

May 20, 2019

PK # 2609-19.157

TRAFFIC SIGNAL WARRANT ANALYSIS

Intersection of:

Northwest Highway at Edgemere Road

In Dallas, Texas

Prepared for:

City of Dallas

On behalf of:

Preston Place Condominium Association

Prepared by:

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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 intersection of Northwest Highway at Edgemere Road 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 meet the minimum warrants for the installation of a traffic signal. Specifically, the following warrant(s) are anticipated to be satisfied:

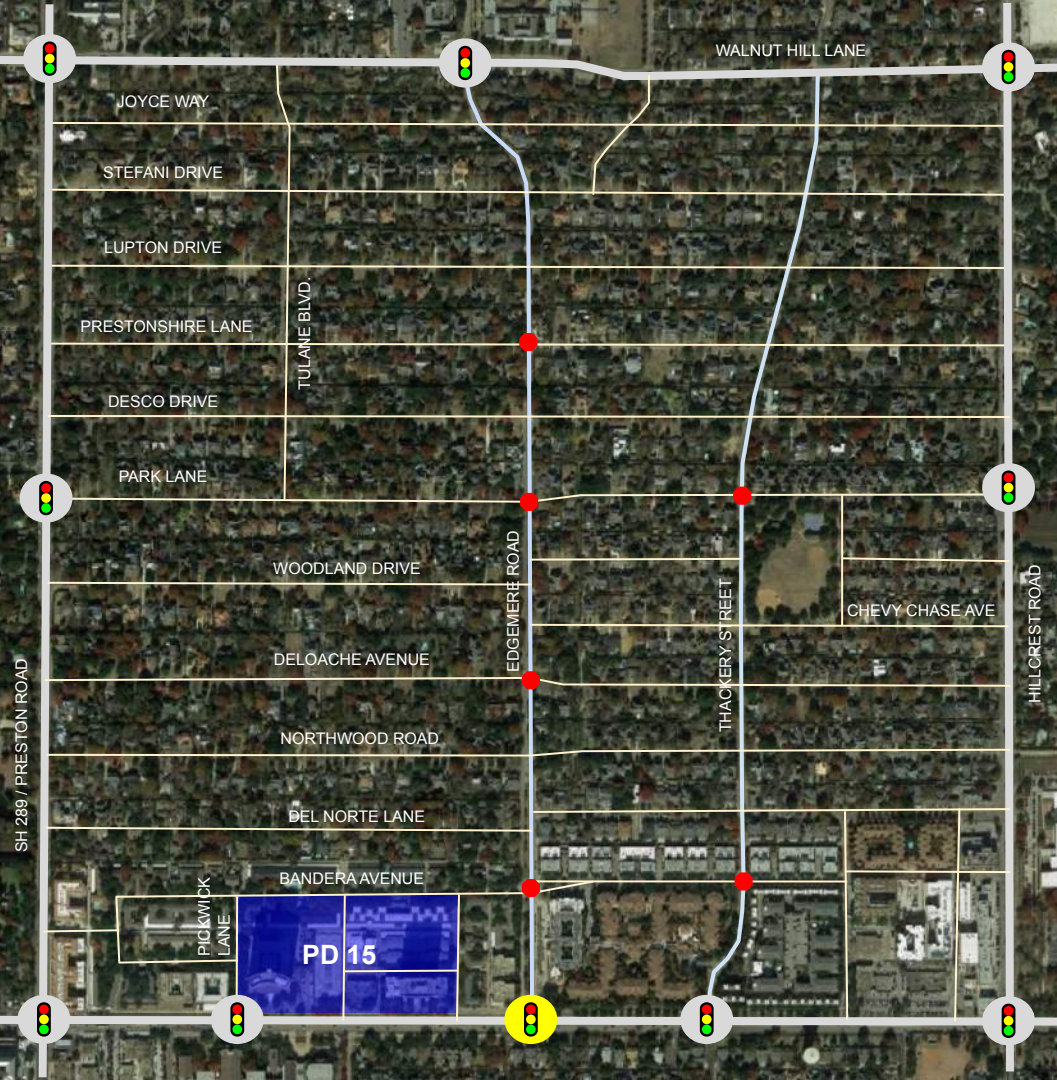
- ❖ Warrant 1 – Eight-Hour Vehicular Volume, Condition B
- ❖ Warrant 2 – Four-Hour Vehicular Volume
- ❖ Warrant 3 – Peak Hour
- ❖ Warrant 6 – Coordinated Signal System

[NOTE: Pending more detailed analysis of historical crash data, the criteria for Warrant 7 – Crash Experience may also be satisfied.]

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 Edgemere Road
Dallas, Texas

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INTRODUCTION

The services of **Pacheco Koch** (PK) were retained by **Preston Place Condominium Association** to conduct a Traffic Signal Warrant Analysis (TSWA) for the intersection of Northwest Highway at Edgemere Road in Dallas, Texas. This analysis was based upon existing traffic volumes, as collected 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

The intersection of Northwest Highway and Edgemere Road currently operates as...

- a minor-street STOP-controlled condition.

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.] The minor street, Edgemere Road, has a four-lane, median-divided cross-section with a 30-MPH posted speed limit.

Nearby traffic signals are located at the intersection of Northwest Highway at Pickwick Lane approximately 1,600-feet west of the subject intersection and at the intersection of Northwest Highway and Thackery Street approximately 1,000-feet east of the subject intersection.

Existing Traffic Volumes

Data used in this analysis include peak period turning movement counts collected on Wednesday, March 27, 2019, at the subject intersection. (Pneumatic 'road tube' counts were used for off-peak period volumes). Detailed volume data are summarized in **Appendix A**. [NOTE: Existing background traffic was NOT redistributed.]

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. [NOTE: A portion of the existing PD 15 traffic was redistributed to account for improved access to a traffic signal.]

Projected Traffic Volumes

The traffic volumes used in the traffic signal warrant analysis represent the sum of existing traffic volumes plus projected PD 15 redevelopment traffic volumes.

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.)

In addition, commentary is provided on other warrants.

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: Nine (9) hours of both the major and minor street vehicular traffic volumes meet the warrant criteria; Condition B is 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: (not applicable, since Condition B is 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: Seven (7) hours of both the major and minor street vehicular traffic volumes meet the warrant criteria; Warrant 2 is 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: One (1) hour of both the major and minor street vehicular traffic volumes meet the peak hour warrant criteria; Warrant 3 is satisfied.

Other Warrants

The six remaining traffic signal warrants are not explicitly based upon traffic volumes. Some of the warrants do not apply to this location (Warrant 5—School Crossing, Warrant 8—Roadway Network, and Warrant 9—Intersection Near a Grade Crossing). Warrant 4—Pedestrian Volume is only applicable to high-volume pedestrian crossings and was therefore not considered.

Warrant 6—Coordinated Signal System is specifically intended for a major corridor, such as Northwest Highway, that has a series of traffic signals that are operationally coordinated. The warrant is only applicable where traffic signals have spacing of at least 1,000 feet. While the analysis used to evaluate this warrant is very technical, Pacheco Koch's assessment using the corridor data from the City's *Synchro* model indicates that progression would not be significantly impacted during morning and afternoon peak periods; therefore, conditions do exist to consider Warrant 6 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	Is met
Warrant 2. Four-Hour Vehicular Volume	Is met
Warrant 3. Peak-Hour	Is met
Warrant 6. Coordinated Signal System	Is 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 Edgemere Road will 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.

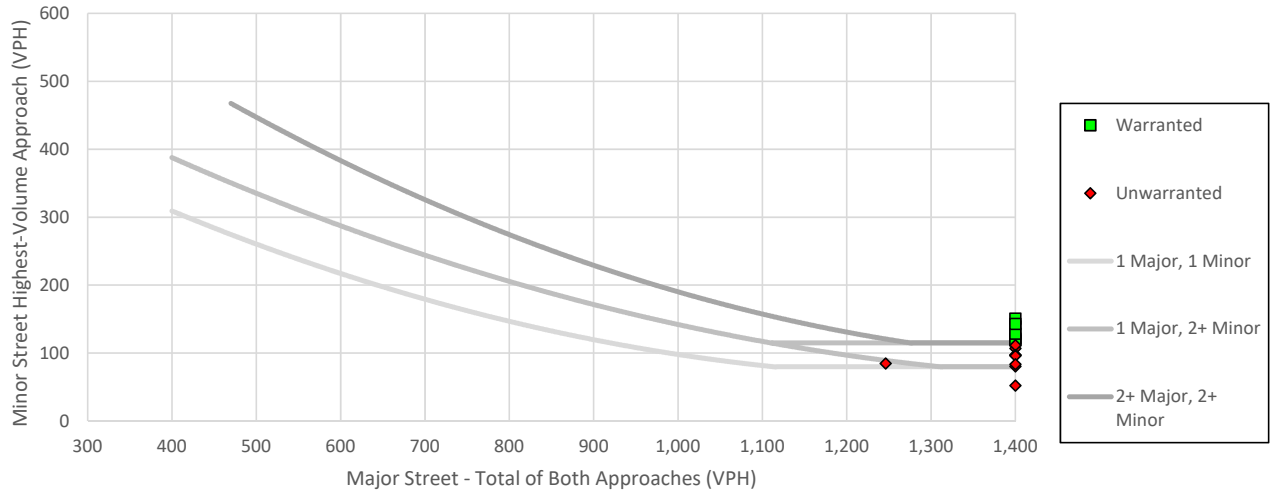
END OF MEMO

APPENDIX

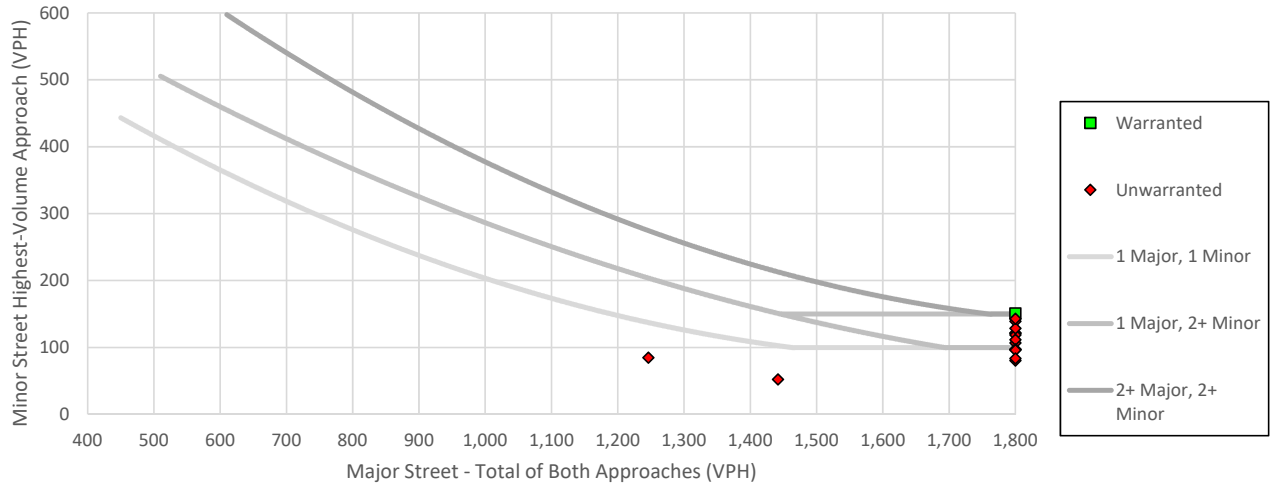
Date: 5/20/2019
 Intersection: Edgemere Road at Northwest Highway
 Conditions: Projected Volumes
 Project #: 3602-17.341



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: Edgemere Road 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		
	Edgemere Road			Northwest Highway		
	EB	WB	TOTAL	NB	SB	MAX
6:00 AM	710	1,871	2581	0	81	81
7:00 AM	1,487	3,184	4671	0	107	107
8:00 AM	1,601	3,045	4645	0	97	97
9:00 AM	1,420	2,104	3524	0	139	139
10:00 AM	1,409	1,246	2655	0	122	122
11:00 AM	1,726	1,112	2838	0	121	121
12:00 PM	1,345	1,023	2368	0	151	151
1:00 PM	1,010	874	1885	0	119	119
2:00 PM	1,177	1,152	2329	0	129	129
3:00 PM	1,484	1,278	2762	0	143	143
4:00 PM	2,529	2,066	4596	0	112	112
5:00 PM	2,506	2,027	4533	0	97	97
6:00 PM	1,862	900	2762	0	96	96
7:00 PM	1,267	577	1844	0	83	83
8:00 PM	923	519	1442	0	52	52
9:00 PM	779	467	1246	0	85	85

Warrant					
8-Hour				4-Hour	Peak-Hour
(100%)	(100%)	(80%)			
Condition A	Condition B	Condition A	Condition B		
Not Met	Not Met	Not Met	Met	Not Met	Not Met
Not Met	Met	Not Met	Met	Not Met	Not Met
Not Met	Not Met	Not Met	Met	Not Met	Not Met
Not Met	Met	Not Met	Met	Met	Not Met
Not Met	Met	Not Met	Met	Met	Not Met
Not Met	Met	Not Met	Met	Met	Met
Not Met	Met	Not Met	Met	Met	Not Met
Not Met	Met	Not Met	Met	Met	Not Met
Not Met	Met	Not Met	Met	Met	Not Met
Not Met	Not Met	Not Met	Met	Not Met	Not Met
Not Met	Not Met	Not Met	Met	Not Met	Not Met
Not Met	Not Met	Not Met	Met	Not Met	Not Met
Not Met	Not Met	Not Met	Met	Not Met	Not Met
Not Met	Not Met	Not Met	Met	Not Met	Not Met
Not Met	Not Met	Not Met	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	Met
		Condition B Met?	900	100	9	8	
	(80%)	Condition A Met?	480	160	0	8	Not Met
		& Condition B Met?	720	80	15	8	
2. Four-Hour Warrant	Met?			7	4	Met	
3. Peak-Hour Warrant	Met?			1	1	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>						

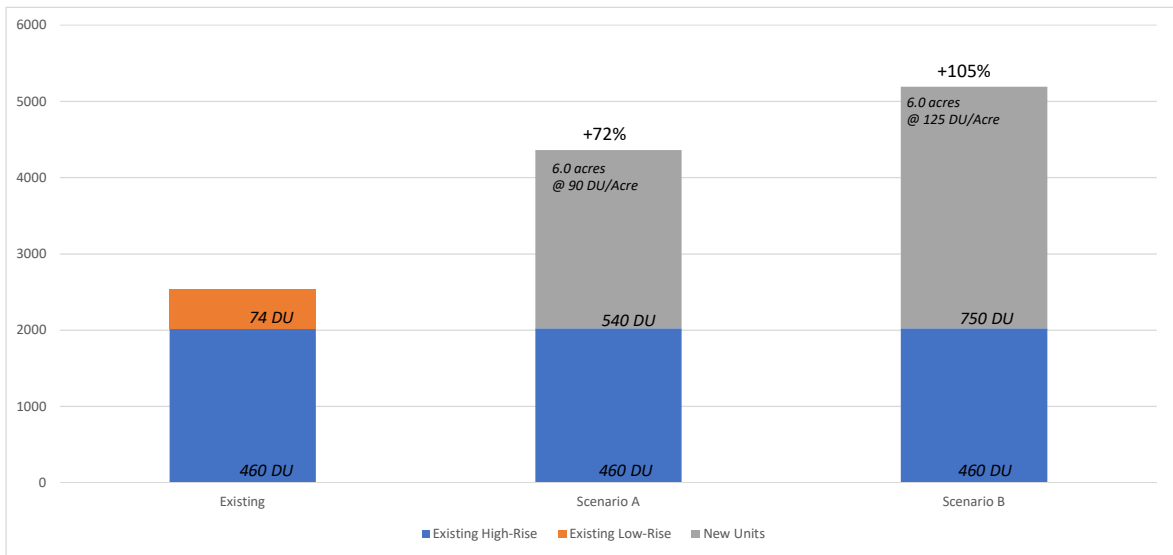
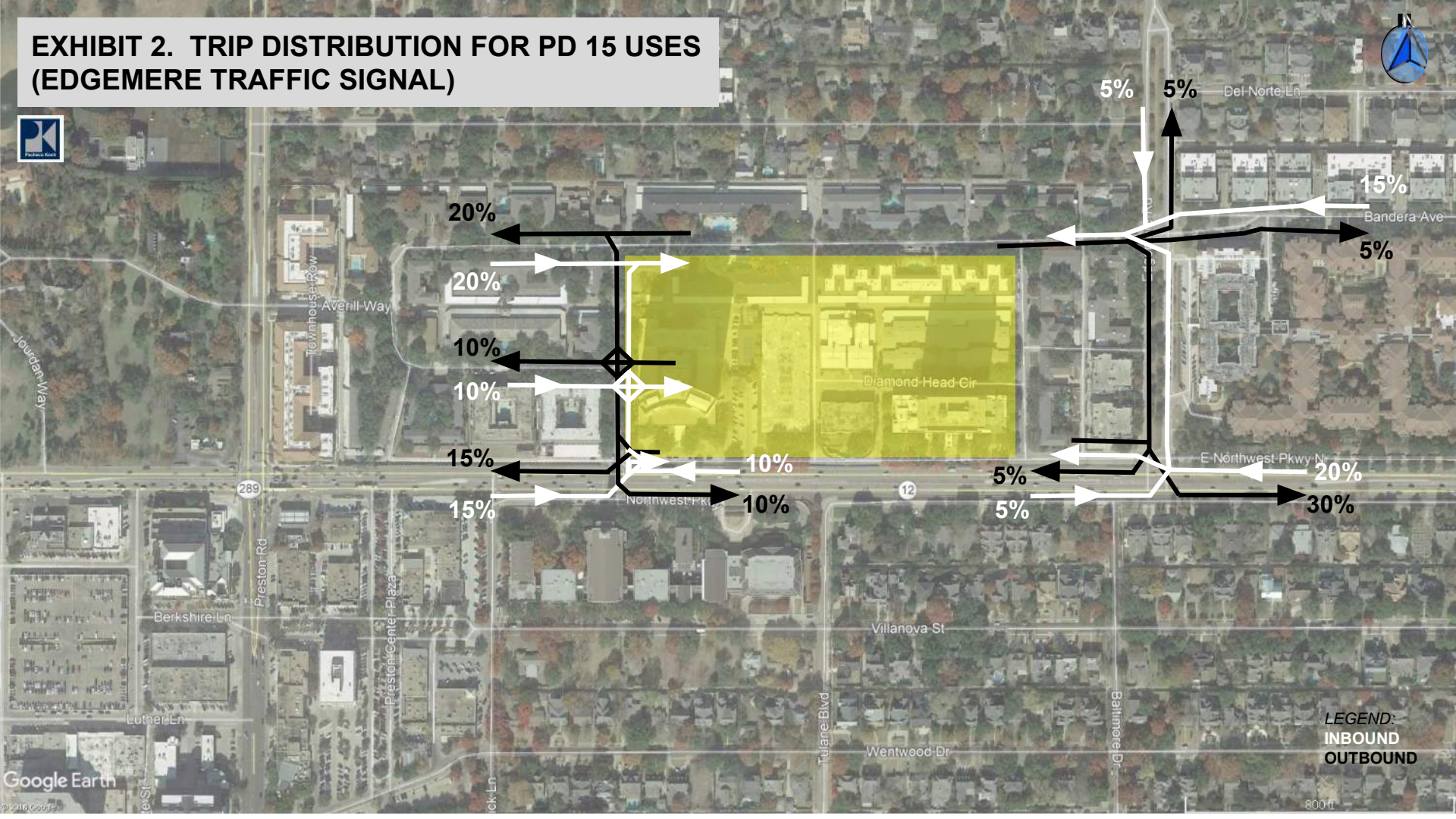


EXHIBIT 2. TRIP DISTRIBUTION FOR PD 15 USES (EDGEMERE TRAFFIC SIGNAL)



LEGEND:
 INBOUND
 OUTBOUND

800 ft