TETRA TECH

December 11, 2017

Mr. Jeff Schmitz
J.S. Capitol Group
155 Romeo Road, Suite 300
Rochester, Michigan 48307

Re: Proposed Premier Day Care Development
Traffic Impact Assessment
City of Rochester Hills, Michigan
200-191473-18001

Dear Mr. Schmitz:

Tetra Tech of Michigan, P.C. (Tt) has completed our traffic impact assessment related to the proposed Premier Day Care development to be located in the southeast quadrant of Adams and Tienken Roads in the City of Rochester Hills, Oakland County. Information from your office indicates that a proposed 162 student day care facility is proposed for the site. This traffic impact assessment has been completed in accordance with the requirements specified by the City of Rochester Hills and the Road Commission for Oakland County (RCOC).

Traffic Counts

Turning movement traffic counts were collected at the intersection of Adams and Tienken Roads during the weekday AM (7:00 – 9:00 a.m.) and PM (4:00 – 6:00 p.m.) peak periods on November 29, 2017. The existing turning movement traffic counts are shown in Figure 2 attached to this letter.

Background Traffic Scenario

Based on a review of historic traffic counts available on the SouthEast Michigan Council Of Governments (SEMCOG) website for Adams and Tienken Roads in the vicinity of the proposed development, traffic volumes have been relatively stable or even decreasing slightly. However, in order to provide a conservative analysis, a 0.5% annual growth rate was used in forecasting background increases in traffic, which are unrelated to your proposed development. No other proposed developments within the vicinity of your site were assumed. Based on discussions with your office, a build-out year of 2019 was assumed for this analysis. The background traffic volumes are shown in Figure 3 attached to this letter.

Tetra Tech of Michigan, P.C.
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Trip Generation

Using the information and methodologies specified in the latest version of *Trip Generation (10th Edition)* published by the Institute of Transportation Engineers (ITE), Tt forecast the weekday AM and PM peak hour trips associated with the proposed Premier Day Care development. The results of the trip generation forecasts for the proposed site are provided below in Table 1.

Table 1
ITE Trip Generation for Proposed Premier Day Care Development

Land Use	Land Use Code	Size	AM Peak Hour			PM Peak Hour			Week Day
			In	Out	Total	In	Out	Total	
Day Care Center	565	162 students	67	59	126	60	68	128	663
TOTAL TRIPS			**67**	**59**	**126**	**60**	**68**	**128**	**663**

Trip Distribution

The existing traffic volumes at the intersection of Adams and Tienken Roads were used to develop a trip distribution model for the AM and PM peak hours for traffic generated by the proposed development. The existing traffic patterns indicate the following probable distribution for the proposed development:

AM Peak Hour
37% from and 18% to the north
17% from and 39% to the south
31% from and 18% to the east
15% from and 25% to the west

PM Peak Hour
26% from and 37% to the north
30% from and 24% to the south
25% from and 27% to the east
19% from and 12% to the west

The proposed trip distribution for the site is shown in Figure 4 attached to this letter. The background traffic volumes were combined with the site generated traffic volumes to obtain the total future traffic volumes, which are shown in Figure 5 attached to this letter.

Level of Service Analysis

Level of service (LOS) analyses for existing, background, and total future traffic conditions for the AM and PM peak hours were performed for the intersection of Adams and Tienken Roads. The proposed site driveways onto Adams Road and Tienken Road were also analyzed under total future traffic conditions for the AM and PM peak hours.

According to the most recent edition (6th Edition) of the Highway Capacity Manual, level of service is a qualitative measure describing operational conditions of a traffic stream or intersection. Level of service ranges from A to F, with LOS A being the best. LOS D is generally considered to be acceptable. Tables 2 and 3 present the criteria for defining the various levels of service for unsignalized and signalized intersections, respectively.

Table 2
Level of Service Criteria (Unsignalized Intersection)

Level of Service	Average Stopped Delay/Vehicle (seconds)
A	≤10
B	> 10 and ≤ 15
C	> 15 and ≤ 25
D	> 25 and ≤ 35
E	> 35 and ≤ 50
F	> 50

Note: LOS "D" is considered acceptable in urban/suburban areas.

Table 3
Level of Service Criteria (Signalized Intersection)

Level of Service	Average Stopped Delay/Vehicle (seconds)
A	≤10
B	> 10 and ≤ 20
C	> 20 and ≤ 35
D	> 35 and ≤ 55
E	> 55 and ≤ 80
F	> 80

Note: LOS "D" is considered acceptable in urban/suburban areas.

The results of the level of service analyses for the intersection of Adams and Tienken Roads are summarized in Tables 4 and 5, and the results for the proposed site driveways are summarized in Tables 6 (Adams Road driveway) and 7 (Tienken Road driveway).

Signalized Intersection of Adams and Tienken Roads

The results of the level of service analysis for the intersection of Adams and Tienken Roads indicate that under existing conditions, all approaches to the intersection operate at a LOS C or better during both the AM and PM peak hours, except for the eastbound approach which operates at a LOS E during the AM peak hour and a LOS F during the PM peak hour, and the westbound approach which operates at a LOS F during both the AM and PM peak hours. The overall intersection operates at a LOS E during both the AM and PM peak hours.

With the addition of background traffic, the intersection would continue to operate in a manner similar to the existing condition during both the AM and PM peak hours. With the background improvement of optimizing the traffic signal timing during the both the AM and PM peak hours, all

approaches to the intersection would operate at a LOS D. The overall intersection would operate at a LOS D during both the AM and PM peak hours.

While the intersection currently runs with SCATS signal timing programming, which continually monitors traffic conditions and updates the phase lengths accordingly, there are still maximums programmed into the timing that limit individual phase lengths. These current maximums favor the Adams Road approaches over the Tienken Road approaches, resulting in the operational results presented below. The proposed timing improvements consist of modifying phase length maximums to allow more time to be given to the Tienken Road approaches.

With the addition of site generated traffic and considering the recommended background improvement of optimizing the traffic signal timing during both the AM and PM peak hours, all approaches to the intersection would continue to operate at a LOS D. The overall intersection would continue to operate at a LOS D during both the AM and PM peak hours.

The 95th percentile (maximum) anticipated queue lengths at the intersection of Adams and Tienken Roads were reviewed under Total Future conditions for the AM and PM peak hours for the Tienken Road westbound left-turn movement. This review was performed to determine if vehicle queues from the westbound left-turn movement would become long enough to prevent access to the site driveway on Tienken Road. The 95th percentile westbound left-turn queue would be 215 feet during the AM peak hour, and the driveway is proposed to be approximately 300 feet from the intersection. Therefore, it is not anticipated that westbound left-turn vehicle queues from the Adams and Tienken Roads intersection would prevent access into the site driveway on Tienken Road. The queue reports are included at the end of the operational results attached to this memo.

The operational results for the intersection of Adams and Tienken Roads are presented in Tables 4 and 5.

Table 4
AM Peak Hour
Level of Service Analysis for Adams and Tienken Roads

Approach	Existing	Background	Background w/ Imp.[1]	Future[2]
Northbound Adams Road	C (28.8)	C (29.2)	D (37.0)	D (38.6)
Southbound Adams Road	C (28.7)	C (29.0)	D (53.9)	D (54.3)
Eastbound Tienken Road	E (65.6)	E (66.6)	D (55.0)	D (54.9)
Westbound Tienken Road	F (161.4)	F (164.2)	D (53.8)	D (54.9)
Overall	**E (77.1)**	**E (78.3)**	**D (51.0)**	**D (51.7)**

(XX.X) Average seconds of delay per vehicle.
1. Includes optimizing the traffic signal timing via phase length adjustments.
2. Future condition assumes background improvements.

Table 5
PM Peak Hour
Level of Service Analysis for Adams and Tienken Roads

Approach	Existing	Background	Background w/ Imp.[1]	Future[2]
Northbound Adams Road	C (25.8)	C (26.1)	D (49.2)	D (54.5)
Southbound Adams Road	C (31.7)	C (32.3)	D (41.9)	D (51.1)
Eastbound Tienken Road	F (145.6)	F (149.1)	D (54.7)	D (54.8)
Westbound Tienken Road	F (116.1)	F (119.1)	D (53.9)	D (55.0)
Overall	**E (72.7)**	**E (74.4)**	**D (49.5)**	**D (53.8)**

(XX.X) Average seconds of delay per vehicle.
1. Includes optimizing the traffic signal timing via phase length adjustments.
2. Future condition assumes background improvements.

Unsignalized Intersection of Adams Road and the Premier Day Care Site Driveway

The Premier Day Care site driveway onto Adams Road will be located on the east side of Adams Road approximately 250' south of Tienken Road, and will be a right-in\right-out only driveway. The results of the level of service analysis for this intersection indicate that under future traffic conditions the Premier Day Care site driveway approach would operate at a LOS B during the AM peak hour and at a LOS C during the PM peak hour. All other approaches would operate at LOS A during both peak hours. The operational results for the intersection of Adams Road and the Premier Day Care site driveway are presented in Table 6.

The Road Commission for Oakland County requirements for right turn deceleration lanes at driveways were evaluated for the Premier Day Care site driveway onto Adams Road. An evaluation of left-turn lane warrants was not performed since there is an existing left-turn lane at the driveway location and the driveway will be constructed to prohibit left-turns from entering the site. The daily traffic volume on Adams Road in the vicinity of the Premier Day Care site driveway is forecast to be approximately 20,000 vehicles per day. At the Premier Day Care site driveway, the peak hour right turn volume would be 18. Based on RCOC standards, only a right turn deceleration taper is warranted at this driveway. The RCOC requirements can be found in the Appendix materials attached to this memo.

Table 6
Level of Service Analysis for Adams Road and the Premier Day Care Site Driveway

Approach	AM Peak Hour	PM Peak Hour
Northbound Adams Road	Free[1]	Free[1]
Southbound Adams Road	Free[1]	Free[1]
Westbound Premier Day Care Driveway	B (11.0)	C (17.3)

(XX.X) Average seconds of delay per vehicle.
1. Northbound and southbound through movements are unopposed ("free") and experiences no delay.

Unsignalized Intersection of Tienken Road and the Premier Day Care Site Driveway

The Premier Day Care site driveway onto Tienken Road will be located on the south side of Tienken Road approximately 300' east of Adams Road. The results of the level of service analysis for this intersection indicate that under future traffic conditions the Premier Day Care site driveway approach would operate at LOS C during the AM peak hour and at a LOS D during the PM peak hour. All other approaches would operate at LOS A during both peak hours. The operational results for the intersection of Tienken Road and the Premier Day Care site driveway are presented in Table 7.

A review of the anticipated 95th percentile queue lengths for the left-turn movements (both the westbound entering and the northbound exiting left-turn movements) at the site driveway on Tienken Road was performed. The results indicate that vehicle queues for both movements during both peak periods would be less than one vehicle (less than 25 feet). The 95th percentile queue length information is included in the operational results for the driveway.

The Road Commission for Oakland County requirements for right turn deceleration lanes at driveways were evaluated for the Premier Day Care site driveway onto Adams Road. An evaluation of left-turn lane warrants was not performed since there is an existing left-turn lane at the driveway location, and your office has indicated that in your discussions with the RCOC, you have agreed to extend the storage length for the westbound left-turn lane along Tienken Road. The daily traffic volume on Tienken Road in the vicinity of the Premier Day Care site driveway is forecast to be approximately 9,400 vehicles per day. At the Premier Day Care site driveway, the peak hour right turn volume would be 35. Based on RCOC standards, only a right turn deceleration taper is warranted at this driveway. The RCOC requirements can be found in the Appendix materials attached to this memo.

Table 7
Level of Service Analysis for Tienken Road and the Premier Day Care Site Driveway

Approach	AM Peak Hour	PM Peak Hour
Eastbound Tienken Road	Free[1]	Free[1]
Westbound Tienken Road	A (8.5)[2]	A (9.7)[2]
Northbound Premier Day Care Driveway	C (24.4)	D (32.4)

(XX.X) Average seconds of delay per vehicle.
1. Results are for eastbound right-turn movement; through movement is unopposed ("free") and experiences no delay.
2. Results are for westbound left-turn movement; through movement is unopposed ("free") and experiences no delay.

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Conclusions and Recommendations

The proposed Premier Day Care development consists of a 162 student day care facility. The proposed development will have access to Adams Road via a right-in\right-out only driveway located approximately 250 feet south of Tienken Road, and access to Tienken Road via a full-access driveway located approximately 300 feet east of Adams Road.

The proposed development is forecast to generate 126 trips during the AM peak hour (67 inbound and 59 outbound from the site) and 128 trips during the PM peak hour (60 inbound and 68 outbound from the site).

An operational analysis of the signalized intersection of Adams and Tienken Roads was performed for the Existing, Background and Total Future conditions. This analysis indicated that while the intersection is currently operating at unacceptable levels, optimizing the traffic signal timing would allow all approaches to the intersection to operate at a LOS D during both the AM and PM peak hours under both Background and Total Future conditions.

The unsignalized intersections of Adams and Tienken Roads with the Premier Day Care site driveways were performed for Total Future conditions. The operational reviews of the site driveways indicated that they would operate at acceptable levels during both the AM and PM peak hours.

A review of RCOC standards indicates that only right-turn tapers are warranted at the site driveways. Your office has indicated it has already agreed with the RCOC to extend the storage for the existing left-turn lane for westbound Tienken Road at Adams Road.

We trust that this letter fulfills your current transportation needs regarding your site. If you have any questions, please feel free to call our office at (810)-220-2112.

Sincerely,

Kyle W. Ramakers, P.E., PTOE
Transportation Engineer

Attachments

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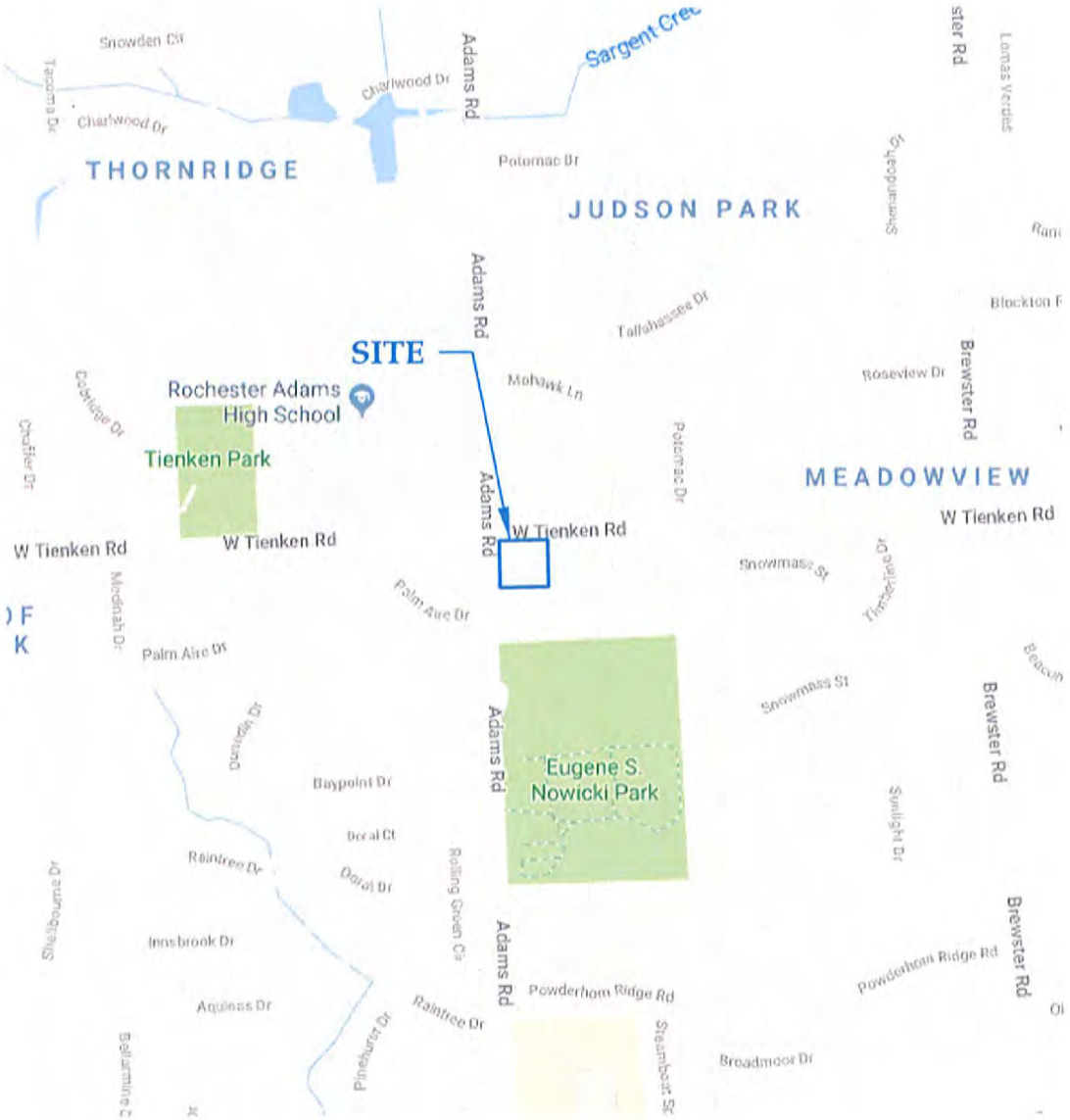
REPORT FIGURES

N

NO SCALE



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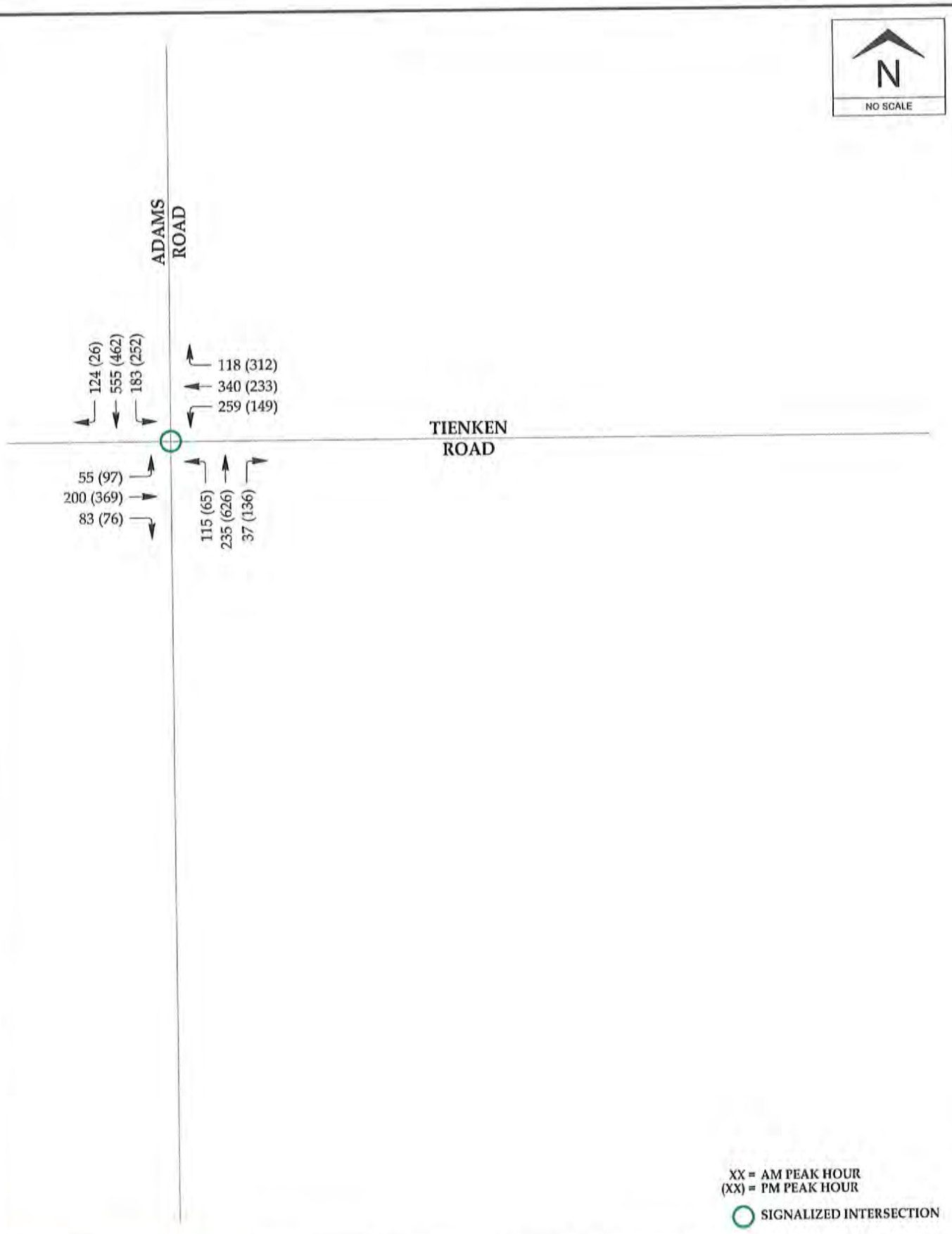
SITE LOCATION MAP

FIGURE 1



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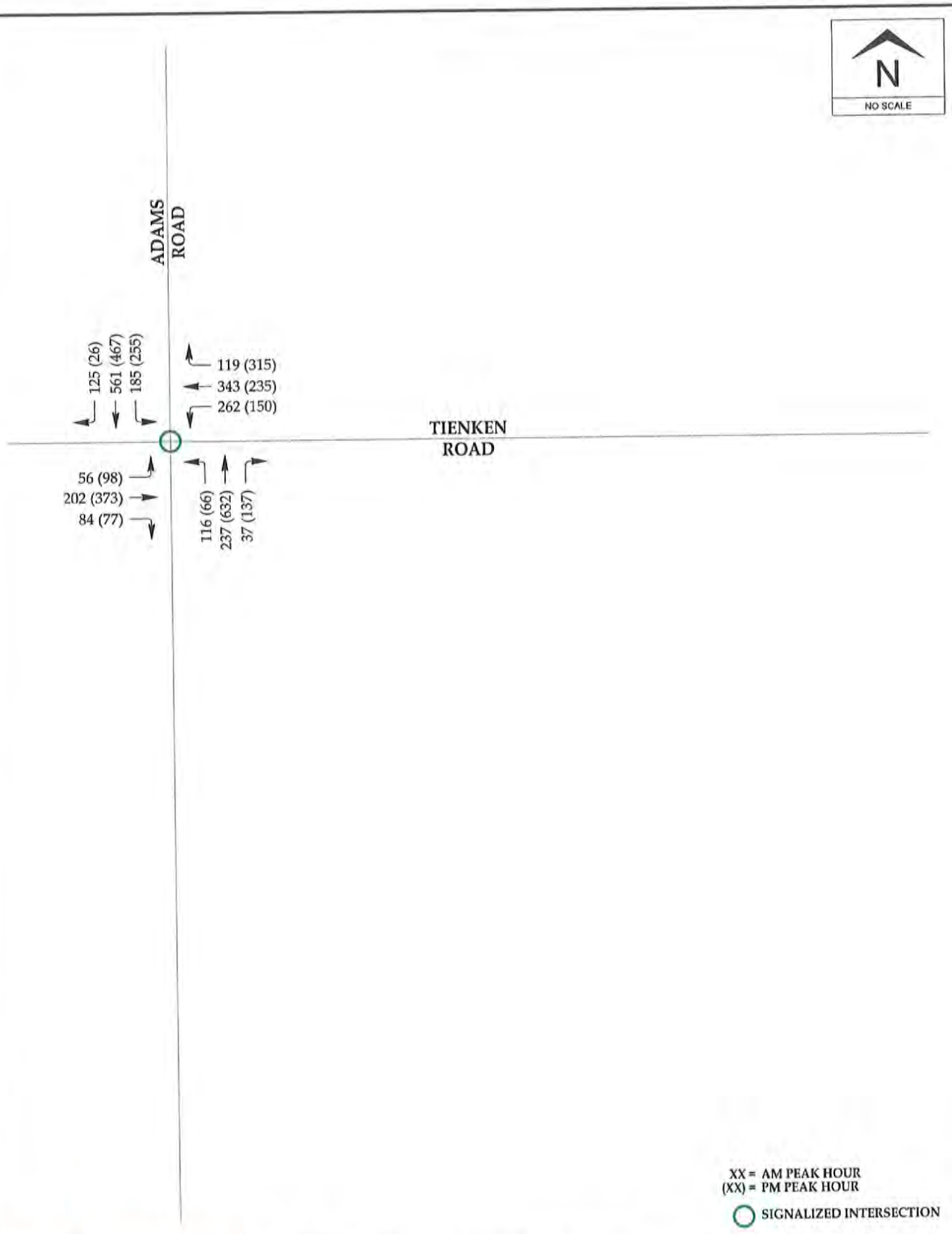
2017 EXISTING AM (PM) PEAK HOUR TRAFFIC VOLUMES

FIGURE 2



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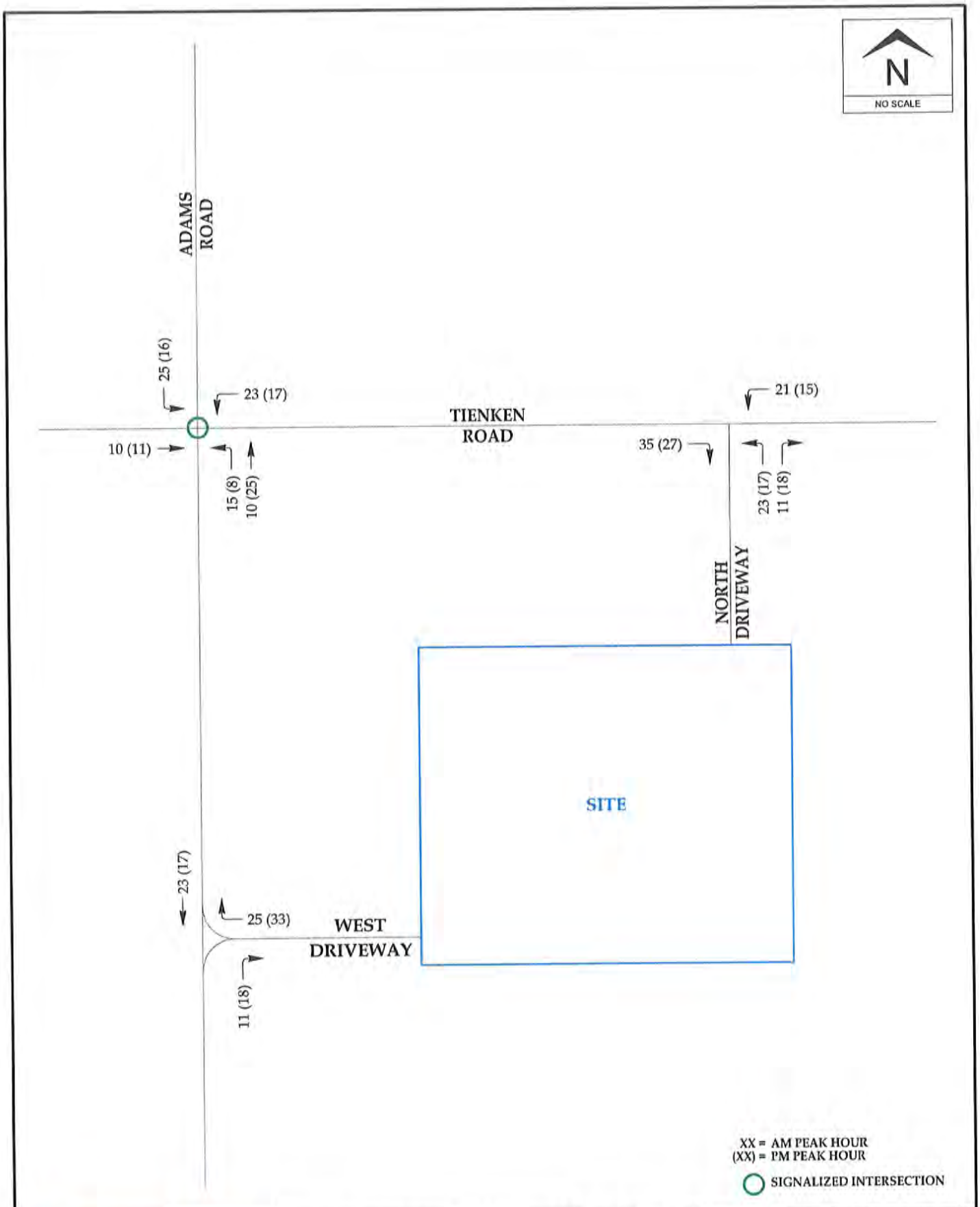
2019 BACKGROUND AM (PM) PEAK HOUR TRAFFIC VOLUMES

FIGURE 3



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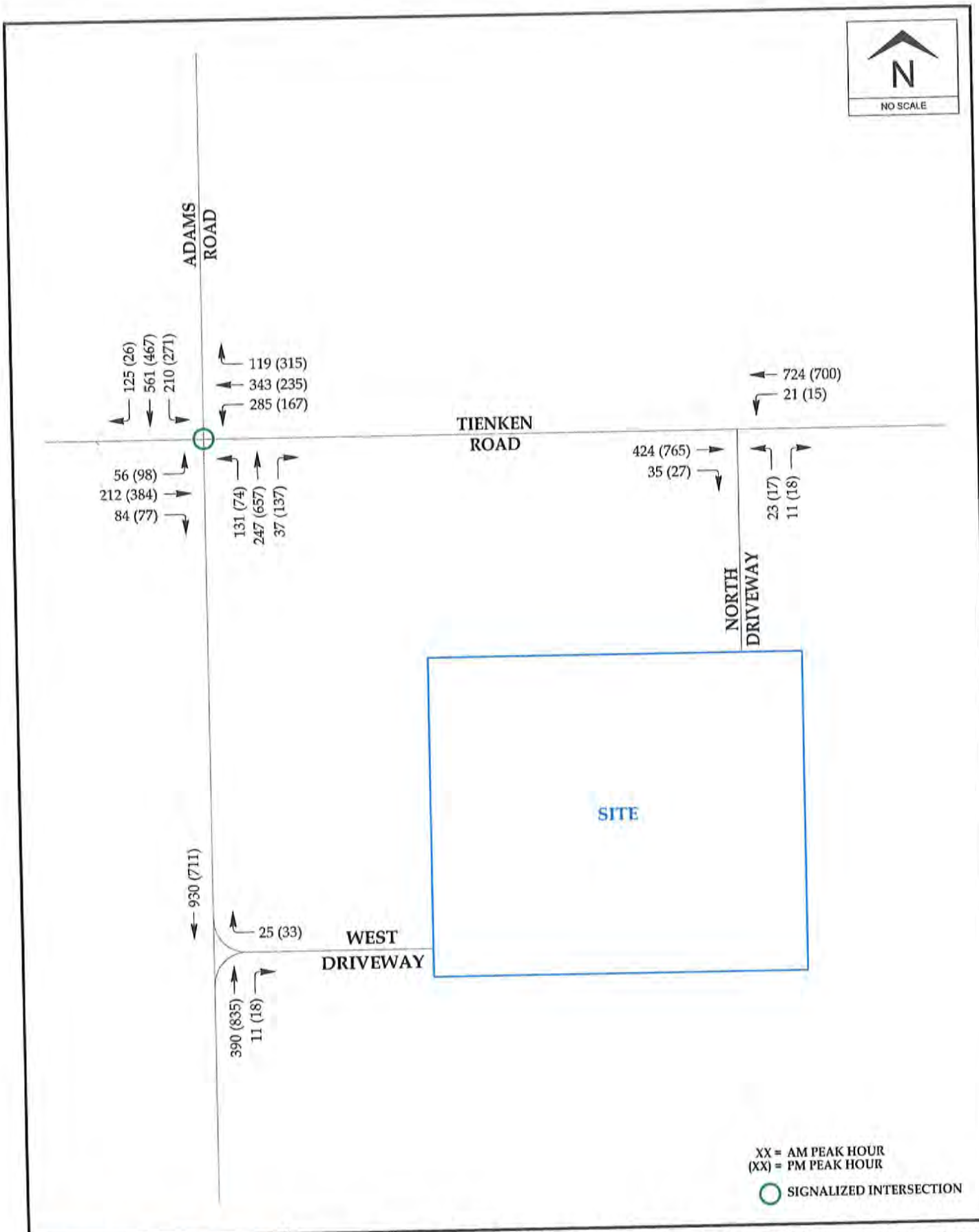
SITE GENERATED AM (PM) PEAK HOUR TRAFFIC VOLUMES

FIGURE 4



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2019 TOTAL FUTURE AM (PM) PEAK HOUR TRAFFIC VOLUMES

FIGURE 5

TRAFFIC COUNTS

AND PROJECTIONS

TRIP GENERATION FORECASTS

Growth Rate: 0.5%

Buildout Year: 2019
Count Year: 2017

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
North Road & East Street	A.M. Peak 11/29/17		PHF		0.74			0.79			0.75			0.90	
A.M.		2017	Existing	**55**	**200**	**83**	**259**	**340**	**118**	**115**	**235**	**37**	**183**	**555**	**124**
		2019	Background	56	202	84	262	343	119	116	237	37	185	561	125
		Total Background		**56**	**202**	**84**	**262**	**343**	**119**	**116**	**237**	**37**	**185**	**561**	**125**
		Site Generated			10		23			15	10		25		
		Total Future		**56**	**212**	**84**	**285**	**343**	**119**	**131**	**247**	**37**	**210**	**561**	**125**

Intersection	Time period	Year	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
North Road & East Street	A.M. Peak 11/29/17		PHF		0.93			0.96			0.92			0.97	
P.M.		2017	Existing	**97**	**369**	**76**	**149**	**233**	**312**	**65**	**626**	**136**	**252**	**462**	**26**
		2019	Background	98	373	77	150	235	315	66	632	137	255	467	26
		Total Background		**98**	**373**	**77**	**150**	**235**	**315**	**66**	**632**	**137**	**255**	**467**	**26**
		Site Generated			11		17			8	25		16		
		Total Future		**98**	**384**	**77**	**167**	**235**	**315**	**74**	**657**	**137**	**271**	**467**	**26**

File Name: C:\Users\Owner\Documents\TDC\Clients\TetraTech\Rochester Hills\TMC_1 Adams & Tienken_11-29-17.ppd
Start Date: 11/29/2017
Start Time: 7:00:00 AM
Site Code: TMC_1
Comment 1: Project: Rocheste Hills Traffic Study
Comment 2: Type: 4 Hr. Video Turning Movement Count
Comment 3: Weather: Clear, Dry Deg's 40's
Comment 4: Count By: Miovision Video VCU 1US SW

Start Time	Adams Road Southbound				Tienken Road Westbound				Adams Road Northbound				Tienken Road Eastbound				15 Minute Totals	60 Minute Totals	Peak Hour Periods
	Rgt	Thru	Left	Peds	Rgt	Thru	Left	Peds	Rgt	Thru	Left	Peds	Rgt	Thru	Left	Peds			
07:00 AM	53	114	40	0	24	101	31	0	6	60	51	0	22	44	12	1	558		
07:15 AM	52	127	60	0	26	84	45	0	12	72	45	0	26	58	30	4	637	**2304**	**7:00 - 8:00**
07:30 AM	12	150	39	0	30	76	72	0	11	50	13	0	15	54	6	0	528		
07:45 AM	7	164	44	0	38	79	111	0	8	53	6	0	20	44	7	0	581	2304	7:00 - 8:00
08:00 AM	5	148	46	0	46	85	75	0	12	53	11	0	28	45	1	0	555	2301	7:15 - 8:15
08:15 AM	15	158	53	0	26	67	86	0	20	51	10	0	24	48	3	0	561	2225	7:30 - 8:30
08:30 AM	8	158	69	0	49	80	62	0	21	58	15	0	12	55	5	0	592	2289	7:45 - 8:45
08:45 AM	6	153	72	0	37	62	67	0	22	60	11	0	18	35	7	0	550	2258	8:00 - 9:00
04:00 PM	6	112	52	0	70	49	38	0	37	161	15	0	20	74	12	0	646		
04:15 PM	7	96	64	0	75	62	40	0	28	152	14	3	20	90	14	4	662	**2803**	**4:45 - 5:45**
04:30 PM	5	93	61	0	57	49	36	0	30	167	12	0	11	75	14	0	610		
04:45 PM	10	111	65	1	74	61	44	0	31	156	18	1	17	96	20	0	703	2621	4:00 - 5:00
05:00 PM	8	119	63	1	80	59	37	1	42	150	17	1	21	78	28	0	702	2677	4:15 - 5:15
05:15 PM	4	120	64	0	80	66	34	0	28	148	13	0	13	105	28	0	703	2718	4:30 - 5:30
05:30 PM	4	112	60	0	78	47	34	0	35	172	17	0	25	90	21	0	695	2803	4:45 - 5:45
05:45 PM	5	91	74	0	88	47	44	0	40	144	9	0	16	90	33	0	681	2781	5:00 - 6:00
TOTALS:	**207**	**2026**	**926**	**2**	**878**	**1074**	**856**	**1**	**383**	**1707**	**277**	**5**	**308**	**1081**	**241**	**9**	**9964**		

	Adams Road Southbound				Tienken Road Westbound				Adams Road Northbound				Tienken Road Eastbound					
	Rgt	Thru	Left	Peds	Rgt	Thru	Left	Peds	Rgt	Thru	Left	Peds	Rgt	Thru	Left	Peds		
AM Peak	124	555	183	0	118	340	259	0	37	235	115	0	83	200	55	5	**2304**	Check **7:00 - 8:00**
AM PHF			0.90				0.79				0.75				0.74			
PM Peak	26	462	252	2	312	233	149	1	136	626	65	2	76	369	97	0	**2803**	Check **4:45 - 5:45**
PM PHF			0.97				0.96				0.92				0.93			

Day Care Center
(565)

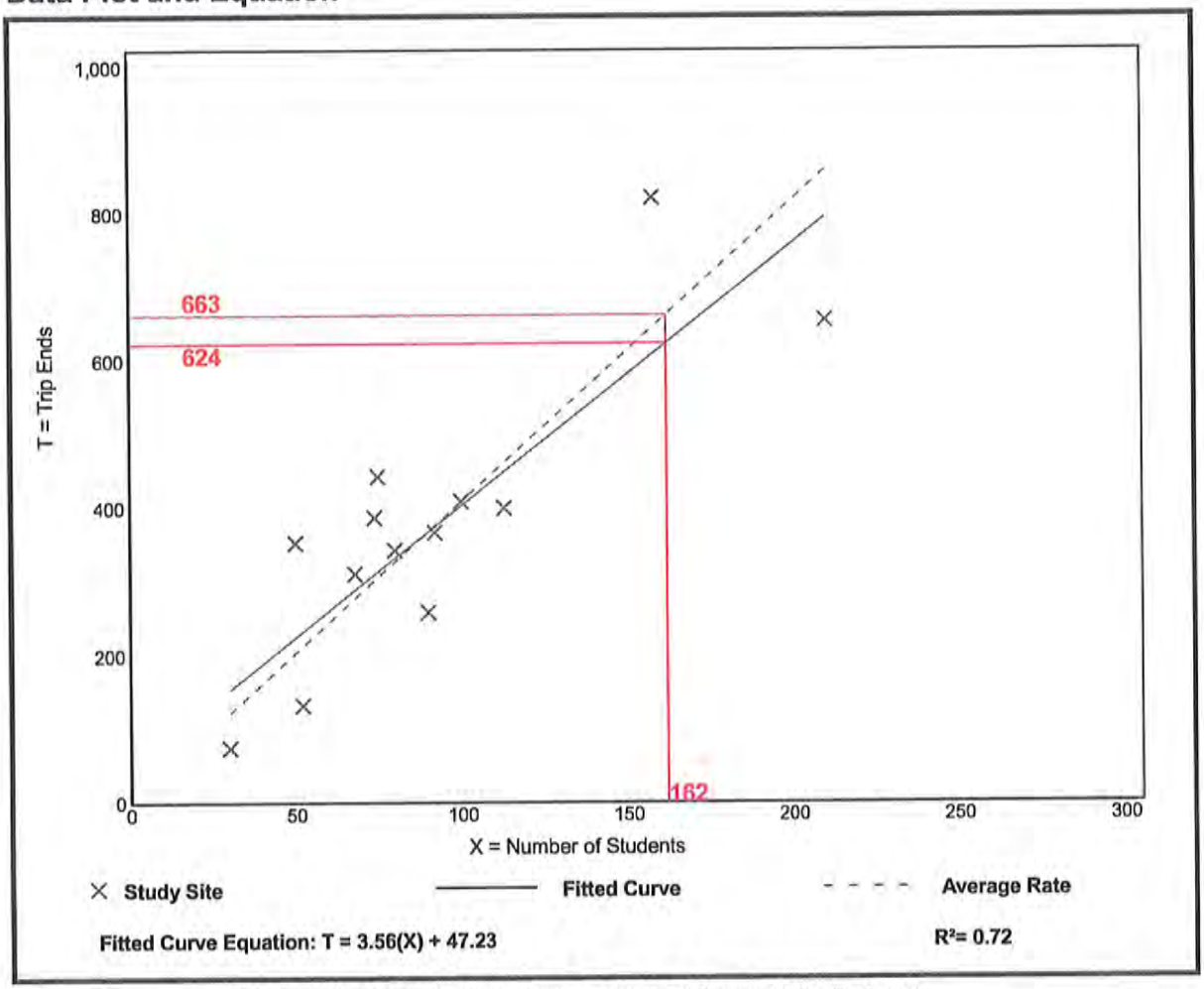
Vehicle Trip Ends vs: **Students**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 14
Avg. Num. of Students: 89
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
4.09	2.50 - 7.06	1.21

Data Plot and Equation



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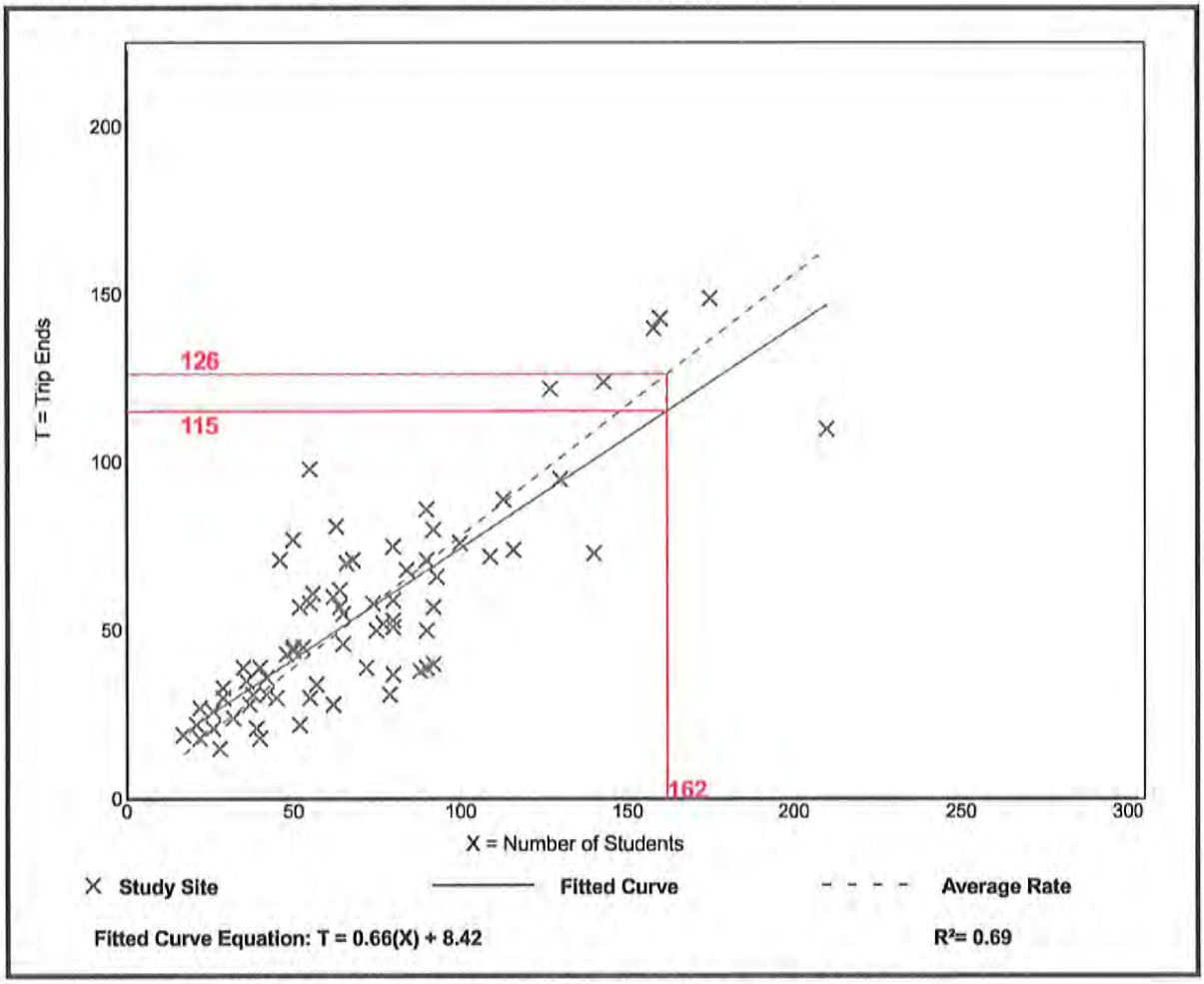
Day Care Center
(565)

Vehicle Trip Ends vs: **Students**
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: 75
Avg. Num. of Students: 71
Directional Distribution: 53% entering, 47% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.78	0.39 - 1.78	0.25

Data Plot and Equation



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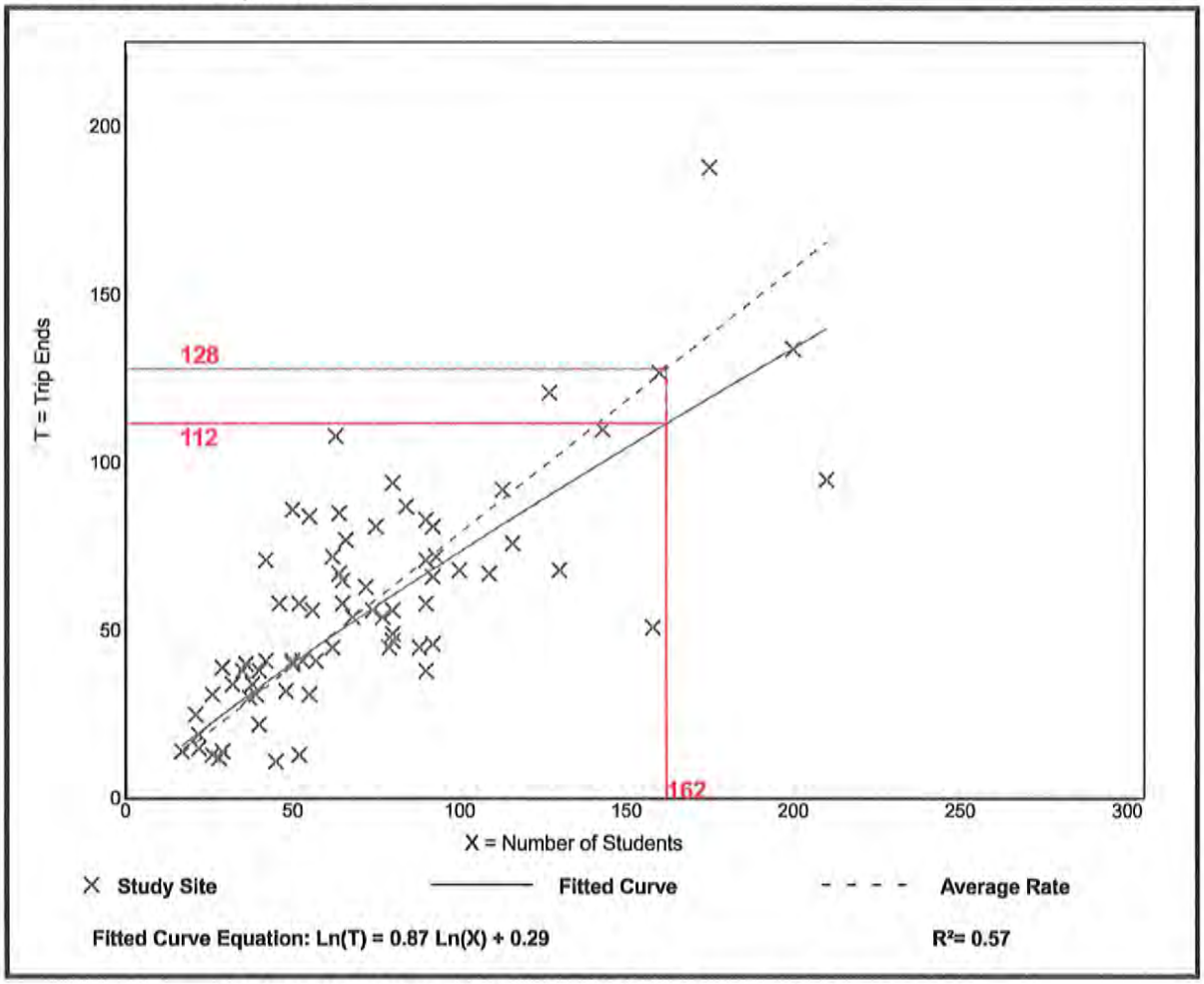
Day Care Center
(565)

Vehicle Trip Ends vs: **Students**
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: 75
Avg. Num. of Students: 72
Directional Distribution: 47% entering, 53% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.79	0.24 - 1.72	0.30

Data Plot and Equation



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LEVEL OF SERVICE

OUTPUT REPORTS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	200	83	259	340	118	115	235	37	183	555	124
Future Volume (veh/h)	55	200	83	259	340	118	115	235	37	183	555	124
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	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	74	270	112	328	430	149	153	313	49	203	617	138
Peak Hour Factor	0.74	0.74	0.74	0.79	0.79	0.79	0.75	0.75	0.75	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	340	298	253	357	299	253	299	886	751	511	886	751
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.05	0.45	0.45	0.05	0.45	0.45
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Grp Volume(v), veh/h	74	270	112	328	430	149	153	313	49	203	617	138
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Q Serve(g_s), s	0.2	16.2	7.3	15.7	18.2	10.0	0.0	12.5	2.0	0.0	30.1	6.0
Cycle Q Clear(g_c), s	0.2	16.2	7.3	15.7	18.2	10.0	0.0	12.5	2.0	0.0	30.1	6.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	340	298	253	357	299	253	299	886	751	511	886	751
V/C Ratio(X)	0.22	0.90	0.44	0.92	1.44	0.59	0.51	0.35	0.07	0.40	0.70	0.18
Avail Cap(c_a), veh/h	376	299	253	392	299	253	299	886	751	511	886	751
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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.4	50.1	46.3	48.2	50.9	47.4	42.9	21.6	18.7	27.1	26.4	19.8
Incr Delay (d2), s/veh	0.3	29.1	1.2	25.0	216.1	3.6	1.5	1.1	0.2	0.5	4.5	0.5
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	1.9	10.2	3.1	11.9	26.7	4.3	4.3	5.8	0.8	4.3	14.4	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.7	79.1	47.5	73.2	267.0	51.0	44.4	22.7	18.9	27.6	30.9	20.3
LnGrp LOS	D	E	D	E	F	D	D	C	B	C	C	C
Approach Vol, veh/h		456			907			515			958	
Approach Delay, s/veh		65.6			161.4			28.8			28.7	
Approach LOS		E			F			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.3	60.0	23.7	24.0	12.3	60.0	23.7	24.0
Change Period (Y+Rc), s	* 6	* 6	* 5.8	* 5.8	* 6	* 6	* 5.8	* 5.8
Max Green Setting (Gmax), s	* 4	* 54	* 20	* 18	* 4	* 54	* 20	* 18
Max Q Clear Time (g_c+I1), s	2.0	14.5	17.7	18.2	2.0	32.1	2.2	20.2
Green Ext Time (p_c), s	0.1	1.9	0.3	0.0	0.1	4.2	0.1	0.0

Intersection Summary	
HCM 6th Ctrl Delay	77.1
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	202	84	262	343	119	116	237	37	185	561	125
Future Volume (veh/h)	56	202	84	262	343	119	116	237	37	185	561	125
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	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	76	273	114	332	434	151	155	316	49	206	623	139
Peak Hour Factor	0.74	0.74	0.74	0.79	0.79	0.79	0.75	0.75	0.75	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	346	299	253	361	299	253	290	886	751	503	886	751
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.05	0.45	0.45	0.05	0.45	0.45
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Grp Volume(v), veh/h	76	273	114	332	434	151	155	316	49	206	623	139
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Q Serve(g_s), s	0.3	16.4	7.5	16.0	18.2	10.1	0.0	12.6	2.0	0.0	30.6	6.0
Cycle Q Clear(g_c), s	0.3	16.4	7.5	16.0	18.2	10.1	0.0	12.6	2.0	0.0	30.6	6.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	346	299	253	361	299	253	290	886	751	503	886	751
V/C Ratio(X)	0.22	0.91	0.45	0.92	1.45	0.60	0.53	0.36	0.07	0.41	0.70	0.19
Avail Cap(c_a), veh/h	376	299	253	391	299	253	290	886	751	503	886	751
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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.1	50.1	46.3	48.1	50.9	47.5	43.8	21.6	18.7	27.6	26.6	19.8
Incr Delay (d2), s/veh	0.3	30.9	1.3	25.7	221.8	3.8	1.9	1.1	0.2	0.5	4.7	0.5
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	1.9	10.5	3.1	12.1	27.2	4.4	4.4	5.8	0.8	4.4	14.6	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.4	81.0	47.6	73.7	272.7	51.3	45.7	22.7	18.9	28.2	31.2	20.3
LnGrp LOS	D	F	D	E	F	D	D	C	B	C	C	C
Approach Vol, veh/h		463			917			520			968	
Approach Delay, s/veh		66.6			164.2			29.2			29.0	
Approach LOS		E			F			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.9	60.0	24.1	24.0	11.9	60.0	24.1	24.0
Change Period (Y+Rc), s	* 6	* 6	* 5.8	* 5.8	* 6	* 6	* 5.8	* 5.8
Max Green Setting (Gmax), s	* 4	* 54	* 20	* 18	* 4	* 54	* 20	* 18
Max Q Clear Time (g_c+I1), s	2.0	14.6	18.0	18.4	2.0	32.6	2.3	20.2
Green Ext Time (p_c), s	0.1	1.9	0.2	0.0	0.1	4.2	0.1	0.0

Intersection Summary	
HCM 6th Ctrl Delay	78.3
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	202	84	262	343	119	116	237	37	185	561	125
Future Volume (veh/h)	56	202	84	262	343	119	116	237	37	185	561	125
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	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	76	273	114	332	434	151	155	316	49	206	623	139
Peak Hour Factor	0.74	0.74	0.74	0.79	0.79	0.79	0.75	0.75	0.75	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	185	320	271	365	497	422	364	648	549	555	648	549
Arrive On Green	0.07	0.16	0.16	0.16	0.25	0.25	0.16	0.33	0.33	0.16	0.33	0.33
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Grp Volume(v), veh/h	76	273	114	332	434	151	155	316	49	206	623	139
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Q Serve(g_s), s	0.7	16.2	7.4	16.3	25.4	8.9	4.0	15.4	2.4	0.0	37.3	7.3
Cycle Q Clear(g_c), s	0.7	16.2	7.4	16.3	25.4	8.9	4.0	15.4	2.4	0.0	37.3	7.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	185	320	271	365	497	422	364	648	549	555	648	549
V/C Ratio(X)	0.41	0.85	0.42	0.91	0.87	0.36	0.43	0.49	0.09	0.37	0.96	0.25
Avail Cap(c_a), veh/h	185	464	393	455	799	677	364	648	549	555	648	549
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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.3	48.9	45.2	47.8	43.0	36.8	43.5	32.2	27.8	31.2	39.5	29.5
Incr Delay (d2), s/veh	1.5	10.1	1.0	19.5	6.3	0.5	0.8	2.6	0.3	0.4	27.0	1.1
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	2.2	8.7	3.1	11.4	12.9	3.6	4.0	7.5	1.0	4.7	22.0	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.8	59.0	46.2	67.2	49.3	37.4	44.3	34.8	28.1	31.6	66.5	30.6
LnGrp LOS	D	E	D	E	D	D	D	C	C	C	E	C
Approach Vol, veh/h		463			917			520			968	
Approach Delay, s/veh		55.0			53.8			37.0			53.9	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.6	45.5	24.6	25.3	24.6	45.5	13.8	36.1
Change Period (Y+Rc), s	* 6	* 6	* 5.8	* 5.8	* 6	* 6	* 5.8	* 5.8
Max Green Setting (Gmax), s	* 4	* 40	* 25	* 28	* 4	* 40	* 4.2	* 49
Max Q Clear Time (g_c+I1), s	2.0	17.4	18.3	18.2	6.0	39.3	2.7	27.4
Green Ext Time (p_c), s	0.1	1.8	0.5	1.3	0.0	0.1	0.0	3.0

Intersection Summary	
HCM 6th Ctrl Delay	51.0
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	212	84	285	343	119	131	247	37	210	561	125
Future Volume (veh/h)	56	212	84	285	343	119	131	247	37	210	561	125
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	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	76	286	114	361	434	151	175	329	49	233	623	139
Peak Hour Factor	0.74	0.74	0.74	0.79	0.79	0.79	0.75	0.75	0.75	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	224	332	282	392	497	422	324	648	549	506	648	549
Arrive On Green	0.09	0.17	0.17	0.17	0.25	0.25	0.13	0.33	0.33	0.13	0.33	0.33
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Grp Volume(v), veh/h	76	286	114	361	434	151	175	329	49	233	623	139
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Q Serve(g_s), s	0.6	17.0	7.3	18.1	25.4	8.9	5.5	16.2	2.4	0.0	37.3	7.3
Cycle Q Clear(g_c), s	0.6	17.0	7.3	18.1	25.4	8.9	5.5	16.2	2.4	0.0	37.3	7.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	224	332	282	392	497	422	324	648	549	506	648	549
V/C Ratio(X)	0.34	0.86	0.40	0.92	0.87	0.36	0.54	0.51	0.09	0.46	0.96	0.25
Avail Cap(c_a), veh/h	224	464	393	455	799	677	324	648	549	506	648	549
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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.0	48.5	44.5	46.9	43.0	36.8	46.2	32.4	27.8	35.2	39.5	29.5
Incr Delay (d2), s/veh	0.9	11.3	0.9	22.1	6.3	0.5	1.8	2.8	0.3	0.7	27.0	1.1
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	2.1	9.2	3.1	12.7	12.9	3.6	4.8	7.9	1.0	5.8	22.0	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.9	59.8	45.4	69.0	49.3	37.4	48.0	35.2	28.1	35.9	66.5	30.6
LnGrp LOS	D	E	D	E	D	D	D	D	C	D	E	C
Approach Vol, veh/h		476			946			553			995	
Approach Delay, s/veh		54.9			54.9			38.6			54.3	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	22.1	45.5	26.4	26.1	22.1	45.5	16.3	36.1
Change Period (Y+Rc), s	* 6	* 6	* 5.8	* 5.8	* 6	* 6	* 5.8	* 5.8
Max Green Setting (Gmax), s	* 4	* 40	* 25	* 28	* 4	* 40	* 4.2	* 49
Max Q Clear Time (g_c+I1), s	2.0	18.2	20.1	19.0	7.5	39.3	2.6	27.4
Green Ext Time (p_c), s	0.1	1.8	0.5	1.3	0.0	0.1	0.0	3.0

Intersection Summary	
HCM 6th Ctrl Delay	51.7
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	97	369	76	149	233	312	65	626	136	252	462	26
Future Volume (veh/h)	97	369	76	149	233	312	65	626	136	252	462	26
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	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	104	397	82	157	245	328	71	680	148	265	486	27
Peak Hour Factor	0.93	0.93	0.93	0.95	0.95	0.95	0.92	0.92	0.92	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	222	315	267	188	315	267	505	968	820	365	968	820
Arrive On Green	0.07	0.16	0.16	0.07	0.16	0.16	0.08	0.49	0.49	0.08	0.49	0.49
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Grp Volume(v), veh/h	104	397	82	157	245	328	71	680	148	265	486	27
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Q Serve(g_s), s	0.2	19.2	5.2	6.0	14.3	19.2	0.0	32.2	5.9	2.6	20.0	1.0
Cycle Q Clear(g_c), s	0.2	19.2	5.2	6.0	14.3	19.2	0.0	32.2	5.9	2.6	20.0	1.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	222	315	267	188	315	267	505	968	820	365	968	820
V/C Ratio(X)	0.47	1.26	0.31	0.84	0.78	1.23	0.14	0.70	0.18	0.73	0.50	0.03
Avail Cap(c_a), veh/h	316	315	267	282	315	267	505	968	820	365	968	820
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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.3	50.4	44.5	53.8	48.4	50.4	22.8	23.7	17.0	43.1	20.6	15.8
Incr Delay (d2), s/veh	1.5	140.2	0.6	12.8	11.7	131.3	0.1	4.3	0.5	7.1	1.9	0.1
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	3.0	21.5	2.2	5.2	7.9	17.6	1.3	15.0	2.3	7.9	9.1	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.8	190.6	45.2	66.5	60.0	181.7	22.9	27.9	17.5	50.2	22.4	15.8
LnGrp LOS	D	F	D	E	E	F	C	C	B	D	C	B
Approach Vol, veh/h		583			730			899			778	
Approach Delay, s/veh		145.6			116.1			25.8			31.7	
Approach LOS		F			F			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.0	65.0	14.0	25.0	16.0	65.0	14.0	25.0
Change Period (Y+Rc), s	* 6	* 6	* 5.8	* 5.8	* 6	* 6	* 5.8	* 5.8
Max Green Setting (Gmax), s	* 4	* 59	* 14	* 19	* 4	* 59	* 14	* 19
Max Q Clear Time (g_c+I1), s	4.6	34.2	8.0	21.2	2.0	22.0	2.2	21.2
Green Ext Time (p_c), s	0.0	4.9	0.2	0.0	0.0	3.1	0.2	0.0

Intersection Summary	
HCM 6th Ctrl Delay	72.7
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	98	373	77	150	235	315	66	632	137	255	467	26
Future Volume (veh/h)	98	373	77	150	235	315	66	632	137	255	467	26
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	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	105	401	83	158	247	332	72	687	149	268	492	27
Peak Hour Factor	0.93	0.93	0.93	0.95	0.95	0.95	0.92	0.92	0.92	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	222	315	267	189	315	267	500	968	820	360	968	820
Arrive On Green	0.07	0.16	0.16	0.07	0.16	0.16	0.08	0.49	0.49	0.08	0.49	0.49
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Grp Volume(v), veh/h	105	401	83	158	247	332	72	687	149	268	492	27
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Q Serve(g_s), s	0.3	19.2	5.3	6.1	14.5	19.2	0.0	32.7	6.0	3.1	20.3	1.0
Cycle Q Clear(g_c), s	0.3	19.2	5.3	6.1	14.5	19.2	0.0	32.7	6.0	3.1	20.3	1.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	222	315	267	189	315	267	500	968	820	360	968	820
V/C Ratio(X)	0.47	1.27	0.31	0.84	0.78	1.24	0.14	0.71	0.18	0.74	0.51	0.03
Avail Cap(c_a), veh/h	315	315	267	282	315	267	500	968	820	360	968	820
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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	51.3	50.4	44.6	53.7	48.4	50.4	23.1	23.8	17.0	43.6	20.7	15.8
Incr Delay (d2), s/veh	1.6	145.4	0.7	13.0	12.2	137.2	0.1	4.4	0.5	8.2	1.9	0.1
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	3.0	22.0	2.2	5.3	8.0	18.0	1.3	15.3	2.3	8.1	9.3	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.9	195.8	45.2	66.7	60.6	187.6	23.2	28.2	17.5	51.8	22.6	15.8
LnGrp LOS	D	F	D	E	E	F	C	C	B	D	C	B
Approach Vol, veh/h		589			737			908			787	
Approach Delay, s/veh		149.1			119.1			26.1			32.3	
Approach LOS		F			F			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.0	65.0	14.0	25.0	16.0	65.0	14.0	25.0
Change Period (Y+Rc), s	* 6	* 6	* 5.8	* 5.8	* 6	* 6	* 5.8	* 5.8
Max Green Setting (Gmax), s	* 4	* 59	* 14	* 19	* 4	* 59	* 14	* 19
Max Q Clear Time (g_c+I1), s	5.1	34.7	8.1	21.2	2.0	22.3	2.3	21.2
Green Ext Time (p_c), s	0.0	5.0	0.2	0.0	0.0	3.1	0.2	0.0

Intersection Summary	
HCM 6th Ctrl Delay	74.4
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	98	373	77	150	235	315	66	632	137	255	467	26
Future Volume (veh/h)	98	373	77	150	235	315	66	632	137	255	467	26
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	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	105	401	83	158	247	332	72	687	149	268	492	27
Peak Hour Factor	0.93	0.93	0.93	0.95	0.95	0.95	0.92	0.92	0.92	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	262	448	379	189	445	377	480	738	626	359	738	626
Arrive On Green	0.06	0.23	0.23	0.06	0.23	0.23	0.15	0.38	0.38	0.15	0.38	0.38
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Grp Volume(v), veh/h	105	401	83	158	247	332	72	687	149	268	492	27
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Q Serve(g_s), s	0.0	23.7	4.9	4.4	13.3	23.1	0.0	40.2	7.4	10.7	25.0	1.2
Cycle Q Clear(g_c), s	0.0	23.7	4.9	4.4	13.3	23.1	0.0	40.2	7.4	10.7	25.0	1.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	262	448	379	189	445	377	480	738	626	359	738	626
V/C Ratio(X)	0.40	0.90	0.22	0.84	0.56	0.88	0.15	0.93	0.24	0.75	0.67	0.04
Avail Cap(c_a), veh/h	315	551	467	301	610	517	480	738	626	359	738	626
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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.1	45.0	37.7	54.2	41.1	44.9	30.9	36.0	25.7	46.4	31.2	23.8
Incr Delay (d2), s/veh	1.0	15.0	0.3	10.7	1.1	12.6	0.1	19.9	0.9	8.2	4.7	0.1
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	3.0	13.2	2.0	5.2	6.5	10.6	1.5	22.3	3.0	8.1	12.3	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	48.1	59.9	38.0	64.9	42.2	57.5	31.0	55.9	26.6	54.6	36.0	24.0
LnGrp LOS	D	E	D	E	D	E	C	E	C	D	D	C
Approach Vol, veh/h		589			737			908			787	
Approach Delay, s/veh		54.7			53.9			49.2			41.9	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.5	51.0	12.4	33.1	23.5	51.0	12.6	32.9
Change Period (Y+Rc), s	* 6	* 6	* 5.8	* 5.8	* 6	* 6	* 5.8	* 5.8
Max Green Setting (Gmax), s	* 4	* 45	* 14	* 34	* 4	* 45	* 10	* 37
Max Q Clear Time (g_c+I1), s	12.7	42.2	6.4	25.7	2.0	27.0	2.0	25.1
Green Ext Time (p_c), s	0.0	1.3	0.2	1.6	0.0	2.7	0.1	2.0

Intersection Summary	
HCM 6th Ctrl Delay	49.5
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	98	384	77	167	235	315	74	657	137	271	467	26
Future Volume (veh/h)	98	384	77	167	235	315	74	657	137	271	467	26
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	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969	1969
Adj Flow Rate, veh/h	105	413	83	176	247	332	80	714	149	285	492	27
Peak Hour Factor	0.93	0.93	0.93	0.95	0.95	0.95	0.92	0.92	0.92	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	296	459	389	207	445	377	446	738	626	312	738	626
Arrive On Green	0.07	0.23	0.23	0.07	0.23	0.23	0.13	0.38	0.38	0.13	0.38	0.38
Sat Flow, veh/h	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Grp Volume(v), veh/h	105	413	83	176	247	332	80	714	149	285	492	27
Grp Sat Flow(s),veh/h/ln	1875	1969	1668	1875	1969	1668	1875	1969	1668	1875	1969	1668
Q Serve(g_s), s	0.0	24.4	4.8	5.9	13.3	23.1	0.0	42.7	7.4	13.3	25.0	1.2
Cycle Q Clear(g_c), s	0.0	24.4	4.8	5.9	13.3	23.1	0.0	42.7	7.4	13.3	25.0	1.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	296	459	389	207	445	377	446	738	626	312	738	626
V/C Ratio(X)	0.35	0.90	0.21	0.85	0.56	0.88	0.18	0.97	0.24	0.91	0.67	0.04
Avail Cap(c_a), veh/h	315	551	467	296	610	517	446	738	626	312	738	626
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	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.1	44.7	37.1	53.4	41.1	44.9	32.9	36.8	25.7	49.7	31.2	23.8
Incr Delay (d2), s/veh	0.7	15.9	0.3	14.8	1.1	12.6	0.2	26.0	0.9	30.1	4.7	0.1
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	13.6	2.0	6.0	6.5	10.6	1.8	24.6	3.0	10.7	12.3	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	45.8	60.5	37.4	68.2	42.2	57.5	33.0	62.8	26.6	79.8	36.0	24.0
LnGrp LOS	D	E	D	E	D	E	C	E	C	E	D	C
Approach Vol, veh/h		601			755			943			804	
Approach Delay, s/veh		54.8			55.0			54.5			51.1	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	21.3	51.0	13.9	33.8	21.3	51.0	14.8	32.9
Change Period (Y+Rc), s	* 6	* 6	* 5.8	* 5.8	* 6	* 6	* 5.8	* 5.8
Max Green Setting (Gmax), s	* 4	* 45	* 14	* 34	* 4	* 45	* 10	* 37
Max Q Clear Time (g_c+I1), s	15.3	44.7	7.9	26.4	2.0	27.0	2.0	25.1
Green Ext Time (p_c), s	0.0	0.2	0.2	1.5	0.0	2.7	0.1	2.0

Intersection Summary	
HCM 6th Ctrl Delay	53.8
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	25	390	11	0	930
Future Vol, veh/h	0	25	390	11	0	930
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized		-	Stop	-	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, %	2	2	2	2	2	2
Mvmt Flow	0	27	424	12	0	1011

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	430	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	625	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	625	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	625	-
HCM Lane V/C Ratio	-	-	0.043	-
HCM Control Delay (s)	-	-	11	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	33	835	18	0	711
Future Vol, veh/h	0	33	835	18	0	711
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized		Stop		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, %	2	2	2	2	2	2
Mvmt Flow	0	36	908	20	0	773

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	918	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.22	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.318	-	-	-	-
Pot Cap-1 Maneuver	0	329	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	329	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.3	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	329	-
HCM Lane V/C Ratio	-	-	0.109	-
HCM Control Delay (s)	-	-	17.3	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.4	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	424	35	21	724	23	11
Future Vol, veh/h	424	35	21	724	23	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	461	38	23	787	25	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	499	0	1313	480
Stage 1	-	-	-	-	480	-
Stage 2	-	-	-	-	833	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1065	-	175	586
Stage 1	-	-	-	-	622	-
Stage 2	-	-	-	-	427	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1065	-	171	586
Mov Cap-2 Maneuver	-	-	-	-	171	-
Stage 1	-	-	-	-	608	-
Stage 2	-	-	-	-	427	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	24.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	222	-	-	1065	-
HCM Lane V/C Ratio	0.166	-	-	0.021	-
HCM Control Delay (s)	24.4	-	-	8.5	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.6	-	-	0.1	-

Intersection						
Int Delay, s/veh	0.8					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	765	27	15	700	17	18
Future Vol, veh/h	765	27	15	700	17	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	832	29	16	761	18	20

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	861	0	1640	847
Stage 1	-	-	-	-	847	-
Stage 2	-	-	-	-	793	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	781	-	110	362
Stage 1	-	-	-	-	420	-
Stage 2	-	-	-	-	446	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	781	-	108	362
Mov Cap-2 Maneuver	-	-	-	-	108	-
Stage 1	-	-	-	-	412	-
Stage 2	-	-	-	-	446	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	32.4
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	169	-	-	781	-
HCM Lane V/C Ratio	0.225	-	-	0.021	-
HCM Control Delay (s)	32.4	-	-	9.7	-
HCM Lane LOS	D	-	-	A	-
HCM 95th %tile Q(veh)	0.8	-	-	0.1	-

Queues
3: Adams Road & Tienken Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	76	286	114	361	434	151	175	329	49	233	623	139
v/c Ratio	0.45	0.78	0.37	0.87	0.76	0.31	0.82	0.38	0.07	0.51	0.72	0.19
Control Delay	39.5	61.3	44.8	61.0	47.6	34.1	61.1	26.4	23.5	26.2	35.7	24.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.5	61.3	44.8	61.0	47.6	34.1	61.1	26.4	23.5	26.2	35.7	24.0
Queue Length 50th (ft)	38	212	78	212	311	93	69	169	22	96	391	65
Queue Length 95th (ft)	49	231	102	215	324	117	#143	229	45	177	#686	129
Internal Link Dist (ft)		1047			253			183			485	
Turn Bay Length (ft)	200		200			275	250		115	275		50
Base Capacity (vph)	169	462	393	530	795	676	214	860	732	458	860	732
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.62	0.29	0.68	0.55	0.22	0.82	0.38	0.07	0.51	0.72	0.19

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
3: Adams Road & Tienken Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	105	413	83	176	247	332	80	714	149	285	492	27
v/c Ratio	0.22	0.86	0.16	0.72	0.72	0.68	0.26	0.85	0.19	2.01	0.56	0.03
Control Delay	25.9	61.2	1.6	57.5	57.6	20.7	22.0	43.6	6.1	504.4	30.2	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.9	61.2	1.6	57.5	57.6	20.7	22.0	43.6	6.1	504.4	30.2	0.1
Queue Length 50th (ft)	51	303	0	88	182	66	32	502	7	~243	293	0
Queue Length 95th (ft)	83	412	8	131	252	157	64	#794	51	#432	438	0
Internal Link Dist (ft)		1047			253			183			485	
Turn Bay Length (ft)	200		200			275	250		115	275		50
Base Capacity (vph)	474	549	563	279	607	678	310	840	790	142	873	816
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.75	0.15	0.63	0.41	0.49	0.26	0.85	0.19	2.01	0.56	0.03

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

ROAD COMMISSION FOR OAKLAND COUNTY (RCOC)

TURN LANE WARRANTS

FIGURE 6-3

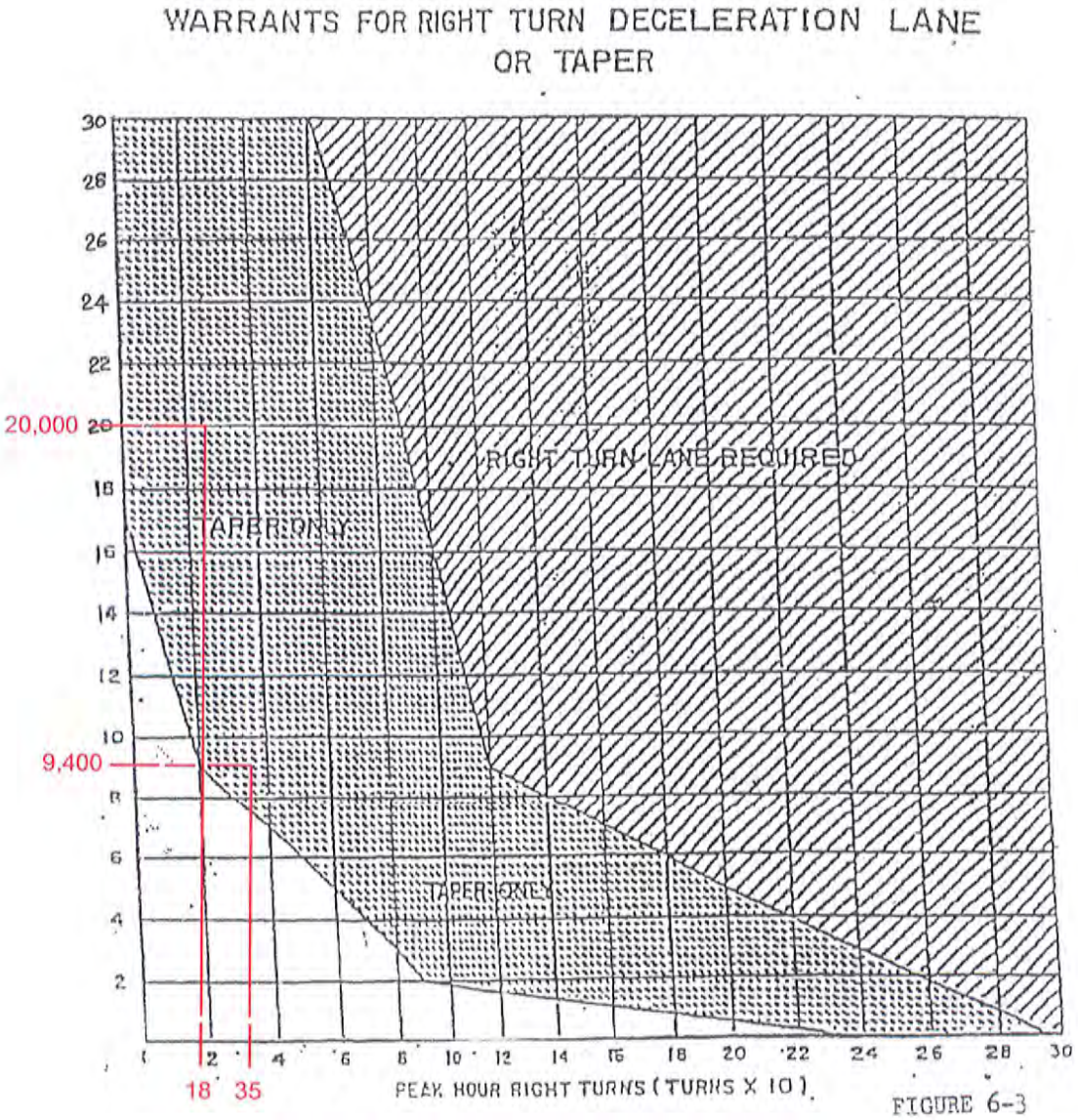
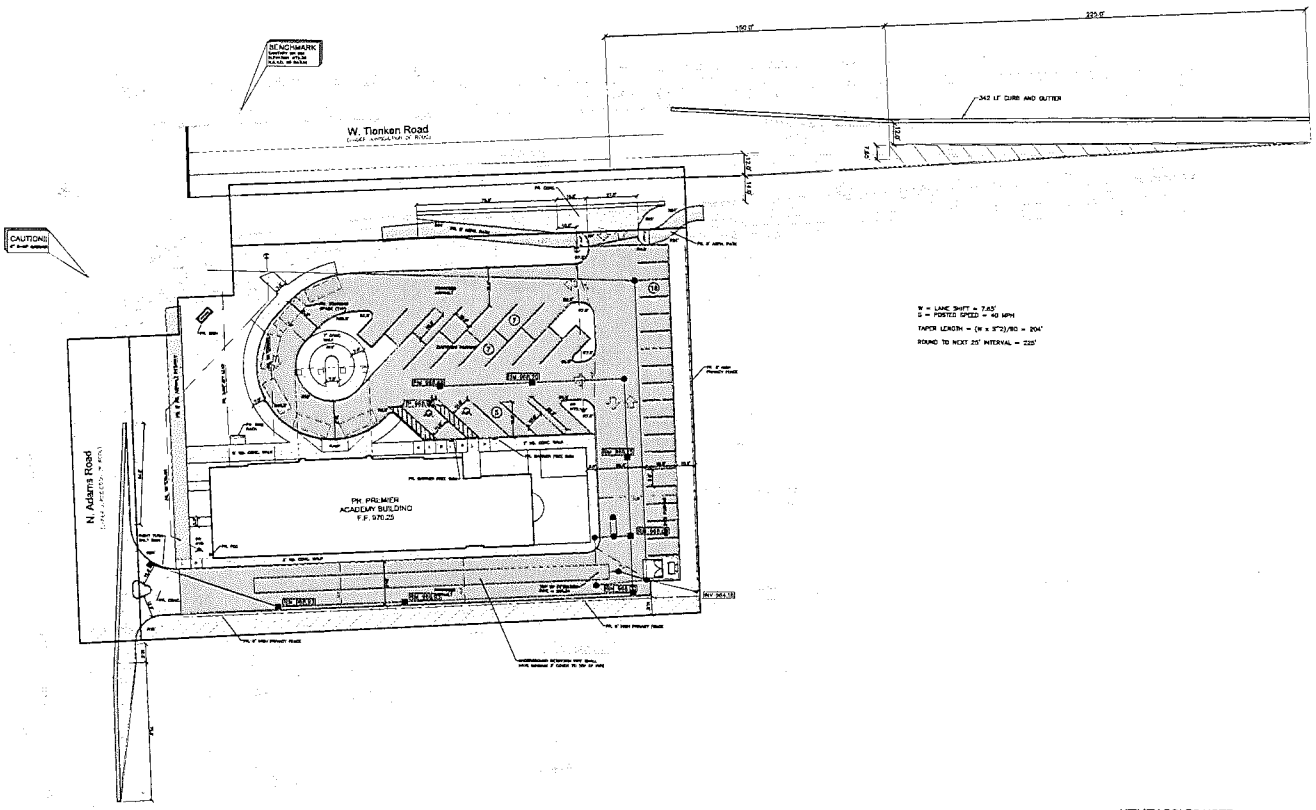


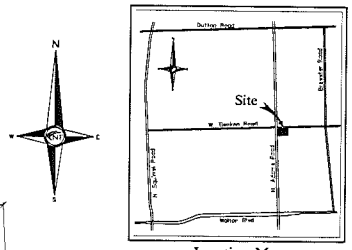
FIGURE 6-3

Adams Road Forecast 2019 ADT: 20,000 vehicles per day
Tienken Road Forecast 2019 ADT: 9,400 vehicles per day

Peak hour right-turns into site from Adams Road: 18 vehicles
Peak hour right-turns into site from Tienken Road: 35 vehicles

SITE PLAN





Location Map
N.T.S.

GENERAL PAVING NOTES

PAVEMENT SHALL BE OF THE TYPE, THICKNESS AND CROSS SECTION AS INDICATED ON THE PLANS AND AS FOLLOWS:

CONCRETE: PORTLAND CEMENT TYPE IA (AIR-ENTRAINED) WITH A MINIMUM CEMENT CONTENT OF SIX SACKS PER CUBIC YARD, MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3,500 PSI AND A SLUMP OF 1 1/2 TO 3 INCHES.

ASPHALT: BASE COURSE – MDOT BITUMINOUS MIXTURE NO. 1100L, 20AA; SURFACE COURSE – MDOT BITUMINOUS MIXTURE NO. 1100T, 20AA; ASPHALT CEMENT PENETRATION GRADE 85-100, BOND COAT – MDOT SS-1H EMULSION AT 0.10 GALLON PER SQUARE YARD; MAXIMUM 2 INCH LIFT.

PAVEMENT BASE SHALL BE COMPACTED TO 95% OF THE MAXIMUM DENSITY (MODIFIED PROCTOR) PRIOR TO PLACEMENT OF PROPOSED PAVEMENT. CUTTING SUB-BASE SHALL BE PROOF-ROLLED IN THE PRESENCE OF THE ENGINEER TO DETERMINE STABILITY.

ALL CONCRETE PAVEMENT, DRIVEWAYS, CURB & GUTTER, ETC., SHALL BE SPRAY CURED WITH WHITE MEMBRANE CURING COMPOUND IMMEDIATELY FOLLOWING FINISHING OPERATION.

ALL CONCRETE PAVEMENT JOINTS SHALL BE FILLED WITH HOT POURED RUBBERIZED ASPHALT JOINT SEALING COMPOUND IMMEDIATELY AFTER SAWCUT OPERATION. FEDERAL SPECIFICATION SS-S164.

ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND SPECIFICATIONS OF THE MUNICIPALITY AND THE MICHIGAN DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION, CURRENT EDITION.

ALL TOP OF CURB ELEVATIONS, AS SHOWN ON THE PLANS, ARE CALCULATED FOR A 6" CONCRETE CURB UNLESS OTHERWISE NOTED.

ALL SIDEWALK RAMPS, CONFORMING TO PUBLIC ACT NO. 8, 1973, SHALL BE INSTALLED AS INDICATED ON THE PLANS.

CONSTRUCTION OF A NEW OR RECONSTRUCTED DRIVE APPROACH CONNECTING TO AN EXISTING STATE OR COUNTY ROADWAY SHALL BE ALLOWED ONLY AFTER AN APPROVED PERMIT HAS BEEN SECURED FROM THE AGENCY HAVING JURISDICTION OVER SAID ROADWAY.

FOR ANY WORK WITHIN THE PUBLIC RIGHT-OF-WAY, THE CONTRACTOR SHALL PAY FOR AND SECURE ALL NECESSARY PERMITS AND LIKEWISE ARRANGE FOR ALL INSPECTION.

EXISTING TOPSOIL, VEGETATION AND ORGANIC MATERIALS SHALL BE STRIPPED AND REMOVED FROM PROPOSED PAVEMENT AREA PRIOR TO PLACEMENT OF BASE MATERIALS.

EXPANSION JOINTS SHOULD BE INSTALLED AT THE END OF ALL INTERSECTION RADII.

SIDEWALK RAMPS, CONFORMING TO PUBLIC ACT NO. 8, 1973, SHALL BE INSTALLED AS SHOWN AT ALL STREET INTERSECTIONS AND AT ALL BARRIER FREE PARKING AREAS AS INDICATED ON THE PLANS.

ALL PAVEMENT AREAS SHALL BE PROOF-ROLLED UNDER THE SUPERVISION OF A GEOTECHNICAL ENGINEER PRIOR TO THE PLACEMENT OF BASE MATERIALS AND PAVING MATERIALS.

FILL AREAS SHALL BE MACHINE COMPACTED IN UNIFORM LIFTS NOT EXCEEDING 8 INCHES THICK TO 95% OF THE MAXIMUM DENSITY (MODIFIED PROCTOR) PRIOR TO PLACEMENT OF PROPOSED PAVEMENT.

UTILITY POLES NOTE

DISCONNECT POWER WHEN DEMOLISHING THE HOUSES COORDINATE WITH DETROIT EDISON THE RELOCATION OF POWER POLES.

ESTIMATED QUANTITIES

PAVING

DESCRIPTION	QUANTITY	UNITS
4" ASPHALT ON 8" 21AA BASE	2,932	S.Y.
4" ASPHALT ON 4" 21AA BASE	748	S.Y.
4" CONCRETE SIDEWALK	5,744	S.F.
8" NON-REINFORCED CONCRETE	82	S.Y.
6" CONCRETE CURB & GUTTER	1,402	L.F.
8" CONCRETE APPROACH	320	S.Y.
M.D.O.T. DRIVEWAY OPENING DETAIL "M"	277	L.F.

PAVING LEGEND

PROPOSED CONCRETE PAVEMENT

PROPOSED ASPHALT PAVEMENT

LEGEND

MANHOLE — EXISTING SANITARY SEWER
HYDRANT — SAN. CLEAN OUT
GATE VALVE — EXISTING WATERMAIN
MANHOLE CATCH BASIN — EXISTING STORM SEWER
EX. R. Y. CATCH BASIN
UTILITY POLE GUY POLE — EXISTING BURIED CABLES
GUY WIRE — OVERHEAD LINES
LIGHT POLE
SIGN
C.O. MANHOLE — EXISTING GAS MAIN
HYDRANT GATE VALVE — PR. SANITARY SEWER
PILOT C.B. MANHOLE — PR. WATER MAIN
PR. STORM SEWER
PR. R. Y. CATCH BASIN
PROPOSED LIGHT POLE
TC 100.00 — PR. TOP OF CURB ELEVATION
GUTTER 99.50 — PR. GUTTER ELEVATION
TW 100.00 — PR. TOP OF WALK ELEVATION
TP 101.00 — PR. TOP OF PAVT. ELEVATION
FG 100.00 — FINISH GRADE ELEVATION

City File #17-018

NF ENGINEERS
CIVIL ENGINEERS
LAND SURVEYORS
LAND PLANNERS

NOWAK & FRAUS ENGINEERS
46777 WOODWARD AVE.
PONTIAC, MI 48342-5032
TEL (248) 332-7931
FAX (248) 332-8257

SEAL

PROJECT
Premier Academy

CLIENT
JS Capitol Group
945 S. Rochester Road
Rochester Hills, MI 48308
Contact: Paul Dunn
Phone: (248) 249-4911

PROJECT LOCATION
Part of the NE ¼
of Section 8
T.3N. , R.11E.
City of Rochester Hills,
Oakland County, Michigan

SHEET
Paving and Grading Plan

811 Know what's below Call before you dig.

REVISIONS
7-7-17 SPA
7-24-17 SPA
8-29-17 SPA
11-16-17 SPA
12-05-17 SPA

DRAWN BY:
M. Kurmas
DESIGNED BY:
M. Kurmas
APPROVED BY:
M. Peterson
DATE
12-05-2017
SCALE 1" = 30'
30 15 0 15 30 45
NFE JOB NO. J580
SHEET NO. C3