EXECUTIVE SUMMARY

The Slaughter Lane Development is proposed to be located west of the intersection of Slaughter Lane and South First Street within the City of Austin, Texas. The development is proposed to be comprised of Mixed Use Residential, Commercial, Retail, and Restaurant land uses. All access to the development will be routed through the existing adjacent apartment driveway.

This signal warrant study was conducted in accordance with Chapter 4C of the Texas Manual on Uniform Traffic Control Devices (TMUTCD)[(1)]. As stated in the TMUTCD, traffic control signals should not be installed unless one or more of the signal warrants are met. However, the satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

Warrants 1, 2, 4, and 7 were evaluated at the development shared use driveway at Slaughter Lane intersection. The remaining warrants were not applicable for this location. Warrants 1, 2, 4, and 7 were not met at the intersection under existing conditions; however, warrants 1 and 2 were met at the intersection based on the build out year of 2021 with the proposed development. Therefore, a traffic signal is recommended at the intersection of the development shared use driveway at Slaughter Lane.

Table 1: Summary of Signal Warrant Analysis Findings

Warrant	Existing Conditions (2019)	Future Conditions (2021)
Warrant 1, Eight-Hour Vehicular Volume	Not Met	Met
Warrant 2, Four-Hour Vehicular Volume	Not Met	Met
Warrant 3, Peak Hour	N/A	N/A
Warrant 4, Pedestrian Volume	Not Met	Not Met
Warrant 5, School Crossing	N/A	N/A
Warrant 6, Coordinated Signal System	N/A	N/A
Warrant 7, Crash Experience	Not Met	Not Met
Warrant 8, Roadway Network	N/A	N/A
Warrant 9, Intersection Near a Grade Crossing	N/A	N/A

INTRODUCTION

The Slaughter Lane Development is proposed to be located west of the intersection of Slaughter Lane and South First Street within the City of Austin, Texas. The development is proposed to be comprised of Mixed Use Residential, Commercial, Retail, and Restaurant land uses. All access to the development will be routed through the existing adjacent apartment driveway (referred to as the "development shared use driveway" in this report).

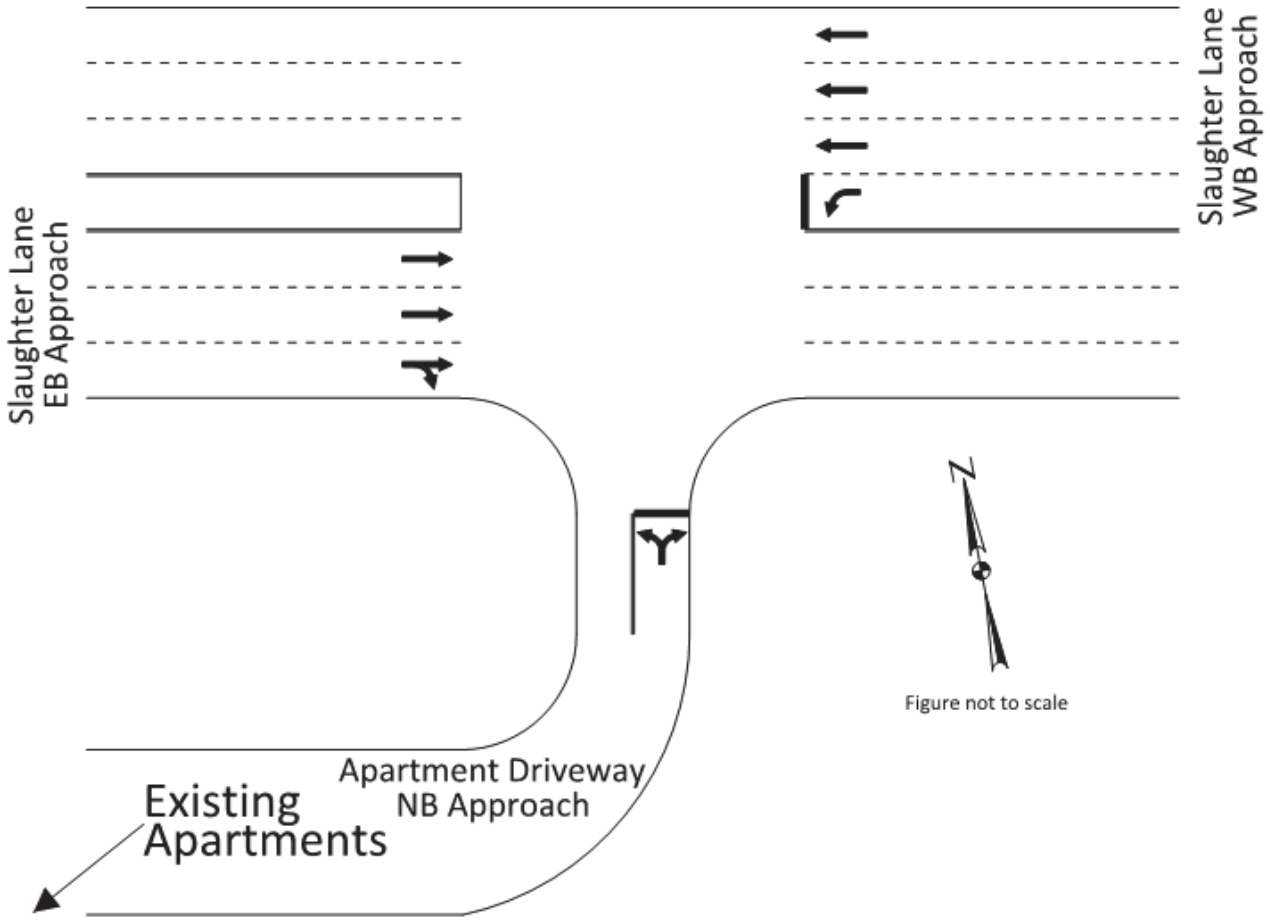
The development shared use driveway at Slaughter Lane is a three-legged intersection. Slaughter Lane is considered the major street, while the shared use driveway is considered the minor street. Slaughter Lane is an east/west roadway with a posted speed limit of 45 mph. The westbound approach has a 125-foot left-turn lane and three adjacent through lanes. The eastbound approach has a shared right-through lane and two adjacent through lanes. The shared use driveway has a single lane for all movements at the northbound approach.

This signal warrant study was conducted in accordance with Chapter 4C of the Texas Manual on Uniform Traffic Control Devices (TMUTCD)[1]. As stated in the TMUTCD, traffic control signals should not be installed unless one or more of the signal warrants are met. A discussion of the warrants, analysis and results of the analysis are presented in the following sections. However, the satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

EXISTING CONDITIONS

Traffic counts were collected at the existing intersection on February 13, 2019. A signal warrant analysis was performed on the existing count data to determine if the existing intersection met warrants before applying additional proposed development volume. A discussion of each signal warrant for existing conditions follows.

Figure 1: Study Area Existing Conditions (2019)



SIGNAL WARRANT ANALYSIS

As noted in Chapter 4C in the TMUTCD, a traffic control signal should not be installed unless one or more of the warrants described in this chapter are met. Further, 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. A traffic control signal should not be installed if it will seriously disrupt progressive traffic flow.

For the study intersection, traffic count data is provided in **Appendix A**. This traffic data was then compared with the requirements set forth in the TMUTCD to determine whether traffic signals are warranted at the study intersections.

Analysis is based on the nine warrants set forth in the TMUTCD. These warrants are shown below:

- 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

The TMUTCD allows for reductions in the volumes required for satisfying warrants 1, 2, 3, 4, and 7 if the major street speed is greater than 40 mph (35 mph in the case of warrant 4) or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000. The following provides a description of each warrant and an assessment of its applicability to the study intersections.

WARRANT 1, EIGHT-HOUR VEHICULAR VOLUME

The Minimum Vehicular Volume, Condition A, is intended for application at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

The Interruption of Continuous Traffic, Condition B, is intended for application at locations where Condition A is not satisfied and where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street.

It is intended that Warrant 1 be treated as a single warrant. If Condition A is satisfied, then Warrant 1 is satisfied and analyses of Condition B and the combination of Conditions A and B are not needed. Similarly, if Condition B is satisfied, then Warrant 1 is satisfied and the combination of Conditions A and B is not needed.

The need for a traffic control signal shall be considered if an engineering study finds that one of the following conditions exist for each of any 8 hours of an average day:

A. The vehicles per hour given in both of the 100 percent columns of Condition A in TMUTCD Table 4C-1 (**Figure** 2) exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; or

B. The vehicles per hour given in both of the 100 percent columns of Condition B in TMUTCD Table 4C-1 (**Figure 2**) exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

When applying each condition, the major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of these 8 hours.

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, then the traffic volumes in the 70 percent columns in TMUTCD Table 4C-1 may be used in place of the 100 percent columns.

The combination of Conditions A and B is intended for application at locations where Condition A is not satisfied and Condition B is not satisfied and should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.

The need for a traffic control signal shall be considered if an engineering study finds that both of the following conditions exist for each of any 8 hours of an average day:

A. The vehicles per hour given in both of the 80 percent columns of Condition A in TMUTCD Table 4C-1 (**Figure 2**) exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection; and

B. The vehicles per hour given in both of the 80 percent columns of Condition B in TMUTCD Table 4C-1 (**Figure 2**) exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

These major-street and minor-street volumes shall be for the same 8 hours for each condition; however, the 8 hours satisfied in Condition A shall not be required to be the same 8 hours satisfied in Condition B. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, then the traffic volumes in the 56 percent columns in TMUTCD Table 4C-1 may be used in place of the 80 percent columns.

Figure 2: TMUTCD Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume

Condition A—Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

[a] Basic minimum hourly volume
[b] Used for combination of Conditions A and B after adequate trial of other remedial measures
[c] May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000
[d] May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

This warrant is applicable at the study intersection and will be discussed further in this report.

WARRANT 2, FOUR-HOUR VEHICULAR VOLUME

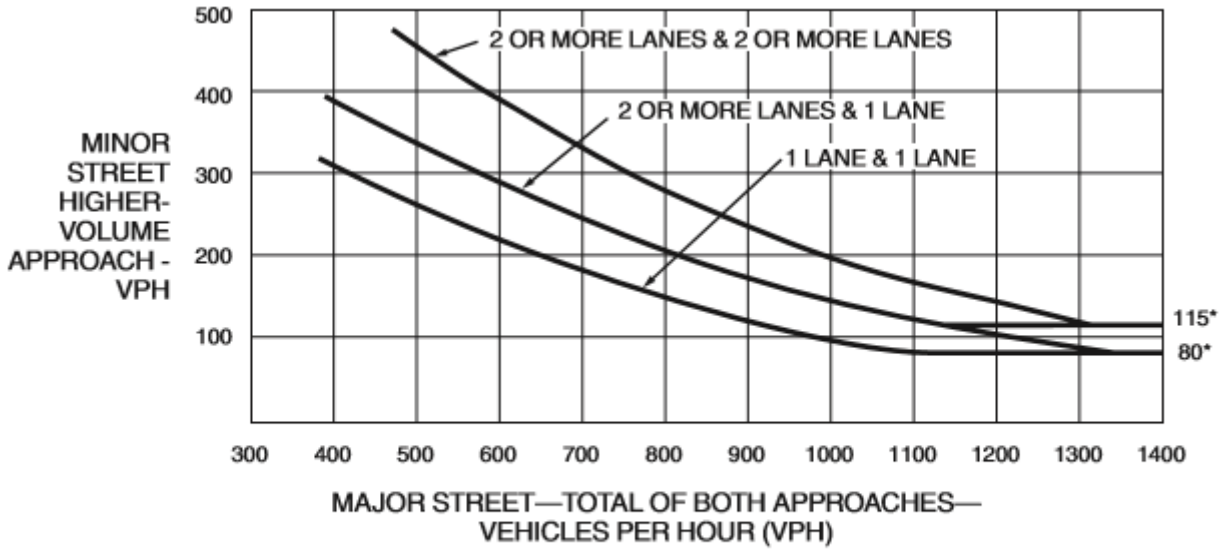
The Four-Hour Vehicular Volume signal warrant conditions are intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

The need for a traffic control signal shall be considered if an engineering study finds that, for each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) all fall above the applicable curve in TMUTCD Figure 4C-1 (**Figure 3**) for the existing combination of approach lanes. On the minor street, the higher volume shall not be required to be on the same approach during each of these 4 hours.

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, then TMUTCD Figure 4C-2 (**Figure 4**) may be used in place of TMUTCD Figure 4C-1.

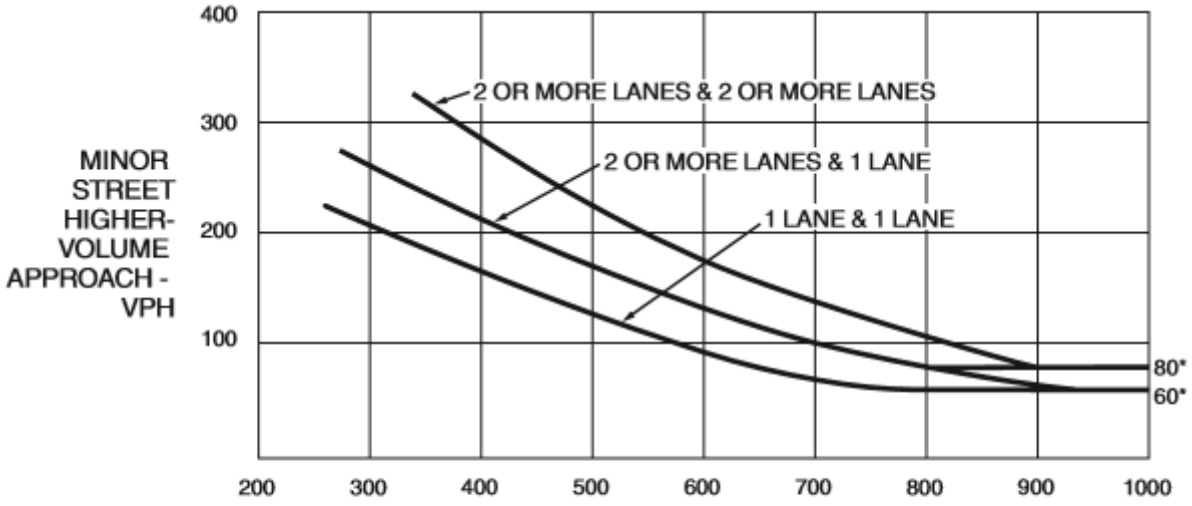
This warrant is applicable at the study intersection and will be discussed further in this report.

Figure 3: TMUTCD Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4: TMUTCD Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume (70% Factor)



*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

WARRANT 3, PEAK HOUR

The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day the minor-street traffic suffers undue delay when entering or crossing the major street.

This signal warrant shall be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

The need for a traffic control signal shall be considered if an engineering study finds that the criteria in either of the following two categories are met:

A. If all three of the following conditions exist for the same 1 hour (any four consecutive 15-minute periods) of an average day:

   1. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach; or 5 vehicle-hours for a two-lane approach, and

   2. The volume on the same minor-street approach (one direction only) 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 approaches or 800 vehicles per hour for intersections with four or more approaches.

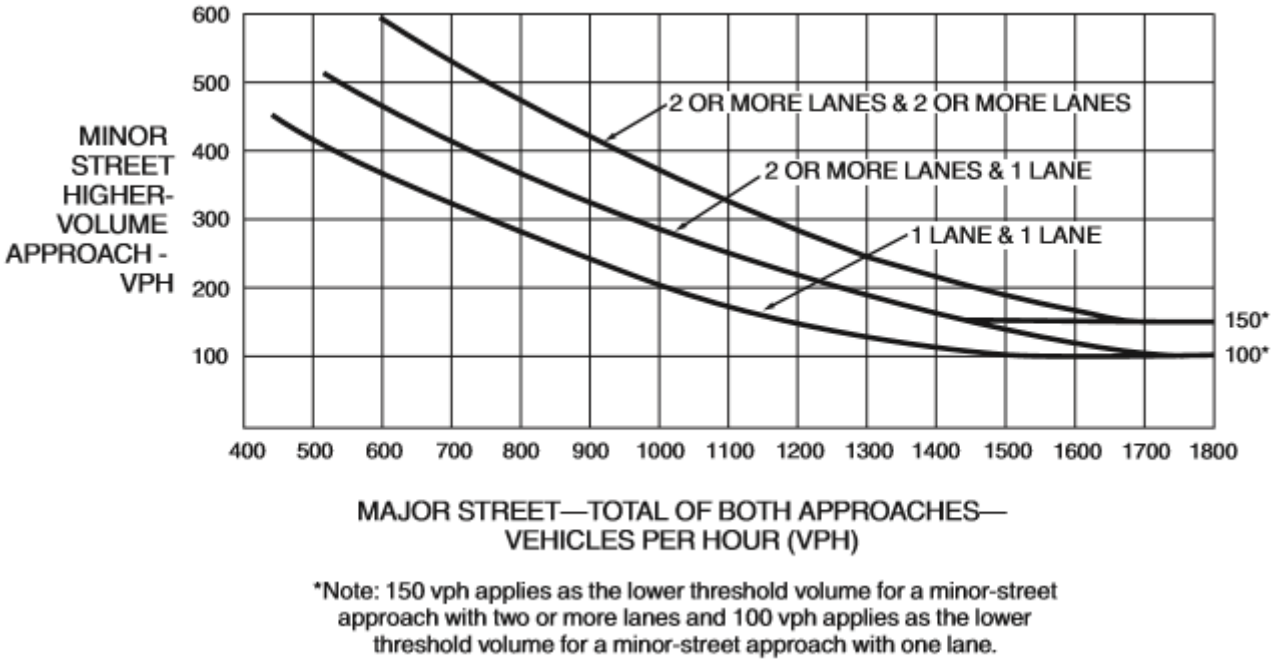
B. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in TMUTCD Figure 4C-3 (**Figure 5**) for the existing combination of approach lanes.

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, then TMUTCD Figure 4C-4 (**Figure 6**) may be used in place of TMUTCD Figure 4C-3 to satisfy the criteria in the second category of the Standard.

The development is not anticipated to attract or discharge large numbers of vehicles over a short time.

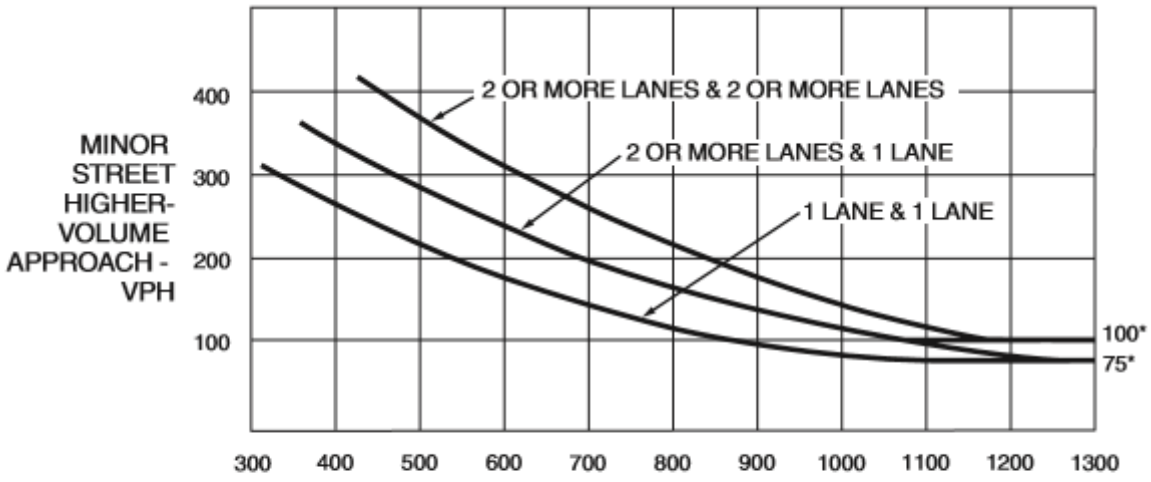
This warrant is not applicable at the study intersection.

Figure 5: TMUTCD Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 6: TMUTCD Figure 4C-3. Warrant 3, Peak Hour (70% Factor)



*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.

WARRANT 4, PEDESTRIAN VOLUME

The Pedestrian Volume signal warrant is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street.

The need for a traffic control signal at an intersection or midblock crossing shall be considered if an engineering study finds that both of the following criteria is met:

A. For each of any 4 hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all crossings) all fall above the curve in TMUTCD Figure 4C-5 (**Figure 7**); or

B. For 1 hour (any four consecutive 15-minute periods) of an average day, the plotted point representing the vehicles per hour on a major street (total of both approaches) and the corresponding pedestrians per hour crossing the major street (total of all crossings) falls above the curve TMUTCD in Figure 4C-7 (**Figure 9**).

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 35 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, TMUTCD Figure 4C-6 (**Figure 8**) may be used in place of TMUTCD Figure 4C-5 to evaluate Criterion A in Paragraph 2, and TMUTCD Figure 4C-8 (**Figure 10**) may be used in place of TMUTCD Figure 4C-7 to evaluate Criterion B in Paragraph 2.

The Pedestrian Volume signal warrant shall not be applied at locations where the distance to the nearest traffic control signal or STOP sign controlling the street that pedestrians desire to cross is less than 300 feet, unless the proposed traffic control signal will not restrict the progressive movement of traffic.

If this warrant is met and a traffic control signal is justified by an engineering study, the traffic control signal shall be equipped with pedestrian signal heads conforming to requirements set forth in Chapter 4E.

If this warrant is met and a traffic control signal is justified by an engineering study, then:

A. If it is installed at an intersection or major driveway location, the traffic control signal should also control the minor-street or driveway traffic, should be traffic-actuated, and should include pedestrian detection.

B. If it is installed at a non-intersection crossing, the traffic control signal should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs and should be pedestrian-actuated. If the traffic control signal is at a non-intersection crossing, at least one of the signal faces should be over the traveled way of approach, parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the crosswalk or site accommodations should be made through curb extensions or other techniques to provide adequate sight distance, and the installation should be included suitable standard signs and pavement markings.

C. Furthermore, if it is installed within a signal system, the traffic control signal should be coordinated.

The criterion for the pedestrian volume crossing the major roadway may be reduced as much as 50 percent if the 15^{th} percentile crossing speed pedestrians is less than 3.5 feet per second.

A traffic control signal may not be needed at the study location if adjacent coordinated traffic control signals consistently provide gaps of adequate length for pedestrians to cross the street.

This warrant is applicable at the study intersection and will be discussed further in this report.

Figure 7: TMUTCD Figure 4C-5. Warrant 4, Pedestrian Four-Hour Volume

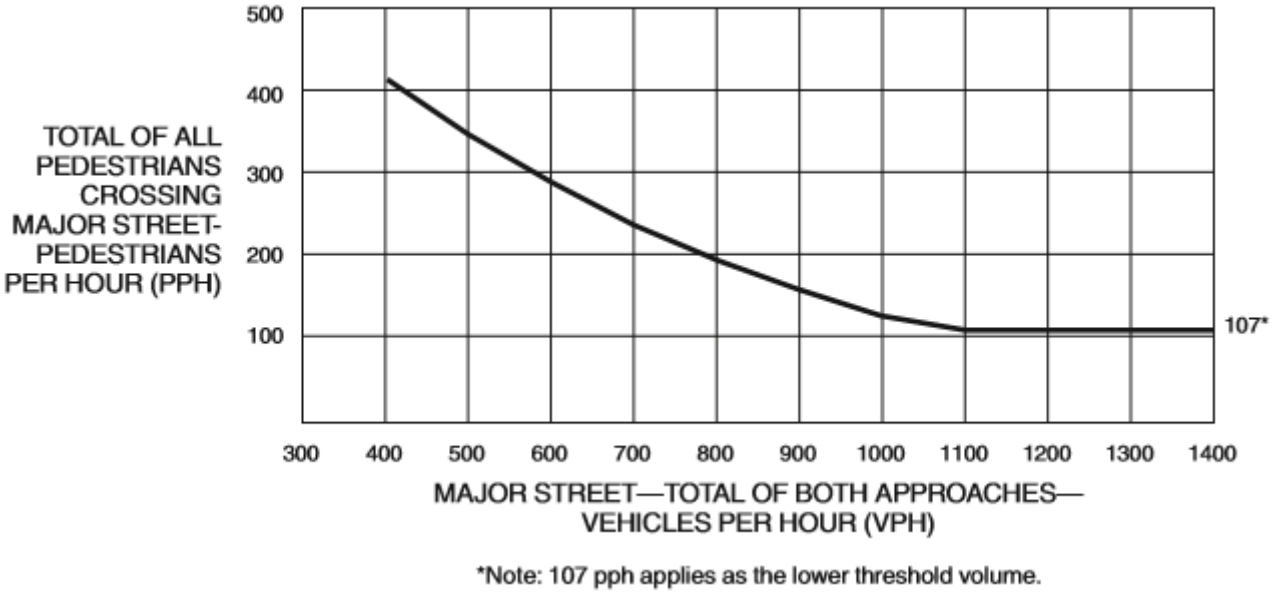


Figure 8: TMUTCD Figure 4C-6. Warrant 4, Pedestrian Four-Hour Volume (70% Factor)

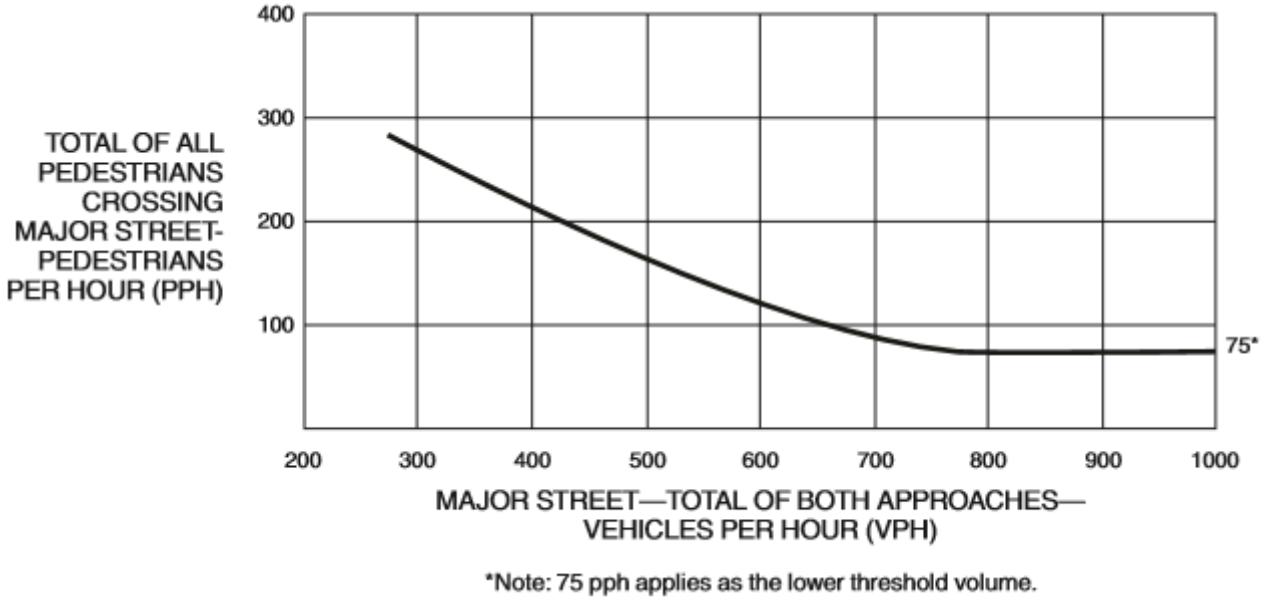


Figure 9: TMUTCD Figure 4C-7. Warrant 4, Pedestrian Peak Hour

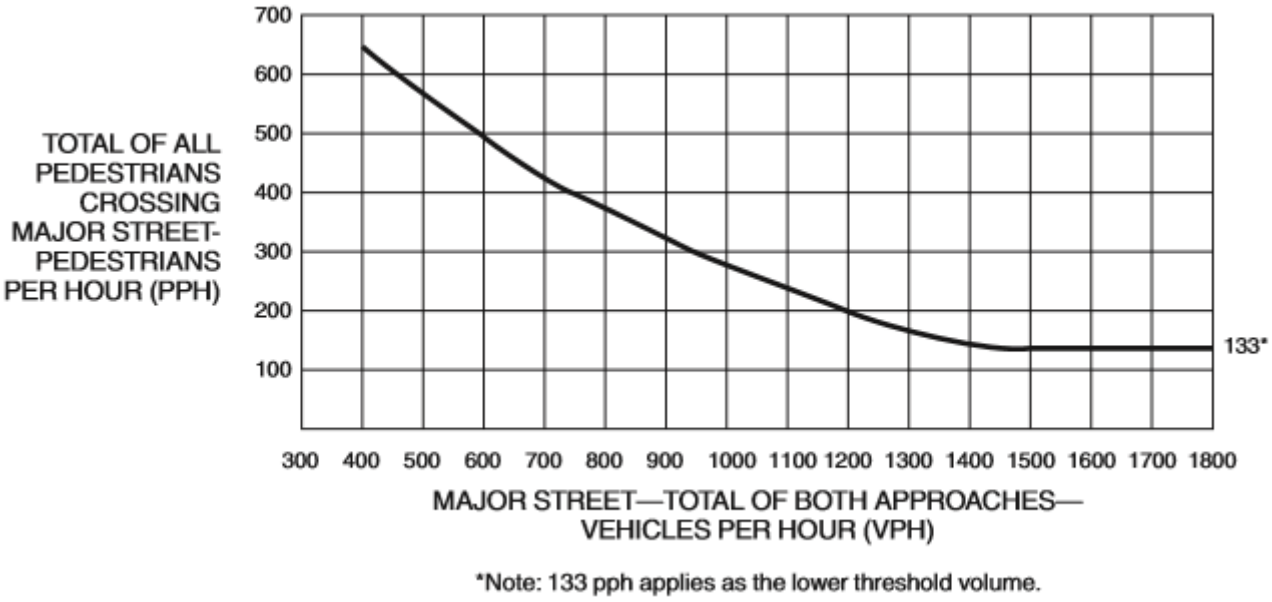
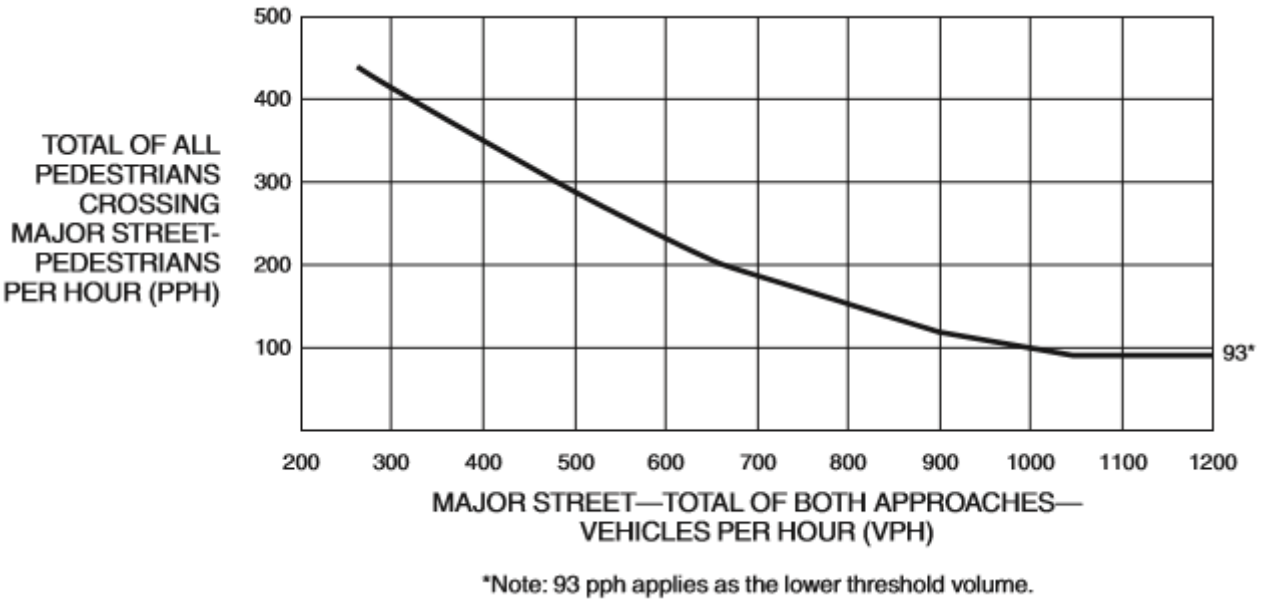


Figure 10: TMUTCD Figure 4C-8. Warrant 4, Pedestrian Peak Hour (70% Factor)



WARRANT 5, SCHOOL CROSSING

The School Crossing signal warrant is intended for application where the fact that school children cross the major street is the principal reason to consider installing a traffic control signal. For the purposes of this warrant, the word “school children” includes elementary through high school students.

The need for a traffic control signal shall be considered when an engineering study of the frequency and adequacy of gaps in the vehicular traffic stream as related to the number and size of groups of school children at an established school crossing across the major street shows that the number of adequate gaps in the traffic stream

during the period when the children are using the crossing is less than the number of minutes in the same period (see TMUTCD Section 7A.03) and there are a minimum of 20 students during the highest crossing hour.

Before a decision is made to install a traffic control signal, consideration shall be given to the implementation of other remedial measures, such as warning signs and flashers, school speed zones, school crossing guards, or a grade separated crossing.

The School Crossing signal warrant shall not be applied at locations where the distance to the nearest traffic control signal along the major street is less than 300 feet, unless the proposed traffic signal control will not restrict the progressive movement of traffic.

If this warrant is met and a traffic control signal is justified by an engineering study, then:

A. If at an intersection, the traffic control signal should be traffic-actuated and should include pedestrian detectors.

B. If at a non-intersection crossing, the traffic control signal should be pedestrian actuated, parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the crosswalk, and the installation should include suitable standard signs and pavement markings.

C. Furthermore, if installed within a signal system, the traffic control signal should be coordinated.

The study intersection is not located in close vicinity to a school.

This warrant is not applicable at the study intersection.

WARRANT 6, COORDINATED SIGNAL SYSTEM

Progressive movement in a coordinated signal system sometimes necessitates installing traffic control signals at intersections where they would not otherwise be needed in order to maintain proper platooning of vehicles.

The need for a traffic control signal shall be considered if an engineering study finds that one of the following criteria is met:

A. On a one-way street or a street that has traffic predominantly in one direction, the adjacent traffic control signals are so far apart that they do not provide the necessary degree of vehicular platooning.

B. On a two-way street, adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will collectively provide a progressive operation.

The Coordinated Signal System signal warrant should not be applied where the resultant spacing of traffic control signals would be less than 1,000 feet.

A traffic control signal at the study location is not needed to improve traffic progression.

This warrant is not applicable at the study intersection.

WARRANT 7, CRASH EXPERIENCE

The Crash Experience signal warrant conditions are intended for application where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal.

The need for a traffic control signal shall be considered if an engineering study finds that all of the following criteria are met:

A. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and

B. Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash; and

C. For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in TMUTCD Table 4C-1 (**Figure 2**), or the vph in both of the 80 percent columns of Condition B in TMUTCD Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, then the traffic volumes in the 56 percent columns in TMUTCD Table 4C-1 may be used in place of the 80 percent columns.

This warrant is applicable at the study intersection and will be discussed further in this report.

WARRANT 8, ROADWAY NETWORK

Installing a traffic control signal at some intersections might be justified to encourage concentration and organization of traffic flow on a roadway network.

The need for a traffic control signal shall be considered if an engineering study finds that the common intersection of two or more major routes meets one or both of the following conditions:

A. The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during an average weekday; or

B. The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday).

A major route as used in this signal warrant shall have one or more of the following characteristics:

A. It is part of the street or highway system that serves as the principal roadway network for through traffic flow; or

B. It includes rural or suburban highways outside, entering, or traversing a city; or

C. It appears as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study; or

D. It connects areas of principal traffic generation; or

E. It has surface street freeway or expressway ramp terminals.

The study intersection is not a common intersection of two or more major routes.

This warrant is not applicable at the study intersection.

WARRANT 9, INTERSECTION NEAR A GRADE CROSSING

The Intersection Near a Grade Crossing signal warrant is intended for use at a location where none of the conditions described in the other eight traffic signal warrants are met, but the proximity to the intersection of a grade crossing on an intersection approach controlled by a STOP or YIELD sign is the principal reason to consider installing a traffic control signal.

This signal warrant should be applied only after adequate consideration has been given to other alternatives or after a trial of an alternative has failed to alleviate the safety concerns associated with the grade crossing. Among the alternatives that should be considered or tried are:

A. Providing additional pavement that would enable vehicles to clear the track or that would provide space for an evasive maneuver, or

B. Reassigning the stop controls at the intersection to make the approach across the track a non-stopping approach.

The need for a traffic control signal shall be considered if an engineering study finds that both of the following criteria are met:

A. A grade crossing exists on an approach controlled by a STOP or YIELD sign and the center of the track nearest to the intersection is within 140 feet of the stop line or yield line on the approach; and

B. During the highest traffic volume hour during which rail traffic uses the crossing, the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the minor-street approach that crosses the track (one direction only, approaching the intersection) falls above the applicable curve in TMUTCD Figure 4C-9 (**Figure 11**) or 4C-10 (**Figure 12**) for the existing combination of approach lanes over the track and the distance D, which is the clear storage distance as defined in TMUTCD Section 1A.13.

The following considerations apply when plotting the traffic volume data on TMUTCD Figure 4C-9 or 4C-10:

A. TMUTCD Figure 4C-9 should be used if there is only one lane approaching the intersection at the track crossing location and TMUTCD Figure 4C-10 should be used if there are two or more lanes approaching the intersection at the track crossing location.

B. After determining the actual distance D, the curve for the distance D that is nearest to the actual distance D should be used. For example, if the actual distance D is 95 feet, the plotted point should be compared to the curve for D = 90 feet.

C. If the rail traffic arrival times are unknown, the highest traffic volume hour of the day should be used.

The minor-street approach volume may be multiplied by up to three adjustment factors as provided in the following paragraphs.

Because the curves are based on an average of four occurrences of rail traffic per day, the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in TMUTCD Table 4C-2 (**Figure 13**) for the appropriate number of occurrences of rail traffic per day.

Because the curves are based on typical vehicle occupancy, if at least 2% of the vehicles crossing the track are buses carrying at least 20 people, the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in TMUTCD Table 4C-3 (**Figure 14**) for the appropriate percentage of high-occupancy buses.

Because the curves are based on tractor-trailer trucks comprising 10% of the vehicles crossing the track, the vehicles per hour on the minor-street approach may be multiplied by the adjustment factor shown in TMUTCD Table 4C-4 (**Figure 15**) for the appropriate distance and percentage of tractor-trailer trucks.

If this warrant is met and a traffic control signal at the intersection is justified by an engineering study, then:

A. The traffic control signal shall have actuation on the minor street;

B. Preemption control shall be provided in accordance with TMUTCD Sections 4D.27, 8C.09, and 8C.10 and

C. The grade crossing shall have flashing-light signals

The study intersection is not located in close vicinity to a grade crossing.

This warrant is not applicable at the study intersection.

Figure 11: TMUTCD Figure 4C-9. Warrant 9, Intersection Near a Grade Crossing (One Approach Lane at the Track Crossing)

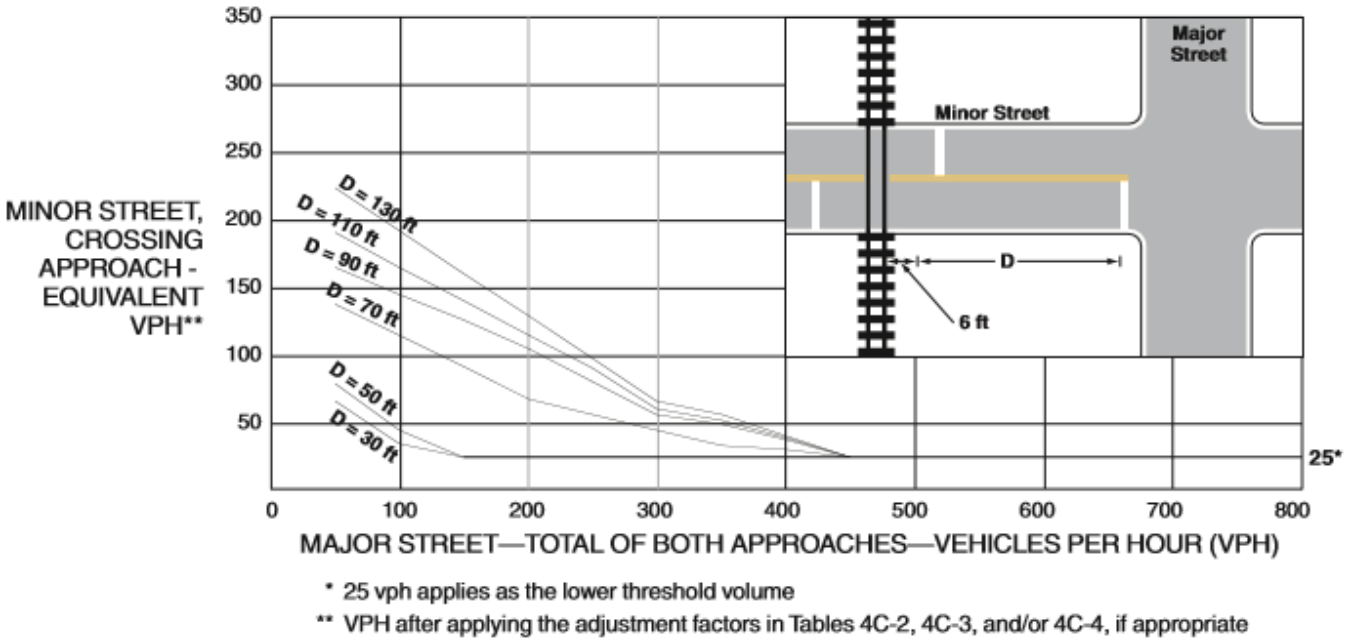


Figure 12: TMUTCD Figure 4C-10. Warrant 9, Intersection Near a Grade Crossing (Two or More Approach Lanes at the Track Crossing)

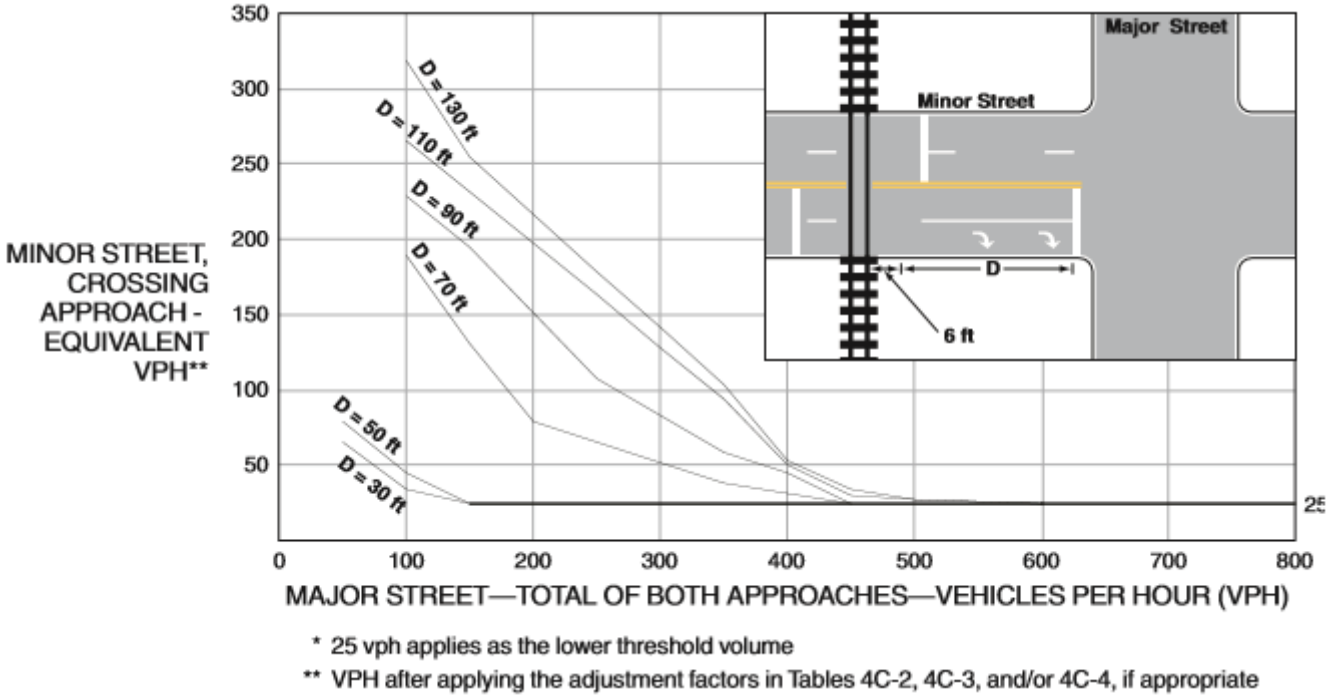


Figure 13: TMUTCD Table 4C-2. Warrant 9, Adjustment Factor for Daily Frequency of Rail Traffic

Rail Traffic per Day	Adjustment Factor
1	0.67
2	0.91
3 to 5	1.00
6 to 8	1.18
9 to 11	1.25
12 or more	1.33

Figure 14: TMUTCD Table 4C-3. Warrant 9, Adjustment Factor for Percentage of High-Occupancy Buses

% of High-Occupancy Buses* on Minor-Street Approach	Adjustment Factor
0%	1.00
2%	1.09
4%	1.19
6% or more	1.32

* A high-occupancy bus is defined as a bus occupied by at least 20 people.

Figure 15: TMUTCD Table 4C-4. Warrant 9, Adjustment Factor for Percentage of Tractor-Trailer Trucks

% of Tractor-Trailer Trucks on Minor-Street Approach	Adjustment Factor	
	D less than 70 feet	D of 70 feet or more
0% to 2.5%	0.50	0.50
2.6% to 7.5%	0.75	0.75
7.6% to 12.5%	1.00	1.00
12.6% to 17.5%	2.30	1.15
17.6% to 22.5%	2.70	1.35
22.6% to 27.5%	3.28	1.64
More than 27.5%	4.18	2.09

ANALYSIS OF WARRANTS: EXISTING CONDITIONS (2019)

As noted in the prior discussion, Warrants 1, 2, 4, and 7 are applicable at the study intersection and will be discussed in more detail in the following paragraphs.

Existing traffic data for the apartment (future shared use) driveway at Slaughter Lane intersection is summarized in **Table 2**. The intersection approach counts were obtained on Wednesday, February 13, 2019 and are included in **Appendix A**.

Table 2: Approach Counts (2019)

Time Interval	Slaughter Lane (Total of Both Approaches)	Apartment Driveway (Single Approach)
6:00 - 7:00	1560	44
7:00 - 8:00	2692	58
8:00 - 9:00	2690	42
9:00 - 10:00	2354	21
10:00 - 11:00	2244	18
11:00 - 12:00	2403	21
12:00 - 13:00	2541	18
13:00 - 14:00	2636	20
14:00 - 15:00	2607	10
15:00 - 16:00	2913	16
16:00 - 17:00	2927	19
17:00 - 18:00	3287	17
18:00 - 19:00	3076	19

Slaughter Lane is the major road at the intersection with three approach lanes in the eastbound and the westbound directions. The apartment (future shared use) driveway is the minor road at the intersection with one approach lane in the northbound direction. The speed limit on Slaughter Lane is 45 mph. Therefore, the reduced values in the TMUTCD can be used as the criteria for determination of satisfying Warrants 1, 2, 4 and 7.

To satisfy the criteria in Warrant 1 – Condition A, eight hours of an average day must have more than 420 vehicles per hour on the major street and 105 vehicles per hour on the minor street. As noted in **Table 2**, there are 13 hours which satisfy the major street volume requirements and no hours which satisfy the minor street volume requirements. There are no unique hours which meet both the major and minor street requirements. The conditions for Warrant 1 – Condition A are not met.

To satisfy the criteria in Warrant 1 – Condition B, eight hours of an average day must have more than 630 vehicles per hour on the major street and 53 vehicles per hour on the minor street. As noted in **Table 2**, there are 13 hours

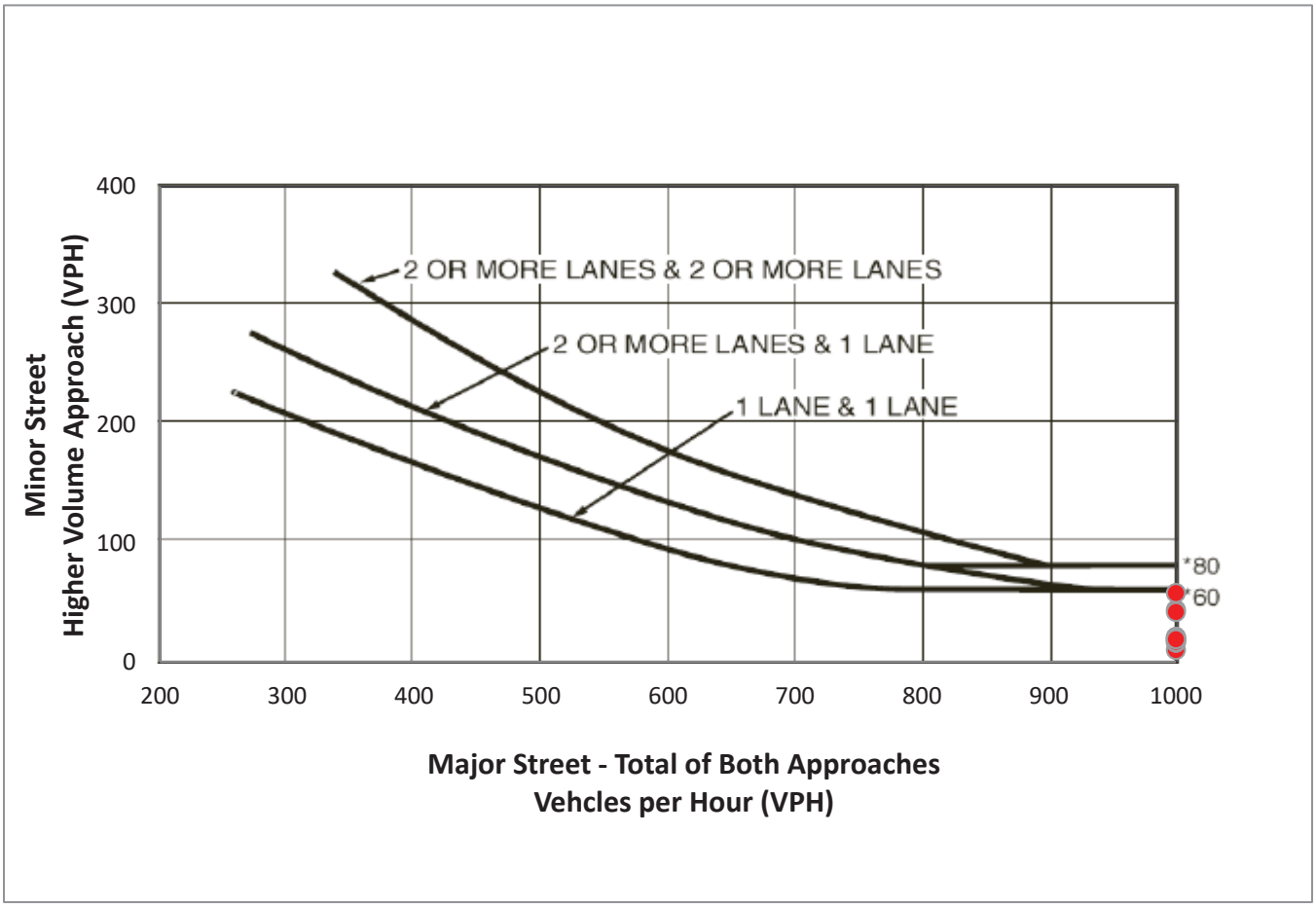
which satisfy the major street volume requirements and 1 hour which satisfies the minor street volume requirements. There is 1 unique hour which meets both the major and minor street requirements. The conditions for Warrant 1 – Condition B are not met.

Although conditions A and B are not met, an evaluation of the combination of both conditions under the 80% or 56% values of TMUTCD Warrant 1 cannot be considered as there has not been adequate trial of other alternatives that could cause less delay and inconvenience to traffic.

Thus warrant 1 is not satisfied at the intersection.

The evaluation of Warrant 2 (Four Hour Volumes) for this intersection utilizes Figure 4C-2 from the TMUTCD. Data points showing the combination of major and minor street volumes are shown in **Figure 16**.

Figure 16: TMUTCD Table 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)



As indicated in the above figure, The major and minor street approach volumes do not meet the required threshold (2 or more lanes & 1 lane). **Therefore, Warrant 2 is not satisfied at the intersection.**

The evaluation of Warrant 4 (Pedestrian Volumes) for this intersection utilizes Figures 4C-6 and 4C-8 from the TMUTCD. Data points showing the combination of major street vehicular and major street pedestrian crossing volumes are shown in **Figure 17** and **Figure 18**.

Figure 17: TMUTCD Table 4C-6. Warrant 4, Pedestrian Four-Hour (70% Factor)

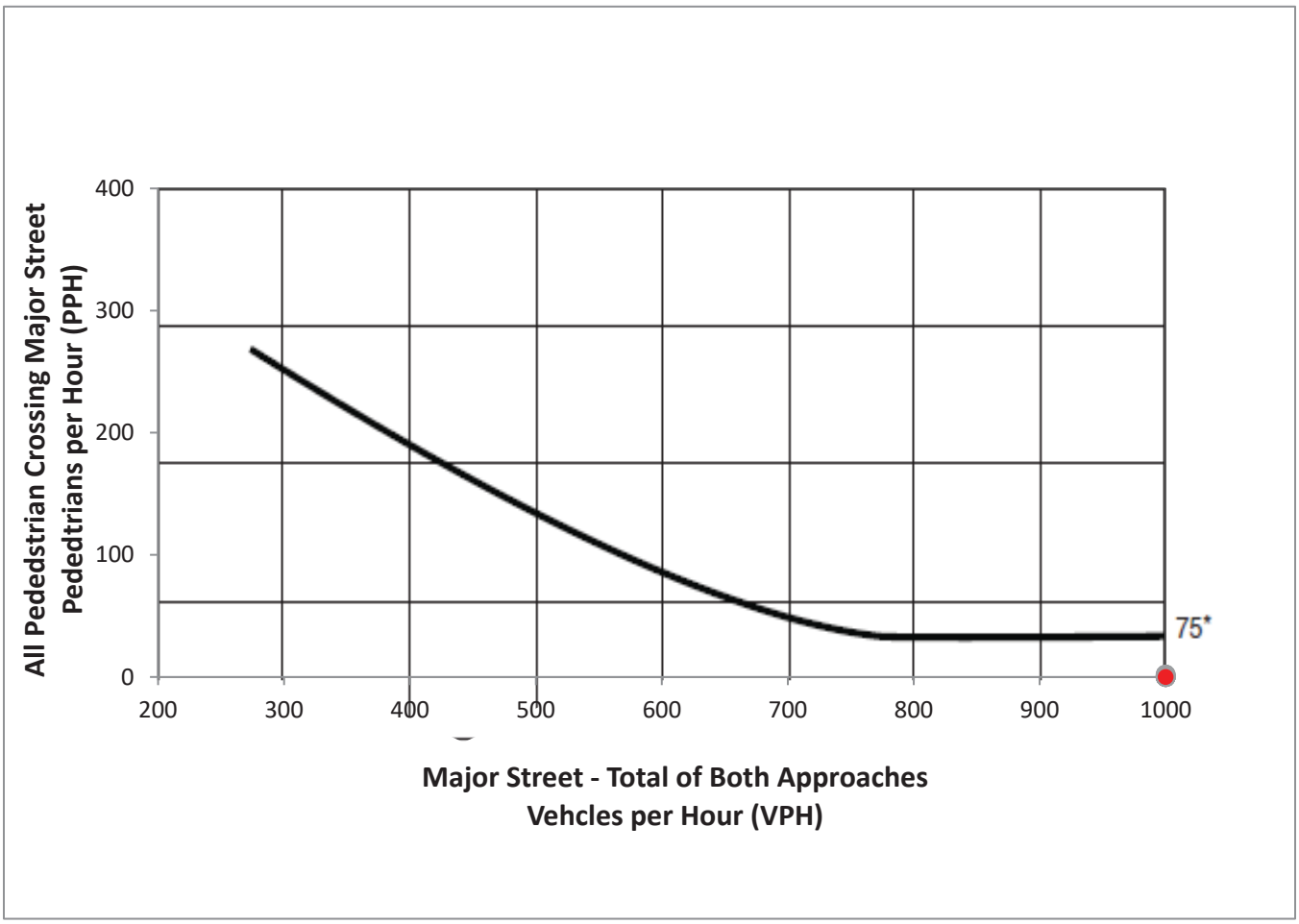
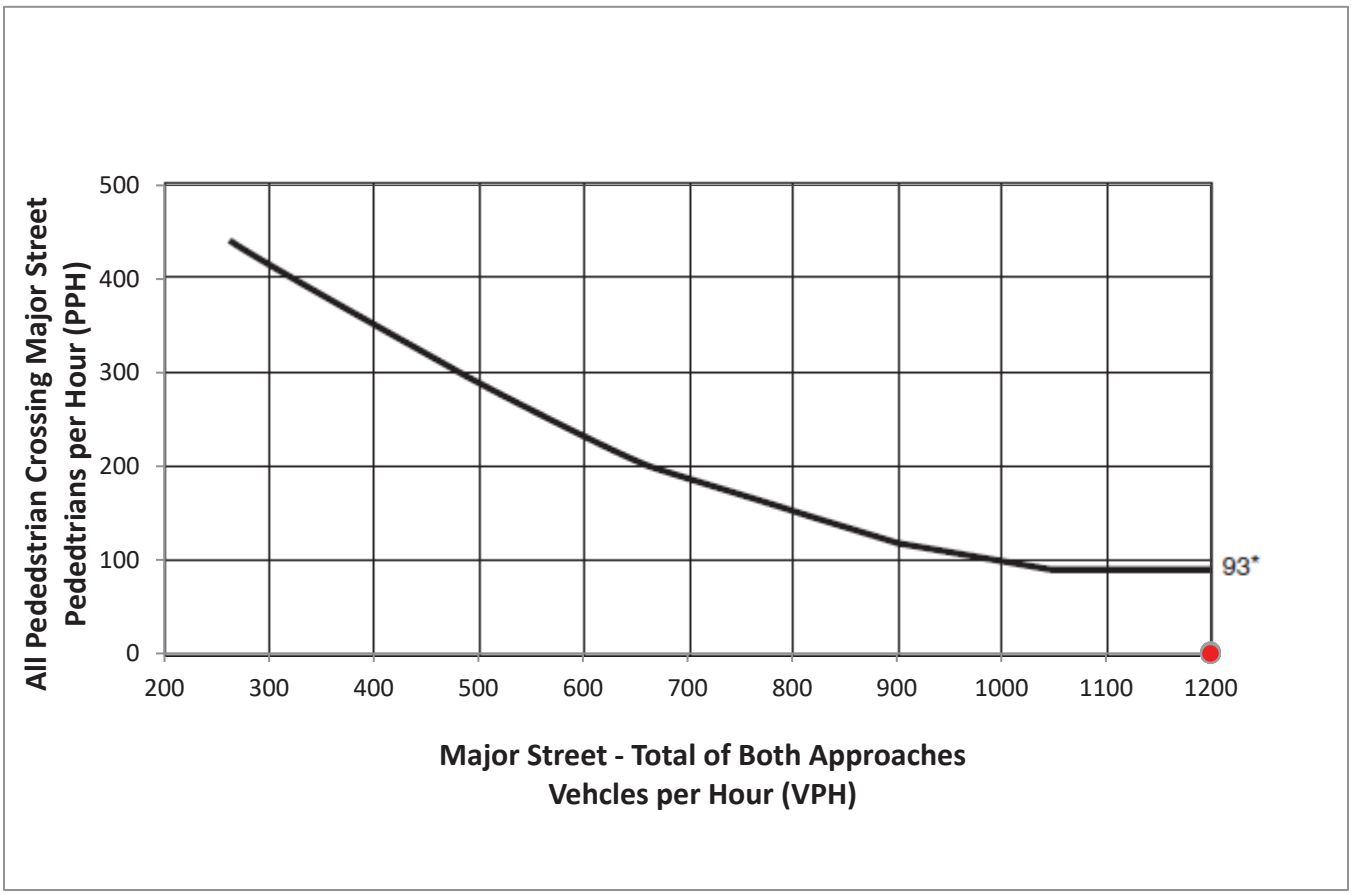


Figure 18: TMUTCD Table 4C-8. Warrant 4, Pedestrian Peak Hour (70% Factor)



As indicated in the above figures, pedestrian volumes did not meet required thresholds. **Therefore, Warrant 4 is not satisfied at the intersection.**

Crash data was obtained from the TxDOT Crash Records Information System. The number of crashes from 2016-2018 are reported in **Table 3**.

Table 3: Collision Data 2016-2018

Year	Total Number of Crashes	Total Number of Crashes Susceptible to Correction by a Traffic Control Signal
2016	2	0
2017	1	1
2018	1	0

As indicated in **Table 3**, no year had more than 5 reported crashes of types susceptible to correction by a traffic control signal. **Therefore, Warrant 7 is not satisfied at the intersection.**

ANALYSIS OF FUTURE CONDITIONS

A technical approach for estimating future travel demand was utilized in evaluating the study intersection. Information used to develop the projection of future traffic for this area is documented in the following sections of the report.

BACKGROUND TRAFFIC

Existing and projected traffic volumes at the intersection without the proposed project are commonly called background traffic. For the proposed Slaughter Lane Development, background traffic was based upon traffic counts collected in February of 2019. A 3.1% compound annual growth rate was then applied to existing traffic. The growth rate was determined using Texas Department of Transportation traffic count maps from 2013 to 2017. The anticipated build out year is 2021. Thus, existing traffic was grown over a two-year period.

SITE TRAFFIC

Entering and exiting volumes for the proposed development were calculated using information from ITE's Trip Generation Manual, 10th Edition[2] and are shown in **Table 4**. As tenants are not always known during this phase of development planning, conservative categories were chosen. The trips shown in **Table 4** are the unadjusted generated trips attributed to the development for the AM and PM peak hour(s).

Table 4: Unadjusted ITE Trip Generation

ITE Code	Description	Quantity	ADT	AM Peak		PM Peak	
				Enter	Exit	Enter	Exit
221-10	**Multifamily Housing (Mid-Rise) - General Urban/Suburban**	**225 DU**	1226	20	56	59	38
930-10	**Fast Casual Restaurant**	**1.5 KSF**	474	2	1	13	10
820-10	**Shopping Center**	**4 KSF**	674	95	58	24	26
		Total	**2373**	**117**	**115**	**95**	**74**

Trips generated by the site are different from total site trips that add to the adjacent roadway. Pass-by and internal capture trips can account for a significant portion of a site's generated traffic and are removed from site traffic per ITE methodology. Internal capture trips are trips that use only internal roadways traveling from one land use to another within the site. Pass-by trips are attracted to the site from traffic passing on the adjacent street. Primary trips, made for the specific purpose of visiting the development, are considered new traffic added to the street system. The net primary trips are determined by subtracting internal and pass-by trips from unadjusted trips for each land use.

The internal capture trips anticipated for the proposed Slaughter Lane Development, per ITE methodology, is 0% of the residential site traffic, 0% of the restaurant site traffic, and 0% of the retail site traffic. Therefore, no additional trips were removed from the unadjusted trip volumes for internal capture trips.

Adjustments for pass-by trips are shown in **Table 5** and were removed from the unadjusted trips shown in **Table 4** for the appropriate land uses. Per ITE methodology, 49% of the AM Peak restaurant site trips, 43% of the PM

Peak restaurant site trips, and 34% of the PM Peak retail site trips were assumed to be pass-by trips. After applying reductions for the internal capture, these pass-by trips were removed from the unadjusted site trips at the study intersection.

Table 5: Pass-By Trips

ITE Code	Description	Quantity	AM Peak		PM Peak	
			Enter	Exit	Enter	Exit
221-10	**Multifamily Housing (Mid-Rise) - General Urban/Suburban**	**225 DU**	0	0	0	0
930-10	**Fast Casual Restaurant**	**1.5 KSF**	1	0	5	4
820-10	**Shopping Center**	**4 KSF**	0	0	8	9
		Total	**1**	**0**	**13**	**13**

Table 6 shows the adjusted trips, or primary trips, for the full build-out of the development. The reported volumes are for the peak generation during the peak hour of the adjacent street.

Table 6: Adjusted ITE Trip Generation

ITE Code	Description	Quantity	ADT	AM Peak		PM Peak	
				Enter	Exit	Enter	Exit
221-10	**Multifamily Housing (Mid-Rise) - General Urban/Suburban**	**225 DU**	1226	20	56	59	38
930-10	**Fast Casual Restaurant**	**1.5 KSF**	464	1	1	7	6
820-10	**Shopping Center**	**4 KSF**	657	95	58	16	17
		Total	**2373**	**117**	**115**	**95**	**74**

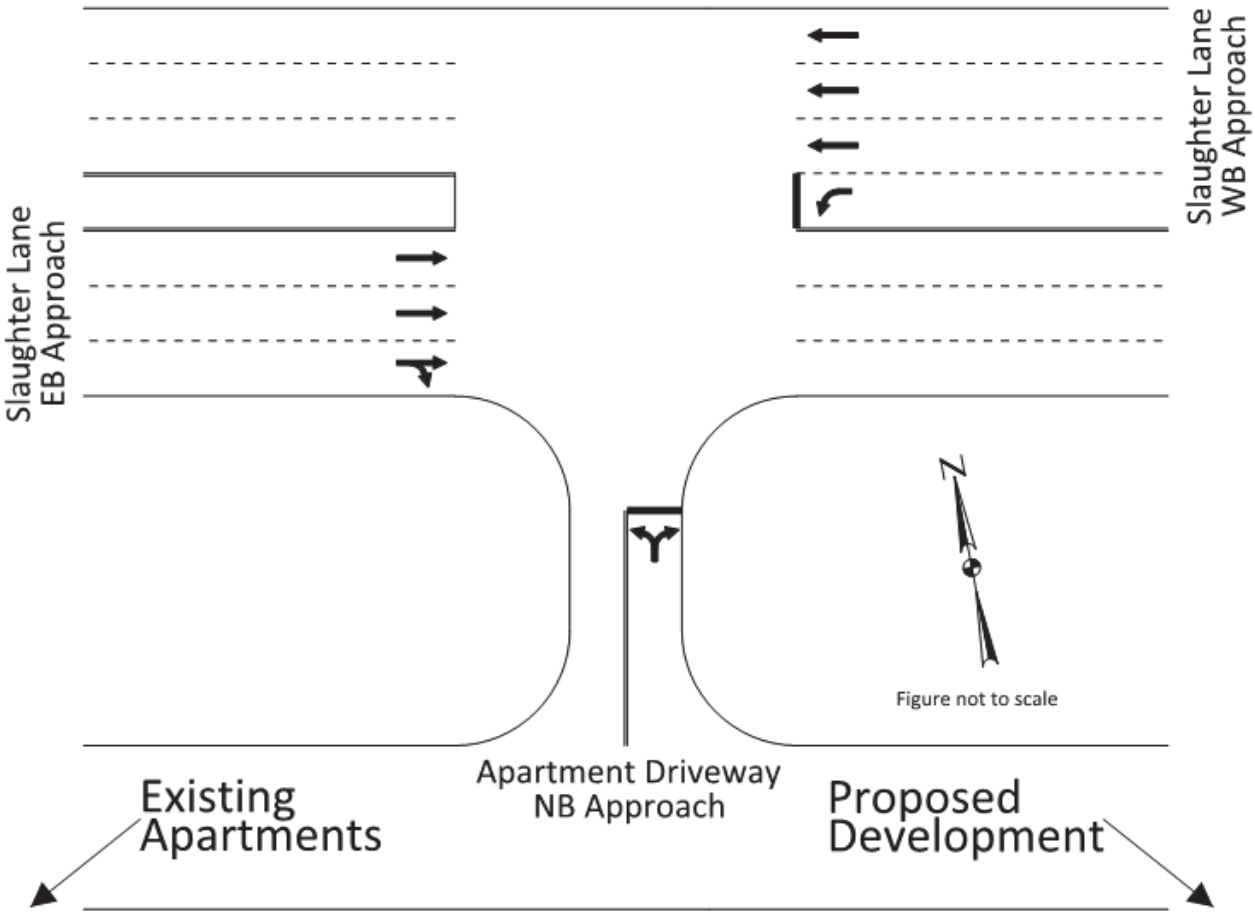
TRIP DISTRIBUTION

Trip distribution takes into account where vehicles generated by the site are going to or coming from based on the roadway network. As the Slaughter Lane Development is centrally located in South Austin, overall entering and exiting generated volumes for non-peak hours were distributed evenly between approaches. Within each approach, totals were distributed proportionally to existing traffic volumes on the applicable approaches to create hourly generated site trip volumes.

SITE ACCESS

Based on current plans, the Slaughter Lane Development is proposed to have 1 access point. The access for the development will be from the existing driveway for the adjacent apartment complex. This arrangement is shown in **Figure 19**.

Figure 19: Study Area Future Conditions (2021)



ANALYSIS OF WARRANTS: FUTURE CONDITIONS (2021)

As noted in the prior discussion, Warrants 1, 2, 4, and 7 are applicable at the study intersection and will be discussed in more detail in the following paragraphs.

Future condition traffic data for the shared use driveway at Slaughter Lane intersection is summarized in **Table 7**. The projected background traffic was combined with the proposed site generated traffic to generate the projected approach counts for the build-out year conditions (2021).

Table 7: Projected Approach Counts (2021)

Time Interval	Slaughter Lane (Total of Both Approaches)	Shared Use Driveway (Single Approach)
6:00 - 7:00	1664	220
7:00 - 8:00	2894	183
8:00 - 9:00	2880	123
9:00 - 10:00	2541	114
10:00 - 11:00	2432	82
11:00 - 12:00	2621	114
12:00 - 13:00	2812	102
13:00 - 14:00	2908	104
14:00 - 15:00	2859	48
15:00 - 16:00	3215	81
16:00 - 17:00	3241	87
17:00 - 18:00	3535	63
18:00 - 19:00	3398	69

Slaughter Lane is the major road at the intersection with three approach lanes in the eastbound and the westbound directions. The apartment driveway is the minor road at the intersection with one approach lane in the northbound direction. The speed limit on Slaughter Lane is 45 mph. Therefore, the reduced values in the TMUTCD can be used as the criteria for determination of satisfying Warrants 1, 2, 4 and 7.

To satisfy the criteria in Warrant 1 – Condition A, eight hours of an average day must have more than 420 vehicles per hour on the major street and 105 vehicles per hour on the minor street. As noted in **Table 7**, there are 13 hours which satisfy the major street volume requirements and 5 hours which satisfy the minor street volume requirements. There are 5 unique hours which meet both the major and minor street requirements. The conditions for Warrant 1 – Condition A are not met.

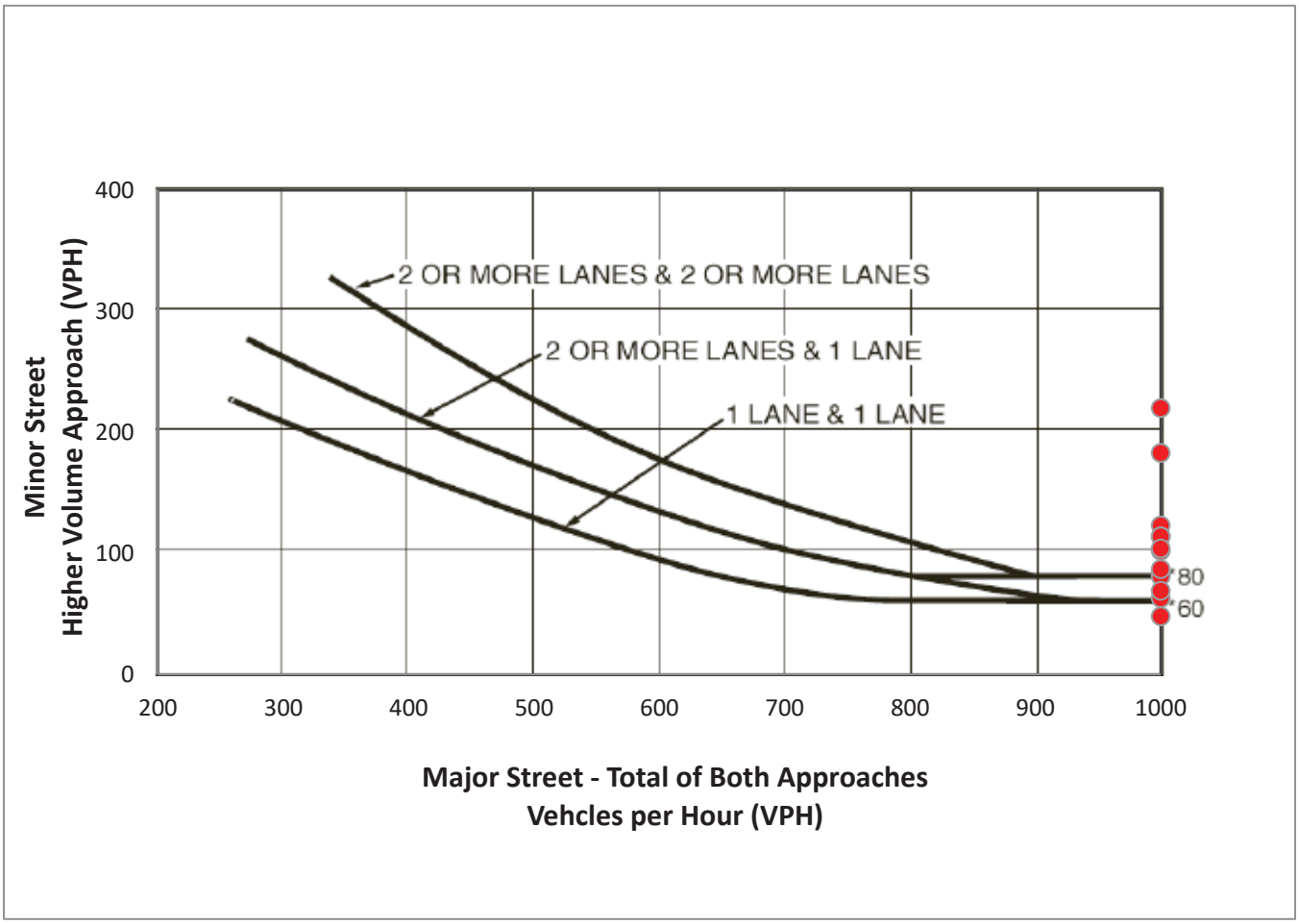
To satisfy the criteria in Warrant 1 – Condition B, eight hours of an average day must have more than 630 vehicles per hour on the major street and 53 vehicles per hour on the minor street. As noted in **Table 7**, there are 13 hours

which satisfy the major street volume requirements and 12 hours which satisfy the minor street volume requirements. There are 12 unique hours which meet both the major and minor street requirements. The conditions for Warrant 1 – Condition B are met.

Thus warrant 1 is satisfied at the intersection.

The evaluation of Warrant 2 (Four Hour Volumes) for this intersection utilizes Figure 4C-2 from the TMUTCD. Data points showing the combination of major and minor street volumes are shown in **Figure 20**.

Figure 20: TMUTCD Table 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)



As indicated in the above figure, 12 hours meet the threshold requirements (2 or more lanes & 1 lane). **Therefore, Warrant 2 is satisfied at the intersection.**

The evaluations of Warrant 4 (Pedestrian Volumes) and Warrant 7 (Crash Experience) remain unchanged from the existing conditions. **Therefore, warrants 4 and 7 are not satisfied at the intersection.**

CONCLUSIONS

The proposed Slaughter Lane Development and its interaction with the adjacent intersection has been analyzed for existing (2019) and build-out (2021) conditions. This analysis evaluated counted and projected data against the criteria contained in the Texas Manual on Uniform Control Devices to determine if a traffic signal would be warranted for installation at the intersection. Based on the analysis, while a traffic signal would not be warranted under existing conditions, projected build-out conditions would satisfy the applicable warrant criteria for signalization. Based on the findings of this study, the installation of a traffic signal at the intersection of the apartment driveway and Slaughter Lane is recommended.

Table 8: Summary of Signal Warrant Analysis Findings

Warrant	Existing Conditions (2019)	Future Conditions (2021)
Warrant 1, Eight-Hour Vehicular Volume	Not Met	Met
Warrant 2, Four-Hour Vehicular Volume	Not Met	Met
Warrant 3, Peak Hour	N/A	N/A
Warrant 4, Pedestrian Volume	Not Met	Not Met
Warrant 5, School Crossing	N/A	N/A
Warrant 6, Coordinated Signal System	N/A	N/A
Warrant 7, Crash Experience	Not Met	Not Met
Warrant 8, Roadway Network	N/A	N/A
Warrant 9, Intersection Near a Grade Crossing	N/A	N/A

CERTIFICATION STATEMENT

I hereby certify that this report complies with applicable technical requirements of the City of Austin and is complete and accurate to the best of my knowledge.

Alliance Transportation Group, Inc.

Jacob A. Sessions, P.E.

Transportation Engineer

REFERENCES

1) Texas Manual on Uniform Traffic Control Devices, Texas Department of Transportation, Austin, Texas, 2011.

2) Trip Generation, an Informal Report. 10th Edition, Institute of Transportation Engineers, Washington D.C., 2017

APPENDIX A | TRAFFIC COUNTS

W Slaughter Lane at Apartment Driveway - TMC
Wed Feb 13, 2019
Full Length (6 AM-7 PM)
All Classes (Lights, Single-Unit Trucks, Articulated Trucks, Buses, Pedestrians, Bicycles on Road, Bicycles on Crosswalk)
All Movements
ID: 616865, Location: 30.174002, -97.80256

CJ Hensch & Associates, Inc.
Provided by: C. J. Hensch & Associates Inc.
5215 Sycamore Ave.,
Pasadena, TX, 77503, US

Leg	apartment driveway					Slaughter Ln					Slaughter Ln					
Direction	Northbound					Eastbound					Westbound					
Time	L	R	U	App	Ped*	T	R	U	App	Ped*	L	T	U	App	Ped*	Int
2019-02-13 6:00AM	2	7	0	**9**	0	151	0	0	**151**	0	0	116	0	**116**	0	**276**
6:15AM	3	6	0	**9**	0	183	1	0	**184**	0	0	143	0	**143**	0	**336**
6:30AM	4	9	0	**13**	0	243	0	0	**243**	0	0	182	0	**182**	0	**438**
6:45AM	2	11	0	**13**	0	319	0	1	**320**	0	1	220	0	**221**	0	**554**
Hourly Total	11	33	0	**44**	0	896	1	1	**898**	0	1	661	0	**662**	0	**1604**
7:00AM	4	12	0	**16**	2	314	0	0	**314**	0	1	295	0	**296**	0	**626**
7:15AM	2	5	0	**7**	1	301	0	1	**302**	0	1	312	0	**313**	0	**622**
7:30AM	5	12	0	**17**	2	361	1	0	**362**	0	3	360	0	**363**	0	**742**
7:45AM	9	9	0	**18**	2	382	2	3	**387**	0	2	353	0	**355**	0	**760**
Hourly Total	20	38	0	**58**	7	1358	3	4	**1365**	0	7	1320	0	**1327**	0	**2750**
8:00AM	5	10	0	**15**	1	358	2	0	**360**	0	2	372	0	**374**	0	**749**
8:15AM	4	8	0	**12**	1	306	0	1	**307**	0	1	320	0	**321**	1	**640**
8:30AM	6	2	0	**8**	1	362	1	0	**363**	1	2	314	0	**316**	0	**687**
8:45AM	2	5	0	**7**	1	316	1	1	**318**	0	2	328	1	**331**	0	**656**
Hourly Total	17	25	0	**42**	4	1342	4	2	**1348**	1	7	1334	1	**1342**	1	**2732**
9:00AM	2	6	0	**8**	3	325	1	0	**326**	0	1	295	0	**296**	0	**630**
9:15AM	2	5	0	**7**	0	280	0	0	**280**	0	2	279	0	**281**	0	**568**
9:30AM	2	2	0	**4**	0	295	0	2	**297**	0	2	295	1	**298**	0	**599**
9:45AM	1	1	0	**2**	0	288	1	2	**291**	0	2	281	2	**285**	0	**578**
Hourly Total	7	14	0	**21**	3	1188	2	4	**1194**	0	7	1150	3	**1160**	0	**2375**
10:00AM	0	3	0	**3**	0	261	1	0	**262**	0	2	273	0	**275**	0	**540**
10:15AM	2	6	0	**8**	0	301	4	0	**305**	0	1	268	1	**270**	0	**583**
10:30AM	0	3	0	**3**	1	299	0	0	**299**	0	0	272	0	**272**	0	**574**
10:45AM	1	3	0	**4**	1	282	0	0	**282**	0	3	273	3	**279**	0	**565**
Hourly Total	3	15	0	**18**	2	1143	5	0	**1148**	0	6	1086	4	**1096**	0	**2262**
11:00AM	0	3	0	**3**	0	322	3	0	**325**	0	3	259	2	**264**	0	**592**
11:15AM	1	5	0	**6**	3	265	3	0	**268**	0	0	290	2	**292**	0	**566**
11:30AM	3	0	0	**3**	1	342	3	0	**345**	0	1	286	1	**288**	0	**636**
11:45AM	3	6	0	**9**	1	298	2	0	**300**	0	0	318	3	**321**	0	**630**
Hourly Total	7	14	0	**21**	5	1227	11	0	**1238**	0	4	1153	8	**1165**	0	**2424**
12:00PM	2	4	0	**6**	1	302	2	1	**305**	0	4	288	0	**292**	1	**603**
12:15PM	3	4	0	**7**	1	303	5	1	**309**	1	2	341	1	**344**	0	**660**
12:30PM	1	3	0	**4**	1	331	1	0	**332**	0	5	309	1	**315**	0	**651**
12:45PM	1	0	0	**1**	2	311	1	0	**312**	0	4	325	3	**332**	0	**645**
Hourly Total	7	11	0	**18**	5	1247	9	2	**1258**	1	15	1263	5	**1283**	1	**2559**
1:00PM	2	3	0	**5**	2	328	1	0	**329**	0	4	301	0	**305**	0	**639**
1:15PM	2	4	0	**6**	3	317	4	1	**322**	0	2	342	0	**344**	0	**672**
1:30PM	1	4	0	**5**	0	321	3	0	**324**	0	2	328	2	**332**	0	**661**
1:45PM	1	3	0	**4**	1	357	4	2	**363**	0	3	312	2	**317**	0	**684**
Hourly Total	6	14	0	**20**	6	1323	12	3	**1338**	0	11	1283	4	**1298**	0	**2656**
2:00PM	0	2	0	**2**	2	328	3	1	**332**	0	1	363	2	**366**	0	**700**
2:15PM	0	2	0	**2**	1	311	1	0	**312**	0	4	311	0	**315**	0	**629**
2:30PM	2	1	0	**3**	2	311	2	1	**314**	0	3	321	0	**324**	0	**641**
2:45PM	0	3	0	**3**	1	309	1	0	**310**	0	4	328	2	**334**	0	**647**
Hourly Total	2	8	0	**10**	6	1259	7	2	**1268**	0	12	1323	4	**1339**	0	**2617**

Leg	apartment driveway					Slaughter Ln					Slaughter Ln					
Direction	Northbound					Eastbound					Westbound					
Time	L	R	U	App	Ped*	T	R	U	App	Ped*	L	T	U	App	Ped*	Int
3:00PM	2	2	0	**4**	1	343	2	1	**346**	0	4	334	0	**338**	1	**688**
3:15PM	1	2	0	**3**	1	391	1	4	**396**	0	1	303	1	**305**	0	**704**
3:30PM	1	5	0	**6**	1	382	6	0	**388**	0	2	355	2	**359**	0	**753**
3:45PM	0	3	0	**3**	2	436	7	0	**443**	0	3	335	0	**338**	0	**784**
Hourly Total	4	12	0	**16**	5	1552	16	5	**1573**	0	10	1327	3	**1340**	1	**2929**
4:00PM	2	3	0	**5**	5	356	3	0	**359**	0	2	346	1	**349**	0	**713**
4:15PM	1	6	0	**7**	3	399	3	0	**402**	0	0	353	0	**353**	0	**762**
4:30PM	0	1	0	**1**	3	366	6	1	**373**	0	5	348	1	**354**	0	**728**
4:45PM	0	6	0	**6**	1	381	3	0	**384**	0	6	346	1	**353**	0	**743**
Hourly Total	3	16	0	**19**	12	1502	15	1	**1518**	0	13	1393	3	**1409**	0	**2946**
5:00PM	1	7	0	**8**	1	435	3	0	**438**	0	3	373	2	**378**	0	**824**
5:15PM	1	3	0	**4**	1	407	1	1	**409**	0	5	395	1	**401**	0	**814**
5:30PM	0	3	0	**3**	2	447	5	1	**453**	0	5	362	0	**367**	0	**823**
5:45PM	0	2	0	**2**	4	455	16	0	**471**	0	1	364	5	**370**	0	**843**
Hourly Total	2	15	0	**17**	8	1744	25	2	**1771**	0	14	1494	8	**1516**	0	**3304**
6:00PM	2	3	0	**5**	0	449	9	1	**459**	0	4	365	1	**370**	0	**834**
6:15PM	0	7	0	**7**	0	420	7	0	**427**	0	4	353	1	**358**	0	**792**
6:30PM	1	4	0	**5**	0	403	5	0	**408**	0	4	335	2	**341**	0	**754**
6:45PM	1	1	0	**2**	0	334	5	0	**339**	0	3	370	1	**374**	0	**715**
Hourly Total	4	15	0	**19**	0	1606	26	1	**1633**	0	15	1423	5	**1443**	0	**3095**
Total	93	230	0	**323**	63	17387	136	27	**17550**	2	122	16210	48	**16380**	3	**34253**
% Approach	28.8%	71.2%	0%	-	-	99.1%	0.8%	0.2%	-	-	0.7%	99.0%	0.3%	-	-	-
% Total	0.3%	0.7%	0%	**0.9%**	-	50.8%	0.4%	0.1%	**51.2%**	-	0.4%	47.3%	0.1%	**47.8%**	-	-
Lights	90	227	0	**317**	-	16930	129	27	**17086**	-	119	15747	48	**15914**	-	33317
% Lights	96.8%	98.7%	0%	**98.1%**	-	97.4%	94.9%	100%	**97.4%**	-	97.5%	97.1%	100%	**97.2%**	-	97.3%
Single-Unit Trucks	2	2	0	**4**	-	195	6	0	**201**	-	3	199	0	**202**	-	407
% Single-Unit Trucks	2.2%	0.9%	0%	**1.2%**	-	1.1%	4.4%	0%	**1.1%**	-	2.5%	1.2%	0%	**1.2%**	-	1.2%
Articulated Trucks	0	0	0	**0**	-	114	0	0	**114**	-	0	98	0	**98**	-	212
% Articulated Trucks	0%	0%	0%	**0%**	-	0.7%	0%	0%	**0.6%**	-	0%	0.6%	0%	**0.6%**	-	0.6%
Buses	1	1	0	**2**	-	142	0	0	**142**	-	0	161	0	**161**	-	305
% Buses	1.1%	0.4%	0%	**0.6%**	-	0.8%	0%	0%	**0.8%**	-	0%	1.0%	0%	**1.0%**	-	0.9%
Bicycles on Road	0	0	0	**0**	-	6	1	0	**7**	-	0	5	0	**5**	-	12
% Bicycles on Road	0%	0%	0%	**0%**	-	0%	0.7%	0%	**0%**	-	0%	0%	0%	**0%**	-	0%
Pedestrians	-	-	-	-	58	-	-	-	-	2	-	-	-	-	2	
% Pedestrians	-	-	-	-	92.1%	-	-	-	-	100%	-	-	-	-	66.7%	-
Bicycles on Crosswalk	-	-	-	-	5	-	-	-	-	0	-	-	-	-	1	
% Bicycles on Crosswalk	-	-	-	-	7.9%	-	-	-	-	0%	-	-	-	-	33.3%	-

*Pedestrians and Bicycles on Crosswalk. L: Left, R: Right, T: Thru, U: U-Turn