 PM peak hour trips.
- An "L" intersection configuration cannot be analyzed for LOS operations given the lack of interaction between the traffic entering the intersection. As a result, the intersection was not able to be analyzed in this scenario. Given this information, it is safe to assume that Veterans Boulevard at Grantland Avenue as the an "L" intersection configuration will operate at an acceptable LOS during both peak periods.
- Therefore, it is recommended that the traffic controls for this intersection utilize a one-way stop sign that serves the southbound approach of Grantland Avenue.

Short Term plus 650 Dwelling Units Traffic Conditions

- Under this scenario, Parc West is estimated to generate approximately 6,130 daily trips, 455 AM peak hour trips and 611 PM peak hour trips.
- Under this scenario, the study intersection is projected to operate at an acceptable LOS during both peak periods.
- Based on the traffic signal warrant, operational analysis and engineering judgment, it is recommended that construction documents for the signalization of the study intersection be prepared and approved prior to occupancy of the 650th dwelling unit.

Near Term plus Parc West Buildout Traffic Conditions

- The total trip generation for the Near Term Projects is 103,559 daily trips, 5,630 AM peak hour trips and 8,999 PM peak hour trips.
- Under this scenario, Parc West is estimated to generate approximately 7,728 daily trips, 563 AM peak hour trips and 752 PM peak hour trips.
- Under this scenario, the study intersection of Veterans Boulevard at Grantland Avenue is projected to exceed its LOS threshold during both peak periods. Additional details as to the recommended improvements for this intersection are presented later in this Report.

Queuing Analysis

- It is recommended that the City consider left-turn and right-turn lane storage lengths as indicated in the Queuing Analysis.

Scope of Work

The TOA focused on evaluating traffic conditions at the intersection of Veterans Boulevard at Grantland-Gettysburg Avenues that will be impacted by the development of Parc West. On August 9, 2024, a Draft Scope of Work for the preparation of a Traffic Operational Analysis for this intersection was provided to the City of Fresno for their review and comment.

On August 27, 2024, the City of Fresno requested the verification of the status of five (5) near term projects, the elimination of one (1) near term project and the inclusion of five (5) additional near term projects. The near term projects were identified after further discussions with the City of Fresno and included in this TOA.

The Scope of Work and the comments received from the lead agency are included in Appendix A.

Study Facilities

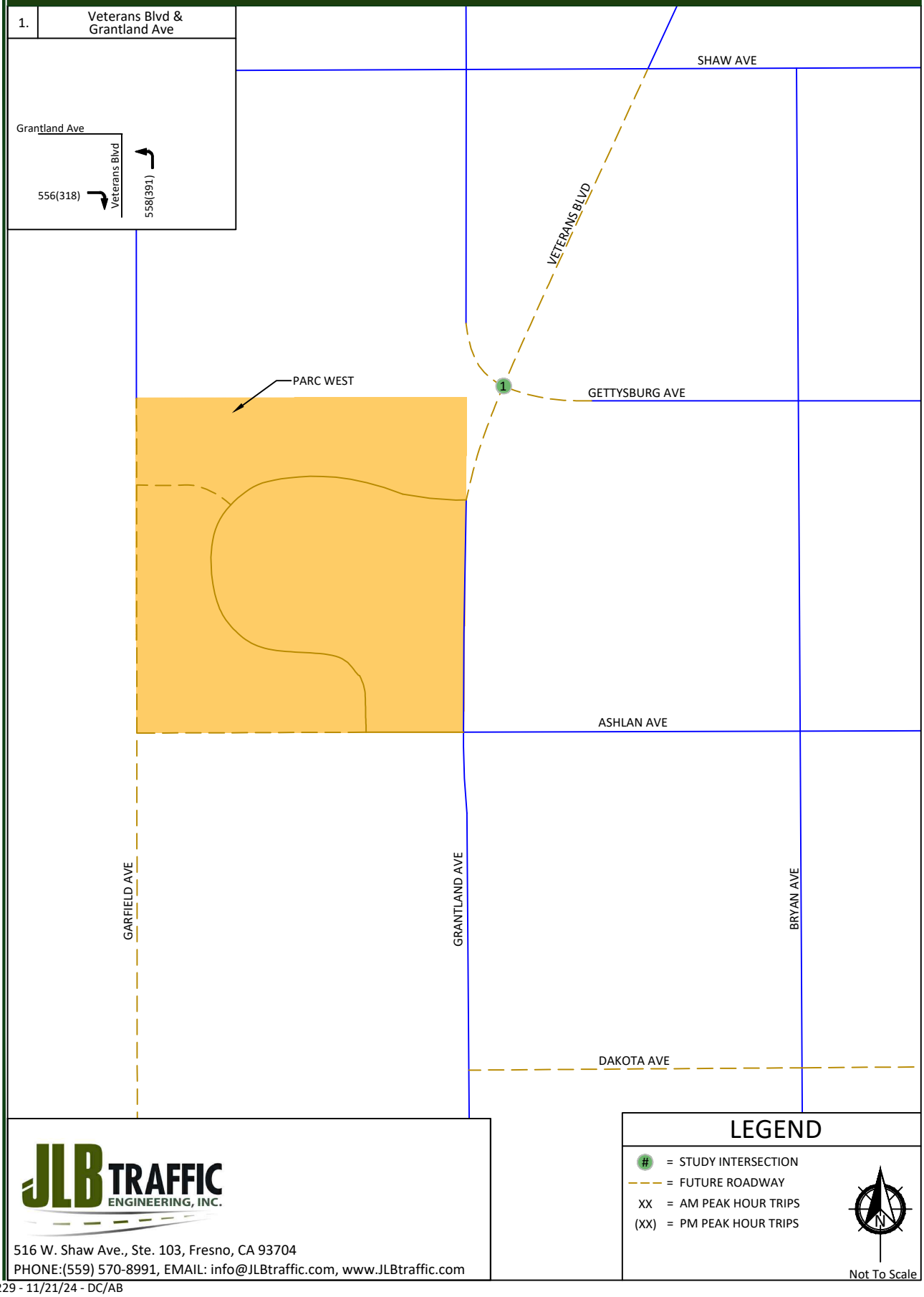
The existing segment volume count was conducted along Grantland Avenue in August 2024 while schools the vicinity of the study intersection site were in session. The traffic count for the existing segment of Grantland Avenue is contained in Appendix B. The intersection turning movement volumes for the existing volumes rerouted for the "L" intersection are illustrated in Figure 2.

Study Intersection

1. Veterans Boulevard / Grantland-Gettysburg Avenue

Veterans Boulevard at Grantland-Gettysburg Avenues
City of Fresno
Existing Rerouted - Traffic Volumes

Figure 2



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LEGEND

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- = FUTURE ROADWAY
- XX = AM PEAK HOUR TRIPS
- (XX) = PM PEAK HOUR TRIPS

N

Not To Scale

Study Scenarios

Existing plus 450 Dwelling Units Traffic Conditions

This scenario evaluates total traffic volumes and roadway conditions based on the Existing plus 450 Dwelling Units Traffic Conditions. The Existing plus 450 Dwelling Units traffic volumes were obtained by adding the trips for 450 dwelling units of the Parc West development to the existing volumes that have been rerouted for the "L" intersection configuration. The Parc West Project Only Trips to the study facilities were developed based on existing travel patterns, the Fresno COG ABM Project Select Zone, the surrounding roadway network, engineering judgment, knowledge of the study area and the *Fresno General Plan* Circulation Element in the vicinity of Parc West's location.

Short Term plus 450 Dwelling Units Traffic Conditions

This scenario evaluates total traffic volumes and roadway conditions based on the Short Term plus 450 Dwelling Units Traffic Conditions. The Short Term plus 450 Dwelling Units traffic volumes were obtained by adding the trips for 450 dwelling units of the Parc West development, the existing volumes that have been rerouted for the "L" intersection configuration and the Short Term related traffic under the "L" intersection configuration.

Short Term plus 650 Dwelling Units Traffic Conditions

This scenario evaluates total traffic volumes and roadway conditions based on the Short Term plus 650 Dwelling Units Traffic Conditions. The Short Term plus 650 Dwelling Units traffic volumes were obtained by adding the trips for 650 dwelling units of the Parc West development, the existing volumes that have been rerouted for the "T" intersection configuration and the Short Term related traffic under the "T" intersection configuration.

Near Term plus Parc West Buildout Traffic Conditions

This scenario evaluates total traffic volumes and roadways conditions based on the Near Term plus Parc West Buildout Traffic Conditions. The Near Term plus Parc West Buildout traffic volumes were obtained by adding the trips for the project buildout of the Parc West development, the existing volumes that have been rerouted for the "T" intersection configuration and the Near Term related traffic under the "T" intersection configuration.

LOS Methodology

LOS is a qualitative index of the performance of an element of the transportation system. LOS is a rating scale running from "A" to "F", with "A" indicating no congestion of any kind and "F" indicating unacceptable congestion and delays. LOS in this study describes the operating conditions for signalized and unsignalized intersections.

The *Highway Capacity Manual* (HCM) 7th Edition is the standard reference published by the Transportation Research Board and contains the specific criteria and methods to be used in assessing LOS. Synchro software was used to define LOS in this study. Details regarding these calculations are included in Appendix C.

While LOS is no longer the criteria of significance for traffic impacts in the state of California, the City of Fresno continues to apply congestion-related conditions or requirements for land development projects through planning approval processes outside of CEQA Guidelines in order to continue the implementation of *Fresno General Plan* policies.

LOS Thresholds

The *Fresno General Plan* has established various degrees of acceptable LOS on its major streets, which are dependent on four (4) Traffic Impact Zones (TIZ) within the City (City of Fresno, 2014). The standard LOS threshold for TIZ I is LOS F, that for TIZ II is LOS E, that for TIZ III is LOS D, and that for TIZ IV is LOS E. Additionally, the 2035 MEIR made findings of overriding consideration to allow a lower LOS threshold than that established by the underlying TIZ's. For those cases in which a LOS criterion for a roadway segment differs from that of the underlying TIZ, such criteria are identified in the roadway description. As all the study facilities fall within TIZ III, LOS D is used to evaluate the potential LOS impacts for the study intersection within the City of Fresno pursuant to the *Fresno General Plan*.

Operational Analysis Assumptions and Defaults

The following operational analysis values, assumptions and defaults were used in this study to ensure a consistent analysis of LOS among the various scenarios.

- Yellow time consistent with the *California Manual on Uniform Traffic Control Devices* (CA MUTCD) based on approach speeds (Caltrans, 2024).
- Yellow time of 3.2 seconds for left-turn phases.
- All-red clearance intervals of 1.0 second for all phases
- Walk intervals of 7.0 seconds.
- Flashing Don't Walk based on 3.5 feet/second walking speed with yellow plus all-red clearance subtracted and 2.0 seconds added.
- At the study intersection, a minimum heavy vehicle factor of 3 percent was utilized under all scenarios.
- An average of 10 pedestrian calls per hour at signalized intersections.
- The observed approach Peak Hour Factor (PHF) of Grantland Avenue is utilized under all scenarios.

Existing plus 450 Dwelling Units Traffic Conditions

Roadway Network

The roadways of the study intersection are discussed below. Figure 3 illustrates the Project Only Trips under the Existing plus 450 Dwelling Units Traffic Conditions. Figure 4 illustrates the traffic volumes for the study intersection under this scenario.

Grantland Avenue is an existing north-south four-lane divided arterial. In this area, Grantland Avenue extends south of Parkway Drive through the southern limits of the City of Fresno SOI. The City of Fresno *2035 General Plan* Circulation Element designates Grantland Avenue as a two-lane arterial between Parkway Drive and Shaw Avenue, a four-lane collector between Shaw Avenue and Gettysburg Avenue and a four-lane super arterial between Gettysburg Avenue and Belmont Avenue.

Veterans Boulevard is an existing northeast-southwest six-lane divided super arterial directly north of Shaw Avenue. Veterans Boulevard will ultimately extend south of Shaw Avenue to its intersection with Grantland-Gettysburg Avenues. The City of Fresno *2035 General Plan* Circulation Element designates Veterans Boulevard as a six-lane super arterial between Herndon Avenue and its future connection to Grantland-Gettysburg Avenues.

Parc West Trip Generation (450 Dwelling Units)

The trip generation rates for Parc West were obtained from the 11th Edition of the Trip Generation Manual published by the Institute of Transportation Engineers (ITE). Table I presents the trip generation rates for a portion of Parc West with trip generations for 450 dwelling units of Single-Family Housing (210). Under this scenario, Parc West is estimated to generate approximately 4,244 daily trips, 315 AM peak hour trips and 423 PM peak hour trips.

Table I: Parc West Trip Generation (450 Dwelling Units)

Land Use (ITE Code)	*Size*	*Unit*	*Daily*		*AM Peak Hour*						*PM Peak Hour*					
			Rate	*Total*	*Trip Rate*	*In*	*Out*	*In*	*Out*	*Total*	*Trip Rate*	*In*	*Out*	*In*	*Out*	*Total*
						%						*%*				
Single-Family Detached Housing (210)	450	DU	9.43	4,244	0.70	26	74	82	233	315	0.94	63	37	266	157	423
Total Driveway Trips				**4,244**				**82**	**233**	**315**				**266**	**157**	**423**

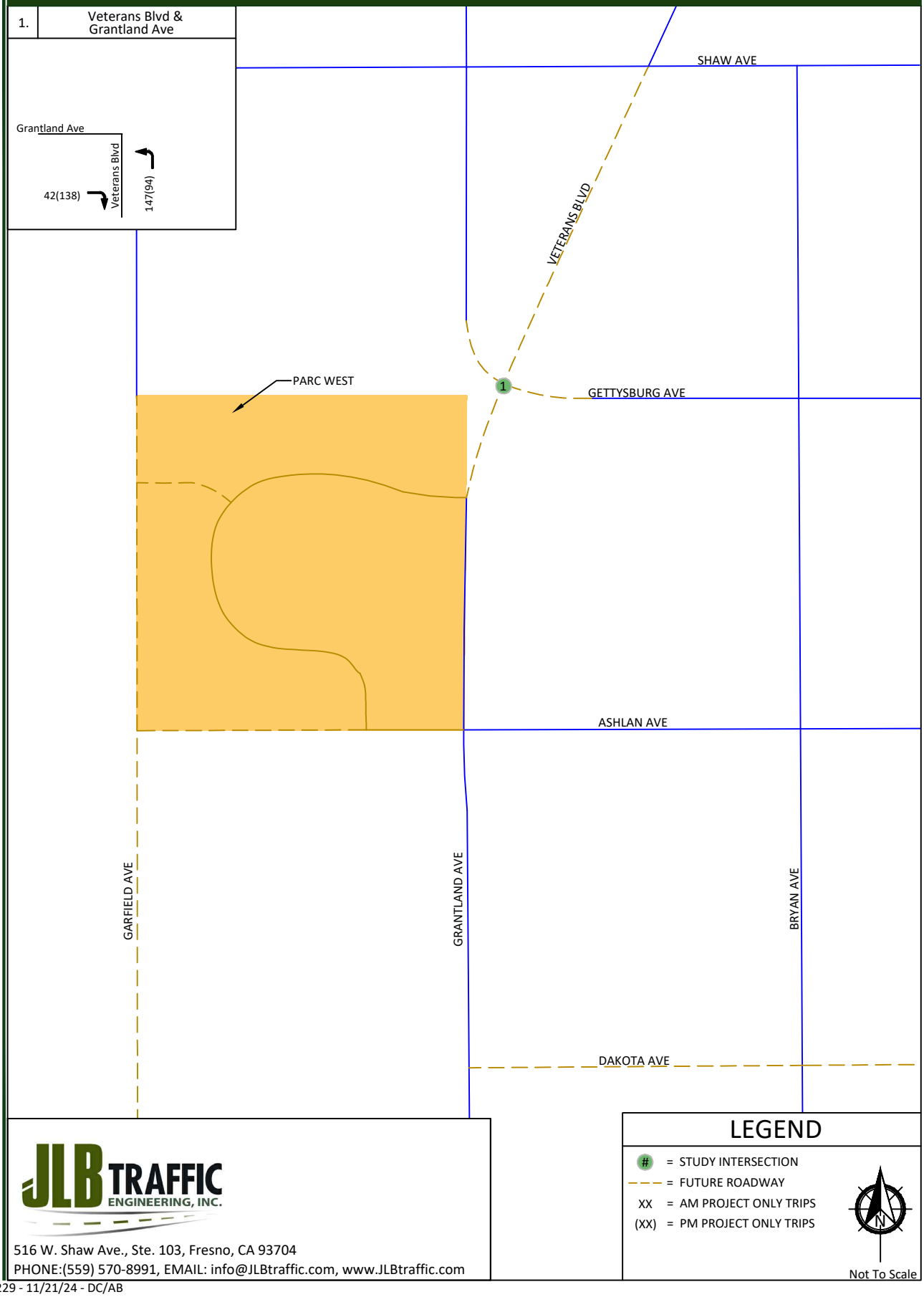
Note: DU = Dwelling Units

Results of Existing plus 450 Dwelling Units Level of Service Analysis

The intersection of future Veterans Boulevard at Grantland Avenue and future Gettysburg Avenue will be initially built as an "L" intersection configuration prior to occupancy of the 450th dwelling unit. An "L" intersection configuration cannot be analyzed for LOS operations given the lack of interaction between the traffic entering the intersection. As a result, the intersection was not able to be analyzed in this scenario. Given this information, it is safe to assume that Veterans Boulevard at Grantland Avenue as an "L" intersection configuration will operate at an acceptable LOS during both peak periods. Therefore, it is recommended that the traffic controls for this intersection utilize a one-way stop sign that serves the southbound approach of Grantland Avenue.

Veterans Boulevard at Grantland-Gettysburg Avenues
City of Fresno
Project Only Trips - 450 Dwelling Units

Figure 3



LEGEND

- # = STUDY INTERSECTION
- = FUTURE ROADWAY
- XX = AM PROJECT ONLY TRIPS
- (XX) = PM PROJECT ONLY TRIPS

N

Not To Scale

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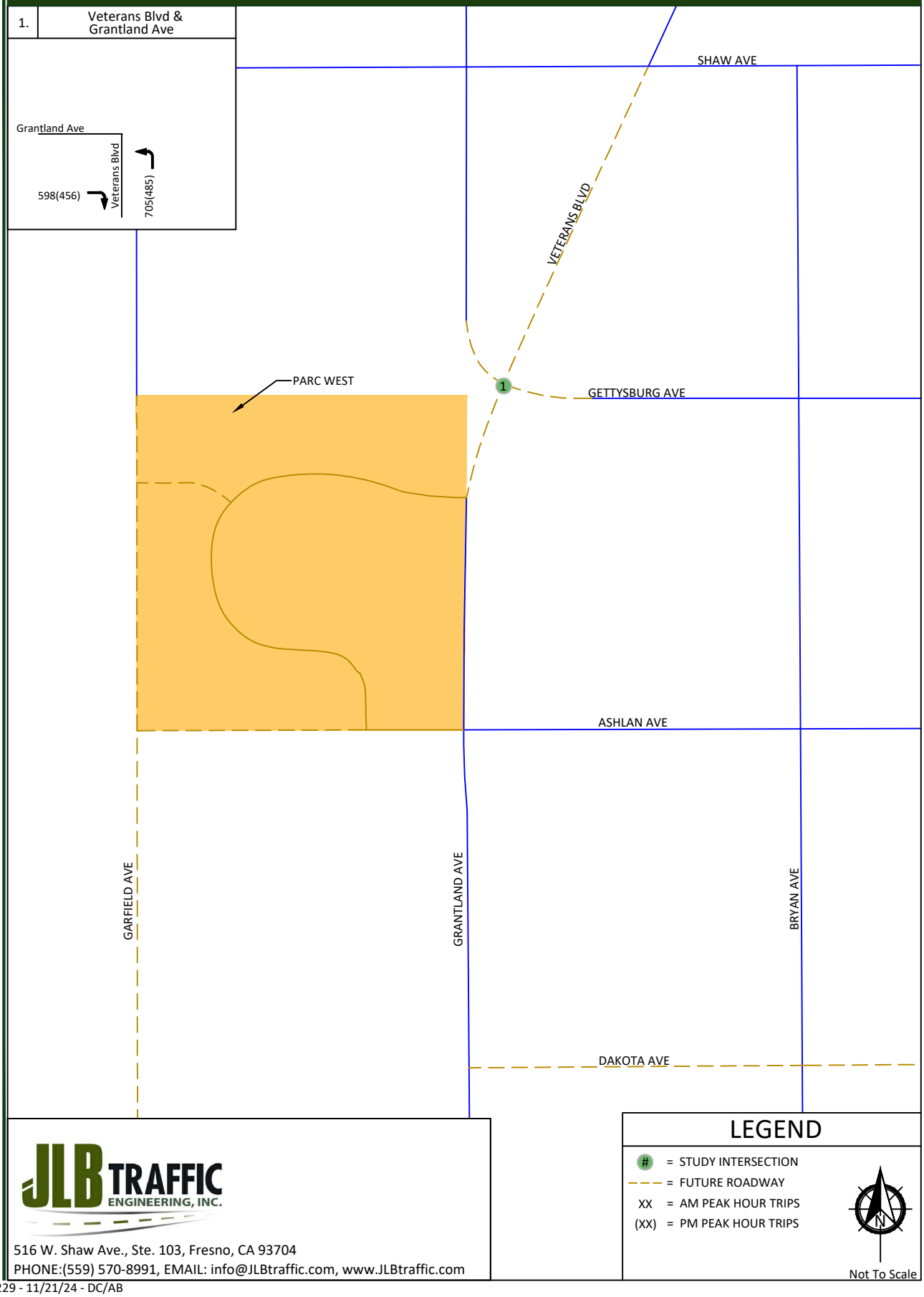
Veterans Boulevard at Grantland-Gettysburg Avenues
City of Fresno
Existing plus 450 Dwelling Units - Traffic Volumes

Figure 4



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Short Term plus 450 Dwelling Units Traffic Conditions

Description of Short Term Projects

Short Term Projects consist of developments that were specifically requested to be analyzed in addition to Parc West in this scenario by the City of Fresno. Therefore, the Short Term Projects listed in Table II are Short Term Projects within the proximity of the study intersection that are projected to add traffic to the study intersection.

Table II: Short Term Projects' Trip Generation

Short Term Project ID	*Short Term Project Name*	*Daily Trips*	*AM Peak Hour*	*PM Peak Hour*
A	TT 6234[2]	4,502	354	472
B	TT 6308[2]	1,208	95	127
C	Justin Garza Highschool[3]	516	132	40
Total Short Term Project Trips		**6,226**	**581**	**639**

Note: 1 = Trip Generation prepared by JLB Traffic Engineering, Inc. based on readily available information
2 = Trip Generation based on JLB Traffic Engineering, Inc. Traffic Impact Analysis Report
3 = Trip Generation based on a Traffic Impact Analysis Report by another Traffic Engineering Firm

The trip generation listed in Table II is that which is anticipated to be added to the streets and highways by Short Term Projects. As shown in Table II, the total trip generation for the Short Term Projects is 6,226 weekday daily trips, 581 weekday AM peak hour trips and 639 weekday PM peak hour trips. Figure 5 illustrates the location of the Short Term Projects and their combined trip assignment to the study intersection under the Short Term plus 450 Dwelling Units Traffic Conditions scenario.

Roadway Network

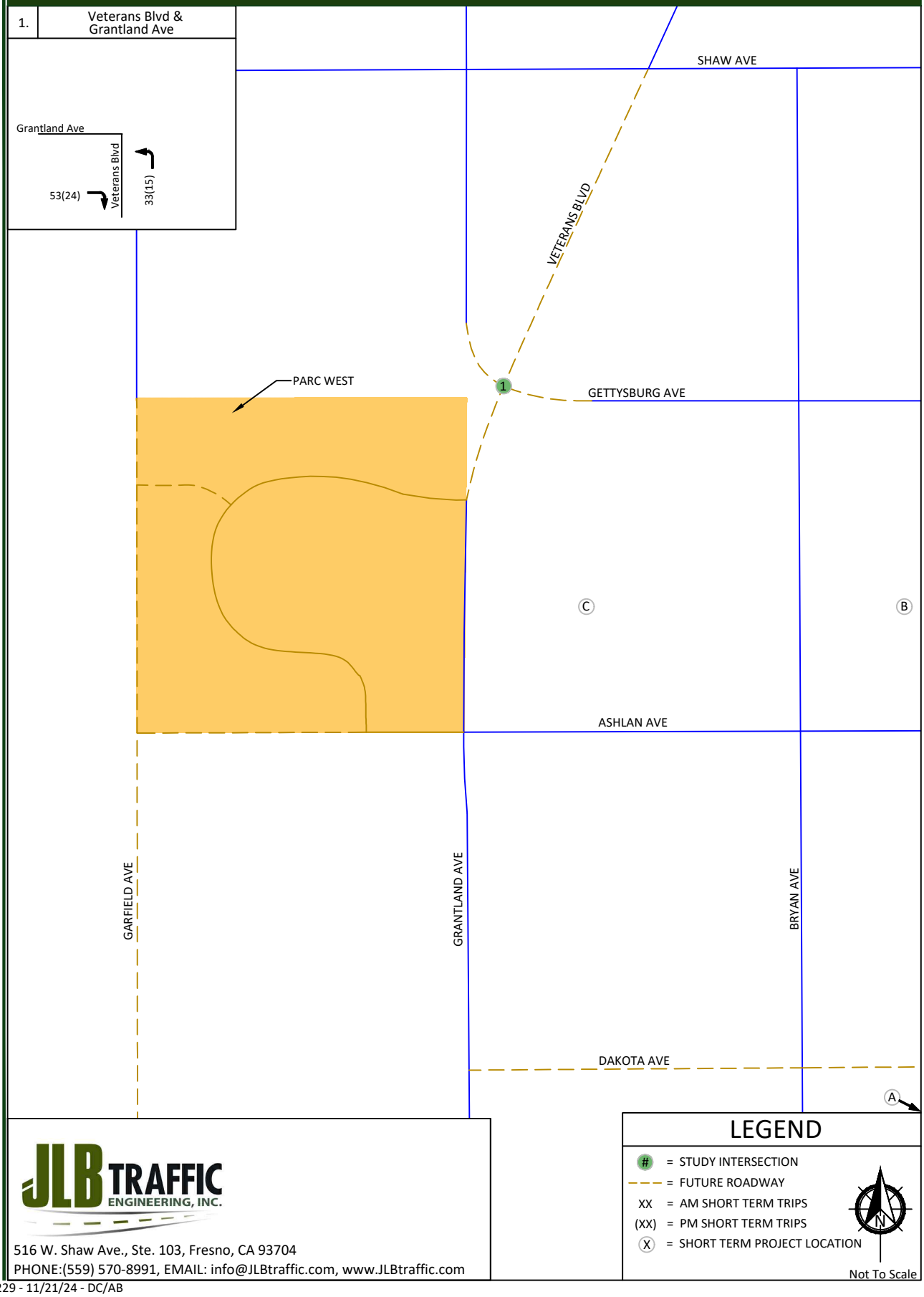
The Short Term plus 450 Dwelling Units Traffic Conditions scenario assumes that the roadway geometrics and traffic controls will remain the same as the Existing plus 450 Dwelling Units scenario. Figure 6 illustrates the traffic volumes for the study intersection under this scenario.

Results of Short Term plus 450 Dwelling Units Level of Service Analysis

The intersection of Grantland Avenue at future Veterans Boulevard and future Gettysburg Avenue will be initially built as an "L" intersection configuration prior to occupancy of the 450th dwelling unit. An "L" intersection configuration cannot be analyzed for LOS operations given the lack of interaction between the traffic entering the intersection. As a result, the intersection was not able to be analyzed in this scenario. Given this information, it is safe to assume that the intersection will operate at an acceptable LOS during both peak periods. Therefore, it is recommended that the traffic controls for this intersection utilize a one-way stop sign that serves the southbound approach of Grantland Avenue.

Veterans Boulevard at Grantland-Gettysburg Avenues
City of Fresno
Short Term Projects' Trip Assignment ("L" Intersection)

Figure 5



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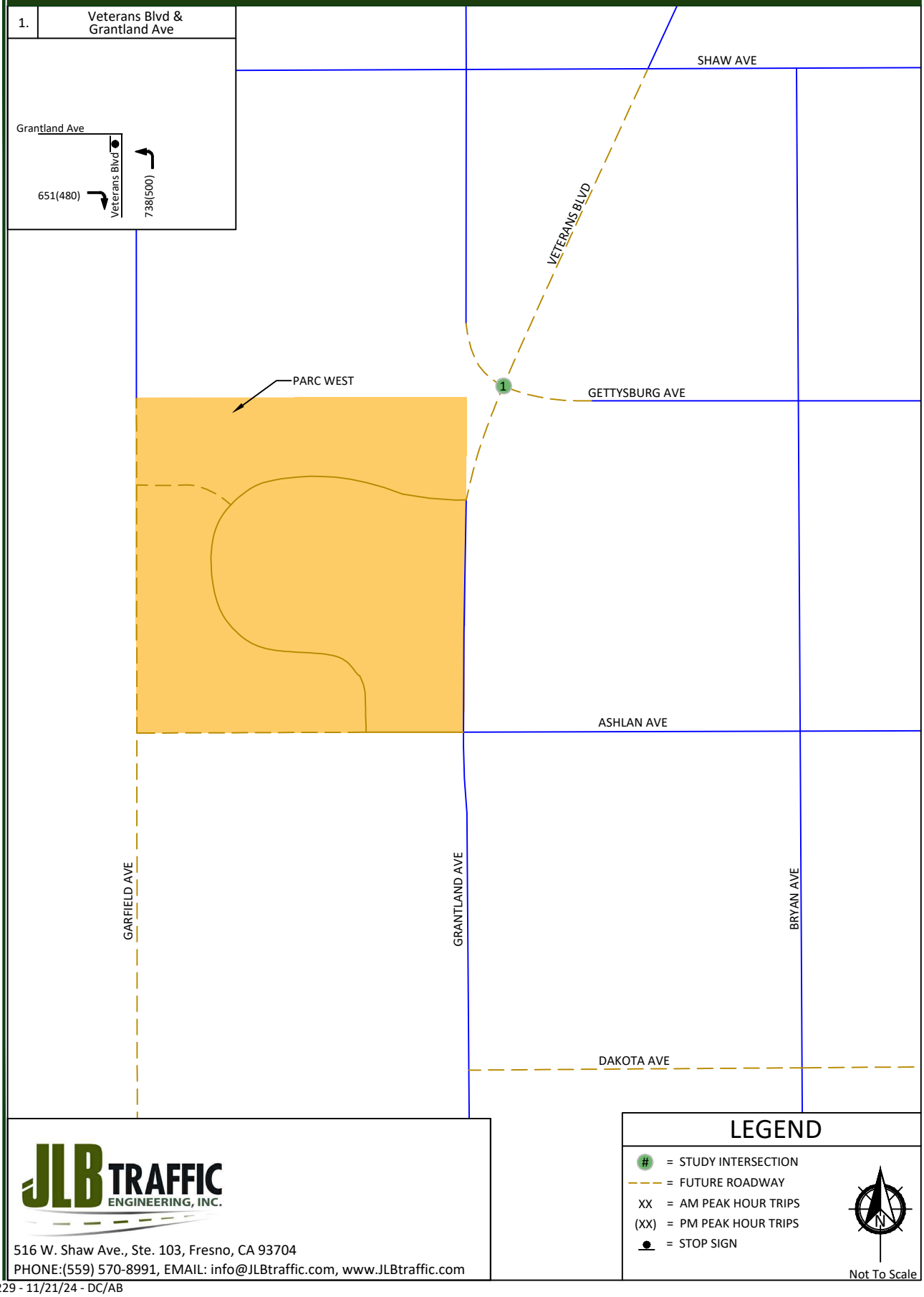
Veterans Boulevard at Grantland-Gettysburg Avenues
City of Fresno
Short Term plus 450 Dwelling Units - Traffic Volumes, Geometrics and Controls

Figure 6



LEGEND

- # = STUDY INTERSECTION
- = FUTURE ROADWAY
- XX = AM PEAK HOUR TRIPS
- (XX) = PM PEAK HOUR TRIPS
- = STOP SIGN

N

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Short Term plus 650 Dwelling Units Traffic Conditions

Roadway Network

The Short Term plus 650 Dwelling Units Traffic Conditions scenario assumes that the intersection of Veterans Boulevard at Grantland-Gettysburg Avenues will be built as a "T" intersection configuration. Figure 7 illustrates the Project Only Trips under the Short Term plus 650 Dwelling Units Traffic Conditions. Figure 8 illustrates the location of the Short Term Projects and their combined trip assignment to the study intersection under the Short Term plus 650 Dwelling Units Traffic Conditions scenario. Figure 9 illustrates the traffic volumes, geometrics and traffic controls for the study intersection under this scenario.

Parc West Trip Generation (650 Dwelling Units)

The trip generation rates for Parc West were obtained from the 11th Edition of the Trip Generation Manual published by the Institute of Transportation Engineers (ITE). Table III presents the trip generation rates for a portion of Parc West with trip generations for 650 dwelling units of Single-Family Housing (210). Under this scenario, Parc West is estimated to generate approximately 6,130 daily trips, 455 AM peak hour trips and 611 PM peak hour trips.

Table III: Parc West Trip Generation (650 Dwelling Units)

Land Use (ITE Code)	*Size*	*Unit*	*Daily*		*AM Peak Hour*						*PM Peak Hour*					
			Rate	*Total*	*Trip Rate*	*In %*	*Out %*	*In*	*Out*	*Total*	*Trip Rate*	*In %*	*Out %*	*In*	*Out*	*Total*
Single-Family Detached Housing (210)	650	DU	9.43	6,130	0.70	26	74	118	337	455	0.94	63	37	385	226	611
Total Driveway Trips				**6,130**				**118**	**337**	**455**				**385**	**226**	**611**

Note: DU = Dwelling Units

Traffic Signal Warrants

The CA MUTCD indicates that an engineering study of traffic conditions, pedestrian characteristics and physical features of an intersection shall be conducted to determine whether the installation of traffic signal controls are justified. The CA MUTCD provides a total of nine (9) warrants to evaluate the need for traffic signal controls. These warrants include 1) Eight-Hour Vehicular Volume, 2) Four-Hour Vehicular Volume, 3) Peak Hour, 4) Pedestrian Volume, 5) School Crossing, 6) Coordinated Signal System, 7) Crash Experience, 8) Roadway Network and 9) Intersection Near a Grade Crossing. Signalization of an intersection may be appropriate if one or more of the signal warrants is satisfied. However, the CA MUTCD also states that "[t]he satisfaction of a signal warrant or warrants shall not in itself require the installation of a traffic control signal" (Caltrans, 2024).

If traffic signal warrants are satisfied when a LOS threshold impact is identified at an unsignalized intersection, then installation of a traffic signal control may serve as an improvement measure. For instances where traffic signal warrants are satisfied, a traffic signal control is not considered to be the default improvement measure. Since the installation of a traffic signal control typically results in increased average delay and requires the construction of additional lanes, an attempt is made to improve the intersection approach lane geometrics in order to improve its LOS while maintaining the existing intersection controls. If the additional lanes did not result in acceptable LOS at the intersection, then in those cases implementation of a traffic signal control would be considered.

Warrant 3 was prepared for the study intersection under the Short Term plus 650 Dwelling Units Traffic Conditions scenario. This warrant is contained in Appendix F. Under this scenario, Warrant 3 is met for the study intersection during both peak periods. Based on the traffic signal warrant, operational analysis and engineering judgment, it is recommended that construction documents for the signalization of the study intersection be prepared and approved prior to occupancy of the 650th dwelling unit.

Results of Short Term plus 650 Dwelling Units Level of Service Analysis

Figure 9 illustrates the Short Term plus 650 Dwelling Units turning movement volumes, intersection geometrics and traffic controls. LOS worksheets for the Short Term plus 650 Dwelling Units Traffic Conditions scenario are provided in Appendix D. Table IV presents a summary of the Short Term plus 650 Dwelling Units peak hour LOS at the study intersection.

Under this scenario, the study intersection is projected to operate at an acceptable LOS during both peak periods.

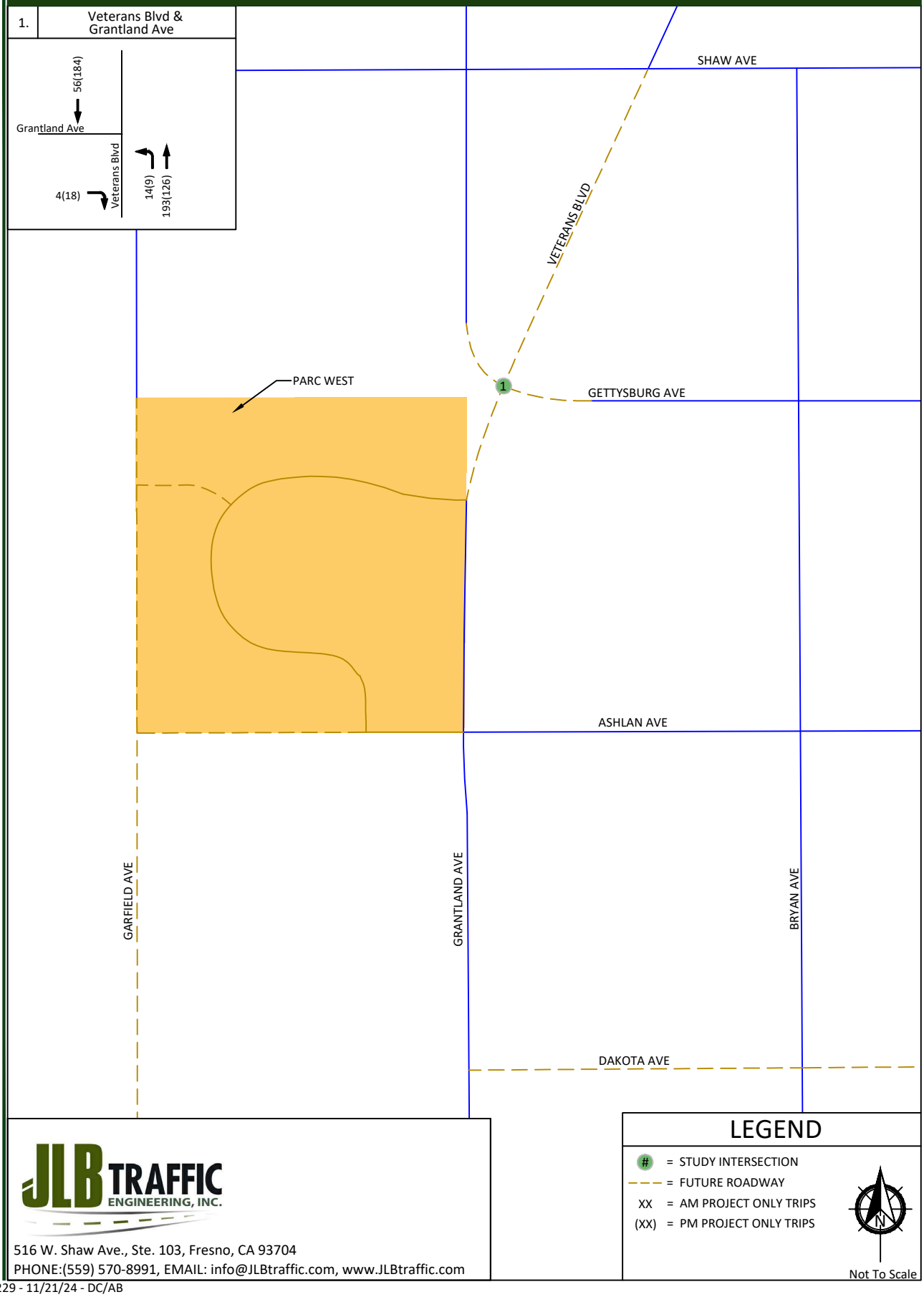
Table IV: Short Term plus 650 Dwelling Units Intersection LOS Results

ID	*Intersection*	*Intersection Control*	*AM (7 - 9) Peak Hour*		*PM (4 - 6) Peak Hour*	
			Average Delay (sec/veh)	*LOS*	*Average Delay (sec/veh)*	*LOS*
1	Veterans Boulevard / Grantland Avenue	Two-Way Stop	24.3	C	15.1	C

Note: LOS for two-way and one-way STOP controlled intersections are based on the worst approach/movement of the minor street.

Veterans Boulevard at Grantland-Gettysburg Avenues
City of Fresno
Project Only Trips - 650 Dwelling Units

Figure 7



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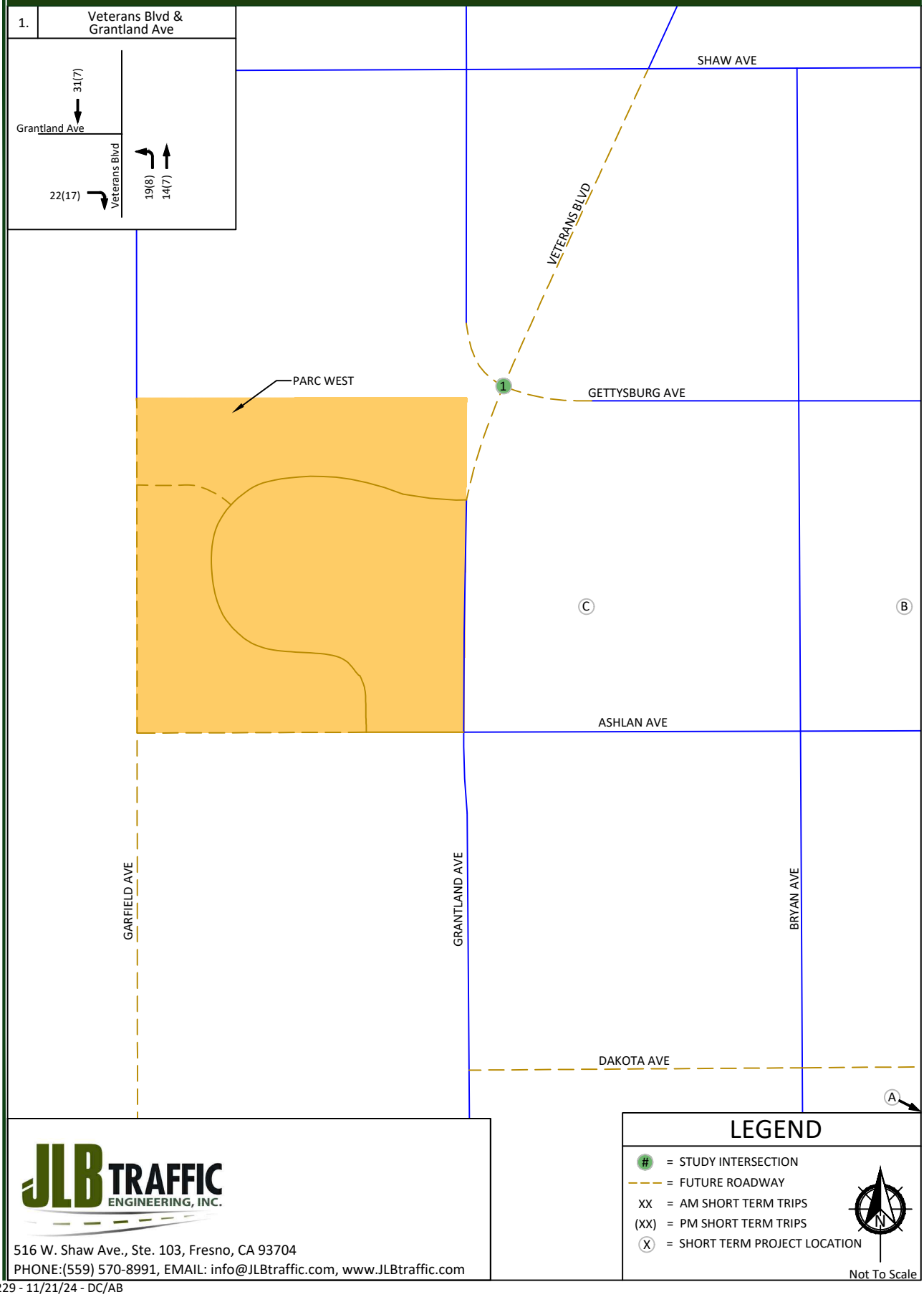
Veterans Boulevard at Grantland-Gettysburg Avenues
City of Fresno
Short Term Projects' Trip Assignment ("T" Intersection)

Figure 8



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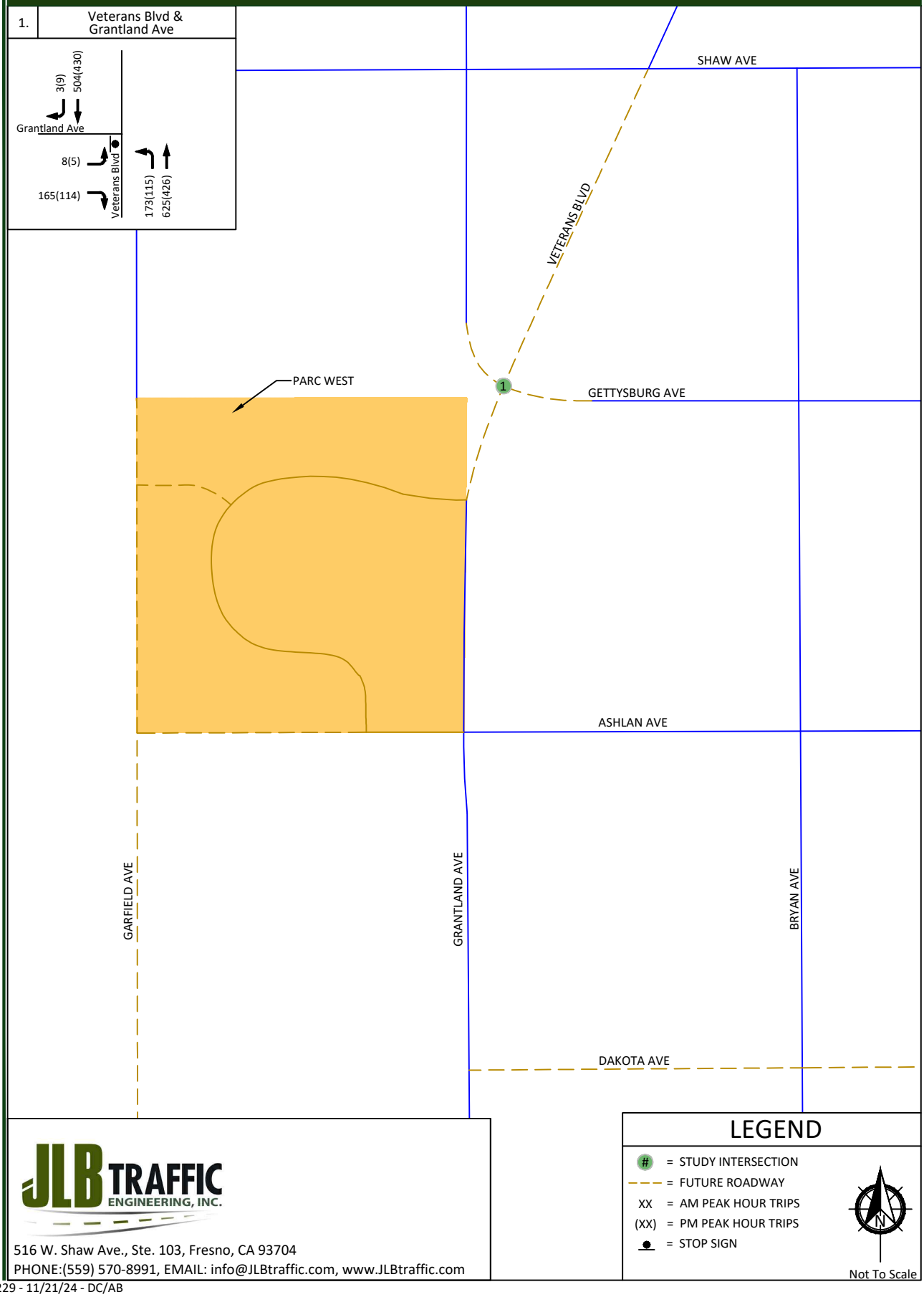
Veterans Boulevard at Grantland-Gettysburg Avenues — Figure 9
City of Fresno
Short Term plus 650 Dwelling Units - Traffic Volumes, Geometrics and Controls



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Near Term plus Parc West Buildout Traffic Conditions

Description of Near Term Projects

Near Term Projects consist of developments that are either under construction, built but not fully occupied, are not built but have final site development review (SDR) approval. City of Fresno staff were consulted throughout the preparation of this TIA regarding Near Term Projects that could potentially impact the study intersection. JLB staff conducted a reconnaissance to confirm the Near Term Projects. Therefore, the Near Term Projects listed in Table V were within the proximity of the study intersection.

Table V: Near Term Projects' Trip Generation

Near Term Project ID	*Near Term Project Name*	*Daily Trips*	*AM Peak Hour*	*PM Peak Hour*
A	TT 6234[2]	4,502	354	472
B	TT 6308[2]	1,208	95	127
C	Justin Garza Highschool[3]	516	132	40
D	TT 5479[1]	1,150	85	115
E	TT 5537[1]	377	28	38
F	TT 5604[1]	1,037	77	103
G	TT 5756[1]	962	71	96
H	TT 5766[1]	170	13	17
I	TT 6192[2]	1,207	90	120
J	TT 6195[2]	840	66	88
K	TT 6199[2]	1,104	87	116
L	TT 6294[3]	1,748	137	184
M	TT 6310[1]	358	27	36
N	TT 6423[1]	783	58	78
O	TT 6429[2]	1,226	91	122
P	TT 6472[3]	4,026	287	366
Q	Ashlan and Blythe Commercial[2]	5,088	346	357
R	Ashlan and Polk Commercial[2]	2,589	247	183
S	AutoZone/Pizza Hut Development[1]	1,099	82	94
T	Bella Vita[2]	6,777	471	544
U	Dakota and Grantland[2]	1,699	133	178
V	El Paseo[3]	41,213	1,251	3,473
W	Fresno Costco[3]	10,616	284	934
X	Golden West Plaza[2]	313	7	27
Y	Jack in the Box[2]	1,284	118	84
Z	Riverside Apartments[2]	2,101	161	196
AA	Shaw and 99 Mixed-Use Development[2]	3,332	302	321
AB	SWC Herndon and Hayes[2]	5,036	454	397
AC	Westbridge Apartments[2]	1,198	76	93
Total Near Term Project Trips		**103,559**	**5,630**	**8,999**

Note: 1 = Trip Generation prepared by JLB Traffic Engineering, Inc. based on readily available information
2 = Trip Generation based on JLB Traffic Engineering, Inc. Traffic Impact Analysis Report
3 = Trip Generation based on a Traffic Impact Analysis Report by another Traffic Engineering Firm

The trip generation listed in Table V is that which is anticipated to be added to the streets and highways by Near Term Projects between the time of the preparation of this Report and five (5) years after buildout of Parc West. As shown in Table V, the total trip generation for the Near Term Projects is 103,559 weekday daily trips, 5,630 weekday AM peak hour trips and 8,999 weekday PM peak hour trips. It should be noted that a large percentage of the non-residential trips are often pass-by or diverted trips and thus the net new trips from the near term projects would likely be lower. Nevertheless, this TIA provides a conservative analysis of the traffic impacts by utilizing the total Near Term Project trips. Figure 10 illustrates the location of the Near Term Projects and their combined trip assignment to the study intersection under the Near Term plus Parc West Buildout Traffic Conditions scenario.

Roadway Network

The Near Term plus Parc West Buildout Traffic Conditions scenario assumes that the Short Term plus 650 Dwelling Units roadway geometrics and traffic controls will remain in place. Figure 11 illustrates the Project Only Trips under the Near Term plus Parc West Buildout Traffic Conditions. Figure 12 illustrates the traffic volumes, geometrics and traffic controls for the study intersection under this scenario.

Parc West Trip Generation (Parc West Buildout)

The trip generation rates for Parc West were obtained from the 11th Edition of the Trip Generation Manual published by the Institute of Transportation Engineers (ITE). Table VI presents the trip generation rates for Parc West with trip generations for 738 dwelling units of Single-Family Housing (210), 114 dwelling units of Multifamily Housing (Low-Rise) (210) and 1.819 acres of Public Park (411). Under this scenario, Parc West is estimated to generate approximately 7,728 daily trips, 563 AM peak hour trips and 752 PM peak hour trips.

Table VI: Parc West Trip Generation (Parc West Buildout)

Land Use (ITE Code)	*Size*	*Unit*	*Daily*		*AM Peak Hour*						*PM Peak Hour*					
			Rate	*Total*	*Trip Rate*	*In*	*Out*	*In*	*Out*	*Total*	*Trip Rate*	*In*	*Out*	*In*	*Out*	*Total*
						%						*%*				
Single-Family Detached Housing (210)	738	DU	9.43	6,959	0.70	26	74	134	383	517	0.94	63	37	437	257	694
Multifamily Housing (Low Rise) Not Close to Transit (220)	114	DU	6.74	768	0.40	24	76	11	35	46	0.51	63	37	37	21	58
Public Park (411)	1.819	Acres	0.78	1	0.02	59	41	0	0	0	0.11	55	45	0	0	0
Total Driveway Trips				**7,728**				**145**	**418**	**563**				**474**	**278**	**752**

Note: DU = Dwelling Units

Traffic Signal Warrants

Warrant 3 was prepared for the study intersection under the Near Term plus Parc West Buildout Traffic Conditions scenario. This warrant is contained in Appendix F. Under this scenario, Warrant 3 is met for the study intersection during both peak periods. Based on the traffic signal warrant, operational analysis and engineering judgment, signalization is recommended for the study intersection.

Results of Near Term plus Parc West Buildout Level of Service Analysis

Figure 12 illustrates the Near Term plus Parc West Buildout turning movement volumes, intersection geometrics and traffic controls. LOS worksheets for the Near Term plus Parc West Buildout Traffic Conditions scenario are provided in Appendix G. Table VII presents a summary of the Near Term plus Parc West peak hour LOS at the study intersection.

Under this scenario, the study intersection of Veterans Boulevard at Grantland Avenue is projected to exceed it LOS threshold during both peak periods. It is recommended that the following improvements be considered for implementation to improve the LOS at this intersection.

- Veterans Boulevard / Grantland Avenue
  - Signalize the intersection with protective left-turn phasing in all directions.

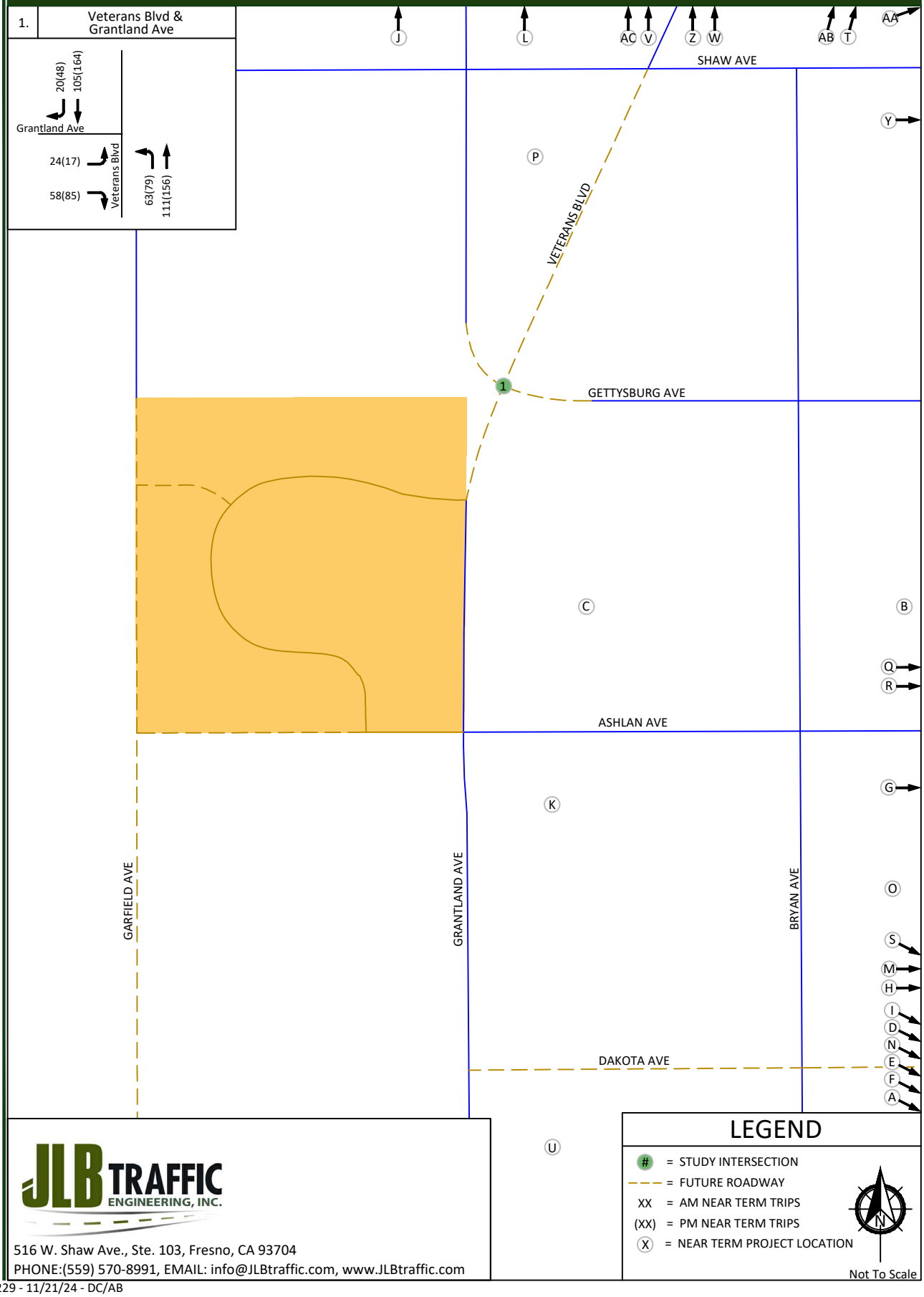
Table VII: Near Term plus Parc West Buildout Intersection LOS Results

ID	*Intersection*	*Intersection Control*	*AM (7 - 9) Peak Hour*		*PM (4 - 6) Peak Hour*	
			Average Delay (sec/veh)	*LOS*	*Average Delay (sec/veh)*	*LOS*
1	Veterans Boulevard / Grantland Avenue	Two-Way Stop	**>120.0**	**F**	**47.7**	**E**
		Traffic Signal (Improved)	31.1	C	23.2	C

Note: LOS = Level of Service based on average delay on signalized intersections and All-Way STOP Controls.
LOS for two-way STOP controlled intersections are based on the worst approach/movement of the minor street.

Veterans Boulevard at Grantland-Gettysburg Avenues
City of Fresno
Near Term Projects' Trip Assignment

Figure 10

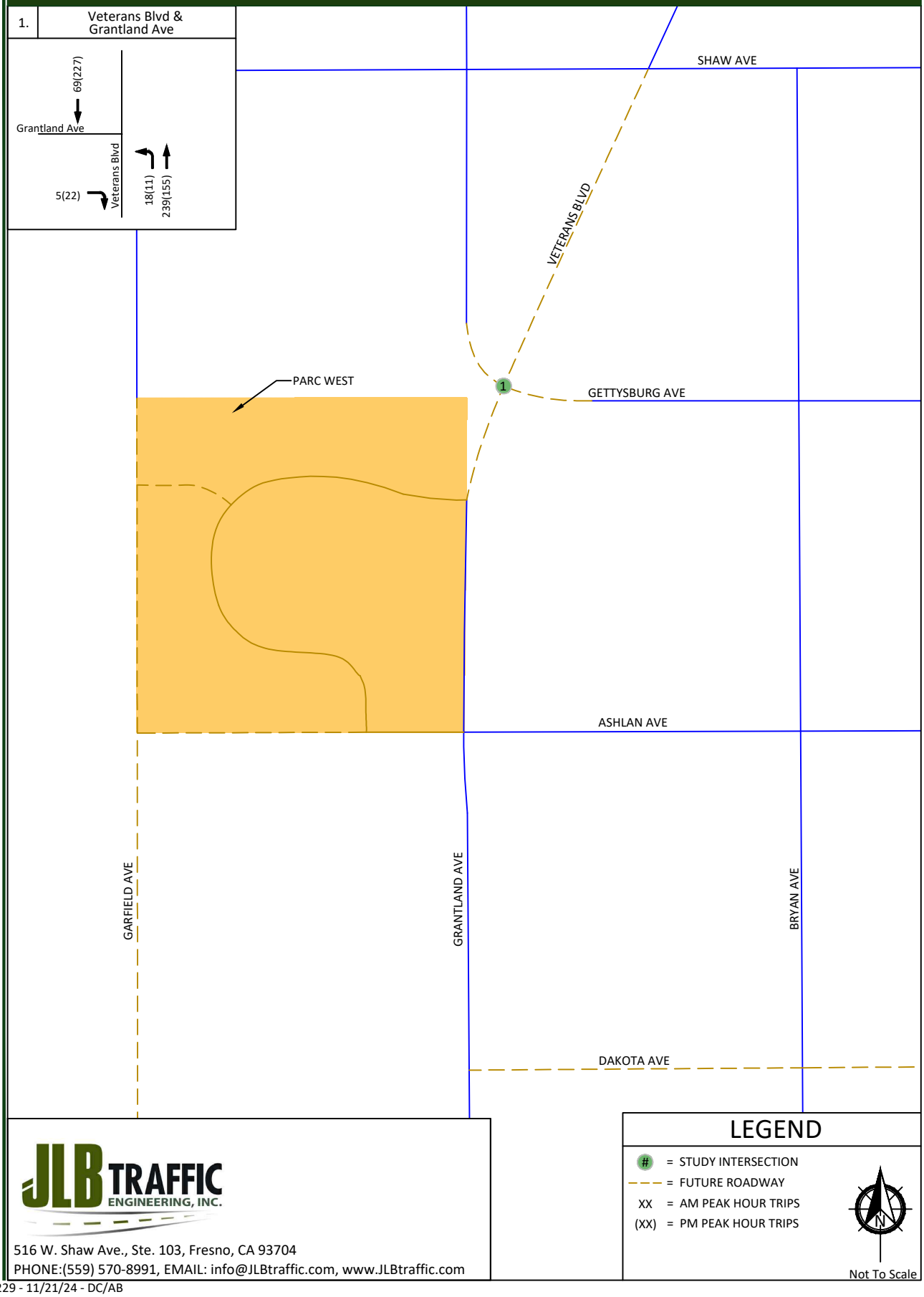


JLB TRAFFIC ENGINEERING, INC.

516 W. Shaw Ave., Ste. 103, Fresno, CA 93704
PHONE:(559) 570-8991, EMAIL: info@JLBtraffic.com, www.JLBtraffic.com

Veterans Boulevard at Grantland-Gettysburg Avenues
City of Fresno
Project Only Trips - Parc West Buildout

Figure 11



LEGEND

- # = STUDY INTERSECTION
- = FUTURE ROADWAY
- XX = AM PEAK HOUR TRIPS
- (XX) = PM PEAK HOUR TRIPS

N

Not To Scale

JLB TRAFFIC ENGINEERING, INC.

516 W. Shaw Ave., Ste. 103, Fresno, CA 93704
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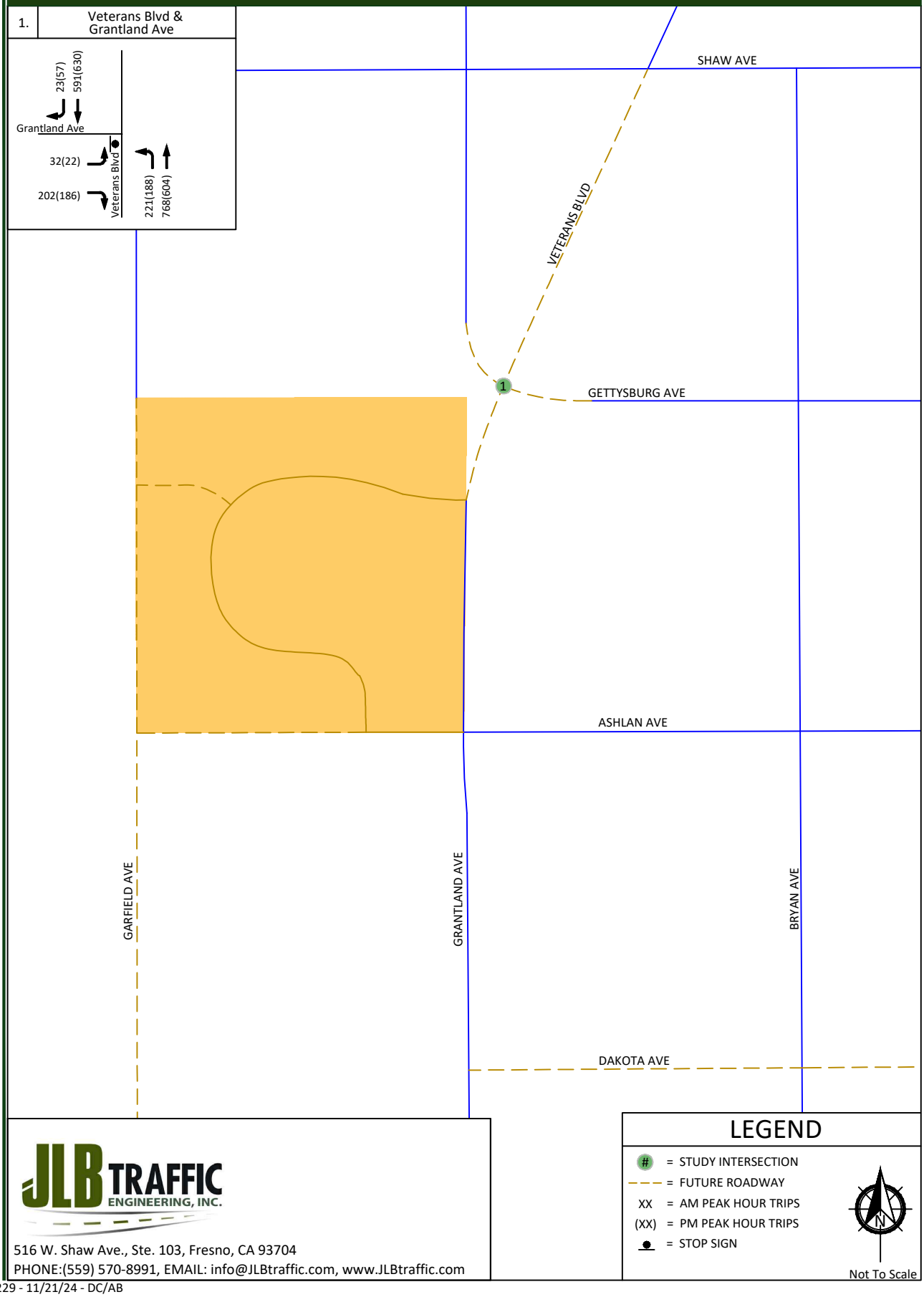
Veterans Boulevard at Grantland-Gettysburg Avenues
City of Fresno
Near Term plus Parc West Buildout

Figure 12



JLB TRAFFIC ENGINEERING, INC.

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PHONE:(559) 570-8991, EMAIL: info@JLBtraffic.com, www.JLBtraffic.com

Queuing Analysis

Table VIII provides a queue length summary for left-turn and right-turn lanes at the study intersection under all study scenarios. The queuing analyses for the study intersection are contained in the LOS worksheets for the respective scenarios. Appendix C contains the methodologies used to evaluate this intersection. Queuing analyses were completed using SimTraffic output information. Synchro provides both 50th and 95th percentile maximum queue lengths (in feet). According to the *Synchro Studio 12 User Guide*, "the 50th percentile maximum queue is the maximum back of queue on a typical cycle and the 95th percentile queue is the maximum back of queue with 95th percentile volumes" (Cubic ITS, Inc., 2023). The queues shown in Table VIII are the 95th percentile queue lengths for the respective lane movements.

The *California Highway Design Manual* (CA HDM) provides guidance for determining deceleration lengths for the left-turn and right-turn lanes based on design speeds. According to the CA HDM, tapers for right-turn lanes are "usually unnecessary since main line traffic need not be shifted laterally to provide space for the right-turn lane. If, in some rare instances, a lateral shift were needed, the approach taper would use the same formula as for a left-turn lane" (Caltrans, 2021). Therefore, a bay taper length pursuant to the CA HDM would need to be added, as necessary, to the recommended storage lengths presented in Table VIII.

The storage capacity for the Near Term plus Parc West Buildout Traffic Conditions shall be based on the SimTraffic output files and engineering judgment. The values in bold presented in Table VIII are the projected queue lengths that will likely need to be accommodated by the Near Term plus Parc West Buildout Traffic Conditions scenario.

Table VIII: Queuing Analysis

ID	*Intersection*	*Existing Queue Storage Length (ft.)*		*Short Term plus 650 Dwelling Units*		*Near Term plus Parc West Buildout*	
				AM	*PM*	*AM*	*PM*
1	Veterans Boulevard / Grantland Avenue	Eastbound Left	*	31	19	51	**57**
		Eastbound Right	*	61	46	133	**107**
		Northbound Left	*	75	59	**245**	169
		Northbound Through	*	0	0	219	199
		Southbound Through	*	0	0	314	368
		Southbound Right	*	7	0	39	**140**

Note: * = Does not exist or is not projected to exist

Conclusions and Recommendations

Conclusions and recommendations regarding the intersection of Veterans Boulevard at Grantland Avenue are presented below.

Existing plus 450 Dwelling Units Traffic Conditions

- Under this scenario, Parc West is estimated to generate approximately 4,244 daily trips, 315 AM peak hour trips and 423 PM peak hour trips.
- An "L" intersection configuration cannot be analyzed for LOS operations given the lack of interaction between the traffic entering the intersection. As a result, the intersection was not able to be analyzed in this scenario. Given this information, it is safe to assume that Veterans Boulevard at Grantland Avenue as the an "L" intersection configuration will operate at an acceptable LOS during both peak periods.
- Therefore, it is recommended that the traffic controls for this intersection utilize a one-way stop sign that serves the southbound approach of Grantland Avenue.

Short Term plus 450 Dwelling Units Traffic Conditions

- The total trip generation for the Short Term Projects is 6,226 daily trips, 581 AM peak hour trips and 639 PM peak hour trips.
- An "L" intersection configuration cannot be analyzed for LOS operations given the lack of interaction between the traffic entering the intersection. As a result, the intersection was not able to be analyzed in this scenario. Given this information, it is safe to assume that Veterans Boulevard at Grantland Avenue as the an "L" intersection configuration will operate at an acceptable LOS during both peak periods.
- Therefore, it is recommended that the traffic controls for this intersection utilize a one-way stop sign that serves the southbound approach of Grantland Avenue.

Short Term plus 650 Dwelling Units Traffic Conditions

- Under this scenario, Parc West is estimated to generate approximately 6,130 daily trips, 455 AM peak hour trips and 611 PM peak hour trips.
- Under this scenario, the study intersection is projected to operate at an acceptable LOS during both peak periods.
- Based on the traffic signal warrant, operational analysis and engineering judgment, it is recommended that construction documents for the signalization of the study intersection be prepared and approved prior to occupancy of the 650th dwelling unit.

Near Term plus Parc West Buildout Traffic Conditions

- The total trip generation for the Near Term Projects is 103,559 daily trips, 5,630 AM peak hour trips and 8,999 PM peak hour trips.
- Under this scenario, Parc West is estimated to generate approximately 7,728 daily trips, 563 AM peak hour trips and 752 PM peak hour trips.

- Under this scenario, the study intersection of Veterans Boulevard at Grantland Avenue is projected to exceed its LOS threshold during both peak periods. It is recommended that the following improvements be implemented to improve the LOS at this intersection.
  - Veterans Boulevard / Grantland Avenue
    - Signalize the intersection with protective left-turn phasing in all directions.

Queuing Analysis

- It is recommended that the City consider left-turn and right-turn lane storage lengths as indicated in the Queuing Analysis.

Study Participants

JLB Traffic Engineering, Inc. Personnel:

Jose Luis Benavides, PE, TE	Project Manager
Matthew Arndt, EIT	Engineer I/II
Christian Sanchez, EIT	Engineer I/II
Adrian Benavides	Engineer I/II
Arjun Dillon	Engineering Aide
Diana Cortes	Engineering Aide

Persons Consulted:

Brian Phelps	Granville Homes
Jill Gormley, TE	City of Fresno
Sophia Pagoulatos	City of Fresno

References

Caltrans. 2019. "Highway Design Manual". Sacramento: State of California.

Caltrans. 2020. “Vehicle Miles Traveled-Focused Transportation Impact Study Guide”. Sacramento: State of California.

Caltrans. 2021. "California Manual on Uniform Traffic Control Devices". Sacramento: State of California.

City of Fresno. 2009. "Traffic Impact Study Guidelines". Fresno: City of Fresno.

City of Fresno. 2014. "Fresno General Plan". Fresno: City of Fresno.

Cubic ITS, Inc. 2023. “Synchro Studio 12 User Guide”. Sugar Land: Trafficware, LLC.

National Academies of Sciences, Engineering, and Medicine. 2022. “Highway Capacity Manual 7th Edition: A Guide for Multimodal Mobility Analysis” Washington: The National Academies Press.

Transportation Research Board. 2016. "Highway Capacity Manual". Washington: The National Academy of Sciences.

Appendix A: Scope of Work

August 9, 2024

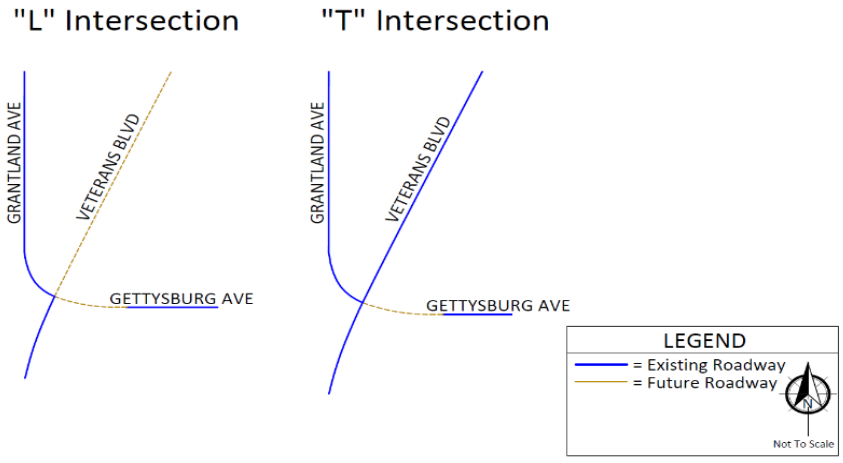
Mrs. Jill Gormley, T.E.
Assistant Director
City of Fresno
2600 Fresno Street
Fresno, CA 93721-3616

Via Email Only: Jill.Gormley@fresno.gov

Subject: ***Draft Scope of Work for the Preparation of a Traffic Operational Analysis for the Intersection of Gettysburg Avenue at Veterans Boulevard-Grantland Avenue in the City of Fresno (JLB Project 004-067)***

Dear Mrs. Gormley,

JLB Traffic Engineering, Inc. (JLB) hereby submits this Draft Scope of Work for the preparation of a Traffic Operational Analysis (TOA) for the above referenced intersection. The Parc West development was conditioned to construct several traffic signals and roadway improvements at different points of development. One of these conditions includes the construction of a traffic signal at the future intersection of Grantland Avenue at Veterans Boulevard prior to occupancy of the 450th dwelling unit. Another of these conductions includes the construction of Veterans Boulevard between the Gettysburg Avenue alignment and Shaw Avenue prior to occupancy of the 650th dwelling unit. As the current Parc West conditions stand, the intersection of Grantland Avenue at future Veterans Boulevard and future Gettysburg Boulevard would be built as an "L" intersection prior to occupancy of the 450th dwelling unit and as a "T" intersection prior to occupancy of the 650th dwelling unit. The "L" and "T" intersections are depicted in the image below. The purpose of this TOA is to determine the timing of the signalization of the intersection of Grantland Avenue with Veterans Boulevard. To complete this analysis, JLB proposes the following TOA Draft Scope of Work.



Scope of Work

- JLB Proposes to utilize the Fresno Council of Governments traffic forecasting model run for the project (Select Zone Analysis) utilized for the original Parc West TIA dated November 27, 2019 .
- JLB will conduct new traffic 24-hour directional volume count for Grantland Avenue between Rialto Avenue and the Gettysburg Avenue alignment. This count will be tabulated in 15-minute intervals.
- JLB will perform a site visit to observe existing traffic conditions, especially during the AM and PM peak hours. Existing roadway conditions including intersection geometrics and traffic controls will be verified.
- JLB will forecast trip distribution based on turn count information, school boundaries and knowledge of the existing and planned circulation network in the vicinity of the Project.
- JLB will evaluate existing and forecasted levels of service (LOS) at the study intersection(s). JLB will use HCM 7 methodologies within Synchro to perform this analysis for the AM and PM peak hours. JLB will identify the causes of poor LOS.
- JLB will prepare California Manual on Uniform Traffic Control Devices (CA MUTCD) peak hour signal warrants for the study intersection under all study scenarios.

Study Scenarios:

1. Existing plus 450 Parc West Single Family Residential Units traffic conditions with proposed improvement measures (if any);
2. Existing plus 450 Parc West Single Family Residential Units + Short Term Projects traffic conditions with proposed improvement measures (if any);
3. Existing plus 650 Parc West Single Family Residential Units + Short Term Projects traffic conditions with proposed improvement measures (if any); and
4. Near Term plus Parc West Buildout traffic conditions with needed improvements (if any).

Weekday (Tuesday, Wednesday, or Thursday Only) peak hours to be analyzed:

1. 7 - 9 AM peak hour
2. 4 - 6 PM peak hour

Study Intersections:

1. Grantland Avenue / Gettysburg Avenue (future) / Veterans Boulevard (future)

Parc West Trip Generation

The trip generation rates for Parc West were obtained from the 11th Edition of the Trip Generation Manual published by the Institute of Transportation Engineers (ITE). Table I presents the trip generation for 450 Single-Family Detached Housing units. At 450 Single Family Detached Housing units, Parc West is estimated to generate approximately 4,244 daily trips, 315 AM peak hour trips and 423 PM peak hour trips.

Table I: Parc West at 450 Single Family Housing Units Trip Generation

Land Use (ITE Code)	*Size*	*Unit*	*Daily*		*AM Peak Hour*						*PM Peak Hour*					
			Rate	*Total*	*Trip Rate*	*In %*	*Out %*	*In*	*Out*	*Total*	*Trip Rate*	*In %*	*Out %*	*In*	*Out*	*Total*
Single-Family Detached Housing (210)	450	d.u.	9.43	4,244	0.70	26	74	82	233	315	0.94	63	37	266	157	423
Total Project Trips				**4,244**				**82**	**233**	**315**				**266**	**157**	**423**

Note: d.u. = Dwelling Units

Table II presents the Parc West trip generation for 650 Single-Family Detached Housing units. At 650 Single Family Detached Housing units, Parc West is estimated to generate approximately of 6,130 daily trips, 455 AM peak hour trips and 611 PM peak hour trips.

Table II: Parc West at 650 Single Family Housing Units Trip Generation

Land Use (ITE Code)	Size	Unit	Daily		AM Peak Hour						PM Peak Hour					
			Rate	Total	Trip Rate	In %	Out %	In	Out	Total	Trip Rate	In %	Out %	In	Out	Total
Single-Family Detached Housing (210)	650	d.u.	9.43	6,130	0.70	26	74	118	337	455	0.94	63	37	385	226	611
Total Project Trips				**6,130**				**118**	**337**	**455**				**385**	**226**	**611**

Note: d.u. = Dwelling Units

Table III presents the Parc West Buildout Trip Generation. At Buildout, Parc West will include the construction of up to 738 Single-Family Detached Housing units, 114 Multifamily Housing (Low Rise) units, and a 1.819-acre Public Park. Parc West at Buildout is estimated to generate approximately 7,728 daily trips, 563 AM peak hour trips and 752 PM peak hour trips.

Table III: Proposed Project Buildout Land Use Trip Generation

Land Use (ITE Code)	Size	Unit	Daily		AM Peak Hour						PM Peak Hour					
			Rate	Total	Trip Rate	In %	Out %	In	Out	Total	Trip Rate	In %	Out %	In	Out	Total
Single-Family Detached Housing (210)	738	d.u.	9.43	6,959	0.70	26	74	134	383	517	0.94	63	37	437	257	694
Multifamily Housing (Low Rise) (220)	114	d.u	6.74	768	0.40	24	76	11	35	46	0.51	63	37	37	21	58
Public Park (411)	1.81	acres	0.78	1	0.02	59	41	0	0	0	0.11	55	45	0	0	0
Total Project Trips				**7,728**				**145**	**418**	**563**				**474**	**278**	**752**

Note: d.u. = Dwelling Units

Short Term and Near Term Cumulative Projects to be Included

Based on our local knowledge of the study area, JLB proposes to include the following projects in the vicinity of the proposed study intersection under the Short Term, Near Term and Buildout of the Parc West Project. Under the Near Term Plus Parc West Buildout analysis, it will be assumed that one hundred percent of these Near Term projects have been developed. For the Existing plus 450 and Existing plus 650 dwelling units, JLB will coordinate with City of Fresno Traffic Engineering the portions of the Short Term or Near Term projects to be assumed to be built prior to completing the analysis for those scenarios. The cumulative projects proposed to be included in the Short Term and Near Term study scenarios are:

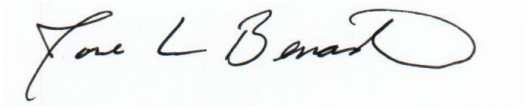
	Short Term Cumulative Project Name	General Location
1.	TT 6162	NE of Hayes Avenue and Ashlan Avenue
2.	TT 6234	NW and SW of Dakota Avenue and Hayes Avenue
3.	TT 6308	NE Bryan Avenue and Ashlan Avenue
4.	Justin Garza High School	NE of Ashlan Avenue and Grantland Avenue

	Near Term Cumulative Project Name	
5.	TT 5479	SE of Dakota Avenue and Cornelia Avenue
6.	TT 5537	SW of Polk Avenue and Dayton Avenue
7.	TT 5538 (portion of)	SE of Ashlan Avenue and Hayes Avenue
8.	TT 5604	NE of Shields Avenue and Hayes Avenue
9.	TT 5756	Ashlan Avenue between Polk Avenue and Hayes Avenue
10.	TT 5766	Ashlan Avenue between Blythe Avenue and Cornelia Avenue
11.	TT 6192	SE of Dakota Avenue and Blythe Avenue
12.	TT 6199	SE of Ashlan Avenue and Grantland Avenue
13.	Ashlan and Blythe Commercial	NE of Ashlan Avenue and Blythe Avenue
14.	Ashlan and Polk Commercial	NE of Ashlan Avenue and Polk Avenue
15.	AutoZone/Pizza Hut Development	SE of Weber Avenue and Clinton Avenue
16.	Dakota Grantland Subdivision	SE of Grantland Avenue and Dakota Avenue
17.	El Paseo (portion of)	SE of Herndon Avenue and Golden State
18.	Fresno Costco	NE of Herndon Avenue and Riverside Avenue
19.	Herndon Hayes Commercial	SW of Herndon Avenue and Hayes Avenue
20.	Jack in the Box	SW of Shaw Avenue and Barcus Avenue
21.	Manufactured Housing Development	SW of Marks Avenue and Olive Avenue
22.	Shaw and 99 Mixed-Use	SE of Island Water Park
23.	Westbridge Apartments	SE of Barstow Avenue and Grantland Avenue
24.	Bella Vista	NW of Veterans Boulevard and Hayes Avenue
25.	Commercial Development	SW of Clinton Avenue and Blythe Avenue
26.	Multi-Family Residential	SE of Herndon Avenue and Riverside Drive

Other Near-Term Projects the City has knowledge of and for which it is anticipated that said project(s) is/are projected to be whole or partially built by the Near Term Plus Project Buildout. City would provide JLB with project details such as a project description, location, proposed land uses with breakdowns and type of residential units and square footage for non-residential uses.

Thank you for your review of the above proposed scope of work. If you have any questions or require additional information, please contact me by phone at (559) 570-8991 or by e-mail at jbenavides@jlbtraffic.com.

Sincerely,



Jose Luis Benavides, P.E., T.E.
President

cc: Matthew Arndt EIT, JLB Traffic Engineering, Inc.

Matt Arndt

From: Jill Gormley <Jill.Gormley@fresno.gov>
Sent: Tuesday, August 27, 2024 6:04 PM
To: Matt Arndt
Subject: RE: Gettysburg Veterans Draft Scope of Work

Hi Matt,

I have the following comments on the scope of work.

1. Please confirm near-term cumulative projects 5, 8,12,15, & 16 are approved.
2. Near term project 21 is too far from the project site and does not need to be included in the analysis.
3. Please include the following near term projects
    a. Lennar development at Veterans/Gettysburg/Grantland
    b. SF development on the SEC of Ashlan/Bryan
    c. Gas Station at Barstow/Grantland
    d. Tract 6294 – Barstow/Grantland
    e. Development NEC Shields/Polk

Let me know if you have any questions.

Jill

From: Jill Gormley
Sent: Thursday, August 22, 2024 2:18 PM
To: 'Matt Arndt' <marndt@jlbtraffic.com>
Subject: RE: Gettysburg Veterans Draft Scope of Work

Hi Matt,

I plan on finishing my review and having comments completed by Tuesday.

Jill

From: Matt Arndt <marndt@jlbtraffic.com>
Sent: Thursday, August 22, 2024 1:32 PM
To: Jill Gormley <Jill.Gormley@fresno.gov>
Subject: RE: Gettysburg Veterans Draft Scope of Work

Hello Jill,

Just following up on this draft scope of Work to see if you had a chance to review. Please let me know if you have any questions.

Appendix B: Traffic Count

Metro Traffic Data Inc.
310 N. Irwin Street - Suite 20
Hanford, CA 93230

800-975-6938 Phone/Fax
www.metrotrafficdata.com

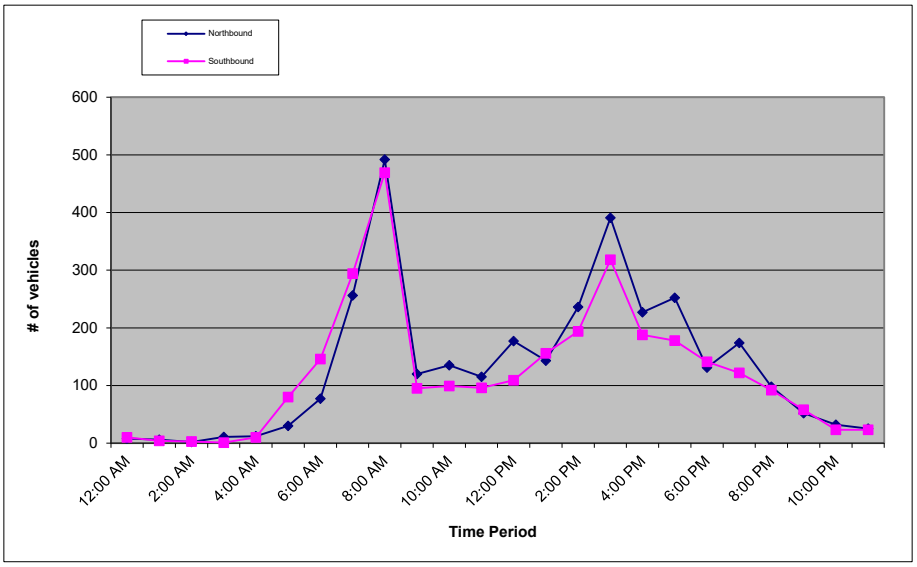
24 Hour Count Report

Prepared For: **JLB Traffic Engineering, Inc.**
516 W. Shaw Ave, Suite 103
Fresno, CA 93704

STREET	Grantland Ave	**LATITUDE**	36.8007628
SEGMENT	South of Rialto Ave	**LONGITUDE**	119.9163831
COLLECTION DATE	Tuesday, August 27, 2024	**WEATHER**	Clear
NUMBER OF LANES	2		

	Northbound					Southbound					Hourly
Hour	1st	2nd	3rd	4th	**Total**	1st	2nd	3rd	4th	**Total**	**Totals**
12:00 AM	0	4	1	3	**8**	2	1	3	4	**10**	**18**
1:00 AM	2	3	0	1	**6**	1	1	1	1	**4**	**10**
2:00 AM	2	0	0	0	**2**	2	1	0	0	**3**	**5**
3:00 AM	6	0	0	5	**11**	0	1	0	0	**1**	**12**
4:00 AM	1	3	5	3	**12**	0	2	1	7	**10**	**22**
5:00 AM	2	11	6	11	**30**	8	11	17	44	**80**	**110**
6:00 AM	7	11	24	35	**77**	32	37	20	57	**146**	**223**
7:00 AM	43	46	71	96	**256**	43	61	67	123	**294**	**550**
8:00 AM	156	180	126	30	**492**	210	195	28	36	**469**	**961**
9:00 AM	28	36	25	31	**120**	21	29	20	25	**95**	**215**
10:00 AM	33	38	32	32	**135**	28	27	16	28	**99**	**234**
11:00 AM	31	28	30	26	**115**	12	30	21	33	**96**	**211**
12:00 PM	26	41	38	72	**177**	23	32	23	31	**109**	**286**
1:00 PM	38	26	42	37	**143**	33	55	40	28	**156**	**299**
2:00 PM	49	40	83	64	**236**	49	34	53	58	**194**	**430**
3:00 PM	58	53	120	160	**391**	72	81	108	57	**318**	**709**
4:00 PM	52	57	70	48	**227**	44	57	38	49	**188**	**415**
5:00 PM	63	60	58	71	**252**	45	41	47	45	**178**	**430**
6:00 PM	39	42	25	25	**131**	42	27	31	41	**141**	**272**
7:00 PM	94	40	22	18	**174**	29	35	19	39	**122**	**296**
8:00 PM	47	27	16	8	**98**	20	24	22	26	**92**	**190**
9:00 PM	12	27	7	6	**52**	18	18	14	8	**58**	**110**
10:00 PM	8	10	12	2	**32**	6	6	5	6	**23**	**55**
11:00 PM	2	18	4	1	**25**	9	2	8	4	**23**	**48**
Total	**52.4%**				**3202**	**47.6%**				**2909**	
	6111										

AM%	**42.1%**	**AM Peak**	**1114**	**7:45 am to 8:45 am**	**AM P.H.F.**	**0.74**
PM%	**57.9%**	**PM Peak**	**709**	**3:00 pm to 4:00 pm**	**PM P.H.F.**	**0.78**



Appendix C: Methodology

Levels of Service Methodology

The description and procedures for calculating capacity and level of service (LOS) are found in the Transportation Research Board, Highway Capacity Manual (HCM). The HCM 7th Edition represents the research on capacity and quality of service for transportation facilities.

Quality of service requires quantitative measures to characterize operational conditions within a traffic stream. Level of service is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience.

Six levels of service are defined for each type of facility that has analysis procedures available. Letters designate each level of service (LOS), from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each LOS represents a range of operating conditions and the driver's perception of these conditions. Safety is not included in the measures that establish an LOS.

Intersection Levels of Service

One of the more important elements limiting and often interrupting the flow of traffic on a highway is the intersection. Flow on an interrupted facility is usually dominated by points of fixed operation such as traffic signals, stop signs and yield signs.

Signalized Intersections

LOS can be characterized for the entire intersection, each intersection approach and each lane group. Control delay alone is used to characterize LOS for the entire intersection or an approach. Control delay and volume-to-capacity ratio are used to characterize LOS for a lane group. Delay quantifies the increase in travel time due to traffic signal control. It is also a surrogate measure of driver discomfort and fuel consumption. The volume-to-capacity ratio quantifies the degree to which a phase's capacity is utilized by a lane group. A description of LOS for signalized intersections is found in Table A-1.

Table 1: Signalized Intersection LOS Description (Motorized Vehicle Mode)

Level of Service	*Description*	*Average Control Delay (Seconds per Vehicle)*
A	Operations with a control delay of 10 seconds/vehicle or less and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is really low and either progression is exceptionally favorable or the cycle length is very short. If it's due to favorable progression, most vehicles arrive during the green indication and travel through the intersection without stopping.	≤10
B	Operations with control delay between 10.1 to 20.0 seconds/vehicle and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the 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.	>10.0 to 20.0
C	Operations with average control delays between 20.1 to 35.0 seconds/vehicle and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio no greater than 1.0, the 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	Operations with control delay between 35.1 to 55.0 seconds/vehicle and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the 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	Operations with control delay between 55.1 to 80.0 seconds/vehicle and a volume-to-capacity ratio no greater than 1.0. This level is typically assigned when the volume-to-capacity ratio is high, progression is unfavorable and the cycle length is long. Individual cycle failures are frequent.	>55 to 80
F	Operations with unacceptable control delay exceeding 80.0 seconds/vehicle and a volume-to-capacity ratio greater than 1.0. This level is typically assigned when the 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

Note: Source: Highway Capacity Manual 7th Edition

All-Way Stop Controlled Intersections

All-way stop controlled intersections are common in the United States. They are characterized by having all approaches controlled by stop sign without any street having priority. Streets intersecting at all-way stop controlled intersections can be public or private. The intersection analysis boundaries for an all-way stop controlled intersection are assumed to be those of an isolated intersection, no upstream or downstream effects are accounted for in analysis.

Two-Way Stop Controlled Intersections

Two-way stop controlled (TWSC) intersections are also common in the United States. A typical configuration is a four-leg intersection in which one street, the major street, is uncontrolled and the other street, the minor street, is controlled by stop signs. The other typical intersection is a three-leg intersection in which a single minor street approach is controlled by a stop sign.

For the analysis of the motorized vehicle mode, the methodology addresses special circumstances that may exist at two-way stop controlled intersections including two-stage gap acceptance, approaches with shared lanes, the presence of upstream traffic signals and flared approaches for minor-street right-turning vehicles. Table A-2 provides a description of LOS at unsignalized intersections.

Table 2: Unsignalized Intersection LOS Description (Motorized Vehicle Mode)

Control Delay (Seconds per Vehicle)	***LOS by Volume-to-Capacity Ratio***	
	v/c ≤ 1.0	***v/c > 1.0***
≤10	A	F
>10 to 15	B	F
>15 to 25	C	F
>25 to 35	D	F
>35 to 50	E	F
>50	F	F

Note: Source: HCM 7th Edition, Exhibit 21-8.

Roundabout Controlled Intersections

Roundabouts are intersections with a generally circular shape, characterized by yield on entry and circulation around a central island. Roundabouts have been used successfully throughout the world and are being used increasingly in the United States, especially since 1990. Intersection analysis models generally fall into two categories: regression models and analytical models. Regression models use field data to develop statistically derived relationships between geometric features and performance measures such as capacity and delay. Analytical models are based on traffic flow theory combined with field measures of driver behavior, resulting in an analytical formulation of the relationship of driver behavior, resulting in an analytical formulation of the relationship between those field measures and performance measures such as capacity and delay. Table A-3 provides a description of LOS at roundabout intersections.

Table 3: Roundabout Intersection Level of Service Description (Automobile Mode)

Control Delay (Seconds per Vehicle)	***LOS by Volume-to-Capacity Ratio***	
	v/c ≤ 1.0	***v/c > 1.0***
≤10	A	F
>10 to 15	B	F
>15 to 25	C	F
>25 to 35	D	F
>35 to 50	E	F
>50	F	F

Note: Source: HCM 7th Edition, Exhibit 22-8.

Segment Levels of Service

Segments are portions of roads without any interruption of flow. These typically include basic freeway segments, multilane highway segments, freeway weaving segments, freeway merge and diverge segments, two-lane highway segments and urban street segments.

Urban Street Segments (Motorized Vehicle Mode)

The term "urban street segments" refers to two elements that are found: points and segments. A point is the boundary between links and is represented by an intersection or ramp terminal. A link is a length of roadway between two points. A link and its boundary are referred to as a segment. A signalized intersection is always used to define a boundary. Only intersections, or ramp terminals, in which the segment through volumes is uncontrolled can exist along the segment. A midsegment traffic control signal provided for the exclusive use of pedestrians should not be used to define a segment boundary. Chapter 18 of the Highway Capacity Manual categorizes each LOS as follows:

LOS A describes primarily free-flow operation. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Control delay at signalized intersections is minimal. Travel speeds exceed 80 percent of the base free flow speed (FFS) and the volume-to-capacity ratio is no greater than 1.0.

LOS B describes reasonably unimpeded operation. The ability to maneuver within the traffic stream is only slightly restricted and control delay at the boundary intersections is not significant. The travel speed is between 67 and 80 percent of the base FFS and the volume-to-capacity ratio is no greater than 1.0.

LOS C describes stable operations. The ability to maneuver and change lanes in midblock location may be more restricted than at LOS B. Longer queues at the boundary intersections may contribute to lower travel speeds. The travel speed is between 50 and 67 percent of the base FFS and the volume-to-capacity ratio is no greater than 1.0.

LOS D indicates a less stable condition in which small increases in flow may cause substantial increases in delay and decreases in travel speed. This operation may be due to adverse signal progression, high volumes or inappropriate signal timing at the boundary intersections. The travel speed is between 40 and 50 percent of the base FFS and the volume-to-capacity ratio is no greater than 1.0.

LOS E is characterized as an unstable operation and has significant delay. Such operations may be due to some combination of adverse progression, high volume and inappropriate signal timing at the boundary intersections. The travel speed is between 30 and 40 percent of the base FFS and the volume-to-capacity ratio is no greater than 1.0.

LOS F is characterized by flow at extremely low speed. Congestion is likely occurring at the boundary intersections, as indicated by high delay and extensive queuing. The travel speed is 30 percent or less of the base FFS or the volume-to-capacity ratio is greater than 1.0.

Urban Street Segments LOS

Two performance measures are used to characterize vehicular LOS for a given direction of travel along an urban street segment. One measure is travel speed for through vehicles. This speed reflects the factors that influence running time along the link and the delay uncured by through vehicles at the boundary intersections. The second measures Is the volume-to-capacity ratio for the through movements at the downstream boundary intersection. These performance measures indicate the degree of mobility provided by the segment. Table A-4 provides a description of LOS for Urban Street Segments.

Table 4: Urban Street Segment Levels of Service (Motorized Vehicle Mode)

LOS	*Travel Speed Threshold by Base Free-Flow Speed (miles/hour)*							*Volume-to-Capacity Ratio*
	55	**50**	**45**	**40**	**35**	**30**	**25**	
A	>44	>40	>36	>32	>28	>24	>20	≤ 1.0
B	>37	>34	>30	>27	>23	>20	>17	
C	>28	>25	>23	>20	>18	>15	>13	
D	>22	>20	>18	>16	>14	>12	>10	
E	>17	>15	>14	>12	>11	>9	>8	
F	≤17	≤15	≤14	≤12	≤11	≤9	≤8	
F	Any							> 1.0

Note: a = Volume-to-capacity ratio of through movement at downstream boundary intersection.
Source: Highway Capacity Manual 7th Edition, Exhibit 18-1.

Basic Freeway and Multilane Highway Segments

Segments of multilane highways and basic freeways outside the influence of merging maneuvers, diverging maneuvers, weaving maneuvers, or signalized intersections define LOS by density. Density describes a motorist's proximity to other vehicles and is related to a motorist's freedom to maneuver within the traffic stream. Chapter 12 of the Highway Capacity Manual categorizes each LOS as follows:

LOS A describes free-flow operations. FFS prevails on the freeway or multilane highway, and vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream. The effects of incidents or point breakdowns are easily absorbed.

LOS B represents reasonably free-flow operations, and FFS on the freeway or multilane highway is maintained. The ability to maneuver within the traffic stream is only slightly restricted, and the general level of physical and psychological comfort provided to drivers is still high. The effects of minor incidents are still easily absorbed.

LOS C provides for flow with speeds near the FFS of the freeway or multilane highway. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver. Minor incidents may still be absorbed, but the local deterioration in service quality will be significant. Queues may be expected to form behind any significant blockages.

LOS D is the level at which speeds begin to decline with increasing flows, with density increasing more quickly. Freedom to maneuver within the traffic stream is seriously limited, and drivers experience reduced physical and psychological comfort levels. Even minor incidents can be expected to create queuing, because the traffic stream has little space to absorb disruptions.

LOS E describes operation at or near capacity. Operations on the freeway or multilane highway at this level are highly volatile because there are virtually no usable gaps within the traffic stream, leaving little room to maneuver within the traffic stream. Any disruption to the traffic stream, such as vehicles entering from a ramp or an access point or a vehicle changing lanes, can establish a disruption wave that propagates throughout the upstream traffic stream. Toward the upper boundary of LOS E, the traffic stream has no ability to dissipate even the most minor disruption, and any incident can be expected to produce a serious breakdown and substantial queuing. The physical and psychological comfort afforded to drivers is poor.

LOS F describes unstable flow. Such conditions exist within queues forming behind bottlenecks. Breakdowns occur for a number of reasons:

- Traffic incidents can temporarily reduce the capacity of a short segment so that the number of vehicles arriving at a point is greater than the number of vehicles that can move through it.
- Points of recurring congestion, such as merge or weaving segments and lane drops, experience very high demand in which the number of vehicles arriving is greater than the number of vehicles that can be discharged.
- In analyses using forecast volumes, the projected flow rate can exceed the estimated capacity of a given location.

Basic Freeway

Basic Freeway segments generally have four to eight lanes (in both directions) and posted speed limits between 50 and 75 mi/hr. The median type depends on right-of-way constraints and other factors. The performance measures include capacity, free flow speed, demand and volume-to-capacity ratio, space mean speed, average density and LOS. The following performance measures are evaluated for each segment: capacity, FFS, demand-to-capacity or volume-to-capacity ratios, space mean average, average density, travel time, vehicle miles traveled, vehicle hours of travel and vehicle hours of delay. Table A-5 provides a description of LOS for Basic Freeway Segments.

Multilane Highway

Multilane Highway segments generally have four to six lanes (in both directions) and posted speed limits between 40 and 55 mi/hr. These highways may be divided, undivided or divided by a two-way left-turn lane. The performance measures include capacity, free flow speed, demand and volume-to-capacity ratio, space mean speed, average density and LOS. The following performance measures are evaluated for each segment: capacity, FFS, demand-to-capacity or volume-to-capacity ratios, space mean average, average density, travel time, vehicle miles traveled, vehicle hours of travel and vehicle hours of delay. Table A-5 provides a description of LOS for Multilane Highway Segments.

Table 5: Basic Freeway and Multilane Highway Segment Level of Service Description

Level of Service	*Density (Passenger Cars per Mile per Lane)*	
	Urban	*Rural*
A	≤11	≤6
B	>11 to 18	>6 to 14
C	>18 to 26	>14 to 22
D	>26 to 35	>22 to 29
E	>35 to 45	>29 to 39
F	>45 or Demand Exceeds Capacity	>39 or Demand Exceeds Capacity

Note: Source: HCM 7th Edition, Exhibit 10-6.

Two-Lane Highway Segments

Two-Lane Highways generally have one lane per direction. The single lane in each direction may be supplemented with passing lanes, truck climbing lanes, turnouts or pullouts. If allowed, passing maneuvers are limited by the availability of gaps in the opposing traffic stream and by the availability of sufficient sight distance for a driver to discern the approach of an opposing vehicle safely. A principal measure of LOS is average speed, percent followers and follower density. Chapter 15 of the Highway Capacity Manual categorizes each LOS as follows:

At **LOS A**, motorists experience operating speeds near the posted speed limit and little difficulty in passing. Platooning is minimal and follower density is very low.

At **LOS B through LOS D,** represent gradations between the conditions for LOS A and LOS E.

At **LOS E**, speeds may still be reasonable, but platooning is significant and follower density is high. Passing, if allowed is essentially impossible.

LOS F exists whenever demand flow in one or both directions exceeds the segment's capacity. When demand exceeds capacity, it is expected that there will be a reduction in the capacity at the bottleneck.

Two-Lane Highway

The performance measures include average speed, FFS and follower density. The LOS output is calculated for an establish segment boundary that includes consistent terrain, lane widths, shoulder widths, facility classification and demand flow rate. Table A-6 provides a description of LOS for Two-Lane Highway Segments.

Table 6: Two-Lane Highway Segment Level of Service Description

LOS	*Follower Density (Followers per Mile per Lane)*	
	Higher-Speed Highways Posted Speed Limit ≥ 50 miles per hour	*Lower-Speed Highways Posted Speed Limit < 50 miles per hour*
A	≤2.0	≤2.5
B	>2.0 to 4.0	>2.5 to 5.0
C	>4.0 to 8.0	>5.0 to 10.0
D	>8.0 to 12.0	>10.0 to 15.0
E	>12.0	>15.0

Note: Source: HCM 7th Edition, Exhibit 15-6.

Appendix D: Short Term plus 650 Dwelling Units Traffic Conditions

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	165	173	625	504	3
Future Vol, veh/h	8	165	173	625	504	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	250	0	250	-	-	250
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	74	74	74	74	74	74
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	11	223	234	845	681	4

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1993	681	685	0	-	0
Stage 1	681	-	-	-	-	-
Stage 2	1312	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	66	449	904	-	-	-
Stage 1	501	-	-	-	-	-
Stage 2	251	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	49	449	904	-	-	-
Mov Cap-2 Maneuver	49	-	-	-	-	-
Stage 1	371	-	-	-	-	-
Stage 2	251	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	24.28	2.25	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	904	-	49	449	-	-
HCM Lane V/C Ratio	0.259	-	0.221	0.497	-	-
HCM Control Delay (s/veh)	10.4	-	98.3	20.7	-	-
HCM Lane LOS	B	-	F	C	-	-
HCM 95th %tile Q(veh)	1	-	0.7	2.7	-	-

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	114	115	426	430	9
Future Vol, veh/h	5	114	115	426	430	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	250	0	250	-	-	250
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	78	78	78	78	78	78
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	6	146	147	546	551	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1392	551	563	0	-	0
Stage 1	551	-	-	-	-	-
Stage 2	841	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	156	532	1004	-	-	-
Stage 1	575	-	-	-	-	-
Stage 2	421	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	133	532	1004	-	-	-
Mov Cap-2 Maneuver	133	-	-	-	-	-
Stage 1	491	-	-	-	-	-
Stage 2	421	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	15.12	1.96	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1004	-	133	532	-	-
HCM Lane V/C Ratio	0.147	-	0.048	0.275	-	-
HCM Control Delay (s/veh)	9.2	-	33.5	14.3	-	-
HCM Lane LOS	A	-	D	B	-	-
HCM 95th %tile Q(veh)	0.5	-	0.2	1.1	-	-

Intersection: 1: Veterans Boulevard & Grantland Avenue

Movement	EB	EB	NB	SB
Directions Served	L	R	L	R
Maximum Queue (ft)	49	68	92	20
Average Queue (ft)	9	36	44	1
95th Queue (ft)	31	61	75	7
Link Distance (ft)		1063		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	250		250	250
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 0

Intersection: 1: Veterans Boulevard & Grantland Avenue

Movement	EB	EB	NB
Directions Served	L	R	L
Maximum Queue (ft)	26	68	71
Average Queue (ft)	4	27	32
95th Queue (ft)	19	46	59
Link Distance (ft)		1063	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	250		250
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Appendix E: Near Term plus Parc West Buildout Traffic Conditions

Intersection	
Int Delay, s/veh	19.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	32	202	221	768	591	23
Future Vol, veh/h	32	202	221	768	591	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	250	0	250	-	-	250
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	74	74	74	74	74	74
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	43	273	299	1038	799	31

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2434	799	830	0	-	0
Stage 1	799	-	-	-	-	-
Stage 2	1635	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	~ 35	384	798	-	-	-
Stage 1	441	-	-	-	-	-
Stage 2	174	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 22	384	798	-	-	-
Mov Cap-2 Maneuver	~ 22	-	-	-	-	-
Stage 1	276	-	-	-	-	-
Stage 2	174	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	44.41	2.72	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	798	-	22	384	-	-
HCM Lane V/C Ratio	0.374	-	1.992	0.711	-	-
HCM Control Delay (s/veh)	12.2	-	$ 839.3	34.3	-	-
HCM Lane LOS	B	-	F	D	-	-
HCM 95th %tile Q(veh)	1.7	-	5.6	5.3	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

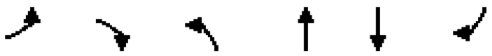
Intersection	
Int Delay, s/veh	7.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	22	186	188	604	630	57
Future Vol, veh/h	22	186	188	604	630	57
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	250	0	250	-	-	250
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	78	78	78	78	78	78
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	28	238	241	774	808	73

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2064	808	881	0	-	0
Stage 1	808	-	-	-	-	-
Stage 2	1256	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	60	380	763	-	-	-
Stage 1	437	-	-	-	-	-
Stage 2	267	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	41	380	763	-	-	-
Mov Cap-2 Maneuver	41	-	-	-	-	-
Stage 1	299	-	-	-	-	-
Stage 2	267	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	47.66	2.82	0
HCM LOS	E		

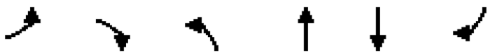
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	763	-	41	380	-	-
HCM Lane V/C Ratio	0.316	-	0.692	0.628	-	-
HCM Control Delay (s/veh)	11.9	-	203.6	29.2	-	-
HCM Lane LOS	B	-	F	D	-	-
HCM 95th %tile Q(veh)	1.4	-	2.6	4.1	-	-



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	32	202	221	768	591	23
Future Volume (veh/h)	32	202	221	768	591	23
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	43	273	299	1038	799	31
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	343	305	333	1299	872	739
Arrive On Green	0.19	0.19	0.19	0.70	0.47	0.47
Sat Flow, veh/h	1767	1572	1767	1856	1856	1572
Grp Volume(v), veh/h	43	273	299	1038	799	31
Grp Sat Flow(s),veh/h/ln	1767	1572	1767	1856	1856	1572
Q Serve(g_s), s	2.0	17.0	16.6	38.1	40.2	1.1
Cycle Q Clear(g_c), s	2.0	17.0	16.6	38.1	40.2	1.1
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	343	305	333	1299	872	739
V/C Ratio(X)	0.13	0.90	0.90	0.80	0.92	0.04
Avail Cap(c_a), veh/h	423	376	402	1581	1081	916
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.4	39.4	39.7	10.2	24.7	14.4
Incr Delay (d2), s/veh	0.2	20.1	19.7	2.5	10.5	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	1.7	8.7	12.2	18.3	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	33.5	59.5	59.5	12.7	35.2	14.4
LnGrp LOS	C	E	E	B	D	B
Approach Vol, veh/h	316			1337	830	
Approach Delay, s/veh	56.0			23.1	34.4	
Approach LOS	E			C	C	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		75.5		24.7	23.1	52.4
Change Period (Y+Rc), s		5.3		5.3	4.2	5.3
Max Green Setting (Gmax), s		85.4		24.0	22.8	58.4
Max Q Clear Time (g_c+I1), s		40.1		19.0	18.6	42.2
Green Ext Time (p_c), s		10.3		0.5	0.3	4.9

Intersection Summary	
HCM 7th Control Delay, s/veh	31.1
HCM 7th LOS	C



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	22	186	188	604	630	57
Future Volume (veh/h)	22	186	188	604	630	57
Initial Q (Qb), veh	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	28	238	241	774	808	73
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	313	279	281	1292	904	766
Arrive On Green	0.18	0.18	0.16	0.70	0.49	0.49
Sat Flow, veh/h	1767	1572	1767	1856	1856	1572
Grp Volume(v), veh/h	28	238	241	774	808	73
Grp Sat Flow(s),veh/h/ln	1767	1572	1767	1856	1856	1572
Q Serve(g_s), s	1.1	12.3	11.1	18.2	33.1	2.1
Cycle Q Clear(g_c), s	1.1	12.3	11.1	18.2	33.1	2.1
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	313	279	281	1292	904	766
V/C Ratio(X)	0.09	0.85	0.86	0.60	0.89	0.10
Avail Cap(c_a), veh/h	506	450	354	1714	1249	1059
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.8	33.4	34.3	6.6	19.5	11.5
Incr Delay (d2), s/veh	0.1	8.7	15.6	0.4	6.6	0.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	10.8	5.7	4.8	13.6	0.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	28.9	42.1	49.9	7.1	26.1	11.6
LnGrp LOS	C	D	D	A	C	B
Approach Vol, veh/h	266			1015	881	
Approach Delay, s/veh	40.8			17.2	24.9	
Approach LOS	D			B	C	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		63.6		20.1	17.5	46.1
Change Period (Y+Rc), s		5.3		5.3	4.2	5.3
Max Green Setting (Gmax), s		77.4		24.0	16.8	56.4
Max Q Clear Time (g_c+I1), s		20.2		14.3	13.1	35.1
Green Ext Time (p_c), s		6.0		0.6	0.2	5.7

Intersection Summary	
HCM 7th Control Delay, s/veh	23.2
HCM 7th LOS	C

Intersection: 1: Veterans Boulevard & Grantland Avenue

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	70	150	342	253	328	49
Average Queue (ft)	20	78	149	117	202	12
95th Queue (ft)	51	133	245	219	314	39
Link Distance (ft)		1063		2073	2789	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	250		250			250
Storage Blk Time (%)			1	0	4	
Queuing Penalty (veh)			9	0	1	

Network Summary

Network wide Queuing Penalty: 10

Intersection: 1: Veterans Boulevard & Grantland Avenue

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (ft)	92	137	187	270	479	370
Average Queue (ft)	16	62	113	90	201	34
95th Queue (ft)	57	107	169	199	368	140
Link Distance (ft)		1063		2073	2789	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	250		250			250
Storage Blk Time (%)				1	5	
Queuing Penalty (veh)				1	3	

Network Summary

Network wide Queuing Penalty: 4

Appendix F: Traffic Signal Warrants

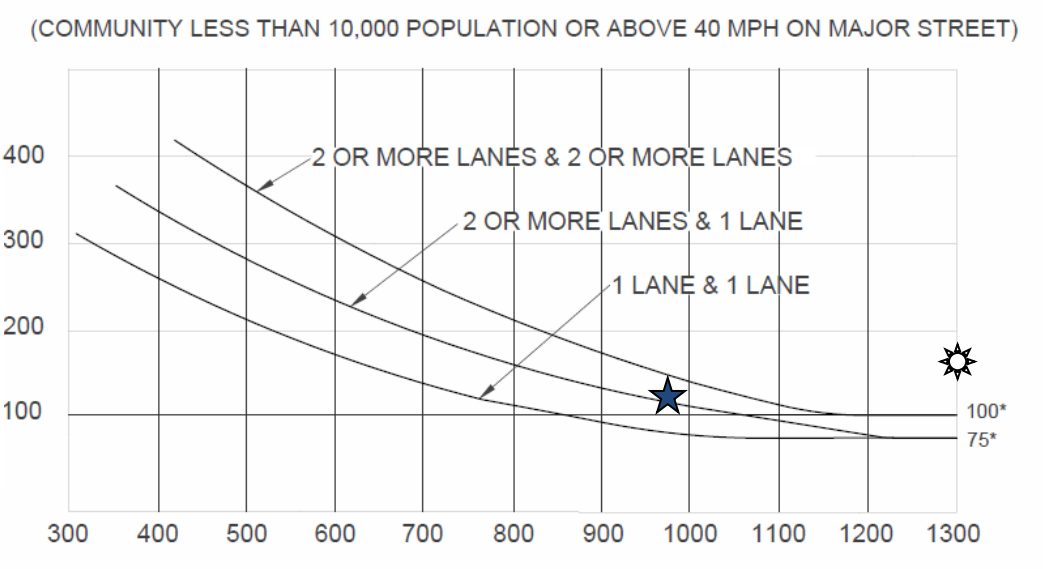
Warrant 3: Peak Hour (Rural)

Short Term plus 650 Dwelling Units Traffic Conditions
1. Veterans Boulevard / Grantland Avenue
AM (PM) Peak Hour

Grantland Avenue

Highest Approach Volume =

173 (119) VPH



Veterans Boulevard Total of Both Approaches =

1305 (980) VPH

*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

AM Peak Hour – Signal Warrant is Met

PM Peak Hour – Signal Warrant is Met

Source: California Manual of Uniform Traffic Control Devices (CA MUTCD 2014 Edition)
Chapter 4C: Traffic Control Signal Needs Studies
Part 4: Highway Traffic Signals
November 7, 2014

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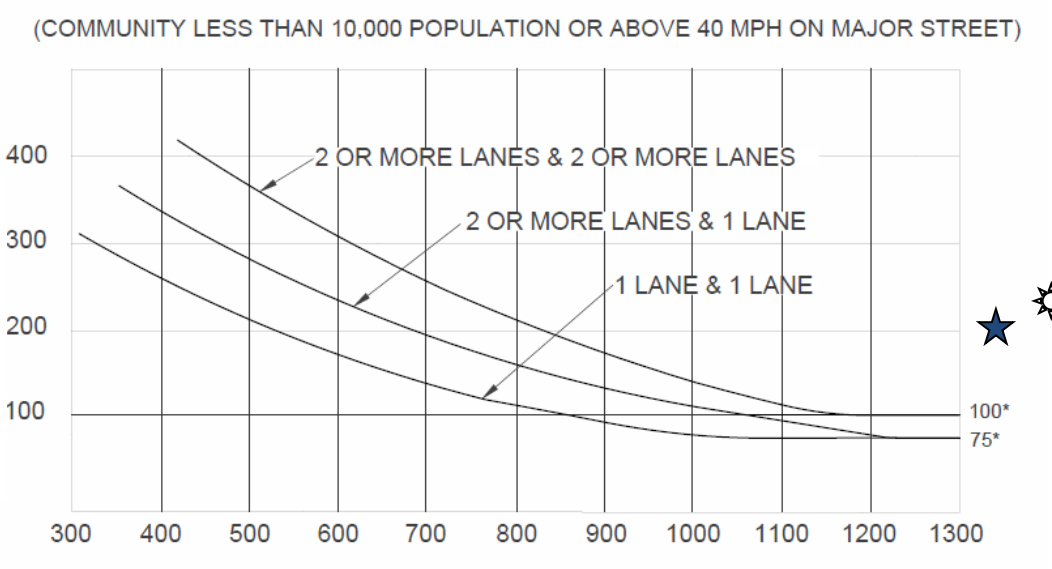
Warrant 3: Peak Hour (Rural)

Near Term plus Project Buildout Traffic Conditions
1. Veterans Boulevard / Grantland Avenue
AM (PM) Peak Hour

Grantland Avenue

Highest Approach Volume =

234 (208) VPH



Veterans Boulevard Total of Both Approaches =

1603 (1479) VPH

*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

AM Peak Hour – Signal Warrant is Met

PM Peak Hour – Signal Warrant is Met

Source: California Manual of Uniform Traffic Control Devices (CA MUTCD 2014 Edition)
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