

May 20, 2019

PK # 2609-19.157

TRAFFIC SIGNAL WARRANT ANALYSIS

Intersection of:

Northwest Highway at Tulane Boulevard

In Dallas, Texas

Prepared for:

City of Dallas

On behalf of:

Preston Place Condominium Association

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TX.REG: ENGINEERING FIRM F-469

TX. REG. SURVEYING FIRM LS-100080-00

EXECUTIVE SUMMARY

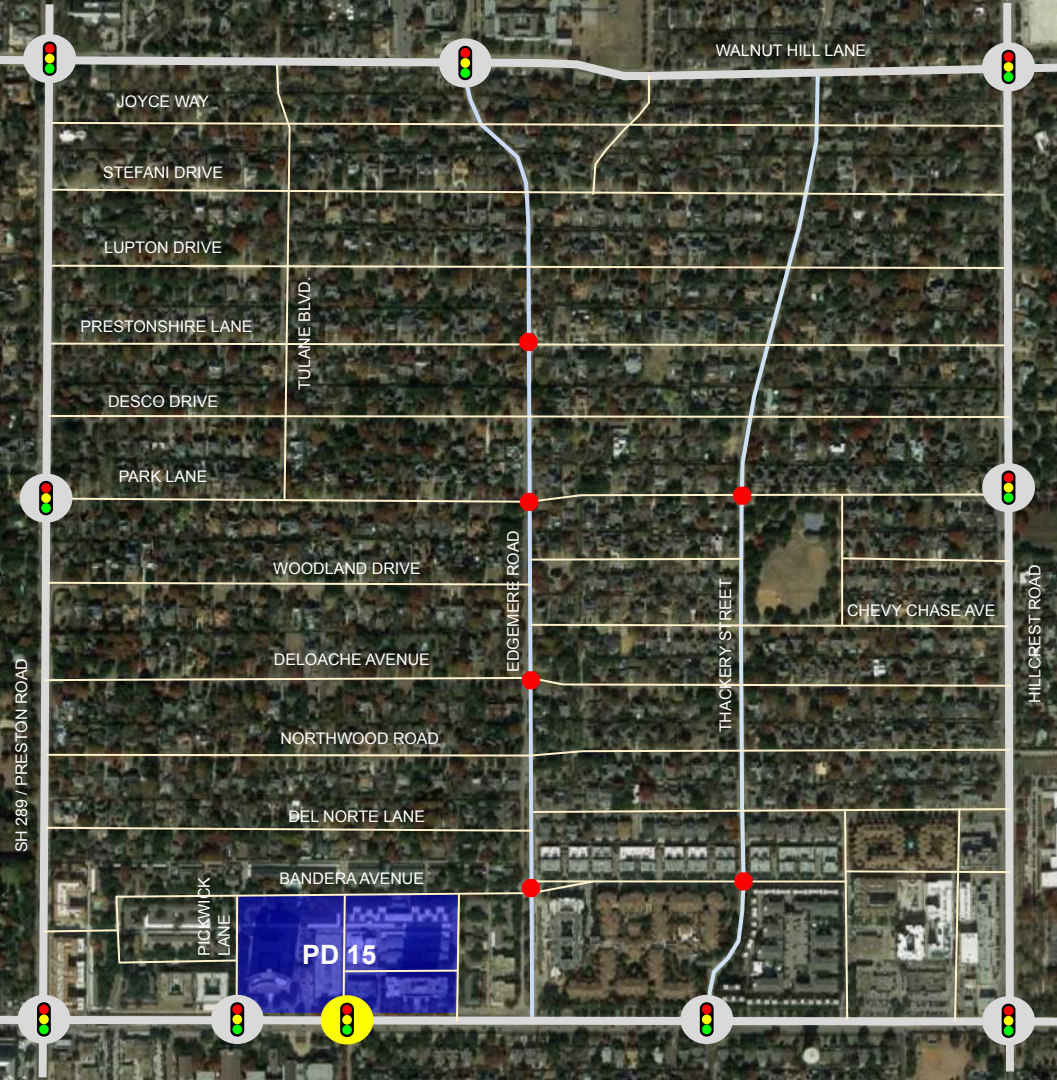
The services of **Pacheco Koch** (PK) were retained by **Preston Place Condominium Association** to conduct a cursory Traffic Signal Warrant Analysis (TSWA) for the *proposed, new* intersection of Northwest Highway at Tulane Boulevard (a private street) in Dallas, Texas. The analysis was based upon existing conditions, as collected on Wednesday, March 27, 2019, with the addition of projected increases in site-generated traffic resulting from potential redevelopment within PD 15. This engineering study was performed in accordance with the traffic signal warrant criteria described in the latest edition of the *Texas Manual on Uniform Traffic Control Devices*.

Based upon Pacheco Koch's technical analysis of the traffic-volume-related traffic signal warrant criteria, it was determined that, at buildout conditions of the potential redevelopment of PD 15, the subject intersection will NOT meet the minimum warrants for the installation of a traffic signal.

The findings of this analysis are subject to the review by and approval of the City of Dallas staff.

END

EXHIBIT 1. STUDY AREA



LEGEND:

- EXISTING TRAFFIC SIGNAL
- PROPOSED TRAFFIC SIGNAL
- EXISTING ALL-WAY STOP



1000 ft

TRAFFIC SIGNAL WARRANT ANALYSIS
Intersection of Northwest Highway at Tulane Boulevard
Dallas, Texas

TABLE OF CONTENTS

EXECUTIVE SUMMARY i

LOCATION MAPii

INTRODUCTION 1

BACKGROUND 1

Description of Intersection 1

Existing Traffic Volumes 2

Site-Generated Traffic Volumes..... 2

Projected Traffic Volumes..... 2

TRAFFIC SIGNAL WARRANT ANALYSIS 2

Traffic Signal Warrants 2

Study Scope 3

Analysis Results 3

 Warrant 1 – Eight-Hour Vehicular Volumes 3

 Warrant 2 - Four-Hour Vehicular Volumes 3

 Warrant 3 - Peak Hour 4

SUMMARY OF FINDINGS 5

LIST OF TABLES:

Table 1. Intersection Characteristics

Table 2. Background Intersection Information

Table 3. Summary of Results

LIST OF EXHIBITS:

Exhibit 1. Location Map

LIST OF APPENDICES:

Appendix A. Current Traffic Volumes

Appendix B. Site-Generated Traffic Volumes

Appendix C. Excerpts from *Texas Manual On Uniform Traffic Control
Devices*

Appendix D. Detailed Warrant Analysis Results

INTRODUCTION

The services of **Pacheco Koch** (PK) were retained by **Preston Place Condominium Association** to conduct a Traffic Signal Warrant Analysis (TSWA) for the *proposed*, new intersection of Northwest Highway at Tulane Boulevard in Dallas, Texas. This analysis was based upon projected traffic volumes, derived from existing traffic volumes collected at nearby intersections on Wednesday, March 27, 2019, with the addition of projected increases in site-generated traffic resulting from potential redevelopment within PD 15. A location map of the subject intersection (**Exhibit 1**) is provided for reference following the EXECUTIVE SUMMARY.

For a traffic signal to be warranted, an engineering study of the intersection is required to determine if at least one of nine, predefined, traffic signal warrants are (or will be) satisfied. The warrant criteria are summarized in the 2014 *Texas Manual on Uniform Traffic Control Devices* (TMUTCD). To obtain approval for installation of a traffic signal, staff of the agency responsible for traffic operations of the intersection must agree that one or more traffic signal warrants is satisfied and determine that installation of a traffic signal is appropriate and can be operated safely and efficiently.

This TSWA was prepared by traffic engineers at Pacheco Koch (the "Engineer") in accordance with industry and local standards. Pacheco Koch is a licensed engineering firm based in Dallas, Texas, that provides professional engineering and related services.

BACKGROUND

Description of Intersection

Currently, Tulane Boulevard (a private street) terminates at Northwest Parkway and does not intersect Northwest Highway. However, creation of a new intersection with Northwest Highway has been proposed in order to provide direct access to the PD 15 district. This hypothetical intersection is the subject of this analysis.

The major street, Northwest Highway, has a six-lane, median-divided cross-section with a 35-MPH posted speed limit. [NOTE: The City of Dallas staff has indicated that an increase to a 45-MPH speed limit has been approved and will be implemented in the future.] Tulane Boulevard, north of Northwest Parkway, has a narrow cross-section of approximately 20 feet.

Nearby traffic signals are located at the intersection of Northwest Highway at Pickwick Lane approximately 600-feet west of the subject intersection and at the intersection of Northwest Highway and Thackery Street approximately 2,000-feet east of the subject intersection.

Existing Traffic Volumes

Data used in this analysis were derived from traffic counts taken at nearby intersections on Wednesday, March 27, 2019. (Pneumatic 'road tube' counts were used for off-peak period volumes). Detailed volume data are summarized in **Appendix A**.

Site-Generated Traffic Volumes

For this analysis, projected traffic volumes generated by the potential PD 15 redevelopment, as described in the associated traffic study prepared by Pacheco Koch, were added to the background traffic volumes. The site generated volumes were calculated by the typical four-step of trip generation; trip distribution; traffic assignment; and mode split. **Appendix B** provides summaries of these analyses.

Projected Traffic Volumes

The traffic volumes used in the traffic signal warrant analysis represent the sum of projected background traffic volumes plus projected PD 15 redevelopment traffic volumes. (NOTE: Existing traffic volumes were adjusted to account for anticipated changes in traffic patterns resulting from the hypothetical installation of a traffic signal at the Northwest Highway-Tulane intersection.)

TRAFFIC SIGNAL WARRANT ANALYSIS

Traffic Signal Warrants

The TMUTCD defines a series of nine traffic signal warrants to be used in the investigation of a traffic signal installation. These warrants are listed as follows:

- Warrant 1 — Eight-Hour Vehicular Volume
- Warrant 2 — Four-Hour Vehicular Volume
- Warrant 3 — Peak Hour
- Warrant 4 — Pedestrian Volume
- Warrant 5 — School Crossing
- Warrant 6 — Coordinated Signal System
- Warrant 7 — Crash Experience
- Warrant 8 — Roadway Network
- Warrant 9 — Intersection Near a Grade Crossing

A description of the warrants as obtained from §4C-01 of the TMUTCD are provided in **Appendix C**. It is important to note that the intersection Level of Service (LOS) is not a warrant for signal installation. The TMUTCD states:

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal. A traffic control signal should not be installed unless one or more of the factors described in this [manual] are met. A traffic control signal should not be installed unless an engineering study indicates that installing a traffic control signal will improve the overall safety and/or operation of the intersection.

Study Scope

The scope of this Traffic Signal Warrant Analysis was to evaluate whether the projected traffic volumes will be sufficient to warrant installation of a traffic signal. Therefore, Warrant 1: Eight-Hour Vehicular Volumes, Warrant 2: Four-Hour Vehicular Volumes, and Warrant 3: Peak Hour were analyzed. (NOTE: Some agencies reserve application of Warrant 3 for special cases only. However, analysis results for Warrant 3 are provided for consideration.)

Based upon the location and physical conditions of the hypothetical intersection, it is Pacheco Koch's finding that Warrants 4-9 do not apply to the subject intersection.

Analysis Results

By applying all the warrant criteria and data, the applicable traffic signal warrants were analyzed. A detailed summary of this traffic signal warrant analysis data are provided in **Appendix D**; and a written summary of each warrant is provided in the following sections.

Warrant 1 – Eight-Hour Vehicular Volumes

Condition A — This application is used where a large volume of intersecting traffic is the principal reason for installing a traffic signal. The total major street approach volumes must be greater than 600 vehicles each hour for a minimum of eight hours. The highest minor street approach volumes must be greater than 200 vehicles each hour for a minimum of eight hours.

- ❖ Finding: No (0) hours of both the major and minor street vehicular traffic volumes meet the warrant criteria; Condition A is NOT satisfied.

Condition B — This application is used where a large volume of major street traffic impedes the movement of the minor street traffic. The total major street approach volumes must be greater than 900 vehicles each hour for a minimum of eight hours. The highest minor street approach volumes must be greater than 100 vehicles each hour for a minimum of eight hours.

- ❖ Finding: No (0) hours of both the major and minor street vehicular traffic volumes meet the warrant criteria; Condition B is NOT satisfied.

Condition A and Condition B Combination (80% Factor) — This alternative warrant is only applicable if Condition A and Condition B are not individually satisfied.

- ❖ Finding: Two (2) hours of the Condition A-Condition B Combination meet the warrant criteria; the Combination warrant is NOT satisfied.

Warrant 2 - Four-Hour Vehicular Volumes

This warrant is for use in applications where the intersecting traffic is the main reason for installing a traffic signal. The total major street approach volumes, when plotted with the corresponding minor street volumes (from either approach), must fall above the applicable curve on Figure 4C-1 for at least four hours.

- ❖ Finding: No (0) hours of both the major and minor street vehicular traffic volumes meet the warrant criteria; Warrant 2 is NOT satisfied.

Warrant 3 - Peak Hour

This warrant is for use in applications where, for a minimum of one hour (i.e., any four, consecutive, 15-minute increments) of an average day, the minor street suffers excessive delay when entering or crossing the major street. The warrant is satisfied if the criteria in either of two categories are met:

- A. If all three of the following conditions exist for the same 1 hour:
 - 1. The total stopped time delay experienced by the traffic on the minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach, or 5 vehicles-hours for a two-lane approach; and
 - 2. The volume on the same minor-street approach equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes; and
 - 3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approach or 800 vehicles per hour for intersections with four or more approaches.
- ❖ Finding: (not analyzed)
- B. The total major street approach volumes, when plotted with the corresponding minor street volumes, must fall above the applicable curve on Figure 4C-3 for at least one hour.
- ❖ Finding: No (0) hours of both the major and minor street vehicular traffic volumes meet the peak hour warrant criteria; Warrant 3 is NOT satisfied.

SUMMARY OF FINDINGS

NOTE: Recommendations presented in this report reflect the opinion of Pacheco Koch based solely upon technical analysis and professional judgment but are not intended to infer mandates or funding responsibility. Installation of a traffic signal, or any other improvements in the public right-of-way are subject to approval of the responsible agency(-ies). Legal precedents and other agency standards apply with regard to funding responsibilities.

The findings of this Traffic Signal Warrant Analysis, which include projected site-generated traffic volumes at site buildout conditions, are summarized in the following table:

Table 3. Summary of Results

TRAFFIC SIGNAL WARRANT	STATUS
Warrant 1. Eight-Hour Vehicular Volume	Not met
Warrant 2. Four-Hour Vehicular Volume	Not met
Warrant 3. Peak-Hour	Not met

Based upon Pacheco Koch's technical analysis of the traffic-volume-related traffic signal warrant criteria defined in the *Texas Manual on Uniform Traffic Control Devices*, it is projected that installation of a traffic signal at the intersection of Northwest Highway and Tulane Boulevard will NOT be warranted at full buildout of the potential PD 15 redevelopment. The findings of this analysis are subject to the review by and approval of the City of Dallas staff.

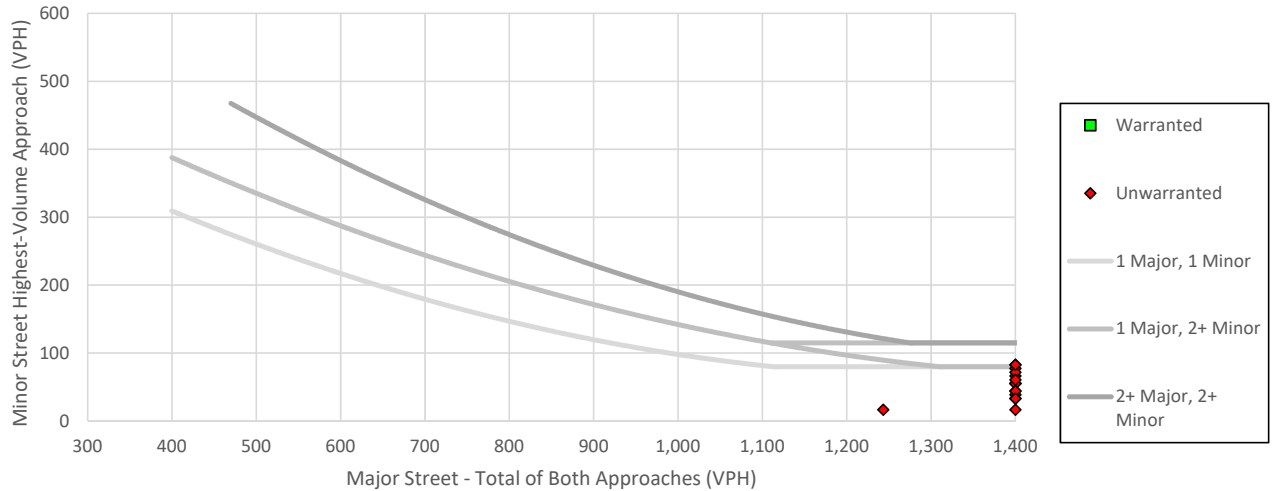
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APPENDIX

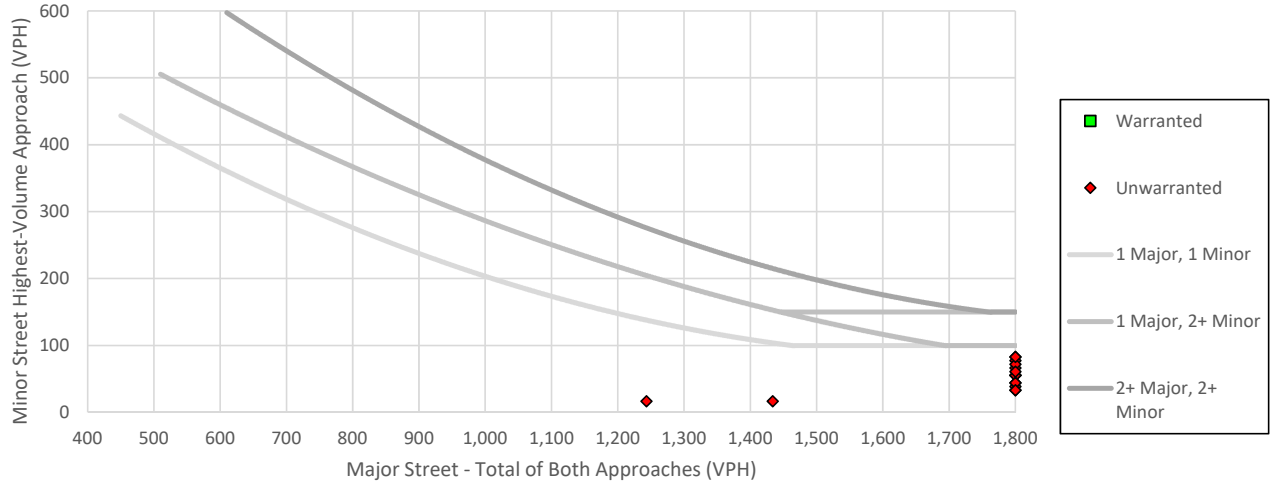
Date: 5/20/2019
 Intersection: Tulane Boulevard at Northwest Highway
 Conditions: Projected Volumes
 Project #: 3602-17.341



MUTCD Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume
 Community Population Greater Than 10,000 and Major Street Approach Below 40 mph



MUTCD Figure 4C-3. Warrant 3, Peak-Hour Vehicular Volume
 Community Population Greater Than 10,000 and Major Street Approach Below 40 mph



Date: 5/20/2019
 Intersection: Tulane Boulevard at Northwest Highway
 Conditions: Projected Volumes
 Project #: 3602-17.341



- Community Population < 10,000?
- Speed Limit > 40 mph?

	Major Street <u>3</u> Lanes			Minor Street <u>2</u> Lanes		
	Tulane Boulevard			Northwest Highway		
	EB	WB	TOTAL	NB	SB	MAX
6:00 AM	744	1,914	2658	0	66	66
7:00 AM	1,538	3,215	4753	0	83	83
8:00 AM	1,650	3,055	4705	0	55	55
9:00 AM	1,464	2,143	3607	0	77	77
10:00 AM	1,451	1,269	2720	0	39	39
11:00 AM	1,777	1,131	2908	0	33	33
12:00 PM	1,355	1,022	2377	0	72	72
1:00 PM	1,019	869	1888	0	55	55
2:00 PM	1,193	1,122	2314	0	55	55
3:00 PM	1,499	1,259	2758	0	83	83
4:00 PM	2,533	2,008	4542	0	61	61
5:00 PM	2,493	1,988	4481	0	44	44
6:00 PM	1,877	877	2754	0	44	44
7:00 PM	1,278	557	1835	0	33	33
8:00 PM	932	502	1434	0	17	17
9:00 PM	785	458	1243	0	17	17

Warrant					
8-Hour				4-Hour	Peak-Hour
(100%)	(100%)	(80%)			
Condition A	Condition B	Condition A	Condition B		
Not Met	Not Met	Not Met	Not Met	Not Met	Not Met
Not Met	Not Met	Not Met	Met	Not Met	Not Met
Not Met	Not Met	Not Met	Not Met	Not Met	Not Met
Not Met	Not Met	Not Met	Not Met	Not Met	Not Met
Not Met	Not Met	Not Met	Not Met	Not Met	Not Met
Not Met	Not Met	Not Met	Not Met	Not Met	Not Met
Not Met	Not Met	Not Met	Not Met	Not Met	Not Met
Not Met	Not Met	Not Met	Not Met	Not Met	Not Met
Not Met	Not Met	Not Met	Not Met	Not Met	Not Met
Not Met	Not Met	Not Met	Not Met	Not Met	Not Met
Not Met	Not Met	Not Met	Met	Not Met	Not Met
Not Met	Not Met	Not Met	Not Met	Not Met	Not Met
Not Met	Not Met	Not Met	Not Met	Not Met	Not Met
Not Met	Not Met	Not Met	Not Met	Not Met	Not Met
Not Met	Not Met	Not Met	Not Met	Not Met	Not Met
Not Met	Not Met	Not Met	Not Met	Not Met	Not Met
Not Met	Not Met	Not Met	Not Met	Not Met	Not Met
Not Met	Not Met	Not Met	Not Met	Not Met	Not Met
Not Met	Not Met	Not Met	Not Met	Not Met	Not Met

	Required Volume		# Hours Satisfied	# Hours Required	Warrant
	Major	Minor			
1. Eight-Hour Warrant					
(100%) Condition A Met?	600	200	0	8	Not Met
(100%) Condition B Met?	900	100	0	8	
(80%) Condition A Met?	480	160	0	8	Not Met
(80%) & Condition B Met?	720	80	2	8	
2. Four-Hour Warrant					
Met?			0	4	Not Met
3. Peak-Hour Warrant					
Met?			0	1	Not Met

TRIP GENERATION SUMMARY
 PD 15
 (based upon ITE *Trip Generation* handbook, 10th Edition)

Existing

		<u>Daily</u>	<u>AM</u>	<u>In</u>	<u>Out</u>	<u>PM</u>	<u>In</u>	<u>Out</u>
High-Rise	460 DU	2024	142	34	108	165	101	64
Low-Rise	74 DU	519	36	8	28	45	28	17
		2543	177	42	135	210	129	81

Scenario 1 - Entire acreage gets redeveloped

	12.4 acres	<u>Daily</u>	<u>AM</u>	<u>In</u>	<u>Out</u>	<u>PM</u>	<u>In</u>	<u>Out</u>
	Total							
A) @ 90 DU/acre	1116 DU	5247	371	89	282	443	270	173
		206%	209%	211%	208%	211%	209%	213%
		<i>inc./existing</i>						
B) @ 125 DU/acre	1550 DU	7205	510	122	387	612	373	239
		283%	287%	290%	286%	291%	289%	295%
		<i>inc./existing</i>						

Scenario 2 - Only existing low-rise gets redeveloped

	6 acres	<u>Daily</u>	<u>AM</u>	<u>In</u>	<u>Out</u>	<u>PM</u>	<u>In</u>	<u>Out</u>
	Total							
A) @ 90 DU/acre	New 540	2339	164	39	125	192	117	75
	Existing 460	2024	142	34	108	165	101	64
	1000 DU	4363	306	73	233	357	218	139
	DIFFERENCE (OVER EXISTING)	1820	128	31	97	147	89	58
		172%	172%	173%	172%	170%	169%	172%
		<i>inc./existing</i>						
B) @ 125 DU/acre	New 750	3167	223	53	170	264	161	103
	Existing 460	2024	142	34	108	165	101	64
	1210 DU	5191	365	87	278	429	262	167
	DIFFERENCE (OVER EXISTING)	2648	187	45	142	219	133	86
		204%	205%	206%	205%	204%	203%	206%
		<i>inc./existing</i>						

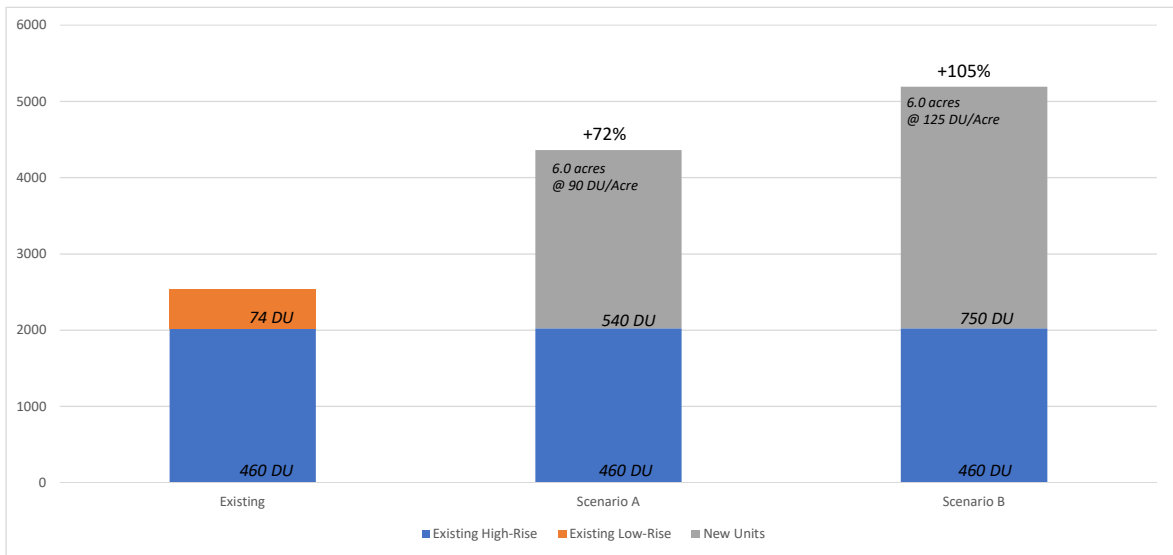
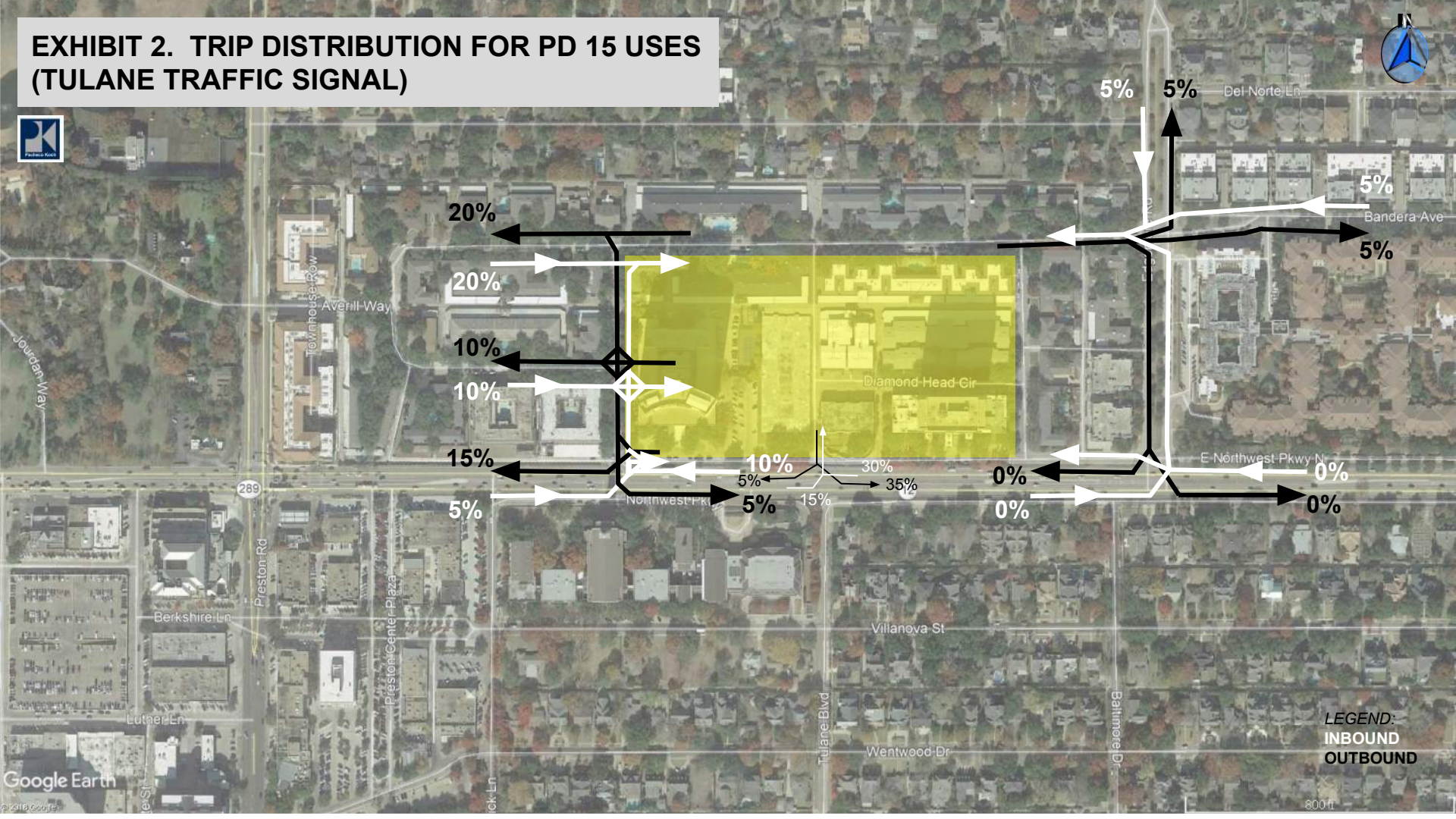


EXHIBIT 2. TRIP DISTRIBUTION FOR PD 15 USES (TULANE TRAFFIC SIGNAL)



LEGEND:
 INBOUND
 OUTBOUND