SAN JUAN DISCOVERY
TRAFFIC IMPACT ANALYSIS

City of Port Townsend, WA

Prepared for: Celine Santiago
c/o Mr. Richard Berg
Terrapin Architecture
727 Taylor Street
Port Townsend, WA 98368

Revised
September 2019

September 3, 2019

Subject: Revisions to San Juan Discovery Traffic Impact Analysis

This letter is in response to the review comments from the city of Port Townsend

1. The Traffic Impact Analysis, Section 3 .6 Sight Distance, Page 8 states that the AASHTO standards recommend 240 and 280 feet of unobstructed visibility for right and left tum movements. Per this recommendation a certification is needed from a Civil Engineer that the proposed main entrance on Discovery Road, located across from 29th Street/ Alder Street meets ITE ASHTO standards for sight distance/line of sight requirements ("unobstructed 280 feet"). It is the City's interpretation that the location as it exists does not provide the 280 feet noted on Sheet 12.0 (dated 12/11/18), as the sight line crosses property shown as private and the projected line of sight ends in an incorrect travel lane. While not an additional submittal, the City encourages you to reexamine the main Discovery Road access as proposed and consider relocation to be aligned with the Hastings Avenue intersection.

   Response:
   A sight distance analysis has been provided by the civil engineer and is attached. The accesses as proposed are to be maintained.

2. Revise and resubmit the Traffic Impact Analysis prepared by Gregary B Heath, Heath & Associates, Inc. dated September 5, 2018.

   a. Section 3.3 Existing Peak Hour Volumes and travel Patterns (page 6). This section needs supplemental intersection counts provided when school is in session. The intersections where the traffic counts were taken are affected by both Blue Heron Middle School and Salish Coast Elementary School drop off (7:00am-9:00am) and pick up schedules (Wednesdays 12:00pm-2:00pm, other days 1 :30pm - 3 :30pm). The existing traffic counts were conducted in August 2018 and do not accurately represent the existing traffic counts without consideration of the counts when school is in session.

   Response:
   The bell times for the schools are 2:50 for Salish Coast and 3:05 for Blue Heron. School peaks last for approximately 15 to 20 minutes during student drop-off and pick-up near these times. The traffic counts in an area such as Port Townsend, as

a desirable warm weather recreation area, are generally higher during the summer months. The field PM peak hour counts were taken from 4 PM to 6 PM in August to capture the highest hourly count at each of the intersections during a time of year when counts are seasonally higher. This is the normal hourly timeframe in traffic engineering to gather peak hour counts for similar commercial/residential projects. With the early release time at nearby schools not entering into the PM peak hour and the higher summer month traffic, the August counts yield an accurate picture of traffic at the nearby intersections. The school traffic with its 2:50 and 3:05 bell times would generate very little traffic into the 4 PM to 6 PM timeframe. However, to account for miscellaneous school influence, all future volumes have been adjusted via a five percent increase.

b. Section 4.1 Project Trip Generation (page 10), Table 4 and Table 5 are missing land uses. Update Tables 4 and 5 as follows:

i. Table 4: Clarify how the total trips are determined. Uses include day care and elder care drop off; carriage house; farm; farm house; estimate of potential trips for live work occupations; boarding house. The Discovery Road count was determined to be 55 SFR units. For the SFR units 4 live/work, 18 cottages and 21 SFR is 43 SFRs and then the 21 SFRs could have ADUs, so maybe 55 is close, but not conservative.

Response:
The uses have been relooked at and additional description has been added to the revised TIA. Each of the many uses have been calculated using ITE data and further description and calculation has been incorporated in the revised TIA.

ii. Table 5: need to add Cafe; pub; and art center.

Response:
The uses on the site have been clarified and further explanation has been added to the trip generation. In addition, the subsequent figures and analysis have been revised.

iii. Table 5: Please clarify what is meant by 25-percent reduction in the project to install a roundabout at the intersection of F Street/ San Juan Ave/Discovery Road budgeted or in the 6-year Transportation Improvement Project (TIP) list, nor are any improvements to San Juan listed in the 6-year CIP.

Response:
Table 5 mentions that a project similar to this would generate a number of linked trips meaning that a percentage of trips would be combined and therefore would reduce the number of external trips. With a number of work – live – shop opportunities available for a multi-use project such as San Juan Discovery, many trips would stay on-site by linking several trips rather than be generated to and from outside the project. A key benefit of a multi-use project such as this is the availability to live but also shop and also work within the confines of the project. Instead of driving to the office a resident of the site can walk or bicycle. The reduction of 25 percent still insinuates that 75 percent of the traffic emanates from outside the site. This project has many uses that are compatible with each other for linking automobile trips or using other modes such as walking or biking and staying within the confines of the project. However, no reduction is accounted for in the revised TIA so as to present a conservative analysis to the outlying intersections.

c. Section 4.2 Distribution & Assignment, page 11. The City does not have a capital project to install a roundabout at the intersection of F Street/ San Juan Ave/Discovery Road budgeted or in the 6-year Transportation Improvement Project (TIP) list, nor are any improvements to San Juan listed in the 6-year CIP.

Response:
The site plan in the TIA is an earlier rendition and has been replaced. It is acknowledged that the city does not have a project for a roundabout at this intersection. The analysis in the TIA assumes that the intersection will continue to operate as an all-way stop.

d. Update Figures and Table 7 with the updated traffic counts (refer to 5.a) and the updated land use (refer to 5.b).

Response:
The TIA has been updated reflecting the comments with regards to trip generation and the figures and calculations are revised as necessary.

Please call if you require anything further.

Sincerely,

Gregary B. Heath, P.E., PTOE

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1. INTRODUCTION

The main goals of this study focus on the assessment of existing roadway conditions and forecasts of newly generated project traffic. The first task includes the review of general roadway information on the roadways serving the site, public transportation information, and entering sight distance data. Forecasts of future traffic and dispersion patterns on the street system are then determined using established trip generation and distribution techniques. As a final step, appropriate conclusions and mitigation measures are defined if needed.

2. PROJECT DESCRIPTION

San Juan Discovery is a proposed mixed-use development consisting of residential, retail, and office uses. The subject site is situated on parcels: 001034001; 001034002; 001034039; 001034040; & 001034041 and is bordered by Discovery Road to the north and west of San Juan Avenue to the east. Access to the development is proposed via two new entrances on Discovery Road and one new entrance on San Juan Avenue. Surrounding land use is primary residential.

Figure 1 illustrates an aerial view of the property boundary. A site plan presenting the overall configuration of the project and accesses is provided in Figure 2. A six-year horizon of 2025 was used for this analysis to assess future impacts conditions at the time of full-buildout.

Figure 1: Aerial View

Development Summary

20 Single-Family Residency w/ ADU Lots

8 Cottages on Small Lots

Co-Housing Lot:
Lot Area: 33,239 sf
Building Footprint: 11,227 sf

Group House Lot:
House Footprint: 11,227 sf

Building 1:
1st Floor: 4,200 sf Retail/Cafe
2nd + 3rd Floor: 6,300 sf Office

Building 2:
1st Floor: 3,840 sf Retail/Pub
2nd + 3rd Floor: 5,760 sf Office

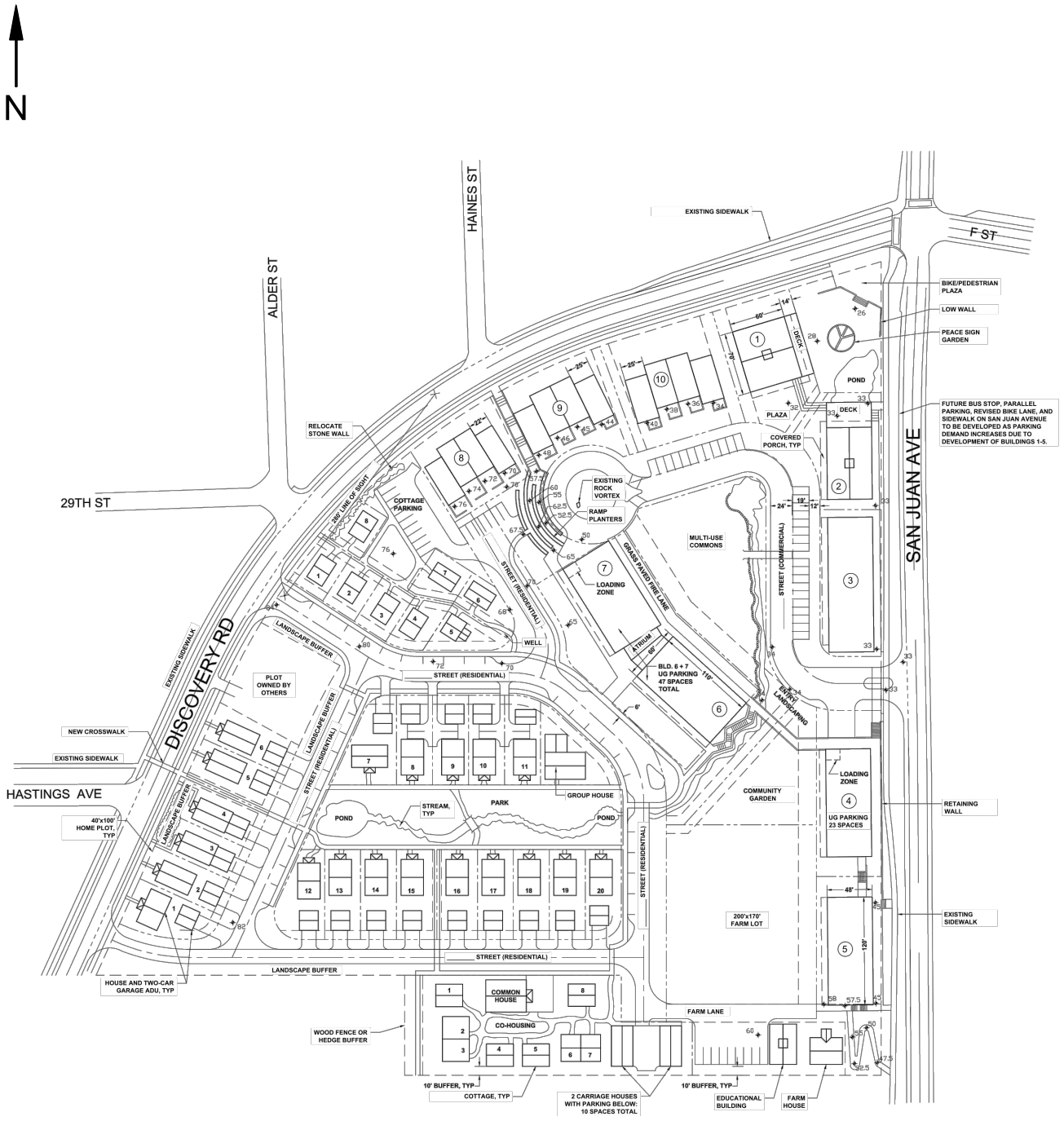
Building 3:
1st Floor: 6,720 Retail/Office
2nd + 3rd Floor: 30 Studio Apartments

Building 4 & 5:
1st Floor (San Juan Grade): 5,760 sf Retail/Office
2nd Floor (Farm Grade): 5,760 sf Culinary/Farm and/or Art Institute
3rd Floor: 5,760 sf Housing (8 units)

Buildings 6 & 7:
Basement (Commons Grade): Parking + 4,400 sf Retail
1st Floor (Entry Street Grade): 14,460 sf Intergenerational Care Center
2nd Floor: 13,200 sf Elder Housing (24 units)

BUILDING 8, 9 & 10:
12 Live/Work: Townhouses with 1st Floor: 1,250 sf Studio, 2nd Floor: 1,000 sf Living\

Farm Lot:
Barn Footprint: 1,350 SF



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SITE PLAN
FIGURE 2

3. EXISTING CONDITIONS

3.1 Existing Street System

The street network serving the proposed project consists of a variety of roadways. The roadways and arterials surrounding the site are listed and described below.

Table 1: Roadway Network

Functional Classification	Roadway	Speed Limit	Travel Lanes	Sidewalk	Bike Facilities
Principal Arterial	Sims Way	30 mph	2	Yes	Yes
Minor Arterial	Hastings Ave	30 mph	2	Yes	No
	F Street	25 mph	2	Yes	Yes
	San Juan Ave	25 mph	2	Yes	Yes
	19th Street	25 mph	2	No	Yes
	Kearney St	25 mph	2	Yes	No
Collector	Discovery Rd	25 mph	2	Yes	Yes
	Blaine St	25 mph	2	Areas	Yes

3.2 Roadway Improvements

A review of the current City of Port Townsend Six-Year 2017-2022 Transportation Improvement Program indicates that improvement projects are currently planned in the vicinity of the site. Descriptions of the nearest projects are provided below.

Discovery Road I, II, & III (Priority #6, #16 & #28)
The scope of these projects intend to rebuild the existing Discovery Road from Howard Street to Sheridan Street (phase 1) to the City limits (phase 2) and finishing from Discovery Road to 19th Street (phase 3). Improvements include sidewalk, drainage, shoulders, and bike lanes. The total length of the projects is approximately 2.2 miles. The projects have a total estimated cost of $13,300,000 with construction beginning in 2020.

Sims Way Improvements II & III (Priority #8 & #9)
These planned improvement projects consists of intersection and corridor improvements including turn lanes, bike lanes, transit pullouts, pedestrian facilities, etc. The total length of the project extends approximately 1.8 miles. The estimated total cost is $12,200,000 with construction beginning in 2020.

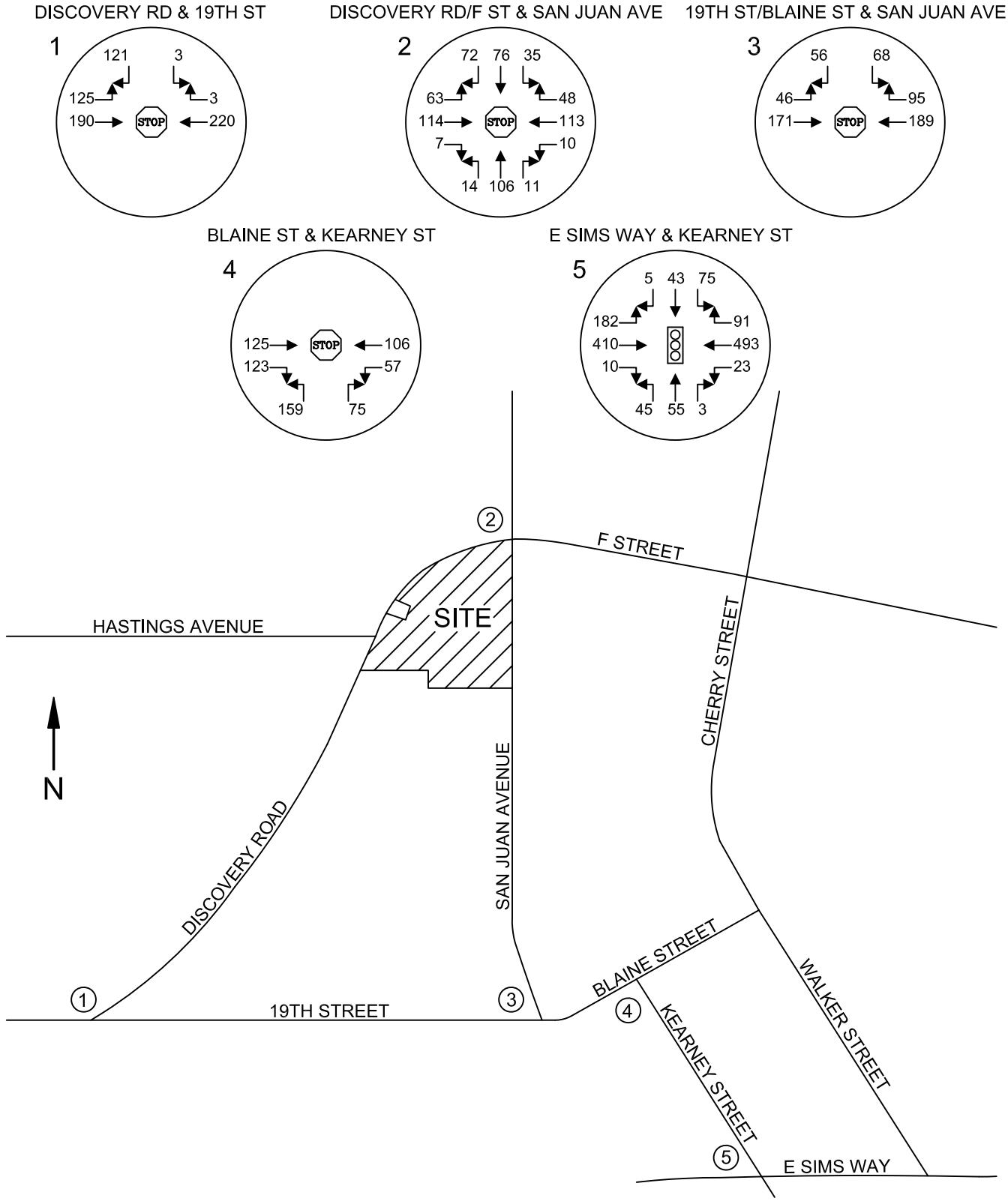
Sims Way (SR 20) Intersection Improvements (Priority #10)
This planned improvement project consists of intersections improvements extending from Kearney Street to Washington Street for a total length of 0.1 miles. The project has an estimated cost of $2,000,000 with a construction date of 2022.

San Juan Improvements II (Priority #12)
This planned improvement project consists of installing a new road surface and sidewalk on one side of the roadway on the San Juan Avenue corridor from Lopez & San Juan to 49th & Jackman for a total length of 0.75 miles. The project has an estimated cost of $1,700,000 with construction beginning in 2022.

Hastings Avenue Improvements (Priority #13)
This planned improvement project consists of shoulder widening, bike lanes, and pavement overlay for the Hastings Avenue corridor. The project has an estimated cost of $3,725,000 with construction beginning in 2022.

3.3 Existing Peak Hour Volumes and Travel Patterns

Field data for this study was obtained and collected in August of 2018. Traffic counts were performed at the primary intersections receiving the bulk of anticipated vehicular impacts. Field data was collected from 4:00 PM to 6:00 PM which generally reflects the highest levels of congestion with respect to traffic and delays during a 24-hour period. The busiest one-hour is then derived from the each intersection count, known as the peak hour, to depict worst case conditions. Figure 3 on the following page illustrates the intersections of study and their associated weekday PM peak hour volumes.



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EXISTING PM PEAK HOUR VOLUMES

FIGURE 3

3.4 Accident History

A list of the recorded accident history from April 30th, 2015 through May 1st, 2018 (representing 3-full years) for the study intersections was requested and obtained from WSDOT. A summary of the accident totals per year is provided in Table 2 below.

Table 2: Accident History

Intersection	2015-16	2016-17	2017-18	Avg/yr
Discovery Road & 19th St	1	0	0	0.33
Discovery Road/F St & San Juan Ave	1	1	2	1.33
19th Street/Blaine St & San Juan Ave	0	0	0	0
Blaine St & Kearney St	1	0	0	0.33
E Sims Way & Kearney St	7	2	4	4.33

Reviewing the crash data, the most common accident occurrence was in the form of rear end collision (12); entering at angle (5); and sideswipe (2). These types of accidents are common occurrences at signalized (Sims Way & Kearney St) and stop controlled intersections due to the stop-and-go operations. Contributing factors are listed as driver inattentiveness and failure to grant vehicle right-of-way as opposed to intersection design and safety.

3.5 Transit Service

A review of the Jefferson Transit regional route maps indicates the nearest transit route in the area is served via Route 2 – Fort Worden and Route 3 – Castle Hill Connector with stops along San Juan Avenue near Umatilla Avenue and 22nd Street. Service is provided from approximately 7 AM to 7 PM with stops at major destinations such as the fairgrounds, Park & Rides, Food Co-op, post office, and more. Given the nature of the incoming project, transit use is anticipated. Limited weekend service is also available. Refer to the Jefferson County schedule for more detailed information.

3.6 Sight Distance

All intersections shall be constructed to provide sufficient entering sight distance and stopping sight distance consistent with AASHTO and City engineering standards. Sight distance shall be examined at the time of final site plan to determine available lines of sight. AASHTO standards recommend 240 and 280 feet of unobstructed visibility for right- and left turn movements. A sight distance diagram for the proposed main access on Discovery Road has been included in the appendix and indicates sufficient sight lines with minor grade work.

3.7 Level of Service

Peak hour delays were determined through the use of the *Highway Capacity Manual* 6th Edition. Capacity analysis is used to determine level of service (LOS) which is an established measure of congestion for transportation facilities. The range[1] for intersection level of service is LOS A to LOS F with the former indicating the best operating conditions with low control delays and the latter indicating the worst conditions with heavy control delays. Detailed descriptions of intersection LOS are given in the 2016 Highway Capacity Manual. Level of service calculations were made through the use of the Synchro 10 analysis program. Table 3 below portrays existing LOS delays for the key intersections of study.

Table 3: Existing PM Peak Hour Level of Service

Delays given in seconds per vehicle

Intersection	Control	LOS	Delay
E Sims Way & Kearney St	Signal	B	12.6
Discovery Road/F St & San Juan Ave	AWSC	A	9.8
Discovery Road & 19th St	Stop	B	10.6
19th Street/Blaine St & San Juan Ave	Stop	B	12.9
Blaine St & Kearney St	Stop	B	14.2

Existing conditions operate satisfactorily at LOS B or better during the critical PM peak hour of travel. No operational deficiencies are identified and the intersections are shown to have additional capacity. The City of Port Townsend has adopted a level of service standard of LOS D or better for all roadways and intersections.

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[1] *Signalized Intersections - Level of Service*

Level of Service	Control Delay per Vehicle (sec)
A	≤10
B	> 10 and ≤20
C	> 20 and ≤35
D	> 35 and ≤55
E	> 55 and ≤80
F	> 80

Stop Controlled Intersections – Level of Service

Level of Service	Control Delay per Vehicle (sec)
A	≤10
B	> 10 and ≤15
C	> 15 and ≤25
D	> 25 and ≤35
E	> 35 and ≤50
F	> 50

Highway Capacity Manual, 6th Edition

4. FORECAST TRAFFIC DEMAND AND ANALYSIS

4.1 Project Trip Generation

Trip generation is used to determine the magnitude of project impacts on the surrounding street system. This is denoted by the quantity or specific number of new trips that enter or exit a project during a designated time period, such as a specific peak hour or an entire day. Data presented in this report was taken from the Institute of Transportation Engineer's publication *Trip Generation*, 10th Edition. It should be noted that many uses are not defined and/or categorized under ITE data; therefore uses are grouped together under general land use descriptions that best represent projected vehicular demands. For example, the proposed culinary institute was considered as office. Moreover, retail space was defined under the ITE 9th Edition Specialty Retail land use due to no comparable general retail uses under the current edition. Table 4 below presents trip generation associated with the Discovery Road Access whereas Table 5 presents the San Juan Avenue Access.

Table 4: Project Trip Generation – Discovery Road Access

Land Use	Size	ADT	AM Peak-Hour Trips			PM Peak-Hour Trips		
			In	Out	Total	In	Out	Total
Single-Family (#210)	61 units	576	11	34	45	39	22	**61**

It should be noted that the above 61 units reflects accessory dwelling units (ADUs) and other co-housing and/or live/work units. This number may be conservative as non-single family residences tend to have lower trip rates. Approximately 61 PM peak hour trips are calculated for the Discovery Road access.

Table 5: Project Trip Generation – San Juan Avenue Access

Land Use	Size	ADT	AM Peak-Hour Trips			PM Peak-Hour Trips		
			In	Out	Total	In	Out	Total
Retail (#826)	16.9 ksf	749	0	0	0	20	26	**46**
Office (#710)	17.9 ksf	173	18	3	**21**	3	18	**21**
Multi-Family (#220)	60 units	439	6	22	**28**	21	13	**34**
Senior Housing (#252)	32 units	118	2	4	**6**	2	4	**6**
Pub (#925)	3.8 ksf	430	0	0	**0**	28	15	**43**
Café (#932)	4.2 ksf	471	26	21	**47**	25	16	**41**
	Total New Trips	2380	52	50	**102**	99	92	**191**

Approximately 191 PM peak hour trips are anticipated emanating to/from the San Juan Avenue access. Uses are based on the provided site plan and development summary. Table 6 summarizes the site total trip generation (both access trip generations).

Table 6: Project Trip Generation – Site Total

Driveway	ADT	AM Peak-Hour Trips			PM Peak-Hour Trips		
		In	Out	Total	In	Out	Total
Discovery Road	576	11	34	**45**	39	22	**61**
San Juan Ave	2380	52	50	**102**	99	92	**191**
Total New Trips	**2956**	63	84	**147**	138	114	**252**

As shown in Table 6, a site total of 147 AM and 252 PM peak hour trips are anticipated.

4.2 Distribution & Assignment

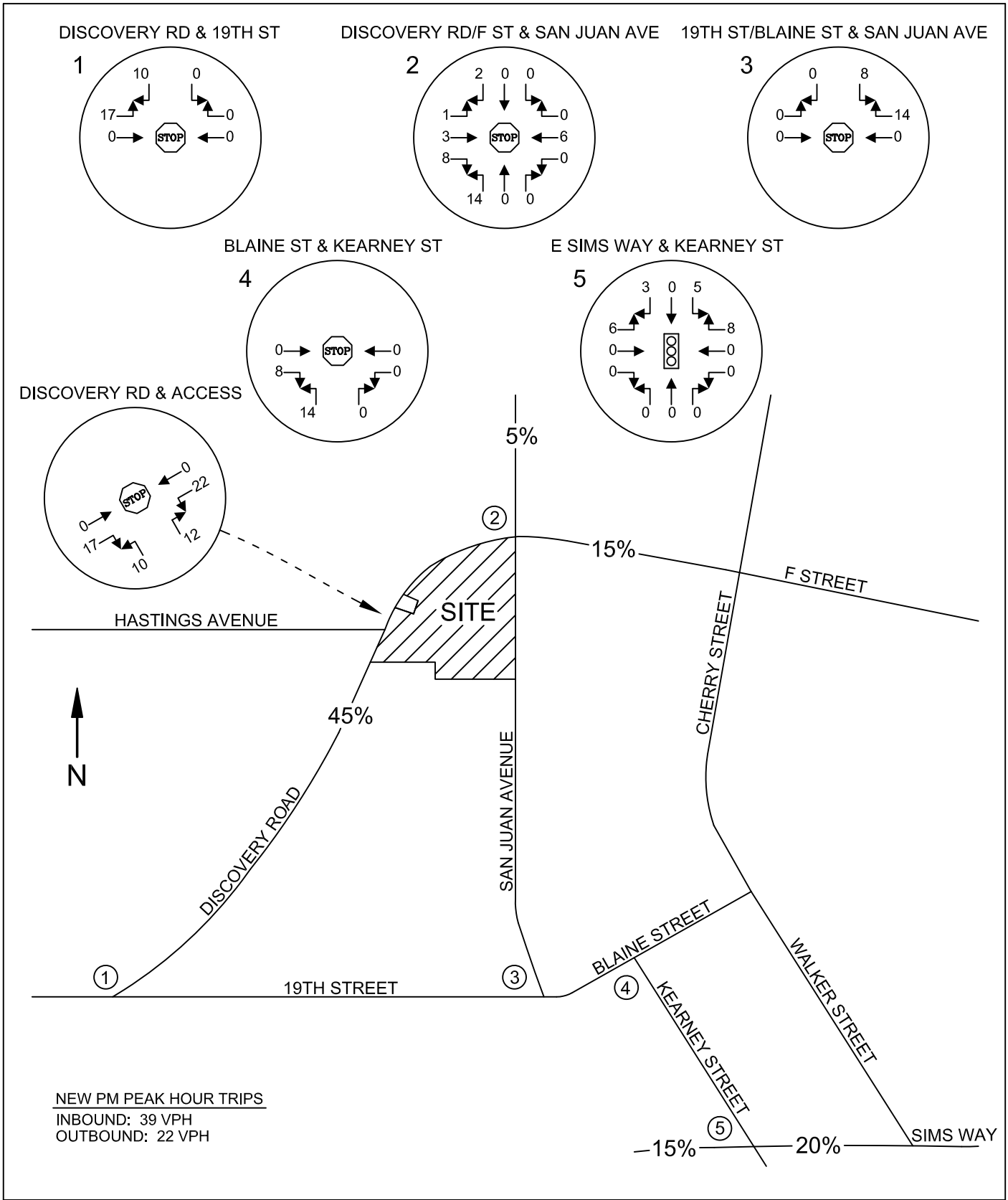
Trip distribution describes the process by which project generated trips are dispersed on the street network surrounding the site. The specific destinations and origins of the generated traffic primarily influences the key intersections, which will effectively receive the bulk of project impacts. Trips generated from the Discovery Road access are illustrated in Figure 4 which represent residential based distributions. Trips generated from the San Juan Access are illustrated in Figure 5 and represent residential and commercial based distributions with a higher percentage of trips heading to/from the surrounding neighborhood.

4.3 Future Peak Hour Volumes

A 6-year horizon of 2025 was used for future traffic delay analysis to depict conditions with project buildout. Forecast 2025 background PM peak hour volumes were derived by applying a 1.5 percent[2] compound annual growth rate per year to the existing traffic volumes (seven total years of applied growth rate as counts were performed in 2018). Furthermore, as counts were taken during summertime while school was not in session, all vehicular volumes were increased via 5 percent. While school-related activity would generally occur before the 4-6 PM study period (school bell times in the area generally release around 3:00 PM), volumes were increased to account for faculty and other miscellaneous activity.

Background 2026 PM peak hour volumes are illustrated in Figure 6. Forecast 2026 PM peak hour volumes with the addition of project traffic are illustrated in Figure 7.

[2] City of Port Townsend Comprehensive Plan. “Land Use Element.” (2016). Reports a projected annualized growth rate of 1.27 percent over the next 20 years.



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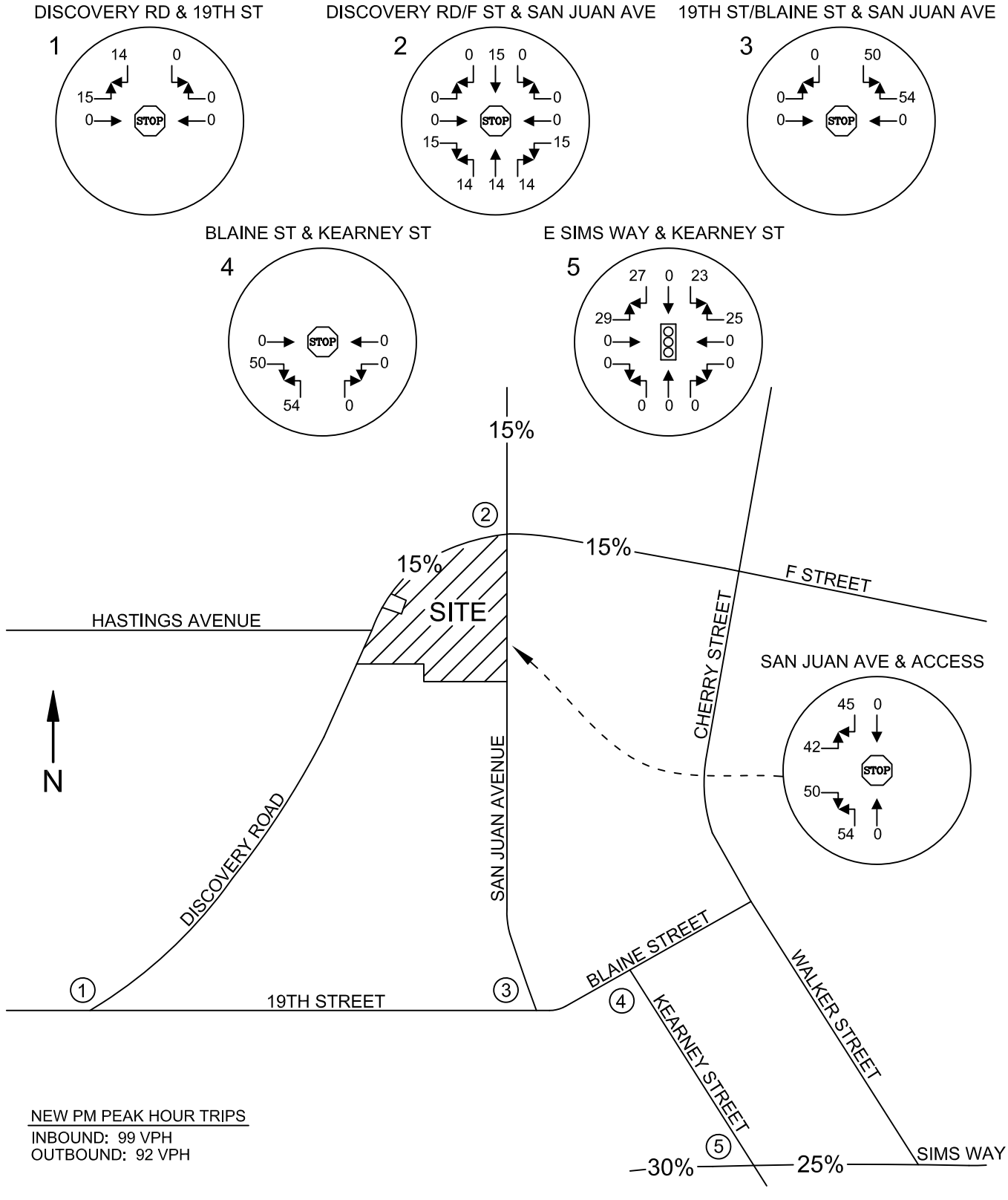
PM PEAK HOUR TRIP DISTRIBUTION - DISCOVERY ROAD ACCESS

FIGURE 4



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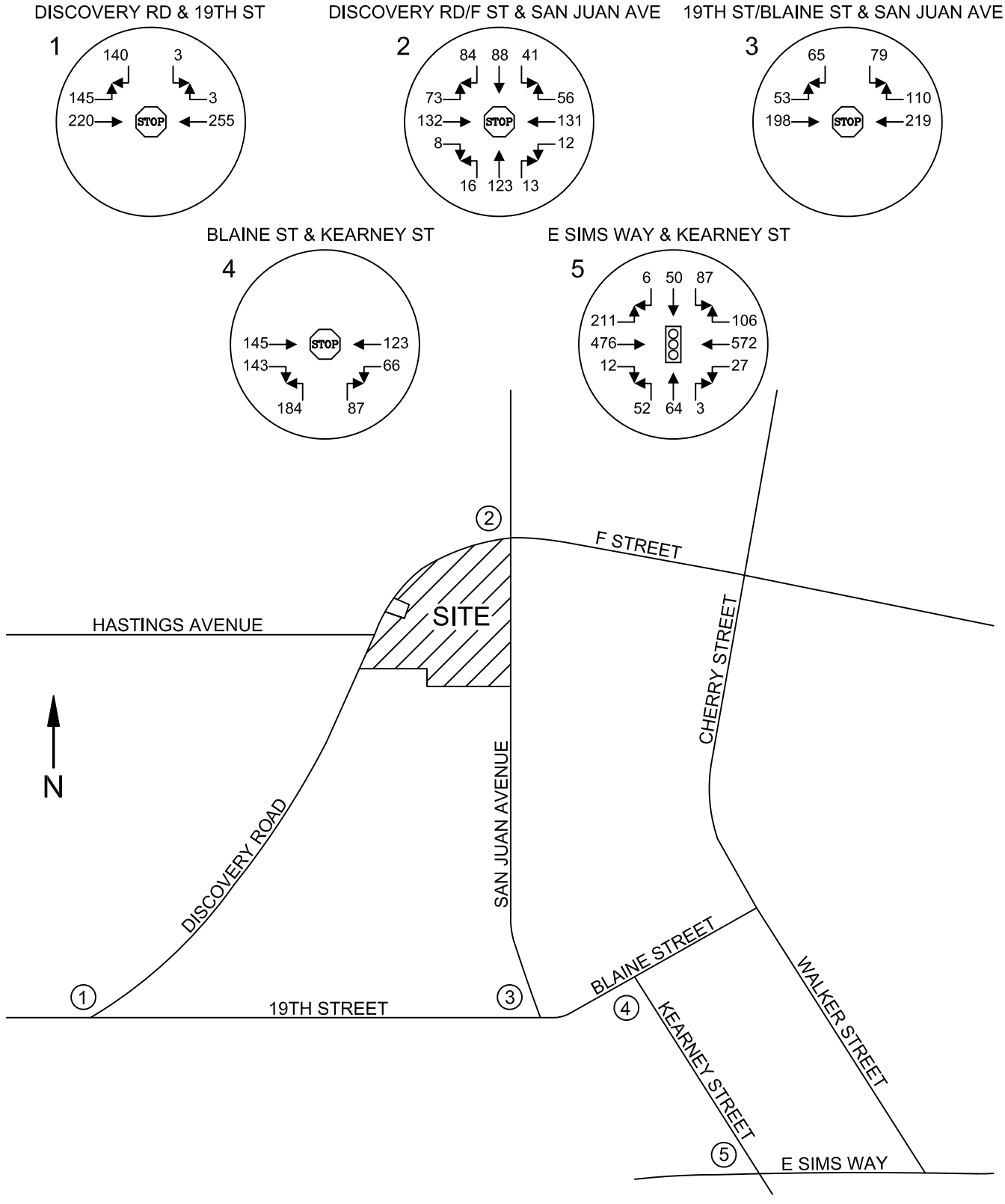
PM PEAK HOUR TRIP DISTRIBUTION - SAN JUAN AVENUE ACCESS

FIGURE 5



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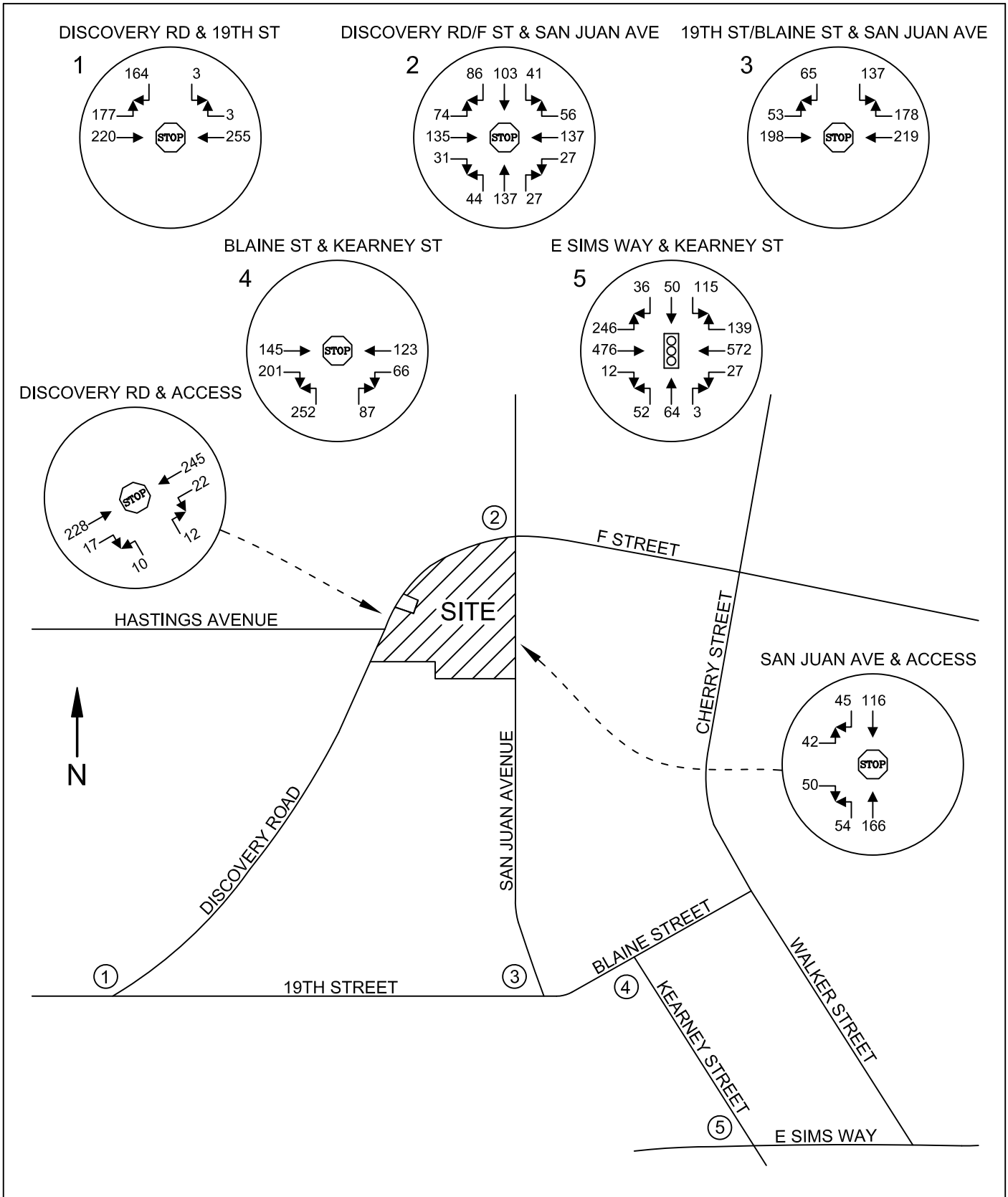
FORECAST 2025 BACKGROUND PM PEAK HOUR VOLUMES

FIGURE 6



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FORECAST 2025 PM PEAK HOUR VOLUMES WITH PROJECT

FIGURE 7

4.4 Future Level of Service

Level of service analyses were made of the future 2025 PM peak hour volumes without and with project related trips added to the key roadways and intersections. This analysis once again involved the use the Synchro 10 analysis program. Delays for the key intersections under future conditions are shown in the table below.

Table 7: Forecast 2025 PM Peak Hour Level or Service

		Background		*With Project*	
Intersection	**Control**	**LOS**	**Delay**	**LOS**	**Delay**
E Sims Way & Kearney St	Signal	B	16.2	C	21.0
Discovery Road/F St & San Juan Ave	AWSC	B	10.9	B	12.4
Discovery Road & 19th St	Stop	B	11.1	B	11.4
19th Street/Blaine St & San Juan Ave	Stop	B	14.4	C	18.6
Blaine St & Kearney St	Stop	C	16.8	C	22.9
Access & Discovery Road	Stop	--	--	B	11.2
Access & San Juan Ave	Stop	--	--	B	11.1

As indicated in Table 7, forecast 2025 PM peak hour delays are anticipated to remain mild at LOS C or better. All intersections are shown to remain meeting the City's LOS standards.

4.5 Left Turn Warrants for Entrances

Procedures described in the Highway Research Record publication, "Volume Warrants for Left-Turn Storage Lanes at Unsignalized Intersections" HRR 211 were used to assess left turn storage needs on both entrances using 2026 PM peak hour volumes with project traffic included. Based on the warrant analysis, a designated left turn lane would *not* be required on either Discovery Road or San Juan Avenue. The left turn lane nomographs are attached to the appendix for reference.

5. CONCLUSIONS AND MITIGATION MEASURES

The incoming San Juan Discovery project proposes to construct a multi-use development located in the City of Port Townsend. The overall site configuration and proposed accesses are illustrated in the site plan (see Figure 2). Land uses and associated sizes are described and summarized in the site development section and trip generation tables 4 & 5. In total, approximately 147 AM peak hour trips and 252 PM peak hour trips are anticipated to travel to/from the development on a daily basis. Existing intersection capacity indicates all intersections of study meeting City of Port Townsend's level of service standards of LOS D or better.

A six-year horizon of 2025 was analyzed to assess operations with the project fully-constructed and occupied. With a background growth rate applied and a growth factor to account for school-related activity, delays are anticipated to remain mild at LOS C or better with or without the addition of project traffic. No operational deficiencies are identified as a result of the proposed development.

Based on the analysis above, recommended mitigation is as follows:

1. Construct and design all new access points to provide sufficient sight distance as required by the City of Port Townsend. A sight distance diagram for the main access on Discovery Road has been attached.

No other mitigation is required at this time.

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APPENDIX

LEVEL OF SERVICE

The following are excerpts from the *Highway Capacity Manual - Transportation Research Board Special Report 209.*

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

Six LOS are defined for each type of facility that has analysis procedures available. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each level of service represents a range of operating conditions and the driver's perception of those conditions.

Level-of-Service definitions

The following definitions generally define the various levels of service for arterials.

Level of service A represents primarily free-flow operations at average travel speeds, usually about 90 percent of the free-flow speed for the arterial classification. Vehicles are seldom impeded in their ability to maneuver in the traffic stream. Delay at signalized intersections is minimal.

Level of service B represents reasonably unimpeded operations at average travel speeds, usually about 70 percent of the free-flow speed for the arterial classification. The ability to maneuver in the traffic stream is only slightly restricted and delays are not bothersome.

Level of service C represents stable operations; however, ability to maneuver and change lanes in midblock locations may be more restricted than in LOS B, and longer queues, adverse signal coordination, or both may contribute to lower average travel speeds of about 50 percent of the average free-flow speed for the arterial classification.

Level of service D borders on a range in which small increases in flow may cause substantial increases in approach delay and hence decreases in arterial speed. LOS D may be due to adverse signal progression, inappropriate signal timing, high volumes, or some combination of these. Average travel speeds are about 40 percent of free-flow speed.

Level of service E is characterized by significant delays and average travel speeds of one-third the free-flow speed or less. Such operations are caused by some combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections, and inappropriate signal timing.

Level of service F characterizes arterial flow at extremely low speeds, from less than one-third to one-quarter of the free-flow speed. Intersection congestion is likely at critical signalized locations, with long delays and extensive queuing.

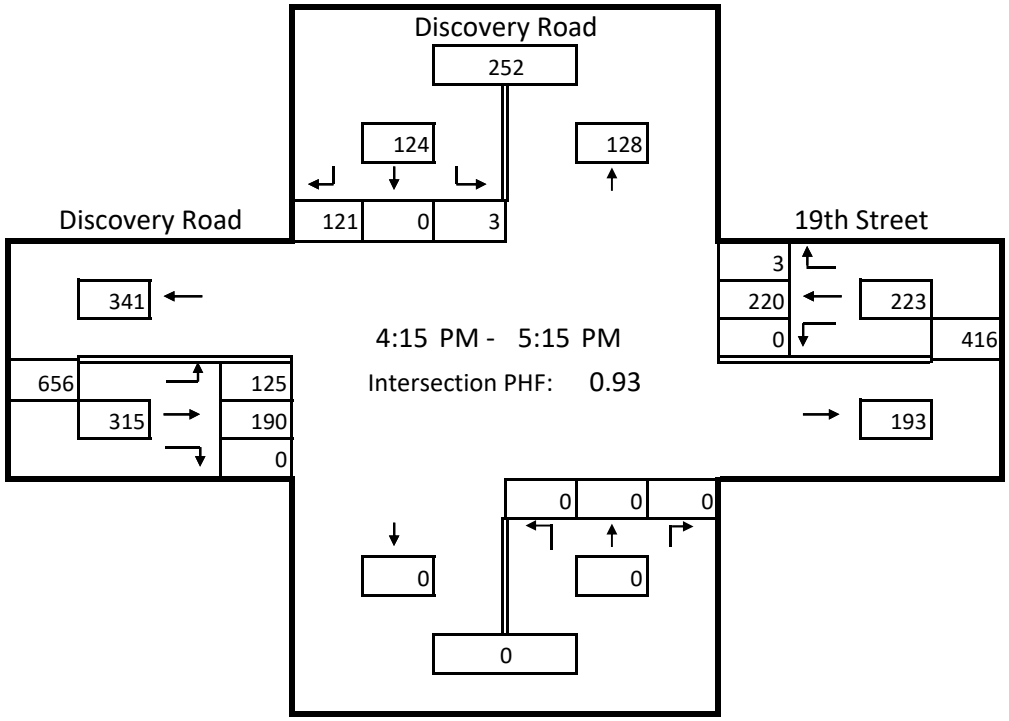
These definitions are general and conceptual in nature, and they apply primarily to uninterrupted flow. Levels of service for interrupted flow facilities vary widely in terms of both the user's perception of service quality and the operational variables used to describe them.

For each type of facility, levels of service are defined based on one or more operational parameters that best describe operating quality for the subject facility type. While the concept of level of service attempts to address a wide range of operating conditions, limitations on data collection and availability make it impractical to treat the full range of operational parameters for every type of facility. The parameters selected to define levels of service for each facility type are called "measures of effectiveness" or "MOE's", and represent available measures that best describe the quality of operation on the subject facility type.

Heath & Associates, Inc.
2214 Tacoma Road
Puyallup, WA 98371

Project Name: **San Juan Discovery**
Intersection: Discovery Road & 19th Street — Date of Count: 8/15/2018
Jurisdiction: City of Port Townsend — Project Number: 4171

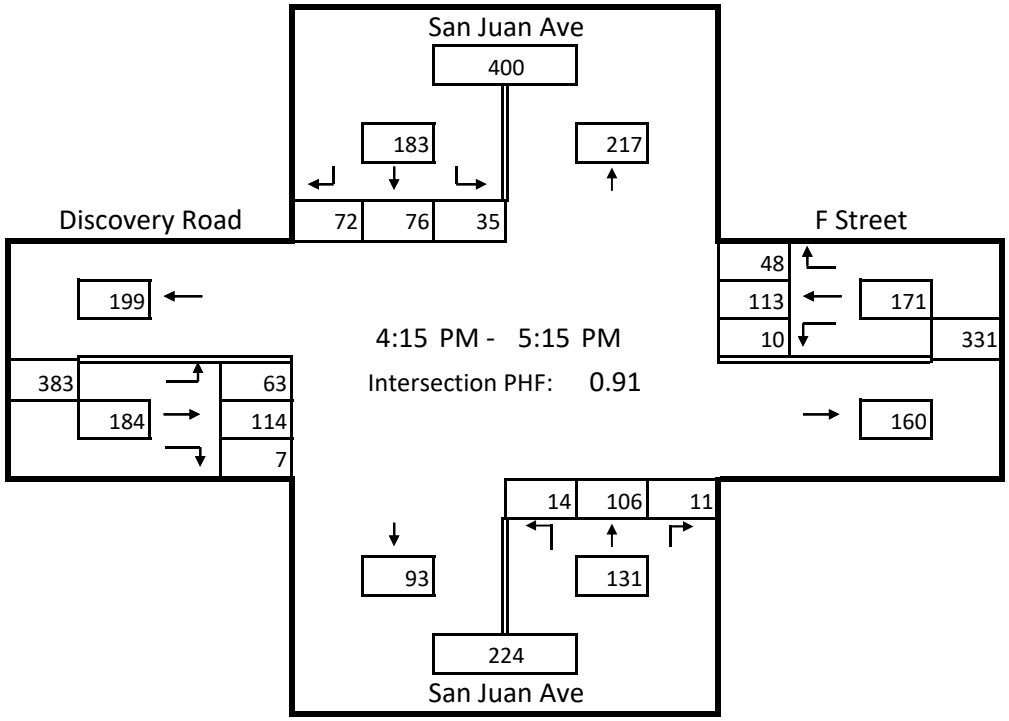
Time Period	Soutbound Discovery Road				Westbound 19th Street				Northbound				Eastbound Discovery Road				
	HV	R	T	L	HV	R	T	L	HV	R	T	L	HV	R	T	L	Total
4:00 PM	0	26	0	1	0	1	45	0	0	0	0	0	0	0	48	42	163
4:15 PM	0	34	0	0	0	2	58	0	0	0	0	0	0	0	56	28	178
4:30 PM	0	34	0	3	0	0	56	0	0	0	0	0	0	0	50	26	169
4:45 PM	0	27	0	0	0	0	47	0	0	0	0	0	0	0	40	31	145
5:00 PM	0	26	0	0	0	1	59	0	0	0	0	0	0	0	44	40	170
5:15 PM	0	24	0	4	0	0	53	0	0	0	0	0	0	0	49	33	163
5:30 PM	0	37	0	0	0	1	37	0	0	0	0	0	0	0	39	29	143
5:45 PM	0	37	0	4	0	1	26	0	0	0	0	0	0	0	40	20	128
Total	0	245	0	12	0	6	381	0	0	0	0	0	0	0	366	249	1,259
Peak Hour	**4:15 PM to 5:15 PM**																Total
Peak Total	0	121	0	3	0	3	220	0	0	0	0	0	0	0	190	125	662
Heavy Veh.	0.0%				0.0%								0.0%				
PHF	0.84				0.93								0.94				



Heath & Associates, Inc.
2214 Tacoma Road
Puyallup, WA 98371

Project Name: **San Juan Discovery**
Intersection: Discovery Road/F Street & San Juan Avenue Date of Count: 8/15/2018
Jurisdiction: City of Port Townsend Project Number: 4171

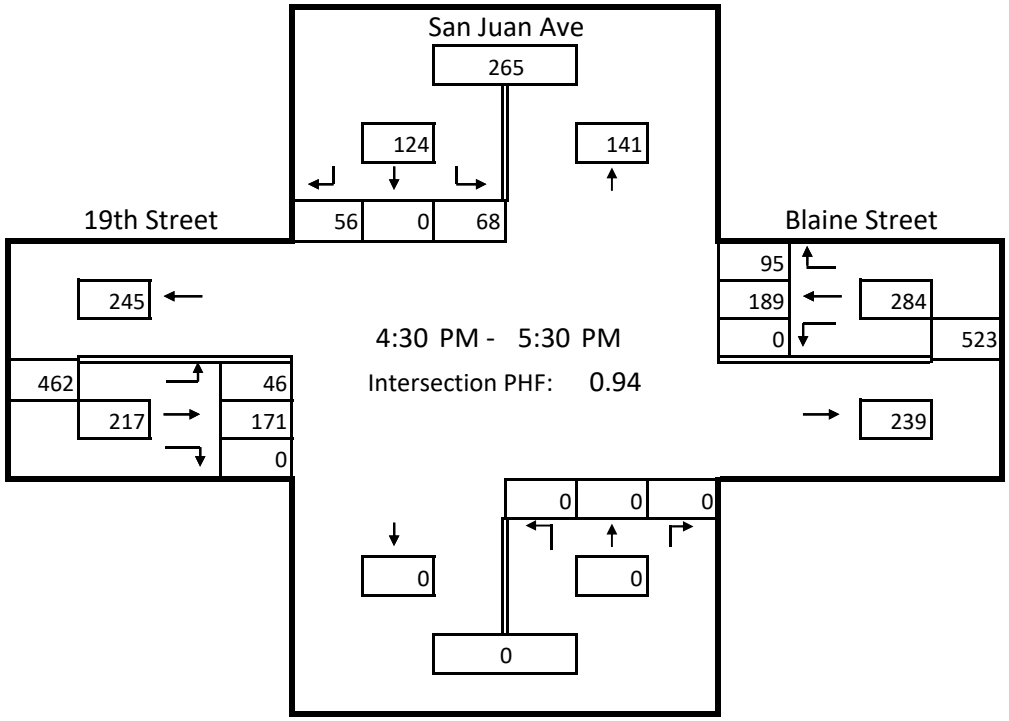
Time Period	Soutbound San Juan Ave				Westbound F Street				Northbound San Juan Ave				Eastbound Discovery Road				
	HV	R	T	L	HV	R	T	L	HV	R	T	L	HV	R	T	L	Total
4:00 PM	0	12	17	6	0	8	26	3	0	3	18	5	0	3	23	30	154
4:15 PM	0	12	14	12	0	10	23	4	0	3	32	2	0	2	29	16	159
4:30 PM	0	25	15	7	0	12	26	1	0	3	24	6	0	1	24	17	161
4:45 PM	0	17	23	9	0	15	27	3	0	3	20	4	0	2	28	14	165
5:00 PM	0	18	24	7	0	11	37	2	0	2	30	2	0	2	33	16	184
5:15 PM	0	12	25	8	0	9	30	1	0	3	25	4	0	2	21	17	157
5:30 PM	0	22	20	10	0	10	30	4	0	3	20	2	0	4	18	13	156
5:45 PM	0	18	14	8	0	10	31	3	0	6	25	0	0	5	25	13	158
Total	0	136	152	67	0	85	230	21	0	26	194	25	0	21	201	136	1,294
Peak Hour	**4:15 PM to 5:15 PM**																Total
Peak Total	0	72	76	35	0	48	113	10	0	11	106	14	0	7	114	63	669
Heavy Veh.	0.0%				0.0%				0.0%				0.0%				
PHF	0.93				0.86				0.89				0.90				



Heath & Associates, Inc.
2214 Tacoma Road
Puyallup, WA 98371

Project Name: **San Juan Discovery**
Intersection: 19th Street/Blaine Street & San Juan Avenue Date of Count: 8/15/2018
Jurisdiction: City of Port Townsend Project Number: 4171

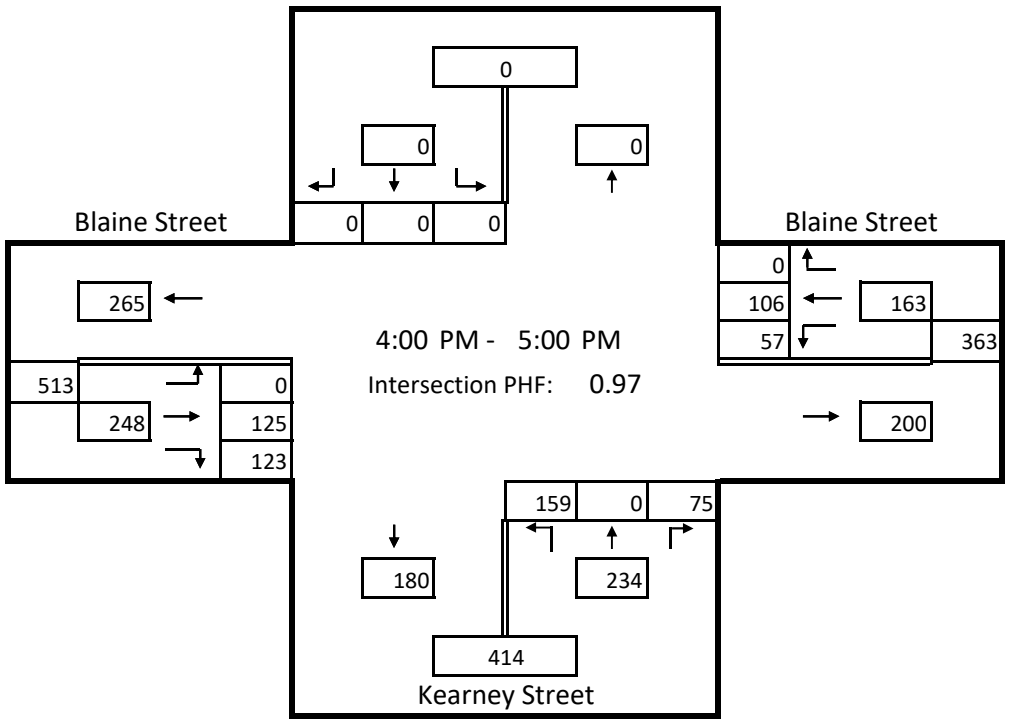
Time Period	Soutbound San Juan Ave				Westbound Blaine Street				Northbound				Eastbound 19th Street				
	HV	R	T	L	HV	R	T	L	HV	R	T	L	HV	R	T	L	Total
4:00 PM	0	5	0	19	0	18	42	0	0	0	0	0	0	0	47	7	138
4:15 PM	0	7	0	16	0	24	45	0	0	0	0	0	0	0	43	13	148
4:30 PM	0	12	0	18	0	23	35	0	0	0	0	0	0	0	51	13	152
4:45 PM	0	18	0	13	0	23	50	0	0	0	0	0	0	0	43	9	156
5:00 PM	0	12	0	15	0	27	61	0	0	0	0	0	0	0	38	13	166
5:15 PM	0	14	0	22	0	22	43	0	0	0	0	0	0	0	39	11	151
5:30 PM	0	10	0	16	0	25	31	0	0	0	0	0	0	0	31	6	119
5:45 PM	0	4	0	11	0	15	29	0	0	0	0	0	0	0	39	16	114
Total	0	82	0	130	0	177	336	0	0	0	0	0	0	0	331	88	1,144
Peak Hour	**4:30 PM to 5:30 PM**																Total
Peak Total	0	56	0	68	0	95	189	0	0	0	0	0	0	0	171	46	625
Heavy Veh.	0.0%				0.0%								0.0%				
PHF	0.86				0.81								0.85				



Heath & Associates, Inc.
2214 Tacoma Road
Puyallup, WA 98371

Project Name: **San Juan Discovery**
Intersection: Blaine Street & Kearney Street — Date of Count: 8/15/2018
Jurisdiction: City of Port Townsend — Project Number: 4171

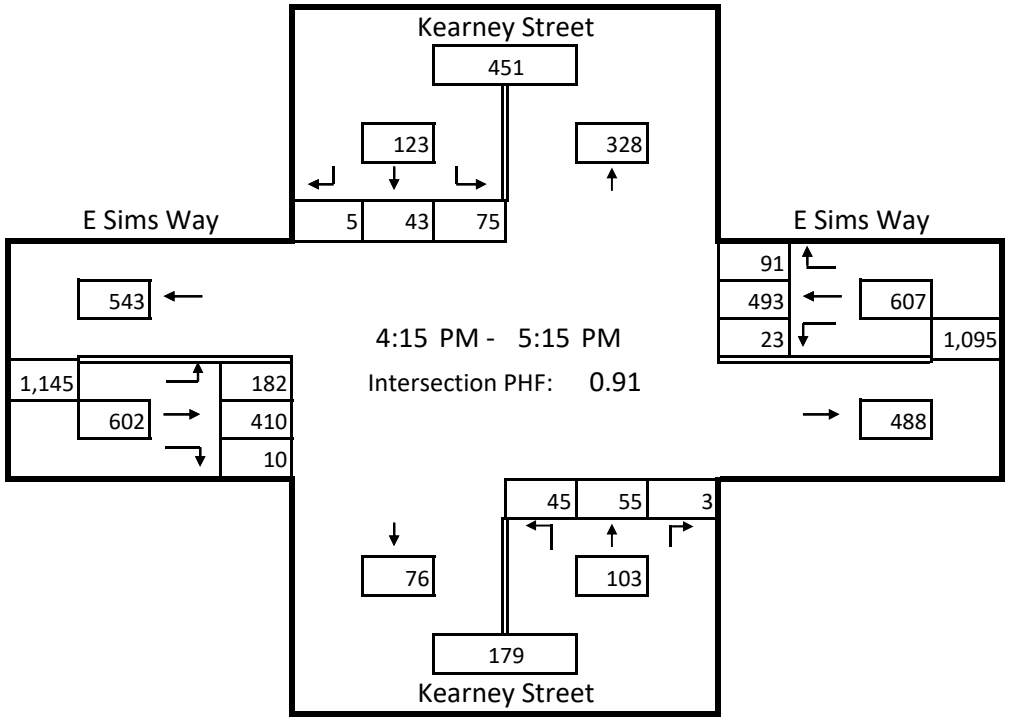
Time Period	Soutbound				Westbound Blaine Street				Northbound Kearney Street				Eastbound Blaine Street				
	HV	R	T	L	HV	R	T	L	HV	R	T	L	HV	R	T	L	Total
4:00 PM	0	0	0	0	0	0	31	20	0	11	0	35	0	38	32	0	167
4:15 PM	0	0	0	0	0	0	26	19	0	19	0	43	0	32	27	0	166
4:30 PM	0	0	0	0	0	0	19	10	0	23	0	43	0	28	36	0	159
4:45 PM	0	0	0	0	0	0	30	8	0	22	0	38	0	25	30	0	153
5:00 PM	0	0	0	0	0	0	33	14	0	18	0	51	0	31	20	0	167
5:15 PM	0	0	0	0	0	0	25	9	0	14	0	41	0	35	27	0	151
5:30 PM	0	0	0	0	0	0	23	10	0	18	0	35	0	29	25	0	140
5:45 PM	0	0	0	0	0	0	16	16	0	7	0	26	0	22	27	0	114
Total	0	0	0	0	0	0	203	106	0	132	0	312	0	240	224	0	1,217
Peak Hour	**4:00 PM to 5:00 PM**																Total
Peak Total	0	0	0	0	0	0	106	57	0	75	0	159	0	123	125	0	645
Heavy Veh.					0.0%				0.0%				0.0%				
PHF					0.80				0.89				0.89				



Heath & Associates, Inc.
2214 Tacoma Road
Puyallup, WA 98371

Project Name: **San Juan Discovery**
Intersection: E Sims Way & Kearney Street
Date of Count: 8/15/2018
Jurisdiction: City of Port Townsend
Project Number: 4171

Time Period	Soutbound Kearney Street				Westbound E Sims Way				Northbound Kearney Street				Eastbound E Sims Way				
	HV	R	T	L	HV	R	T	L	HV	R	T	L	HV	R	T	L	Total
4:00 PM	0	1	10	22	0	23	123	13	0	2	13	8	0	5	106	46	372
4:15 PM	0	3	11	26	0	19	119	11	0	0	17	12	0	3	97	51	369
4:30 PM	0	0	12	11	0	20	105	2	0	0	17	13	0	1	106	41	328
4:45 PM	0	0	8	19	0	22	128	2	0	2	11	11	0	4	94	41	342
5:00 PM	0	2	12	19	0	30	141	8	0	1	10	9	0	2	113	49	396
5:15 PM	0	0	13	15	0	16	112	6	0	1	12	4	0	3	90	43	315
5:30 PM	0	1	9	17	0	21	85	9	0	1	8	5	0	5	93	45	299
5:45 PM	0	2	10	16	0	23	65	2	0	0	10	2	0	5	72	32	239
Total	0	9	85	145	0	174	878	53	0	7	98	64	0	28	771	348	2,660
Peak Hour	**4:15 PM to 5:15 PM**																Total
Peak Total	0	5	43	75	0	91	493	23	0	3	55	45	0	10	410	182	1,435
Heavy Veh.	0.0%				0.0%				0.0%				0.0%				
PHF	0.77				0.85				0.86				0.92				



Heath & Associates
San Juan Discovery, TIA

Intersection Volumes

Annual Growth Rate: 1.5 %
# of Years to Horizon: 7

PM Peak Hour 4-6

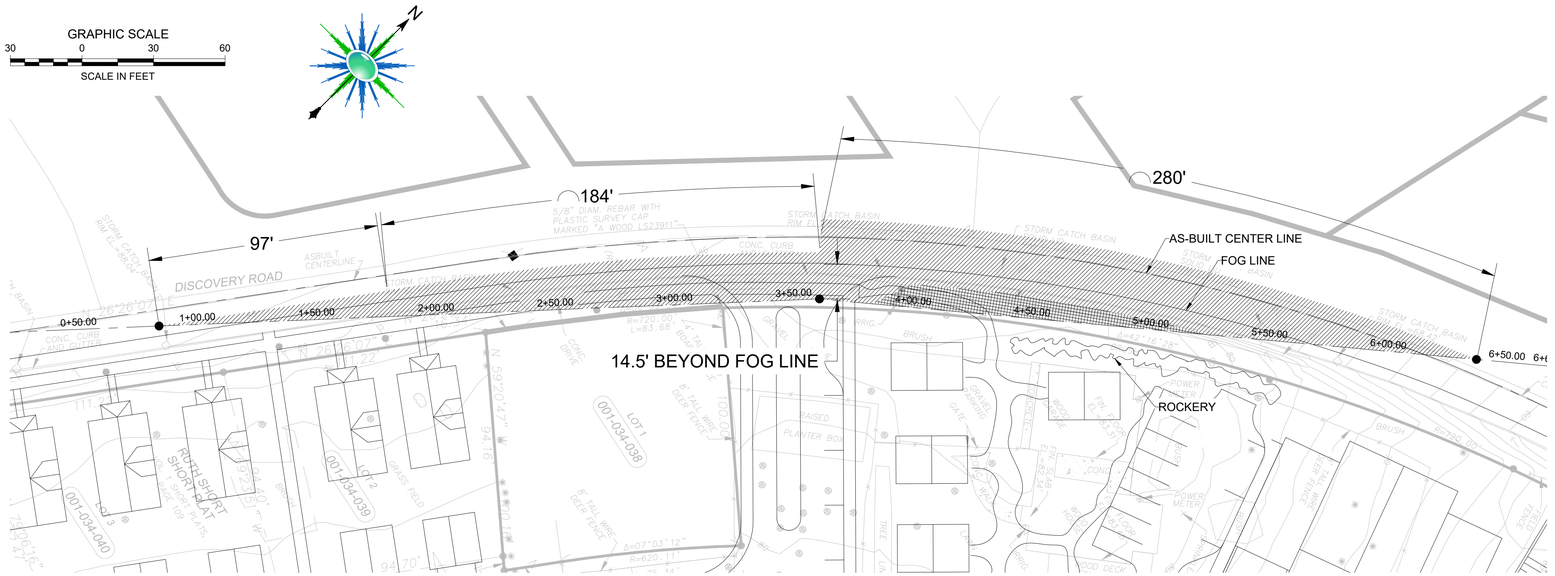
Discovery Rd/19th St	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing 2018	121	0	3	3	220	0	0	0	0	0	190	125
Project Trips	24	0	0	0	0	0	0	0	0	0	0	32
5% School Increase	6	0	0	0	11	0	0	0	0	0	10	6
Without 2025	140	0	3	3	255	0	0	0	0	0	220	145
With 2025	164	0	3	3	255	0	0	0	0	0	220	177

Discovery Rd/F St/San Juan	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing 2018	72	76	35	48	113	10	11	106	14	7	114	63
Project Trips	2	15	0	0	6	15	14	14	28	23	3	1
5% School Increase	4	4	2	2	6	1	1	5	1	0	6	3
Without 2025	84	88	41	56	131	12	13	123	16	8	132	73
With 2025	86	103	41	56	137	27	27	137	44	31	135	74

19th St/Blaine St/San Juan	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing 2018	56	0	68	95	189	0	0	0	0	0	171	46
Project Trips	0	0	58	68	0	0	0	0	0	0	0	0
5% School Increase	3	0	3	5	9	0	0	0	0	0	9	2
Without 2025	65	0	79	110	219	0	0	0	0	0	198	53
With 2025	65	0	137	178	219	0	0	0	0	0	198	53

Blaine St/Kearney St	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing 2018	0	0	0	0	106	57	75	0	159	123	125	0
Project Trips	0	0	0	0	0	0	0	0	68	58	0	0
5% School Increase	0	0	0	0	5	3	4	0	8	6	6	0
Without 2025	0	0	0	0	123	66	87	0	184	143	145	0
With 2025	0	0	0	0	123	66	87	0	252	201	145	0

E Sims Way/Kearney St	SBR	SBT	SBL	WBR	WBT	WBL	NBR	NBT	NBL	EBR	EBT	EBL
Existing 2018	5	43	75	91	493	23	3	55	45	10	410	182
Project Trips	30	0	28	33	0	0	0	0	0	0	0	35
5% School Increase	0	2	4	5	25	1	0	3	2	1	21	9
Without 2025	6	50	87	106	572	27	3	64	52	12	476	211
With 2025	36	50	115	139	572	27	3	64	52	12	476	246



LEGEND

- DRIVER'S FIELD OF SIGHT
- AREA REQUIRING RE-GRADING
- LOCATION OF DRIVER AND CAR

DISCOVERY WAY PROFILE

HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 15'

NOTES

1. DRIVER'S EYE SIGHT DISTANCE DRAWN 3.5' ABOVE GRADE AND 14.5' FROM FOG LINE TO ONCOMING CARS 280' ARC LENGTH AWAY.
2. RE-GRADING WILL BE REQUIRED IN THE R.O.W. TO THE EAST. A ROCKERY IS PROPOSED TO RETAIN IN THAT AREA.

DRAWN BY:
MK, NP, RB, SL
DATE:
12/11/18
SCALE:
AS NOTED

TERRAPIN ARCHITECTURE PC
727 TAYLOR STREET
PORT TOWNSEND, WA 98368
PHONE: (360) 379-8090

2020 ENGINEERING

SIGHT DISTANCE

PLANNED UNIT DEVELOPMENT SUBMITTAL
PT PRESERVATION ALLIANCE
SAN JUAN AND DISCOVERY ROADS
PORT TOWNSEND, WA 98368

SHEET:
4.1

Single-Family Detached Housing
(210)

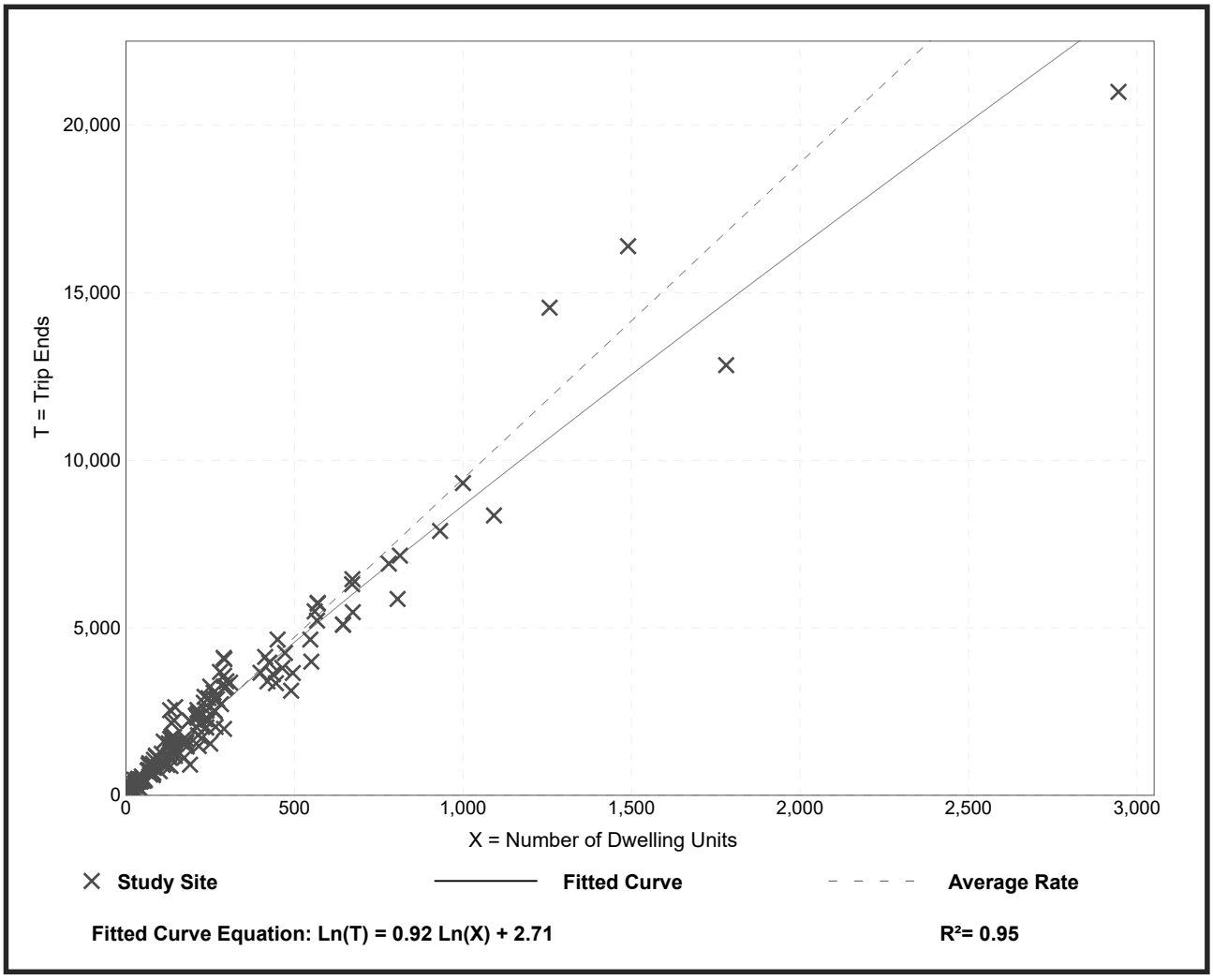
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 159
Avg. Num. of Dwelling Units: 264
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

Data Plot and Equation



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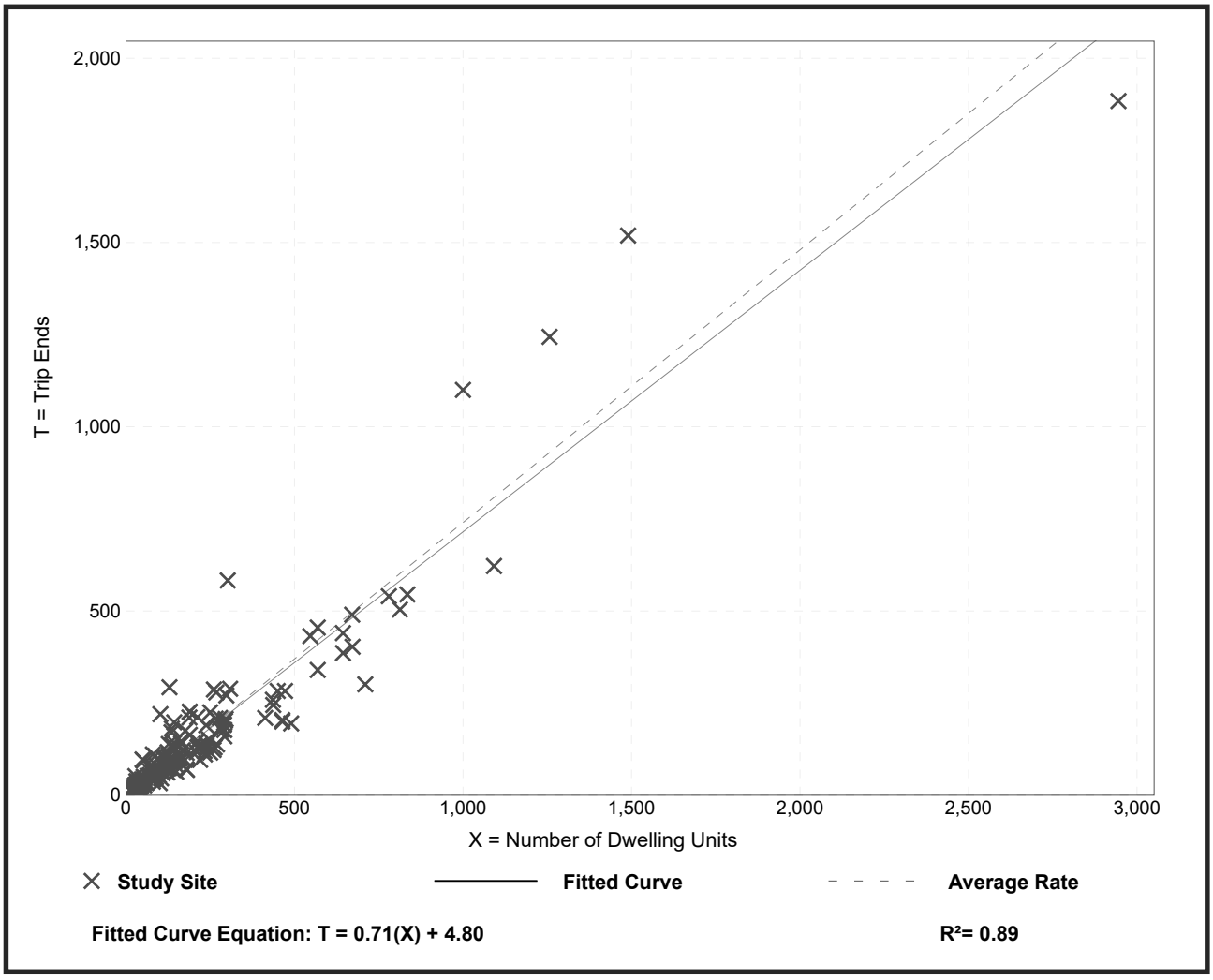
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: **Dwelling Units**
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: 173
Avg. Num. of Dwelling Units: 219
Directional Distribution: 25% entering, 75% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.74	0.33 - 2.27	0.27

Data Plot and Equation



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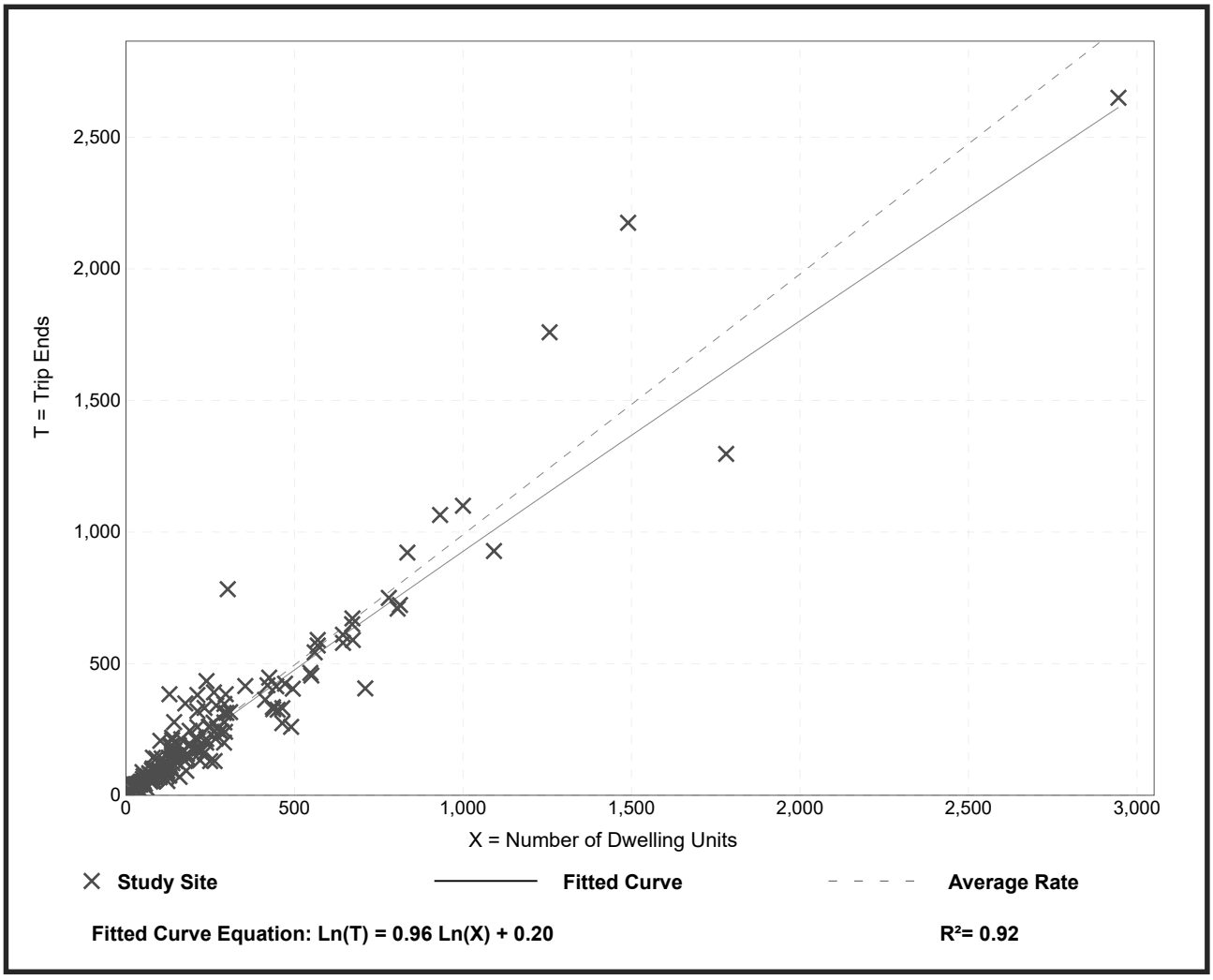
Single-Family Detached Housing
(210)

Vehicle Trip Ends vs: **Dwelling Units**
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: 190
Avg. Num. of Dwelling Units: 242
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

Data Plot and Equation



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Multifamily Housing (Low-Rise)
(220)

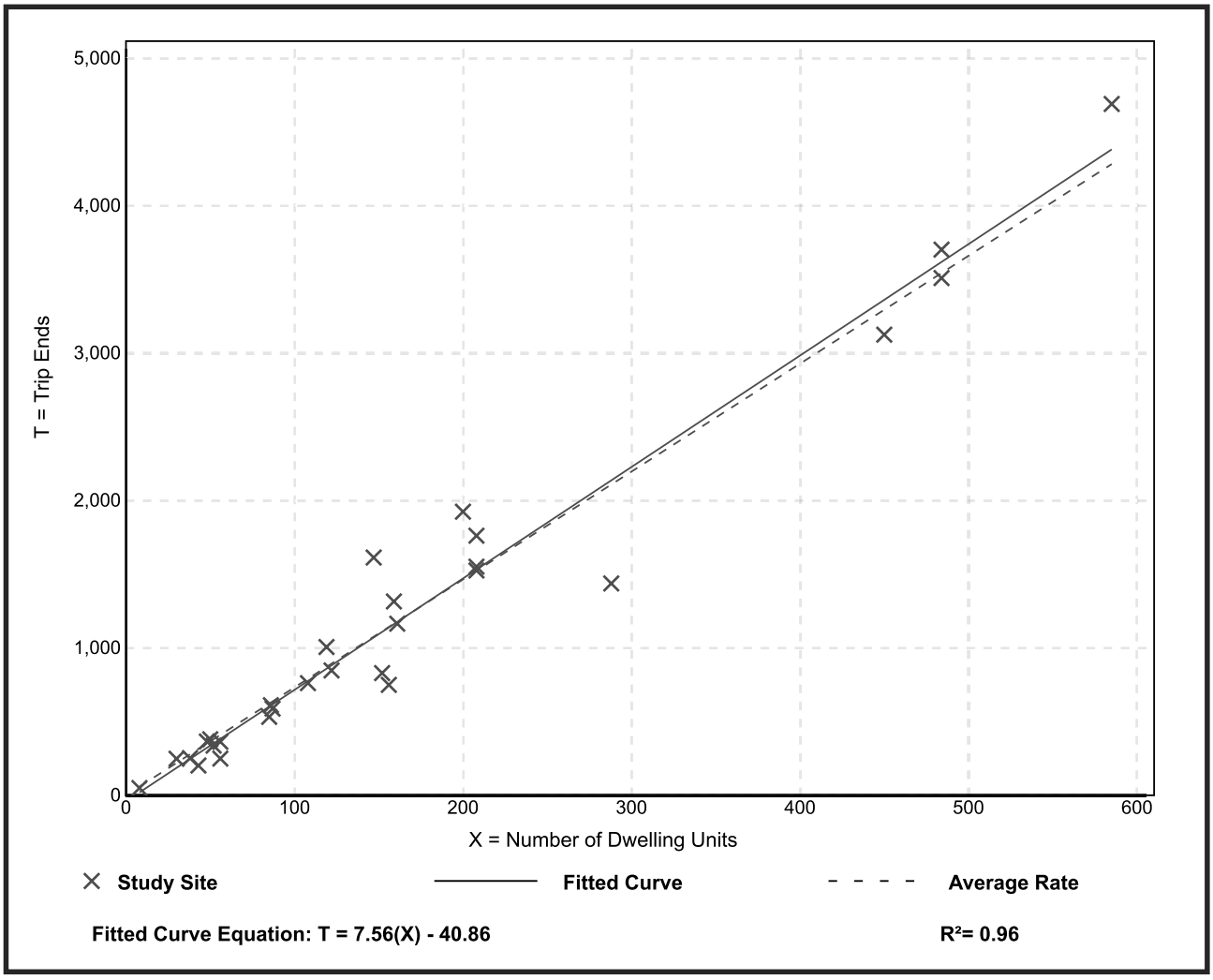
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 29
Avg. Num. of Dwelling Units: 168
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
7.32	4.45 - 10.97	1.31

Data Plot and Equation



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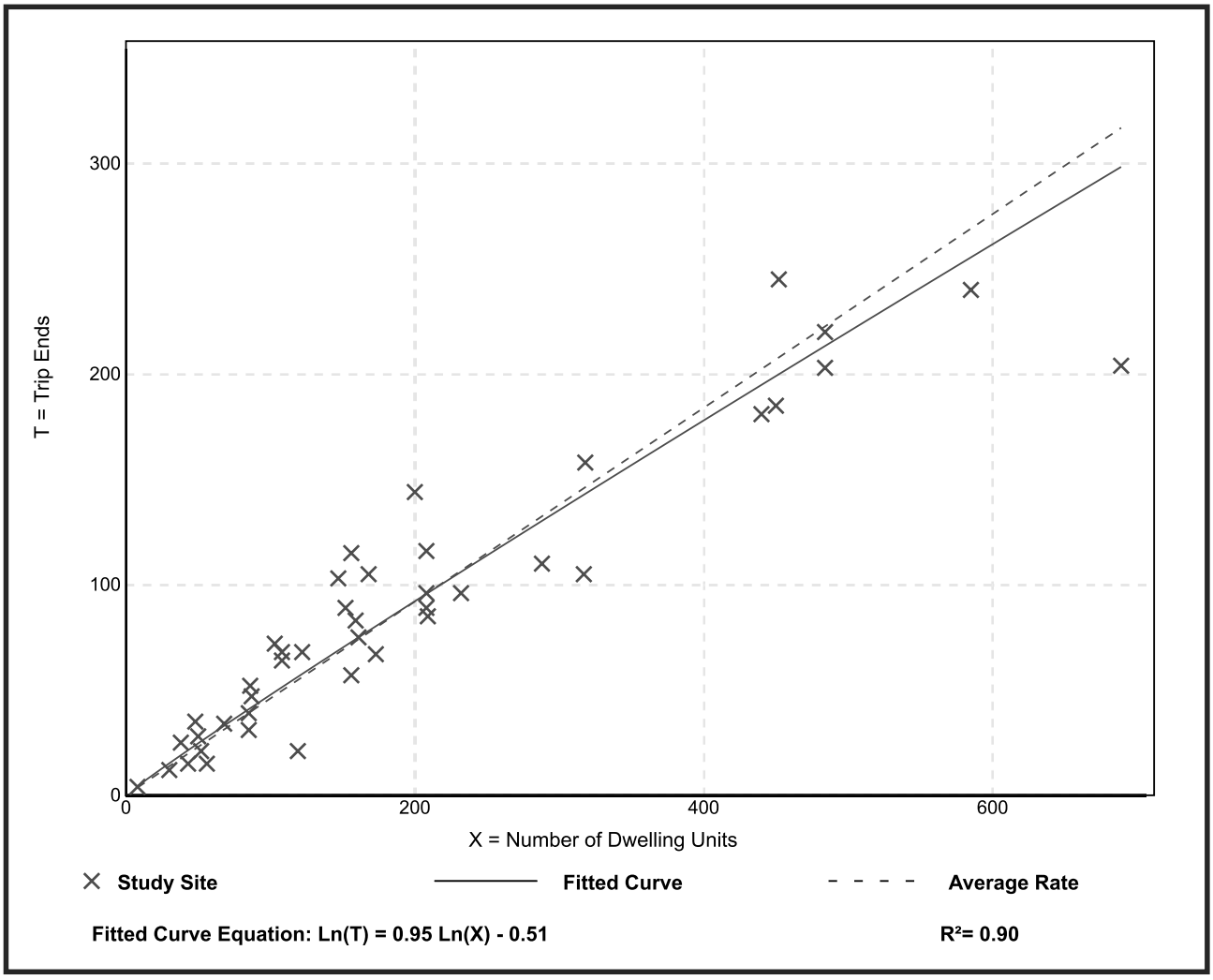
Multifamily Housing (Low-Rise)
(220)

Vehicle Trip Ends vs: **Dwelling Units**
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: 42
Avg. Num. of Dwelling Units: 199
Directional Distribution: 23% entering, 77% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.46	0.18 - 0.74	0.12

Data Plot and Equation



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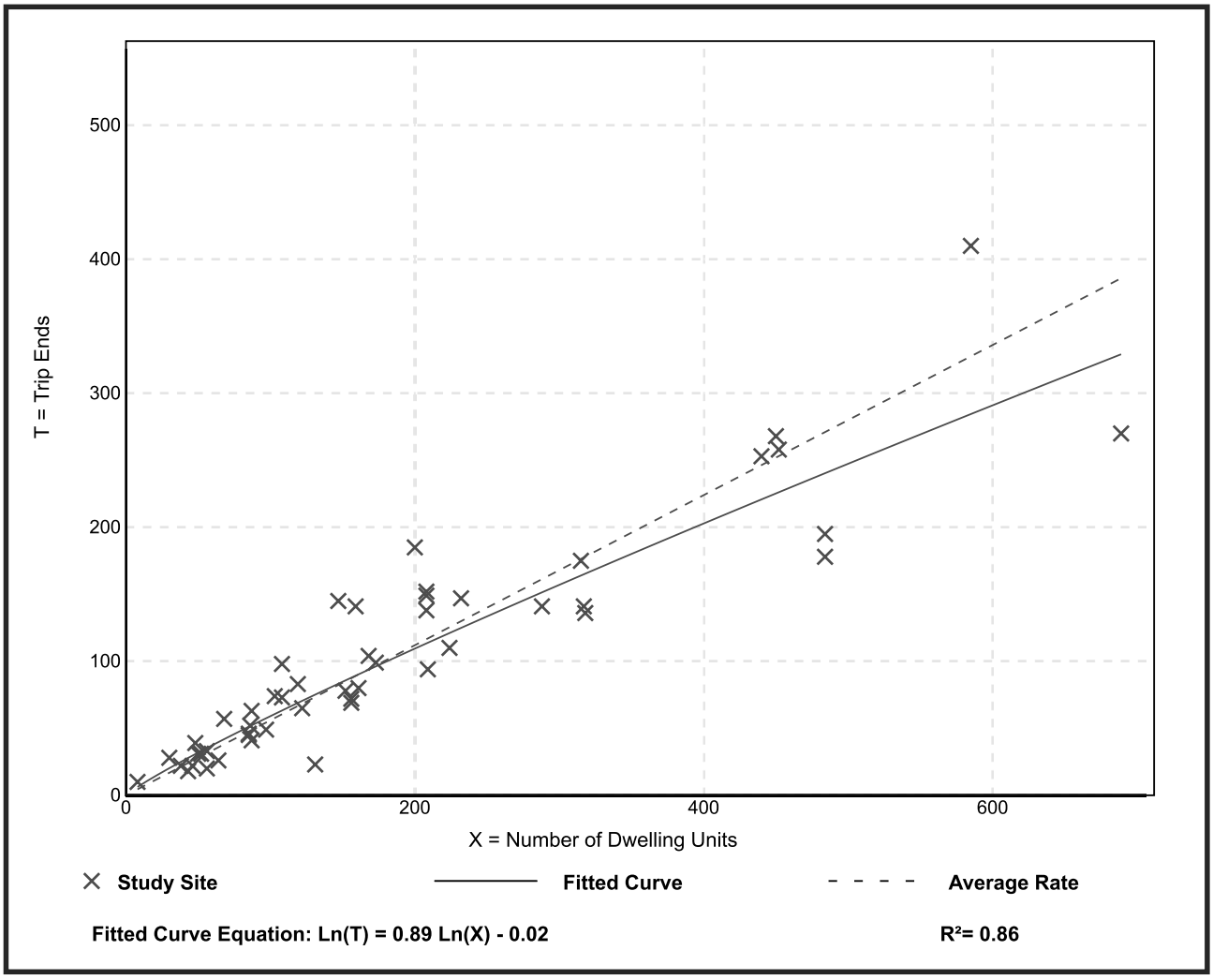
Multifamily Housing (Low-Rise)
(220)

Vehicle Trip Ends vs: **Dwelling Units**
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: 50
Avg. Num. of Dwelling Units: 187
Directional Distribution: 63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.56	0.18 - 1.25	0.16

Data Plot and Equation



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Senior Adult Housing - Attached
(252)

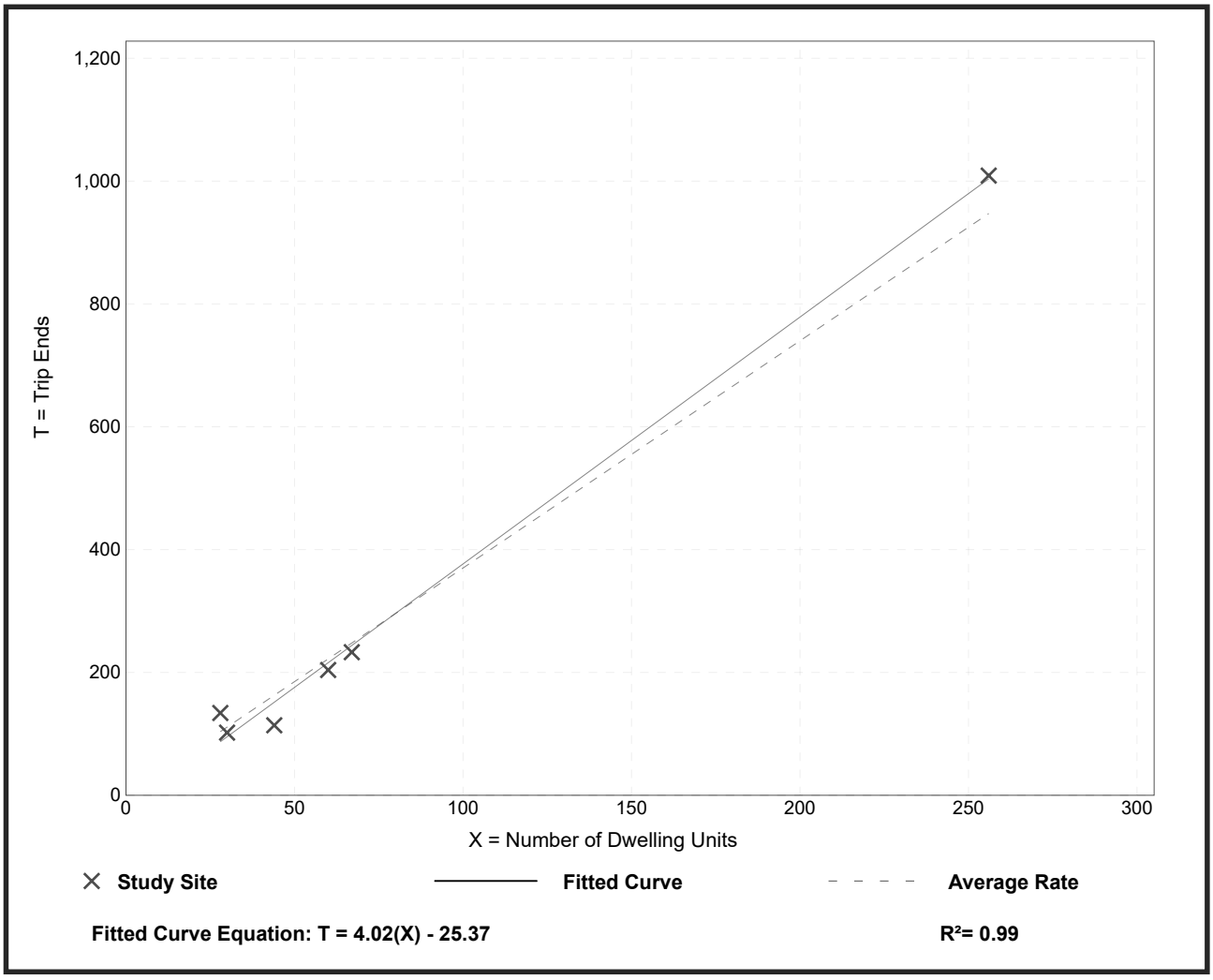
Vehicle Trip Ends vs: **Dwelling Units**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 6
Avg. Num. of Dwelling Units: 81
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
3.70	2.59 - 4.79	0.53

Data Plot and Equation



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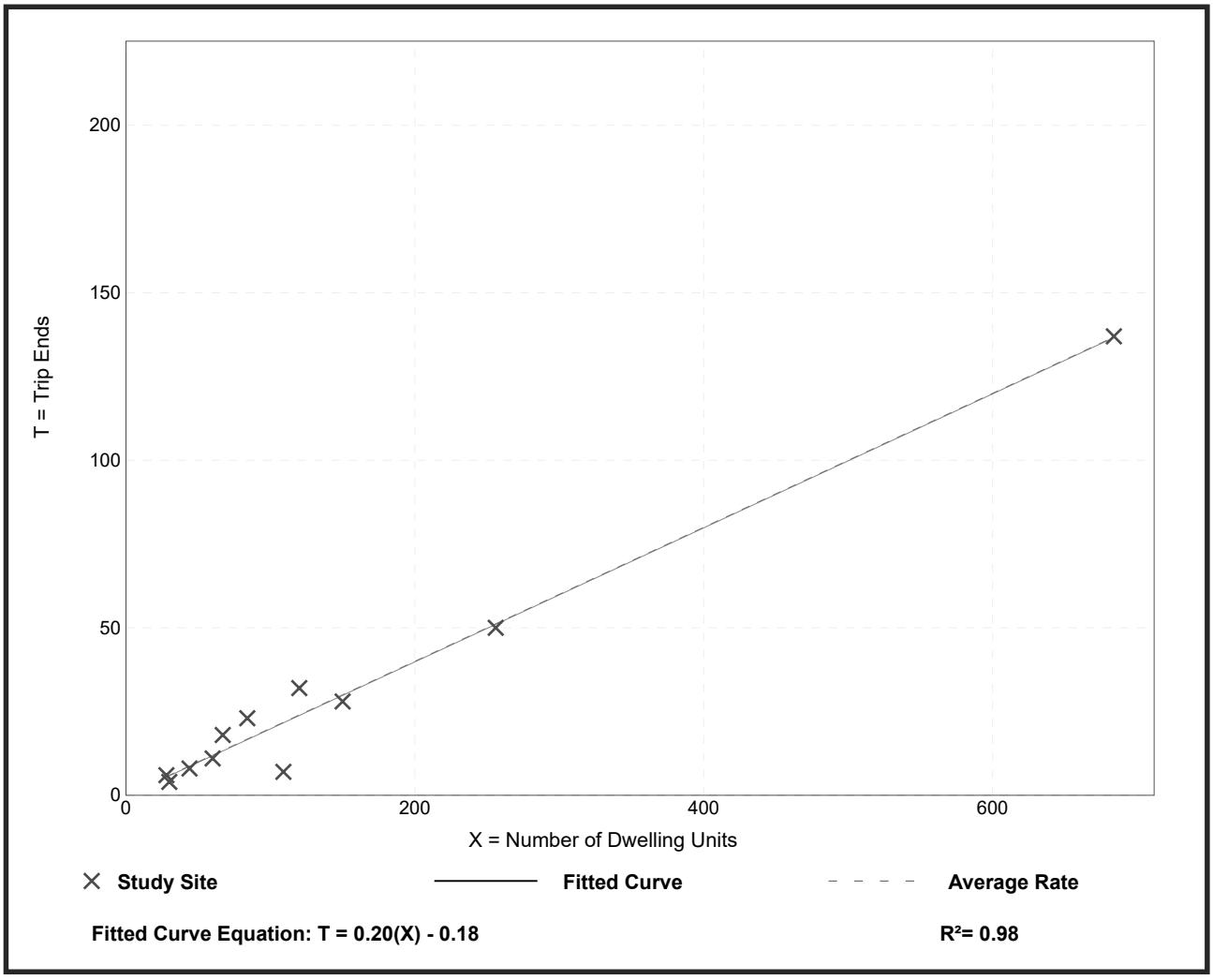
Senior Adult Housing - Attached
(252)

Vehicle Trip Ends vs: **Dwelling Units**
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: 11
Avg. Num. of Dwelling Units: 148
Directional Distribution: 35% entering, 65% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.20	0.06 - 0.27	0.05

Data Plot and Equation



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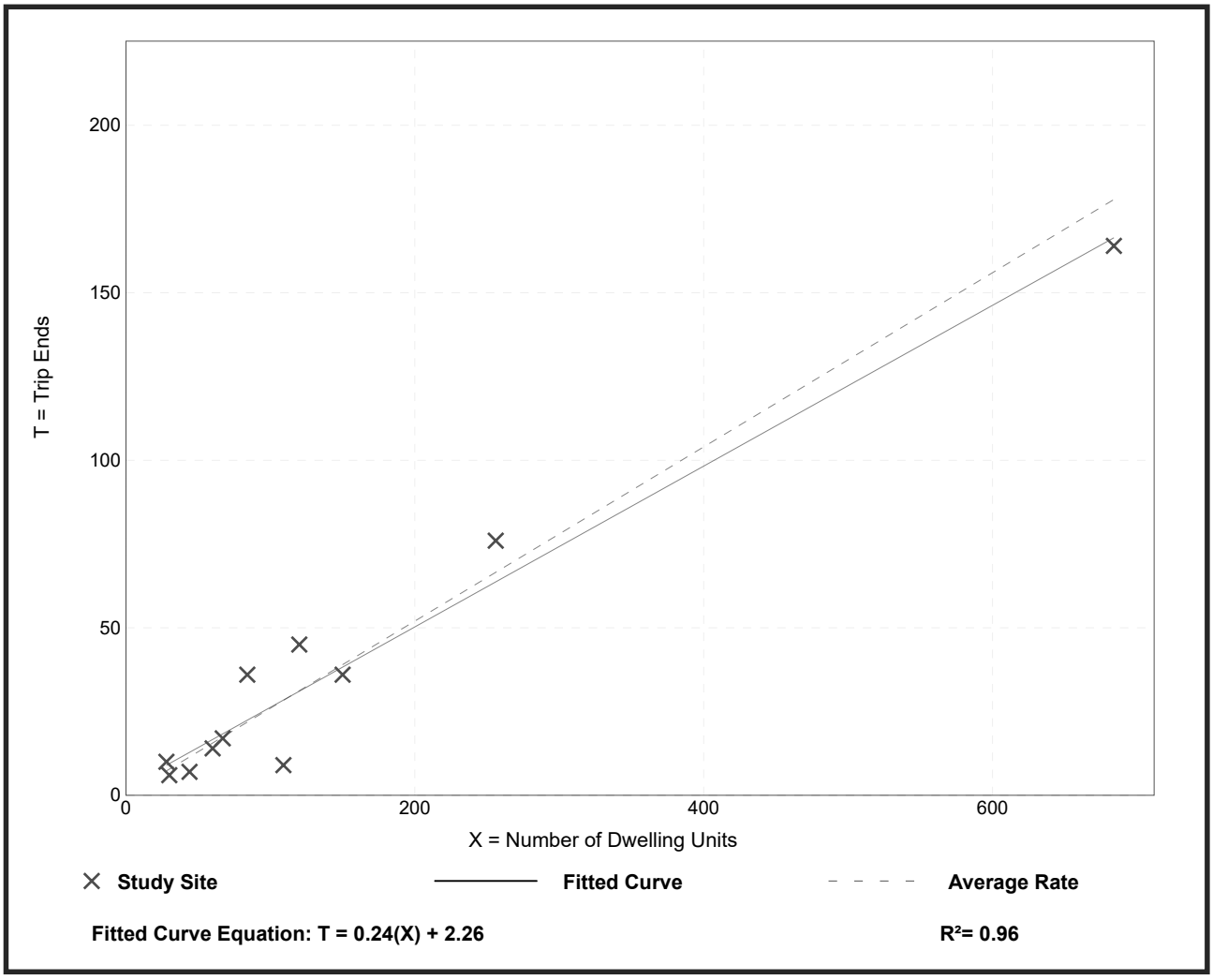
Senior Adult Housing - Attached
(252)

Vehicle Trip Ends vs: **Dwelling Units**
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: 11
Avg. Num. of Dwelling Units: 148
Directional Distribution: 55% entering, 45% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.26	0.08 - 0.43	0.08

Data Plot and Equation



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General Office Building
(710)

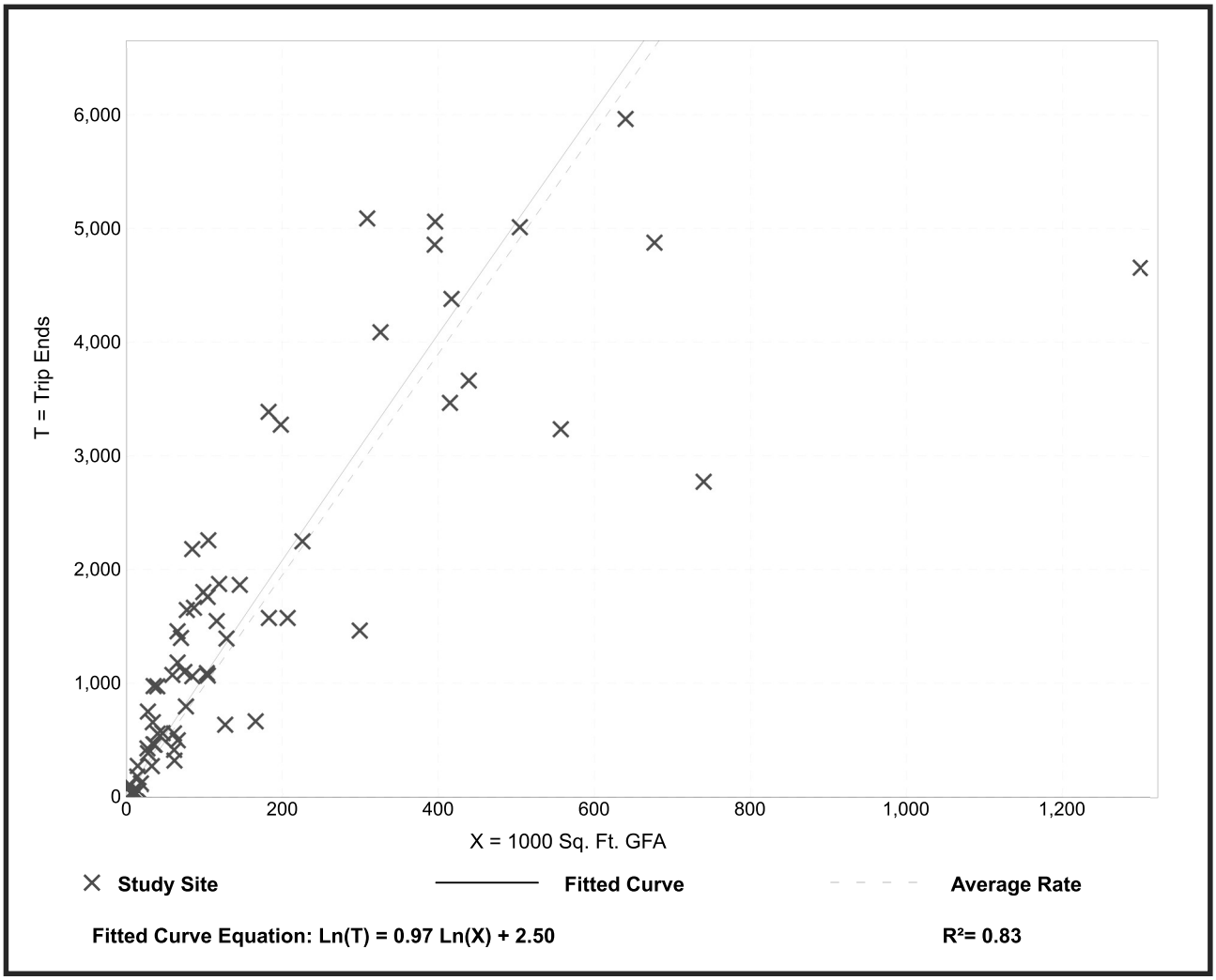
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 66
Avg. 1000 Sq. Ft. GFA: 171
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
9.74	2.71 - 27.56	5.15

Data Plot and Equation



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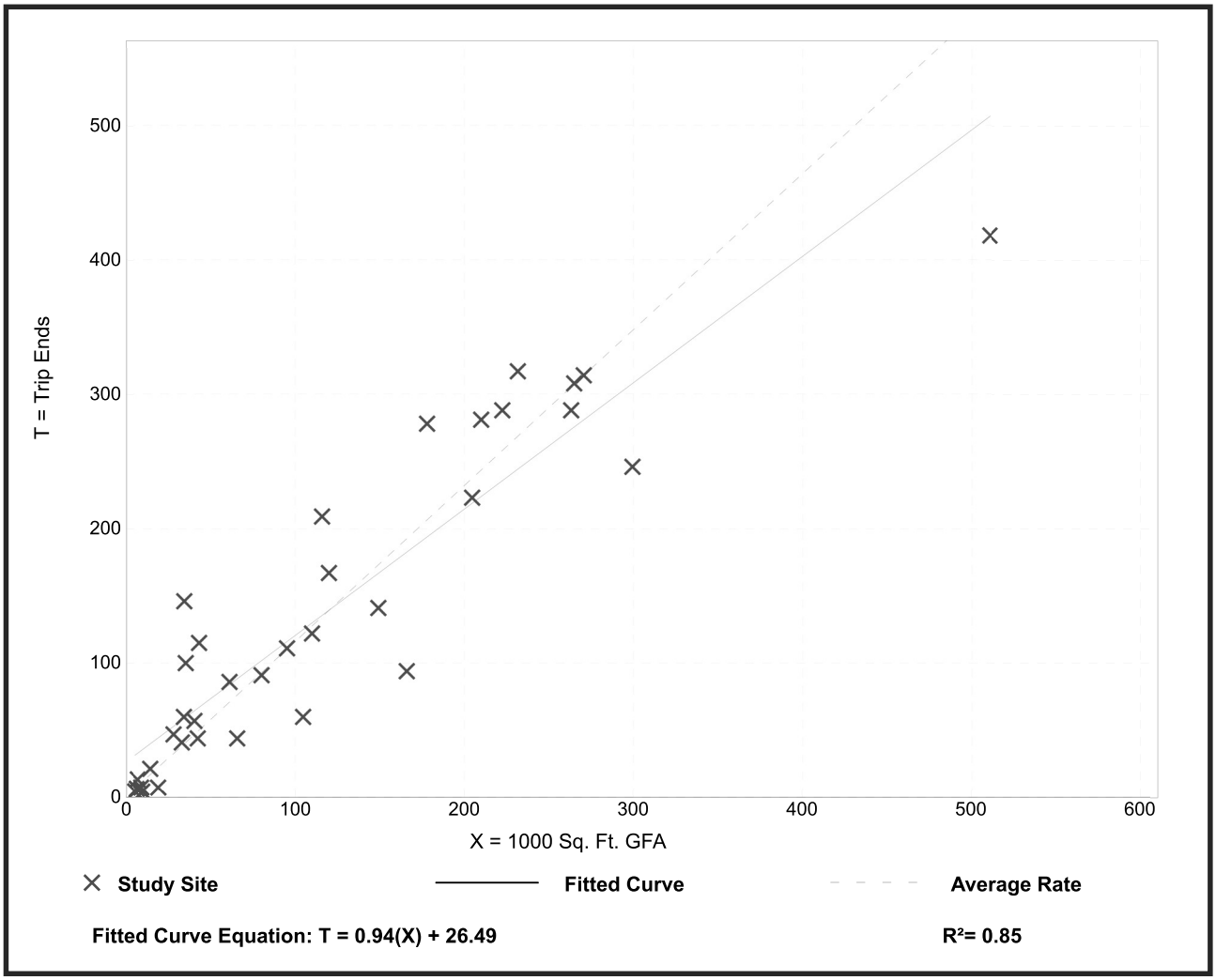
General Office Building
(710)

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: 35
Avg. 1000 Sq. Ft. GFA: 117
Directional Distribution: 86% entering, 14% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.16	0.37 - 4.23	0.47

Data Plot and Equation



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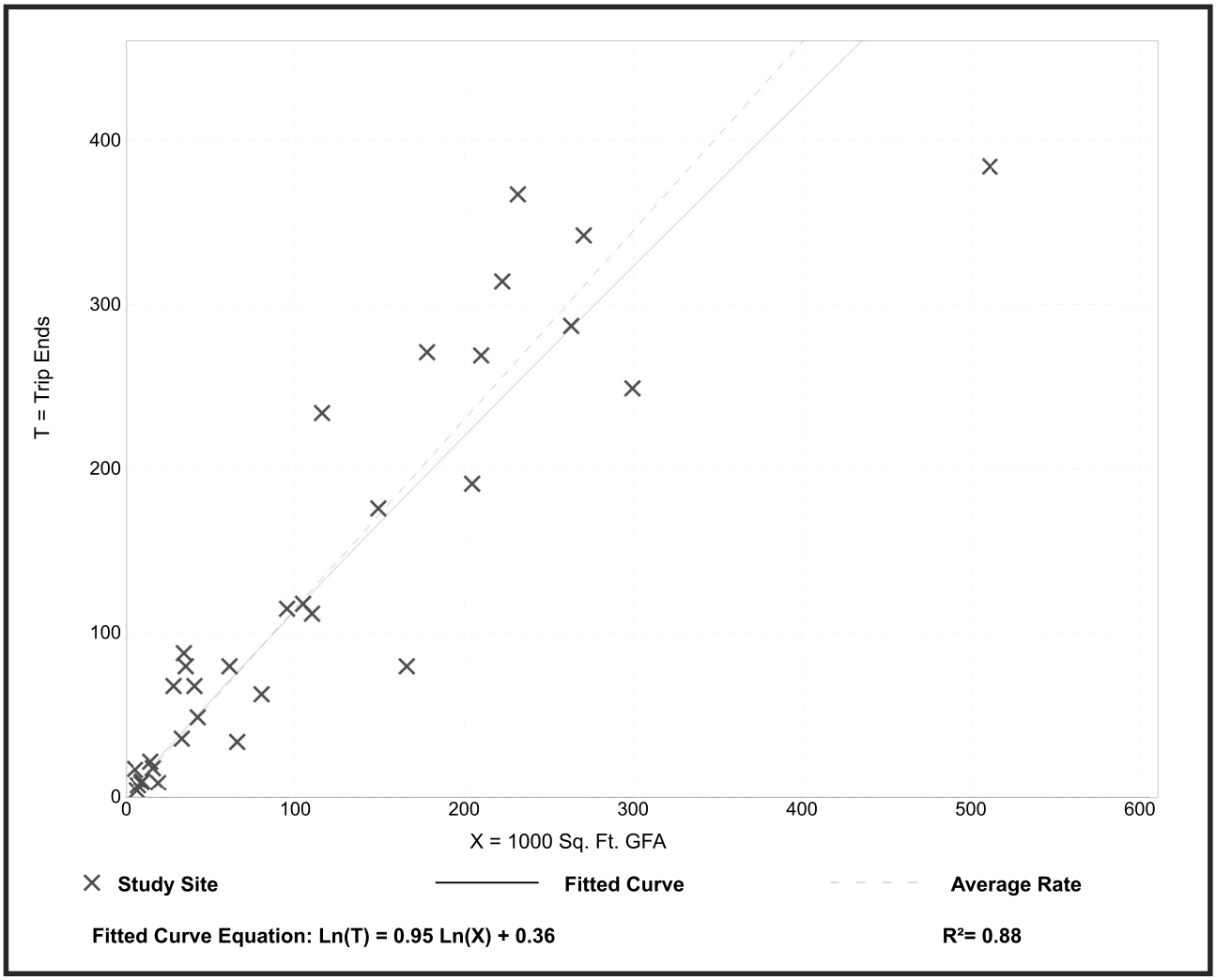
General Office Building
(710)

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: 32
Avg. 1000 Sq. Ft. GFA: 114
Directional Distribution: 16% entering, 84% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.15	0.47 - 3.23	0.42

Data Plot and Equation



Trip Generation Manual, 10th Edition ● Institute of Transportation Engineers

High-Turnover (Sit-Down) Restaurant
(932)

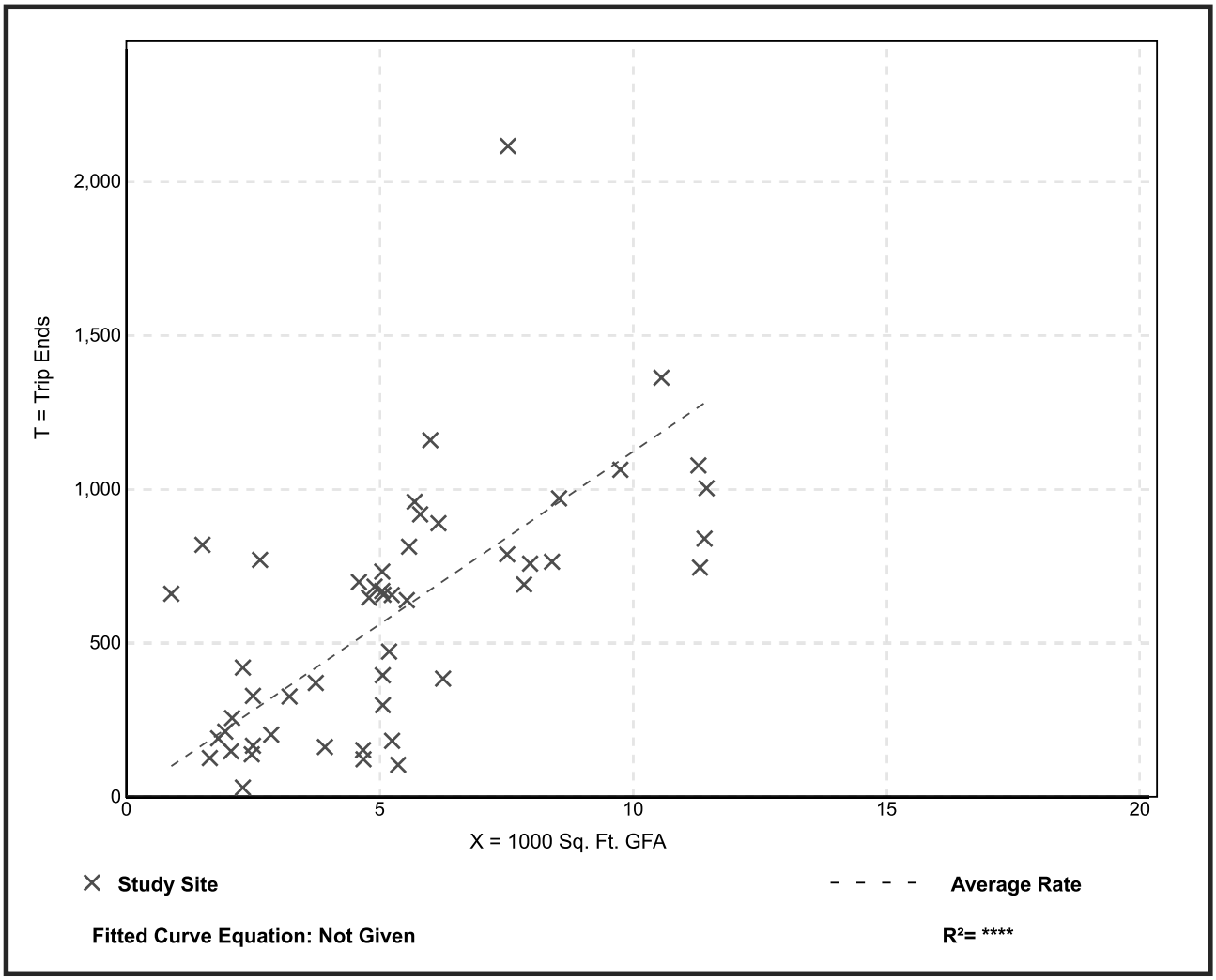
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 50
Avg. 1000 Sq. Ft. GFA: 5
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
112.18	13.04 - 742.41	72.51

Data Plot and Equation



Trip Generation Manual, 10th Edition ● Institute of Transportation Engineers

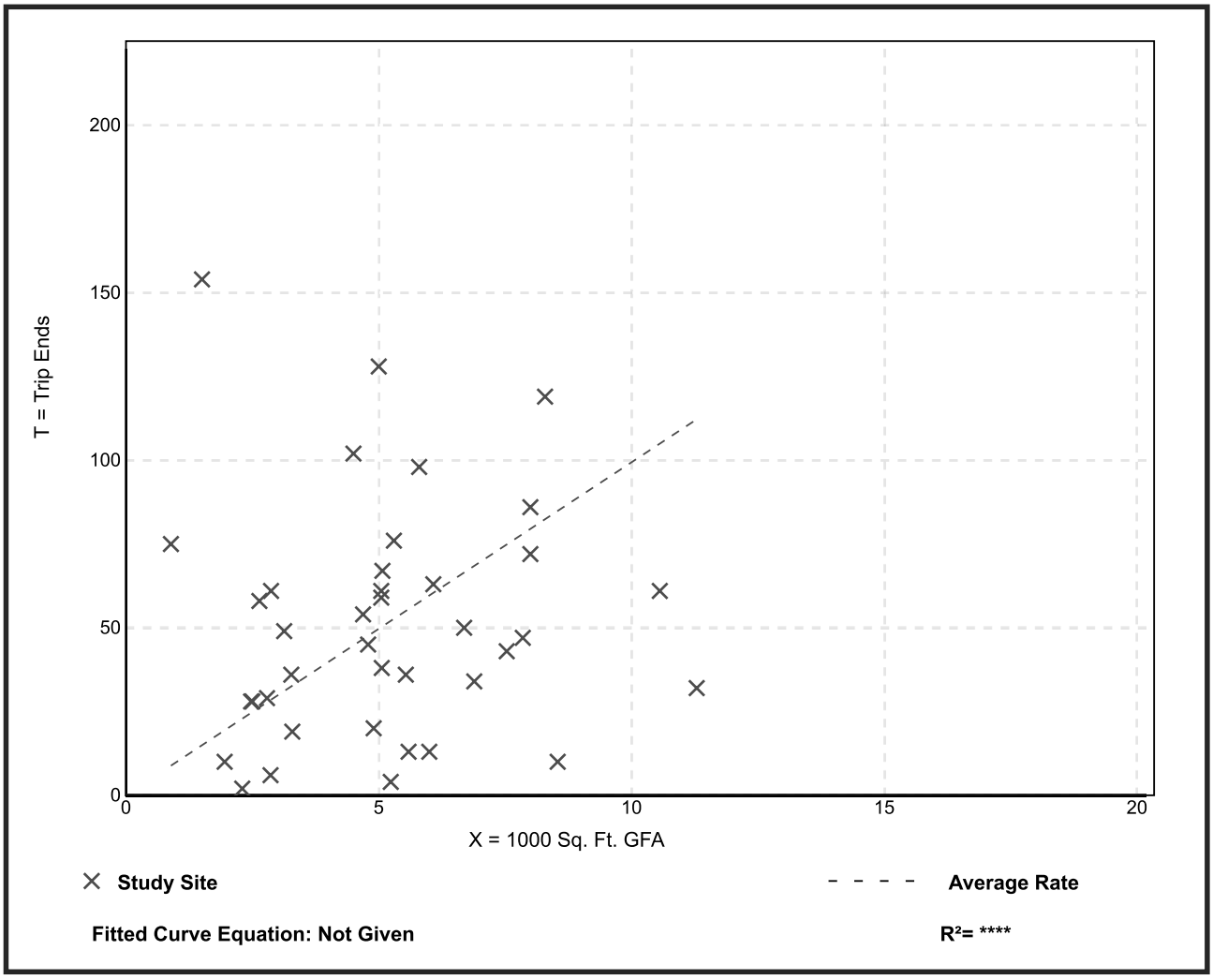
High-Turnover (Sit-Down) Restaurant
(932)

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: 39
Avg. 1000 Sq. Ft. GFA: 5
Directional Distribution: 55% entering, 45% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
9.94	0.76 - 102.39	11.33

Data Plot and Equation



Trip Generation Manual, 10th Edition ● Institute of Transportation Engineers

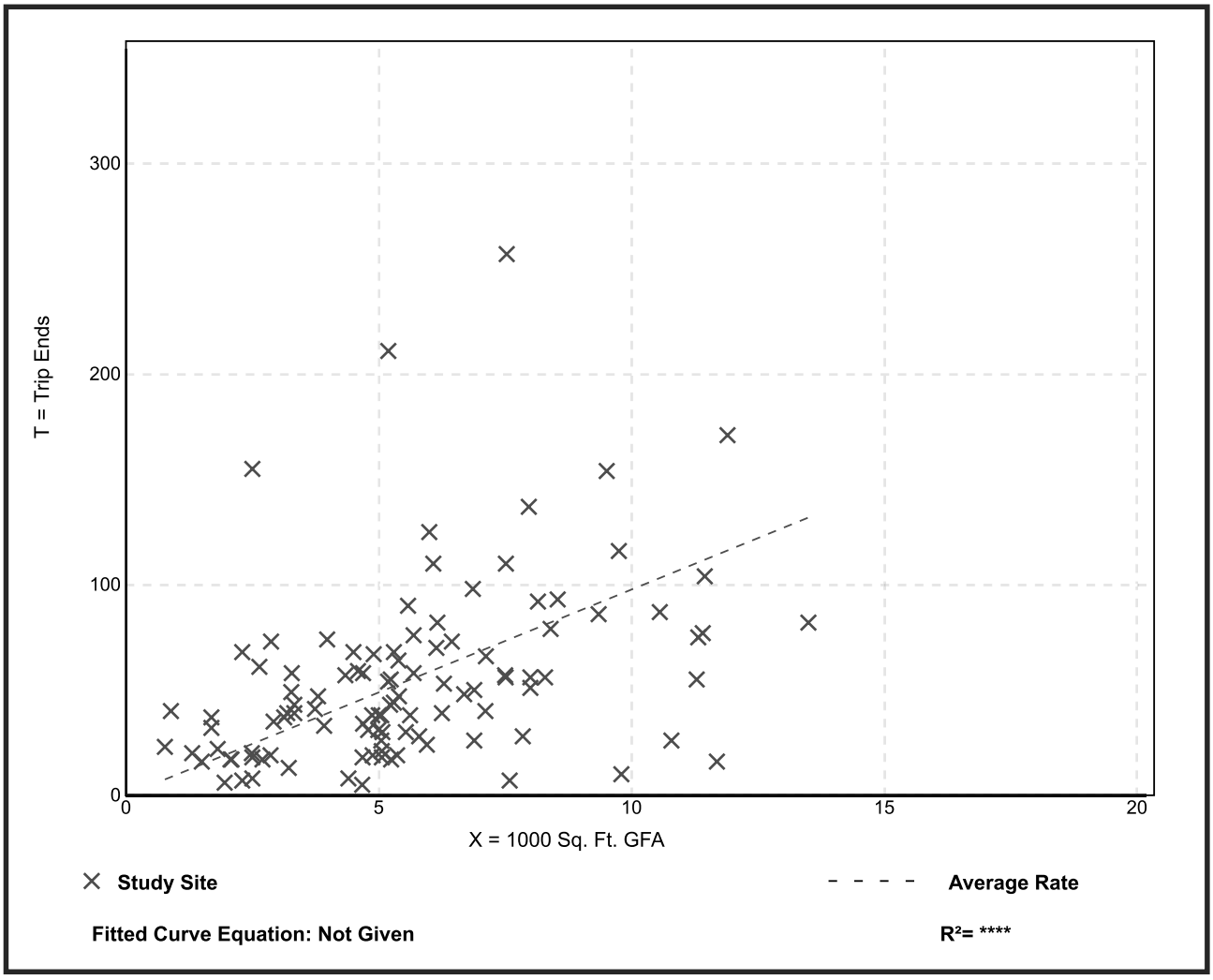
High-Turnover (Sit-Down) Restaurant
(932)

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: 107
Avg. 1000 Sq. Ft. GFA: 6
Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
9.77	0.92 - 62.00	7.37

Data Plot and Equation



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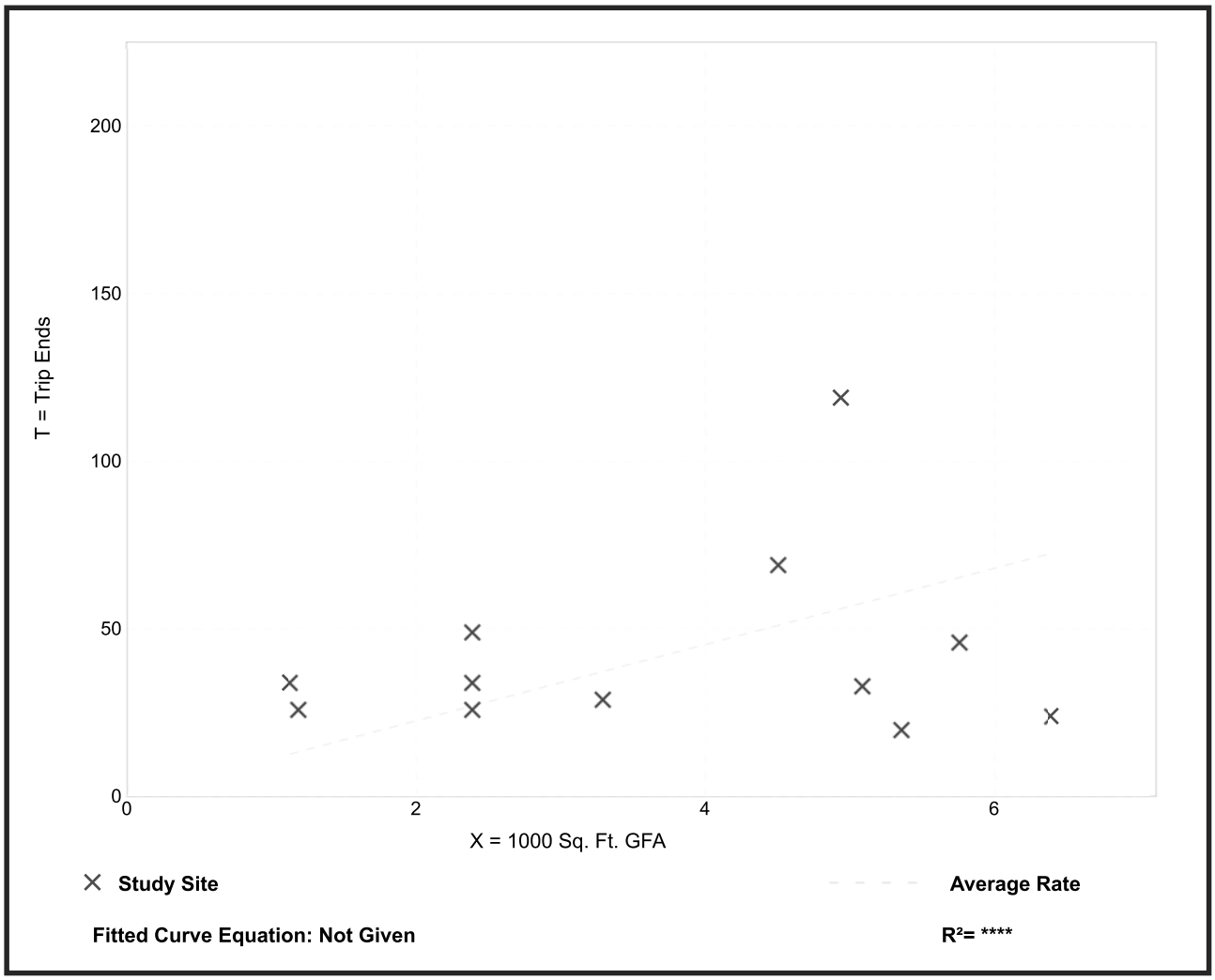
Drinking Place
(925)

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: 12
Avg. 1000 Sq. Ft. GFA: 4
Directional Distribution: 66% entering, 34% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
11.36	3.74 - 30.09	7.81

Data Plot and Equation



Trip Generation Manual, 10th Edition ● Institute of Transportation Engineers

Specialty Retail Center
(826)

Average Vehicle Trip Ends vs: **1000 Sq. Feet Gross Leasable Area**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

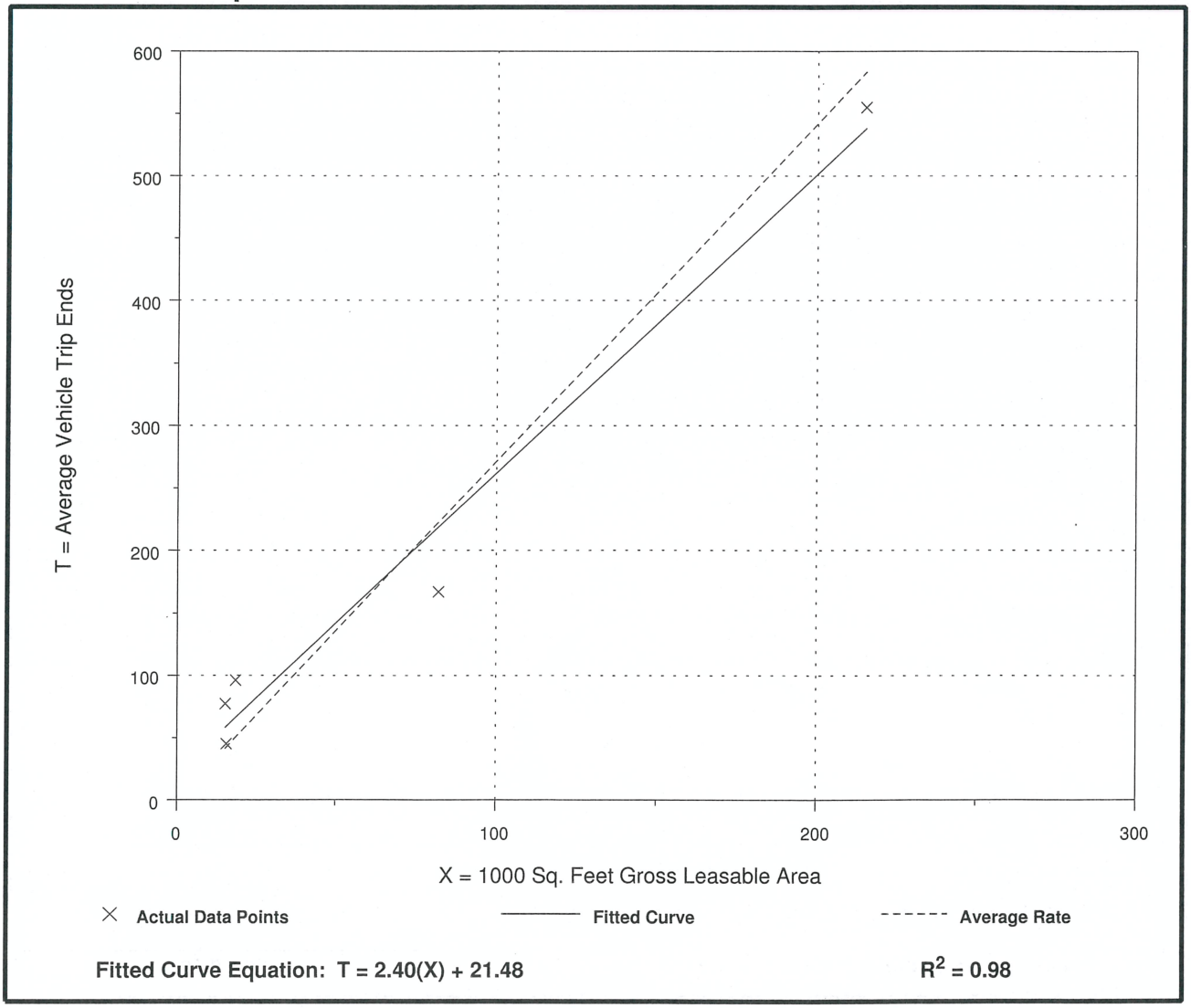
Number of Studies: 5
Average 1000 Sq. Feet GLA: 69
Directional Distribution: 44% entering, 56% exiting

Trip Generation per 1000 Sq. Feet Gross Leasable Area

Average Rate	Range of Rates	Standard Deviation
2.71	2.03 - 5.16	1.83

Data Plot and Equation

Caution - Use Carefully - Small Sample Size



Fitted Curve Equation: T = 2.40(X) + 21.48

R^2 = 0.98

Specialty Retail Center
(826)

Average Vehicle Trip Ends vs: 1000 Sq. Feet Gross Leasable Area
On a: Weekday

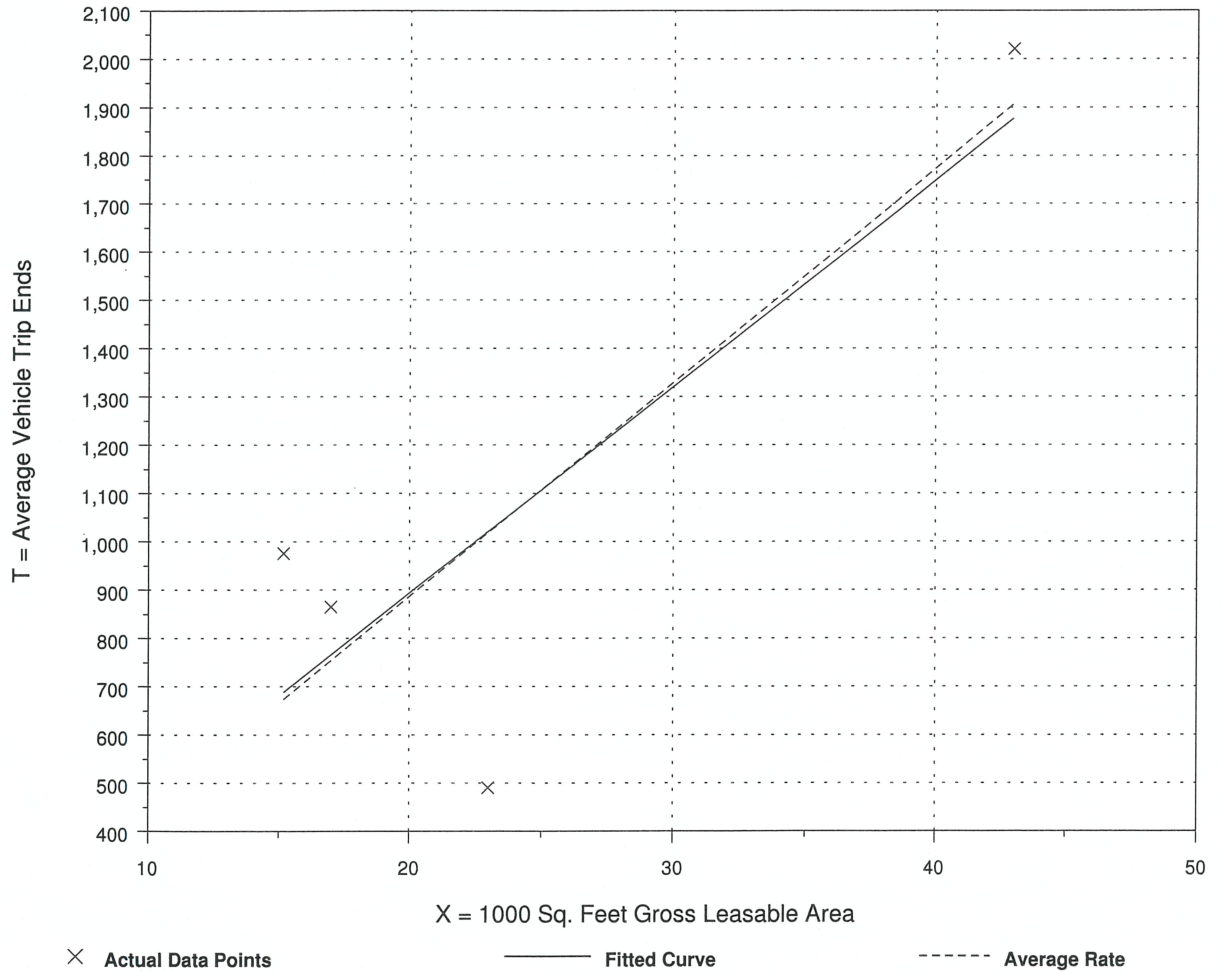
Number of Studies: 4
Average 1000 Sq. Feet GLA: 25
Directional Distribution: 50% entering, 50% exiting

Trip Generation per 1000 Sq. Feet Gross Leasable Area

Average Rate	Range of Rates	Standard Deviation
44.32	21.30 - 64.21	15.52

Data Plot and Equation

Caution - Use Carefully - Small Sample Size



Fitted Curve Equation: T = 42.78(X) + 37.66

R^2 = 0.69

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	125	190	220	3	3	121
Future Vol, veh/h	125	190	220	3	3	121
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	134	204	237	3	3	130

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	240	0	-	0	711	239
Stage 1	-	-	-	-	239	-
Stage 2	-	-	-	-	472	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1333	-	-	-	401	802
Stage 1	-	-	-	-	803	-
Stage 2	-	-	-	-	630	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	1333	-	-	-	356	802
Mov Cap-2 Maneuver	-	-	-	-	356	-
Stage 1	-	-	-	-	712	-
Stage 2	-	-	-	-	630	-

Approach	EB	WB	SW
HCM Control Delay, s	3.2	0	10.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	1333	-	-	-	778
HCM Lane V/C Ratio	0.101	-	-	-	0.171
HCM Control Delay (s)	8	0	-	-	10.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.6

Intersection	
Intersection Delay, s/veh	9.8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	63	114	7	10	113	48	14	106	11	35	76	72
Future Vol, veh/h	63	114	7	10	113	48	14	106	11	35	76	72
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	69	125	8	11	124	53	15	116	12	38	84	79
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	10.2	9.6	9.5	9.8
HCM LOS	B	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	11%	34%	6%	19%
Vol Thru, %	81%	62%	66%	42%
Vol Right, %	8%	4%	28%	39%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	131	184	171	183
LT Vol	14	63	10	35
Through Vol	106	114	113	76
RT Vol	11	7	48	72
Lane Flow Rate	144	202	188	201
Geometry Grp	1	1	1	1
Degree of Util (X)	0.204	0.283	0.254	0.272
Departure Headway (Hd)	5.107	5.047	4.874	4.866
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	694	704	729	730
Service Time	3.2	3.136	2.963	2.952
HCM Lane V/C Ratio	0.207	0.287	0.258	0.275
HCM Control Delay	9.5	10.2	9.6	9.8
HCM Lane LOS	A	B	A	A
HCM 95th-tile Q	0.8	1.2	1	1.1

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	46	171	189	95	68	56
Future Vol, veh/h	46	171	189	95	68	56
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	49	182	201	101	72	60

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	302	0	-	0	532	252
Stage 1	-	-	-	-	252	-
Stage 2	-	-	-	-	280	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1265	-	-	-	510	789
Stage 1	-	-	-	-	792	-
Stage 2	-	-	-	-	770	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1265	-	-	-	488	789
Mov Cap-2 Maneuver	-	-	-	-	488	-
Stage 1	-	-	-	-	758	-
Stage 2	-	-	-	-	770	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	12.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1265	-	-	-	590
HCM Lane V/C Ratio	0.039	-	-	-	0.224
HCM Control Delay (s)	8	0	-	-	12.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.9

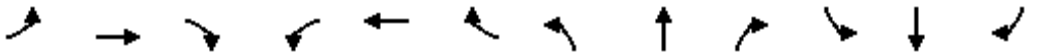
Intersection	
Int Delay, s/veh	5.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	125	123	57	106	159	75
Future Vol, veh/h	125	123	57	106	159	75
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	129	127	59	109	164	77

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	256	0	420	193
Stage 1	-	-	-	-	193	-
Stage 2	-	-	-	-	227	-
Critical Hdwy	-	-	4.11	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.209	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	1315	-	592	851
Stage 1	-	-	-	-	842	-
Stage 2	-	-	-	-	813	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1315	-	564	851
Mov Cap-2 Maneuver	-	-	-	-	564	-
Stage 1	-	-	-	-	802	-
Stage 2	-	-	-	-	813	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.8	14.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	632	-	-	1315	-
HCM Lane V/C Ratio	0.382	-	-	0.045	-
HCM Control Delay (s)	14.2	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	1.8	-	-	0.1	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	182	410	10	23	493	91	45	55	3	75	43	5
Future Volume (veh/h)	182	410	10	23	493	91	45	55	3	75	43	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.97	0.99		0.96	0.99		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1870	1870	1885	1870	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	200	451	11	25	542	100	49	60	3	82	47	5
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	1	2	2	1	2	1	1	1	1	1	1	1
Cap, veh/h	259	895	22	55	709	590	213	145	6	271	88	8
Arrive On Green	0.14	0.49	0.49	0.03	0.38	0.38	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	1795	1817	44	1795	1870	1557	611	1078	46	923	654	61
Grp Volume(v), veh/h	200	0	462	25	542	100	112	0	0	134	0	0
Grp Sat Flow(s),veh/h/ln	1795	0	1861	1795	1870	1557	1735	0	0	1638	0	0
Q Serve(g_s), s	4.2	0.0	6.6	0.5	10.0	1.7	0.0	0.0	0.0	0.6	0.0	0.0
Cycle Q Clear(g_c), s	4.2	0.0	6.6	0.5	10.0	1.7	2.2	0.0	0.0	2.8	0.0	0.0
Prop In Lane	1.00		0.02	1.00		1.00	0.44		0.03	0.61		0.04
Lane Grp Cap(c), veh/h	259	0	917	55	709	590	364	0	0	367	0	0
V/C Ratio(X)	0.77	0.00	0.50	0.46	0.76	0.17	0.31	0.00	0.00	0.37	0.00	0.00
Avail Cap(c_a), veh/h	433	0	1275	228	1068	889	942	0	0	909	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	16.2	0.0	6.7	18.8	10.7	8.1	15.7	0.0	0.0	15.9	0.0	0.0
Incr Delay (d2), s/veh	4.9	0.0	0.4	5.9	1.8	0.1	0.5	0.0	0.0	0.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.0	1.7	0.3	3.3	0.4	0.8	0.0	0.0	1.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.1	0.0	7.2	24.7	12.5	8.3	16.2	0.0	0.0	16.5	0.0	0.0
LnGrp LOS	C	A	A	C	B	A	B	A	A	B	A	A
Approach Vol, veh/h		662			667			112			134	
Approach Delay, s/veh		11.4			12.4			16.2			16.5	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		9.8	5.7	23.9		9.8	10.2	19.4				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		19.5	5.0	27.0		19.5	9.5	22.5				
Max Q Clear Time (g_c+I1), s		4.2	2.5	8.6		4.8	6.2	12.0				
Green Ext Time (p_c), s		0.4	0.0	2.8		0.5	0.2	2.9				

Intersection Summary												
HCM 6th Ctrl Delay			12.6									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	145	220	255	3	3	140
Future Vol, veh/h	145	220	255	3	3	140
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	156	237	274	3	3	151

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	277	0	-	0	825	276
Stage 1	-	-	-	-	276	-
Stage 2	-	-	-	-	549	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1292	-	-	-	344	765
Stage 1	-	-	-	-	773	-
Stage 2	-	-	-	-	581	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1292	-	-	-	296	765
Mov Cap-2 Maneuver	-	-	-	-	296	-
Stage 1	-	-	-	-	666	-
Stage 2	-	-	-	-	581	-

Approach	EB	WB	SW
HCM Control Delay, s	8.2	0	11.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	1292	-	-	-	740
HCM Lane V/C Ratio	0.121	-	-	-	0.208
HCM Control Delay (s)	8.2	0	-	-	11.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.4	-	-	-	0.8

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	53	198	219	110	79	65
Future Vol, veh/h	53	198	219	110	79	65
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	56	211	233	117	84	69

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	350	0	-	0	615	292
Stage 1	-	-	-	-	292	-
Stage 2	-	-	-	-	323	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1214	-	-	-	456	750
Stage 1	-	-	-	-	760	-
Stage 2	-	-	-	-	736	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1214	-	-	-	432	750
Mov Cap-2 Maneuver	-	-	-	-	432	-
Stage 1	-	-	-	-	720	-
Stage 2	-	-	-	-	736	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	14.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1214	-	-	-	534
HCM Lane V/C Ratio	0.046	-	-	-	0.287
HCM Control Delay (s)	8.1	0	-	-	14.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	1.2

Intersection	
Int Delay, s/veh	6.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	145	143	66	123	184	87
Future Vol, veh/h	145	143	66	123	184	87
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	149	147	68	127	190	90

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	296	0	486	223
Stage 1	-	-	-	-	223	-
Stage 2	-	-	-	-	263	-
Critical Hdwy	-	-	4.11	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.209	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	1271	-	542	819
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	783	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1271	-	511	819
Mov Cap-2 Maneuver	-	-	-	-	511	-
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	738	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.8	16.8
HCM LOS			C

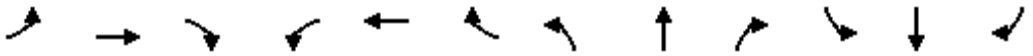
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	581	-	-	1271	-
HCM Lane V/C Ratio	0.481	-	-	0.054	-
HCM Control Delay (s)	16.8	-	-	8	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	2.6	-	-	0.2	-

Intersection	
Intersection Delay, s/veh	10.9
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	73	132	8	12	131	56	16	123	13	41	88	84
Future Vol, veh/h	73	132	8	12	131	56	16	123	13	41	88	84
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	80	145	9	13	144	62	18	135	14	45	97	92
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	11.4	10.7	10.4	11
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	11%	34%	6%	19%
Vol Thru, %	81%	62%	66%	41%
Vol Right, %	9%	4%	28%	39%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	152	213	199	213
LT Vol	16	73	12	41
Through Vol	123	132	131	88
RT Vol	13	8	56	84
Lane Flow Rate	167	234	219	234
Geometry Grp	1	1	1	1
Degree of Util (X)	0.255	0.351	0.318	0.34
Departure Headway (Hd)	5.497	5.403	5.236	5.225
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	653	665	684	688
Service Time	3.539	3.444	3.277	3.265
HCM Lane V/C Ratio	0.256	0.352	0.32	0.34
HCM Control Delay	10.4	11.4	10.7	11
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	1	1.6	1.4	1.5



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	211	476	12	27	572	106	52	64	3	87	50	6
Future Volume (veh/h)	211	476	12	27	572	106	52	64	3	87	50	6
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.97	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1870	1870	1885	1870	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	232	523	13	30	629	116	57	70	3	96	55	7
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	1	2	2	1	2	1	1	1	1	1	1	1
Cap, veh/h	290	959	24	62	750	624	200	160	6	258	96	11
Arrive On Green	0.16	0.53	0.53	0.03	0.40	0.40	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	1795	1816	45	1795	1870	1557	605	1101	40	911	659	73
Grp Volume(v), veh/h	232	0	536	30	629	116	130	0	0	158	0	0
Grp Sat Flow(s),veh/h/ln	1795	0	1861	1795	1870	1557	1746	0	0	1643	0	0
Q Serve(g_s), s	5.7	0.0	8.8	0.8	14.0	2.2	0.0	0.0	0.0	0.9	0.0	0.0
Cycle Q Clear(g_c), s	5.7	0.0	8.8	0.8	14.0	2.2	3.0	0.0	0.0	3.9	0.0	0.0
Prop In Lane	1.00		0.02	1.00		1.00	0.44		0.02	0.61		0.04
Lane Grp Cap(c), veh/h	290	0	982	62	750	624	366	0	0	364	0	0
V/C Ratio(X)	0.80	0.00	0.55	0.48	0.84	0.19	0.36	0.00	0.00	0.43	0.00	0.00
Avail Cap(c_a), veh/h	369	0	1088	194	911	758	807	0	0	777	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	18.6	0.0	7.2	21.9	12.5	9.0	18.1	0.0	0.0	18.5	0.0	0.0
Incr Delay (d2), s/veh	9.4	0.0	0.5	5.7	5.9	0.1	0.6	0.0	0.0	0.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	0.0	2.5	0.4	5.8	0.6	1.2	0.0	0.0	1.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.0	0.0	7.7	27.6	18.4	9.1	18.7	0.0	0.0	19.3	0.0	0.0
LnGrp LOS	C	A	A	C	B	A	B	A	A	B	A	A
Approach Vol, veh/h		768			775			130			158	
Approach Delay, s/veh		13.8			17.4			18.7			19.3	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	2	3	4		6	7	8					
Phs Duration (G+Y+Rc), s	11.2	6.1	28.9		11.2	12.0	23.0					
Change Period (Y+Rc), s	4.5	4.5	4.5		4.5	4.5	4.5					
Max Green Setting (Gmax), s	19.5	5.0	27.0		19.5	9.5	22.5					
Max Q Clear Time (g_c+I1), s	5.0	2.8	10.8		5.9	7.7	16.0					
Green Ext Time (p_c), s	0.5	0.0	3.2		0.7	0.1	2.5					

Intersection Summary	
HCM 6th Ctrl Delay	16.2
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	177	220	255	3	3	164
Future Vol, veh/h	177	220	255	3	3	164
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	190	237	274	3	3	176

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	277	0	-	0	893	276
Stage 1	-	-	-	-	276	-
Stage 2	-	-	-	-	617	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1292	-	-	-	313	765
Stage 1	-	-	-	-	773	-
Stage 2	-	-	-	-	540	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1292	-	-	-	260	765
Mov Cap-2 Maneuver	-	-	-	-	260	-
Stage 1	-	-	-	-	642	-
Stage 2	-	-	-	-	540	-

Approach	EB	WB	SW
HCM Control Delay, s	3.7	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	1292	-	-	-	739
HCM Lane V/C Ratio	0.147	-	-	-	0.243
HCM Control Delay (s)	8.3	0	-	-	11.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.5	-	-	-	0.9

Intersection	
Int Delay, s/veh	5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	53	198	219	178	137	65
Future Vol, veh/h	53	198	219	178	137	65
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	56	211	233	189	146	69

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	422	0	-	0	651	328
Stage 1	-	-	-	-	328	-
Stage 2	-	-	-	-	323	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1143	-	-	-	435	716
Stage 1	-	-	-	-	732	-
Stage 2	-	-	-	-	736	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1143	-	-	-	411	716
Mov Cap-2 Maneuver	-	-	-	-	411	-
Stage 1	-	-	-	-	692	-
Stage 2	-	-	-	-	736	-

Approach	EB	WB	SB
HCM Control Delay, s	1.8	0	18.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1143	-	-	-	476
HCM Lane V/C Ratio	0.049	-	-	-	0.451
HCM Control Delay (s)	8.3	0	-	-	18.6
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	2.3

Intersection	
Int Delay, s/veh	9.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	145	201	66	123	252	87
Future Vol, veh/h	145	201	66	123	252	87
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	149	207	68	127	260	90

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	356	0	516	253
Stage 1	-	-	-	-	253	-
Stage 2	-	-	-	-	263	-
Critical Hdwy	-	-	4.11	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.209	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	1208	-	521	788
Stage 1	-	-	-	-	791	-
Stage 2	-	-	-	-	783	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1208	-	489	788
Mov Cap-2 Maneuver	-	-	-	-	489	-
Stage 1	-	-	-	-	791	-
Stage 2	-	-	-	-	735	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.8	22.9
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	542	-	-	1208	-
HCM Lane V/C Ratio	0.645	-	-	0.056	-
HCM Control Delay (s)	22.9	-	-	8.2	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	4.6	-	-	0.2	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	42	50	54	166	116	45
Future Vol, veh/h	42	50	54	166	116	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	46	54	59	180	126	49

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	449	151	175	0	-	0
Stage 1	151	-	-	-	-	-
Stage 2	298	-	-	-	-	-
Critical Hdwy	6.41	6.21	4.11	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	2.209	-	-	-
Pot Cap-1 Maneuver	569	898	1407	-	-	-
Stage 1	879	-	-	-	-	-
Stage 2	755	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	542	898	1407	-	-	-
Mov Cap-2 Maneuver	542	-	-	-	-	-
Stage 1	838	-	-	-	-	-
Stage 2	755	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.1	1.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1407	-	691	-	-
HCM Lane V/C Ratio	0.042	-	0.145	-	-
HCM Control Delay (s)	7.7	0	11.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.5	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	228	17	22	245	10	12
Future Vol, veh/h	228	17	22	245	10	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	248	18	24	266	11	13

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	266	0	571	257
Stage 1	-	-	-	-	257	-
Stage 2	-	-	-	-	314	-
Critical Hdwy	-	-	4.11	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.209	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	1304	-	484	784
Stage 1	-	-	-	-	788	-
Stage 2	-	-	-	-	743	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1304	-	473	784
Mov Cap-2 Maneuver	-	-	-	-	473	-
Stage 1	-	-	-	-	788	-
Stage 2	-	-	-	-	727	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	11.2
HCM LOS			B

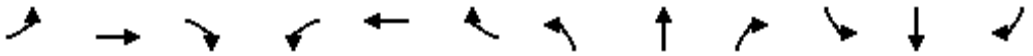
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	604	-	-	1304	-
HCM Lane V/C Ratio	0.04	-	-	0.018	-
HCM Control Delay (s)	11.2	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Intersection Delay, s/veh	12.4
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	74	135	31	27	137	56	44	137	27	41	103	86
Future Vol, veh/h	74	135	31	27	137	56	44	137	27	41	103	86
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	81	148	34	30	151	62	48	151	30	45	113	95
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	12.9	12.2	12.2	12.3
HCM LOS	B	B	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	21%	31%	12%	18%
Vol Thru, %	66%	56%	62%	45%
Vol Right, %	13%	13%	25%	37%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	208	240	220	230
LT Vol	44	74	27	41
Through Vol	137	135	137	103
RT Vol	27	31	56	86
Lane Flow Rate	229	264	242	253
Geometry Grp	1	1	1	1
Degree of Util (X)	0.367	0.418	0.379	0.393
Departure Headway (Hd)	5.78	5.709	5.643	5.591
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	617	625	633	639
Service Time	3.857	3.785	3.721	3.667
HCM Lane V/C Ratio	0.371	0.422	0.382	0.396
HCM Control Delay	12.2	12.9	12.2	12.3
HCM Lane LOS	B	B	B	B
HCM 95th-tile Q	1.7	2.1	1.8	1.9



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	246	476	12	27	572	139	52	64	3	115	50	36
Future Volume (veh/h)	246	476	12	27	572	139	52	64	3	115	50	36
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.97	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1870	1870	1885	1870	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	270	523	13	30	629	153	57	70	3	126	55	40
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	1	2	2	1	2	1	1	1	1	1	1	1
Cap, veh/h	321	958	24	60	716	596	201	211	7	259	88	53
Arrive On Green	0.18	0.53	0.53	0.03	0.38	0.38	0.18	0.18	0.18	0.18	0.18	0.18
Sat Flow, veh/h	1795	1816	45	1795	1870	1557	562	1141	40	829	476	288
Grp Volume(v), veh/h	270	0	536	30	629	153	130	0	0	221	0	0
Grp Sat Flow(s),veh/h/ln	1795	0	1861	1795	1870	1557	1743	0	0	1593	0	0
Q Serve(g_s), s	7.7	0.0	10.2	0.9	16.6	3.6	0.0	0.0	0.0	3.5	0.0	0.0
Cycle Q Clear(g_c), s	7.7	0.0	10.2	0.9	16.6	3.6	3.3	0.0	0.0	6.7	0.0	0.0
Prop In Lane	1.00		0.02	1.00		1.00	0.44		0.02	0.57		0.18
Lane Grp Cap(c), veh/h	321	0	982	60	716	596	419	0	0	400	0	0
V/C Ratio(X)	0.84	0.00	0.55	0.50	0.88	0.26	0.31	0.00	0.00	0.55	0.00	0.00
Avail Cap(c_a), veh/h	321	0	982	169	792	659	706	0	0	670	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	21.1	0.0	8.3	25.2	15.3	11.2	19.0	0.0	0.0	20.2	0.0	0.0
Incr Delay (d2), s/veh	17.9	0.0	0.6	6.2	10.4	0.2	0.4	0.0	0.0	1.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.5	0.0	3.3	0.5	8.0	1.1	1.3	0.0	0.0	2.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.0	0.0	9.0	31.4	25.6	11.5	19.4	0.0	0.0	21.4	0.0	0.0
LnGrp LOS	D	A	A	C	C	B	B	A	A	C	A	A
Approach Vol, veh/h		806			812			130			221	
Approach Delay, s/veh		19.0			23.2			19.4			21.4	
Approach LOS		B			C			B			C	

Timer - Assigned Phs	2	3	4		6	7	8					
Phs Duration (G+Y+Rc), s	14.3	6.3	32.6		14.3	14.0	24.8					
Change Period (Y+Rc), s	4.5	4.5	4.5		4.5	4.5	4.5					
Max Green Setting (Gmax), s	19.5	5.0	27.0		19.5	9.5	22.5					
Max Q Clear Time (g_c+I1), s	5.3	2.9	12.2		8.7	9.7	18.6					
Green Ext Time (p_c), s	0.5	0.0	3.1		0.9	0.0	1.7					

Intersection Summary	
HCM 6th Ctrl Delay	21.0
HCM 6th LOS	C

Left Turn Warrant Calculation

Intersection: Discovery Road and Project Access
Project: San Juan Discovery
Speed Limit: 25
Peak Period: 2025 Weekday PM Peak Hour

Inputs:

V_a =	267	vph	Volume Advancing (Per Hour)
V_o =	245	vph	Volume Opposing (Per Hour)
V_L =	22	vph	Volume Left Turns (Per Hour)
T =	3.0	seconds	Average Time to Make Left Turn
t_g =	5.0	seconds	Critical Gap
t_e =	1.9	sec	Left Turn Time to Clear or Exit

Calculations:

Percent Left Turns in Advancing Stream

L =	8.2%	V_L / V_a

Average Headway: Advancing Stream

t_a =	13.483	seconds	$3600 / V_a$

Opposing Vehicle Flow Rate

λ_o =	0.068	veh/sec	$V_o / 3600$

Average Time That a Left Turning Vehicle Must Wait For a Suitable Gap

t_w =	0.956	sec	$[3600/(V_o e^{-(Vo*tg/3600)})]-(3600/V_0)-t_g$

Number of Arrivals/Hour of Through Vehicles Behind Left Turning Vehicles

λ_1 =	6.414	$[L(1 - L)V_a](t_w - t_e)/[(2/3)t_a]$
β =	0.954	$e^{-\lambda otg}(\lambda_o t_g + 1)$
A =	166.662	(1 - β)3600
B =	83.331	A/2

Average Service Rate (Number of Left Turns That Can be Made in One Hour)

μ =	1116.669	(3600 - A - B)/T
ρ =	**0.006**	λ_1/μ

$\rho_{threshold}$

ρ = 0.020, 40 mph	ρ = 0.0175, 45 mph
ρ = 0.015, 50 mph	
ρ = 0.010, 60 mph	ρ = 0.0125, 55 mph

Left Turn Lane **IS NOT WARRANTED**

Left Turn Warrant Calculation

Intersection: San Juan Avenue and Project Access
Project: San Juan Discovery
Speed Limit: 25
Peak Period: 2025 Weekday PM Peak Hour

Inputs:

V_a =	220	vph	Volume Advancing (Per Hour)
V_o =	161	vph	Volume Opposing (Per Hour)
V_L =	54	vph	Volume Left Turns (Per Hour)
T =	3.0	seconds	Average Time to Make Left Turn
t_g =	5.0	seconds	Critical Gap
t_e =	1.9	sec	Left Turn Time to Clear or Exit

Calculations:

Percent Left Turns in Advancing Stream

L =	24.5%	V_L / V_a

Average Headway: Advancing Stream

t_a =	16.364	seconds	$3600 / V_a$

Opposing Vehicle Flow Rate

λ_o =	0.045	veh/sec	$V_o / 3600$

Average Time That a Left Turning Vehicle Must Wait For a Suitable Gap

t_w =	0.603	sec	$[3600/(V_o e^{-(Vo*tg/3600)})]-(3600/V_0)-t_g$

Number of Arrivals/Hour of Through Vehicles Behind Left Turning Vehicles

λ_1 =	9.349	$[L(1 - L)V_a](t_w - t_e)/[(2/3)t_a]$
β =	0.978	$e^{-\lambda otg}(\lambda_o t_g + 1)$
A =	77.647	(1 - β)3600
B =	38.824	A/2

Average Service Rate (Number of Left Turns That Can be Made in One Hour)

μ =	1161.176	(3600 - A - B)/T
ρ =	**0.008**	λ_1/μ

$\rho_{threshold}$

ρ = 0.020, 40 mph	ρ = 0.0175, 45 mph
ρ = 0.015, 50 mph	
ρ = 0.010, 60 mph	ρ = 0.0125, 55 mph

Left Turn Lane **IS NOT WARRANTED**