Traffic Impact Study

240 Paper Mill Road

Lisbon, Connecticut

Prepared for:

Today's Realty, LLC

Prepared by:

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Lisbon, Connecticut

This study examines the traffic impact of a development site for office, equipment maintenance, and construction material processing and storage uses in Lisbon, Connecticut. Levels of Service (LOS) for traffic flows under 2023 build traffic conditions were analyzed to identify any deficiencies in future traffic operations at two driveway intersections. For the purpose of this traffic study, 2023 was assumed to be the year during which the construction is completed and the facility is in operation.

I. Summary

- The site is estimated to generate 15 and 14 site trips during the respective weekday morning and weekday afternoon peak hours.

- The traffic impact of the development will be limited. All traffic approaches at the two site driveway intersections will operate at favorable LOS A with minimal delays during the two weekday peak hours.

II. Project Description

The development site is located on the east side of Inland Road/Paper Mill Road in Lisbon, Connecticut. A proposed 9,400 building will be used for office, equipment maintenance, and garages. The site will also include an area for material processing and storage.

III. Existing Traffic Conditions

To evaluate the quality of traffic operation for the development, the following unsignalized intersections were analyzed for the study:

- Inland Road/Paper Mill Road and northern site driveway; and
- Inland Road/Paper Mill Road and southern site driveway.

Peak-hour traffic volumes for Inland Road/Paper Mill Road were calculated using November 2017 counts by CTDOT, a seasonal adjustment factor of 1.10 and an annual growth rate of one percent between 2017 and build year 2023. The results reflect peak summer month volumes in 2023 without the effects of the pandemic.

IV. Future Traffic Conditions

For the purpose of this traffic impact study, it was assumed that the development will be completed and in operation in 2023.

Trip Generation

Peak-hour vehicular trips generated by the development in Table 1 were based on data from ITE (Institute of Transportation Engineers) *Trip Generation Manual, 10th Edition* and assumed truck traffic for material processing and storage on the site (four in and four out during each peak hour). The site is expected to generate 15 and 14 trips during the respective weekday morning and weekday afternoon peak hours.

Table 1 Trip Generation (vph)

Proposed Use: 9,400 SF Office, Maintenance Facility, and Garage Building (ITE LU 110, General Light Industrial); and Construction Material Processing and Storage									
	Entry			Exit			Entry & Exit		
	9,400 SF Building	Construction Material Processing and Storage	Total	9,400 SF Building	Construction Material Processing and Storage	Total	9,400 SF Building	Construction Material Processing and Storage	Total
Weekday AM Peak Hour of Adjacent Street	6	4	**10**	1	4	**5**	7	8	**15**
Weekday PM Peak Hour of Adjacent Street	1	4	**5**	5	4	**9**	6	8	**14**

vph Vehicles per hour

Table 2 depicts the distribution of the site-generated trips along area routes. The distribution takes into account the relative traffic volumes of area roadways and the development patterns in this part of Lisbon.

Table 2 Trip Distribution

To / From Route	Entry and Exit
North: Inland Road/Paper Mill Road	30%
South: Inland Road/Paper Mill Road	70%
Total	100%

Capacity Analysis

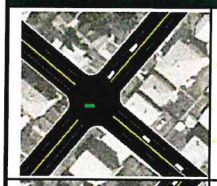
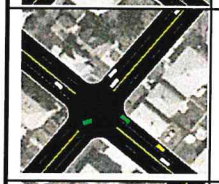
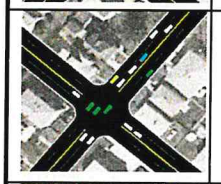
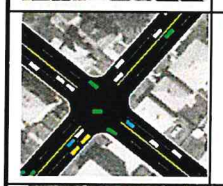
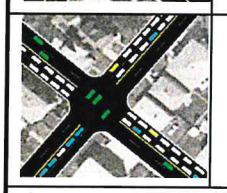
To assess the quality of traffic flow, intersection capacity analysis was conducted for the existing, future no-build and future build traffic conditions. Capacity analysis provides an indication of how well roadway facilities serve the traffic demands placed upon them. *Synchro 10*, a software package that includes the evaluation criteria of the *2000 Highway Capacity Manual (HCM 2000)*, was used to analyze the intersections.

Level of service (LOS) is the term used to describe the different operating conditions that occur on a given roadway segment or intersection under various traffic conditions. It is a

qualitative measure of the effects of a number of factors including roadway geometry, speed, travel delay, freedom to maneuver, and safety. Six levels of service can be defined for each type of facility. Each level of service (LOS) is given a letter designation from A to F, with LOS A representing the best operating conditions and LOS F representing the worst.

LOS at intersection is measured in terms of average control delay. For signalized intersections and all-way stop-controlled intersections, the analysis considers the operation of all traffic entering the intersection, and an overall condition is reported in addition to individual movements. For two-way stop-controlled (TWSC) intersections where side street traffic has to stop for main street traffic, the analysis assumes that through traffic on the main street is not affected by traffic on side streets. Thus, LOS is calculated for the main street left-turn and side street approaches, and no overall intersection LOS is defined for TWSC intersections. Table 3 presents the LOS criteria for signalized and unsignalized intersections as defined in the HCM 2000.

Table 3 LOS Criteria for Signalized and Unsignalized Intersections

	Level-of-Service (LOS)	Signalized Delay Range (Average Control Delay, in sec/veh)	Unsignalized Delay Range (Average Control Delay in sec/veh)
	A	≤ 10	≤ 10
	B	> 10 and ≤ 20	> 10 and ≤ 15
	C	> 20 and ≤ 35	> 15 and ≤ 25
	D	> 35 and ≤ 55	> 25 and ≤ 35
	E	> 55 and ≤ 80	> 35 and ≤ 50
	F	> 80	> 50

Source: 2000 Highway Capacity Manual (Exhibits 16-2 and 17-2)

Table 4 shows the capacity analysis results for the 2023 build traffic conditions. Both driveway intersections are expected operate at favorable LOS A with minimal delays.

Table 4 Capacity Analyses for Build Conditions

Intersection	2023 Build Conditions			
	Weekday Morning Peak Hour of Adjacent Street		Weekday Afternoon Peak Hour of Adjacent Street	
	Delay (sec)	LOS	Delay (sec)	LOS
Inland Rd./Paper Mill Rd. and Site Driveway (N) (Unsignalized)				
WB Site Driveway (N)	9.1	A	9.5	A
SB Inland Rd./Paper Mill Rd.	0.0	A	0.1	A
Inland Rd./Paper Mill Rd. and Site Driveway (S) (Unsignalized)				
WB Site Driveway (S)	9.3	A	9.6	A
SB Inland Rd./Paper Mill Rd.	0.1	A	0.1	A

EB Eastbound
WB Westbound
NB Northbound
SB Southbound
LOS Level of Service

V. Conclusions

Area traffic operation was analyzed for a 9,400 SF building and a material processing and storage facility under 2023 build traffic conditions. The site will generate a limited number of trips. Both driveway intersections will operate at LOS A under the build conditions. The development will produce limited traffic impact on area roadways.

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Technical Appendices

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF POLICY & PLANNING - ROADWAY INFORMATION SYSTEMS
TRAFFIC DATA COLLECTION & VERIFICATION SECTION

FACTORS FOR EXPANDING 24-HOUR COUNTS TO
ANNUAL AVERAGE DAILY TRAFFIC VOLUMES
(BASED ON 2018 CONTINUOUS COUNT STATION DATA)

GROUP - 1 * * INTERSTATE * *

STATION(S): 7, 12, 24, 30, 31, 32, 53, 54

AVG.	WEEKDAY	FRIDAY	SATURDAY	SUNDAY
JANUARY	1.08	1.03	1.21	1.41
FEBRUARY	1.04	0.96	1.13	1.45
MARCH	1.05	0.93	1.05	1.21
APRIL	0.99	0.91	1.03	1.17
MAY	0.94	0.83	0.98	1.10
JUNE	0.95	0.90	0.99	1.08
JULY	0.95	0.91	0.97	1.08
AUGUST	0.94	0.86	0.99	1.06
SEPTEMBER	0.99	0.89	0.99	1.08
OCTOBER	0.98	0.90	1.00	1.12
NOVEMBER	0.98	0.98	1.03	1.13
DECEMBER	1.00	0.96	1.04	1.22

GROUP - 2 * * RURAL * *

STATION(S): 4, 10, 16, 20, 50, 51

AVG.	WEEKDAY	FRIDAY	SATURDAY	SUNDAY
JANUARY	1.12	1.08	1.17	1.48
FEBRUARY	1.12	1.05	1.16	1.55
MARCH	1.08	1.04	1.06	1.32
APRIL	1.05	0.95	0.94	1.29
MAY	0.95	0.89	0.95	1.04
JUNE	0.91	0.80	0.87	0.95
JULY	0.93	0.84	0.87	0.98
AUGUST	0.89	0.83	0.90	0.93
SEPTEMBER	0.97	0.88	0.91	1.02
OCTOBER	0.98	0.88	0.97	1.08
NOVEMBER	1.00	1.02	1.09	1.21
DECEMBER	1.08	1.09	1.11	1.29

GROUP - 3 * * INTERSTATE * *

STATION(S): 27 (I-84 FROM ROUTE 195 TO MASS. STATE LINE)

AVG.	WEEKDAY	FRIDAY	SATURDAY	SUNDAY
JANUARY	1.02	1.10	1.25	0.99
FEBRUARY	0.86	0.81	1.02	1.22
MARCH	1.46	0.91	0.94	0.93
APRIL	1.22	0.96	1.00	1.00
MAY	1.07	0.73	0.99	0.90
JUNE	1.04	0.84	0.96	0.71
JULY	0.98	0.84	0.80	0.74
AUGUST	0.81	0.75	0.89	0.79
SEPTEMBER	1.11	1.09	1.13	0.81
OCTOBER	1.04	1.06	1.30	0.99
NOVEMBER	1.26	1.24	1.15	0.64
DECEMBER	1.14	0.33	0.43	0.79

CONNECTICUT DEPARTMENT OF TRANSPORTATION
BUREAU OF POLICY & PLANNING - ROADWAY INFORMATION SYSTEMS
TRAFFIC MONITORING & DATA ANALYSIS SECTION

FACTORS FOR EXPANDING 24-HOUR COUNTS TO
ANNUAL AVERAGE DAILY TRAFFIC VOLUMES
(BASED ON 2018 CONTINUOUS COUNT STATION DATA)

GROUP - 4 * * URBAN * *

STATION(S): 8, 9, 11, 15, 17, 22, 23, 28, 47, 48, 52

AVG.	WEEKDAY	FRIDAY	SATURDAY	SUNDAY
JANUARY	1.03	1.00	1.18	1.46
FEBRUARY	1.03	0.95	1.14	1.49
MARCH	0.97	0.94	1.07	1.30
APRIL	0.98	0.90	1.03	1.26
MAY	0.92	0.83	1.01	1.21
JUNE	0.91	0.85	1.01	1.15
JULY	0.95	0.89	1.06	1.22
AUGUST	0.95	0.89	1.09	1.23
SEPTEMBER	0.96	0.88	1.03	1.20
OCTOBER	0.95	0.86	1.05	1.16
NOVEMBER	0.97	0.97	1.08	1.27
DECEMBER	0.99	0.96	1.06	1.24

GROUP - 5 * *NORTHWEST RECREATIONAL * *

STATION(S): 1 (Station 18 not available on 2018)

AVG.	WEEKDAY	FRIDAY	SATURDAY	SUNDAY
JANUARY	1.29	1.18	1.05	1.21
FEBRUARY	1.24	1.10	1.02	1.34
MARCH	1.28	1.06	1.14	1.24
APRIL	1.04	0.88	0.96	0.85
MAY	1.00	0.83	0.78	0.80
JUNE	0.96	0.80	0.79	0.77
JULY	0.91	0.80	0.71	0.61
AUGUST	0.94	0.75	0.76	0.71
SEPTEMBER	0.99	0.85	0.69	0.73
OCTOBER	0.95	0.71	0.69	0.68
NOVEMBER	1.15	1.05	1.08	1.06
DECEMBER	1.13	1.11	1.09	1.25

GROUP - 6 * * SOUTHEAST RECREATIONAL * *

STATION(S): 5, 33, 44, 46

AVG.	WEEKDAY	FRIDAY	SATURDAY	SUNDAY
JANUARY	1.24	1.08	1.05	1.22
FEBRUARY	1.17	1.00	0.98	1.21
MARCH	1.19	0.98	0.93	1.06
APRIL	1.13	0.91	0.86	1.00
MAY	1.04	0.85	0.84	0.92
JUNE	1.00	0.80	0.81	0.88
JULY	0.91	0.77	0.75	0.79
AUGUST	0.92	0.75	0.77	0.80
SEPTEMBER	1.07	0.89	0.84	0.92
OCTOBER	1.10	0.89	0.93	0.98
NOVEMBER	1.17	0.97	0.93	1.04
DECEMBER	1.16	1.00	0.97	1.15

Land Use: 110
General Light Industrial

Description

A light industrial facility is a free-standing facility devoted to a single use. The facility has an emphasis on activities other than manufacturing and typically has minimal office space. Typical light industrial activities include printing, material testing, and assembly of data processing equipment. Industrial park (Land Use 130) and manufacturing (Land Use 140) are related uses.

Additional Data

Time-of-day distribution data for this land use are presented in Appendix A. For the 30 general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 7:30 and 8:30 a.m. and 4:30 and 5:30 p.m., respectively.

The sites were surveyed in the 1980s, the 2000s, and the 2010s in Colorado, Connecticut, Indiana, New Jersey, New York, Oregon, Pennsylvania, and Texas.

Source Numbers

106, 157, 174, 177, 179, 184, 191, 251, 253, 286, 300, 611, 874, 875, 912

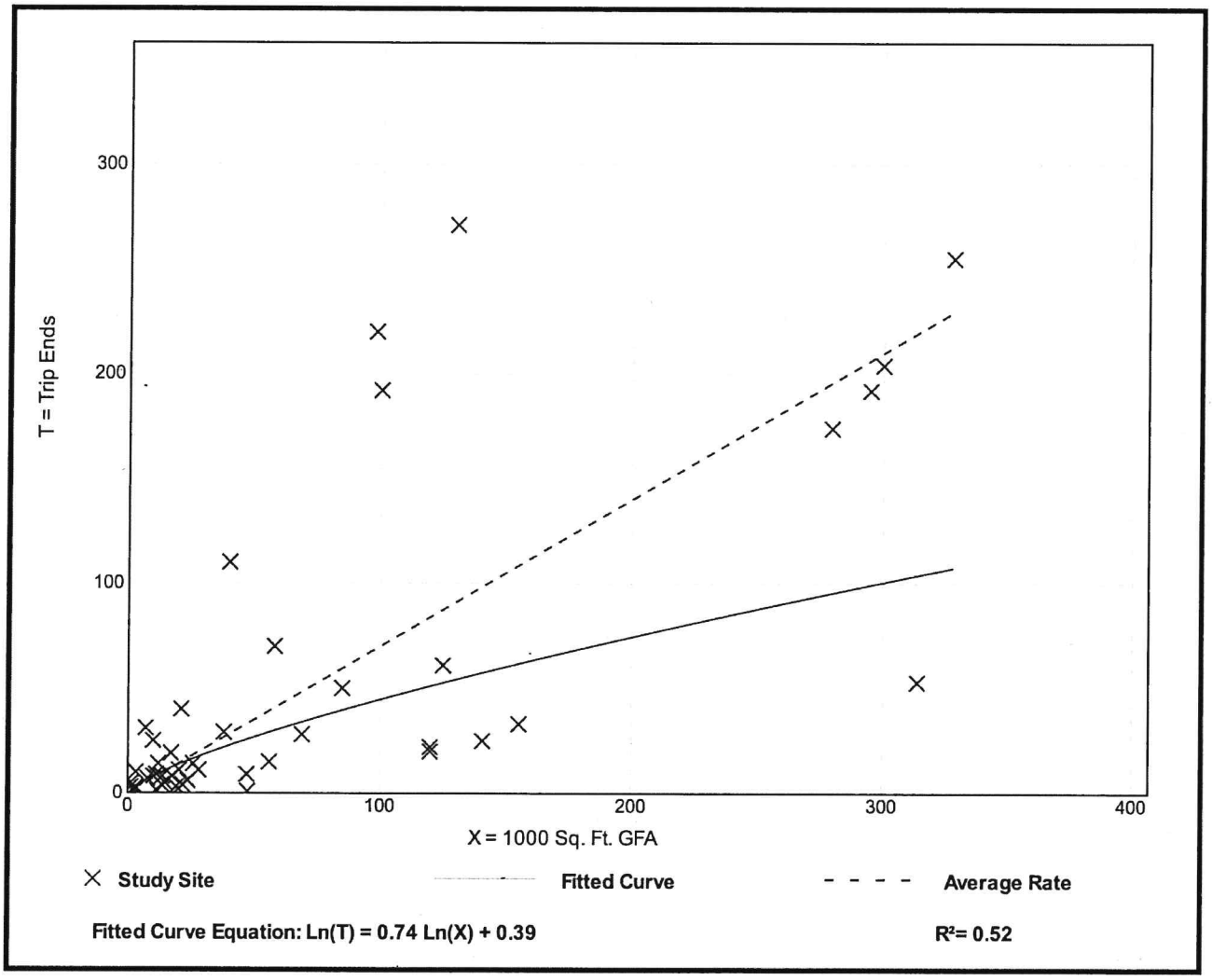
General Light Industrial
(110)

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: 45
1000 Sq. Ft. GFA: 73
Directional Distribution: 88% entering, 12% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.70	0.02 - 4.46	0.65

Data Plot and Equation



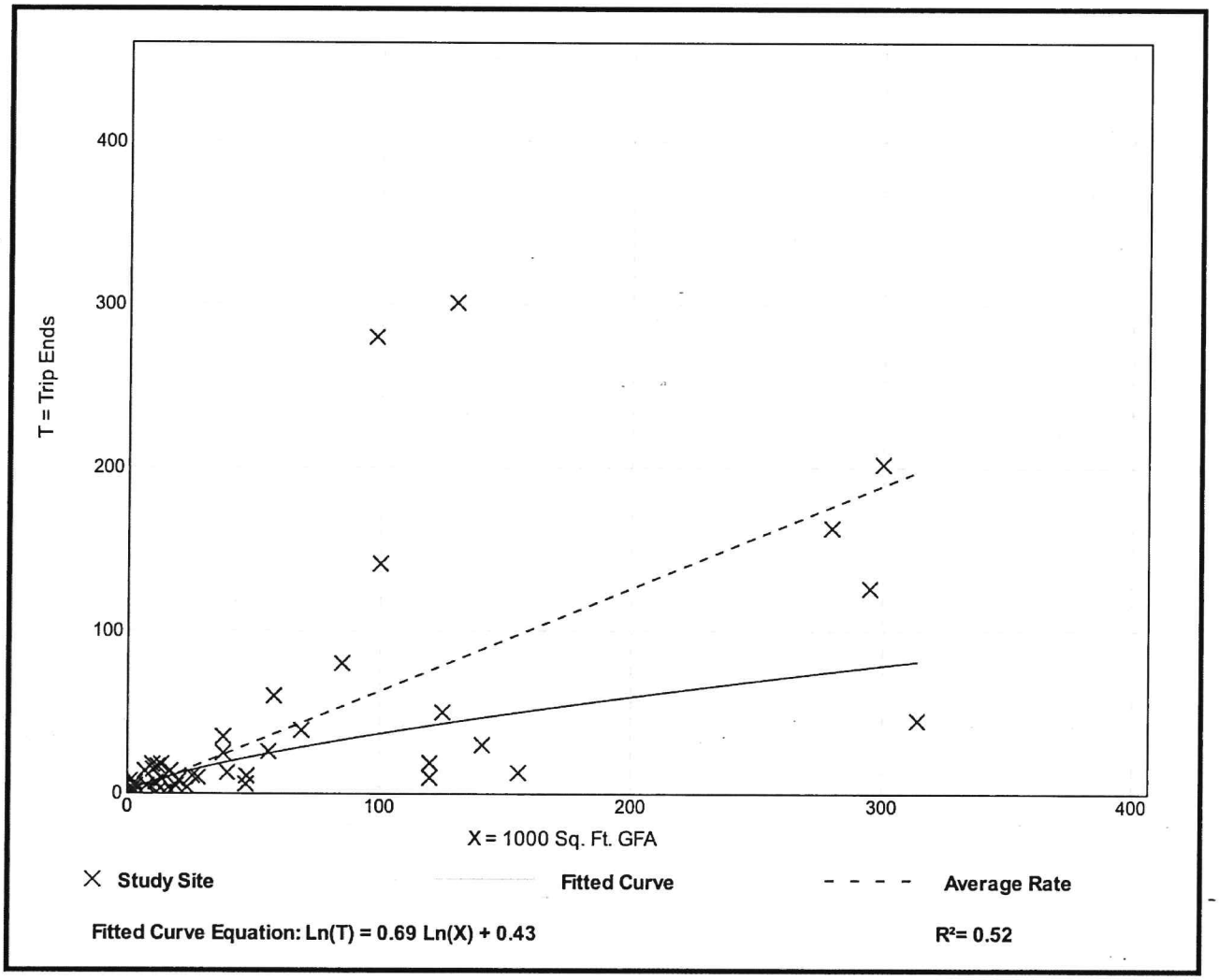
General Light Industrial
(110)

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: 44
1000 Sq. Ft. GFA: 67
Directional Distribution: 13% entering, 87% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.63	0.07 - 7.02	0.68

Data Plot and Equation



Status: OK

SPRA-037 - North & South [16]-Inland Road - 0.02 mi North of Route 138

Town.....Sprague
Station.....37
Location..... 41.615836,-72.036971
2015-Minor Collector 6.....2015-Rural
Start Report.....02-Nov-2017 12:00AM
End Report.....02-Nov-2017 11:00PM
Axle Correction Factor.....None
Annualized ADT.....1400
24-Hour Count... 1407 * G2(0.98) = 1378.9
UnRounded AADT.....1378.9 / 1 = 1378.9
OK 2020 Thu 19-Mar 800
OK 2017 Thu 02-Nov -this report-...1400
OK 2014 Mon 21-Apr 1500

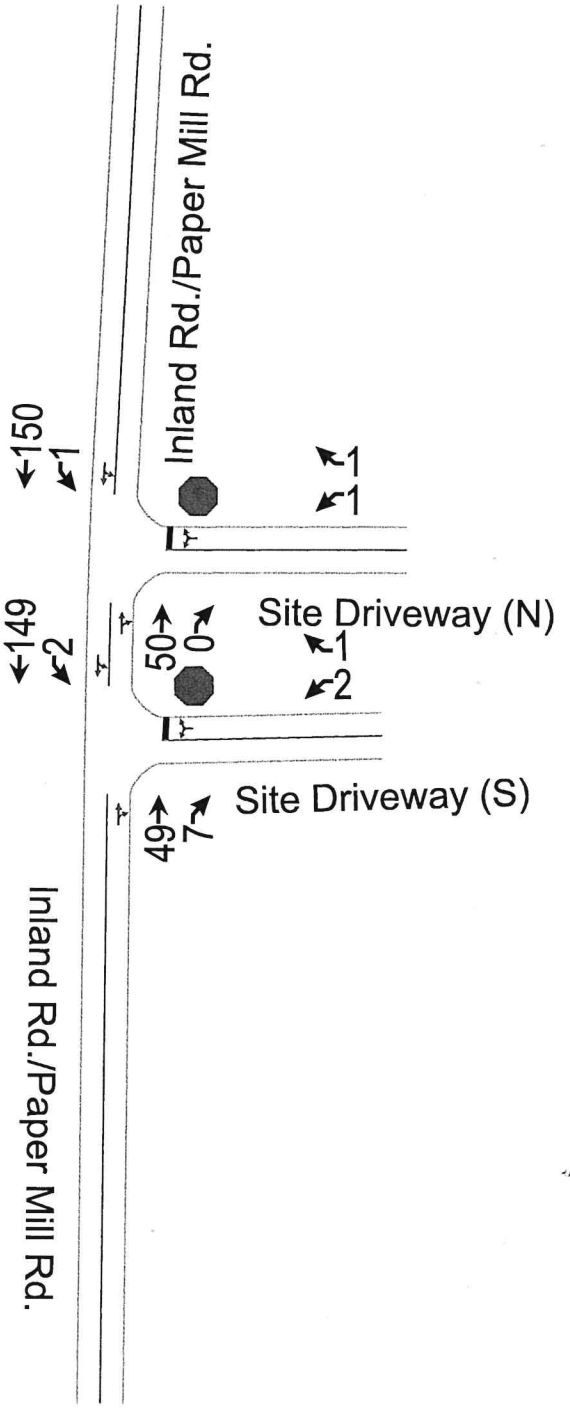
	02-Nov Thu	NB	SB
12:00am	4		
01:00am	0		
02:00am	4		
03:00am	4		
04:00am	13		
05:00am	31		
06:00am	169	42	127
07:00am	122		
08:00am	80		
09:00am	83		
10:00am	49		
11:00am	65		
12:00pm	62		
01:00pm	58		
02:00pm	71		
03:00pm	83		
04:00pm	116		
05:00pm	185	128	57
06:00pm	81		
07:00pm	44		
08:00pm	34		
09:00pm	24		
10:00pm	15		
11:00pm	10		
Totals	1407		

(using 2020 directional splits as guide)

Seasonal adjustment (Nov. to June): 1/0.91= 1.10
Growth between 2017 and 2023 (1% per year) = 1.06

2021 Peak Month Volumes (without Effects of Covid):

	NB	SB
AM	49	148
PM	149	66



2023 Build Conditions, Weekday Morning Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	1	50	0	1	150
Future Volume (Veh/h)	1	1	50	0	1	150
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	1	54	0	1	163
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)			100			
pX, platoon unblocked						
vC, conflicting volume	219	54			54	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	219	54			54	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	769	1013			1551	

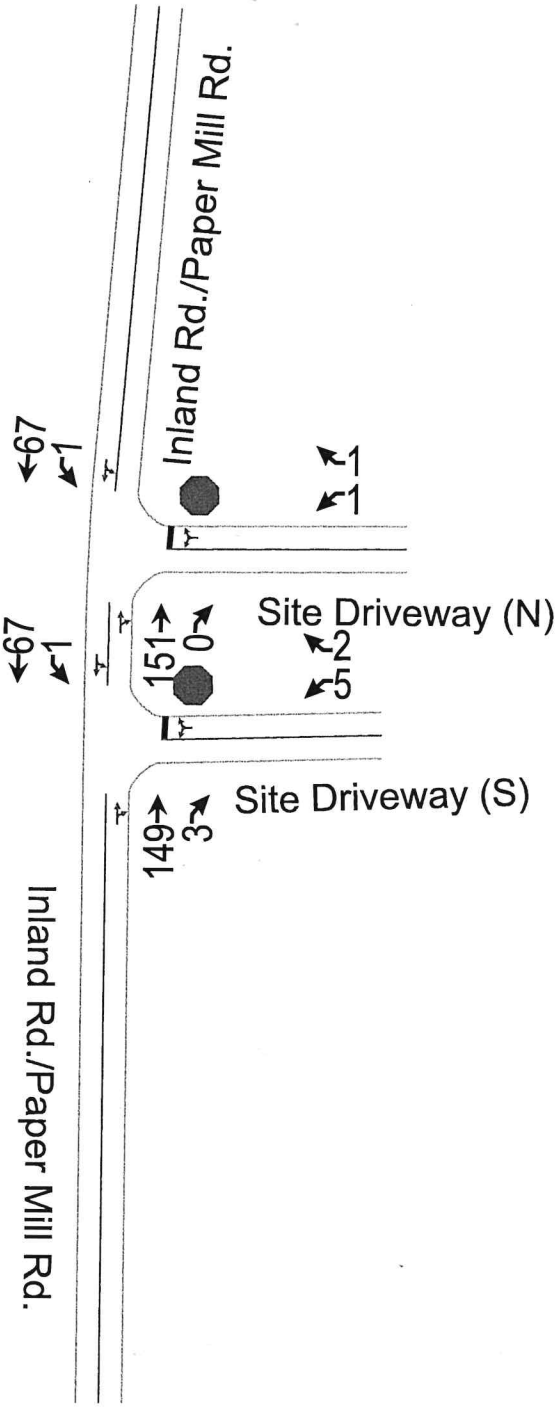
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	2	54	164
Volume Left	1	0	1
Volume Right	1	0	0
cSH	874	1700	1551
Volume to Capacity	0.00	0.03	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	9.1	0.0	0.0
Lane LOS	A		A
Approach Delay (s)	9.1	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	18.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	2	1	49	7	2	149
Future Volume (Veh/h)	2	1	49	7	2	149
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	1	53	8	2	162
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	223	57			61	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	223	57			61	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	764	1009			1542	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	3	61	164
Volume Left	2	0	2
Volume Right	1	8	0
cSH	831	1700	1542
Volume to Capacity	0.00	0.04	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	9.3	0.0	0.1
Lane LOS	A		A
Approach Delay (s)	9.3	0.0	0.1
Approach LOS	A		

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	19.4%	ICU Level of Service	A
Analysis Period (min)	15		



2023 Build Conditions, Weekday Afternoon Peak Hour

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	1	1	151	0	1	67
Future Volume (Veh/h)	1	1	151	0	1	67
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	1	164	0	1	73
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	239	164			164	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	239	164			164	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	749	881			1414	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	2	164	74
Volume Left	1	0	1
Volume Right	1	0	0
cSH	809	1700	1414
Volume to Capacity	0.00	0.10	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	9.5	0.0	0.1
Lane LOS	A		A
Approach Delay (s)	9.5	0.0	0.1
Approach LOS	A		

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	17.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	2	149	3	1	67
Future Volume (Veh/h)	5	2	149	3	1	67
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	2	162	3	1	73
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	238	164			165	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	238	164			165	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	749	881			1413	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	7	165	74
Volume Left	5	0	1
Volume Right	2	3	0
cSH	783	1700	1413
Volume to Capacity	0.01	0.10	0.00
Queue Length 95th (ft)	1	0	0
Control Delay (s)	9.6	0.0	0.1
Lane LOS	A		A
Approach Delay (s)	9.6	0.0	0.1
Approach LOS	A		

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	18.0%	ICU Level of Service	A
Analysis Period (min)	15		