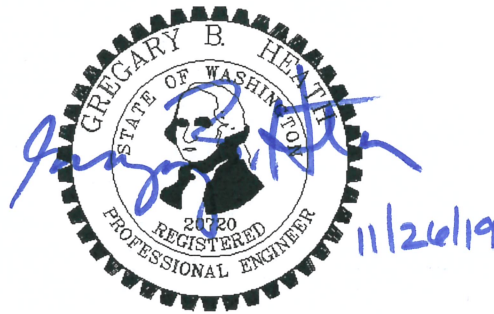




KESSLER CENTER
TRAFFIC IMPACT ANALYSIS

Puyallup, WA



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Revised
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KESSLER CENTER
TRAFFIC IMPACT ANALYSIS

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KESSLER CENTER TRAFFIC IMPACT ANALYSIS

I. INTRODUCTION

This report summarizes traffic impacts for the Kessler Center project. The general goals of this impact study concentrate on 1) the assessment of existing roadway conditions and access and nearby intersection congestion, 2) forecasts of project trip generation, 3) calculations of current and future delay, and 4) recommendations for mitigation if needed.

Preliminary tasks include the detailed collection of roadway information, road improvement information, and peak hour traffic counts. A level of service analysis for existing traffic conditions is then made to determine the present degree of intersection congestion. Based on this analysis, forecasts of future traffic levels on the surrounding street system are found and mitigation needed to resolve any issues.

II. PROJECT DESCRIPTION

The overall site is currently operated by the Puyallup School District and contains bus activity, warehousing and other operations. The current proposal would build a multi-purpose building on the south portion with access primarily to 39th Avenue SE. The uses for the new facility would include the following:

Proposed Project

The total building program is currently estimated at 38,000 square feet in the main building and 3,600 square feet in a separate building used for the Summit program. The total new building square footage to this campus is therefore 41,600 square feet allocated as follows:

High School Type Uses

1. Advance Program = 4,200 square feet
2. Digital Learning = 12,400 square feet which would be used for Puyallup Online Academy and other programs
3. Summit Program = 3,600 square feet (separate building)
4. Interim Alternative Education = 1,000 square feet
5. Lobby, foyer and electrical-mechanical space allocation = 2,500 square feet

Total high school use = 23,700 square feet using LUC 530

Elementary School Type Uses

1. Highly Capable/Quest = 2,000 square feet
2. Child Find = 3,000 square feet
3. Lobby, foyer and electrical-mechanical space allocation = 900 square feet

Total elementary use = 5,900 square feet using LUC 520

School Administration Type Uses

1. Special Services office = 8,400 square feet
2. Professional Development = 1,900 square feet
3. Lobby, foyer and electrical-mechanical space allocation = 1,700 square feet

Total office use = 12,000 square feet using LUC 538

In discussion with the district, only a small number of junior high students, less than 10, are expected to access this campus and would primarily be associated with the high school uses.

This study analyzes the school operating at full-capacity at a three-year horizon date of 2022. Figure 1 on the following page shows the general site location along with the local street network servicing the vicinity. The site plan showing the proposed design schematic is given in Figure 2.

III. EXISTING CONDITIONS

A. Surrounding Roadway System

The key streets near the site are described below.

39th Avenue SW: is an east-west city of Puyallup arterial that borders the southside of the proposed Kessler Center. The road cross section near the site typically consists of two travel lanes in each direction and a center two-way left-turn lane. The roadway has a posted speed limit of 35 mph in the vicinity. The road has curb gutter and sidewalks along both sides of the traveled way. Grades are generally flat across the project frontage.

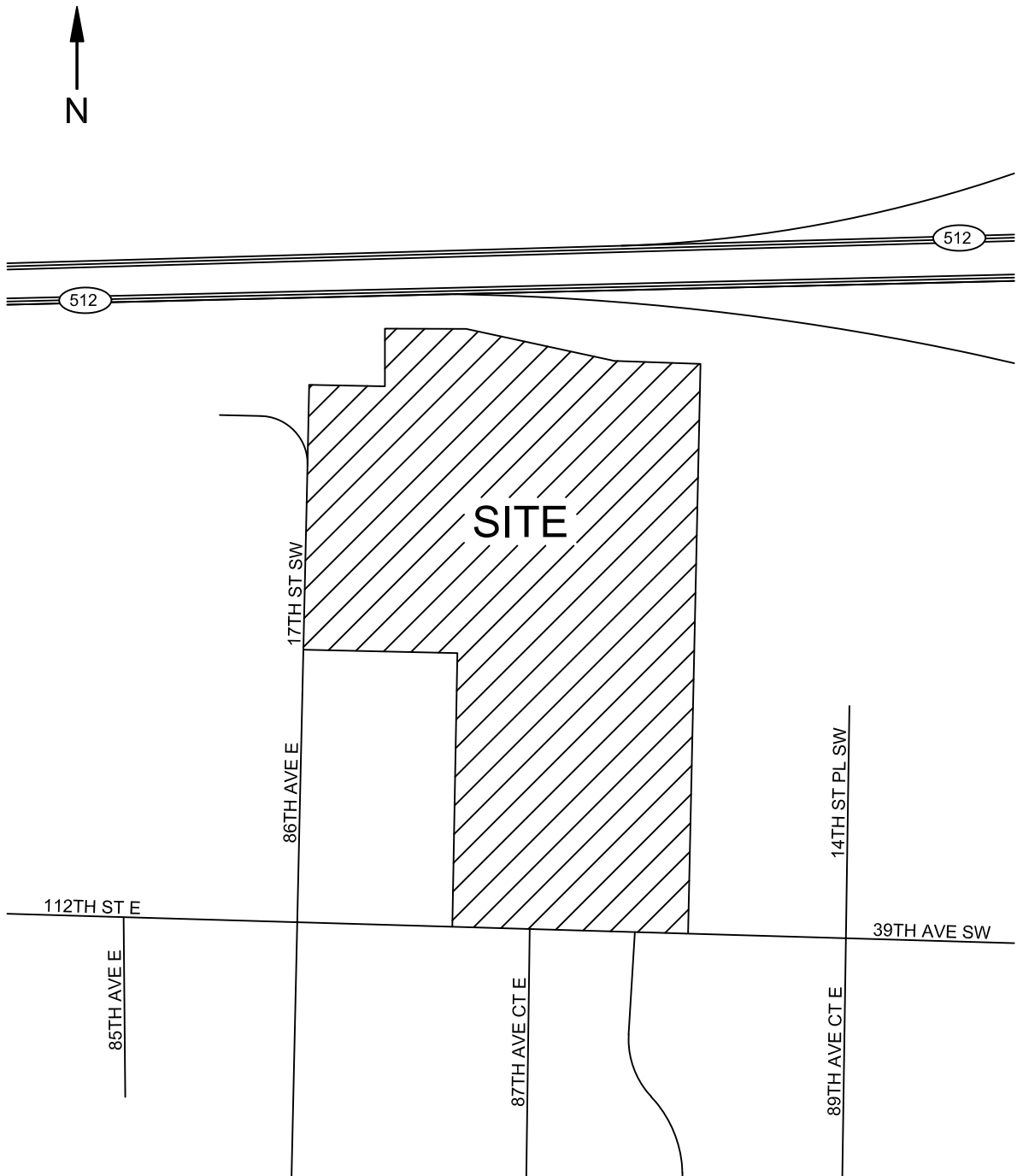
17th Street SW/86th Avenue E is a north-south roadway that borders the west side of the district property. The road cross section typically consists of one travel lane in each direction. The roadway has an assumed speed of 25 mph north of 39th Avenue SW and a posted speed limit of 35 mph on the south side of 39th Avenue SW. Shoulders are a mix of grass/gravel with no on-street parking in the vicinity. Sidewalks are not available along either leg of the roadway near 39th Avenue SW but are available across the district property on the northern part of 17th Street SW.

B. Existing Peak Hour Volumes and Patterns

Field data for this study was collected in March of 2019 while school was still in session. The counts were taken from 7 AM to 9 AM and from 2 PM to 6 PM at the intersection 17th/86th/39th and at 39th and the existing access. The counts can be found in the appendix.

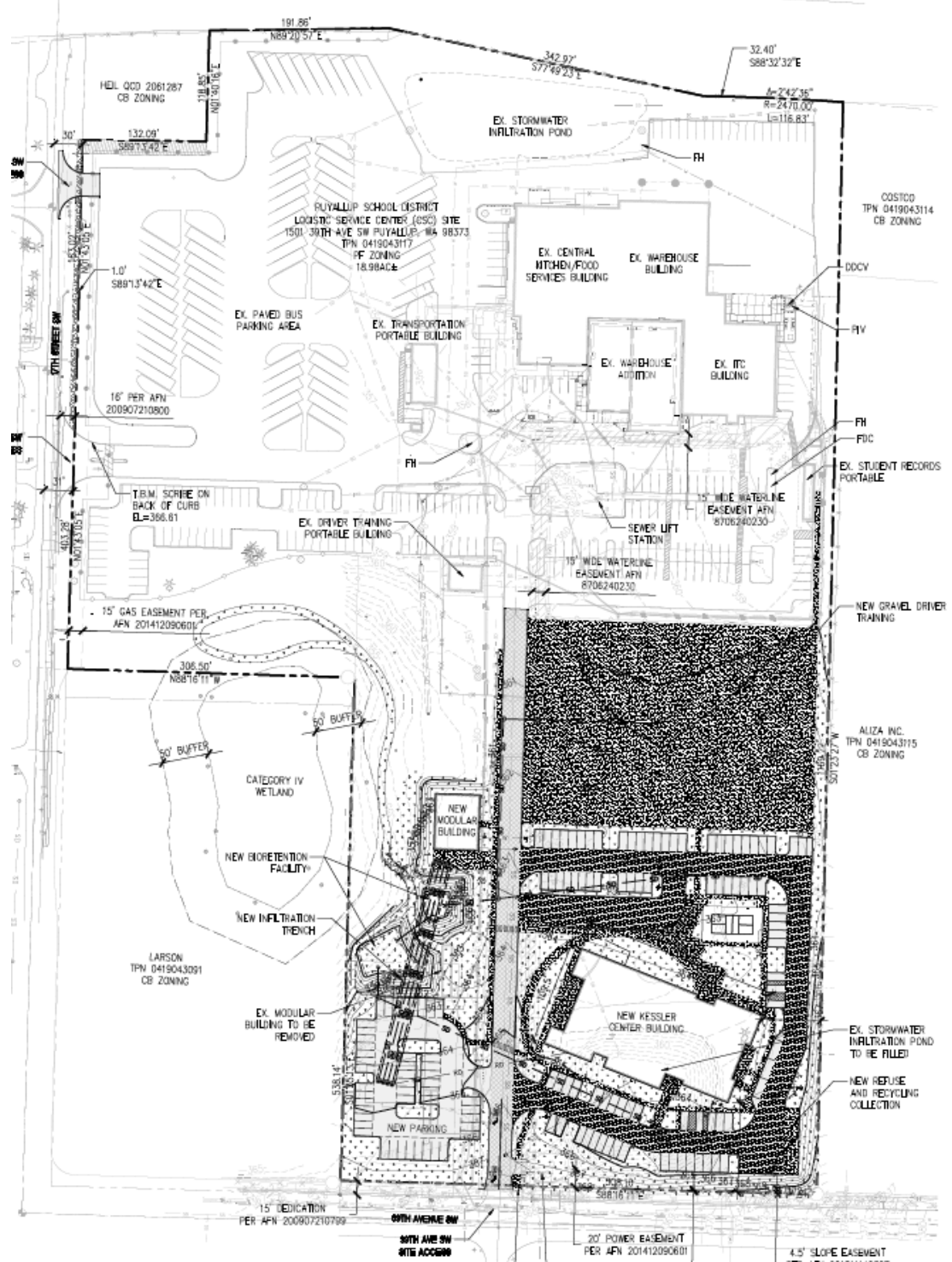
Generally, the highest volumes of traffic associated with the school in the AM occur within the hour that parents drop their children off before the morning bell. Conversely, the highest vehicular volumes observed in the PM occur within the hour that parents' queue at the school, shortly before/after the dismissal bell. In the case of the Kessler Center, the programs offered and the activities at this particular facility are scheduled throughout the day without the traditional bell times associated with schools. Based on this the analysis focuses on the traditional 4 PM to 6 PM peak hour as representative of the worst case.

Figure 3 on page 7 shows the existing 4 PM to 6 PM peak hour and the existing 7 AM to 9 AM peak hour indicating the substantially higher traffic during the PM in the vicinity of the Kessler Center. Based on this difference the LOS analysis will review the PM peak hour only.



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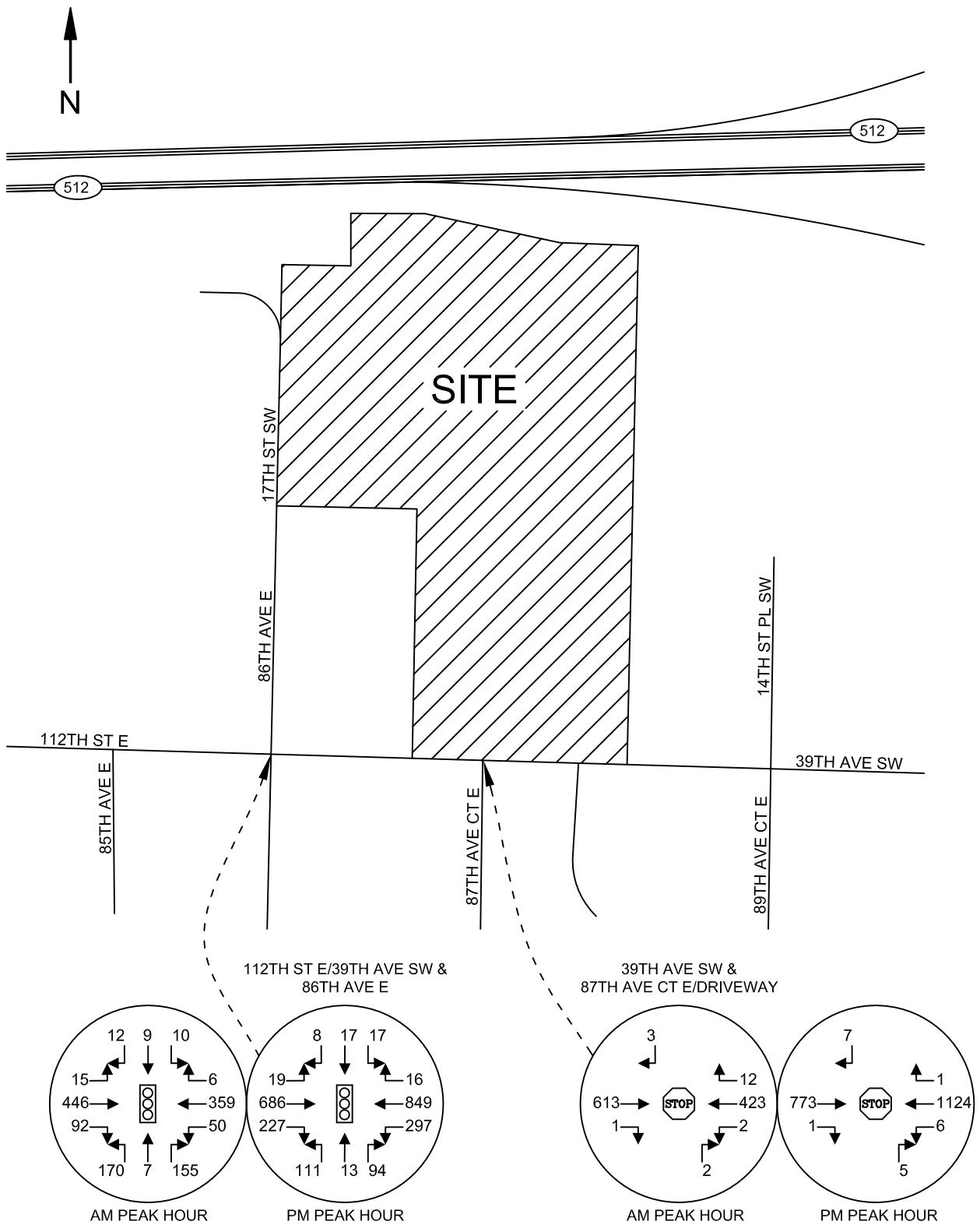
KESSLER CENTER
VICINITY MAP & ROADWAY SYSTEM
FIGURE 1



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SITE PLAN
FIGURE 2



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EXISTING PEAK HOUR VOLUMES
FIGURE 3

C. Pedestrian and Bicycle Activity

Pedestrian and bicycle activity were observed on the nearby street segments studied for this project. Observations were made during the peak hour movement counts and during other site visits. Very little existing bicycle or pedestrian activity was noted. Routes from the east and west are served by existing sidewalk systems. The project, as a magnet site, is not anticipated to generate local pedestrian traffic.

17th Street SW has a sidewalk across district property which lies north of the 39th Avenue SW intersection. Currently planned is a senior project at the northeast corner of 17th/39th that would fill in the balance of the sidewalk north of 39th on east side of 17th. This assumed to be part of that project's frontage improvements. South of 39th Avenue SW is controlled by the county and no improvements to sidewalks is planned at this time.

D. Public Transit

A review of the Pierce Transit regional bus schedule indicates that the nearest service route is Route 4 which travels adjacent to the site on 39th Avenue SW with bus stops at the intersection of 17th/39th. In addition, some bus activity with Puyallup School District transportation would be provided depending on the program and needs of the students.

IV. *FUTURE TRAFFIC DEMAND*

A. School Traffic Generation & Flow

The building serves to augment the educational opportunities with programs that meet the students' needs. The programs contained in the building are currently provided by the district but consolidation will create economies and collaborations for staff and students that couldn't be achieved under the presently dispersed arrangement.

The project trip generation can be defined by the use along with the square footage based on that use. This is consistent with the city of Puyallup approach when scoping the impact of school projects within the city.

Attached to this document are excerpts from the ITE Trip Generation, 10th Edition for the following uses that are being offered on the site in the new Kessler Center building.

LUC 530 High School - independent variable = 23,700 square feet

LUC 520 Elementary School - independent variable = 5,900 square feet

LUC 538 School District Office - independent variable = 12,000 square feet

The trip generation is as shown in Table 1 on the following page.

Table 1
Project Trip Generation

Time Period	High School	Elementary School	School Dist. Off.	Total
AWDT	333.5	115.2	172.4	621.1
AM Peak Hour In	56.9	22.6	21.5	101.0
AM Peak Hour Out	23.2	18.5	6.8	48.5
AM Peak Hour Total	80.1	41.1	28.3	149.5
PM Peak Hour In	12.4	3.6	4.2	20.2
PM Peak Hour Out	10.6	4.4	20.3	35.3
PM Peak Hour Total	23.0	8.0	24.5	55.5
School PM Peak In	15.8	8.2	10 (est)	34.0
School PM Peak Out	35.2	10.4	10 (est)	55.6
School PM Peak Total	51.0	18.6	20 (est)	89.6

(vpd: vehicles per day; vph: vehicles per hour)

B. Distribution & Assignment

The pattern by which project trips disperse on the roadway network is highly variable and largely depends on the origin and destination of project traffic. In this case the location of parent/student population and to a lesser degree staff on the site. Based on discussions with the district, peak hour trips are expected to follow the general pattern shown in Figure 4 for the PM peak hour. For analysis purposes, the 4 PM to 6 PM peak hour was used to reflect worst case. Based on the trip generation presented in Table 1, the LOS analysis used the 89 school PM peak trips attributed to the commute hour.

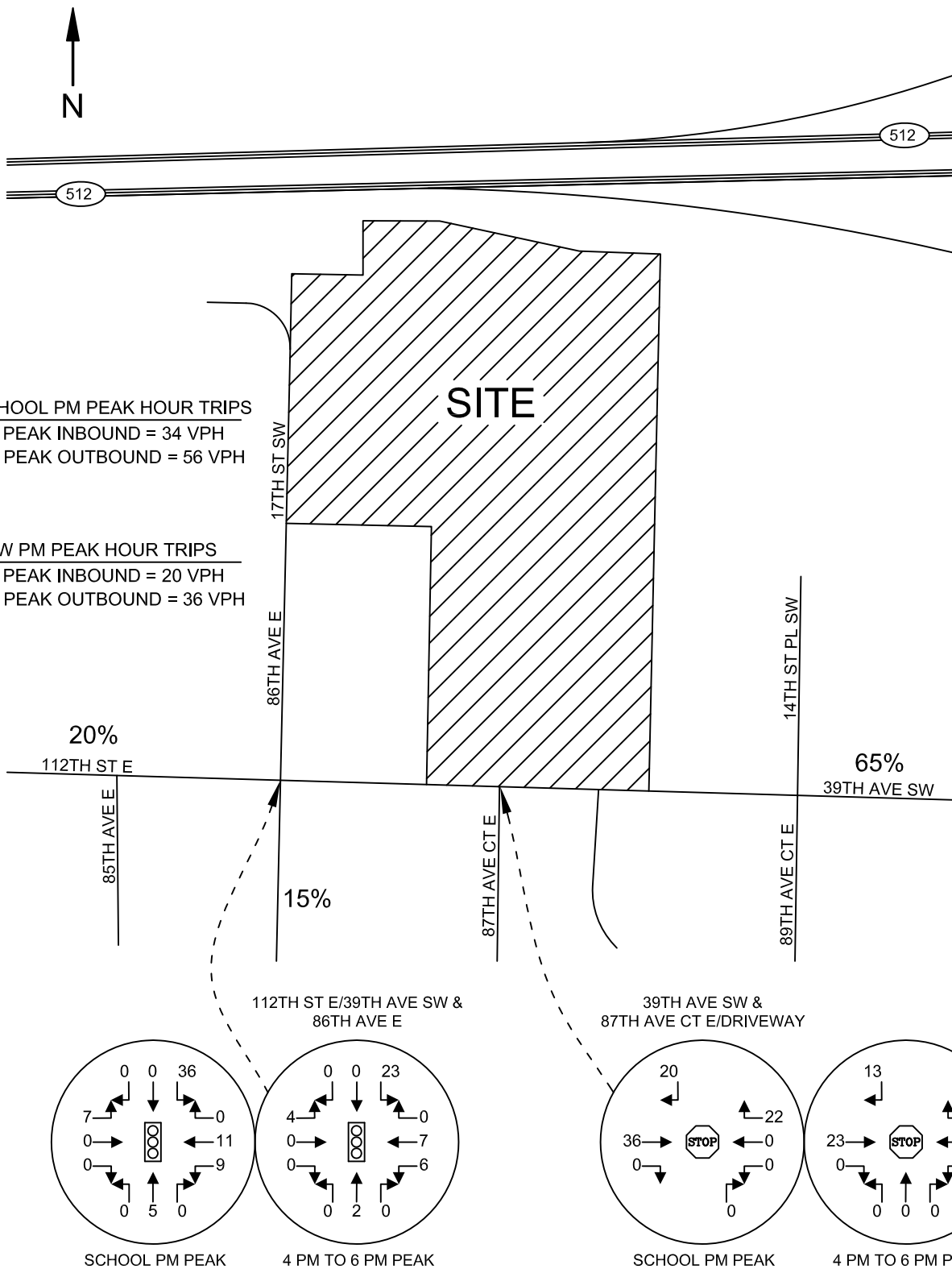
C. Access and Circulation Plan

Parent/Visitor Access:

The site design will accommodate adequate queuing near the building. Given the programs provided specific bell times are not going to be used at this facility. The project anticipates moderate bus traffic with most of the buses the smaller version that accommodates up to about ten students. On-site monitoring will be needed as access patterns are determined and program timings are built.

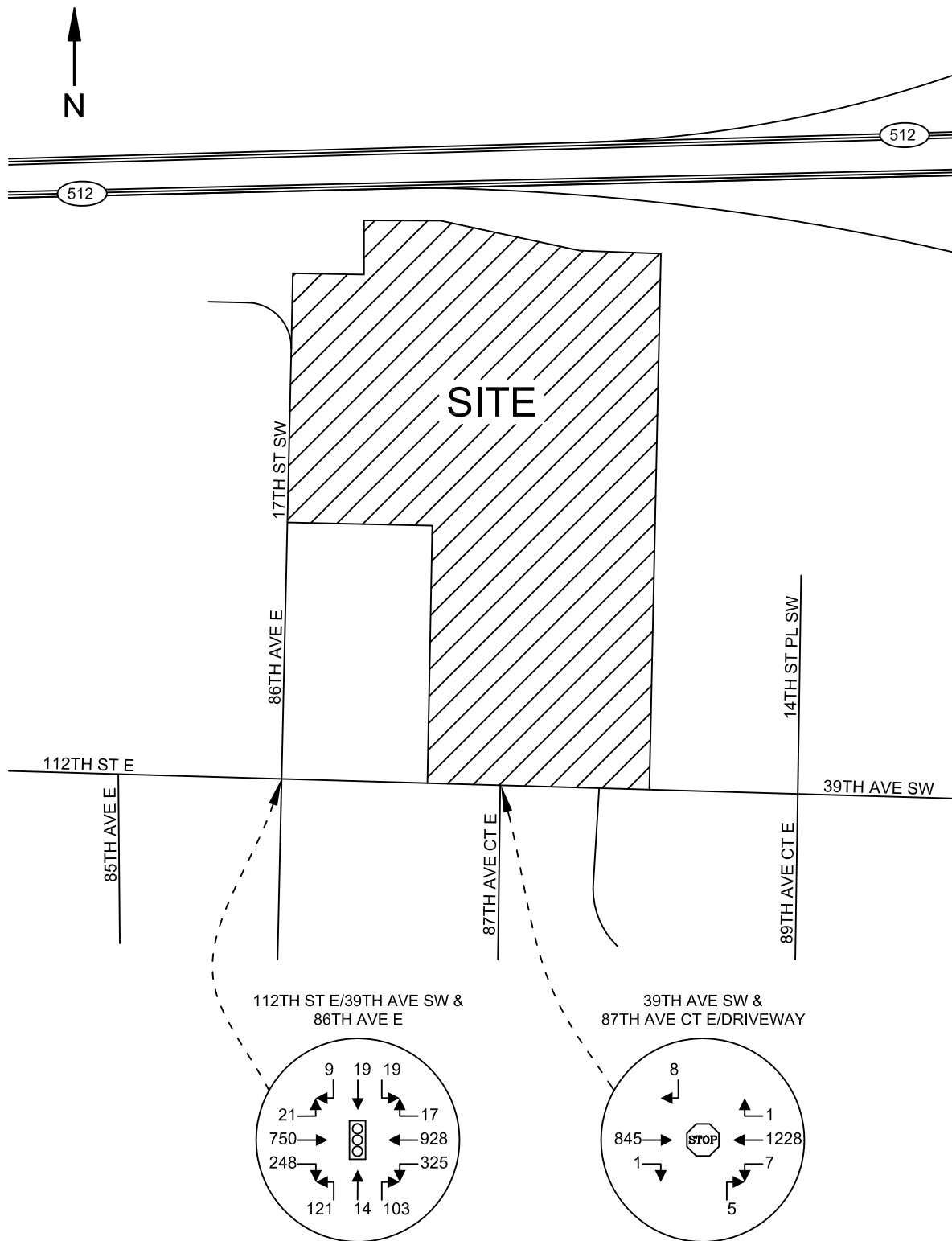
D. Future Traffic Volumes Without and With the Project

A horizon year of 2022 was chosen for the future study period to determine any impact during peak hours of travel. The future 2022 background traffic volumes were derived by applying a 3 percent compound annual growth rate to the existing traffic volumes shown in Figure 3. The 2022 background volumes are shown in Figure 5 while Figure 6 represents the future background volumes with the addition of Kessler Center traffic.



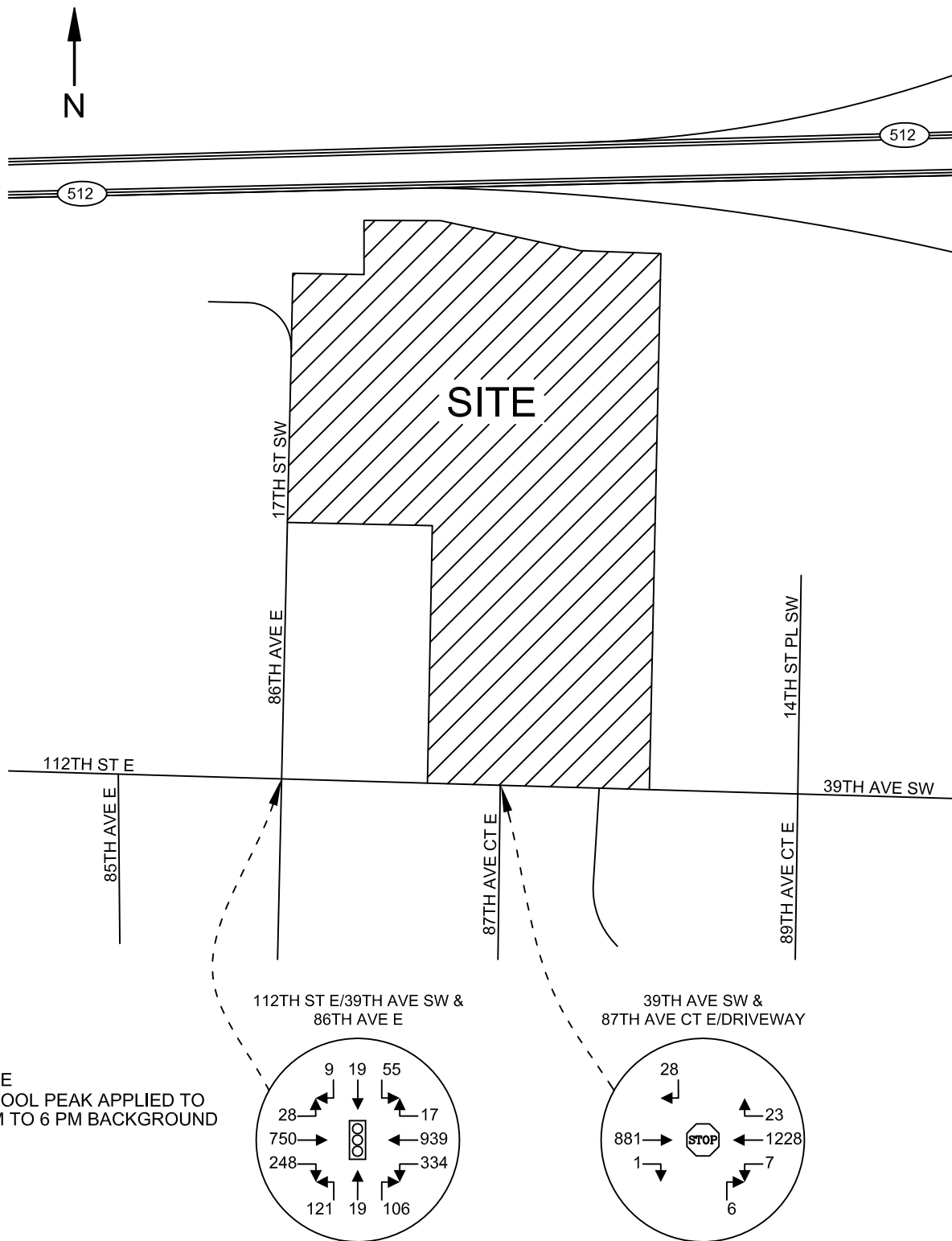
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KESSLER CENTER
 SCHOOL PM PEAK HOUR AND 4 PM TO 6 PM PEAK HOUR
 FIGURE 4



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2022 4 PM TO 6 PM PEAK HOUR VOLUMES WITHOUT PROJECT
FIGURE 5



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KESSLER CENTER
2022 4 PM TO 6 PM PEAK HOUR VOLUMES WITH PROJECT
FIGURE 6

E. Future Level of Service

Future peak hour delays were determined through the use of the *Highway Capacity Manual 2016*. Capacity analysis is used to determine level of service (LOS) which is an established measure of congestion for transportation facilities. LOS is defined for a variety of facilities including intersections, freeways, arterials, etc. A complete definition of level of service and related criteria can be found in the HCM.

The methodology for determining the LOS at unsignalized intersections strives to determine the potential capacities for the various vehicle movements and ultimately determines the average total delay for each movement. *Potential Capacity* represents the number of additional vehicles that could effectively utilize a particular movement, which is essentially the equivalent of the difference between the movement capacity and the existing movement volume. *Total delay* is described as the elapsed time from when a vehicle stops at the end of a queue until the vehicle departs from the stop line. *Average total delay* is simply the mean total delay over the entire stream. A number of factors influence potential capacity and total delay including the availability/usefulness of gaps.

The range 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 program, which follows procedures of the HCM for unsignalized intersections. Level of service results and accompanying approach delays are shown below in Table 2. These results reflect 2022 future traffic conditions with project trips added to the street system.

Table 2
2022 Level of Service
Delays given in seconds per vehicle

Intersection	Control	Approach	2022 Without		2022 With	
			LOS	Delay	LOS	Delay
39 th Ave SW & 17 th St SW	Signal	Overall	B	17.3	B	17.5
39 th Ave SW & Entrance (RIRO)	Stop	Southbound			B	14.8

The 39th Avenue SW entrance was analyzed as a right-out, right in only.

G. Access Sight Distance

Assessments of the existing access driveway was made to determine whether or not adequate entering sight distance (ESD) can be provided for project traffic. Sight distance requirements were obtained from the AASHTO Green Book.

Table 3
Entering Sight Distance (ESD)
Measurements given in feet

Roadway	Direction	Posted Speed Limit	Recommended	Available
39 th Avenue SW	East/West	35 mph	390	>500

No safety issues were noted at the project access.

V. CONCLUSIONS AND MITIGATION

The proposed project is a new facility on the existing Puyallup School District transportation site. The programs offered at the Kessler Center are different in terms of operations but can be categorized by age level into high school programs and elementary school programs. Very little junior high level programs are anticipated with the 8 to 10 students at that level served by the high school level programs. The project description on page 3 outlines what activities or programs are to be incorporated

Access to the school is proposed via a single access to 39th Avenue SW and existing access to the northern part of the site where the school district transportation and warehousing activity takes place via 17th Street SW.

This study analyzed the project distributed to a right turn in and right turn out onto 39th Avenue SW and also access to 17th Street SW and the signal at 17th Street SW and 39th Avenue SW.

1. Based on this analysis the district would pay traffic impact fees to the city of Puyallup as required.

KESSLER CENTER
TRAFFIC IMPACT ANALYSIS

APPENDIX

LEVEL OF SERVICE

The following are excerpts from the *2016 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.

Each level of service represents a range of conditions, as defined by a range in the parameters given. Thus, a level of service is not a discrete condition, but rather a range of conditions for which boundaries are established.

The following tables describe levels of service for signalized and unsignalized intersections. Level of service for signalized intersections is defined in terms of average control delay. Delay is a measure of driver discomfort, frustration, fuel consumption and lost travel time, as well as time from movements at slower speeds and stops on intersection approaches as vehicles move up in queue position or slow down upstream of an intersection. Level of service for unsignalized intersections is determined by the computed or measured control delay and is determined for each minor movement.

Signalized Intersections - Level of Service

<u>Level of Service</u>	<u>Control Delay per Vehicle (sec)</u>
A	≤ 10
B	$> 10 \text{ and } \leq 20$
C	$> 20 \text{ and } \leq 35$
D	$> 35 \text{ and } \leq 55$
E	$> 55 \text{ and } \leq 80$
F	> 80

Unsignalized Intersections - Level of Service

<u>Level of Service</u>	<u>Average Total Delay per Vehicle (sec)</u>
A	≤ 10
B	$> 10 \text{ and } \leq 15$
C	$> 15 \text{ and } \leq 25$
D	$> 25 \text{ and } \leq 35$
E	$> 35 \text{ and } \leq 50$
F	> 50

As described in the 2000 Highway Capacity Manual, level of service breakpoints for all-way stop controlled (AWSC) intersections are somewhat different than the criteria used for signalized intersections. The primary reason for this difference is that drivers expect different levels of performance from distinct kinds of transportation facilities. The expectation is that a signalized intersection is designed to carry higher traffic volumes than an AWSC intersection. Thus, a higher level of control delay is acceptable at a signalized intersection for the same level of service.

AWSC Intersections - Level of Service

<u>Level of Service</u>	<u>Average Total Delay per Vehicle (sec)</u>
A	≤ 10
B	$> 10 \text{ and } \leq 15$
C	$> 15 \text{ and } \leq 25$
D	$> 25 \text{ and } \leq 35$
E	$> 35 \text{ and } \leq 50$
F	> 50

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2214 Tacoma Rd E
Puyallup, WA 98371

File Name : 4226e
Site Code : 00004226
Start Date : 3/26/2019
Page No : 1

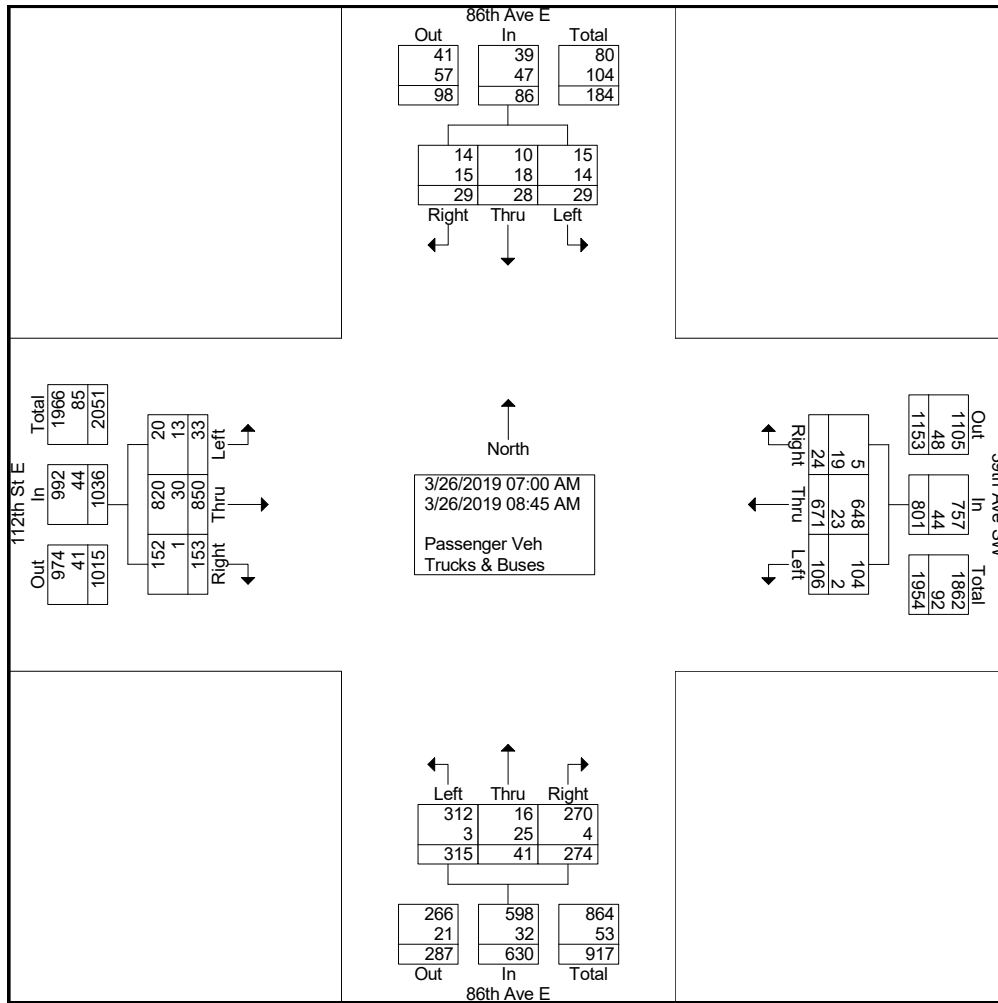
Groups Printed- Passenger Veh - Trucks & Buses

	86th Ave E Southbound				39th Ave SW Westbound				86th Ave E Northbound				112th St E Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
07:00 AM	4	12	8	24	1	57	8	66	30	2	55	87	16	108	0	124	301
07:15 AM	0	0	0	0	4	76	8	88	42	6	50	98	29	111	2	142	328
07:30 AM	2	1	3	6	2	91	19	112	41	5	52	98	28	117	0	145	361
07:45 AM	5	4	1	10	0	101	15	116	36	4	35	75	27	117	3	147	348
Total	11	17	12	40	7	325	50	382	149	17	192	358	100	453	5	558	1338
08:00 AM	5	4	6	15	0	91	8	99	37	3	36	76	8	101	10	119	309
08:15 AM	7	2	3	12	1	84	11	96	31	2	33	66	20	101	4	125	299
08:30 AM	5	3	5	13	2	77	10	89	33	7	27	67	12	94	9	115	284
08:45 AM	1	2	3	6	14	94	27	135	24	12	27	63	13	101	5	119	323
Total	18	11	17	46	17	346	56	419	125	24	123	272	53	397	28	478	1215
Grand Total	29	28	29	86	24	671	106	801	274	41	315	630	153	850	33	1036	2553
Apprch %	33.7	32.6	33.7		3	83.8	13.2		43.5	6.5	50		14.8	82	3.2		
Total %	1.1	1.1	1.1	3.4	0.9	26.3	4.2	31.4	10.7	1.6	12.3	24.7	6	33.3	1.3	40.6	
Passenger Veh	14	10	15	39	5	648	104	757	270	16	312	598	152	820	20	992	2386
% Passenger Veh	48.3	35.7	51.7	45.3	20.8	96.6	98.1	94.5	98.5	39	99	94.9	99.3	96.5	60.6	95.8	93.5
Trucks & Buses	15	18	14	47	19	23	2	44	4	25	3	32	1	30	13	44	167
% Trucks & Buses	51.7	64.3	48.3	54.7	79.2	3.4	1.9	5.5	1.5	61	1	5.1	0.7	3.5	39.4	4.2	6.5

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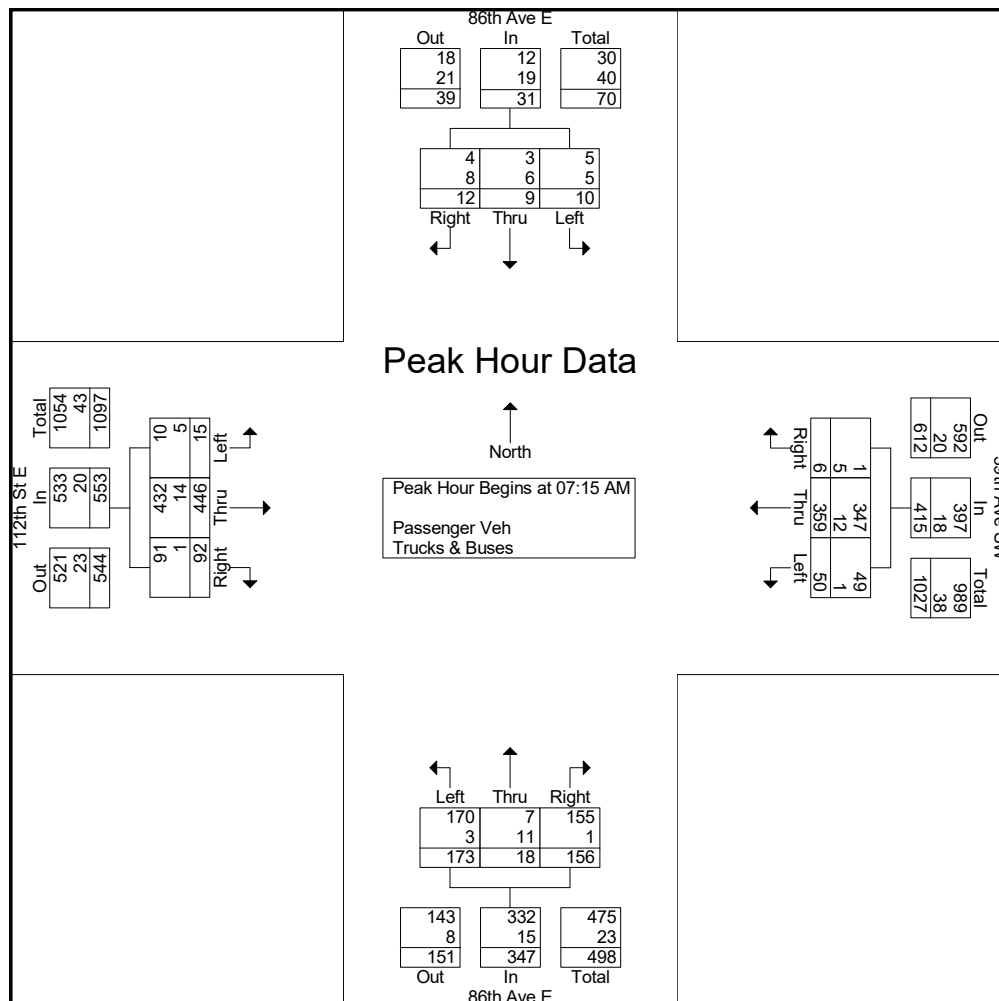


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File Name : 4226e
Site Code : 00004226
Start Date : 3/26/2019
Page No : 3

	86th Ave E Southbound				39th Ave SW Westbound				86th Ave E Northbound				112th St E Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	0	0	0	0	4	76	8	88	42	6	50	98	29	111	2	142	328
07:30 AM	2	1	3	6	2	91	19	112	41	5	52	98	28	117	0	145	361
07:45 AM	5	4	1	10	0	101	15	116	36	4	35	75	27	117	3	147	348
08:00 AM	5	4	6	15	0	91	8	99	37	3	36	76	8	101	10	119	309
Total Volume	12	9	10	31	6	359	50	415	156	18	173	347	92	446	15	553	1346
% App. Total	38.7	29	32.3		1.4	86.5	12		45	5.2	49.9		16.6	80.7	2.7		
PHF	.600	.563	.417	.517	.375	.889	.658	.894	.929	.750	.832	.885	.793	.953	.375	.940	.932
Passenger Veh	4	3	5	12	1	347	49	397	155	7	170	332	91	432	10	533	1274
% Passenger Veh	33.3	33.3	50.0	38.7	16.7	96.7	98.0	95.7	99.4	38.9	98.3	95.7	98.9	96.9	66.7	96.4	94.7
Trucks & Buses	8	6	5	19	5	12	1	18	1	11	3	15	1	14	5	20	72
% Trucks & Buses	66.7	66.7	50.0	61.3	83.3	3.3	2.0	4.3	0.6	61.1	1.7	4.3	1.1	3.1	33.3	3.6	5.3



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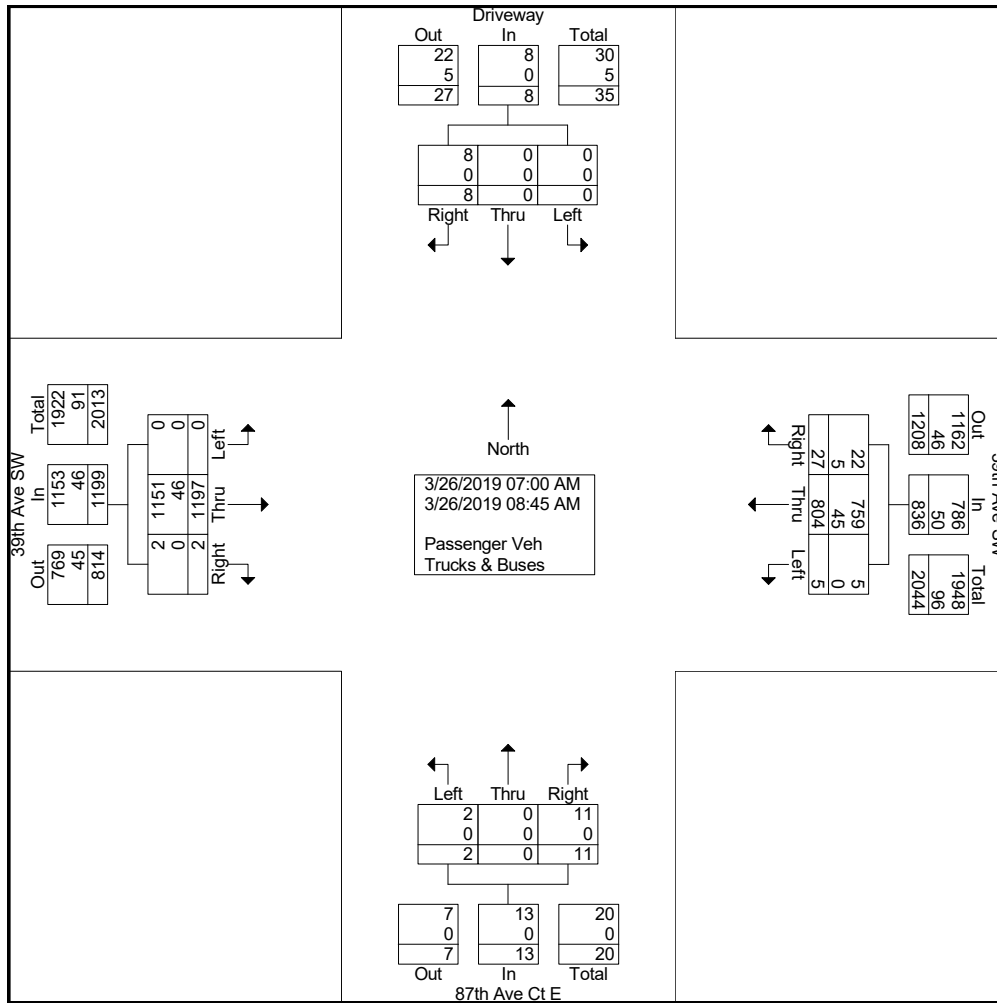
Groups Printed- Passenger Veh - Trucks & Buses

	Driveway Southbound				39th Ave SW Westbound				87th Ave Ct E Northbound				39th Ave SW Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
07:00 AM	0	0	0	0	6	71	0	77	2	0	0	2	0	161	0	161	240
07:15 AM	0	0	0	0	3	87	0	90	0	0	1	1	0	152	0	152	243
07:30 AM	0	0	0	0	3	115	0	118	0	0	0	0	0	163	0	163	281
07:45 AM	2	0	0	2	4	119	0	123	1	0	0	1	0	154	0	154	280
Total	2	0	0	2	16	392	0	408	3	0	1	4	0	630	0	630	1044
08:00 AM	1	0	0	1	2	102	2	106	1	0	0	1	1	144	0	145	253
08:15 AM	0	0	0	0	1	98	1	100	2	0	1	3	0	138	0	138	241
08:30 AM	3	0	0	3	4	86	1	91	2	0	0	2	1	141	0	142	238
08:45 AM	2	0	0	2	4	126	1	131	3	0	0	3	0	144	0	144	280
Total	6	0	0	6	11	412	5	428	8	0	1	9	2	567	0	569	1012
Grand Total	8	0	0	8	27	804	5	836	11	0	2	13	2	1197	0	1199	2056
Apprch %	100	0	0		3.2	96.2	0.6		84.6	0	15.4		0.2	99.8	0		
Total %	0.4	0	0	0.4	1.3	39.1	0.2	40.7	0.5	0	0.1	0.6	0.1	58.2	0	58.3	
Passenger Veh	8	0	0	8	22	759	5	786	11	0	2	13	2	1151	0	1153	1960
% Passenger Veh	100	0	0	100	81.5	94.4	100	94	100	0	100	100	100	96.2	0	96.2	95.3
Trucks & Buses	0	0	0	0	5	45	0	50	0	0	0	0	0	46	0	46	96
% Trucks & Buses	0	0	0	0	18.5	5.6	0	6	0	0	0	0	0	3.8	0	3.8	4.7

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2214 Tacoma Rd E
Puyallup, WA 98371

File Name : 4226f
Site Code : 00004226
Start Date : 3/26/2019
Page No : 2

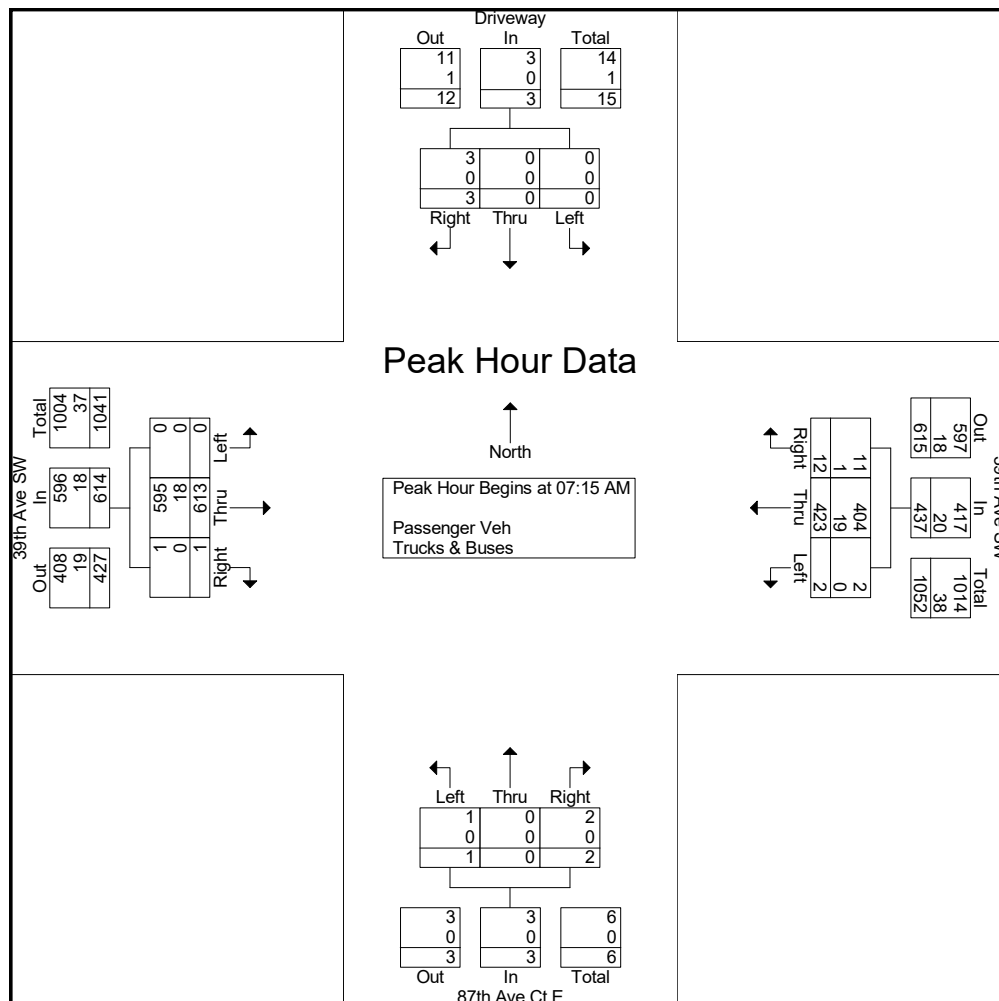


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2214 Tacoma Rd E
Puyallup, WA 98371

File Name : 4226f
Site Code : 00004226
Start Date : 3/26/2019
Page No : 3

	Driveway Southbound				39th Ave SW Westbound				87th Ave Ct E Northbound				39th Ave SW Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	0	0	0	0	3	87	0	90	0	0	1	1	0	152	0	152	243
07:30 AM	0	0	0	0	3	115	0	118	0	0	0	0	0	163	0	163	281
07:45 AM	2	0	0	2	4	119	0	123	1	0	0	1	0	154	0	154	280
08:00 AM	1	0	0	1	2	102	2	106	1	0	0	1	1	144	0	145	253
Total Volume	3	0	0	3	12	423	2	437	2	0	1	3	1	613	0	614	1057
% App. Total	100	0	0		2.7	96.8	0.5		66.7	0	33.3		0.2	99.8	0		
PHF	.375	.000	.000	.375	.750	.889	.250	.888	.500	.000	.250	.750	.250	.940	.000	.942	.940
Passenger Veh	3	0	0	3	11	404	2	417	2	0	1	3	1	595	0	596	1019
% Passenger Veh	100	0	0	100	91.7	95.5	100	95.4	100	0	100	100	100	97.1	0	97.1	96.4
Trucks & Buses	0	0	0	0	1	19	0	20	0	0	0	0	0	18	0	18	38
% Trucks & Buses	0	0	0	0	8.3	4.5	0	4.6	0	0	0	0	0	2.9	0	2.9	3.6



Heath & Associates

2214 Tacoma Rd E
Puyallup, WA 98371

File Name : 4226g
Site Code : 00004226
Start Date : 3/26/2019
Page No : 1

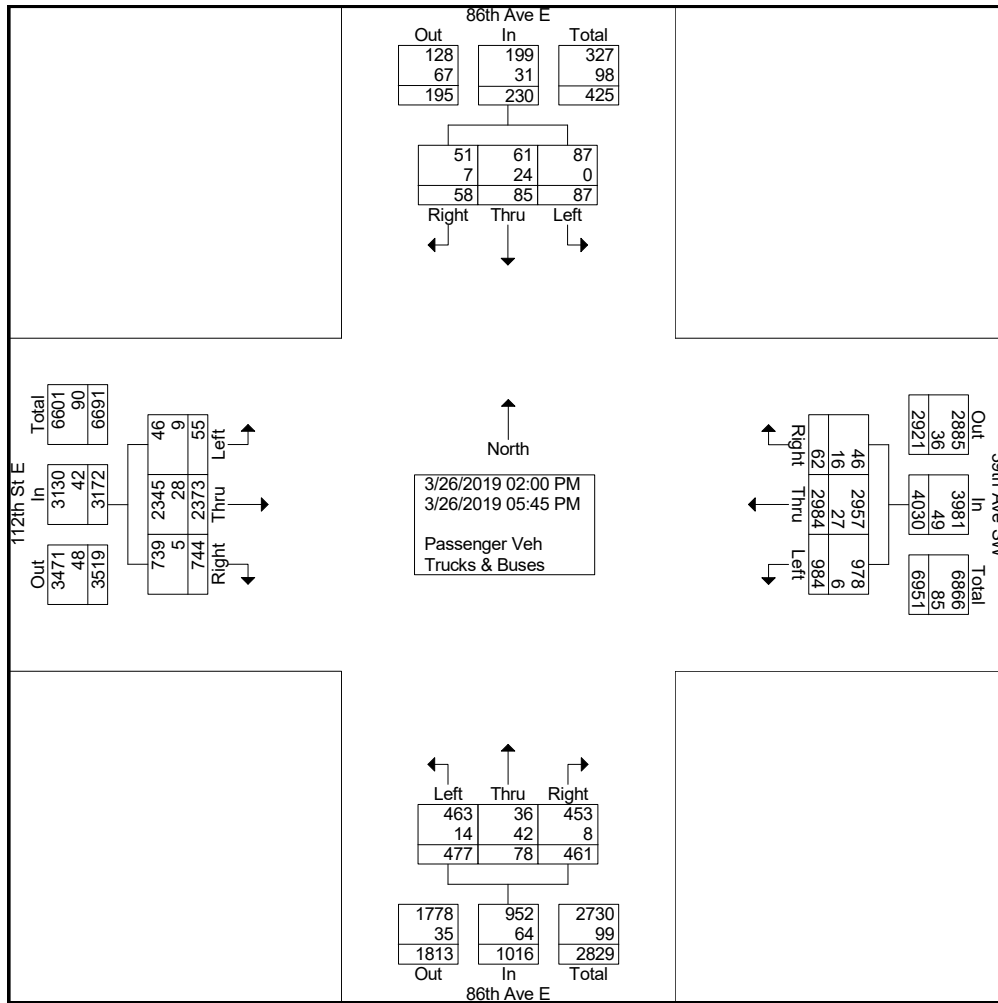
Groups Printed- Passenger Veh - Trucks & Buses

	86th Ave E Southbound				39th Ave SW Westbound				86th Ave E Northbound				112th St E Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
02:00 PM	5	11	4	20	1	159	31	191	33	3	27	63	20	135	0	155	429
02:15 PM	3	9	4	16	1	155	47	203	24	2	36	62	29	116	2	147	428
02:30 PM	6	1	6	13	3	145	45	193	39	2	55	96	27	134	4	165	467
02:45 PM	2	2	3	7	1	167	53	221	37	3	33	73	28	121	1	150	451
Total	16	23	17	56	6	626	176	808	133	10	151	294	104	506	7	617	1775
03:00 PM	4	10	8	22	3	190	42	235	32	3	16	51	37	169	1	207	515
03:15 PM	5	4	4	13	3	175	66	244	34	5	26	65	42	129	9	180	502
03:30 PM	5	7	6	18	3	193	69	265	25	12	26	63	45	136	1	182	528
03:45 PM	2	6	9	17	10	178	52	240	25	16	37	78	48	168	3	219	554
Total	16	27	27	70	19	736	229	984	116	36	105	257	172	602	14	788	2099
04:00 PM	5	11	12	28	6	197	69	272	34	7	25	66	62	116	2	180	546
04:15 PM	7	3	6	16	6	193	56	255	31	5	30	66	46	159	4	209	546
04:30 PM	4	8	6	18	4	220	80	304	17	9	34	60	60	169	3	232	614
04:45 PM	0	2	2	4	2	229	68	299	19	2	26	47	49	176	5	230	580
Total	16	24	26	66	18	839	273	1130	101	23	115	239	217	620	14	851	2286
05:00 PM	3	5	4	12	3	181	71	255	32	2	28	62	61	171	3	235	564
05:15 PM	1	2	5	8	7	219	78	304	26	0	23	49	57	170	8	235	596
05:30 PM	3	4	7	14	8	197	83	288	28	6	30	64	73	164	3	240	606
05:45 PM	3	0	1	4	1	186	74	261	25	1	25	51	60	140	6	206	522
Total	10	11	17	38	19	783	306	1108	111	9	106	226	251	645	20	916	2288
Grand Total	58	85	87	230	62	2984	984	4030	461	78	477	1016	744	2373	55	3172	8448
Apprch %	25.2	37	37.8		1.5	74	24.4		45.4	7.7	46.9		23.5	74.8	1.7		
Total %	0.7	1	1	2.7	0.7	35.3	11.6	47.7	5.5	0.9	5.6	12	8.8	28.1	0.7	37.5	
Passenger Veh	51	61	87	199	46	2957	978	3981	453	36	463	952	739	2345	46	3130	8262
% Passenger Veh	87.9	71.8	100	86.5	74.2	99.1	99.4	98.8	98.3	46.2	97.1	93.7	99.3	98.8	83.6	98.7	97.8
Trucks & Buses	7	24	0	31	16	27	6	49	8	42	14	64	5	28	9	42	186
% Trucks & Buses	12.1	28.2	0	13.5	25.8	0.9	0.6	1.2	1.7	53.8	2.9	6.3	0.7	1.2	16.4	1.3	2.2

Heath & Associates

2214 Tacoma Rd E
Puyallup, WA 98371

File Name : 4226g
Site Code : 00004226
Start Date : 3/26/2019
Page No : 2

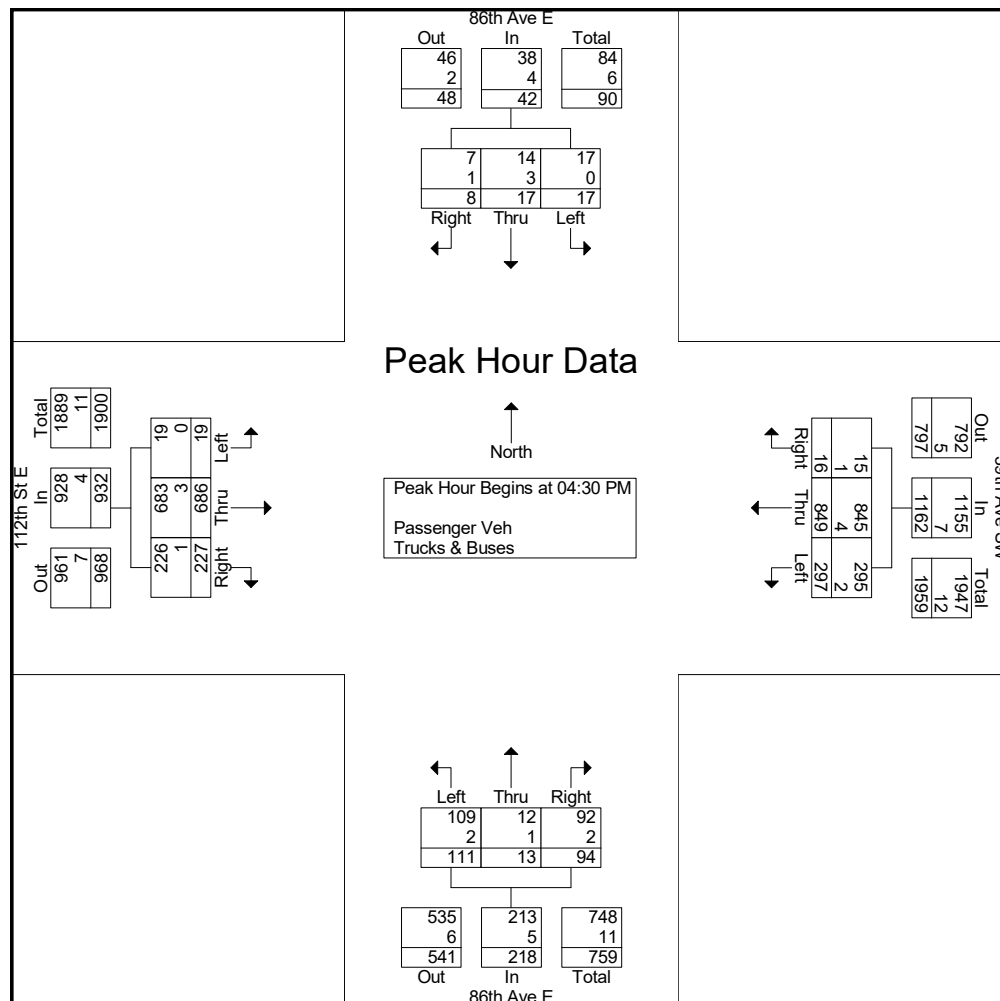


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2214 Tacoma Rd E
Puyallup, WA 98371

File Name : 4226g
Site Code : 00004226
Start Date : 3/26/2019
Page No : 3

	86th Ave E Southbound				39th Ave SW Westbound				86th Ave E Northbound				112th St E Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	4	8	6	18	4	220	80	304	17	9	34	60	60	169	3	232	614
04:45 PM	0	2	2	4	2	229	68	299	19	2	26	47	49	176	5	230	580
05:00 PM	3	5	4	12	3	181	71	255	32	2	28	62	61	171	3	235	564
05:15 PM	1	2	5	8	7	219	78	304	26	0	23	49	57	170	8	235	596
Total Volume	8	17	17	42	16	849	297	1162	94	13	111	218	227	686	19	932	2354
% App. Total	19	40.5	40.5		1.4	73.1	25.6		43.1	6	50.9		24.4	73.6	2		
PHF	.500	.531	.708	.583	.571	.927	.928	.956	.734	.361	.816	.879	.930	.974	.594	.991	.958
Passenger Veh	7	14	17	38	15	845	295	1155	92	12	109	213	226	683	19	928	2334
% Passenger Veh	87.5	82.4	100	90.5	93.8	99.5	99.3	99.4	97.9	92.3	98.2	97.7	99.6	99.6	100	99.6	99.2
Trucks & Buses	1	3	0	4	1	4	2	7	2	1	2	5	1	3	0	4	20
% Trucks & Buses	12.5	17.6	0	9.5	6.3	0.5	0.7	0.6	2.1	7.7	1.8	2.3	0.4	0.4	0	0.4	0.8



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2214 Tacoma Rd E
Puyallup, WA 98371

File Name : 4226h
Site Code : 00004226
Start Date : 3/26/2019
Page No : 1

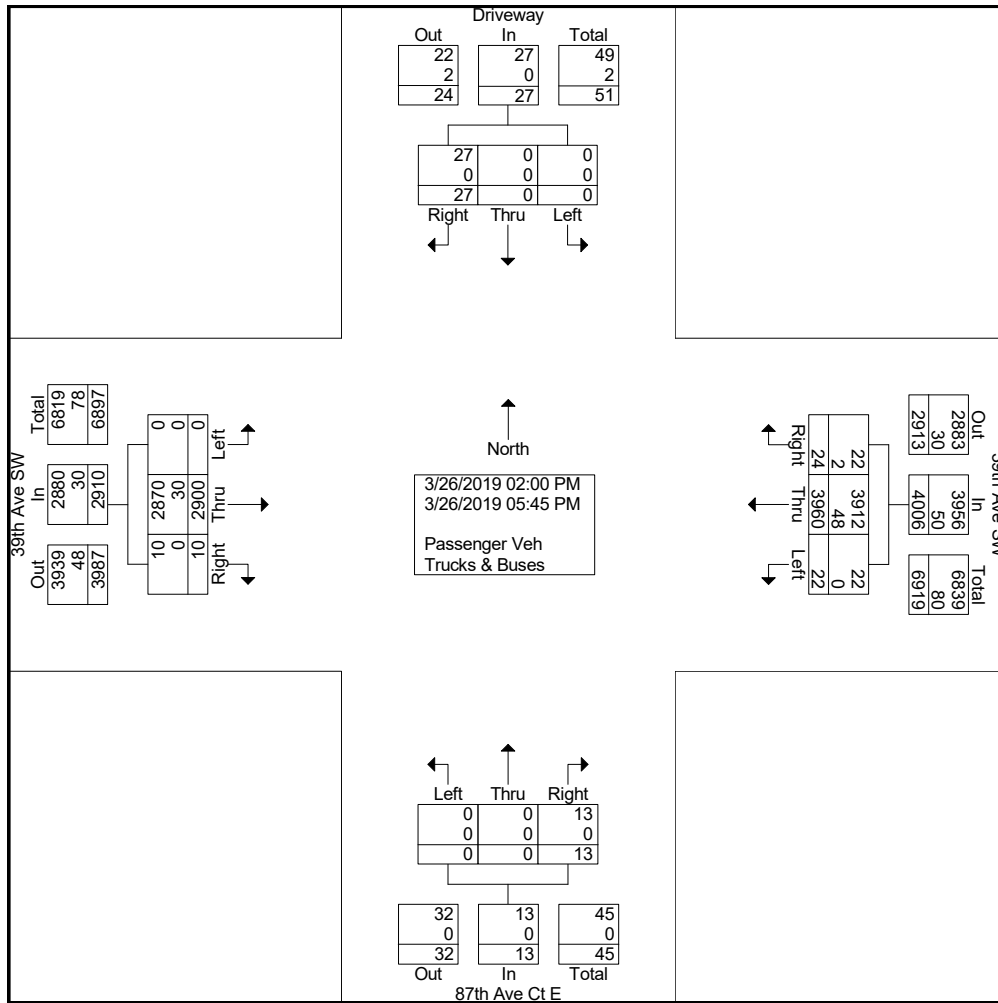
Groups Printed- Passenger Veh - Trucks & Buses

	Driveway Southbound				39th Ave SW Westbound				87th Ave Ct E Northbound				39th Ave SW Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
02:00 PM	2	0	0	2	5	184	3	192	0	0	0	0	0	170	0	170	364
02:15 PM	1	0	0	1	0	208	2	210	1	0	0	1	1	134	0	135	347
02:30 PM	0	0	0	0	1	184	2	187	1	0	0	1	1	174	0	175	363
02:45 PM	0	0	0	0	2	246	1	249	1	0	0	1	0	153	0	153	403
Total	3	0	0	3	8	822	8	838	3	0	0	3	2	631	0	633	1477
03:00 PM	1	0	0	1	1	212	0	213	1	0	0	1	1	208	0	209	424
03:15 PM	2	0	0	2	0	258	1	259	1	0	0	1	1	178	0	179	441
03:30 PM	5	0	0	5	1	234	1	236	0	0	0	0	1	166	0	167	408
03:45 PM	1	0	0	1	5	253	2	260	1	0	0	1	2	210	0	212	474
Total	9	0	0	9	7	957	4	968	3	0	0	3	5	762	0	767	1747
04:00 PM	3	0	0	3	4	267	0	271	0	0	0	0	0	167	0	167	441
04:15 PM	2	0	0	2	3	241	2	246	1	0	0	1	1	202	0	203	452
04:30 PM	1	0	0	1	1	291	2	294	2	0	0	2	0	192	0	192	489
04:45 PM	0	0	0	0	0	291	1	292	0	0	0	0	0	188	0	188	480
Total	6	0	0	6	8	1090	5	1103	3	0	0	3	1	749	0	750	1862
05:00 PM	1	0	0	1	0	234	2	236	2	0	0	2	0	195	0	195	434
05:15 PM	5	0	0	5	0	308	1	309	1	0	0	1	1	198	0	199	514
05:30 PM	3	0	0	3	1	284	1	286	0	0	0	0	1	190	0	191	480
05:45 PM	0	0	0	0	0	265	1	266	1	0	0	1	0	175	0	175	442
Total	9	0	0	9	1	1091	5	1097	4	0	0	4	2	758	0	760	1870
Grand Total	27	0	0	27	24	3960	22	4006	13	0	0	13	10	2900	0	2910	6956
Apprch %	100	0	0		0.6	98.9	0.5		100	0	0		0.3	99.7	0		
Total %	0.4	0	0	0.4	0.3	56.9	0.3	57.6	0.2	0	0	0.2	0.1	41.7	0	41.8	
Passenger Veh	27	0	0	27	22	3912	22	3956	13	0	0	13	10	2870	0	2880	6876
% Passenger Veh	100	0	0	100	91.7	98.8	100	98.8	100	0	0	100	100	99	0	99	98.8
Trucks & Buses	0	0	0	0	2	48	0	50	0	0	0	0	0	30	0	30	80
% Trucks & Buses	0	0	0	0	8.3	1.2	0	1.2	0	0	0	0	0	1	0	1	1.2

Heath & Associates

2214 Tacoma Rd E
Puyallup, WA 98371

File Name : 4226h
Site Code : 00004226
Start Date : 3/26/2019
Page No : 2

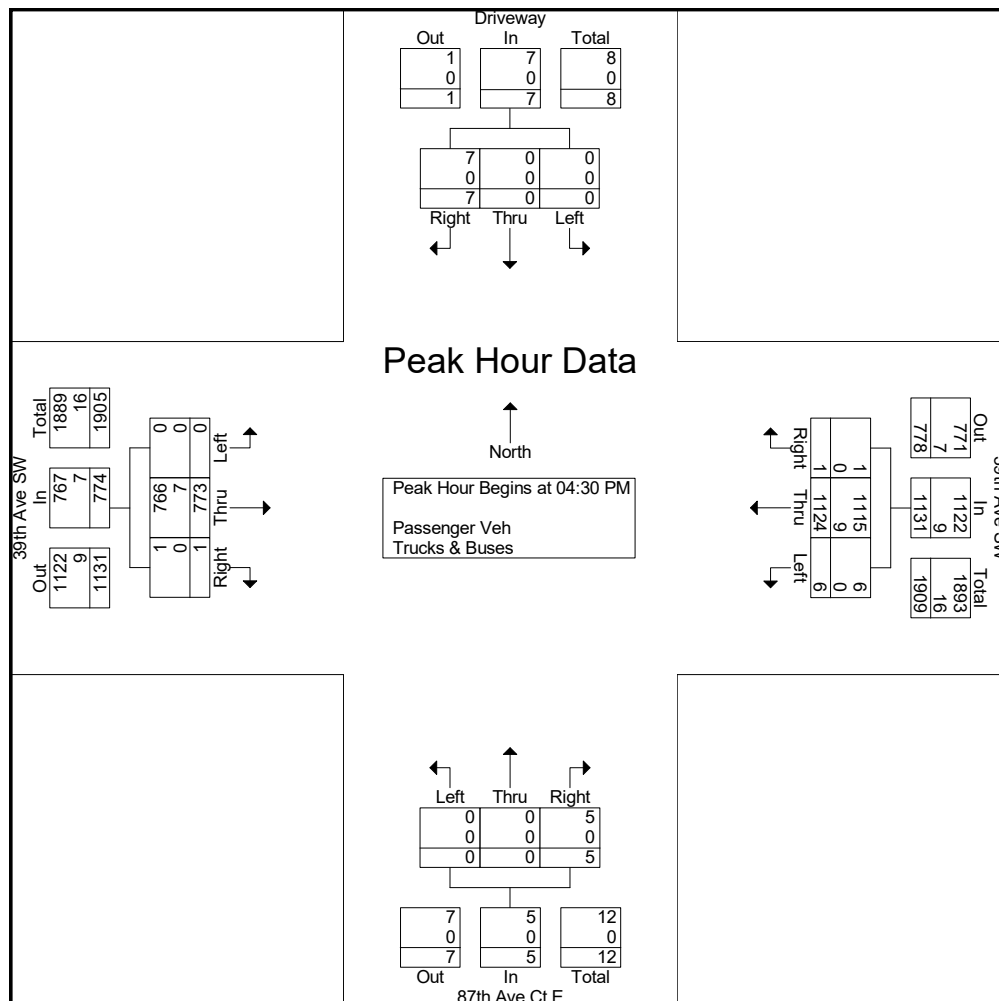


Heath & Associates

2214 Tacoma Rd E
Puyallup, WA 98371

File Name : 4226h
Site Code : 00004226
Start Date : 3/26/2019
Page No : 3

	Driveway Southbound				39th Ave SW Westbound				87th Ave Ct E Northbound				39th Ave SW Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	1	0	0	1	1	291	2	294	2	0	0	2	0	192	0	192	489
04:45 PM	0	0	0	0	0	291	1	292	0	0	0	0	0	188	0	188	480
05:00 PM	1	0	0	1	0	234	2	236	2	0	0	2	0	195	0	195	434
05:15 PM	5	0	0	5	0	308	1	309	1	0	0	1	1	198	0	199	514
Total Volume	7	0	0	7	1	1124	6	1131	5	0	0	5	1	773	0	774	1917
% App. Total	100	0	0		0.1	99.4	0.5		100	0	0		0.1	99.9	0		
PHF	.350	.000	.000	.350	.250	.912	.750	.915	.625	.000	.000	.625	.250	.976	.000	.972	.932
Passenger Veh	7	0	0	7	1	1115	6	1122	5	0	0	5	1	766	0	767	1901
% Passenger Veh	100	0	0	100	100	99.2	100	99.2	100	0	0	100	100	99.1	0	99.1	99.2
Trucks & Buses	0	0	0	0	0	9	0	9	0	0	0	0	0	7	0	7	16
% Trucks & Buses	0	0	0	0	0	0.8	0	0.8	0	0	0	0	0	0.9	0	0.9	0.8



High School (530)

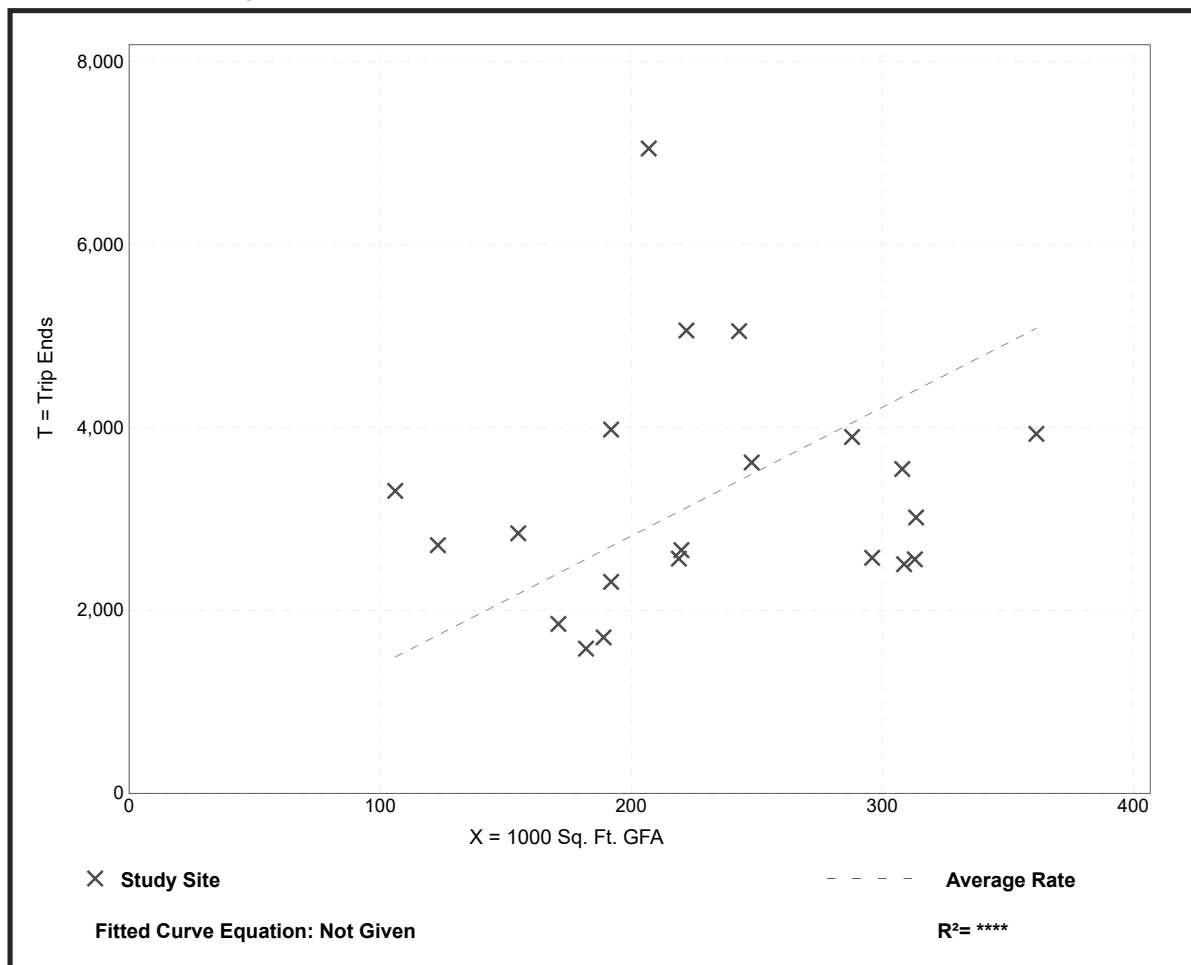
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 21
Avg. 1000 Sq. Ft. GFA: 231
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
14.07	8.12 - 34.06	6.86

Data Plot and Equation



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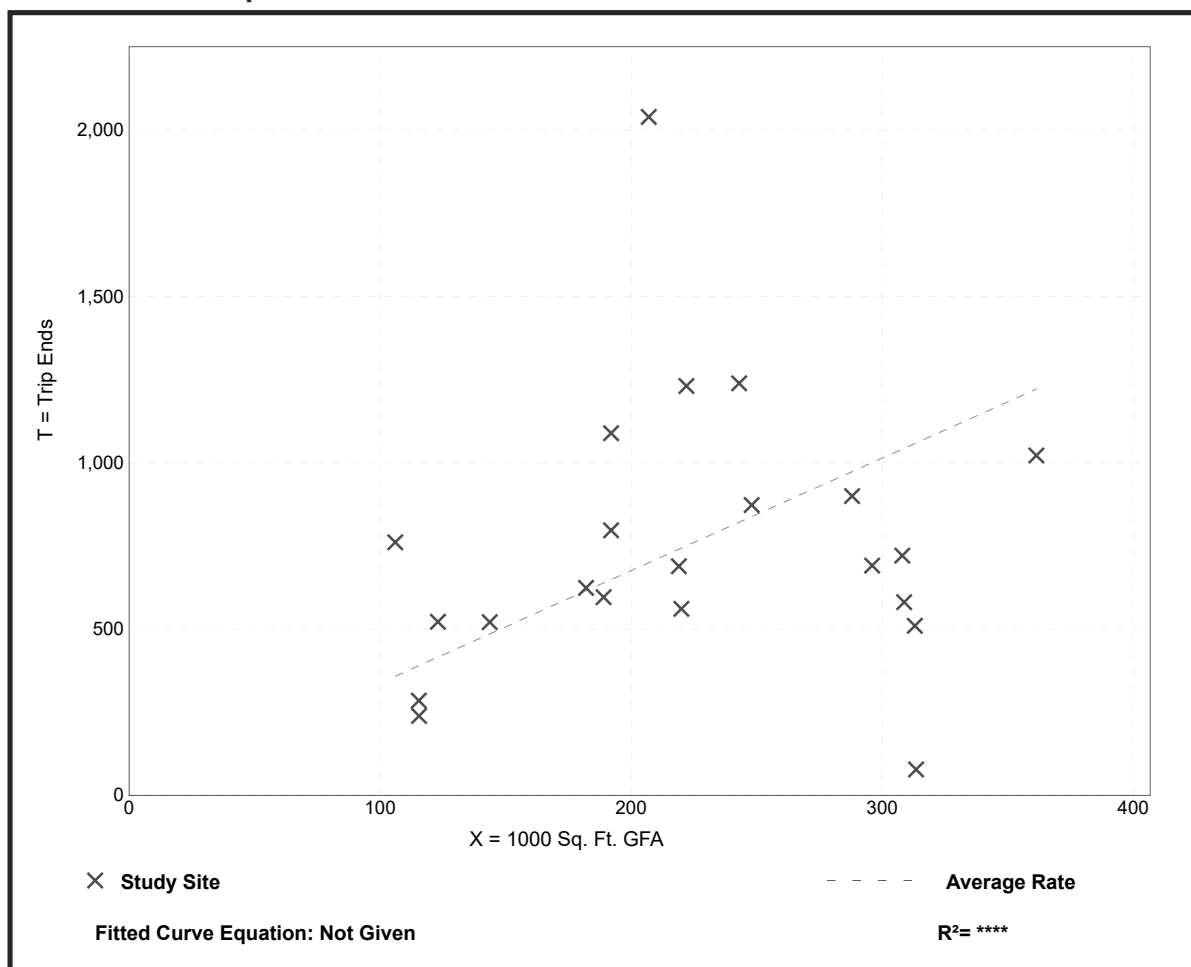
High School (530)

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: 22
 Avg. 1000 Sq. Ft. GFA: 223
 Directional Distribution: 71% entering, 29% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
3.38	0.25 - 9.86	2.02

Data Plot and Equation



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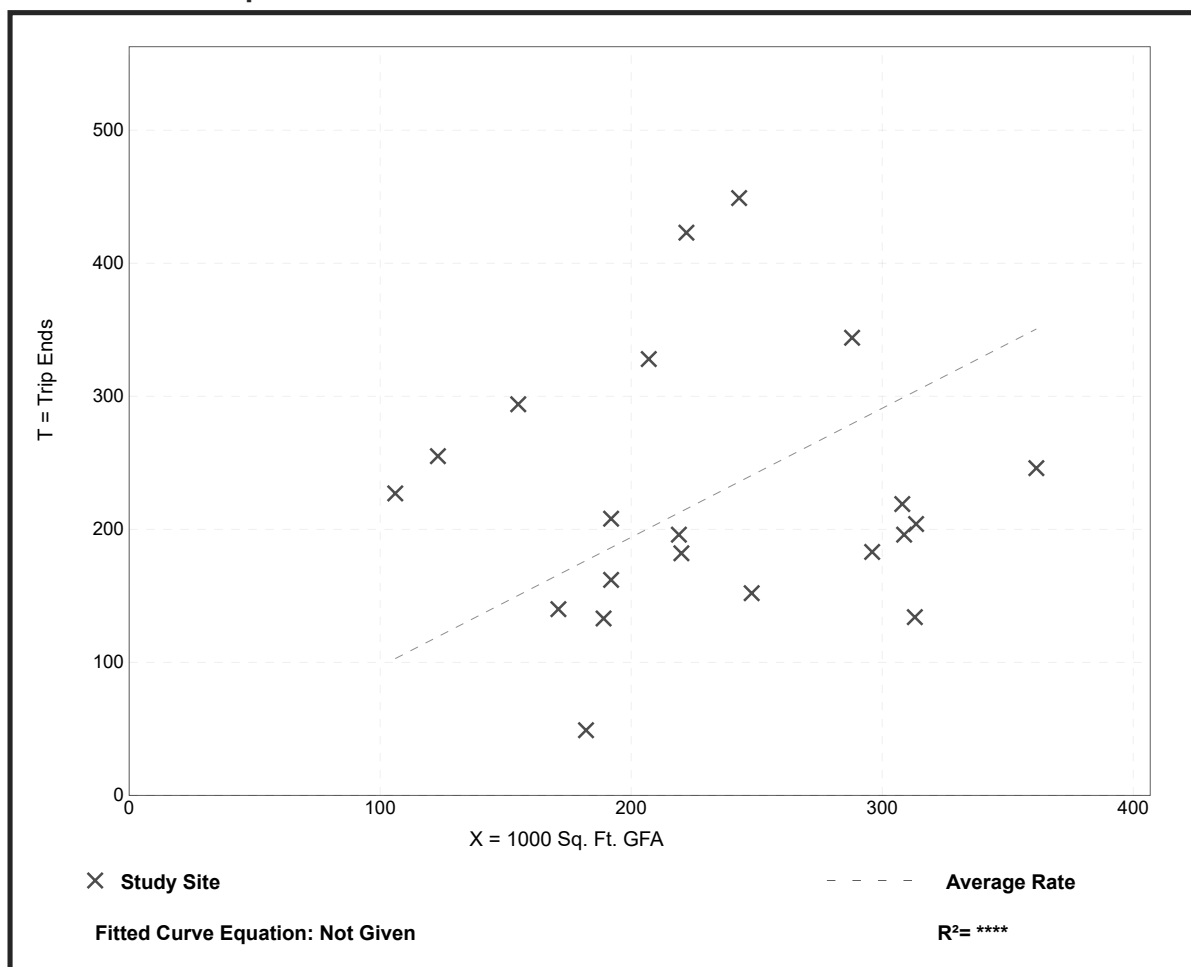
High School (530)

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: 21
 Avg. 1000 Sq. Ft. GFA: 231
 Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.97	0.27 - 2.14	0.53

Data Plot and Equation



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High School (530)

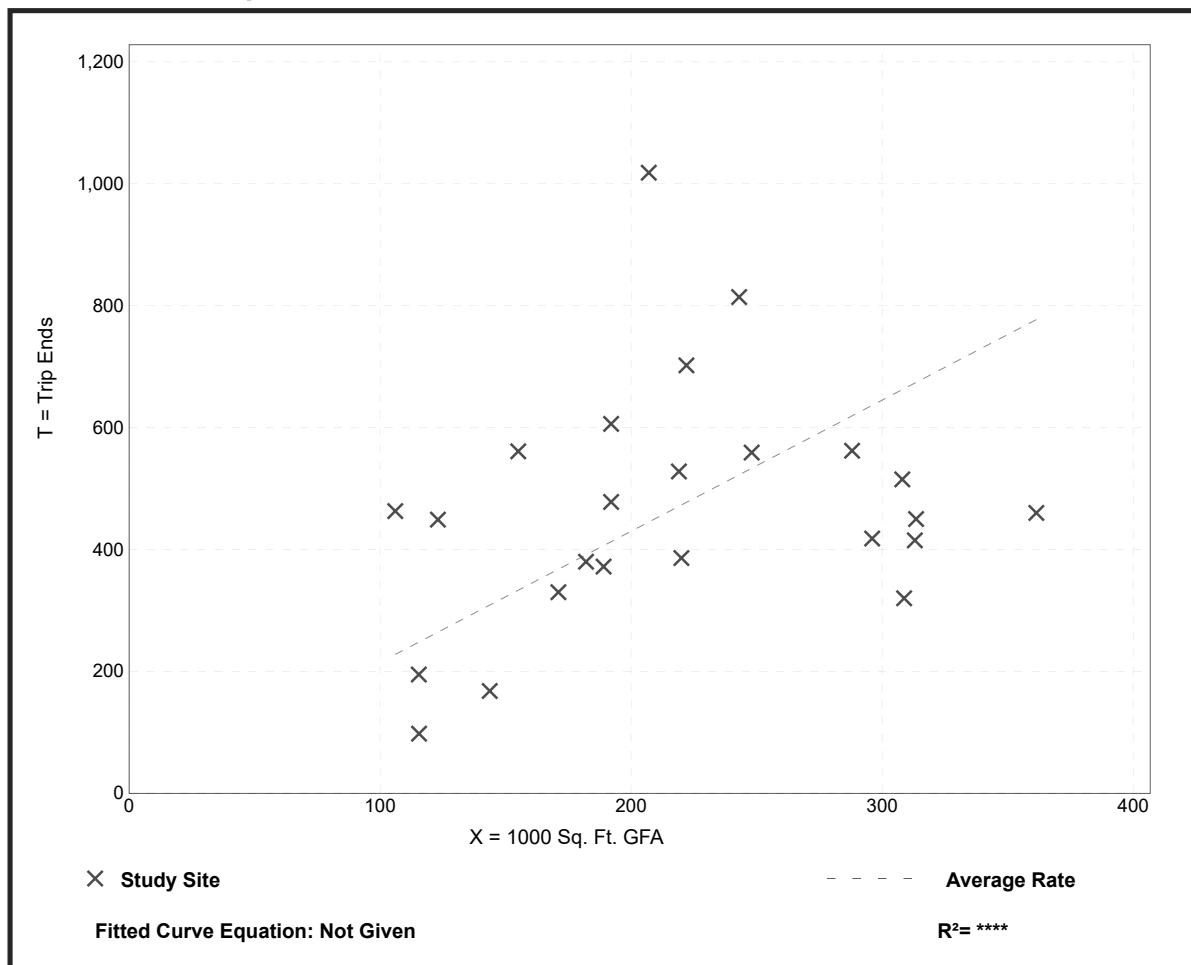
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
Number of Studies: 24
Avg. 1000 Sq. Ft. GFA: 218
Directional Distribution: 31% entering, 69% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
2.15	0.85 - 4.92	1.02

Data Plot and Equation



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Elementary School

(520)

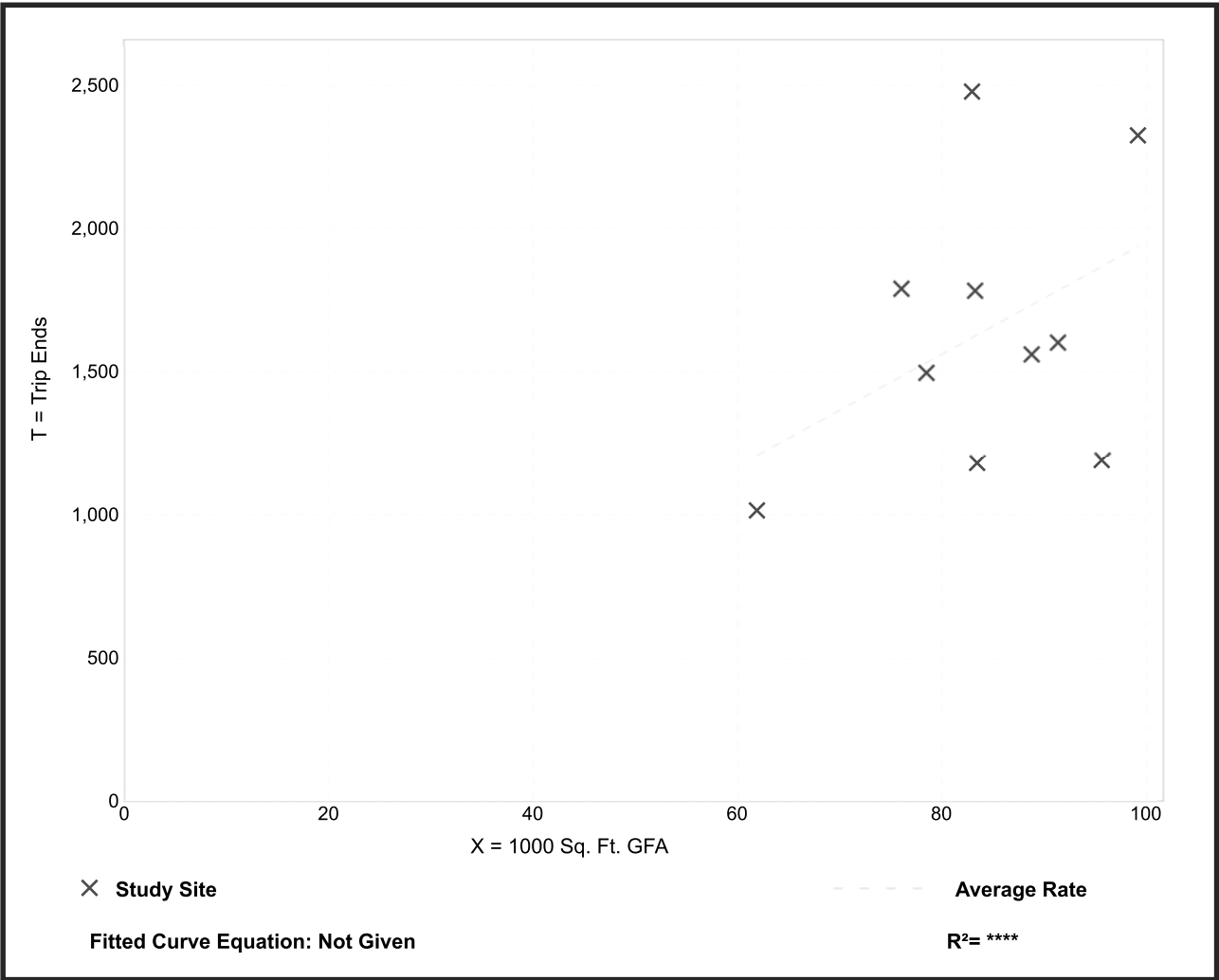
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 10
Avg. 1000 Sq. Ft. GFA: 84
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
19.52	12.46 - 29.87	5.19

Data Plot and Equation



Elementary School

(520)

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: 18

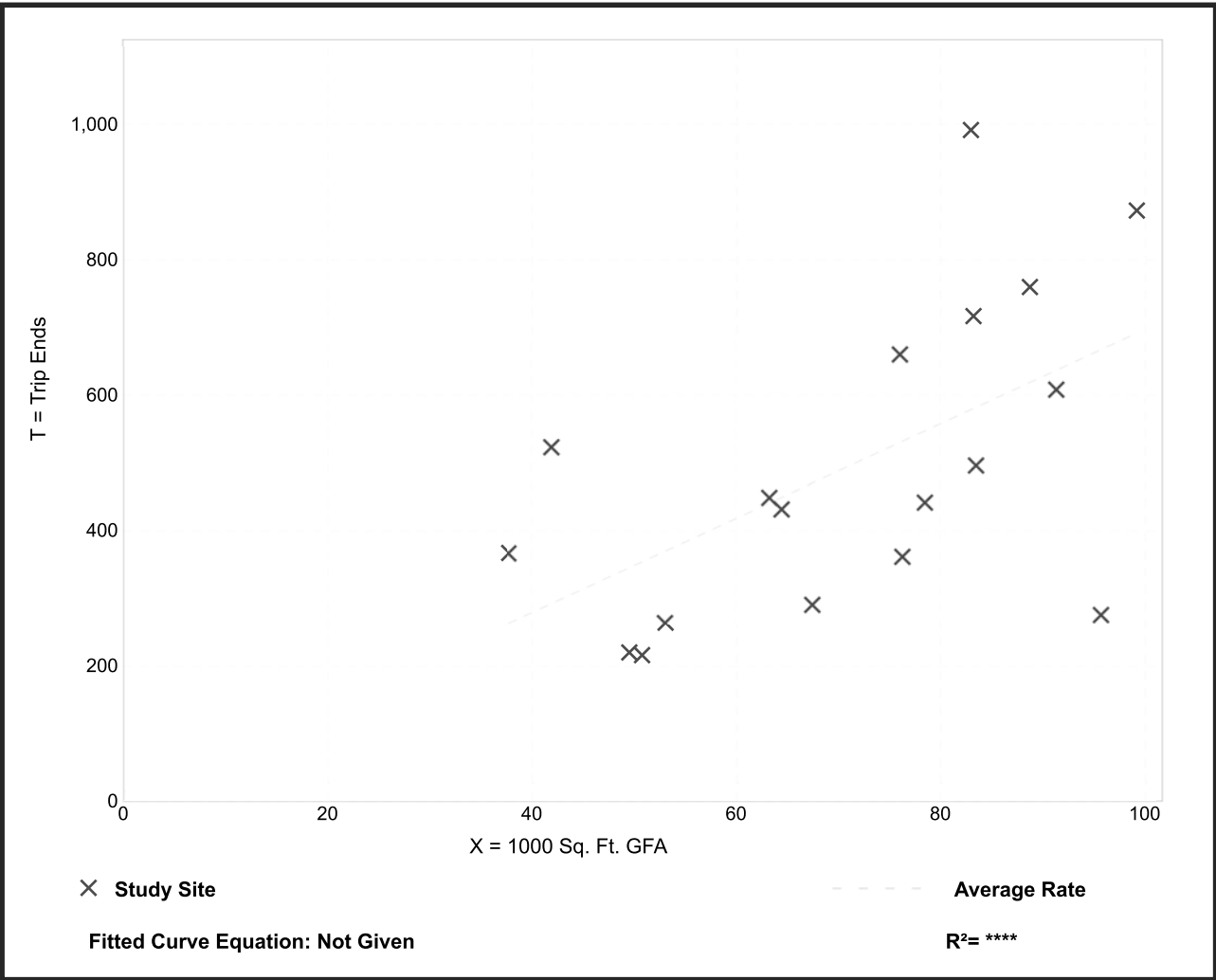
Avg. 1000 Sq. Ft. GFA: 71

Directional Distribution: 55% entering, 45% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
6.97	2.88 - 12.45	2.60

Data Plot and Equation



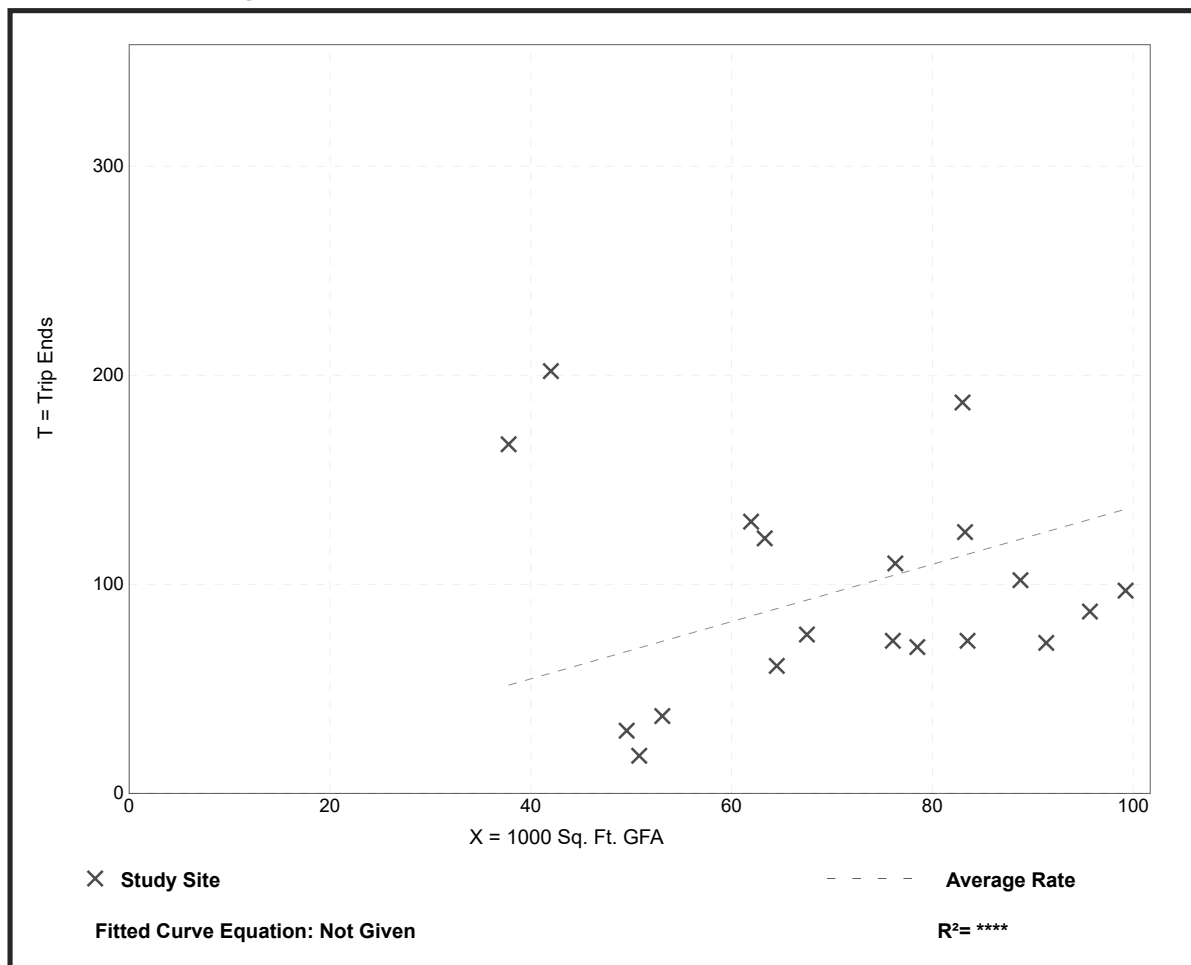
Elementary School (520)

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: 19
 Avg. 1000 Sq. Ft. GFA: 71
 Directional Distribution: 45% entering, 55% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.37	0.35 - 4.81	0.97

Data Plot and Equation



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Elementary School (520)

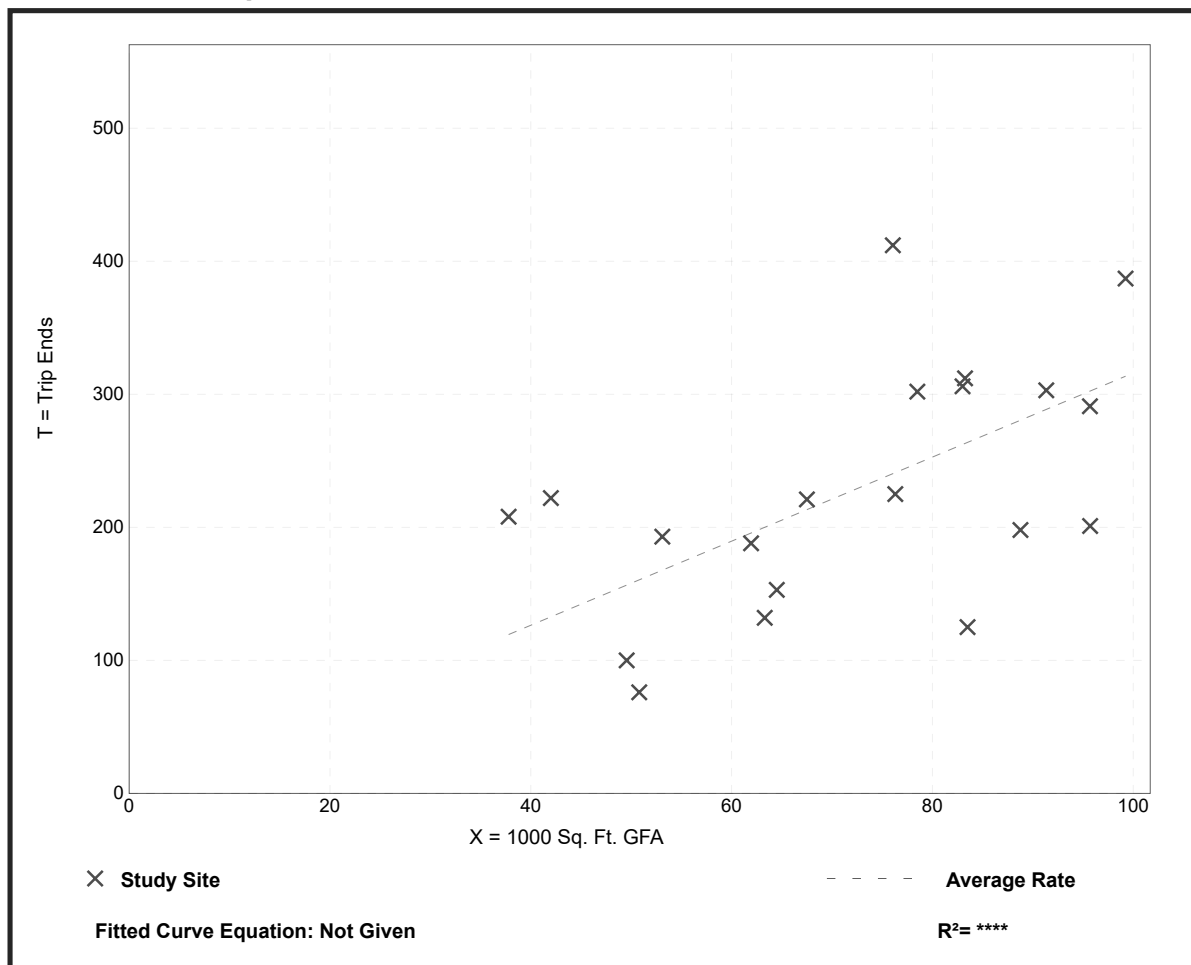
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
PM Peak Hour of Generator

Setting/Location: General Urban/Suburban
 Number of Studies: 20
 Avg. 1000 Sq. Ft. GFA: 72
 Directional Distribution: 44% entering, 56% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
3.16	1.50 - 5.50	1.11

Data Plot and Equation



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School District Office (538)

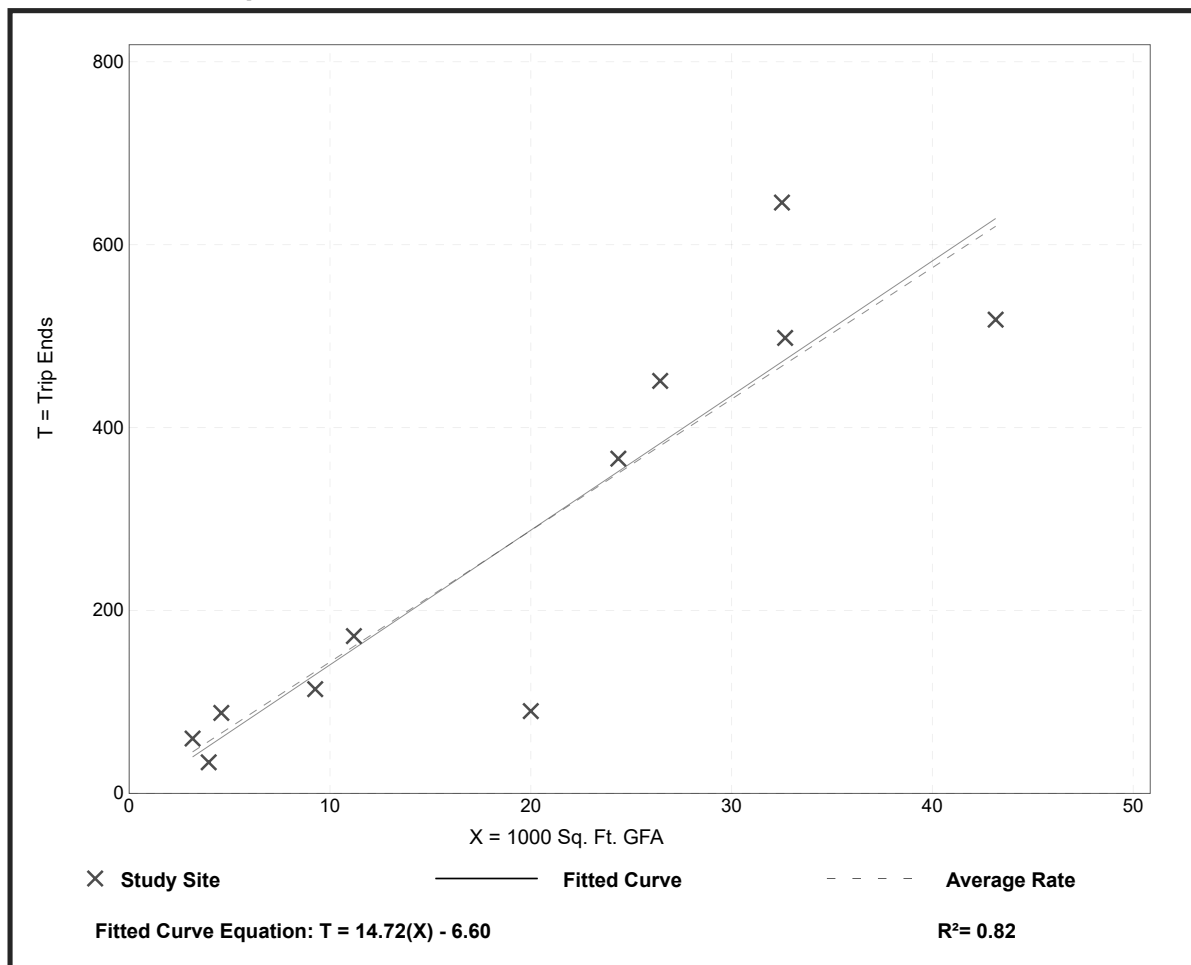
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 11
Avg. 1000 Sq. Ft. GFA: 19
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
14.37	4.50 - 19.87	4.42

Data Plot and Equation



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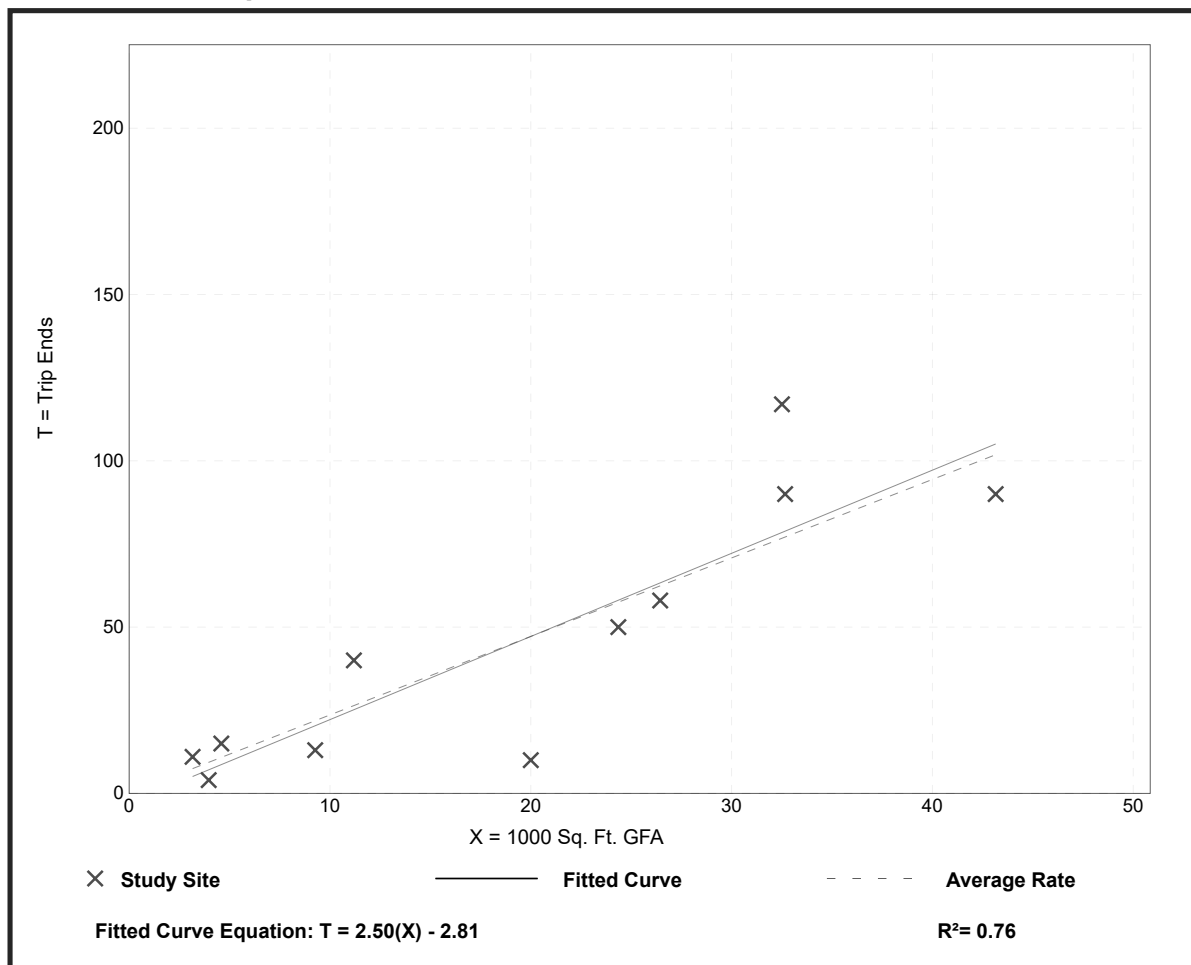
School District Office (538)

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: 11
 Avg. 1000 Sq. Ft. GFA: 19
 Directional Distribution: 76% entering, 24% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
2.36	0.50 - 3.60	0.94

Data Plot and Equation



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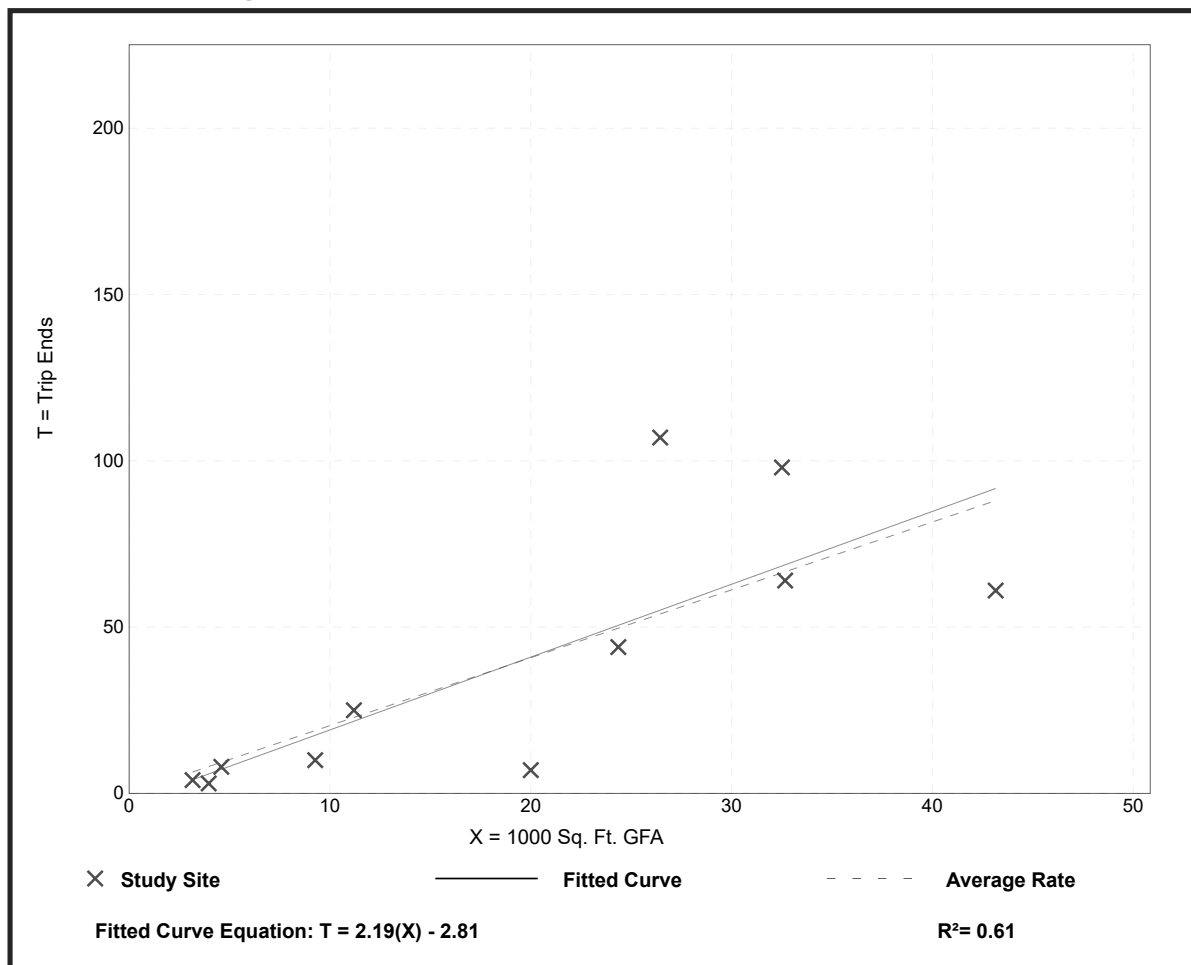
School District Office (538)

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: 11
 Avg. 1000 Sq. Ft. GFA: 19
 Directional Distribution: 17% entering, 83% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
2.04	0.35 - 4.05	1.10

Data Plot and Equation



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

HCM 6th Signalized Intersection Summary
1: 86th Ave E & 112th St E/39th Ave SW

Existing 2019 PM Peak Hour
07/19/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	686	227	297	849	16	111	13	94	17	17	8
Future Volume (veh/h)	19	686	227	297	849	16	111	13	94	17	17	8
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	21	746	247	323	923	17	121	14	102	18	18	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	377	924	306	475	1697	31	257	38	134	209	185	71
Arrive On Green	0.03	0.35	0.35	0.15	0.48	0.48	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1781	2623	868	1781	3570	66	676	187	652	483	903	347
Grp Volume(v), veh/h	21	505	488	323	459	481	237	0	0	45	0	0
Grp Sat Flow(s),veh/h/ln	1781	1777	1714	1781	1777	1859	1515	0	0	1733	0	0
Q Serve(g_s), s	0.3	11.8	11.8	4.6	8.4	8.4	5.7	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.3	11.8	11.8	4.6	8.4	8.4	6.7	0.0	0.0	0.9	0.0	0.0
Prop In Lane	1.00		0.51	1.00		0.04	0.51		0.43	0.40		0.20
Lane Grp Cap(c), veh/h	377	626	604	475	845	884	429	0	0	465	0	0
V/C Ratio(X)	0.06	0.81	0.81	0.68	0.54	0.54	0.55	0.00	0.00	0.10	0.00	0.00
Avail Cap(c_a), veh/h	525	697	672	580	871	911	740	0	0	785	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	1.00	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	9.1	13.4	13.4	9.0	8.5	8.5	17.1	0.0	0.0	14.9	0.0	0.0
Incr Delay (d2), s/veh	0.1	6.4	6.6	2.4	0.7	0.6	1.1	0.0	0.0	0.1	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	0.1	4.9	4.8	1.5	2.5	2.6	2.2	0.0	0.0	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.1	19.8	20.0	11.5	9.2	9.1	18.2	0.0	0.0	15.0	0.0	0.0
LnGrp LOS	A	B	C	B	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1014			1263			237			45	
Approach Delay, s/veh		19.7			9.7			18.2			15.0	
Approach LOS		B			A			B			B	
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		13.9	11.3	20.7		13.9	5.7	26.3				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		19.0	9.5	18.0		19.0	5.0	22.5				
Max Q Clear Time (g_c+I1), s		8.7	6.6	13.8		2.9	2.3	10.4				
Green Ext Time (p_c), s		1.0	0.3	2.4		0.1	0.0	4.8				
Intersection Summary												
HCM 6th Ctrl Delay				14.6								
HCM 6th LOS				B								

Intersection												
Int Delay, s/veh	0.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑	↑↑				↑			↑
Traffic Vol, veh/h	0	773	1	6	1124	1	0	0	5	0	0	7
Future Vol, veh/h	0	773	1	6	1124	1	0	0	5	0	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	75	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	840	1	7	1222	1	0	0	5	0	0	8
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	841	0	0	-	-	421	-	-	612
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	-	-	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	-	-	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	790	-	-	0	0	581	0	0	436
Stage 1	0	-	-	-	-	-	0	0	-	0	0	-
Stage 2	0	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	790	-	-	-	-	581	-	-	436
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.1			11.3			13.4		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1	SBT	SBR	NBLn1	EBT	EBR
Capacity (veh/h)	581	-	-	790	-	-	436	-	-	581	-	-
HCM Lane V/C Ratio	0.009	-	-	0.008	-	-	0.017	-	-	0.009	-	-
HCM Control Delay (s)	11.3	-	-	9.6	-	-	13.4	-	-	11.3	-	-
HCM Lane LOS	B	-	-	A	-	-	B	-	-	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0	-	-	0.1	-	-	0	-	-

HCM 6th Signalized Intersection Summary
1: 86th Ave E & 112th St E/39th Ave SW

Forecast 2022 PM Peak Hour Without Project
07/19/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	750	248	325	928	17	121	14	103	19	19	9
Future Volume (veh/h)	21	750	248	325	928	17	121	14	103	19	19	9
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
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	1885	1885	1885	1885	1885	1781	1781	1781	1678	1678	1678
Adj Flow Rate, veh/h	23	815	270	353	1009	18	132	15	112	21	21	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	8	8	8	15	15	15
Cap, veh/h	419	1000	331	463	1596	28	243	37	138	188	164	62
Arrive On Green	0.09	0.38	0.38	0.16	0.44	0.44	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	1795	2643	875	1795	3600	64	653	166	624	438	743	281
Grp Volume(v), veh/h	23	552	533	353	502	525	259	0	0	52	0	0
Grp Sat Flow(s),veh/h/ln	1795	1791	1728	1795	1791	1874	1444	0	0	1462	0	0
Q Serve(g_s), s	0.4	15.2	15.3	6.0	11.9	11.9	7.9	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.4	15.2	15.3	6.0	11.9	11.9	9.3	0.0	0.0	1.4	0.0	0.0
Prop In Lane	1.00		0.51	1.00		0.03	0.51		0.43	0.40		0.19
Lane Grp Cap(c), veh/h	419	678	654	463	794	830	417	0	0	414	0	0
V/C Ratio(X)	0.05	0.81	0.82	0.76	0.63	0.63	0.62	0.00	0.00	0.13	0.00	0.00
Avail Cap(c_a), veh/h	423	765	738	624	1038	1086	607	0	0	597	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	1.00	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	8.5	15.4	15.4	10.8	11.8	11.8	20.2	0.0	0.0	17.3	0.0	0.0
Incr Delay (d2), s/veh	0.1	6.1	6.4	3.8	0.8	0.8	1.5	0.0	0.0	0.1	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	0.1	6.4	6.3	2.2	4.1	4.3	3.0	0.0	0.0	0.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.6	21.5	21.8	14.6	12.7	12.7	21.8	0.0	0.0	17.4	0.0	0.0
LnGrp LOS	A	C	C	B	B	B	C	A	A	B	A	A
Approach Vol, veh/h		1108			1380			259			52	
Approach Delay, s/veh		21.4			13.2			21.8			17.4	
Approach LOS		C			B			C			B	
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		16.6	13.1	25.3		16.6	9.5	28.9				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		19.5	13.5	23.5		19.5	5.1	31.9				
Max Q Clear Time (g_c+I1), s		11.3	8.0	17.3		3.4	2.4	13.9				
Green Ext Time (p_c), s		0.9	0.6	3.6		0.2	0.0	6.5				
Intersection Summary												
HCM 6th Ctrl Delay				17.3								
HCM 6th LOS				B								

Intersection												
Int Delay, s/veh	0.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑	↑↑				↑			↑
Traffic Vol, veh/h	0	845	1	7	1228	1	0	0	5	0	0	8
Future Vol, veh/h	0	845	1	7	1228	1	0	0	5	0	0	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	75	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	0
Mvmt Flow	0	918	1	8	1335	1	0	0	5	0	0	9
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	919	0	0	-	-	460	-	-	668
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	-	-	6.94	-	-	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	-	-	3.32	-	-	3.3
Pot Cap-1 Maneuver	0	-	-	738	-	-	0	0	548	0	0	405
Stage 1	0	-	-	-	-	-	0	0	-	0	0	-
Stage 2	0	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	738	-	-	-	-	548	-	-	405
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.1			11.6			14.1		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1	SBT	SBR	NBLn1	EBT	EBR
Capacity (veh/h)	548	-	-	738	-	-	405	-	-	548	-	-
HCM Lane V/C Ratio	0.01	-	-	0.01	-	-	0.021	-	-	0.01	-	-
HCM Control Delay (s)	11.6	-	-	9.9	-	-	14.1	-	-	11.6	-	-
HCM Lane LOS	B	-	-	A	-	-	B	-	-	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0	-	-	0.1	-	-	0	-	-

HCM 6th Signalized Intersection Summary 1: 86th Ave E & 112th St E/39th Ave SW

Forecast 2022 PM Peak Hour With Project

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	750	248	334	939	17	121	19	106	55	19	9
Future Volume (veh/h)	28	750	248	334	939	17	121	19	106	55	19	9
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
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	1885	1885	1885	1885	1885	1781	1781	1781	1678	1678	1678
Adj Flow Rate, veh/h	30	815	270	363	1021	18	132	21	115	60	21	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	8	8	8	15	15	15
Cap, veh/h	416	998	330	467	1603	28	242	43	141	269	84	30
Arrive On Green	0.09	0.38	0.38	0.16	0.45	0.45	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	1795	2643	875	1795	3601	63	657	196	641	733	381	137
Grp Volume(v), veh/h	30	552	533	363	508	531	268	0	0	91	0	0
Grp Sat Flow(s),veh/h/ln	1795	1791	1728	1795	1791	1874	1495	0	0	1251	0	0
Q Serve(g_s), s	0.5	15.3	15.4	6.2	12.1	12.1	6.1	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.5	15.3	15.4	6.2	12.1	12.1	9.2	0.0	0.0	3.1	0.0	0.0
Prop In Lane	1.00		0.51	1.00		0.03	0.49		0.43	0.66		0.11
Lane Grp Cap(c), veh/h	416	676	652	467	797	834	426	0	0	384	0	0
V/C Ratio(X)	0.07	0.82	0.82	0.78	0.64	0.64	0.63	0.00	0.00	0.24	0.00	0.00
Avail Cap(c_a), veh/h	419	761	734	621	1033	1081	615	0	0	549	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	1.00	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	8.6	15.5	15.5	10.8	11.9	11.9	20.2	0.0	0.0	17.9	0.0	0.0
Incr Delay (d2), s/veh	0.1	6.3	6.5	4.5	0.9	0.8	1.5	0.0	0.0	0.3	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	0.2	6.5	6.3	2.3	4.2	4.4	3.1	0.0	0.0	0.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.7	21.8	22.0	15.3	12.7	12.7	21.8	0.0	0.0	18.3	0.0	0.0
LnGrp LOS	A	C	C	B	B	B	C	A	A	B	A	A
Approach Vol, veh/h												
1115												
Approach Delay, s/veh												
21.5												
Approach LOS												
C												
Timer - Assigned Phs												
2												
3												
4												
6												
7												
8												
Phs Duration (G+Y+Rc), s												
16.7												
13.3												
25.4												
16.7												
9.5												
29.1												
Change Period (Y+Rc), s												
4.5												
4.5												
4.5												
Max Green Setting (Gmax), s												
19.5												
13.5												
23.5												
19.5												
5.1												
31.9												
Max Q Clear Time (g_c+I1), s												
11.2												
8.2												
17.4												
5.1												
2.5												
14.1												
Green Ext Time (p_c), s												
1.0												
0.6												
3.5												
0.3												
0.0												
6.6												
Intersection Summary												
HCM 6th Ctrl Delay												
17.5												
HCM 6th LOS												
B												

HCM 6th TWSC
2: 87th Ave Ct E/Driveway & 39th Ave SW

Forecast 2022 PM Peak Hour With Project

Intersection												
Int Delay, s/veh	0.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑	↑↑				↑			↑
Traffic Vol, veh/h	0	881	1	7	1228	23	0	0	6	0	0	28
Future Vol, veh/h	0	881	1	7	1228	23	0	0	6	0	0	28
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	75	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	0
Mvmt Flow	0	958	1	8	1335	25	0	0	7	0	0	30
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	959	0	0	-	-	480	-	-	680
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	-	-	6.94	-	-	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	-	-	3.32	-	-	3.3
Pot Cap-1 Maneuver	0	-	-	713	-	-	0	0	532	0	0	398
Stage 1	0	-	-	-	-	-	0	0	-	0	0	-
Stage 2	0	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	713	-	-	-	-	532	-	-	398
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.1			11.9			14.8		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1	SBT	SBR	NBLn1	EBT	EBR
Capacity (veh/h)	532	-	-	713	-	-	398	-	-	532	-	-
HCM Lane V/C Ratio	0.012	-	-	0.011	-	-	0.076	-	-	0.012	-	-
HCM Control Delay (s)	11.9	-	-	10.1	-	-	14.8	-	-	11.9	-	-
HCM Lane LOS	B	-	-	B	-	-	B	-	-	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0	-	-	0.2	-	-	0	-	-