DOLAN&DEAN
CONSULTING ENGINEERS, LLC

181 WEST HIGH STREET
SOMERVILLE, NJ 08876

908 927 0100 p
908 927 0181 f

TRAFFIC IMPACT STUDY

FOR

THE LEARNING EXPERIENCE®

PROPOSED CHILDCARE CENTER

100 UNION AVENUE
BLOCK 7801, LOT 1
BOROUGH OF WATCHUNG
SOMERSET COUNTY, NEW JERSEY

JULY 25, 2019

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INTRODUCTION

This traffic engineering evaluation has been prepared for a site plan application submitted to the Watchung Planning Board for The Learning Experience, a proposed childcare center to be located at the intersection of Union Avenue and New Providence Road.

The applicant proposes to construct a new two-story, 10,794 square foot building. The Learning Experience will have a maximum enrollment of 154 children. One driveway is proposed on Union Avenue to access the new 32-space parking lot.

Dolan & Dean Consulting Engineers, LLC (D&D) has been commissioned by the applicant to prepare this study for the proposed childcare center. This study evaluates existing roadway conditions and traffic volumes, trip generation characteristics of the proposed use, and evaluates the site access, circulation, and parking for the new childcare center.

EXISTING CONDITIONS

The subject site is designated as Lot 1, Block 7801 with frontage along Union Avenue in the Borough of Watchung. For general orientation purposes, this study will consider Union Avenue running the in east-west direction with New Providence Road running north-south. The general site location is shown on Figure 1.

EXISTING ROADWAY CONDITIONS

Union Avenue provides one lane for each direction of travel along the site frontage. Union Avenue originates at New Providence Road to the west and continues east past the site, intersecting Route 22, which is a divided highway. As such, the intersection of Union Avenue only allows right-turn movements to and from Route 22.

New Providence Road has a general north-south orientation and provides one lane of travel in the site vicinity. New Providence Road begins to the south at Bonnie Burn Road and continues north into Berkeley Heights where it becomes Diamond Hill Road. Near the site, New Providence Road is under Somerset County jurisdiction, and is designated as County Route 655.

Union Avenue intersects New Providence Road from the east to form a T-shaped intersection, controlled by a STOP sign. Land uses in the vicinity of the site are generally industrial with a quarry located to the west of New Providence Road, directly across from Union Avenue.

West of Union Avenue is the Bonnie Burn Road intersection with Route 22 which also only accommodates right-turn movements. Bonnie Burn Road forms a 4-leg intersection with New Providence Road, which is controlled by a traffic signal. New Providence Road west of the signalized intersection then forms an overpass, crossing Route 22 to access Park Avenue.

EXISTING TRAFFIC VOLUMES

D&D performed manual traffic counts at the intersection of Union Avenue and New Providence Road during the following periods:

- Wednesday, June 27, 2019 from 4:00 p.m. to 6:00 p.m.
- Wednesday, July 10, 2019 from 7:00 a.m. to 9:00 a.m.

Extensive queuing occurs along northbound New Providence Road during the morning peak hour and on the southbound approach during the evening peak hour. This is a result of the commuting patterns to the Route 78 corridor in the morning and from the interstate in the evening. The queuing requires that movements from Union Avenue be made with "courtesy gaps." Left-turn movements from Union Avenue are low during both peak hours because these movements can be made by traveling eastbound on Union Avenue, turning right onto Route 22 westbound, and turning right onto Bonnie Burn Road.

The recent counts were compared with a December 2017 NJDOT count on New Providence Road just north of Union Avenue. The comparison shows northbound morning and southbound evening volumes are generally the same, which is because these flows are at capacity. The southbound morning volume was greater in December 2017, as was the northbound evening volume, due to seasonal variation.

The traffic counts are appended. Figure 2 shows the comparison of traffic count data.

TRAFFIC CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The potential traffic generation from any use is directly related to the type, size, and characteristic of the use itself. Trip generation projections are customarily made using estimates as compiled by the Institute of Transportation Engineers (ITE) in the Trip Generation Manual, 10th Edition, for uses that closely resemble the anticipated operation.

The site is proposed to be developed as a childcare facility that will provide educational and cultural opportunities for younger children. To accommodate parents' working and travel schedules, childcare will be offered throughout the day. This type of operation allows for flexible times for pick-up and drop-off. Therefore, using the most recent ITE data for "Day Care Center" the following peak hour trip generation projections were developed:

TABLE I
TRIP GENERATION PROJECTIONS
PROPOSED 10,794 SF/154-STUDENT LEARNING EXPERIENCE

Morning Peak Hour			Evening Peak Hour		
Enter	Exit	Total	Enter	Exit	Total
64	56	120	57	65	122

Trip generation calculations are appended.

As shown, based on ITE data, the proposed development will attract approximately one new vehicle to the site each minute during the peak hours associated with employee and child drop off/pick-up activity. However, the above estimates take no credit for trips which may be generated by people living or working in the immediate area. According to the Trip Generation Handbook, 3rd Edition, by the ITE, approximately 56% of daycare trips are "diverted" which is part of a chain of multiple stop trips. At least 50% of the above trip generation could be attributed to employees of the immediate area, and/or already traveling past the site on the adjacent roadways, particularly considering the commuting paths to/from

Route 78. The net traffic impact of approximately 30 new vehicles during the peak hour is generally insignificant from a traffic engineering perspective and would not lead to undue traffic congestion or substantially increased delays in the area.

Also, unlike a school that has specific start or dismissal time for classes, child care/learning centers allow for flexible pick-up and drop-off of students. Consequently, there are much "flatter" traffic peaks at such facilities as parents can drop-off (and pick-up) students over longer time periods and as best suited to their schedules. This operation lessens traffic impacts as such traffic activity occur more evenly distributed over several hours rather than highly concentrated 10-15 minutes before the start/dismissal of a typical school.

Site generated traffic is expected to arrive and depart following existing travel patterns, with expected pass-by activity associated with the northbound flow in the morning and southbound flow in the evening. Little traffic is expected to make a left-turn from Union Avenue onto New Providence Road during peak hours given the limited capacity.

FUTURE TRAFFIC CONDITIONS

FUTURE TRAFFIC VOLUMES

To asses future driveway operations, the peak hour volumes recorded on Union Avenue were increased to account for on-going area development, using the appropriate NJDOT growth rate. Based on NJDOT growth patterns for Somerset County, traffic volumes in the vicinity of the site may experience an annual increase of 1.0% for the peak hours. This factor was applied for a two-year build-out.

Site generated traffic was added to the "no build" volume to establish "build" traffic volumes. The future volumes are shown on Figure 3.

FUTURE "BUILD" TRAFFIC ANALYSIS

Level of Service (LOS) analyses were conducted for the site driveway intersection with Union Avenue and are appended. Entering movements are projected to operate at LOS A. Exiting traffic from the site is projected to operate at favorable LOS B, with an expected queue length of one vehicle within the site driveway during both peak hours.

SITE ACCESS AND CIRCULATION

The site plan was reviewed with attention focused on the site circulation scheme, sufficiency of the proposed internal driveway circulation and parking supply, and overall access to the site.

Access to the proposed childcare center will be provided via one full-movement driveway on Union Avenue. The driveways will provide access to the 24-foot, two-way circulation aisle, and parking spaces.

The parking lot will contain 32 parking spaces facing the building, including 2 handicap spaces. Based on extensive parking demand research at several New Jersey day care facilities, 34 spaces are needed for sites with enrollments of up to 190 children. Therefore, for the proposed 154-student enrollment, approximately 29 spaces will be needed.

Based on parking studies of childcare centers, a large percent of vehicle trips to the site will not require long duration use of parking spaces as most trips consist of pickup/drop-off activity. Parents' vehicles occupy a parking space for an average of 7 minutes.

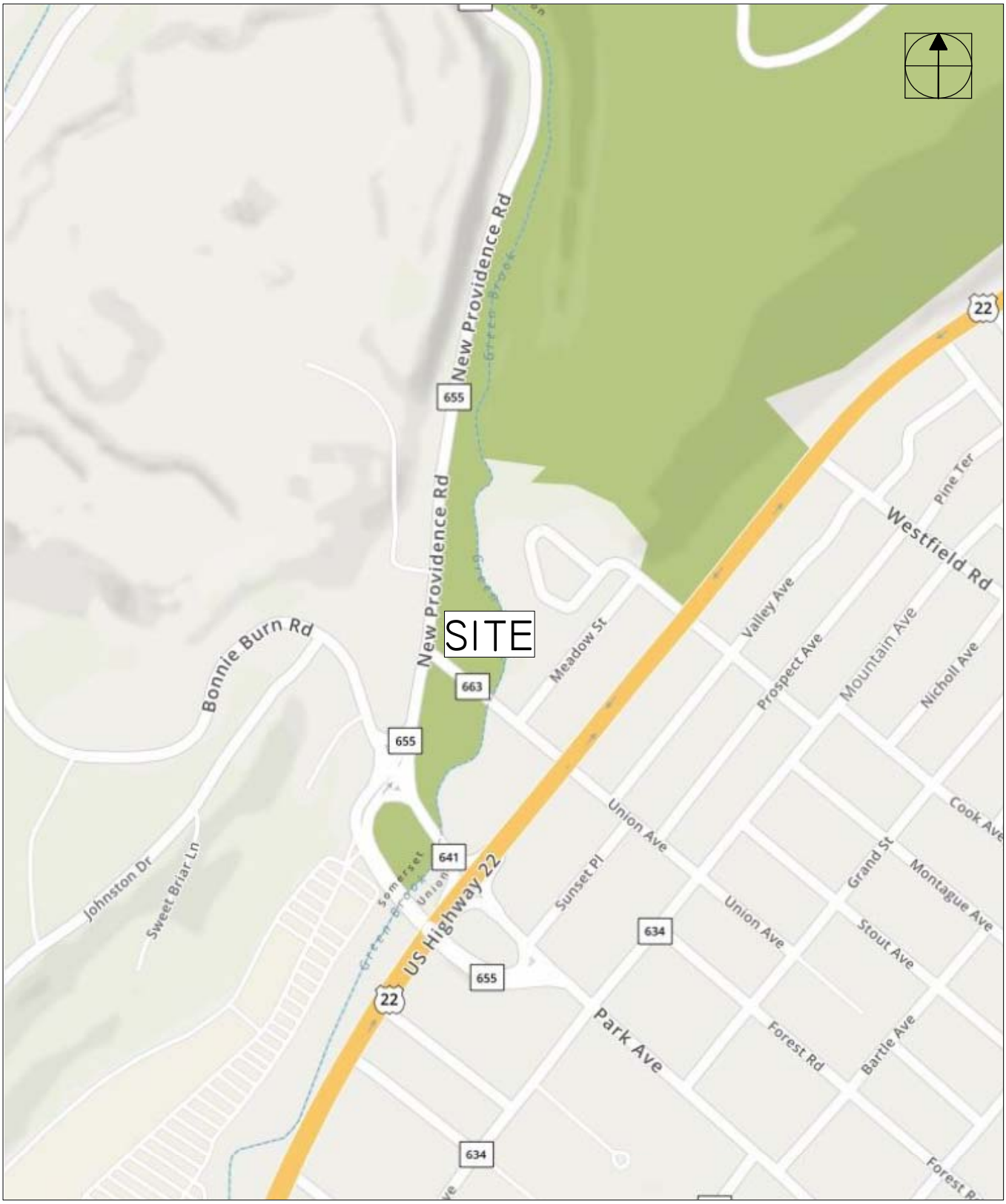
CONCLUSIONS

This analysis confirms that safe and efficient site ingress and egress will be provided during peak traffic hours. Logically, at off-peak times when there would be less overall street traffic, site driveway operations will be even better than projected for the peak hours. All movements to and from the site will operate safely and efficiently with reasonable and prudent driver behavior.

The Site Plan has been prepared consistent with accepted traffic engineering and design standards by providing accessible and sufficient parking area that will adequately serve the anticipated employee and parent demands. The site layout will also provide safe and efficient access and circulation for the types of vehicles anticipated to frequent the site.

Based on these findings, it is concluded that the site is particularly well suited for The Learning Experience. Such an operation will not negatively impact the traffic in the surrounding area or along the adjacent streets.

TECHNICAL APPENDIX

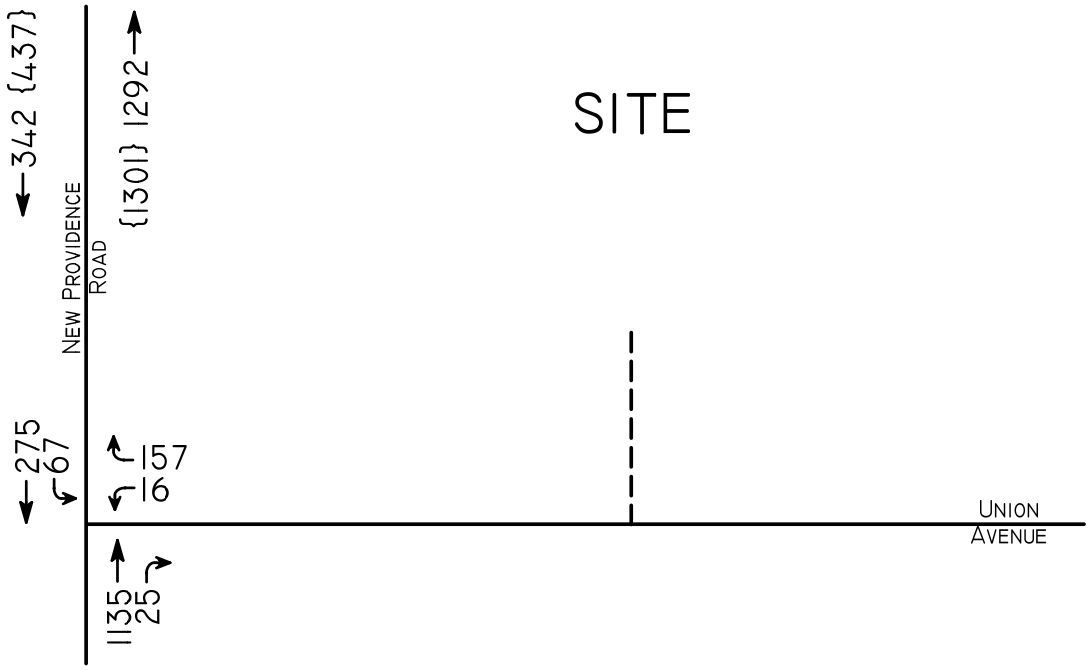


100 Union Avenue
Borough of Watchung
Somerset County, New Jersey

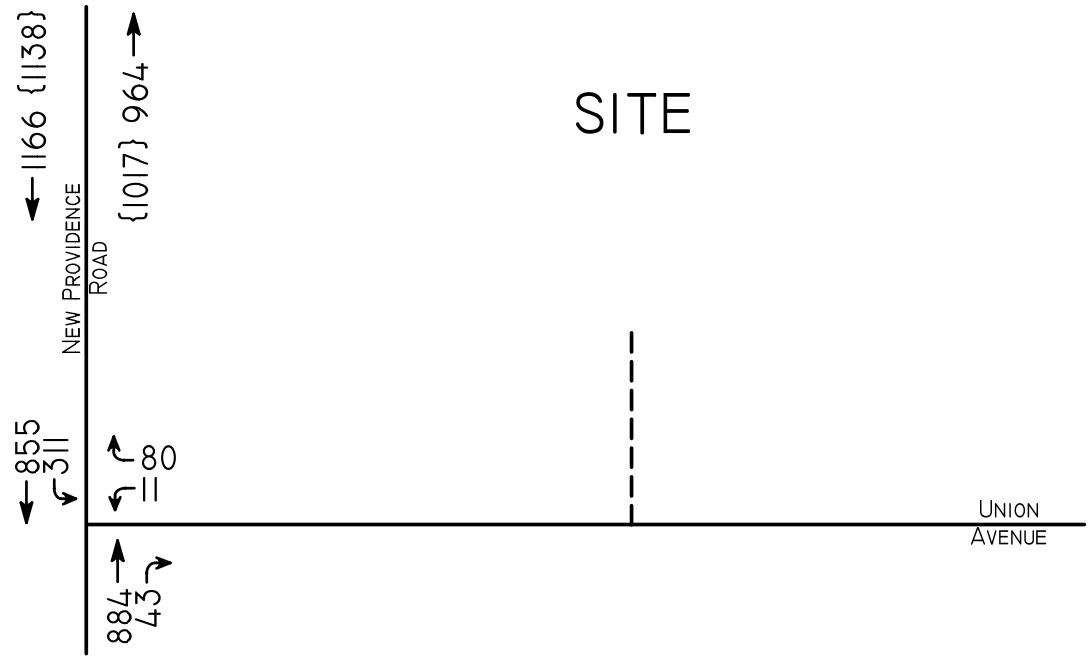
FIGURE 1

DOLAN&DEAN
CONSULTING ENGINEERS, LLC

SITE LOCATION MAP



MORNING PEAK HOUR
7:45 A.M. TO 8:45 A.M.



Legend
—— = Existing Roadway
-- = Proposed Driveway

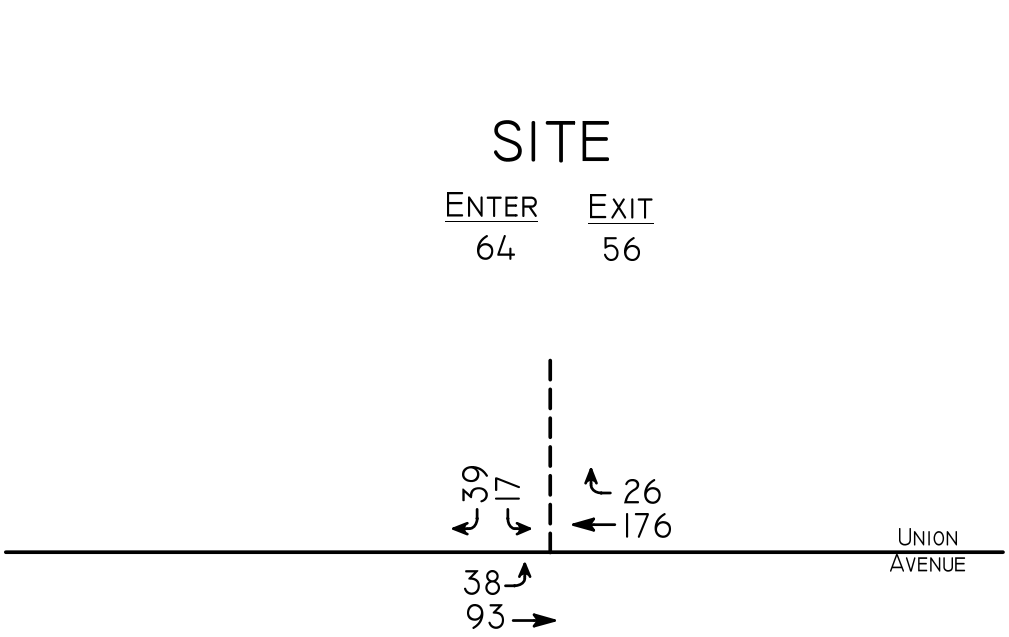
EVENING PEAK HOUR
4:30 P.M. TO 5:30 P.M.

100 UNION AVENUE
BOROUGH OF WATCHUNG
SOMERSET COUNTY, NEW JERSEY

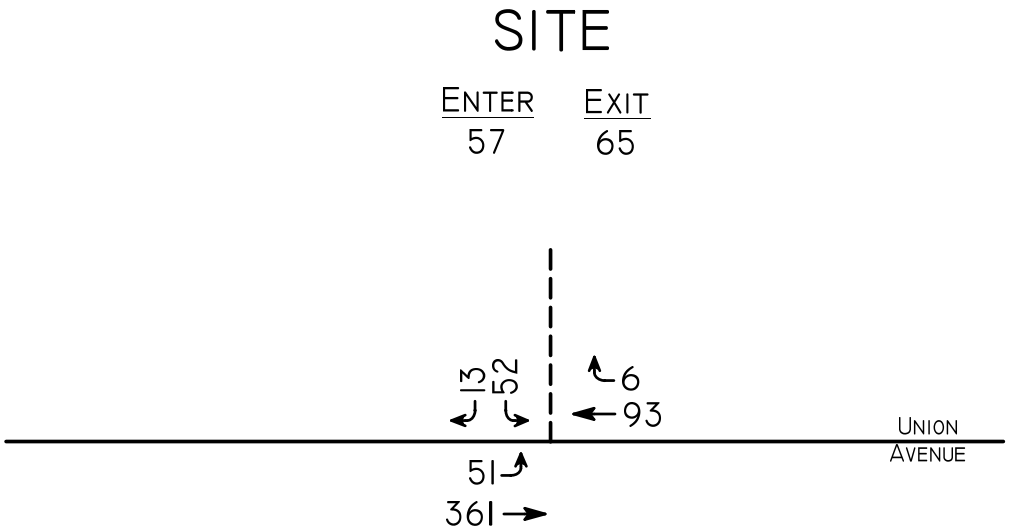
FIGURE 2

DOLAN&DEAN
CONSULTING ENGINEERS, LLC

TRAFFIC VOLUME COMPARISON
2019 {2017} PEAK HOUR VOLUMES



MORNING PEAK HOUR
7:45 A.M. TO 8:45 A.M.



Legend
— = Existing Roadway
-- = Proposed Driveway

EVENING PEAK HOUR
4:30 P.M. TO 5:30 P.M.

100 UNION AVENUE
BOROUGH OF WATCHUNG
SOMERSET COUNTY, NEW JERSEY

FIGURE 3

DOLAN&DEAN
CONSULTING ENGINEERS, LLC

FUTURE BUILD TRAFFIC VOLUMES

100 UNION AVENUE - THE LEARNIG EXPERIENCE
BOROUGH OF WATCHUNG, SOMERSET COUNTY, NJ
TRAFFIC COUNTS
WEDNESDAY, JUNE 27, 2019, 4:00 TO 6:30 PM
WEDNESDAY, JULY 10, 2019, 7:00 TO 9:00 PM

	PASSENGER VEHICLES						HEAVY VEHICLES							
START	NORTHBOUND		SOUTHBOUND		WESTBOUND		NORTHBOUND		SOUTHBOUND		WESTBOUND			HOUR
TIME	THRU	RIGHT	LEFT	THRU	LEFT	RIGHT	THRU	RIGHT	LEFT	THRU	LEFT	RIGHT	TOTAL	TOTAL
7:00	257	8	8	33	1	20	19	0	0	13	0	1	360	
7:15	286	4	19	45	0	24	18	0	0	9	0	1	406	
7:30	291	6	19	43	0	28	16	1	1	16	0	0	421	
7:45	253	6	15	49	6	43	20	0	0	15	0	6	413	1600
8:00	236	7	16	53	6	46	25	0	0	13	0	1	403	1643
8:15	271	5	13	73	4	33	23	0	3	13	0	0	438	1675
8:30	241	6	22	52	2	27	22	0	0	19	0	1	392	1646
8:45	247	3	13	73	6	25	14	1	2	16	0	1	401	1634
PEAK	1051	24	63	218	16	150	84	1	4	57	0	7	1675	
HV	84	1	4	57	0	7								
TOTAL	1135	25	67	275	16	157							PHF=0.96	

	TOTAL VEHICLES							
	NORTHBOUND		SOUTHBOUND		WESTBOUND			HOUR
	THRU	RIGHT	LEFT	THRU	LEFT	RIGHT	TOTAL	TOTAL
4:00	187	14	47	177	3	15	443	
4:15	190	9	77	213	2	15	506	
4:30	196	10	83	206	2	17	514	
4:45	213	10	73	233	3	21	553	2016
5:00	249	12	70	202	3	26	562	2135
5:15	226	11	85	214	3	16	555	2184
5:30	210	11	87	183	2	14	507	2177
5:45	190	12	75	223	1	22	523	2147
6:00	210	14	74	211	5	13	527	2112
6:15	206	14	69	212	2	17	520	2077
PEAK	884	43	311	855	11	80	2184	

PHF=0.97

New Jersey Department of Transportation

Short-term Hourly Traffic Volume for 12/11/2017 to 12/13/2017

Site names: 111850,New Providence Road-.45,18000655__
County: SOMERSET
Funct Class: Urban Minor Arterial
Location: BET UNION AVE VALLEY RD

Seasonal Factor Grp: rg1_4U
Daily Factor Grp: rg1_4U
Axle Factor Grp: rg1_4U
Growth Factor Grp: rg1_4U

	Sun, Dec 10, 2017			Mon, Dec 11, 2017			Tue, Dec 12, 2017			Wed, Dec 13, 2017			Thu, Dec 14, 2017			Fri, Dec 15, 2017			Sat, Dec 16, 2017		
	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S	Road	N	S
00:00							67	43	24	54	40	14									
01:00							49	35	14	48	33	15									
02:00							49	39	10	53	40	13									
03:00							71	63	8	71	65	6									
04:00							239	219	20	232	209	23									
05:00							696	608	88	681	585	96									
06:00							1,521	1,332	189	1,555	1,350	205									
07:00							1,655	1,301	354	1,599	1,249	350									
08:00							1,682	1,245	437	1,604	1,198	406									
09:00							1,308	910	398	1,387	975	412									
10:00							1,271	800	471	1,283	807	476									
11:00							1,270	719	551	1,276	750	526									
12:00							1,346	813	533	1,329	805	524									
13:00				1,304	850	454	1,319	810	509												
14:00				1,491	891	600	1,489	897	592												
15:00				1,844	909	935	1,920	1,017	903												
16:00				1,811	761	1,050	1,866	828	1,038												
17:00				1,921	794	1,127	1,847	709	1,138												
18:00				1,306	619	687	1,519	658	861												
19:00				795	443	352	829	446	383												
20:00				579	337	242	606	360	246												
21:00				390	234	156	429	256	173												
22:00				235	152	83	283	203	80												
23:00				142	92	50	143	88	55												
Total				11,818	6,082	5,736	23,474	14,399	9,075	11,172	8,106	3,066									
AM Peak Vol							1,682	1,332	551	1,604	1,350	526									
AM Peak Fct							1	1	1	1	1	1									
AM Peak Hr							8: 00	6: 00	11: 00	8: 00	6: 00	11: 00									
PM Peak Vol							1,920	1,017	1,138												
PM Peak Fct							1	1	1												
PM Peak Hr							15: 00	15: 00	17: 00	:	:	:									
Seasonal Fct				1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001	1.001									
Daily Fct				.945	.945	.945	.883	.883	.883	.873	.873	.873									
Axle Fct				.496	.496	.496	.496	.496	.496	.496	.496	.496									
Pulse Fct				2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000									

Created 06/26/2018 11:33 AM

ROAD AADT 20,655 NDIR AADT 7,990 PDIR AADT 12,665

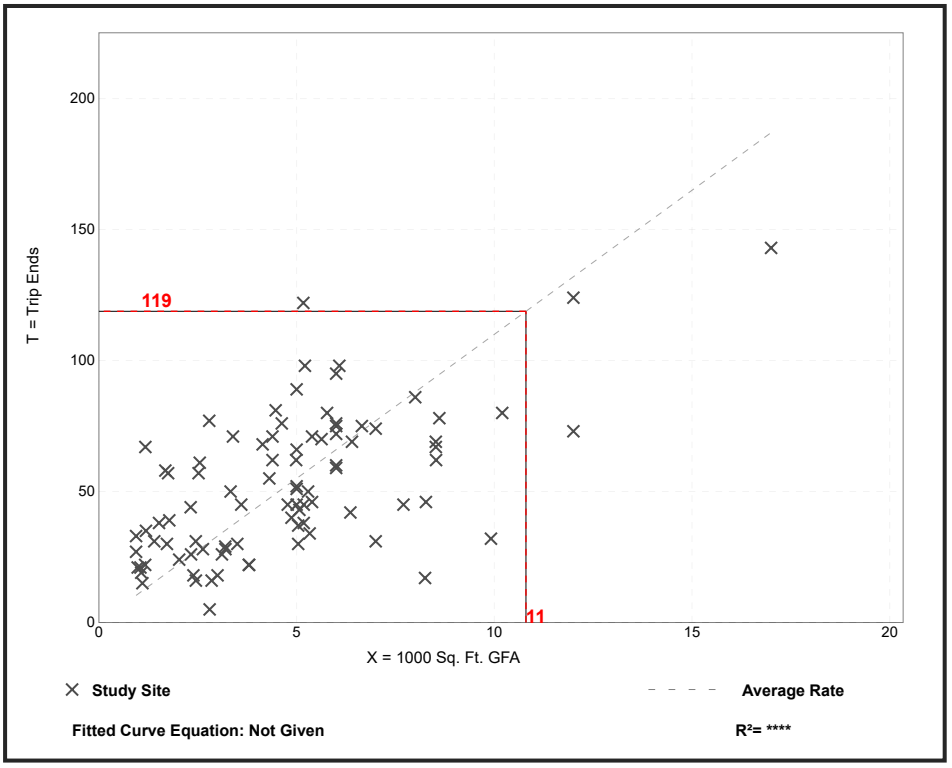
Day Care Center
(565)

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: 89
Avg. 1000 Sq. Ft. GFA: 5
Directional Distribution: 53% entering, 47% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
11.00	1.79 - 57.02	6.08

Data Plot and Equation



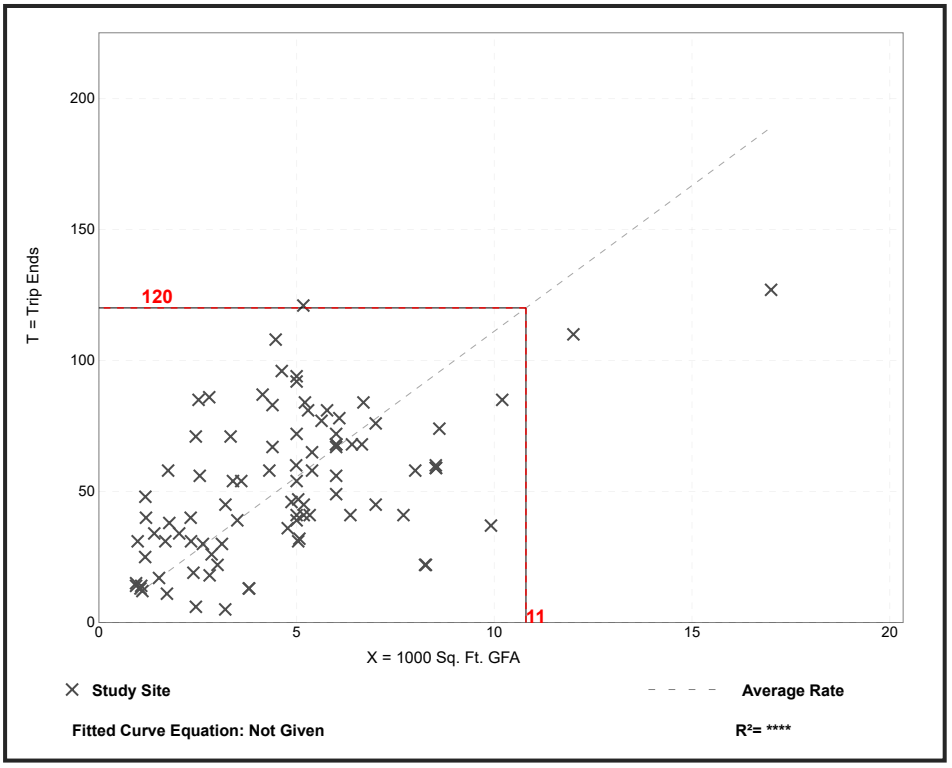
Day Care Center
(565)

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: 90
Avg. 1000 Sq. Ft. GFA: 5
Directional Distribution: 47% entering, 53% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
11.12	1.56 - 40.85	6.28

Data Plot and Equation



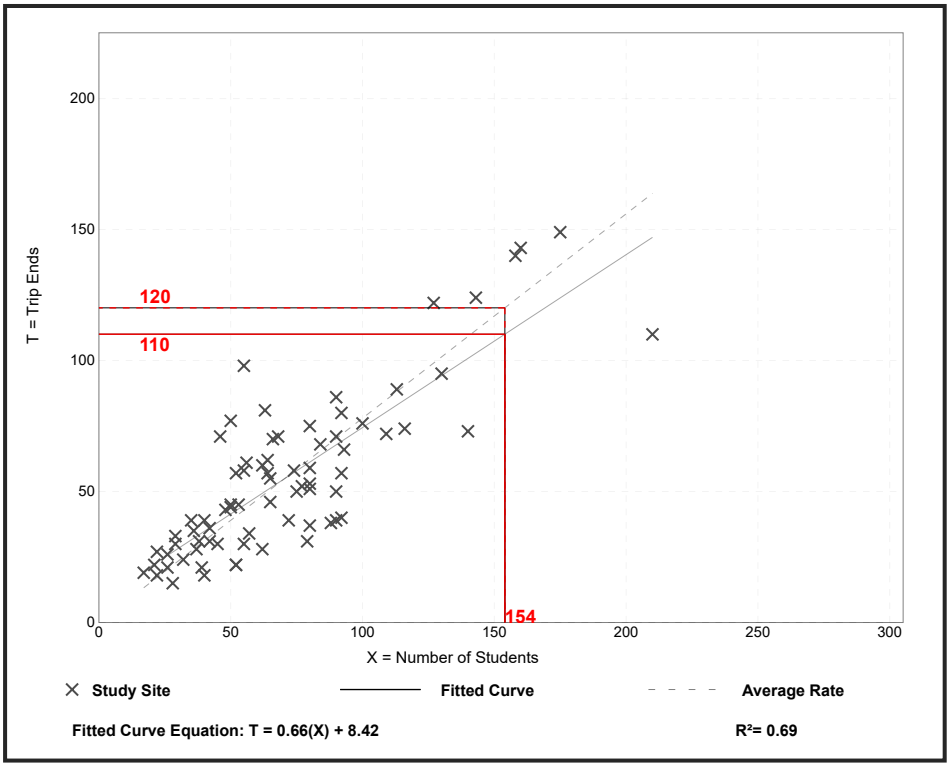
Day Care Center
(565)

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



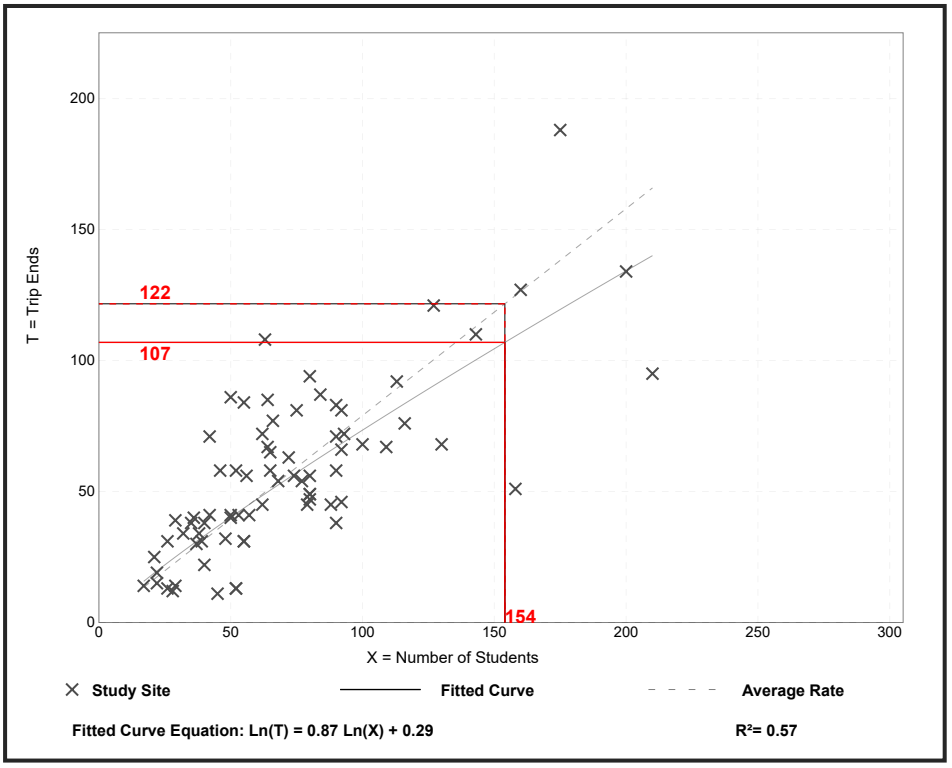
Day Care Center
(565)

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

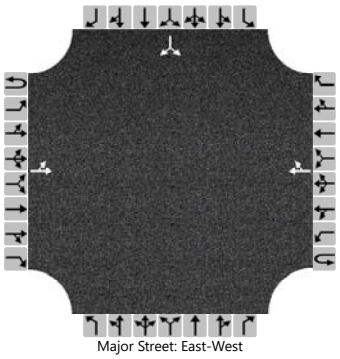
Data Plot and Equation



HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	D&D	Intersection	Union Ave & Driveway
Agency/Co.		Jurisdiction	
Date Performed	7/25/2019	East/West Street	Union Avenue
Analysis Year	2021	North/South Street	Site Driveway
Time Analyzed	AM peak hour	Peak Hour Factor	0.96
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	100 Union Ave - TLE		

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		38	93				176	26						17		39
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage																

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		40													58	
Capacity, c (veh/h)		1354													753	
v/c Ratio		0.03													0.08	
95% Queue Length, Q_{95} (veh)		0.1													0.3	
Control Delay (s/veh)		7.7													10.2	
Level of Service (LOS)		A													B	
Approach Delay (s/veh)		2.4												10.2		
Approach LOS														B		

HCS7 Two-Way Stop-Control Report

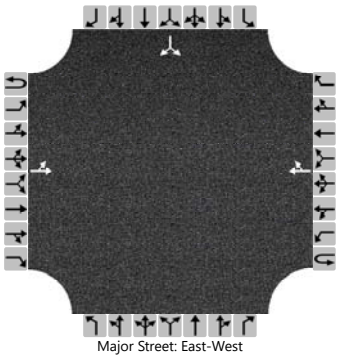
General Information

Analyst	D&D
Agency/Co.	
Date Performed	7/25/2019
Analysis Year	2021
Time Analyzed	PM peak hour
Intersection Orientation	East-West
Project Description	100 Union Ave - TLE

Site Information

Intersection	Union Ave & Driveway
Jurisdiction	
East/West Street	Union Avenue
North/South Street	Site Driveway
Peak Hour Factor	0.97
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		51	361				93	6						52		13
Percent Heavy Vehicles (%)		3												3		3
Proportion Time Blocked																
Percent Grade (%)														0		
Right Turn Channelized																
Median Type | Storage																

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.13												6.43		6.23
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.23												3.53		3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		53													67	
Capacity, c (veh/h)		1484													509	
v/c Ratio		0.04													0.13	
95% Queue Length, Q_{95} (veh)		0.1													0.5	
Control Delay (s/veh)		7.5													13.1	
Level of Service (LOS)		A													B	
Approach Delay (s/veh)		1.2												13.1		
Approach LOS														B		