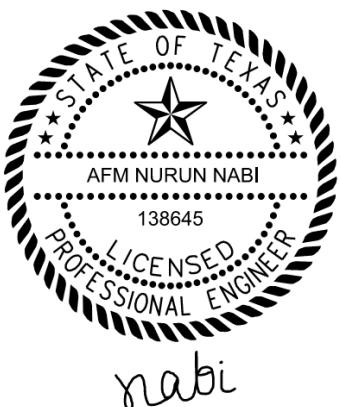


TRAFFIC ANALYSIS TECHNICAL MEMORANDUM
For
PROPOSED DEVELOPMENT AT
40429 FM 149, MAGNOLIA, TX 77354

PREPARED FOR



**Montgomery
County, Texas**



PREPARED BY



MTS Engineering and Design
9950 Westpark Dr. Suite 426
Houston, TX 77063
FIRM NO. 18844

9/8/2025

September 2025

September 8, 2025

To whom it may Concern,

Subject: Traffic Analysis Memorandum for 40429 FM 149, MAGNOLIA, TX 77354

INTRODUCTION

This memorandum summarizes the results of the traffic analysis conducted by Midstream & Terminal Services in connection with the proposed Convenience Store/Gas Station development, designated as "Atlas Market" located in the City of Houston, Texas. The proposed project consists of development of approximately 6,540 square feet of Convenience Store/Gas Station with 10 vehicle fueling positions and 2,460 square feet retail store are proposed to be located along FM 149. Figure 1 illustrates the site location map of the proposed project.

PURPOSE

The purpose of this analysis was to evaluate the impact of the proposed project on the adjacent roadway system, in accordance with the requirements set forth by the Montgomery County, Texas and Texas Department of Transportation. The construction of this development is planned in a single phase and is anticipated to be complete by the Year 2026.

PROPOSED DEVELOPMENT

The Convenience Store/Gas Station is proposed to be accessible via one driveway abutting FM 149. For analysis purposes, these accesses at FM 149 are designated as Driveway # 1. Figure 2 shows the proposed site plan with location and spacing of the access driveway.

EXISTING CONDITIONS

FM 149 is generally aligned in north south direction in the vicinity of the study area. It is generally a two-lane (one lane in each direction) divided roadway with double yellow pavement markings and raised pavement markers. The posted speed limit on this road is 55 mph. Direct access to the project site will be provided by FM 149.

PROJECTED TRAFFIC, YEAR 2025

Both AM and PM peak hours traffic volumes were projected to the Year 2025 by applying a 3.98% compound annual growth rate to establish background traffic conditions for the Year 2025. Figure 3 shows traffic volumes during AM and PM peak hours near the project site.

Anticipated AM and PM peak hour trips for the proposed project was projected based on the trip generation procedures recommended by the Institute of Transportation Engineers (ITE) Trip Generation Manual (11th Edition) and based on the anticipated operations of the proposed project.

Traffic Technical Memorandum
Proposed Development at
40429 FM 149, MAGNOLIA, TX 77354

Proposed Land Use (ITE Code)	Vehicles Fueling Positions	Gross Floor Area (Sq. feet)	Daily Traffic	AM Peak		PM Peak	
				Enter	Exit	Enter	Exit
Convenience Store/ Gas Station – GFA (5.5k – 10 k)	10	6,540 sft	4,217	185	185	179	178
Strip Retail Plaza (<40k) (822)		2,460 sft	134	4	2	8	8
Pass-By Trips (ITE recommended 76% during AM peak hour and 75% during PM peak hour for Land Use Code 945)				141	141	134	134
Volume added to the adjacent streets				48	46	53	52

Table 1 presents the trip generation summary for the proposed development. Trip generation computations are attached with this this memorandum.

For the project trips during AM and PM peak hours, it was assumed that 60 percent of the project trips will arrive from northbound FM 149, and the remaining 40 percent from southbound FM 149. It was also assumed that project traffic will be exiting from the development in a similar fashion as entering. All traffic generated by the proposed development would utilize Driveway # 1 for entering and exiting purposes. Pass-by trips were included at all access driveways but deducted from background traffic. The anticipated project trips distribution percentages and project traffic assignments (primary trips and pass-by trips) for the AM and PM peak hours are presented in the same Figure 2-1. The AM and PM peak-hour trip assignments for the project were added to the background (Year 2026) traffic volumes to obtain traffic volumes representing AM and PM peak hour project traffic conditions for the Year 2026. The AM and PM peak hour project condition traffic volumes (Year 2026), are presented in the same Figure 2-1.

TRAFFIC SAFETY INVESTIGATION AND OBSERVATIONS

An in-depth field review was conducted within the immediate vicinity of the proposed development. This review involves an inspection of the physical condition of the site and an observation of traffic operations along FM 149 on a weekday. Information obtained from this field review in conjunction with trip generation of the proposed land uses was used to analyze any potential existence of physical deficiencies. There were no sight-distance obstructions within the immediate vicinity of the proposed site. Figure 3-1 illustrates the sight visibility triangle at the driveway, confirming that vehicles exiting the site have an unobstructed line of sight in both directions along the roadway.

AUTOTURN ANALYSIS

An AutoTURN vehicle path analysis was performed to ensure that the site has smooth accessibility to vehicles. Largest vehicle that will maneuver the site is refueling truck. WB-50 has taken as design vehicle. TxDOT Roadway Design manual figure 16-2 proposes width and radius for one lane entering and one lane exiting driveways. For a 30 ft wide driveway minimum 25 ft radius is proposed. Based on AutoTURN vehicle path analysis shown in Figure 1-3, 45 ft driveway width and 50 ft radii are proposed for smooth movement of the vehicles.

LEFT TURN AND RIGHT TURN LANE WARRANT ANALYSIS

Warrant for northbound left turn lanes along FM 149 at Driveway # 1 were conducted TxDOT Roadway Design Manual. According to TxDOT Roadway Design Manual Figure 14-17, for Left-Turn Lane Peak-Hour Volume 30 to 45 (veh/hr), a left turn lane will be warranted if the major urban and sub-urban arterial volume is more than 150 vehicle per hour. In our study, left turn lane volume is 32 and opposing thru lane volume is 687. Based on the analysis results, no northbound left turn lane is warranted along FM 149 at Driveway # 1.

A right turn lane warrant analysis at southbound FM 149 was performed. Speed limit at FM 149 is 55 mph. from trip distribution, we have 21 right turn volume at Driveway # 1 at FM 149. Per TxDOT Access Management manual page 2-12, at least 50 right turn volume is required for a right turn lane to be warranted. Therefore, no right turn lane is warranted at the Driveway #1 at FM 149.

RECOMMENDATIONS

Driveway # 1 at FM 149 will be full access driveway. This driveway shall be configured as one lane entering and one lane exiting. A left turn lane will be provided at Driveway #1 and FM 149. The length of the storage and taper will be 100 ft each, and the length of the deceleration left turn lane will be 605 ft. The proposed access driveway and the left turn lane shall be built with appropriate signage and pavement markings and conform to TxDOT's Roadway Design manual and Texas Manual on Uniform Traffic Control Devices (TMUTCD).

Should you need any further information, please do not hesitate to contact me.

Sincerely

nabi

AFM Nurun Nabi, P.E.

License No. 138645



Attachment:

1. Figure 1-1: Vicinity Map
2. Figure 1-2: Proposed Site Layout
3. Figure 1-3: Truck Maneuverability Exhibit and Design Vehicle
4. Figure 1-4 Traffic Volume Data
5. Trip Generation
6. Figure 2-1: Trip Distribution
7. Figure 3-1: Intersection Sight Triangle
8. Left Turn Warrant Analysis Chart
9. Auxiliary Lane threshold

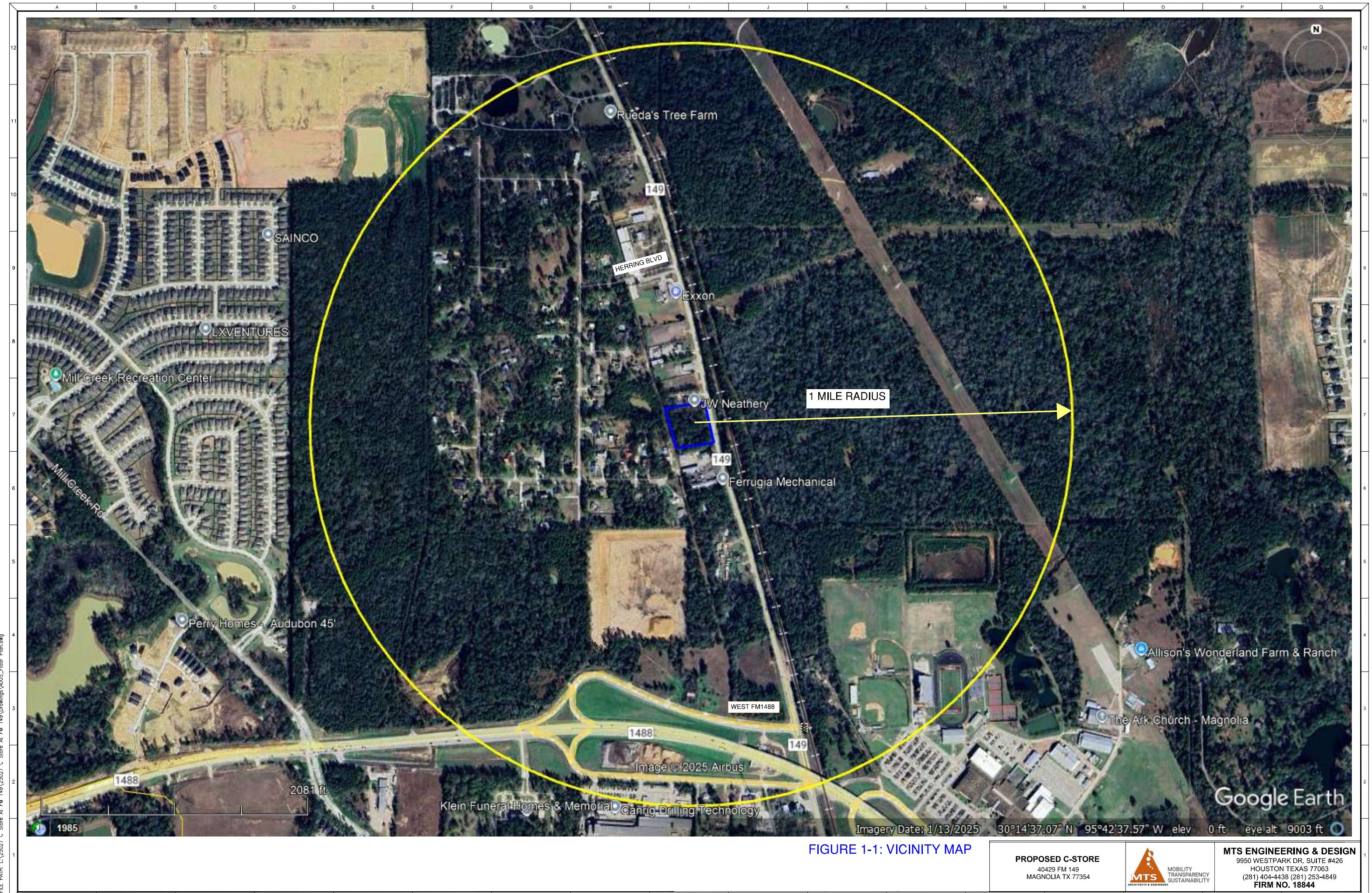


FIGURE 1-1: VICINITY MAP

PROPOSED C-STORE
40429 FM 149
MAGNOLIA TX 77354



MTS ENGINEERING & DESIGN
9950 WESTPARK DR. SUITE #426
HOUSTON TEXAS 77063
(281) 404-4438 (281) 253-4849
FIRM NO. 18844

TBM:
PK NAIL SET IN ASPHALT ROAD @ THE WESTERLY RIGHT OF WAY
OF F.M. 149. ELEVATION=232.74'

BENCHMARK:

FLOODPLAIN REFERENCE MARK NUMBER 100195 IS A BRASS DISC, FROM THE INTERSECTION OF FM 1488 AND FM 1774, TRAVEL SOUTHEAST ALONG FM 1774 0.4 MILES TO NICHOLS SAWMILL ROAD, SOUTH ALONG NICHOLS SAWMILL RD. 0.8 MILES TO THE BENCHMARK ON THE RIGHT, KEY MAP 212N IN THE SPRING CREEK WATERSHED NEAR STREAM 1100-00-00

ELEV. 231.72 FEET NAVD 1988, 2001 ADJUSTED.

FLOOD NOTE:

SUBJECT PROPERTY IS NOT LOCATED IN A FEDERAL INSURANCE ADMINISTRATION DESIGNATED FLOOD HAZARD AREA AND IS IN ZONE "X" (UNSHADED), MAP # 48339C, PANEL 0480G, DATED 08-18-14.

SITE DATA TABLE

PROPOSED PROPERTY ZONED : COMMERCIAL ZONE

SETBACKS: FRONT = 35' BUILDING LINE
LEFT SIDE = N/A
RIGHT SIDE = N/A
REAR = N/A

ITEM	AMOUNT		
	SQ.FT	ACRES	%
SITE AREA	87121.00	2.000	100% OF SITE AREA
BUILDING AREA	9000	0.207	10% OF SITE AREA
PROPOSED PERVIOUS AREA	30615.00	0.703	35% OF SITE AREA
PROPOSED IMPERVIOUS AREA	56506.00	1.297	65% OF SITE AREA
EXISTING PERVIOUS AREA	87121.00	2.000	100% OF SITE AREA
EXISTING IMPERVIOUS AREA	0	0	0% OF SITE AREA
PARKING	PARKING REQUIRED =43 SPACES		
	PARKING PROVIDED =50 SPACES		

PARKING SYNOPSIS

OCCUPANCY TYPE	PARKING COUNT	REQUIRED	PROVIDED
C-STORE	6,540/ 1,000 X 5	32.7(33)	40
RETAIL SPACE	2,460/ 1,000 X 4	9.8(10)	
GAS CANOPY	10		10
TOTAL		43	50

CO-ORDINATE:

POINT	X	Y
①	3012318.02	14011452.67
②	3012306.04	14011492.21
③	3012252.74	14011710.08
④	3011931.25	14011631.44
⑤	3012007.46	14011371.63
⑥	3012098.89	14011437.35
⑦	3012156.95	14011452.50
⑧	3012119.07	14011597.64
⑨	3012061.01	14011582.49
⑩	3012218.17	14011465.39
⑪	3012241.39	14011471.44
⑫	3012202.06	14011622.40
⑬	3012178.78	14011616.32

LEGEND

-  PROPERTY LINE

 BENCHMARK

 PROPOSED GREEN AREA

[A] PROPOSED C-STORE 6,540 SQ.FT.

[B] PROPOSED CAR PARKING (19'-0" X 9'-0")

[C] WHEEL STOPPER (5'-0" X 0'-6")

[D] PROPOSED 6" MONOLITHIC CONCRETE CURB

[E] PROPOSED RETAIL 2,460 SQ.FT.

[F] PROPOSED DRIVEWAY (45'-0")

[G] PROPOSED TRASH ENCLOSER

[H] PROPOSED GASOLINE CANOPY

[J] PROPOSED FUEL TANK

[K] PROPOSED HANDICAP PARKING (19'-0" X 9'-0")

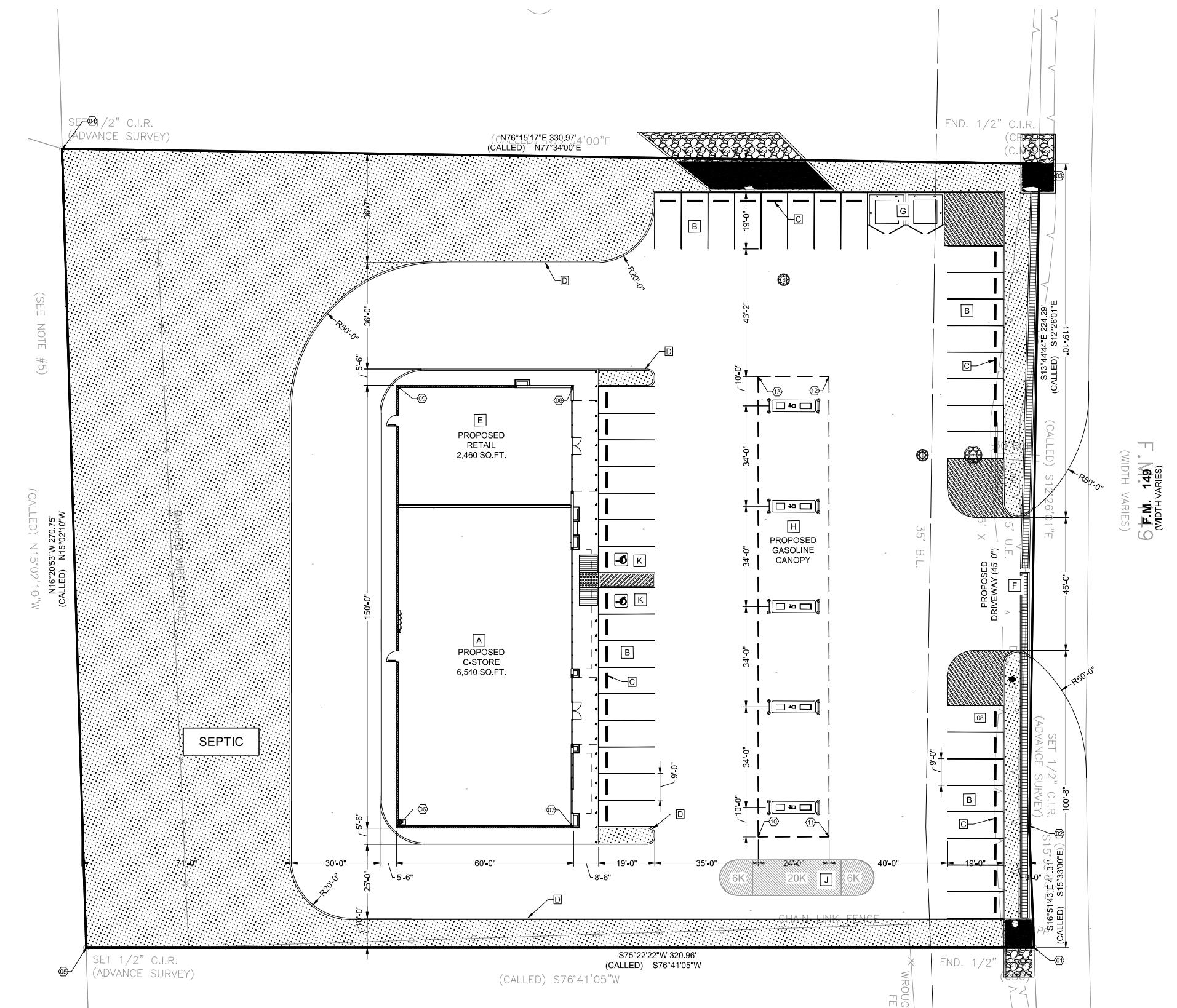


FIGURE 1.2. INTERSECTION SITE DISTANCE

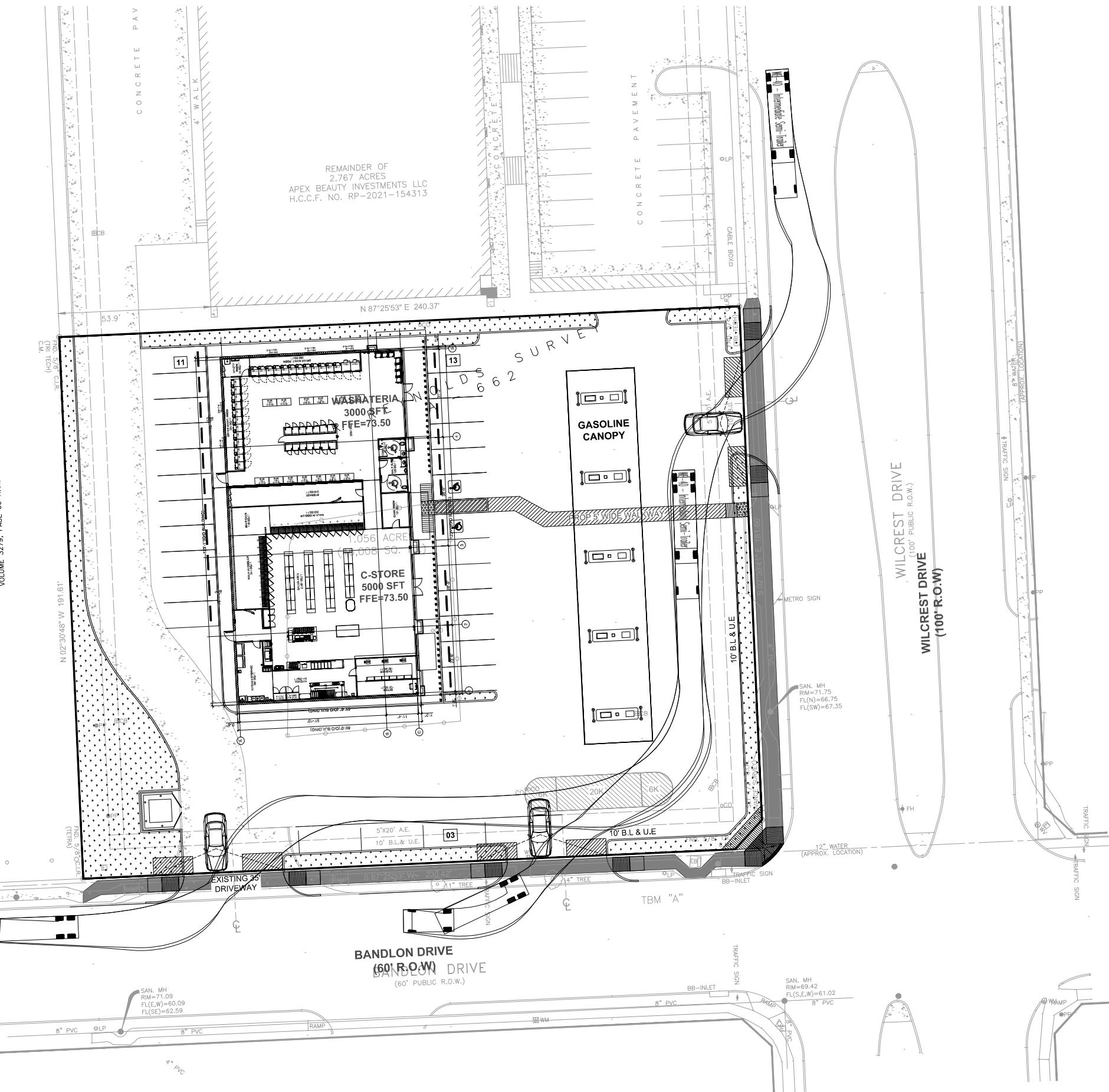
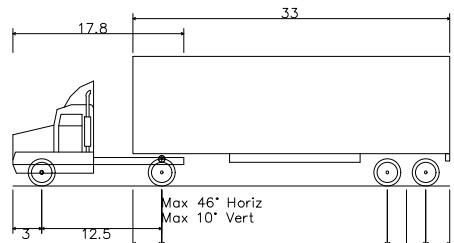


FIGURE 1-3A INTERSECTION SITE DISTANCE



WB-40 – Intermediate Semi-Trailer
 Overall Length
 Overall Width
 Overall Body Height
 Min Body Ground Clearance
 Track Width
 Lock-to-lock time
 Max Steering Angle (Virtual)

45.499ft
 8.000ft
 13.500ft
 1.334ft
 8.000ft
 4.00s
 20.30°

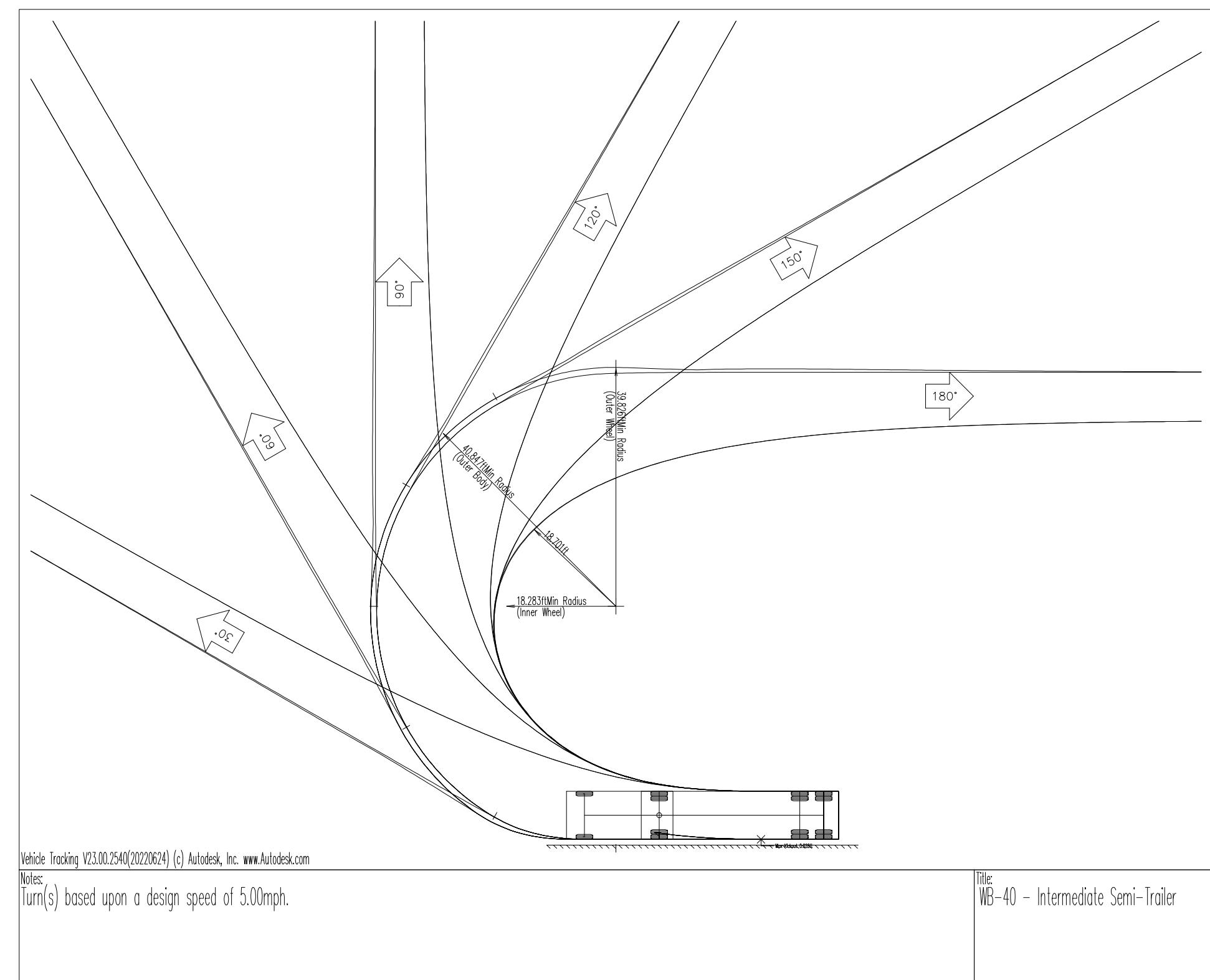


FIGURE 1-3B INTERSECTION SITE DISTANCE

ON GO
 6506 WILCREST DR
 HOUSTON, TX 77072



MTS ENGINEERING & DESIGN
 9950 WESTPARK DR. SUITE #426
 HOUSTON TEXAS 77063
 (281) 404-4438 (281) 253-4849
FIRM NO. 18844

EXISTING TRAFFIC COUNTS

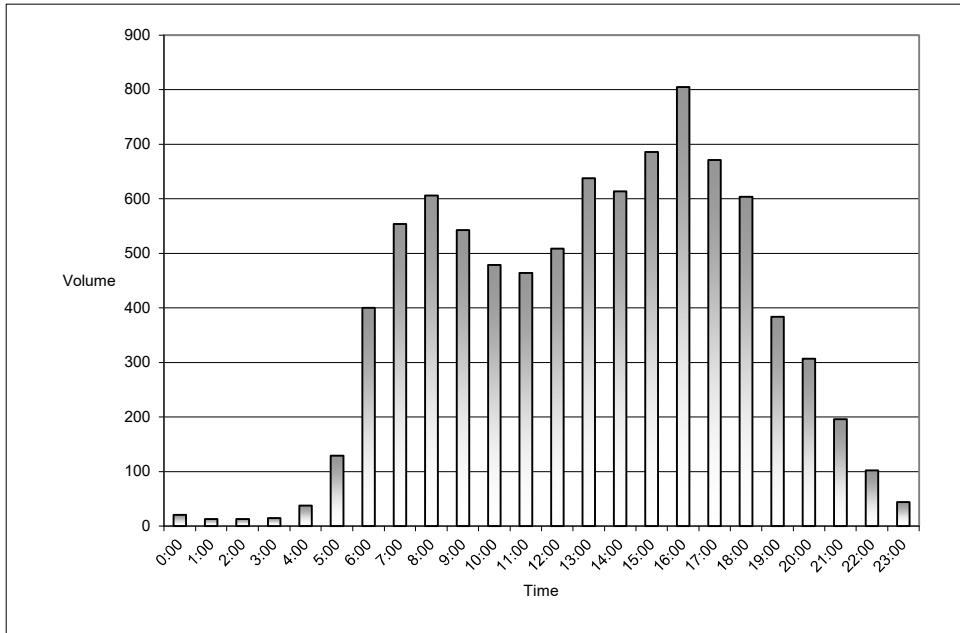
Date Began:
5/1/2025

Northbound FM 149 north of Heritage Dr

TIME	0:00	0:15	0:30	0:45	Total
0:00	8	10	3	0	21
1:00	2	4	4	3	13
2:00	1	5	1	6	13
3:00	1	3	3	8	15
4:00	2	9	4	23	38
5:00	11	27	29	62	129
6:00	46	96	126	132	400
7:00	138	144	152	120	554
8:00	141	162	165	138	606
9:00	147	115	148	133	543
10:00	132	129	114	104	479
11:00	80	116	145	123	464
12:00	125	138	130	116	509
13:00	136	191	147	164	638
14:00	108	163	172	171	614
15:00	184	166	156	180	686
16:00	195	219	195	196	805
17:00	164	162	161	184	671
18:00	177	171	140	116	604
19:00	103	104	87	90	384
20:00	87	85	73	62	307
21:00	61	41	34	60	196
22:00	32	28	24	18	102
23:00	13	8	12	11	44
				TOTAL:	8835

The A.M. peak hour from 8:15 to 9:14 is 612

The P.M. peak hour from 16:00 to 16:59 is 805



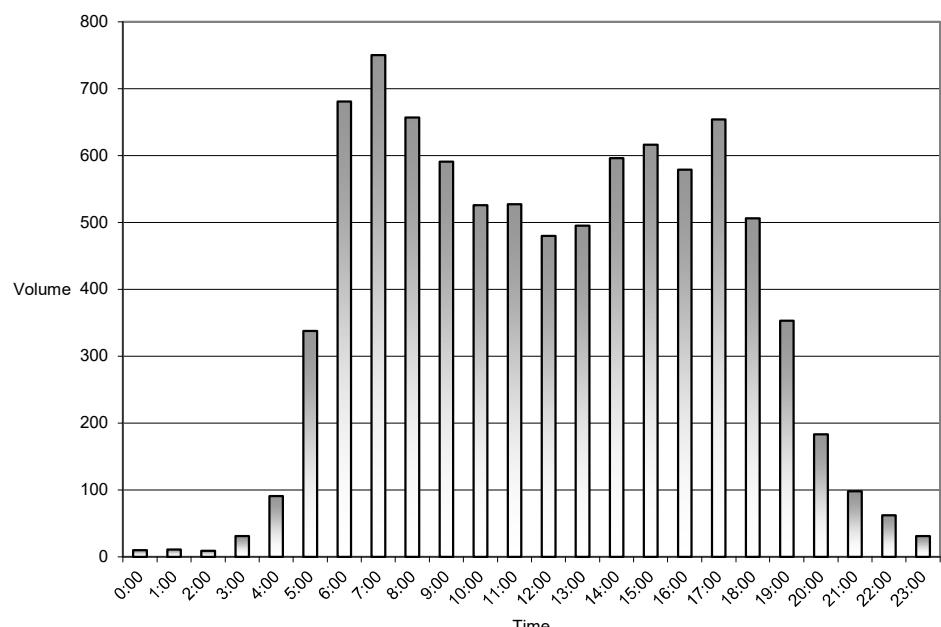
Date Began:
5/1/2025

Southbound FM 149 north of Heritage Dr

TIME	0:00	0:15	0:30	0:45	Total
0:00	2	1	4	3	10
1:00	2	1	4	4	11
2:00	1	0	4	4	9
3:00	5	8	8	10	31
4:00	12	16	27	36	91
5:00	60	81	96	101	338
6:00	148	174	174	185	681
7:00	210	184	168	188	750
8:00	169	176	162	150	657
9:00	168	145	146	132	591
10:00	138	120	140	128	526
11:00	120	136	145	126	527
12:00	148	118	112	102	480
13:00	132	113	122	128	495
14:00	129	142	171	154	596
15:00	114	150	176	176	616
16:00	140	142	142	155	579
17:00	149	156	182	167	654
18:00	156	140	108	102	506
19:00	99	89	84	81	353
20:00	62	62	35	24	183
21:00	24	28	24	22	98
22:00	20	16	20	6	62
23:00	8	14	6	3	31
				TOTAL:	8875

The A.M. peak hour from 6:30 to 7:29 is 753

The P.M. peak hour from 17:15 to 18:14 is 661



TRIP GENERATION

Convenience Store/Gas Station - VFP (9-15) (945)

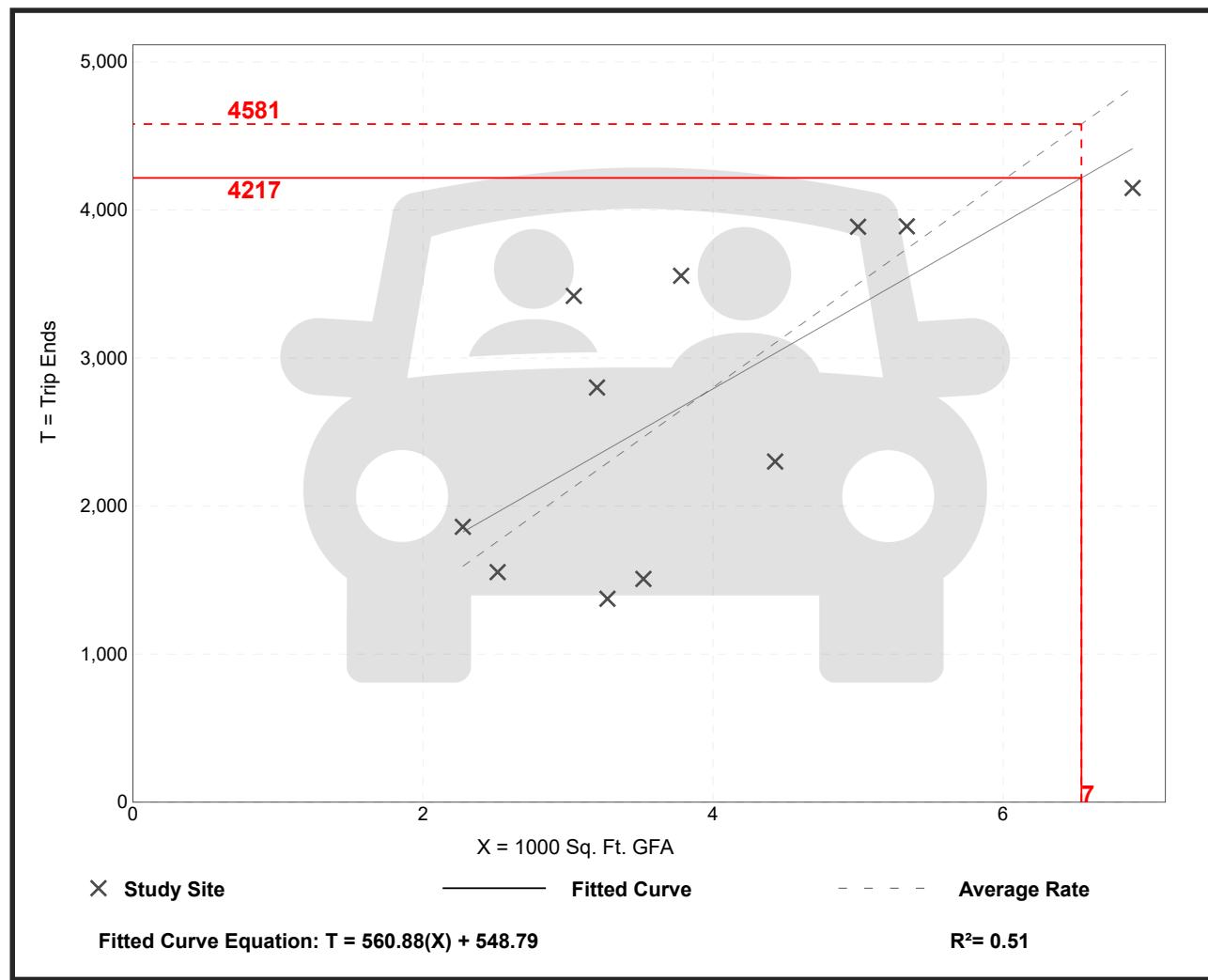
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 11
Avg. 1000 Sq. Ft. GFA: 4
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
700.43	419.93 - 1125.00	206.44

Data Plot and Equation



Convenience Store/Gas Station - VFP (9-15) (945)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 34

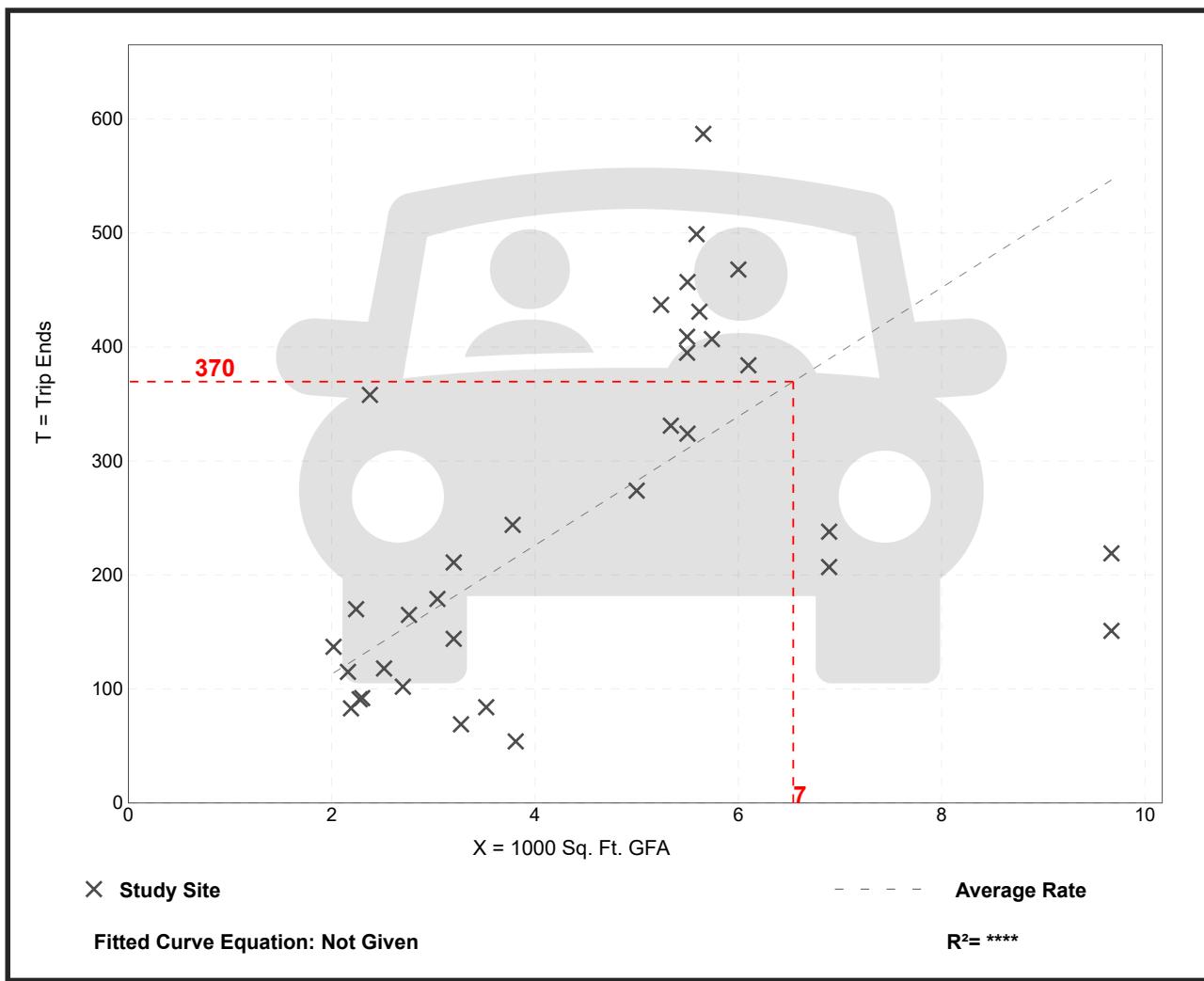
Avg. 1000 Sq. Ft. GFA: 4

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
56.52	14.17 - 150.67	27.56

Data Plot and Equation



Convenience Store/Gas Station - VFP (9-15) (945)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 39

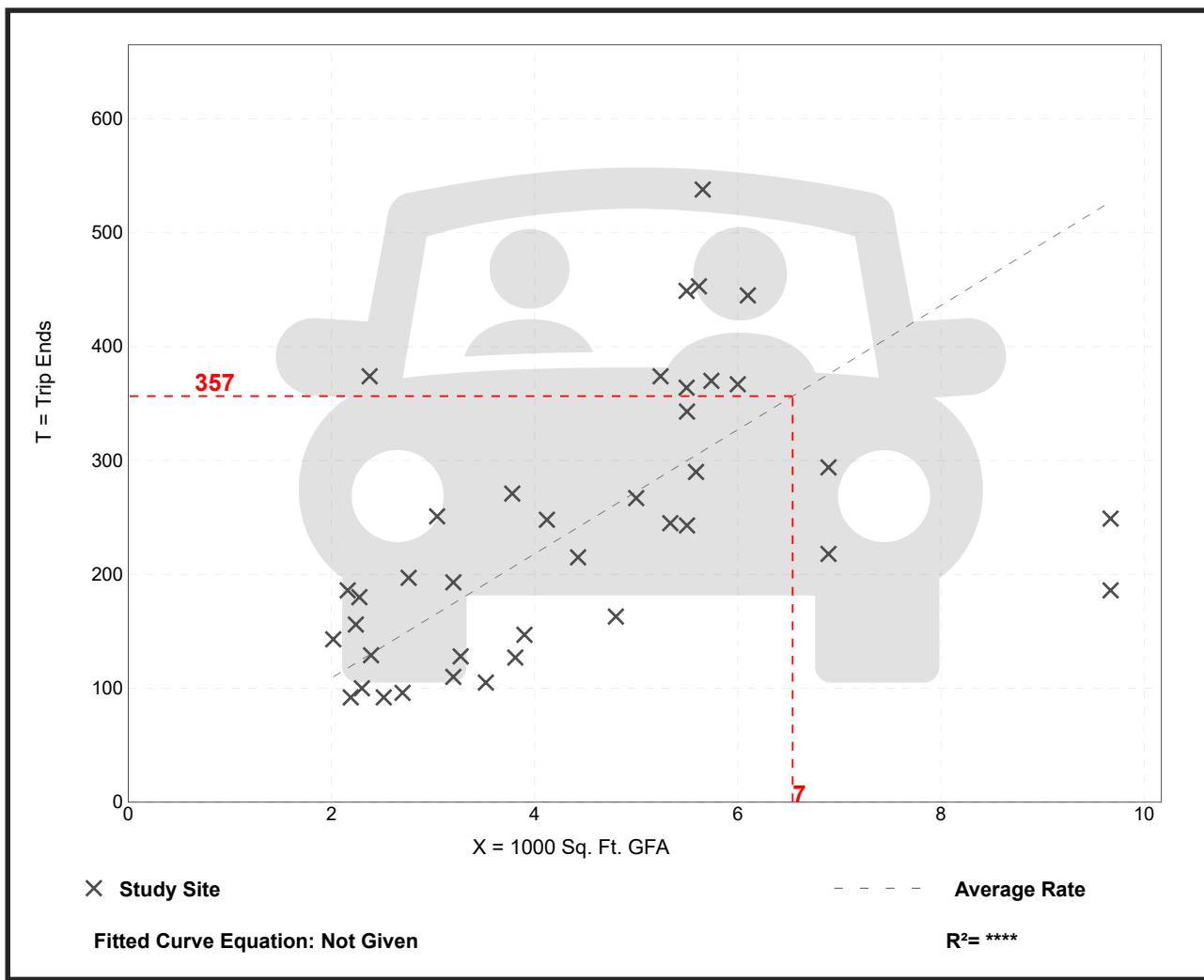
Avg. 1000 Sq. Ft. GFA: 4

Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
54.52	19.23 - 157.41	23.69

Data Plot and Equation



Strip Retail Plaza (<40k) (822)

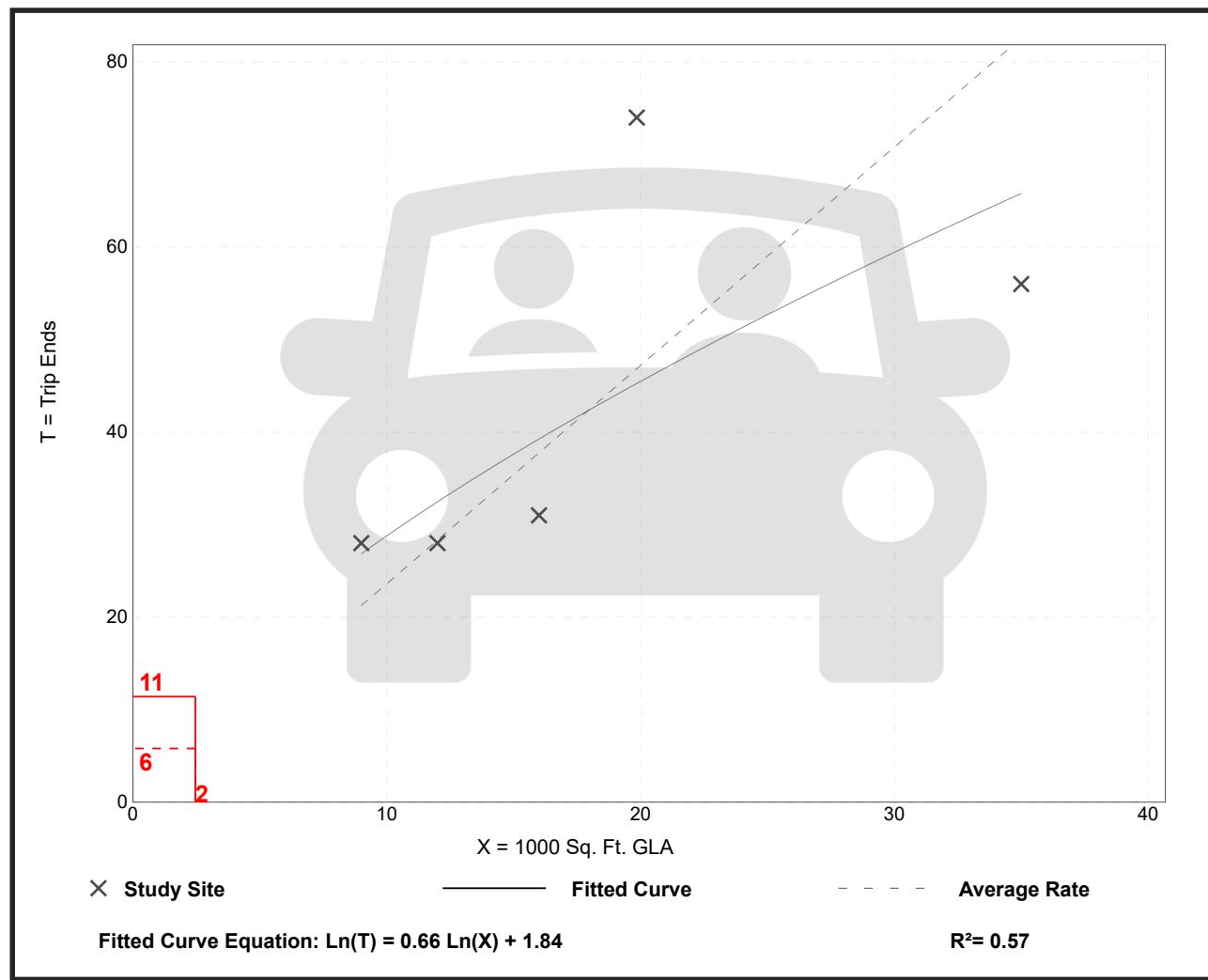
Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday,
 Peak Hour of Adjacent Street Traffic,
 One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 5
 Avg. 1000 Sq. Ft. GLA: 18
 Directional Distribution: 60% entering, 40% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
2.36	1.60 - 3.73	0.94

Data Plot and Equation

Caution – Small Sample Size



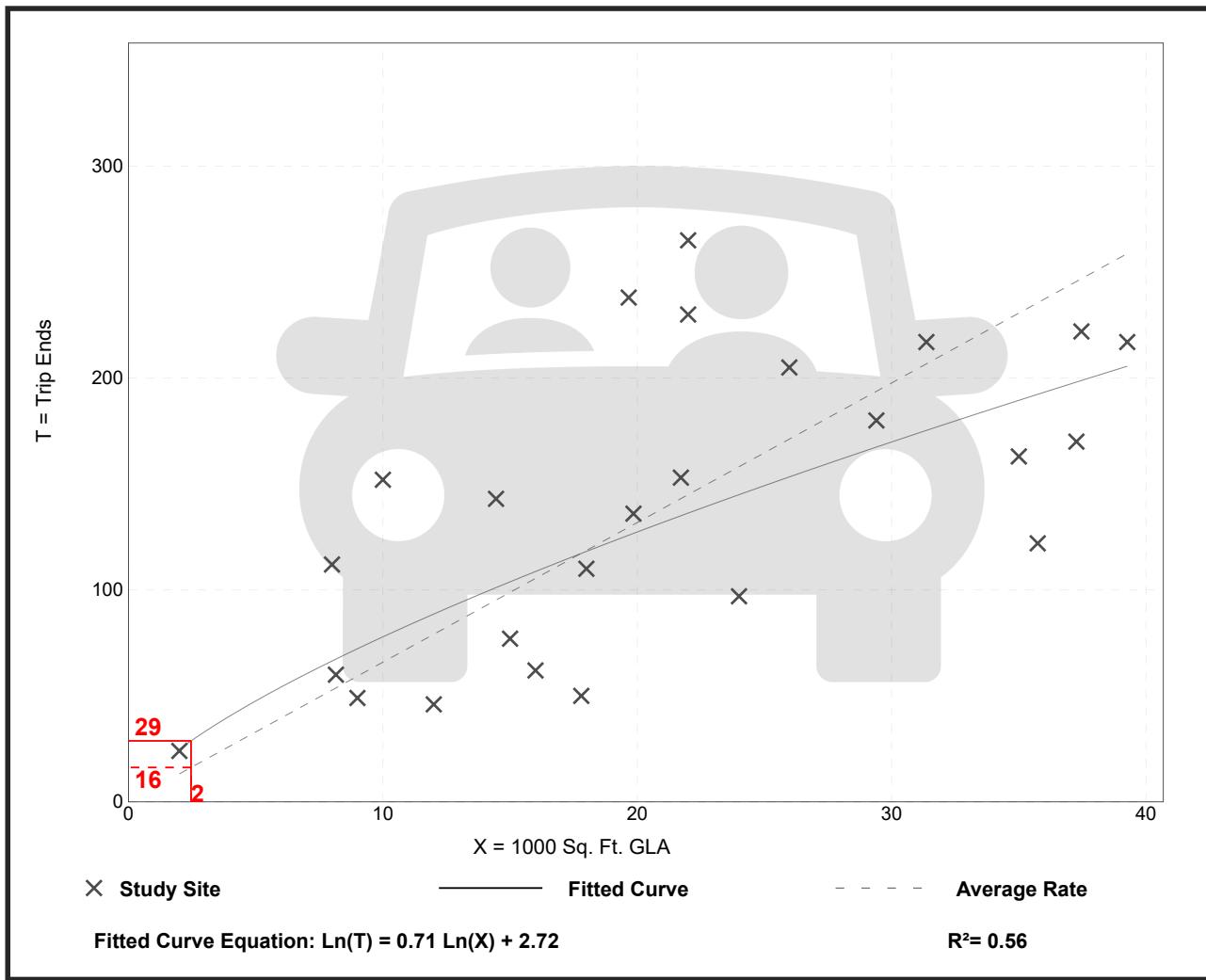
Strip Retail Plaza (<40k) (822)

Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 25
Avg. 1000 Sq. Ft. GLA: 21
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
6.59	2.81 - 15.20	2.94

Data Plot and Equation



Strip Retail Plaza (<40k) (822)

**Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday**

Setting/Location: General Urban/Suburban

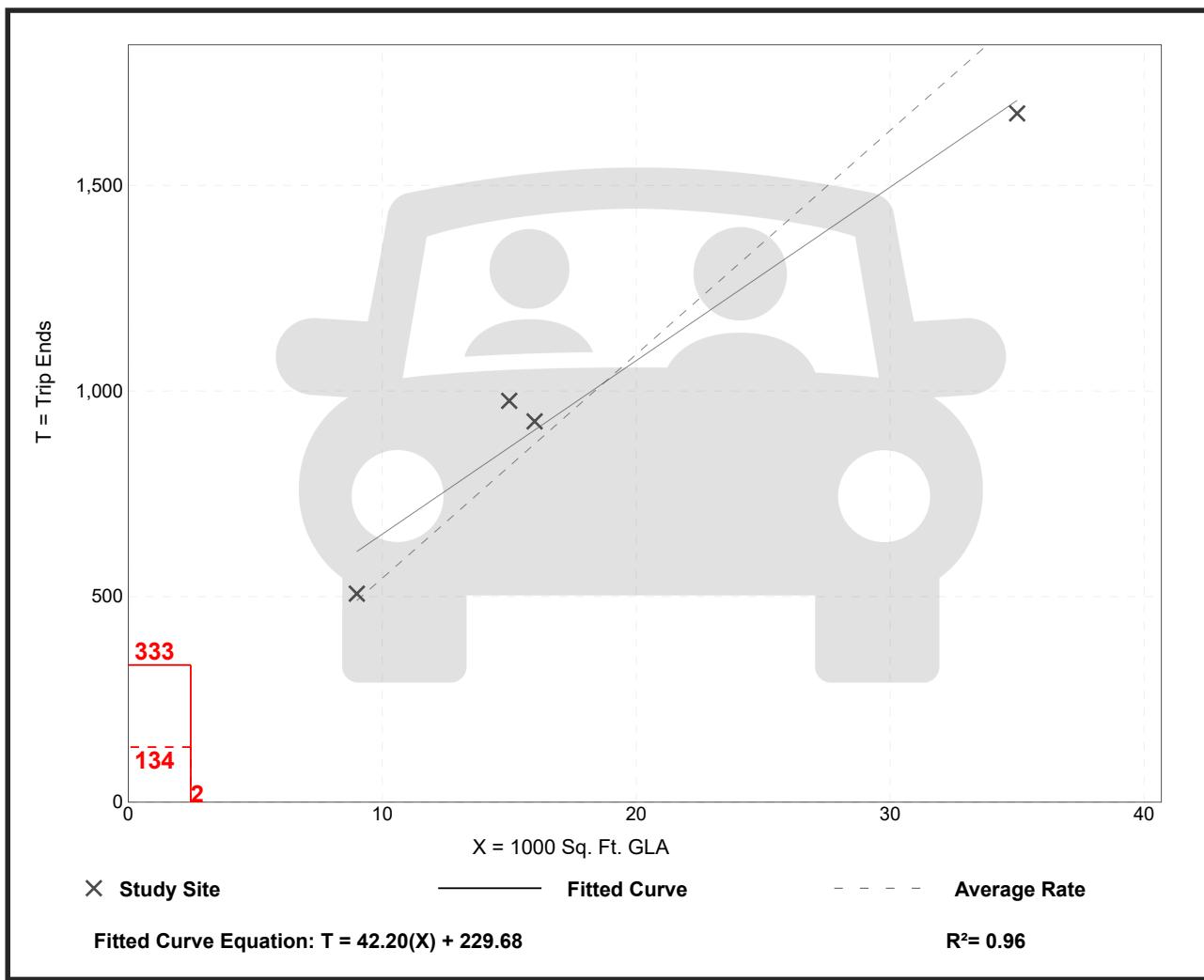
Number of Studies: 4
Avg. 1000 Sq. Ft. GLA: 19
Directional Distribution: 50% entering, 50% exiting

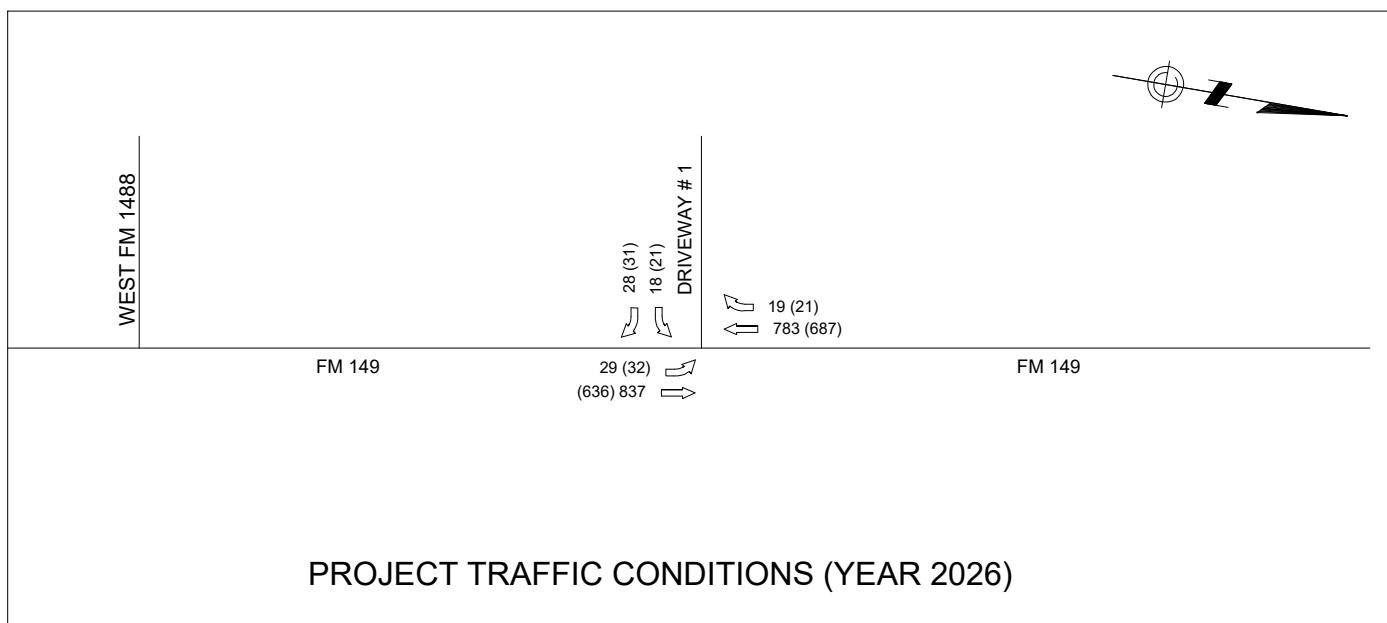
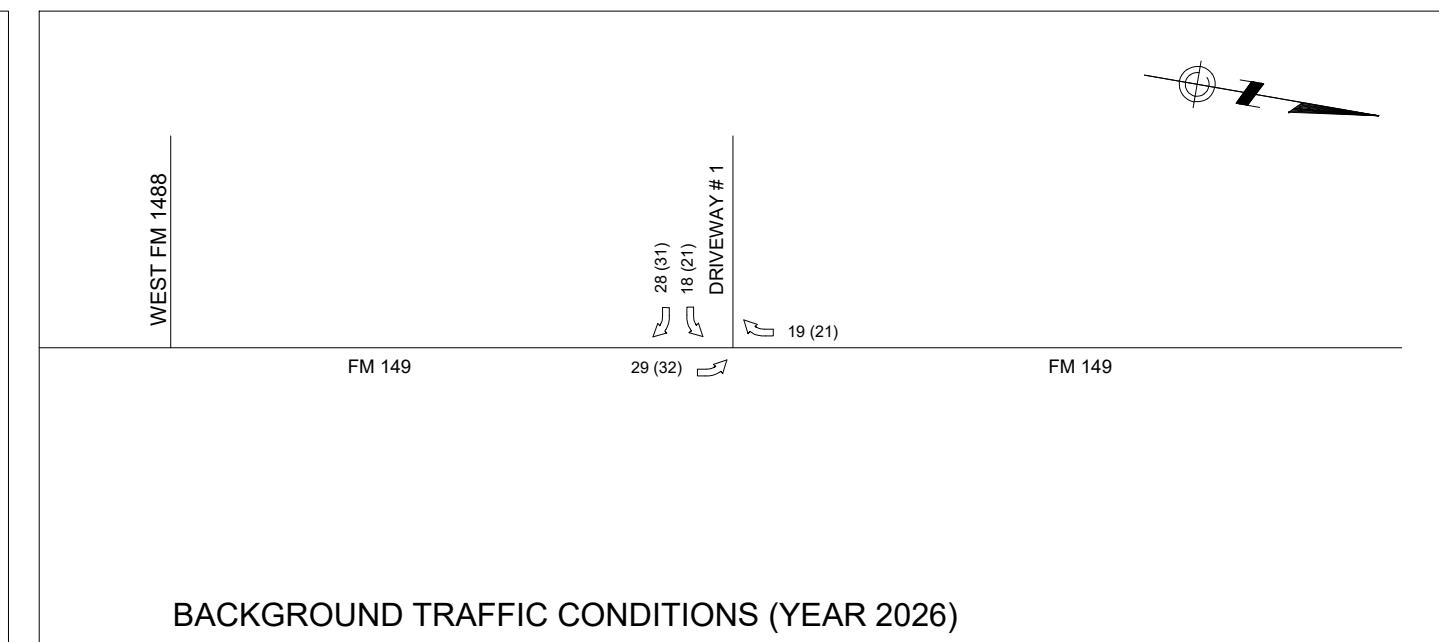
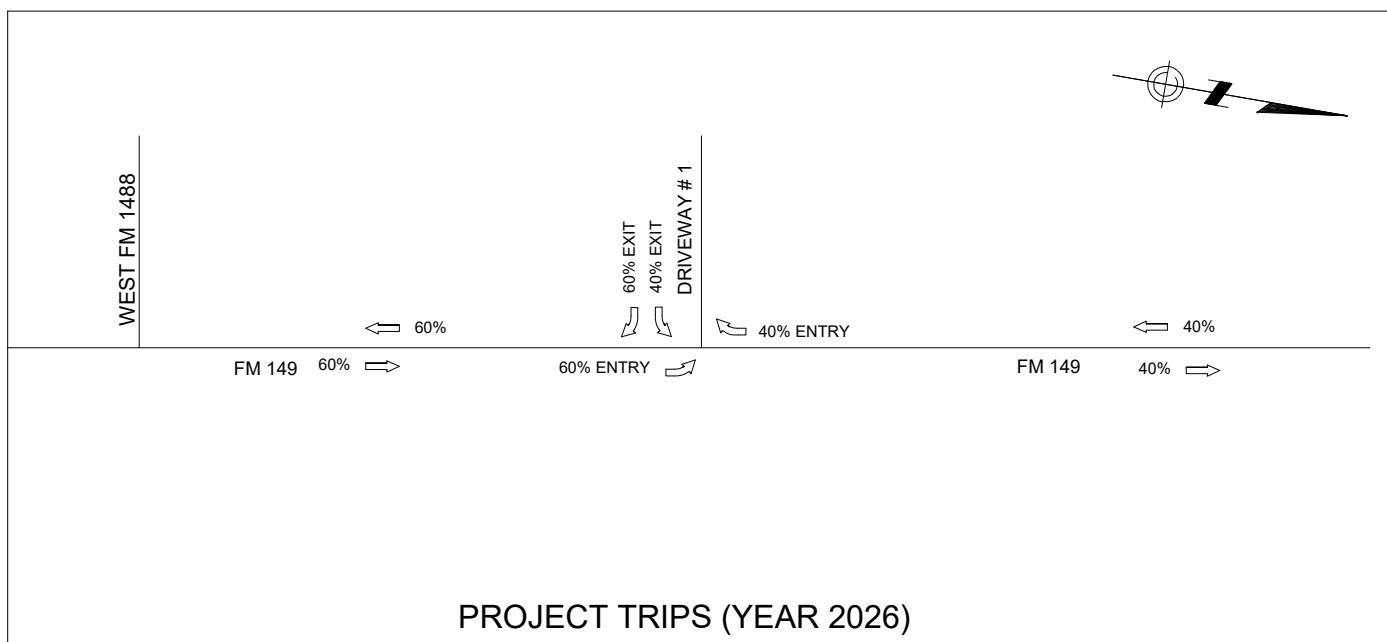
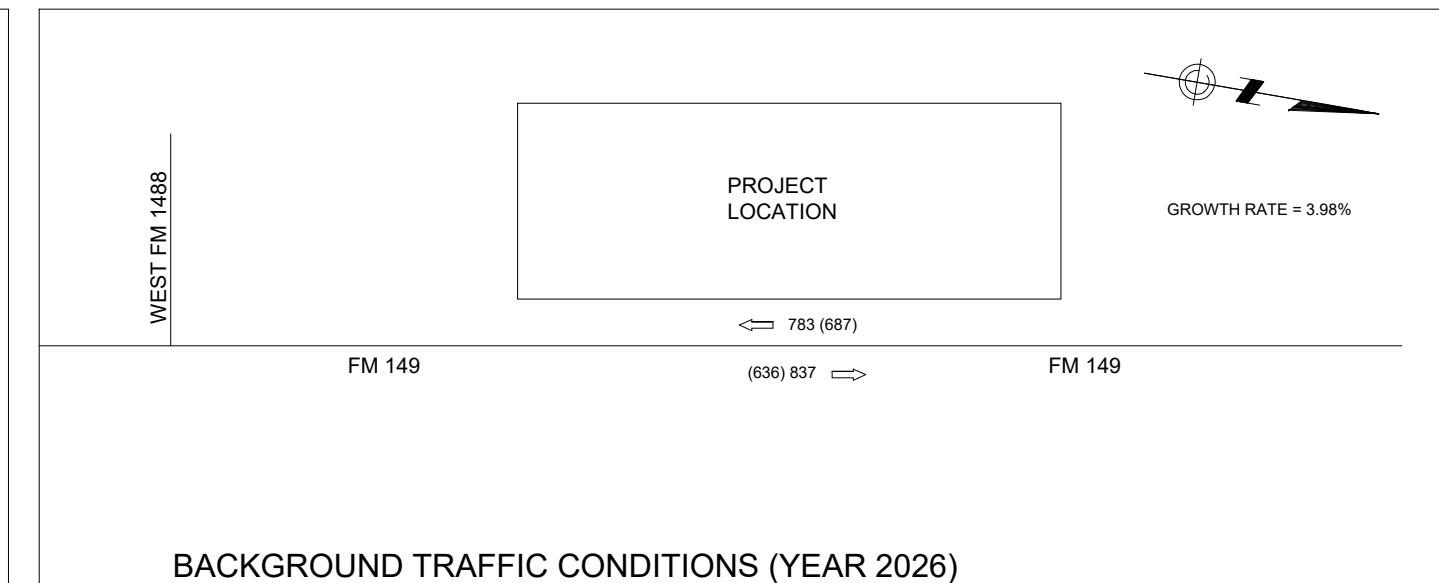
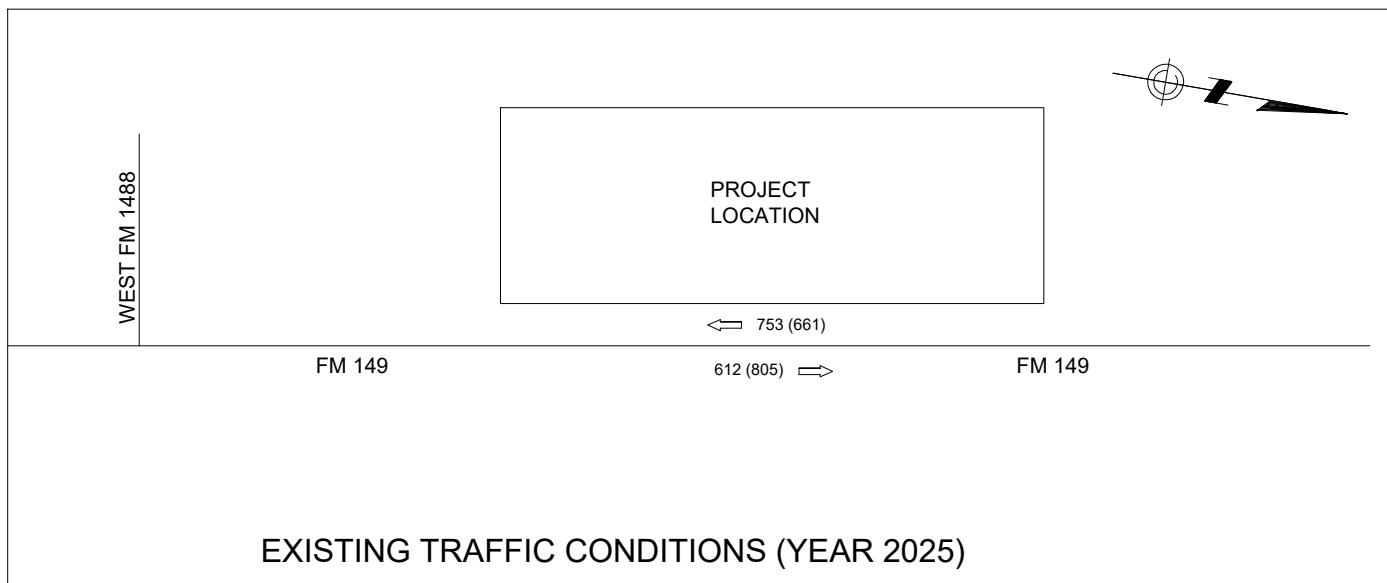
Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
54.45	47.86 - 65.07	7.81

Data Plot and Equation

Caution – Small Sample Size





NOT TO SCALE

XXX - AM PEAK HOUR TRAFFIC VOLUMES
(XXX) - PM PEAK HOUR TRAFFIC VOLUMES

FIGURE 2-1: TRAFFIC VOLUME DATA

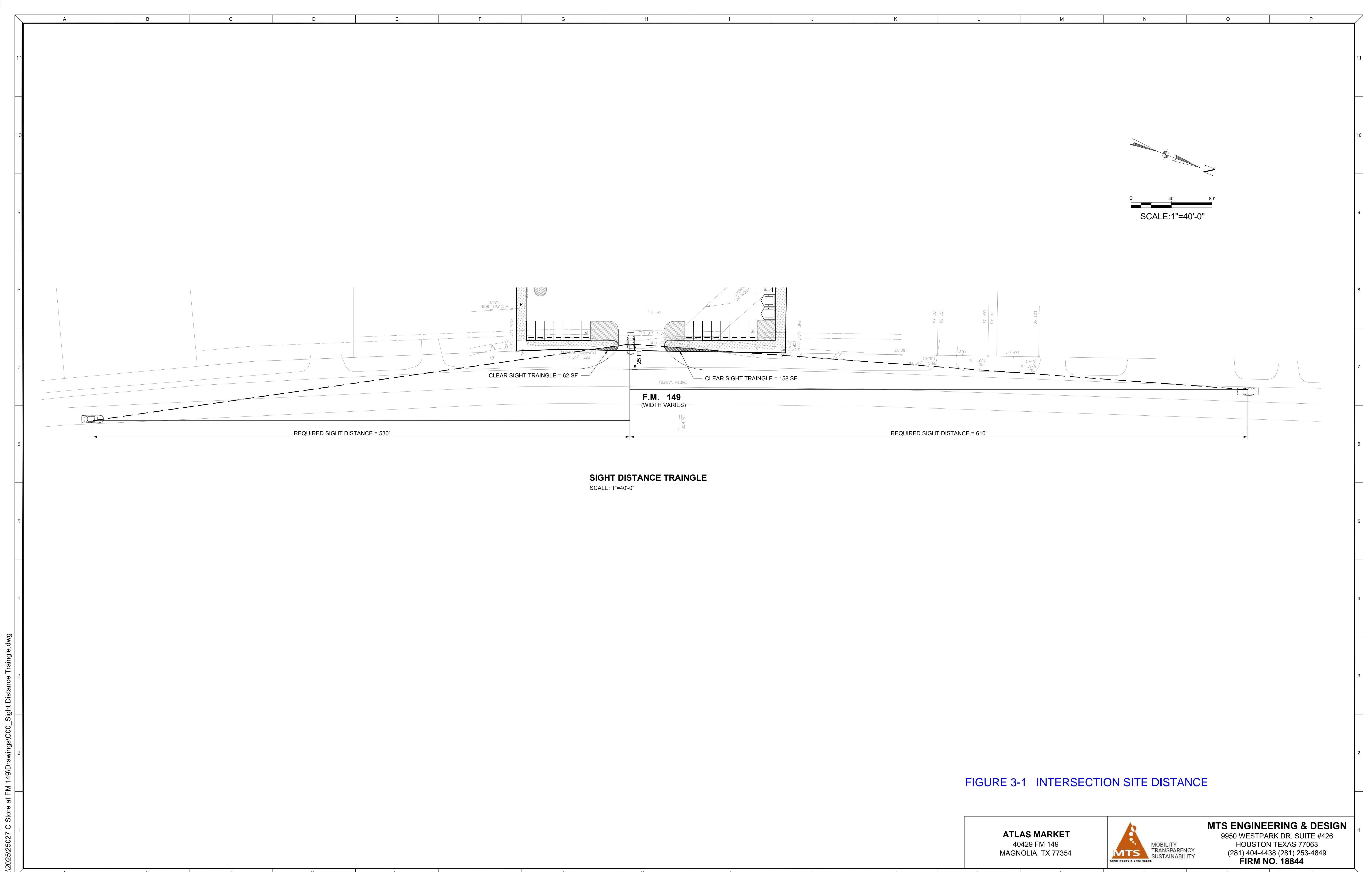


FIGURE 3-1 INTERSECTION SITE DISTANCE

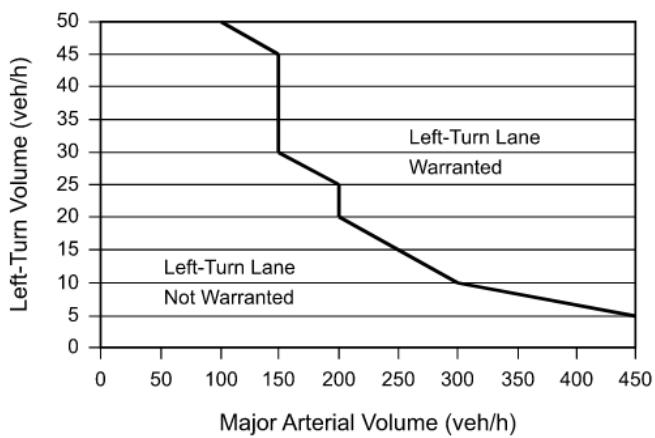
Table 4-17: Guide for Left-Turn Lane Warrants for Urban and Suburban Arterials

Source: AASHTO A Policy on Geometric Design of Highways and Streets

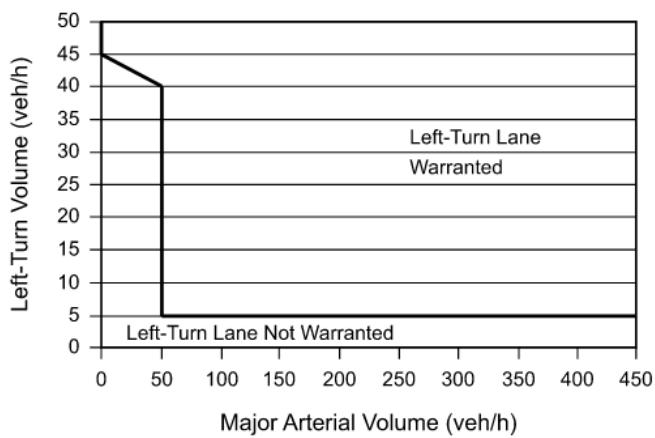
Left-Turn Lane Peak-Hour Volume (veh/hr)	Three-Leg Intersection, Major Urban and Suburban Arterial Volume (veh/hr/ln) That Warrants a Left-Turn Lane	Four-Leg Intersection, Major Urban and Suburban Arterial Volume (veh/hr/ln) That Warrants a Left-Turn Lane
5	450	50
10	300	50
15	250	50
20	200	50
25	200	50
30	150	50
35	150	50
40	150	50
45	150	< 50
50 or More	100	< 50

Notes:

1. These guidelines apply where the major road is uncontrolled, and the minor-road approaches are stop- or yield-controlled. Both the left-turn peak-hour volume and the major-road volume warrants should be met as shown in Figure 4-11.



(a) Three-Leg Intersections



(b) Four-Leg Intersections

Figure 4-11: Suggested Left-Turn Warrants Based on Results from Benefit-Cost Evaluations for Intersections on Urban and Suburban Arterials

Source: AASHTO A Policy on Geometric Design of Highways and Streets

Table 2-3: Auxiliary Lane Thresholds

Median Type	Left Turn to or from Property		Right Turn to or from Property⁽⁵⁾	
	Acceleration	Deceleration	Acceleration	Deceleration
Non-Traversable (Raised Median)	(2)	All	Right turn egress > 200 vph (4)	<ul style="list-style-type: none"> • > 45 mph where right turn volume is > 50 vph (3) • ≤ 45 where right turn volume is > 60 vph (3)
Traversable (Undivided Road)	(2)	(1)	Same as above	Same as above

1) Refer to Table 3-11, TxDOT Roadway Design Manual, for alternative left-turn-bay operational considerations.

(2) A left-turn acceleration lane may be required if it would provide a benefit to the safety and operation of the roadway. A left-turn acceleration lane would interfere with the left-turn ingress movements to any other access connection.

(3) Additional right-turn considerations:

- Conditions for providing an exclusive right-turn lane when the right-turn traffic volume projections are less than indicated in Table 2-3:
 - High crash experience
 - Heavier than normal peak flow movements on the main roadway
 - Large volume of truck traffic
 - Highways where sight distance is limited
- Conditions for NOT requiring a right-turn lane where right-turn volumes are more than indicated in Table 2-3:
 - Dense or built-out corridor where space is limited
 - Where queues of stopped vehicles would block the access to the right turn lane
 - Where sufficient length of property width is not available for the appropriate design

(4) The acceleration lane should not interfere with any downstream access connection.

- The distance from the end of the acceleration lane taper to the next unsignalized downstream access connection should be equal to or greater than the distances found in Table 2-2.
- Additionally, if the next access connection is signalized, the distance from the end of the acceleration lane taper to the back of the 90th percentile queue should be greater than or equal to the distances found in Table 2-2.

(5) Continuous right-turn lanes can provide mobility benefits both for through movements and for the turning vehicles.¹ Access connections within a continuous right turn lane should meet the spacing requirements found in Table 2-2. However, when combined with crossing left-in movements, a continuous right-turn lane can introduce additional operational conflicts.

Emergency Access

Direct emergency access (to be used by authorized emergency vehicles only) may be permitted if it is not feasible to provide adequate emergency access to a secondary roadway. A written explanation with references to local criteria from an appropriate government public safety official will be included with the permit application.

1. Florida Department of Transportation (FDOT), Florida's Driveway Handbook, 2002.