
TRAFFIC IMPACT STUDY SUPPLEMENT

for

**Hudson Logistics Center
Hudson, New Hampshire**

Prepared for:

Hillwood Enterprises, L.P.



Prepared By:

**Langan Engineering & Environmental Services, Inc.
888 Bolyston Street, Suite 510
Boston, MA 02199**

Luke Mauro, PTOE

**John D. Plante, P.E.
New Hampshire Licensed Professional Engineer No. 14072**

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1.0 INTRODUCTION

Langan has prepared this traffic impact study supplement to provide additional analysis of the potential impacts of the proposed Hudson Logistics Center (HLC) development at 43 Steele Road in Hudson, New Hampshire. This supplemental analysis should be used in conjunction with the information provided in the report titled "Traffic Impact Study for Hudson Logistics Center" prepared by Langan and dated September 2020.

The site is bordered by residential properties to the south, the Merrimack River to the west, and Sagamore Bridge Road/Circumferential Highway to the north. Commercial and industrial uses, with frontage along Lowell Road (Route 3A), border the site to the east.

The project site is approximately 377 acres, which is currently the Green Meadows Golf Course. The proposed development includes the subdivision of the site into three lots on a proposed roadway. Three e-commerce fulfillment warehouses along with associated parking, landscaping, utility improvements and stormwater systems are proposed to be constructed. The proposed subdivision roadway will connect to Lowell Road at the current location of the Mercury Systems driveway, opposite the intersection of Rena Avenue. The Mercury Systems parking facilities will tie into the new subdivision road called Green Meadow Drive. The project also proposes a roadway connection to Wal-Mart Boulevard (a private way). Wal-Mart Boulevard forms a four-way signalized intersection on Lowell Road, with the westbound approach of Wal-Mart Boulevard. (See Site Plan in Appendix A).

The development's building construction schedule is anticipated to be phased based on individual tenant schedules; however, although not likely, for this study we will presume that the entire development will be open in 2022. This study provides an analysis of the traffic conditions for the 2022 build-year and also a 10-year horizon build-out for 2032, in accordance with New Hampshire Department of Transportation guidelines.

2.0 QUEUING ANALYSIS

As requested by the New Hampshire Department of Transportation (NHDOT) as part of the ongoing coordination efforts, we evaluated the resulting vehicular queuing for all conditions using Synchro 10 Plus SimTraffic software to assess the impacts at study intersections. SimTraffic provides a simulated model of traffic conditions and was used to provide a more accurate representation of anticipated vehicular queues for all analyzed conditions. NHDOT SimTraffic standards were used to seed and record the simulations. Five separate runs were conducted for each scenario and the average of the five runs was used to calculate the queue lengths provided in Tables 1 through 6 below. Each run was seeded for 30 minutes, sufficient time for vehicles to fill the network, as required by the NHDOT SimTraffic standards. After the run was seeded with vehicles, four

consecutive 15 minute intervals were recorded for analysis, totaling to a 60 minute recorded period. Growth factor adjustments were applied to the seeding interval and all recording intervals. Anti-PHF adjustments were applied to the first, third, and fourth recording intervals and PHF adjustments were applied to the second recording interval. The percentile adjustment was not used for these analyses and the default random number seed value of one was used.

In evaluating queuing length, the industry standard is to utilize the 50th and the 95th percentile queue lengths developed by the analysis. The 50th percentile queue represents the average or typical vehicular queue that can be expected during the peak-hour. The 95th percentile queue length represents the queuing experience during the highest peak periods within the peak hour, which accounts for 5% of the analysis period. Queues are calculated in feet, and approximately 20 feet of queue is equal to a single vehicle in the SimTraffic analysis.

Tables 1 through 6 provide the expected 50th and 95th percentile queue lengths for the analyzed periods. Results shown under the build with base improvements column reflect the base recommended improvements report and include the two-lane roundabout alternative at the intersection of Lowell Road/River Road (Route 3A) & Dracut Road/Steele Road. A detailed description of the proposed base improvements, including the roundabout at the intersection of Lowell Road/River Road/Dracut Road/Steele Road, can be found in the report titled "Traffic Impact Study for Hudson Logistics Center" prepared by Langan dated September 2020.

As recommended by NHDOT, we also evaluated a potential alternate improvement at the intersection of Lowell Road/River Road at Dracut Road/Steele Road, which includes the conversion of one of the southbound through lanes to a second exclusive left-turn lane onto Dracut Road and widening on Dracut Road to accept a second receiving lane which would transition back down to a single lane with a lane drop. Table 5 compares the traffic operating conditions for the 2022 and 2032 no-build, two-lane roundabout improvement and the alternative improvement recommended by NHDOT outlined above. Table 6 compares the traffic operating conditions for the 2022 and 2032 no-build, build with base improvements and build with potential future improvements at the intersection of Lowell Road at Flagstone Drive/Wason Road. A detailed description of the suggested NHDOT improvements and the potential future improvements can be found in the report titled "Traffic Impact Study for Hudson Logistics Center" prepared by Langan dated September 2020.

See the following appendices for detailed SimTraffic queueing reports. Appendix B contains reports for the 2019 Existing conditions. Appendix C contains reports for the 2022 and 2032 No-Build conditions. Appendix D contains reports for the 2022 and 2032 Build conditions. Appendix E contains reports for the 2022 and 2032 Build with Improvements conditions. Appendix F contains reports for the 2022 and 2032 Build with Future Improvements conditions.

TABLE 1 OPENING YEAR QUEUING ANALYSIS SUMMARY – WEEKDAY A.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	LANE USE	STORAGE LENGTH	2019 EXISTING CONDITIONS		2022 NO-BUILD CONDITIONS		2022 BUILD CONDITIONS		2022 BUILD WITH BASE IMPROVEMENTS CONDITIONS			
				QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	QUEUES (ft)
				50th%	95th%	50th%	95th%	50th%	95th%			50th%	95th%
River Road (Route 3A)/ Lowell Road (Route 3A) & Dracut Road & Steele Road	ACTUATED-COORDINATED/ ROUNDABOUT	EB-L	±590'	1'	10'	2'	12'	2'	11'	EB-LTR	±590'	3'	21'
		EB-RR	50'	5'	28'	4'	21'	4'	22'				
		NB-L	200'	0'	0'	0'	0'	0'	0'	NB-LT	±760'	55'	103'
		NB-TTR	±760'	97'	161'	107'	183'	110'	186'	NB-TR	±760'	0'	0'
		SB-L	775'	196'	313'	208'	331'	147'	257'	SB-LT	>1000'	2'	23'
		SB-TTR	>1000'	51'	102'	58'	116'	29'	86'	SB-TR	>1000'	0'	0'
		NWB-LL	100'	2'	26'	0'	0'	1'	18'	WB-LTR	>1000'	77'	142'
		NWB-R	>1000'	512'	535'	513'	535'	515'	538'	WB-R	150'	19'	86'
Lowell Road (Route 3A) & Green Meadow Drive/ Rena Avenue	ACTUATED-COORDINATED	EB-LT	±510'	2'	15'	2'	14'	126'	234'	EB-LL		91'	160'
		EB-R	50'	5'	27'	4'	26'	25'	77'	EB-TR	±510'	14'	41'
		WB-LTR	±560'	17'	42'	21'	46'	21'	52'	WB-LTR	±560'	22'	53'
		NB-L	300'	10'	33'	12'	38'	53'	204'	NB-L	300'	33'	70'
		NB-TTR	±1730'	32'	102'	27'	100'	246'	648'	NB-TTR	±1730'	79'	158'
		SB-L	350'	19'	66'	6'	28'	6'	27'	SB-L	350'	5'	25'
		SB-TTR	±980'	53'	168'	58'	181'	181'	341'	SB-TT	±980'	150'	167'
								SB-R		85'	166'		
Lowell Road (Route 3A) & Wal-Mart Boulevard	ACTUATED-COORDINATED	EB-LL	175'	49'	89'	45'	82'	94'	177'	EB-LL	175'	52'	99'
		EB-T	±400'	2'	16'	4'	17'	42'	224'	EB-T	±400'	2'	11'
		EB-R	175'	33'	77'	31'	70'	35'	75'	EB-R	175'	34'	83'
		WB-LL	150'	8'	31'	12'	37'	12'	39'	WB-LL	150'	12'	38'
		WB-T	±450'	6'	24'	4'	18'	4'	19'	WB-T	±450'	4'	19'
		WB-R	200'	51'	97'	51'	93'	53'	102'	WB-R	200'	49'	97'
		NB-LL	350'	37'	68'	37'	71'	196'	543'	NB-LL	350'	43'	74'
		NB-TT	±980'	199'	301'	211'	339'	609'	1077'	NB-TTTR	±980'	201'	324'
		NB-R	175'	9'	34'	8'	31'	27'	126'				
		SB-LL	350'	39'	73'	42'	75'	39'	70'	SB-LL	350'	39'	74'
		SB-TT	>1000'	117'	262'	99'	253'	146'	357'	SB-TTT	±1190'	101'	237'
SB-R	725'	17'	48'	12'	39'	42'	188'	SB-R	400'	23'	62'		
Lowell Road (Route 3A) & Sagamore Bridge Road	ACTUATED-COORDINATED	EB-LL	>1000'	273'	379'	694'	1157'	695'	1095'	EB-LL	>1000'	300'	527'
		EB-R	>1000'	0'	0'	536'	1252'	456'	1188'	EB-R	>1000'	47'	344'
		NB-LL	525'	194'	278'	217'	296'	608'	686'	NB-LLL	525'	210'	313'
		NB-TT	±1190'	41'	85'	53'	118'	940'	1425'	NB-TT	±1190'	59'	119'
		SB-TT	±1000'	879'	968'	471'	1042'	474'	1074'	SB-TT	±1000'	192'	552'
		SB-R	200'	250'	251'	773'	1222'	802'	1197'	SB-RR	200'	443'	941'

TABLE 1 OPENING YEAR QUEUING ANALYSIS SUMMARY – WEEKDAY A.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	LANE USE	STORAGE LENGTH	2019 EXISTING CONDITIONS		2022 NO-BUILD CONDITIONS		2022 BUILD CONDITIONS		2022 BUILD WITH BASE IMPROVEMENTS CONDITIONS			
				QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	QUEUES (ft)
				50th%	95th%	50th%	95th%	50th%	95th%			50th%	95th%
Lowell Road (Route 3A) & Flagstone Drive/ Wason Road	ACTUATED-COORDINATED	EB-LT	±810'	48'	164'	202'	510'	183'	478'	EB-LT	±810'	65'	148'
		EB-R	250'	143'	250'	200'	315'	202'	311'	EB-R	250'	109'	193'
		WB-L	200'	193'	346'	203'	340'	205'	332'	WB-L	200'	222'	335'
		WB-LT	±590'	540'	552'	538'	545'	539'	550'	WB-LT	±590'	520'	530'
		WB-R	75'	31'	113'	35'	119'	31'	112'	WB-R	75'	38'	125'
		NB-L	575'	329'	571'	697'	885'	736'	809'	NB-L	575'	246'	423'
		NB-TT	±1000'	205'	438'	744'	1208'	831'	1187'	NB-TT	±1000'	174'	274'
		NB-R	275'	26'	136'	20'	83'	18'	83'	NB-RR	275'	22'	101'
		SB-L	175'	14'	67'	22'	87'	16'	61'	SB-L	175'	12'	47'
SB-TTR	±1520'	1452'	1533'	575'	960'	607'	970'	SB-TTTR	300'	195'	223'		
Lowell Road (Route 3A) & Hampshire Drive/ Oblate Drive	ACTUATED-UNCOORDINATED	EB-LT	±500'	6'	20'	5'	23'	8'	28'				
		EB-R	100'	8'	27'	5'	22'	6'	25'				
		WB-LT	±380'	2'	15'	4'	21'	3'	16'				
		WB-R	100'	8'	32'	7'	27'	3'	19'				
		NB-L	225'	75'	144'	59'	118'	61'	133'				
		NB-TTR	±1520'	28'	110'	26'	91'	22'	83'				
		SB-L	225'	7'	72'	1'	8'	1'	9'				
		SB-TTR	±1790'	1565'	2121'	88'	204'	98'	240'				
Lowell Road (Route 3A) & Executive Drive	ACTUATED-UNCOORDINATED	EB-LT	±490'	29'	72'	32'	75'	29'	75'				
		EB-R	225'	0'	0'	0'	0'	0'	0'				
		WB-LT	±580'	492'	662'	509'	679'	490'	685'				
		WB-R	80'	49'	128'	71'	143'	63'	137'				
		NB-L	350'	186'	351'	124'	223'	129'	256'				
		NB-TTR	±1790'	108'	268'	92'	179'	98'	221'				
		SB-L	150'	142'	256'	81'	160'	92'	182'				
		SB-TTR	±1170'	815'	1571'	197'	296'	218'	315'				
Lowell Road (Route 3A) & Fox Hollow Drive/ Nottingham Square Driveway	ACTUATED-COORDINATED	EB-LT	±600'	39'	135'	24'	90'	25'	98'	EB-LT	±600'	29'	105'
		EB-R	50'	43'	81'	39'	77'	44'	78'	EB-R	50'	42'	7'
		WB-LT	±260'	6'	23'	3'	15'	5'	20'	WB-LT	±260'	7'	27'
		WB-R	100'	5'	19'	4'	16'	5'	18'	WB-R	100'	7'	27'
		NB-L	210'	3'	16'	2'	14'	4'	22'	NB-L	210'	3'	17'
		NB-T	±1410'	68'	191'	62'	188'	99'	264'	NB-T	±1410'	50'	116'
		NB-R	325'	0'	4'	0'	4'	0'	0'	NB-TR	325'	32'	98'
		SB-L	125'	16'	74'	20'	77'	26'	105'	SB-L	125'	20'	71'
SB-TR	±550'	255'	521'	206'	447'	224'	487'	SB-TR	±550'	160'	324'		

TABLE 1 OPENING YEAR QUEUING ANALYSIS SUMMARY – WEEKDAY A.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	LANE USE	STORAGE LENGTH	2019 EXISTING CONDITIONS		2022 NO-BUILD CONDITIONS		2022 BUILD CONDITIONS		2022 BUILD WITH BASE IMPROVMENTS CONDITIONS			
				QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	QUEUES (ft)
				50th%	95th%	50th%	95th%	50th%	95th%			50th%	95th%
Lowell Road (Route 3A) & Pelham Road	ACTUATED-COORDINATED	WB-L	±510'	308'	569'	373'	595'	443'	619'				
		WB-R	75'	68'	155'	65'	153'	63'	152'				
		NB-TR	±550'	137'	325'	145'	323'	153'	364'				
		SB-L	150'	84'	183'	84'	171'	104'	201'				
		SB-T	±1310'	431'	983'	387'	758'	372'	732'				

TABLE 2 OPENING YEAR QUEUING ANALYSIS SUMMARY – WEEKDAY P.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	LANE USE	STORAGE LENGTH	2019 EXISTING CONDITIONS		2022 NO-BUILD CONDITIONS		2022 BUILD CONDITIONS		2022 BUILD WITH BASE IMPROVMENTS CONDITIONS			
				QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	QUEUES (ft)
				50th%	95th%	50th%	95th%	50th%	95th%			50th%	95th%
River Road (Route 3A)/ Lowell Road (Route 3A) & Dracut Road & Steele Road	ACTUATED-COORDINATED/ ROUNDABOUT	EB-L	±590'	28'	62'	34'	78'	35'	77'	EB-LTR	±590'	20'	50'
		EB-RR	50'	8'	31'	5'	27'	8'	36'				
		NB-L	200'	0'	0'	0'	0'	2'	44'	NB-LT	±760'	167'	260'
		NB-TTR	±760'	224'	312'	249'	366'	547'	787'	NB-TR	±760'	110'	246'
		SB-L	775'	849'	858'	841'	926'	850'	850'	SB-LT	>1000'	12'	92'
		SB-TTR	>1000'	1595'	2273'	1608'	2270'	1673'	2132'	SB-TR	>1000'	0'	0'
		NWB-LL	100'	8'	53'	15'	80'	14'	75'	WB-LTR	>1000'	89'	159'
		NWB-R	>1000'	466'	630'	488'	584'	502'	507'	WB-R	150'	40'	117'
Lowell Road (Route 3A) & Green Meadow Drive/ Rena Avenue	ACTUATED-COORDINATED	EB-LT	±510'	44'	91'	50'	101'	325'	534'	EB-LL		131'	211'
		EB-R	50'	18'	56'	22'	62'	48'	93'	EB-TR	±510'	17'	40'
		WB-LTR	±560'	13'	37'	12'	38'	15'	43'	WB-LTR	±560'	12'	36'
		NB-L	300'	2'	12'	10'	99'	184'	489'	NB-L	300'	27'	63'
		NB-TTR	±1730'	301'	956'	444'	1215'	1655'	1775'	NB-TTR	±1730'	144'	233'
		SB-L	350'	85'	320'	88'	331'	89'	335'	SB-L	350'	19'	54'
		SB-TTR	±980'	478'	1050'	561'	1119'	705'	1180'	SB-TT	±980'	66'	130'
Lowell Road (Route 3A) & Wal-Mart Boulevard	ACTUATED-COORDINATED	EB-LL	175'	159'	253'	147'	254'	196'	211'	EB-LL	175'	149'	215'
		EB-T	±400'	219'	490'	189'	463'	352'	363'	EB-T	±400'	64'	259'
		EB-R	175'	66'	148'	85'	188'	66'	156'	EB-R	175'	71'	136'
		WB-LL	150'	43'	107'	44'	99'	42'	93'	WB-LL	150'	72'	138'
		WB-T	±450'	325'	559'	336'	555'	396'	396'	WB-T	±450'	39'	166'
		WB-R	200'	234'	295'	238'	294'	250'	252'	WB-R	200'	149'	237'
		NB-LL	350'	275'	628'	312'	654'	361'	678'	NB-LL	350'	58'	97'
		NB-TT	±980'	676'	1079'	761'	1177'	906'	936'	NB-TTTR	±980'	261'	371'
		NB-R	175'	63'	207'	71'	217'	70'	220'				
		SB-LL	350'	139'	317'	218'	484'	289'	575'	SB-LL	350'	99'	155'
		SB-TT	>1000'	288'	808'	459'	1102'	694'	1346'	SB-TTT	±1190'	145'	540'
SB-R	725'	126'	579'	276'	1009'	602'	1475'	SB-R	400'	28'	70'		
Lowell Road (Route 3A) & Sagamore Bridge Road	ACTUATED-COORDINATED	EB-LL	>1000'	889'	939'	891'	959'	891'	1103'	EB-LL	>1000'	892'	958'
		EB-R	>1000'	889'	898'	889'	898'	893'	910'	EB-R	>1000'	892'	907'
		NB-LL	525'	616'	669'	604'	693'	620'	664'	NB-LLL	525'	491'	706'
		NB-TT	±1190'	974'	1450'	912'	1479'	1035'	1153'	NB-TT	±1190'	266'	399'
		SB-TT	±1000'	894'	928'	147'	280'	177'	319'	SB-TT	±1000'	211'	325'
		SB-R	200'	246'	295'	103'	536'	110'	529'	SB-RR	200'	175'	541'

TABLE 2 OPENING YEAR QUEUING ANALYSIS SUMMARY – WEEKDAY P.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	LANE USE	STORAGE LENGTH	2019 EXISTING CONDITIONS		2022 NO-BUILD CONDITIONS		2022 BUILD CONDITIONS		2022 BUILD WITH BASE IMPROVMENTS CONDITIONS			
				QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	QUEUES (ft)
				50th%	95th%	50th%	95th%	50th%	95th%			50th%	95th%
Lowell Road (Route 3A) & Flagstone Drive/ Wason Road	ACTUATED-COORDINATED	EB-LT	±810'	662'	981'	293'	648'	328'	748'	EB-LT	±810'	149'	316'
		EB-R	250'	273'	289'	224'	327'	216'	331'	EB-R	250'	187'	296'
		WB-L	200'	193'	340'	143'	299'	149'	301'	WB-L	200'	220'	326'
		WB-LT	±590'	509'	632'	284'	455'	281'	439'	WB-LT	±590'	519'	570'
		WB-R	75'	38'	125'	23'	93'	17'	77'	WB-R	75'	29'	106'
		NB-L	575'	63'	126'	93'	165'	96'	173'	NB-L	575'	84'	147'
		NB-TT	±1000'	257'	404'	258'	423'	236'	405'	NB-TT	±1000'	197'	275'
		NB-R	275'	185'	397'	209'	403'	188'	393'	NB-RR	275'	73'	114'
		SB-L	175'	69'	172'	61'	134'	61'	129'	SB-L	175'	57'	117'
SB-TTR	±1520'	1270'	1826'	221'	423'	231'	427'	SB-TTTR	±430'	191'	225'		
Lowell Road (Route 3A) & Hampshire Drive/ Oblate Drive	ACTUATED-UNCOORDINATED	EB-LT	±500'	50'	170'	14'	37'	17'	47'				
		EB-R	100'	62'	126'	35'	76'	43'	91'				
		WB-LT	±380'	8'	31'	9'	31'	11'	34'				
		WB-R	100'	6'	25'	5'	22'	5'	23'				
		NB-L	225'	11'	37'	14'	48'	11'	39'				
		NB-TTR	±1520'	104'	266'	91'	233'	88'	230'				
		SB-L	225'	8'	74'	3'	16'	4'	19'				
		SB-TTR	±1790'	543'	1384'	70'	167'	83'	181'				
Lowell Road (Route 3A) & Executive Drive	ACTUATED-UNCOORDINATED	EB-LT	±490'	98'	186'	100'	175'	90'	156'				
		EB-R	225'	6'	58'	4'	42'	4'	25'				
		WB-LT	±580'	213'	516'	190'	447'	163'	424'				
		WB-R	80'	20'	74'	23'	84'	22'	79'				
		NB-L	350'	33'	78'	42'	124'	31'	74'				
		NB-TTR	±1790'	128'	276'	142'	314'	125'	257'				
		SB-L	150'	9'	33'	12'	37'	10'	34'				
		SB-TTR	±1170'	93'	190'	92'	183'	92'	188'				
Lowell Road (Route 3A) & Fox Hollow Drive/ Nottingham Square Driveway	ACTUATED-COORDINATED	EB-LT	±600'	15'	57'	20'	68'	15'	53'	EB-LT	±600'	8'	33'
		EB-R	50'	23'	60'	28'	67'	28'	64'	EB-R	50'	21'	50'
		WB-LT	±260'	31'	92'	28'	73'	25'	66'	WB-LT	±260'	27'	64'
		WB-R	100'	30'	79'	29'	77'	26'	67'	WB-R	100'	21'	47'
		NB-L	210'	35'	128'	39'	149'	26'	100'	NB-L	210'	22'	52'
		NB-T	±1410'	317'	749'	440'	989'	371'	863'	NB-T	±1410'	132'	241'
		NB-R	325'	12'	107'	23'	165'	13'	123'	NB-TR	325'	121'	236'
		SB-L	125'	44'	99'	57'	131'	45'	109'	SB-L	125'	51'	110'
SB-TR	±550'	86'	267'	97'	290'	83'	258'	SB-TR	±550'	130'	250'		

TABLE 2 OPENING YEAR QUEUING ANALYSIS SUMMARY – WEEKDAY P.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	LANE USE	STORAGE LENGTH	2019 EXISTING CONDITIONS		2022 NO-BUILD CONDITIONS		2022 BUILD CONDITIONS		2022 BUILD WITH BASE IMPROVMENTS CONDITIONS			
				QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	QUEUES (ft)
				50th%	95th%	50th%	95th%	50th%	95th%			50th%	95th%
Lowell Road (Route 3A) & Pelham Road	ACTUATED-COORDINATED	WB-L	±510'	167'	333'	237'	473'	233'	441'				
		WB-R	75'	99'	147'	105'	151'	108'	149'				
		NB-TR	±550'	314'	582'	314'	613'	308'	606'				
		SB-L	150'	194'	206'	194'	205'	194'	207'				
		SB-T	±1310'	1213'	1466'	1248'	1378'	1233'	1425'				

TABLE 3 HORIZON YEAR QUEUING ANALYSIS SUMMARY – WEEKDAY A.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	LANE USE	STORAGE LENGTH	2019 EXISTING CONDITIONS		2032 NO-BUILD CONDITIONS		2032 BUILD CONDITIONS		2032 BUILD WITH BASE IMPROVEMENTS CONDITIONS			
				QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	QUEUES (ft)
				50th%	95th%	50th%	95th%	50th%	95th%			50th%	95th%
River Road (Route 3A)/ Lowell Road (Route 3A) & Dracut Road & Steele Road	ACTUATED-COORDINATED/ ROUNDABOUT	EB-L	±590'	1'	10'	2'	12'	2'	18'	EB-LTR	±590'	3'	20'
		EB-RR	50'	5'	28'	4'	22'	5'	29'				
		NB-L	200'	0'	0'	0'	0'	0'	0'	NB-LT	±760'	61'	122'
		NB-TTR	±760'	97'	161'	113'	197'	125'	201'	NB-TR	±760'	7'	56'
		SB-L	775'	196'	313'	208'	353'	160'	278'	SB-LT	>1000'	0'	0'
		SB-TTR	>1000'	51'	102'	51'	111'	24'	70'	SB-TR	>1000'	0'	0'
		NWB-LL	100'	2'	26'	4'	38'	4'	38'	WB-LTR	>1000'	91'	170'
		NWB-R	>1000'	512'	535'	512'	535'	511'	532'	WB-R	150'	30'	117'
Lowell Road (Route 3A) & Green Meadow Drive/ Rena Avenue	ACTUATED-COORDINATED	EB-LT	±510'	2'	15'	3'	15'	118'	209'	EB-LL		85'	151'
		EB-R	50'	5'	27'	4'	23'	36'	88'	EB-TR	±510'	14'	42'
		WB-LTR	±560'	17'	42'	20'	44'	25'	59'	WB-LTR	±560'	26'	55'
		NB-L	300'	10'	33'	9'	33'	130'	396'	NB-L	300'	31'	70'
		NB-TTR	±1730'	32'	102'	36'	113'	507'	1237'	NB-TTR	±1730'	105'	190'
		SB-L	350'	19'	66'	8'	32'	8'	32'	SB-L	350'	5'	24'
		SB-TTR	±980'	53'	168'	49'	157'	173'	313'	SB-TT	±980'	145'	281'
								SB-R		83'	195'		
Lowell Road (Route 3A) & Wal-Mart Boulevard	ACTUATED-COORDINATED	EB-LL	175'	49'	89'	44'	84'	129'	245'	EB-LL	175'	51'	94'
		EB-T	±400'	2'	16'	3'	14'	142'	417'	EB-T	±400'	3'	17'
		EB-R	175'	33'	77'	34'	78'	41'	94'	EB-R	175'	33'	79'
		WB-LL	150'	8'	31'	9'	32'	11'	36'	WB-LL	150'	10'	34'
		WB-T	±450'	6'	24'	4'	20'	5'	23'	WB-T	±450'	6'	24'
		WB-R	200'	51'	97'	45'	86'	56'	116'	WB-R	200'	57'	108'
		NB-LL	350'	37'	68'	38'	107'	287'	648'	NB-LL	350'	41'	73'
		NB-TT	±980'	199'	301'	218'	353'	785'	1127'	NB-TTTR	±980'	184'	285'
		NB-R	175'	9'	34'	7'	31'	28'	133'				
		SB-LL	350'	39'	73'	36'	70'	37'	69'	SB-LL	350'	36'	64'
		SB-TT	>1000'	117'	262'	97'	257'	157'	365'	SB-TTT	±1190'	108'	252'
SB-R	725'	17'	48'	10'	35'	43'	186'	SB-R	400'	32'	83'		
Lowell Road (Route 3A) & Sagamore Bridge Road	ACTUATED-COORDINATED	EB-LL	>1000'	273'	379'	859'	1042'	842'	1100'	EB-LL	>1000'	827'	1067'
		EB-R	>1000'	0'	0'	783'	1263'	802'	1248'	EB-R	>1000'	771'	1260'
		NB-LL	525'	194'	278'	268'	425'	620'	666'	NB-LLL	525'	231'	349'
		NB-TT	±1190'	41'	85'	84'	230'	691'	1445'	NB-TT	±1190'	42'	89'
		SB-TT	±1000'	879'	968'	557'	1136'	609'	1155'	SB-TT	±1000'	324'	811'
		SB-R	200'	250'	251'	804'	1186'	837'	1142'	SB-RR	200'	627'	1102'

TABLE 3 HORIZON YEAR QUEUING ANALYSIS SUMMARY – WEEKDAY A.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	LANE USE	STORAGE LENGTH	2019 EXISTING CONDITIONS		2032 NO-BUILD CONDITIONS		2032 BUILD CONDITIONS		2032 BUILD WITH BASE IMPROVEMENTS CONDITIONS			
				QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	QUEUES (ft)
				50th%	95th%	50th%	95th%	50th%	95th%			50th%	95th%
Lowell Road (Route 3A) & Flagstone Drive/ Wason Road	ACTUATED-COORDINATED	EB-LT	±810'	48'	164'	278'	624'	262'	641'	EB-LT	±810'	92'	230'
		EB-R	250'	143'	250'	230'	322'	228'	317'	EB-R	250'	135'	244'
		WB-L	200'	193'	346'	199'	342'	208'	330'	WB-L	200'	221'	338'
		WB-LT	±590'	540'	552'	539'	551'	538'	547'	WB-LT	±590'	522'	535'
		WB-R	75'	31'	113'	27'	104'	32'	116'	WB-R	75'	39'	128'
		NB-L	575'	329'	571'	745'	782'	733'	831'	NB-L	575'	601'	882'
		NB-TT	±1000'	205'	438'	865'	1117'	823'	1170'	NB-TT	±1000'	483'	1058'
		NB-R	275'	26'	136'	28'	128'	25'	109'	NB-RR	275'	15'	74'
		SB-L	175'	14'	67'	25'	104'	22'	82'	SB-L	175'	8'	27'
SB-TTR	±1520'	1452'	1533'	712'	1289'	1002'	1616'	SB-TTTR	±410'	183'	196'		
Lowell Road (Route 3A) & Hampshire Drive/ Oblate Drive	ACTUATED-UNCOORDINATED	EB-LT	±500'	6'	20'	6'	23'	4'	19'				
		EB-R	100'	8'	27'	8'	28'	8'	29'				
		WB-LT	±380'	2'	15'	2'	13'	3'	18'				
		WB-R	100'	8'	32'	8'	31'	7'	28'				
		NB-L	225'	75'	144'	63'	129'	64'	128'				
		NB-TTR	±1520'	28'	110'	26'	97'	25'	99'				
		SB-L	225'	7'	72'	1'	10'	1'	9'				
		SB-TTR	±1790'	1565'	2121'	97'	231'	206'	614'				
Lowell Road (Route 3A) & Executive Drive	ACTUATED-UNCOORDINATED	EB-LT	±490'	29'	72'	35'	75'	37'	86'	EB-LT	±490'	38'	89'
		EB-R	225'	0'	0'	0'	0'	0'	0'	EB-R	225'	0'	0'
		WB-LT	±580'	492'	662'	539'	586'	531'	607'	WB-LT	±580'	127'	228'
		WB-R	80'	49'	128'	63'	137'	60'	140'	WB-R	80'	75'	127'
		NB-L	350'	186'	351'	122'	227'	124'	228'	NB-L	350'	158'	280'
		NB-TTR	±1790'	108'	268'	86'	195'	91'	192'	NB-T	±1790'	73'	146'
		SB-L	150'	142'	256'	72'	146'	78'	162'	SB-L	150'	83'	166'
		SB-TTR	±1170'	815'	1571'	218'	325'	212'	309'	SB-TR	±1170'	219'	309'
Lowell Road (Route 3A) & Fox Hollow Drive/ Nottingham Square Driveway	ACTUATED-COORDINATED	EB-LT	±600'	39'	135'	24'	91'	33'	112'	EB-LT	±600'	42'	130'
		EB-R	50'	43'	81'	45'	80'	42'	82'	EB-R	50'	47'	86'
		WB-LT	±260'	6'	23'	4'	19'	3'	19'	WB-LT	±260'	7'	26'
		WB-R	100'	5'	19'	5'	19'	5'	17'	WB-R	100'	8'	29'
		NB-L	210'	3'	16'	3'	16'	5'	43'	NB-L	210'	4'	20'
		NB-T	±1410'	68'	191'	89'	244'	111'	298'	NB-T	±1410'	38'	103'
		NB-R	325'	0'	4'	0'	4'	0'	5'	NB-TR	325'	44'	113'
		SB-L	125'	16'	74'	17'	60'	17'	66'	SB-L	125'	21'	81'
SB-TR	±550'	255'	521'	209'	446'	219'	468'	SB-TR	±550'	164'	340'		

TABLE 3 HORIZON YEAR QUEUING ANALYSIS SUMMARY – WEEKDAY A.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	LANE USE	STORAGE LENGTH	2019 EXISTING CONDITIONS		2032 NO-BUILD CONDITIONS		2032 BUILD CONDITIONS		2032 BUILD WITH BASE IMPROVMENTS CONDITIONS			
				QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	QUEUES (ft)
				50th%	95th%	50th%	95th%	50th%	95th%			50th%	95th%
Lowell Road (Route 3A) & Pelham Road	ACTUATED-COORDINATED	WB-L	±510'	308'	569'	477'	580'	486'	532'				
		WB-R	75'	68'	155'	67'	162'	69'	160'				
		NB-TR	±550'	137'	325'	138'	340'	162'	374'				
		SB-L	150'	84'	183'	102'	196'	108'	206'				
		SB-T	±1310'	431'	983'	450'	903'	441'	867'				

TABLE 4 HORIZON YEAR QUEUING ANALYSIS SUMMARY – WEEKDAY P.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	LANE USE	STORAGE LENGTH	2019 EXISTING CONDITIONS		2032 NO-BUILD CONDITIONS		2032 BUILD CONDITIONS		2032 BUILD WITH BASE IMPROVEMENTS CONDITIONS			
				QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	QUEUES (ft)
				50th%	95th%	50th%	95th%	50th%	95th%			50th%	95th%
River Road (Route 3A)/ Lowell Road (Route 3A) & Dracut Road & Steele Road	ACTUATED-COORDINATED/ ROUNDABOUT	EB-L	±590'	28'	62'	33'	76'	39'	85'	EB-LTR	±590'	24'	55'
		EB-RR	50'	8'	31'	5'	29'	6'	28'				
		NB-L	200'	0'	0'	0'	0'	0'	0'	NB-LT	±760'	195'	280'
		NB-TTR	±760'	224'	312'	392'	637'	583'	780'	NB-TR	±760'	151'	275'
		SB-L	775'	849'	858'	849'	857'	850'	852'	SB-LT	>1000'	21'	126'
		SB-TTR	>1000'	1595'	2273'	1607'	2345'	1670'	2118'	SB-TR	>1000'	1'	30'
		NWB-LL	100'	8'	53'	11'	66'	7'	49'	WB-LTR	>1000'	108'	180'
		NWB-R	>1000'	466'	630'	502'	502'	502'	502'	WB-R	150'	56'	140'
Lowell Road (Route 3A) & Green Meadow Drive/ Rena Avenue	ACTUATED-COORDINATED	EB-LT	±510'	44'	91'	41'	92'	298'	495'	EB-LL		133'	211'
		EB-R	50'	18'	56'	17'	50'	46'	88'	EB-TR	±510'	18'	45'
		WB-LTR	±560'	13'	37'	15'	41'	15'	42'	WB-LTR	±560'	14'	39'
		NB-L	300'	2'	12'	6'	79'	194'	500'	NB-L	300'	26'	61'
		NB-TTR	±1730'	301'	956'	949'	1955'	1641'	1808'	NB-TTR	±1730'	175'	271'
		SB-L	350'	85'	320'	119'	391'	108'	377'	SB-L	350'	18'	52'
		SB-TTR	±980'	478'	1050'	651'	1213'	805'	1183'	SB-TT	±980'	77'	147'
Lowell Road (Route 3A) & Wal-Mart Boulevard	ACTUATED-COORDINATED	EB-LL	175'	159'	253'	187'	244'	195'	223'	EB-LL	175'	138'	206'
		EB-T	±400'	219'	490'	311'	484'	350'	363'	EB-T	±400'	28'	150'
		EB-R	175'	66'	148'	58'	146'	54'	154'	EB-R	175'	80'	151'
		WB-LL	150'	43'	107'	41'	102'	40'	85'	WB-LL	150'	45'	87'
		WB-T	±450'	325'	559'	369'	518'	396'	398'	WB-T	±450'	388'	388'
		WB-R	200'	234'	295'	244'	280'	250'	253'	WB-R	200'	250'	251'
		NB-LL	350'	275'	628'	349'	677'	337'	671'	NB-LL	350'	60'	97'
		NB-TT	±980'	676'	1079'	880'	1039'	905'	953'	NB-TTTR	±980'	267'	393'
		NB-R	175'	63'	207'	80'	232'	57'	196'				
		SB-LL	350'	139'	317'	228'	516'	332'	611'	SB-LL	350'	95'	144'
		SB-TT	>1000'	288'	808'	518'	1224'	836'	1447'	SB-TTT	±1190'	122'	353'
SB-R	725'	126'	579'	402'	1250'	785'	1648'	SB-R	400'	53'	111'		
Lowell Road (Route 3A) & Sagamore Bridge Road	ACTUATED-COORDINATED	EB-LL	>1000'	889'	939'	889'	1059'	890'	903'	EB-LL	>1000'	891'	906'
		EB-R	>1000'	889'	898'	890'	901'	891'	904'	EB-R	>1000'	889'	899'
		NB-LL	525'	616'	669'	624'	629'	612'	679'	NB-LLL	525'	425'	654'
		NB-TT	±1190'	974'	1450'	1079'	1248'	477'	1235'	NB-TT	±1190'	128'	268'
		SB-TT	±1000'	894'	928'	167'	371'	275'	588'	SB-TT	±1000'	290'	591'
		SB-R	200'	246'	295'	116'	564'	226'	800'	SB-RR	200'	358'	871'

TABLE 4 HORIZON YEAR QUEUING ANALYSIS SUMMARY – WEEKDAY P.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	LANE USE	STORAGE LENGTH	2019 EXISTING CONDITIONS		2032 NO-BUILD CONDITIONS		2032 BUILD CONDITIONS		2032 BUILD WITH BASE IMPROVEMENTS CONDITIONS			
				QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	QUEUES (ft)
				50th%	95th%	50th%	95th%	50th%	95th%			50th%	95th%
Lowell Road (Route 3A) & Flagstone Drive/ Wason Road	ACTUATED-COORDINATED	EB-LT	±810'	662'	981'	596'	976'	591'	995'	EB-LT	±810'	250'	580'
		EB-R	250'	273'	289'	262'	320'	259'	325'	EB-R	250'	226'	315'
		WB-L	200'	193'	340'	181'	321'	185'	324'	WB-L	200'	213'	328'
		WB-LT	±590'	509'	632'	377'	570'	376'	576'	WB-LT	±590'	553'	554'
		WB-R	75'	38'	125'	18'	84'	27'	104'	WB-R	75'	34'	117'
		NB-L	575'	63'	126'	96'	175'	87'	165'	NB-L	575'	91'	158'
		NB-TT	±1000'	257'	404'	278'	457'	235'	373'	NB-TT	±1000'	189'	253'
		NB-R	275'	185'	397'	230'	425'	171'	364'	NB-RR	275'	113'	174'
		SB-L	175'	69'	172'	68'	140'	77'	172'	SB-L	175'	67'	128'
SB-TTR	±1520'	1270'	1826'	218'	437'	253'	483'	SB-TTTR	±410'	186'	209'		
Lowell Road (Route 3A) & Hampshire Drive/ Oblate Drive	ACTUATED-UNCOORDINATED	EB-LT	±500'	50'	170'	15'	49'	15'	43'				
		EB-R	100'	62'	126'	39'	81'	38'	76'				
		WB-LT	±380'	8'	31'	10'	33'	11'	34'				
		WB-R	100'	6'	25'	5'	24'	5'	23'				
		NB-L	225'	11'	37'	10'	37'	11'	36'				
		NB-TTR	±1520'	104'	266'	95'	239'	86'	223'				
		SB-L	225'	8'	74'	3'	17'	3'	16'				
		SB-TTR	±1790'	543'	1384'	78'	174'	86'	189'				
Lowell Road (Route 3A) & Executive Drive	ACTUATED-UNCOORDINATED	EB-LT	±490'	98'	186'	102'	175'	103'	205'				
		EB-R	225'	6'	58'	4'	32'	8'	62'				
		WB-LT	±580'	213'	516'	143'	339'	137'	319'				
		WB-R	80'	20'	74'	22'	81'	26'	89'				
		NB-L	350'	33'	78'	36'	81'	32'	71'				
		NB-TTR	±1790'	128'	276'	129'	267'	144'	302'				
		SB-L	150'	9'	33'	9'	32'	13'	51'				
		SB-TTR	±1170'	93'	190'	82'	172'	96'	191'				
Lowell Road (Route 3A) & Fox Hollow Drive/ Nottingham Square Driveway	ACTUATED-COORDINATED	EB-LT	±600'	15'	57'	15'	57'	16'	57'	EB-LT	±600'	10'	39'
		EB-R	50'	23'	60'	26'	64'	30'	67'	EB-R	50'	18'	46'
		WB-LT	±260'	31'	92'	31'	81'	38'	114'	WB-LT	±260'	27'	62'
		WB-R	100'	30'	79'	34'	86'	39'	98'	WB-R	100'	25'	54'
		NB-L	210'	35'	128'	34'	137'	26'	112'	NB-L	210'	26'	82'
		NB-T	±1410'	317'	749'	556'	1268'	525'	1250'	NB-T	±1410'	155'	292'
		NB-R	325'	12'	107'	10'	106'	18'	152'	NB-TR	325'	145'	285'
		SB-L	125'	44'	99'	42'	104'	40'	96'	SB-L	125'	54'	131'
SB-TR	±550'	86'	267'	58'	208'	83'	280'	SB-TR	±550'	151'	281'		

TABLE 4 HORIZON YEAR QUEUING ANALYSIS SUMMARY – WEEKDAY P.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	LANE USE	STORAGE LENGTH	2019 EXISTING CONDITIONS		2032 NO-BUILD CONDITIONS		2032 BUILD CONDITIONS		2032 BUILD WITH BASE IMPROVMENTS CONDITIONS			
				QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	QUEUES (ft)	LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	QUEUES (ft)
				50th%	95th%	50th%	95th%	50th%	95th%			50th%	95th%
Lowell Road (Route 3A) & Pelham Road	ACTUATED-COORDINATED	WB-L	±510'	167'	333'	220'	425'	228'	426'				
		WB-R	75'	99'	147'	107'	146'	107'	151'				
		NB-TR	±550'	314'	582'	332'	640'	351'	625'				
		SB-L	150'	194'	206'	195'	204'	191'	217'				
		SB-T	±1310'	1213'	1466'	1230'	1481'	1150'	1615'				

TABLE 5 BASE & ROUNDABOUT IMPROVEMENTS QUEUING ANALYSIS SUMMARY COMPARISON FOR LOWELL ROAD/RIVER ROAD (ROUTE 3A) & DRACUT ROAD/STEELE ROAD													
2022 QUEUING ANALYSIS SUMMARY – WEEKDAY A.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	NO-BUILD CONDITIONS				ROUNDABOUT BUILD CONDITIONS				NHDOT SUGGESTED BUILD CONDITIONS			
		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	QUEUES (ft)	LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	QUEUES (ft)	LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	QUEUES (ft)
				50th%	95th%			50th%	95th%			50th%	95th%
River Road (Route 3A)/ Lowell Road (Route 3A) & Dracut Road & Steele Road	ACTUATED-COORDINATED	EB-L	±590'	2'	12'	EB-LTR	±590'	3'	21'	EB-L	±590'	2'	12'
		EB-RR	50'	4'	21'					EB-RR	50'	3'	18'
		NB-L	200'	0'	0'	NB-LT	±760'	55'	103'	NB-L	200'	0'	0'
		NB-TTR	±760'	107'	183'	NB-TR	±760'	0'	0'	NB-TTR	±760'	108'	200'
		SB-L	775'	208'	331'	SB-LT	>1000'	2'	23'	SB-LL	775'	84'	214'
		SB-TTR	>1000'	58'	116'	SB-TR	>1000'	0'	0'	SB-TR	>1000'	84'	214'
		NWB-LL	100'	0'	0'	WB-LTR	>1000'	77'	142'	NWB-LL	100'	3'	33'
		NWB-R	>1000'	513'	535'	WB-R	150'	19'	86'	NWB-R	>1000'	475'	498'
2022 QUEUING ANALYSIS SUMMARY – WEEKDAY P.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	NO-BUILD CONDITIONS				ROUNDABOUT BUILD CONDITIONS				NHDOT SUGGESTED BUILD CONDITIONS			
		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	QUEUES (ft)	LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	QUEUES (ft)	LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	QUEUES (ft)
				50th%	95th%			50th%	95th%			50th%	95th%
River Road (Route 3A)/ Lowell Road (Route 3A) & Dracut Road & Steele Road	ACTUATED-COORDINATED	EB-L	±590'	34'	78'	EB-LTR	±590'	20'	50'	EB-L	±590'	27'	69'
		EB-RR	50'	5'	27'					EB-RR	50'	6'	30'
		NB-L	200'	0'	0'	NB-LT	±760'	167'	260'	NB-L	200'	2'	44'
		NB-TTR	±760'	249'	366'	NB-TR	±760'	110'	246'	NB-TTR	±760'	347'	591'
		SB-L	775'	841'	926'	SB-LT	>1000'	12'	92'	SB-LL	775'	106'	179'
		SB-TTR	>1000'	1608'	2270'	SB-TR	>1000'	0'	0'	SB-TR	>1000'	31'	91'
		NWB-LL	100'	15'	80'	WB-LTR	>1000'	89'	159'	NWB-LL	100'	8'	56'
		NWB-R	>1000'	488'	584'	WB-R	150'	40'	117'	NWB-R	>1000'	464'	464'

TABLE 5 BASE & ROUNDABOUT IMPROVEMENTS CAABLE 10PACITY ANALYSIS SUMMARY COMPARISON FOR LOWELL ROAD/RIVER ROAD (ROUTE 3A) & DRACUT ROAD/STEELE ROAD													
2032 QUEUING ANALYSIS SUMMARY – WEEKDAY A.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	NO-BUILD CONDITIONS				ROUNDABOUT BUILD CONDITIONS				NHDOT SUGGESTED BUILD CONDITIONS			
		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	
				50th%	95th%			50th%	95th%			50th%	95th%
River Road (Route 3A)/ Lowell Road (Route 3A) & Dracut Road & Steele Road	ACTUATED-COORDINATED	EB-L	±590'	2'	12'	EB-LTR	±590'	3'	20'	EB-L	±590'	1'	10'
		EB-RR	50'	4'	22'					EB-RR	50'	4'	25'
		NB-L	200'	0'	0'	NB-LT	±760'	61'	122'	NB-L	200'	0'	0'
		NB-TTR	±760'	113'	197'	NB-TR	±760'	7'	56'	NB-TTR	±760'	117'	220'
		SB-L	775'	208'	353'	SB-LT	>1000'	0'	0'	SB-LL	775'	95'	158'
		SB-TTR	>1000'	51'	111'	SB-TR	>1000'	0'	0'	SB-TR	>1000'	97'	235'
		NWB-LL	100'	4'	38'	WB-LTR	>1000'	91'	170'	NWB-LL	100'	1'	18'
		NWB-R	>1000'	512'	535'	WB-R	150'	30'	117'	NWB-R	>1000'	472'	492'
2032 QUEUING ANALYSIS SUMMARY – WEEKDAY P.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	NO-BUILD CONDITIONS				ROUNDABOUT BUILD CONDITIONS				NHDOT SUGGESTED BUILD CONDITIONS			
		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	
				50th%	95th%			50th%	95th%			50th%	95th%
River Road (Route 3A)/ Lowell Road (Route 3A) & Dracut Road & Steele Road	ACTUATED-COORDINATED	EB-L	±590'	33'	76'	EB-LTR	±590'	24'	55'	EB-L	±590'	29'	64'
		EB-RR	50'	5'	29'					EB-RR	50'	6'	32'
		NB-L	200'	0'	0'	NB-LT	±760'	195'	280'	NB-L	200'	6'	77'
		NB-TTR	±760'	392'	637'	NB-TR	±760'	151'	275'	NB-TTR	±760'	588'	588'
		SB-L	775'	849'	857'	SB-LT	>1000'	21'	126'	SB-LL	775'	120'	197'
		SB-TTR	>1000'	1607'	2345'	SB-TR	>1000'	1'	30'	SB-TR	>1000'	20'	72'
		NWB-LL	100'	11'	66'	WB-LTR	>1000'	108'	180'	NWB-LL	100'	458'	467'
		NWB-R	>1000'	502'	502'	WB-R	150'	56'	140'	NWB-R	>1000'	550'	467'

TABLE 6 BASE & FUTURE IMPROVMENTS QUEUING ANALYSIS SUMMARY COMPARISON FOR LOWELL ROAD (ROUTE 3A) & FLAGSTONE DRIVE/WASON ROAD													
2022 QUEUING ANALYSIS SUMMARY – WEEKDAY A.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	2022 NO-BUILD CONDITIONS				2022 BUILD WITH BASE IMPROVEMENTS CONDITIONS				2022 FUTURE BUILD WITH IMPROVEMENTS CONDITIONS			
		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	
				50th%	95th%			50th%	95th%			50th%	95th%
Lowell Road (Route 3A) & Flagstone Drive/ Wason Road	ACTUATED-COORDINATED	EB-LT	±810'	202'	510'	EB-LT	±810'	65'	148'	EB-LT	±810'	61'	117'
		EB-R	250'	200'	315'	EB-R	250'	109'	193'	EB-RR	250'	64'	110'
		WB-L	200'	203'	340'	WB-L	200'	222'	335'	WB-L	200'	232'	323'
		WB-LT	±590'	538'	545'	WB-LT	±590'	520'	530'	WB-LT	±590'	520'	529'
		WB-R	75'	35'	119'	WB-R	75'	38'	125'	WB-R	75'	34'	118'
		NB-L	575'	697'	885'	NB-L	575'	246'	423'	NB-LL	575'	100'	159'
		NB-TT	±1000'	744'	1208'	NB-TT	±1000'	174'	274'	NB-TT	±1000'	164'	229'
		NB-R	275'	20'	83'	NB-RR	275'	22'	101'	NB-RR	275'	17'	75'
		SB-L	175'	22'	87'	SB-L	175'	12'	47'	SB-L	175'	13'	47'
		SB-TTTR	±1520'	575'	960'	SB-TTTR	300'	195'	223'	SB-TTTR	±430'	195'	223'
2022 QUEUING ANALYSIS SUMMARY – WEEKDAY P.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	2022 NO-BUILD CONDITIONS				2022 BUILD WITH BASE IMPROVEMENTS CONDITIONS				2022 FUTURE BUILD WITH IMPROVEMENTS CONDITIONS			
		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	
				50th%	95th%			50th%	95th%			50th%	95th%
Lowell Road (Route 3A) & Flagstone Drive/ Wason Road	ACTUATED-COORDINATED	EB-LT	±810'	293'	648'	EB-LT	±810'	149'	316'	EB-LT	±810'	116'	236'
		EB-R	250'	224'	327'	EB-R	250'	187'	296'	EB-RR	250'	110'	192'
		WB-L	200'	143'	299'	WB-L	200'	220'	326'	WB-L	200'	205'	334'
		WB-LT	±590'	284'	455'	WB-LT	±590'	519'	570'	WB-LT	±590'	440'	618'
		WB-R	75'	23'	93'	WB-R	75'	29'	106'	WB-R	75'	35'	120'
		NB-L	575'	93'	165'	NB-L	575'	84'	147'	NB-L	575'	80'	146'
		NB-TT	±1000'	258'	423'	NB-TT	±1000'	197'	275'	NB-TTT	±1000'	136'	186'
		NB-R	275'	209'	403'	NB-RR	275'	73'	114'	NB-RR	275'	58'	94'
		SB-L	175'	61'	134'	SB-L	175'	57'	117'	SB-L	175'	52'	100'
		SB-TTR	±1520'	221'	423'	SB-TTTR	±430'	191'	225'	SB-TTTR	±430'	192'	220'

TABLE 6 BASE & FUTURE IMPROVMENTS CAPACITY ANALYSIS SUMMARY COMPARISON FOR LOWELL ROAD (ROUTE 3A) & FLAGSTONE DRIVE/WASON ROAD													
2032 QUEUING ANALYSIS SUMMARY – WEEKDAY A.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	2032 NO-BUILD CONDITIONS				2032 BUILD WITH BASE IMPROVEMENTS CONDITIONS				2032 FUTURE BUILD WITH IMPROVEMENTS CONDITIONS			
		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	
				50th%	95th%			50th%	95th%			50th%	95th%
Lowell Road (Route 3A) & Flagstone Drive/Wason Road	ACTUATED-COORDINATED	EB-LT	±810'	278'	624'	EB-LT	±810'	92'	230'	EB-LT	±810'	68'	130'
		EB-R	250'	230'	322'	EB-R	250'	135'	244'	EB-RR	250'	71'	119'
		WB-L	200'	199'	342'	WB-L	200'	221'	338'	WB-L	200'	213'	343'
		WB-LT	±590'	539'	551'	WB-LT	±590'	522'	535'	WB-LT	±590'	523'	538'
		WB-R	75'	27'	104'	WB-R	75'	39'	128'	WB-R	75'	37'	125'
		NB-L	575'	745'	782'	NB-L	575'	601'	882'	NB-LL	575'	99'	145'
		NB-TT	±1000'	865'	1117'	NB-TT	±1000'	483'	1058'	NB-TT	±1000'	94'	176'
		NB-R	275'	28'	128'	NB-RR	275'	15'	74'	NB-RR	275'	14'	39'
		SB-L	175'	25'	104'	SB-L	175'	8'	27'	SB-L	175'	9'	35'
		SB-TTTR	±1520'	712'	1289'	SB-TTTR	±410'	183'	196'	SB-TTTR	±410'	184'	214'
2032 QUEUING ANALYSIS SUMMARY – WEEKDAY P.M. PEAK-HOUR													
INTERSECTION	CONTROL TYPE	2032 NO-BUILD CONDITIONS				2032 BUILD WITH BASE IMPROVEMENTS CONDITIONS				2032 FUTURE BUILD WITH IMPROVEMENTS CONDITIONS			
		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)		LANE USE	STORAGE LENGTH (ft)	QUEUES (ft)	
				50th%	95th%			50th%	95th%			50th%	95th%
Lowell Road (Route 3A) & Flagstone Drive/Wason Road	ACTUATED-COORDINATED	EB-LT	±810'	596'	976'	EB-LT	±810'	250'	580'	EB-LT	±810'	110'	202'
		EB-R	250'	262'	320'	EB-R	250'	226'	315'	EB-RR	250'	113'	194'
		WB-L	200'	181'	321'	WB-L	200'	213'	328'	WB-L	200'	224'	326'
		WB-LT	±590'	377'	570'	WB-LT	±590'	553'	554'	WB-LT	±590'	540'	554'
		WB-R	75'	18'	84'	WB-R	75'	34'	117'	WB-R	75'	42'	131'
		NB-L	575'	96'	175'	NB-L	575'	91'	158'	NB-L	575'	95'	161'
		NB-TT	±1000'	278'	457'	NB-TT	±1000'	189'	253'	NB-TT	±1000'	137'	188'
		NB-R	275'	230'	425'	NB-RR	275'	113'	174'	NB-RR	275'	94'	158'
		SB-L	175'	68'	140'	SB-L	175'	67'	128'	SB-L	175'	62'	126'
		SB-TTTR	±1520'	218'	437'	SB-TTTR	±410'	186'	209'	SB-TTTR	±410'	189'	209'

Queue Analysis Results

The queuing analysis of the study intersections reveals that most of the signalized intersections analyzed on Lowell Road will generally result in an increase of less than three car lengths from no-build conditions to build with base improvements for both 2022 and 2032 analysis years using SimTraffic methodology. Note that Tables 3 and 4 show the southbound right-turn lane queue at the intersection of Lowell Road and Sagamore Bridge Road as exceeding storage capacity in no-build, build, and build with improvements conditions for the 2032 analyses. We do not believe this is accurate due to the complex lane geometry at the intersection and as it merges onto Sagamore Bridger Road westbound. The software does not accurately model this geometric condition. A more accurate representation of this movement is presented by Stantec in their VISSIM microsimulation software analysis. Please see memorandum titled "VISSIM Evaluation of Merge and Weave Segments Along Sagamore Bridge Road" under separate cover summarizing the VISSIM analysis findings by Stantec.

The findings using SimTraffic methodology above identify similar queue length changes that the Synchro methodology, found in the previously submitted "Traffic Impact Study for Hudson Logistics Center", identified from no-build to build with improvements conditions. The queue lengths shown based on SimTraffic methodology are typically slightly higher than the queue lengths provided using Synchro methodology. However, in areas where Synchro results provided extremely long queues (sometimes greater than 1000 feet), the SimTraffic results were typically much less extreme. We do not recommend drawing exact comparisons between the Synchro calculated queue lengths and the SimTraffic calculated queue lengths due to the differences in the analysis methodologies. The SimTraffic results presented in Tables 1 through 6 verify that the base and potential future improvements noted in the previously submitted "Traffic Impact Study for Hudson Logistics Center" will provide adequate mitigation of project related impacts.

3.0 FREEWAY ANALYSIS

In addition to the intersection capacity analyses provided in the report titled "Traffic Impact Study for Hudson Logistics Center" prepared by Langan dated September 2020 and the queuing analysis presented above, we also performed capacity analyses on the following freeway segments as requested by NHDOT:

- Weaving Segment on Sagamore Bridge Road EB from Everett Turnpike On-ramp to Daniel Webster Highway Off-ramp
- Weaving Segment on Sagamore Bridge Road WB from Lowell Road On-ramps to Daniel Webster Highway Off-ramp

- Weaving Segment on Sagamore Bridge Road WB from Daniel Webster Highway On-ramp to Everett Turnpike Off-ramp
- Merge Segment on Sagamore Bridge Road EB at Daniel Webster Highway On-ramp
- Merge Segment on Sagamore Bridge Road WB at Lowell Road On-ramps
- Diverge Segment on Sagamore Bridge Road WB at Daniel Webster Highway Off-ramp

Langan conducted capacity analyses for the existing, no-build and build traffic conditions to assess quality of traffic flow for these freeway segments. No-build and build scenarios were evaluated for the “opening year (OY)” and “horizon year (OY+10)” time periods in accordance with New Hampshire Department of Transportation guidelines. Capacity analyses provide an indication of the adequacy of the freeway segments to serve traffic demands.

Level of Service Criteria

Level of Service (LOS) is the term used to denote the different operating conditions that occur on the freeway under various traffic volume demands. LOS is a qualitative measure that considers a number of factors including geometry, speed and travel delay. LOS provides an index to the operational qualities of an intersection. LOS designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions. The LOS designation is reported differently for merge/diverge segments and weaving segments.

The LOS for freeway weaving segments and for merge/diverge ramp junctions is determined by density. Density is expressed as passenger cars per mile per lane (pc/mi/ln).

The evaluation criteria used to analyze the study area intersections and roadway segments are based on the Highway Capacity Manual (HCM) 6th Edition, published by the Transportation Research Board (TRB). McTrans HCS 7 capacity analysis software was used to facilitate computer calculation for the analyses of the weaving segments and merge/diverge ramp junctions.

The HCM defines level of service for weaving segments as follows:

<u>Level of Service</u>	<u>Density (pc/mi/ln)</u>
A	≤ 10
B	$> 10 - 20$
C	$> 20 - 28$
D	$> 28 - 35$
E	$> 35 - 43$
F	> 43 , or demand exceeds capacity

The HCM defines level of service for merge and diverge ramp junctions as follows:

<u>Level of Service</u>	<u>Density (pc/mi/ln)</u>
A	≤ 10
B	$> 10 - 20$
C	$> 20 - 28$
D	$> 28 - 35$
E	> 35
F	Demand exceeds capacity

Existing, No-Build and Build Freeway Traffic Volumes

Existing freeway peak-hour traffic volumes are based on volumes obtained from the New Hampshire Department of Transportation (NHDOT) Transportation Data Management System (TDMS) website (<https://nhdot.ms2soft.com/tcds/tsearch.asp?loc=nhdot>). Automatic traffic recorder (ATR) counts of the study area were unable to be completed due to the 2020 coronavirus pandemic, which has led to atypical traffic volumes and patterns. Based on discussions with NHDOT, sufficient historical data was available on the TDMS website to complete the request to provide capacity analyses of these freeway segments without being able to complete new ATR counts for this project.

Existing freeway peak-hour traffic volumes were obtained by combining data from two different sources. The first source of data is the turning movement counts conducted by Accurate Counts on October 8, 2019 at the intersection of Lowell Road (Route 3A) and Sagamore Bridge Road. The eastbound peak-hour volumes at this intersection were utilized for the eastbound Sagamore Bridge Road/Circumferential Highway mainline volumes and the combination of the northbound left-turning volumes and the southbound right-turning volumes were used for the westbound Sagamore Bridge Road/Circumferential Highway mainline volumes. Seasonal adjustment factors that were previously applied to the existing turning movement counts is discussed in detail

in the report titled "Traffic Impact Study for Hudson Logistics Center" prepared by Langan dated September 2020.

The second source of data is raw data provided on the TDMS website at count stations in the vicinity of the study area. These count station volumes were used to estimate the different ramp volumes. Although the majority of count stations in the vicinity of Everett Turnpike, Daniel Webster Highway, and Sagamore Bridge Road/Circumferential Highway provide annual average daily traffic (AADT) volumes for each count station, most of the count stations' 2019 AADTs were grown from 2018 data and do not have ATR data available for 2019. Since ATR data was not available for 2019, no hourly traffic volume breakdown was available for 2019. Most count stations had 2018 ATR data available, all of which was conducted in late September/early October 2018. In order to provide consistent and accurate data for the ramps on Sagamore Bridge Road/Circumferential Highway, the same ATR data date was selected for the majority of the count stations, September 20, 2018. For two locations, this date did not have data available and other dates in early October 2018. No seasonal or ambient growth adjustments were made to the 2018 data.

The ramp volumes obtained from the TDMS website are provided in Appendix G. Existing peak-hour traffic volumes that are combined from these two sources are provided on Figure 10. Note that the main line volumes on Sagamore Bridge Road/Circumferential Highway are based on the turning movement counts and the ramp volumes are based on the volumes obtained from the TDMS website.

2022 and 2032 no-build freeway peak-hour traffic volumes are provided on Figure 11 and Figure 12. The no-build freeway volumes were grown using the NHDOT approved 1% growth rate that was also used for the turning movement counts on Lowell Road in the report titled "Traffic Impact Study for Hudson Logistics Center" prepared by Langan dated September 2020. In addition to applying this growth rate, we also considered approved or pending projects and developments in the area that may add substantial traffic volume to the study area. Based on discussions with NHDOT and the town of Hudson, the following area projects were included in the 2022 and 2023 no-build freeway volumes:

- Flagstone Crossing (225 Lowell Road)
- Southbound road widening on Lowell Road @ Flagstone Drive

Peak-hour traffic volumes associated with the projects noted below were distributed through the freeway segments using the distribution percentages for the Hudson Logistics Center site generated trip distributions. See the report titled "Traffic Impact Study for Hudson Logistics Center" prepared by Langan dated September 2020 for

further discussion on the trip generation and roadway geometric changes associated with the developments listed above.

Site generated trips associated with the Hudson Logistics Center were distributed throughout the freeway roadway network primarily based Journey to Work data. The trip generation and distribution methodology has been approved for use by NHDOT Bureau of Traffic. Figure 7 and Figure 13 show the site generated trip assignment for the freeway study area.

2022 and 2032 build freeway peak-hour traffic volumes are provided on Figure 14 and Figure 15. The 2022 and 2032 no-build freeway peak-hour volumes on Figures 11 and 12 were combined with the site generated volumes on Figure 13 to produce the 2022 and 2032 build freeway peak-hour traffic volumes.

Freeway Capacity Analysis and Assumptions

As explained in the section previously, no ATR counts were conducted as part of the proposed project due to the 2020 coronavirus pandemic. In order to perform the requested freeway capacity analyses, a number of assumptions were required to be made in the absence of some of the required data. Below are the key assumptions that were incorporated into the McTrans HCS 7 capacity analysis calculations:

- Free-flow speed: Assumed to be the posted speed limit plus 5 MPH (Highway Capacity Manual 6th Edition suggests to use posted speed limit + 5 MPH in the absence of applicable data). The posted speed limit of Sagamore Bridge Road/ Circumferential Highway and the ramps vary and the free-flow speed used for calculations reflects this 5 MPH adjustment
- PHF: Assumed to be 0.94 (Highway Capacity Manual 6th Edition suggests to use 0.94 in the absence of applicable data)
- HV%: Assumed to be 5% (Highway Capacity Manual 6th Edition suggests to use 5% in the absence of applicable data)
- Adjustment factors: Assumed no adjustment factors (All drivers were assumed to be familiar with the roadway, no adverse weather, no accidents)

In addition to the assumptions listed above, the weaving analysis also required additional assumptions to be made. Although the peak-hour traffic volumes were explored in the previous section, no data exists for the number of vehicles that would be performing weaving movements. Typically, in-person observations or license-plate traffic surveys are required to quantify the different vehicle movement in a weaving segment. In the absence of this data, Langan provided initial assumptions to NHDOT, who provided valuable feedback on the percentages and assumptions. Based on this

discussion with NHDOT and existing traffic patterns, we made the following assumptions:

- Weaving Segment on Sagamore Bridge Road EB from Everett Turnpike On-ramp to Daniel Webster Highway Off-ramp
 - Assumed 80% of eastbound exiting traffic to Daniel Webster Highway originates from the Everett Turnpike NB Exit 2 traffic volumes. The remaining 20% of the exiting ramp traffic volumes comes from the Everett Turnpike SB Exit 2 traffic volumes due to ease of access for southbound vehicles to access Daniel Webster Highway from multiple other approaches.
- Weaving Segment on Sagamore Bridge Road WB from Lowell Road On-ramps to Daniel Webster Highway Off-ramp
 - Existing volumes turning onto Sagamore Bridge Road from either Lowell Road northbound or southbound varied between the morning and evening peak periods. The exit ramp volumes to Daniel Webster Highway are based on percentages of vehicles coming from either Lowell Road northbound or southbound, depending on the time of day. Due to these time-of-day volume variations, the following percentages were used for the weaving segment analysis.
 - Morning peak period: Due to a higher volume compared to northbound, we assumed 65% of westbound exiting traffic to Daniel Webster Highway originates from the Lowell Road SB traffic volumes. The remaining 35% of the exiting ramp traffic volumes comes from the Lowell Road NB traffic volumes.
 - Evening peak period: Due to a more balanced northbound/southbound Lowell Road split, we assumed 55% of westbound exiting traffic to Daniel Webster Highway originates from the Lowell Road SB traffic volumes. The remaining 45% of the exiting ramp traffic volumes comes from the Lowell Road NB traffic volumes.
- Weaving Segment on Sagamore Bridge Road WB from Daniel Webster Highway On-ramp to Everett Turnpike NB/SB Off-ramps
 - Assumed 40% of Daniel Webster Highway on-ramp traffic volumes continue to the Everett Turnpike NB off-ramp due to ease of access for drivers on Daniel Webster Highway to access Everett Turnpike NB to the north. The remaining 60% of the Daniel Webster Highway on-ramp traffic volumes weave onto Everett Turnpike SB off-ramp.

Calculations are provided in Appendix G. These provided calculations show the percentages noted above applied to the mainline and ramp volumes to provide the following volumes for use in the weaving analysis:

- Freeway-to-freeway volumes (FF)
- Freeway-to-ramp volumes (FR)
- Ramp-to-freeway volumes (RF)
- Ramp-to-ramp volumes (RR)

Table 7 and Table 8 compare the 2022 and 2032 traffic operating conditions for the study area freeway segments during the peak-hour periods.

**TABLE 7
OPENING YEAR FREEWAY CAPACITY ANALYSIS SUMMARY**

STUDY LOCATION	ANALYSIS TYPE	2019 EXISTING CONDITIONS		2022 NO-BUILD CONDITIONS		2022 BUILD CONDITIONS	
		LOS (AM/PM)	AVERAGE DENSITY (pc/mi/ln)	LOS (AM/PM)	AVERAGE DENSITY (pc/mi/ln)	LOS (AM/PM)	AVERAGE DENSITY (pc/mi/ln)
Everett Turnpike (Route 3) Ramps to Sagamore Bridge Road EB to Daniel Webster Highway Off-Ramp Weaving Segment	Weave	C (D)	21.8 (34.9)	C (E)	22.8 (36.4)	C (E)	26.2 (41.3)
Sagamore Bridge Road EB Merge with Daniel Webster Highway On-Ramp	Merge	B (B)	13.3 (20.1)	B (B)	13.9 (20.9)	B (B)	15.8 (23.0)
Lowell Road (Route 3A) On-Ramps to Sagamore Bridge Road WB	Merge	B (B)	27.1 (25.8)	B (B)	28.2 (26.8)	B (B)	30.0 (30.1)
Lowell Road (Route 3A) Ramps to Sagamore Bridge Road WB to Daniel Webster Highway Off-Ramp	Weave	D (D)	33.5 (31.5)	E (D)	35.4 (33.0)	E (E)	38.2 (38.1)
Sagamore Bridge Road WB to Daniel Webster Highway Off-Ramp	Diverge	B (B)	26.9 (25.6)	B (B)	27.9 (26.6)	B (B)	29.7 (29.8)
Daniel Webster Highway On-Ramp to Sagamore Bridge Road WB to Everett Turnpike (Route 3) Ramps	Weave	D (D)	32.3 (32.3)	D (D)	33.9 (33.8)	E (E)	36.7 (39.0)

**TABLE 8
HORIZON YEAR FREEWAY CAPACITY ANALYSIS SUMMARY**

STUDY LOCATION	ANALYSIS TYPE	2019 EXISTING CONDITIONS		2032 NO-BUILD CONDITIONS		2032 BUILD CONDITIONS	
		LOS (AM/PM)	AVERAGE DENSITY (pc/mi/ln)	LOS (AM/PM)	AVERAGE DENSITY (pc/mi/ln)	LOS (AM/PM)	AVERAGE DENSITY (pc/mi/ln)
Everett Turnpike (Route 3) Ramps to Sagamore Bridge Road EB to Daniel Webster Highway Off-Ramp Weaving Segment	Weave	C (D)	21.8 (34.9)	C (E)	25.7 (41.7)	D (F)	29.2 (-)
Sagamore Bridge Road EB Merge with Daniel Webster Highway On-Ramp	Merge	B (B)	13.3 (20.1)	B (B)	15.4 (23.1)	B (B)	17.3 (25.3)
Lowell Road (Route 3A) On-Ramps to Sagamore Bridge Road WB	Merge	B (B)	27.1 (25.8)	B (B)	31.8 (29.7)	B (B)	33.1 (33.0)
Lowell Road (Route 3A) Ramps to Sagamore Bridge Road WB to Daniel Webster Highway Off-Ramp	Weave	D (D)	33.5 (31.5)	E (E)	40.2 (37.6)	F (E)	- (42.9)
Sagamore Bridge Road WB to Daniel Webster Highway Off-Ramp	Diverge	B (B)	26.9 (25.6)	B (B)	30.8 (29.4)	B (B)	32.6 (32.6)
Daniel Webster Highway On-Ramp to Sagamore Bridge Road WB to Everett Turnpike (Route 3) Ramps	Weave	D (D)	32.3 (32.3)	E (E)	38.6 (38.5)	E (F)	41.6 (-)

Freeway Analysis Results

As shown above in Table 7, the majority of the 2022 no-build freeway segments operate at LOS B and LOS C with a few segments operating at LOS D or LOS E. In general, the build conditions for 2022 scenario maintain no-build densities and levels-of-service. The morning westbound segment between Daniel Webster Highway and Everett Turnpike changes from LOS D to LOS E. In the evening peak period, the two westbound weaving segments on Sagamore Bridge Road change from LOS D to LOS E.

As shown in Table 8 for the 2032 no-build conditions, many segments operate at LOS E with a few operating at LOS B or LOS C. In general, the merge/diverge segments maintain no-build LOS in the build conditions. The majority of the weaving segments for eastbound and westbound in the build conditions are either LOS E or LOS F.

It should be noted that this analysis was also conducted in conjunction with a model using VISSIM software to more accurately illustrate the weaving and merging occurring on Sagamore Bridge Road. Please see memorandum titled "VISSIM Evaluation of Merge and Weave Segments Along Sagamore Bridge Road" under separate cover summarizing the VISSIM analysis findings by Stantec.

See the following appendices for detailed freeway analysis and data. Appendix H contains HCS reports for the 2019 Existing conditions. Appendix I contains HCS reports for the 2022 and 2032 for the No-Build conditions. Appendix J contains HCS reports for the 2022 and 2032 for the Build conditions.

4.0 CONCLUSION

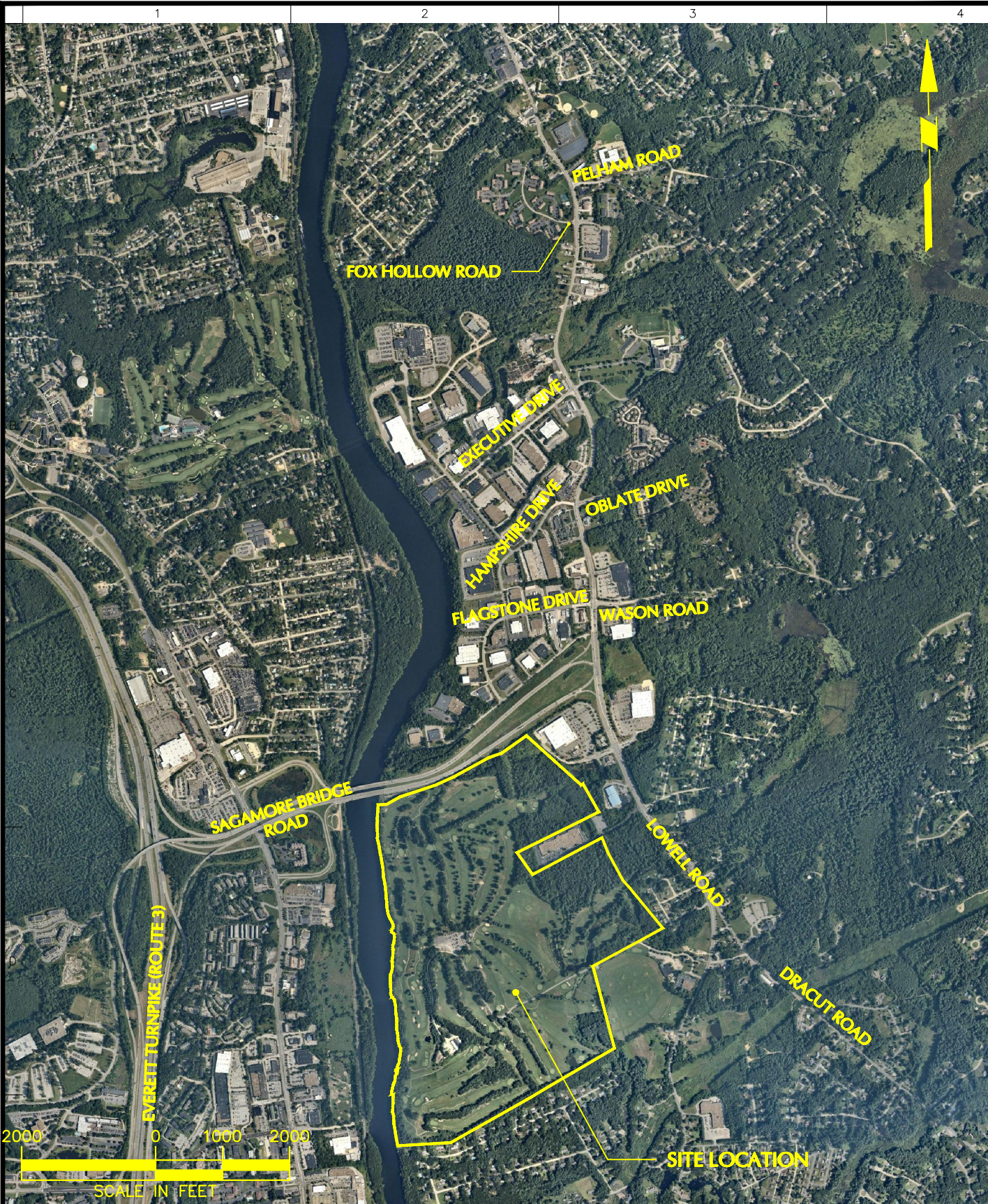
Langan has prepared this traffic impact study supplement to provide additional analysis of the potential impacts of the proposed Hudson Logistics Center (HLC) development at 43 Steele Road in Hudson, New Hampshire. This supplemental analysis should be used in conjunction with the information provided in the report titled "Traffic Impact Study for Hudson Logistics Center" prepared by Langan and dated September 2020.

This supplemental analysis provides an alternate queueing analysis as requested by NHDOT, which provides queue lengths for all previously analyzed scenarios by utilizing SimTraffic modeling software. Although the results are different than what was previously submitted using Synchro queueing methodology, the results presented in this report show that expected queue lengths are anticipated to generally be an increase of less than three car lengths for the 95th percentile queues for all analyzed scenarios using SimTraffic methodology. The SimTraffic results verify that the base and potential future improvements noted in the previously submitted "Traffic Impact Study for Hudson Logistics Center" will provide adequate mitigation of project related impacts.

This analysis also provides capacity analyses for the freeway segments on Sagamore Bridge Road/Circumferential Highway as requested by NHDOT. The methodology and data sources are provided and the capacity analyses are provided using HCS 7 software. This analysis was also conducted in conjunction with a model using VISSIM microsimulation software to more accurately illustrate the weaving and merging occurring on Sagamore Bridge Road. Please see memorandum titled "VISSIM Evaluation of Merge and Weave Segments Along Sagamore Bridge Road" under separate cover summarizing the VISSIM analysis findings by Stantec.

\\langan.com\data\BOS\data1\151010101\Project Data_Discipline\Traffic\Reports\Traffic Impact Assessment Supplement\151010101 - Hudson Logistics Center - Traffic Impact Study Supplement NHDOT - September 2020.docx

Traffic Freeway Figures



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**HUDSON LOGISTICS
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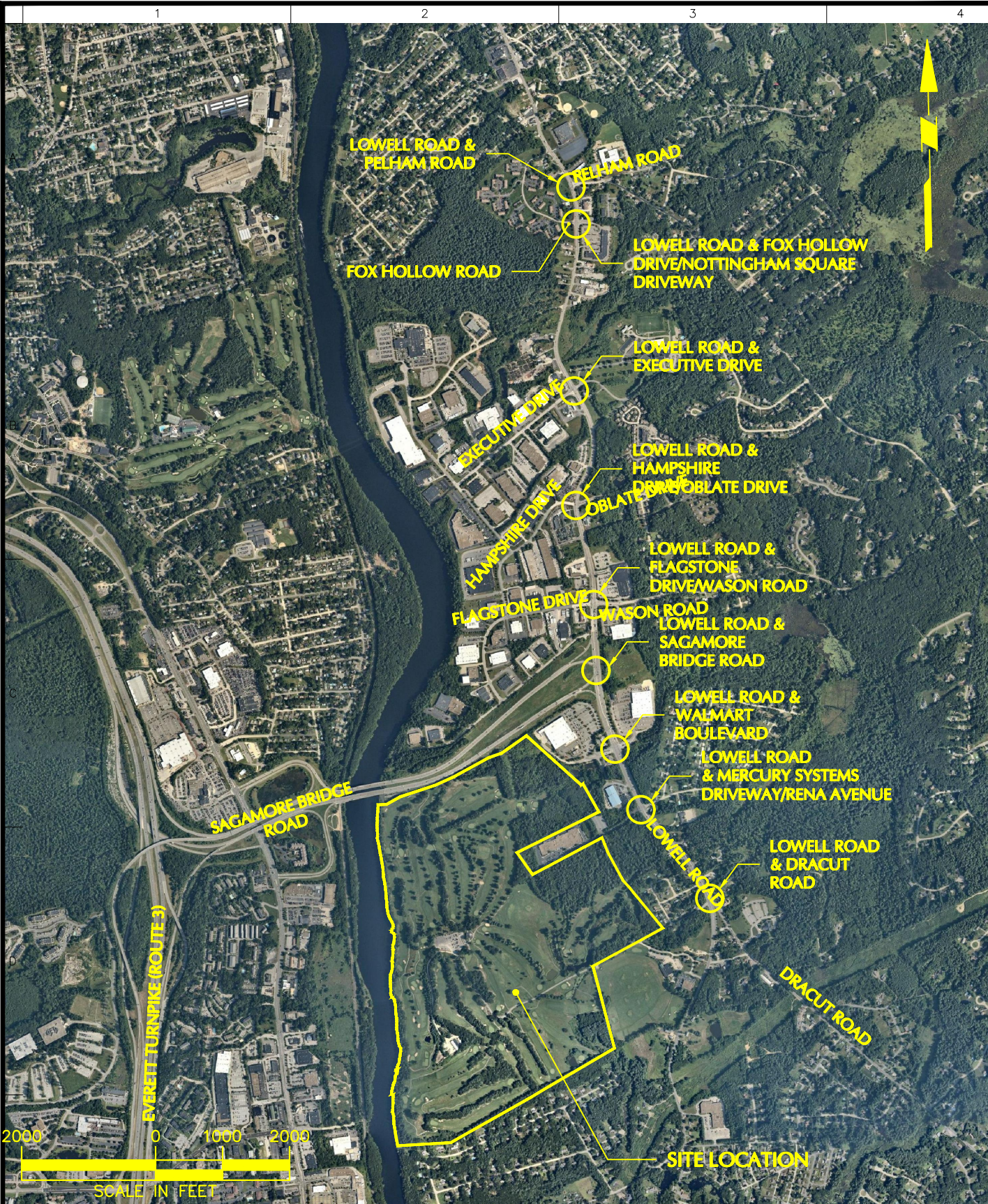
HUDSON
HILLSBOROUGH COUNTY NEW HAMPSHIRE

Drawing Title
LOCATION MAP

Project No.
151010101
Date
03/04/2020
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CJM
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LAM

Drawing No.
FIG. 1

Sheet 1 of 17



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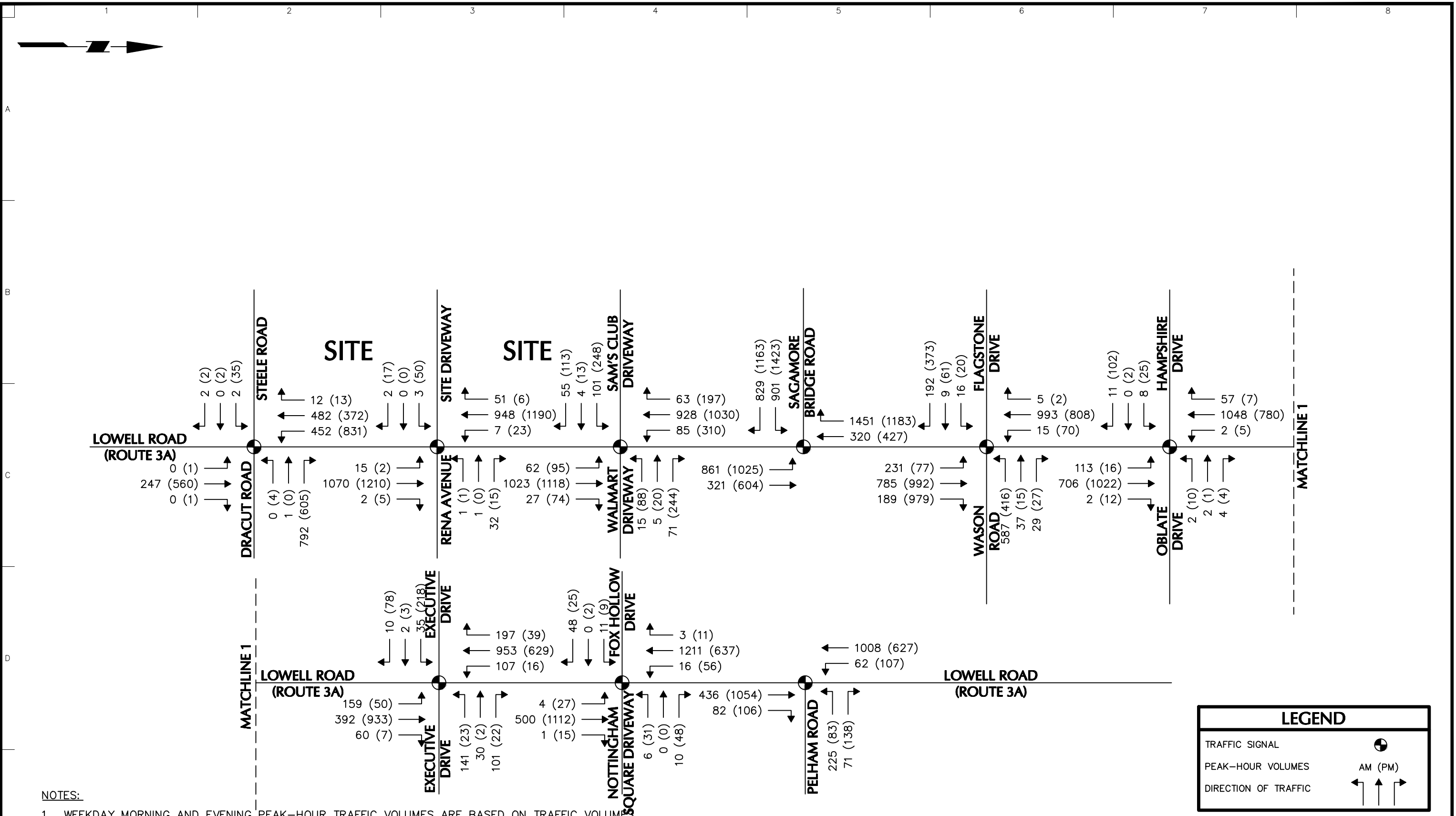
HUDSON
HILLSBOROUGH COUNTY NEW HAMPSHIRE

Drawing Title
**STUDY
INTERSECTIONS MAP**

Project No.
151010101
Date
03/04/2020
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Drawing No.
FIG. 2

Sheet 2 of 17

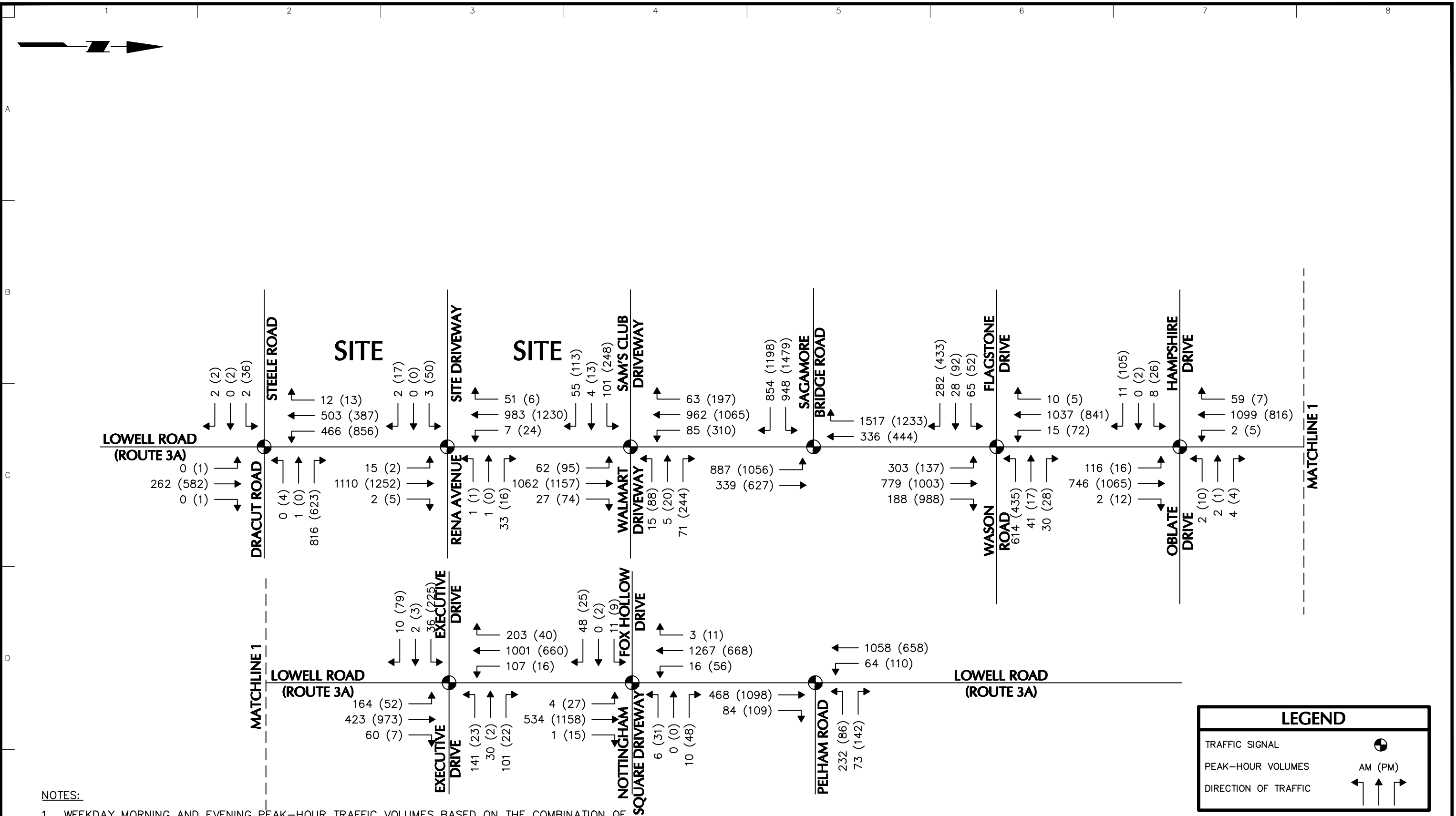


NOTES:

1. WEEKDAY MORNING AND EVENING PEAK-HOUR TRAFFIC VOLUMES ARE BASED ON TRAFFIC VOLUMES OBSERVED ON 10/08/2019 BY ACCURATE COUNTS.
2. MORNING PEAK-HOUR: 7:15 A.M. - 8:15 A.M.
3. EVENING PEAK-HOUR: 4:30 P.M. - 5:30 P.M.

LEGEND	
TRAFFIC SIGNAL	
PEAK-HOUR VOLUMES	AM (PM)
DIRECTION OF TRAFFIC	

 Langan Engineering and Environmental Services, Inc. www.langan.com	Project HUDSON LOGISTICS CENTER HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE	Drawing Title 2019 EXISTING PEAK-HOUR TRAFFIC VOLUMES	Project No. 151010101	Drawing No. FIG. 3
	Date 03/04/2020	Drawn By CJM	Checked By LAM	Sheet 3 of 18

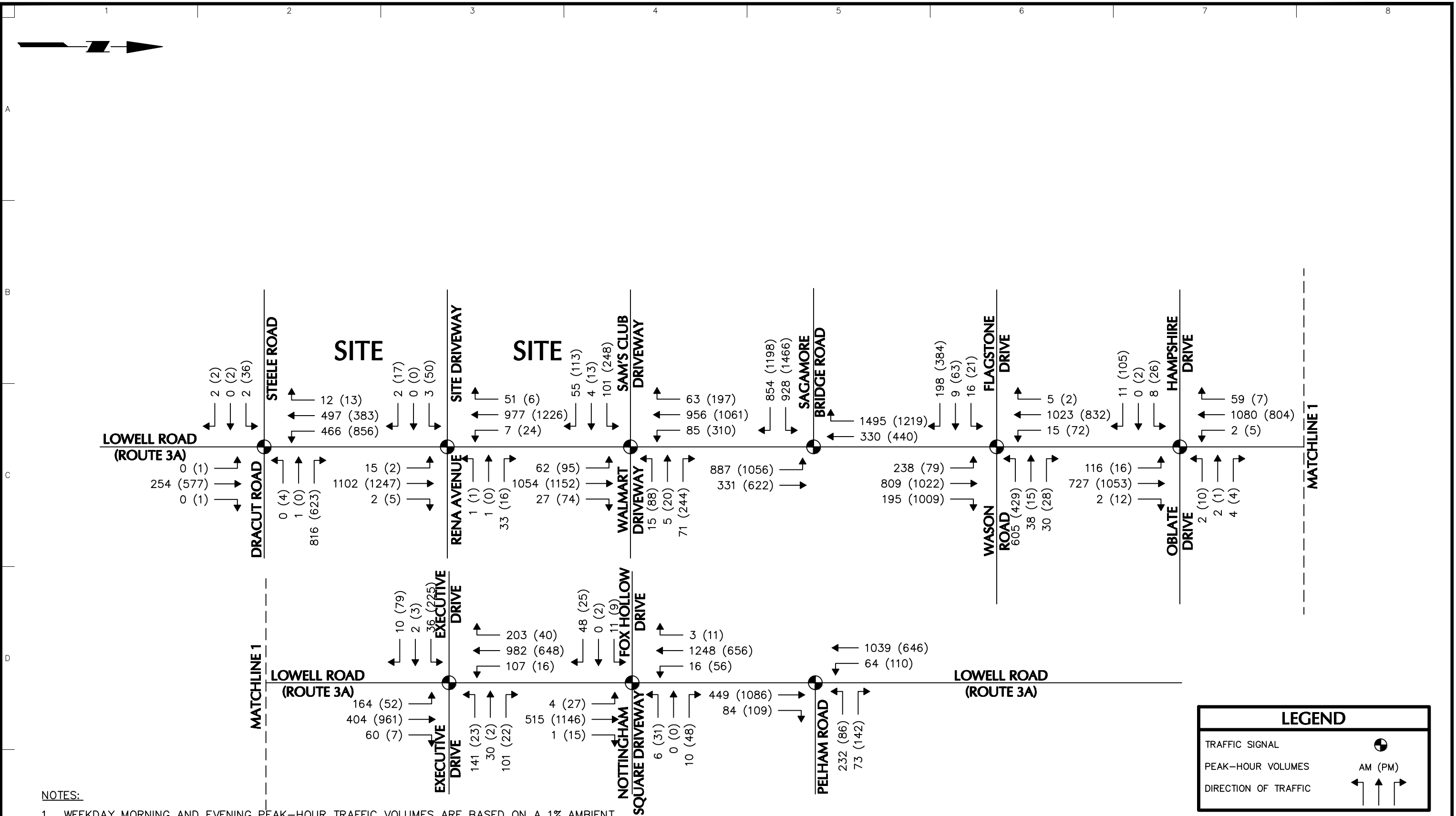


NOTES:

1. WEEKDAY MORNING AND EVENING PEAK-HOUR TRAFFIC VOLUMES BASED ON THE COMBINATION OF VOLUMES FROM FIGURE 4A AND FIGURE 4B OF THIS REPORT.
2. MORNING PEAK-HOUR: 7:15 A.M. - 8:15 A.M.
3. EVENING PEAK-HOUR: 4:30 P.M. - 5:30 P.M.

LEGEND	
TRAFFIC SIGNAL	
PEAK-HOUR VOLUMES	AM (PM)
DIRECTION OF TRAFFIC	

 Langan Engineering and Environmental Services, Inc. www.langan.com	Project HUDSON LOGISTICS CENTER HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE	Drawing Title 2022 COMBINED NO-BUILD PEAK-HOUR TRAFFIC VOLUMES	Project No. 151010101	Drawing No. FIG. 4
			Date 03/04/2020	
			Drawn By CJM	Sheet 4 of 18
			Checked By LAM	

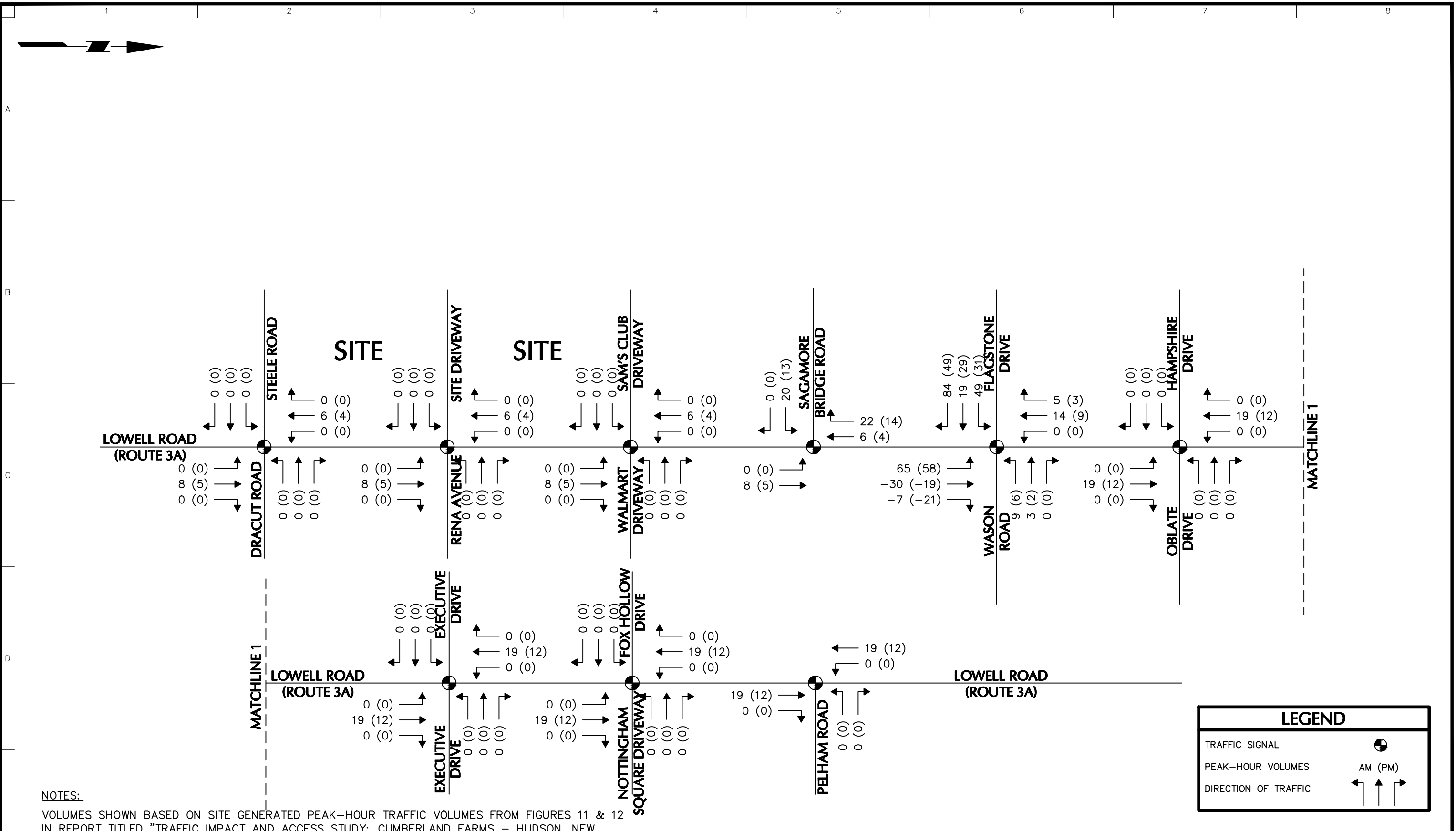


NOTES:

1. WEEKDAY MORNING AND EVENING PEAK-HOUR TRAFFIC VOLUMES ARE BASED ON A 1% AMBIENT GROWTH RATE APPLIED TO THE TRAFFIC VOLUMES SHOWN IN FIGURE 3 OF THIS REPORT.
2. MORNING PEAK-HOUR: 7:15 A.M. - 8:15 A.M.
3. EVENING PEAK-HOUR: 4:30 P.M. - 5:30 P.M.

LEGEND	
TRAFFIC SIGNAL	
PEAK-HOUR VOLUMES	AM (PM)
DIRECTION OF TRAFFIC	

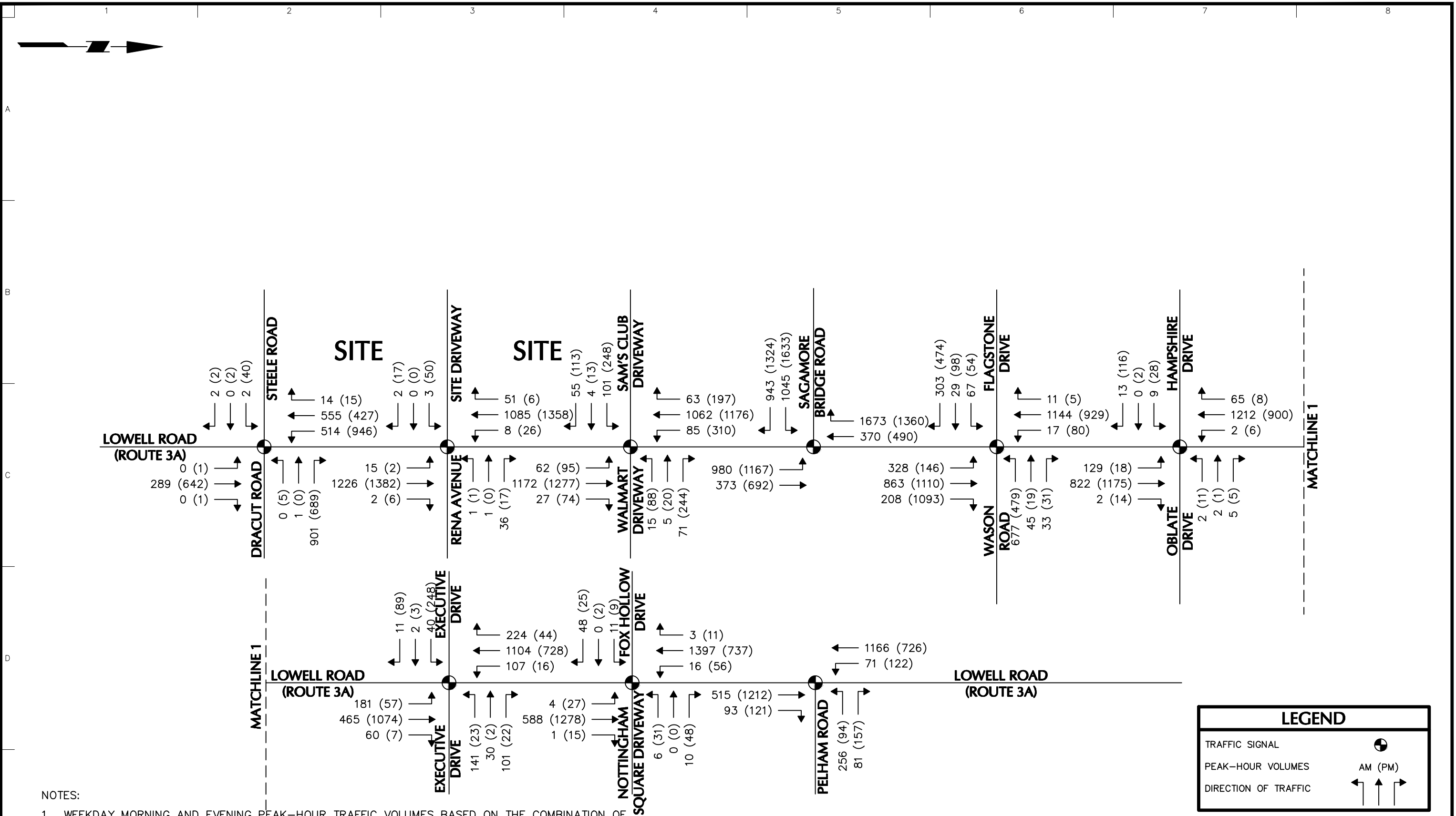
<p>LANGAN Langan Engineering and Environmental Services, Inc. www.langan.com</p>	<p>Project HUDSON LOGISTICS CENTER HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE</p>	<p>Drawing Title 2022 AMBIENT GROWTH PEAK-HOUR TRAFFIC VOLUMES</p>	Project No. 151010101	Drawing No. FIG. 4A
			Date 06/08/2020	
			Drawn By BTW	
			Checked By CJM	



NOTES:
 VOLUMES SHOWN BASED ON SITE GENERATED PEAK-HOUR TRAFFIC VOLUMES FROM FIGURES 11 & 12 IN REPORT TITLED "TRAFFIC IMPACT AND ACCESS STUDY: CUMBERLAND FARMS - HUDSON, NEW HAMPSHIRE" BY GPI DATED OCTOBER 2018.

LEGEND	
TRAFFIC SIGNAL	
PEAK-HOUR VOLUMES	AM (PM)
DIRECTION OF TRAFFIC	

 Langan Engineering and Environmental Services, Inc. www.langan.com	Project HUDSON LOGISTICS CENTER HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE	Drawing Title FLAGSTONE CROSSING PEAK-HOUR TRAFFIC VOLUMES	Project No. 151010101	Drawing No. FIG. 4B
	Date 06/08/2020	Drawn By BTW	Checked By CJM	Sheet 6 of 18

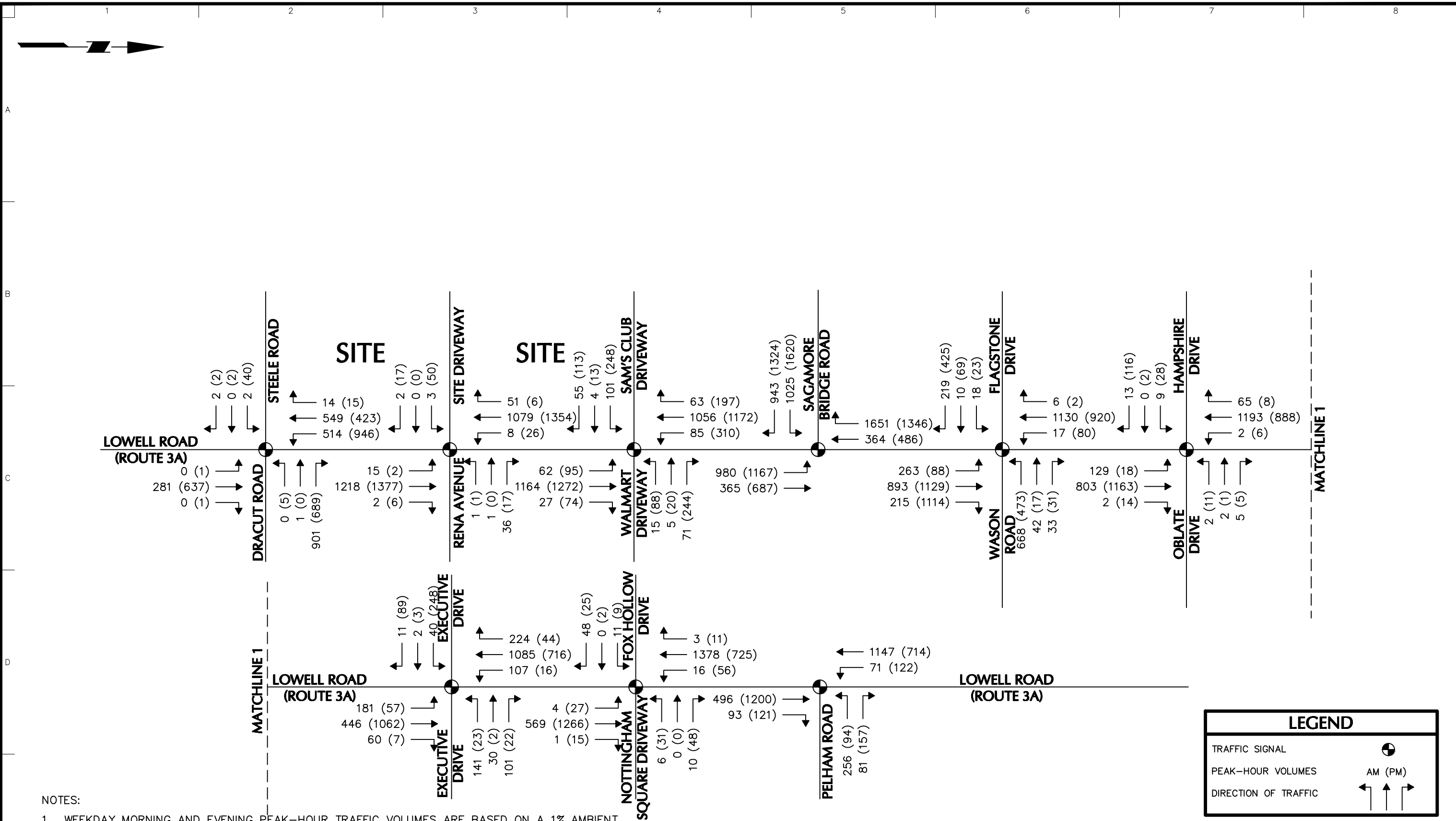


NOTES:

1. WEEKDAY MORNING AND EVENING PEAK-HOUR TRAFFIC VOLUMES BASED ON THE COMBINATION OF VOLUMES FROM FIGURE 5A AND FIGURE 4B OF THIS REPORT.
2. MORNING PEAK-HOUR: 7:15 A.M. - 8:15 A.M.
3. EVENING PEAK-HOUR: 4:30 P.M. - 5:30 P.M.

LEGEND	
TRAFFIC SIGNAL	
PEAK-HOUR VOLUMES	AM (PM)
DIRECTION OF TRAFFIC	

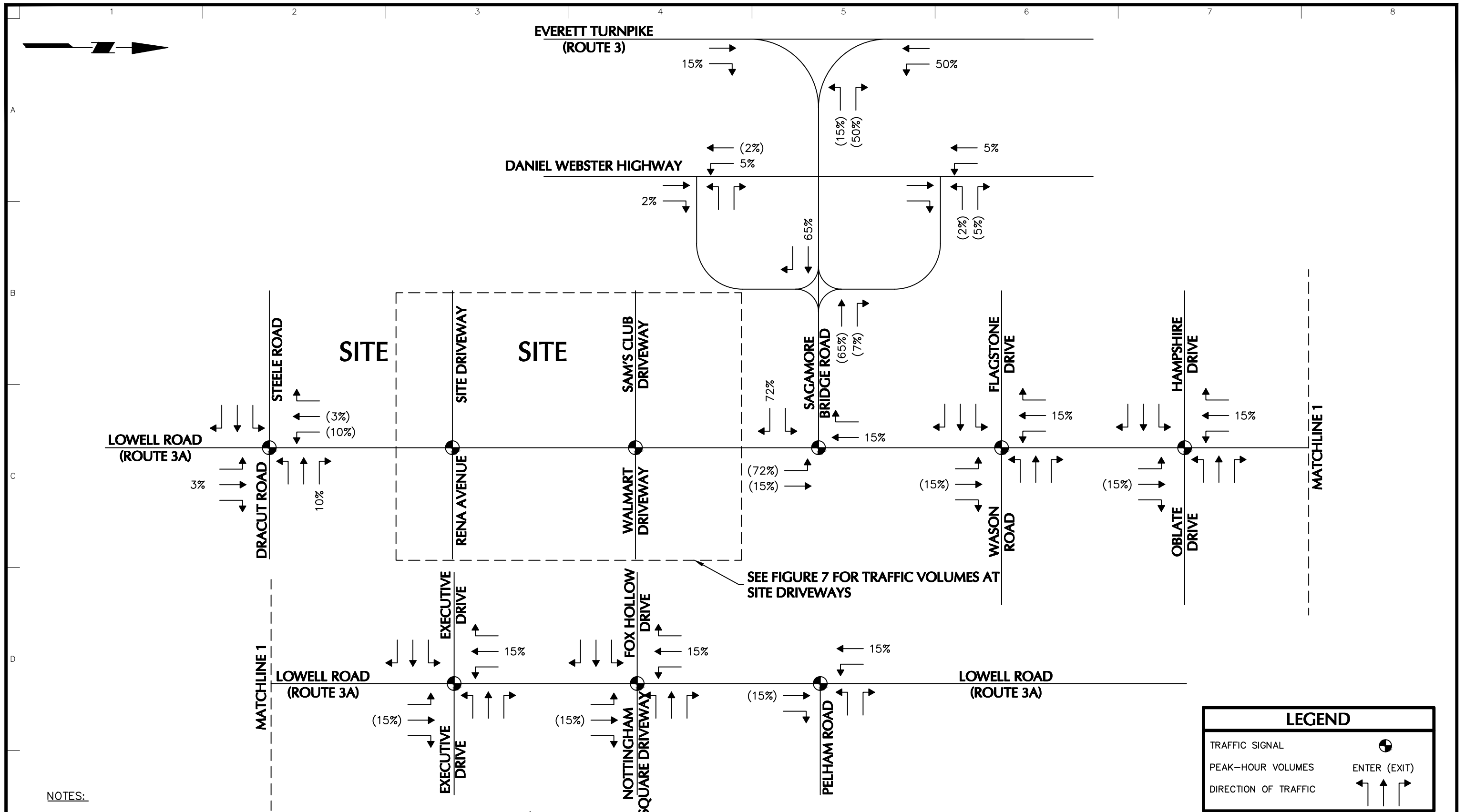
 Langan Engineering and Environmental Services, Inc. www.langan.com	Project HUDSON LOGISTICS CENTER HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE	Drawing Title 2032 NO-BUILD PEAK-HOUR TRAFFIC VOLUMES	Project No. 151010101 Date 03/04/2020 Drawn By CJM Checked By LAM	Drawing No. FIG. 5 Sheet 7 of 18
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- NOTES:
1. WEEKDAY MORNING AND EVENING PEAK-HOUR TRAFFIC VOLUMES ARE BASED ON A 1% AMBIENT GROWTH RATE APPLIED TO THE TRAFFIC VOLUMES SHOWN IN FIGURE 3 OF THIS REPORT.
 2. MORNING PEAK-HOUR: 7:15 A.M. - 8:15 A.M.
 3. EVENING PEAK-HOUR: 4:30 P.M. - 5:30 P.M.

LEGEND	
TRAFFIC SIGNAL	
PEAK-HOUR VOLUMES	AM (PM)
DIRECTION OF TRAFFIC	

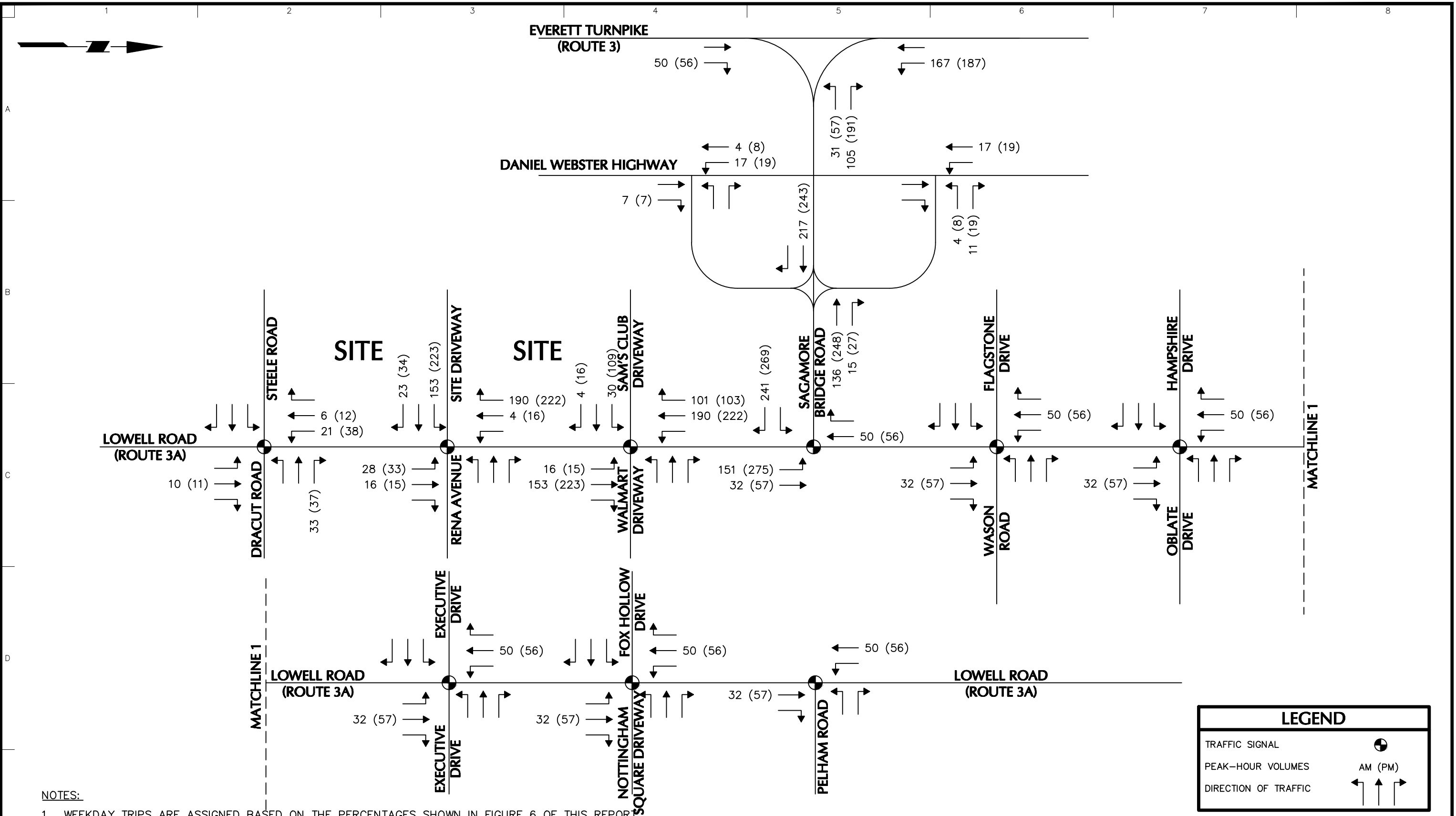
 Langan Engineering and Environmental Services, Inc. www.langan.com	Project HUDSON LOGISTICS CENTER HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE	Drawing Title 2032 AMBIENT GROWTH PEAK-HOUR TRAFFIC VOLUMES	Project No. 151010101	Drawing No. FIG. 5A
	Date 03/04/2020	Drawn By BTW	Checked By CJM	Sheet 8 of 18



NOTES:

1. WEEKDAY MORNING AND EVENING TRIP DISTRIBUTIONS ARE BASED ON THE USER'S WORKFORCE, EXISTING TRAFFIC PATTERNS, ANTICIPATED TRUCK ROUTES, AND JOURNEY TO WORK DATA.

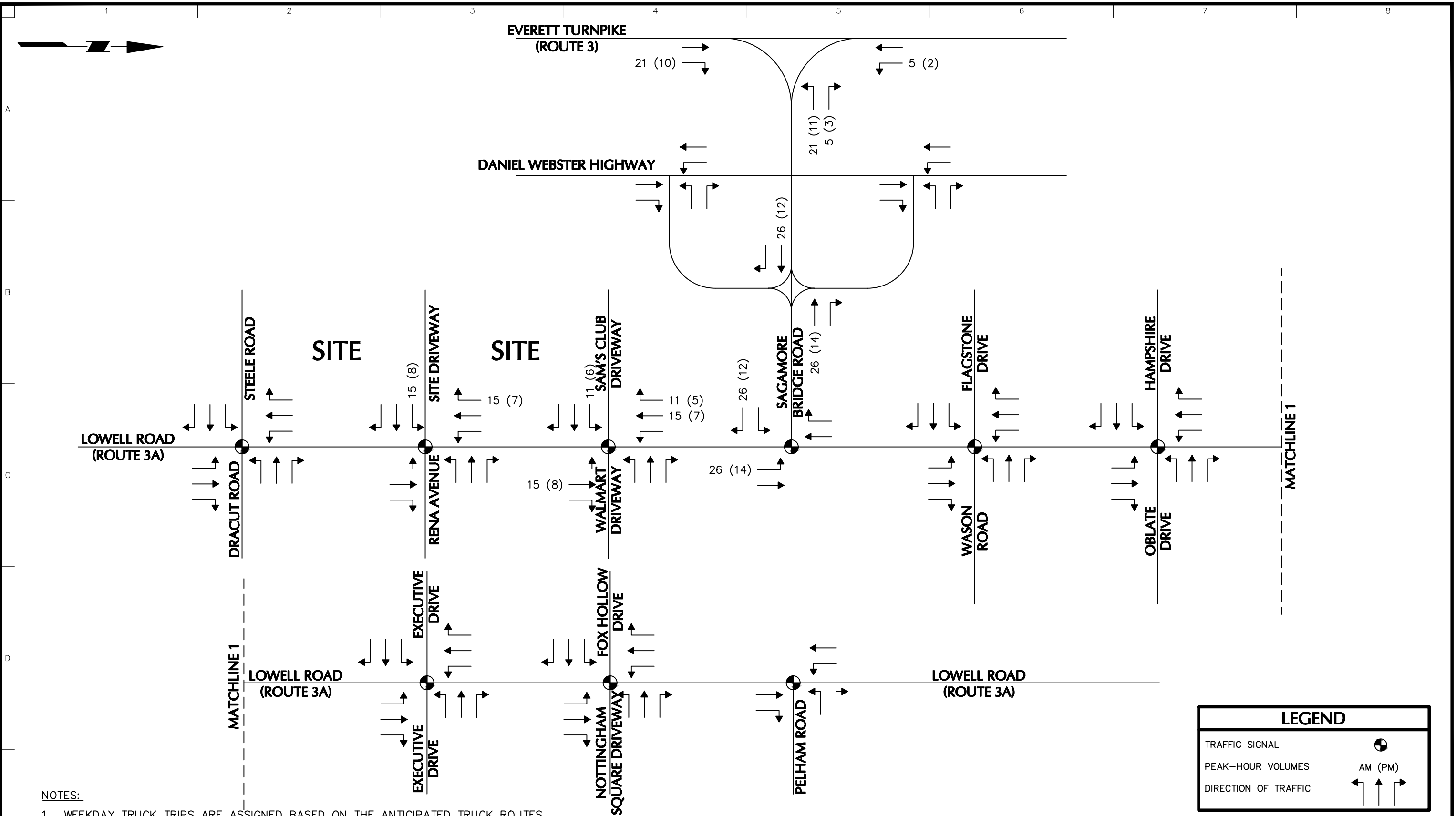
<p>LANGAN Langan Engineering and Environmental Services, Inc. www.langan.com</p>	Project HUDSON LOGISTICS CENTER HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE	Drawing Title TRIP DISTRIBUTION	Project No. 151010101	Drawing No. FIG. 6
	Date 03/04/2020	Drawn By CJM	Checked By LAM	Sheet 9 of 18



- NOTES:**
1. WEEKDAY TRIPS ARE ASSIGNED BASED ON THE PERCENTAGES SHOWN IN FIGURE 6 OF THIS REPORT AND THE TRIP GENERATION TABLE IN THIS REPORT.
 2. MORNING PEAK-HOUR: 7:15 A.M. - 8:15 A.M.
 3. EVENING PEAK-HOUR: 4:30 P.M. - 5:30 P.M.

LEGEND	
TRAFFIC SIGNAL	
PEAK-HOUR VOLUMES	AM (PM)
DIRECTION OF TRAFFIC	

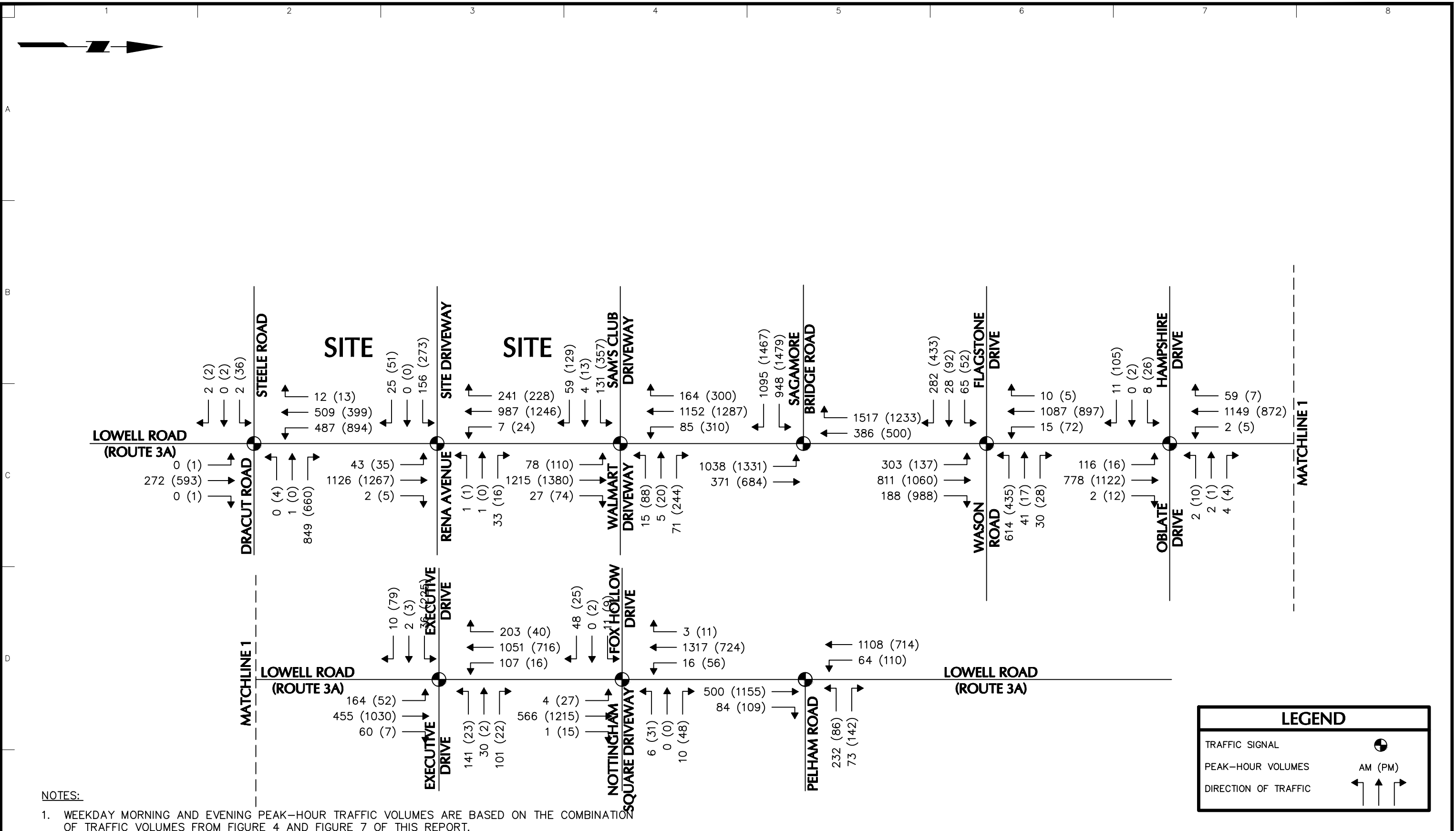
 Langan Engineering and Environmental Services, Inc. www.langan.com	Project HUDSON LOGISTICS CENTER HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE	Drawing Title TRIP ASSIGNMENT	Project No. 151010101	Drawing No. FIG. 7
	Date 03/04/2020	Drawn By CJM	Checked By LAM	Sheet 10 of 18



- NOTES:**
1. WEEKDAY TRUCK TRIPS ARE ASSIGNED BASED ON THE ANTICIPATED TRUCK ROUTES.
 2. WEEKDAY TRUCK TRIP VOLUMES ARE CALCULATED USING ITE 10TH EDITION TRIP GENERATION MANUAL SUPPLEMENT LAND USE CODE 155 (NON-SORT) BASED ON BUILDING GROSS FLOOR AREA.
 3. MORNING PEAK-HOUR: 7:15 A.M. - 8:15 A.M.
 4. EVENING PEAK-HOUR: 4:30 P.M. - 5:30 P.M.

LEGEND	
TRAFFIC SIGNAL	
PEAK-HOUR VOLUMES	AM (PM)
DIRECTION OF TRAFFIC	

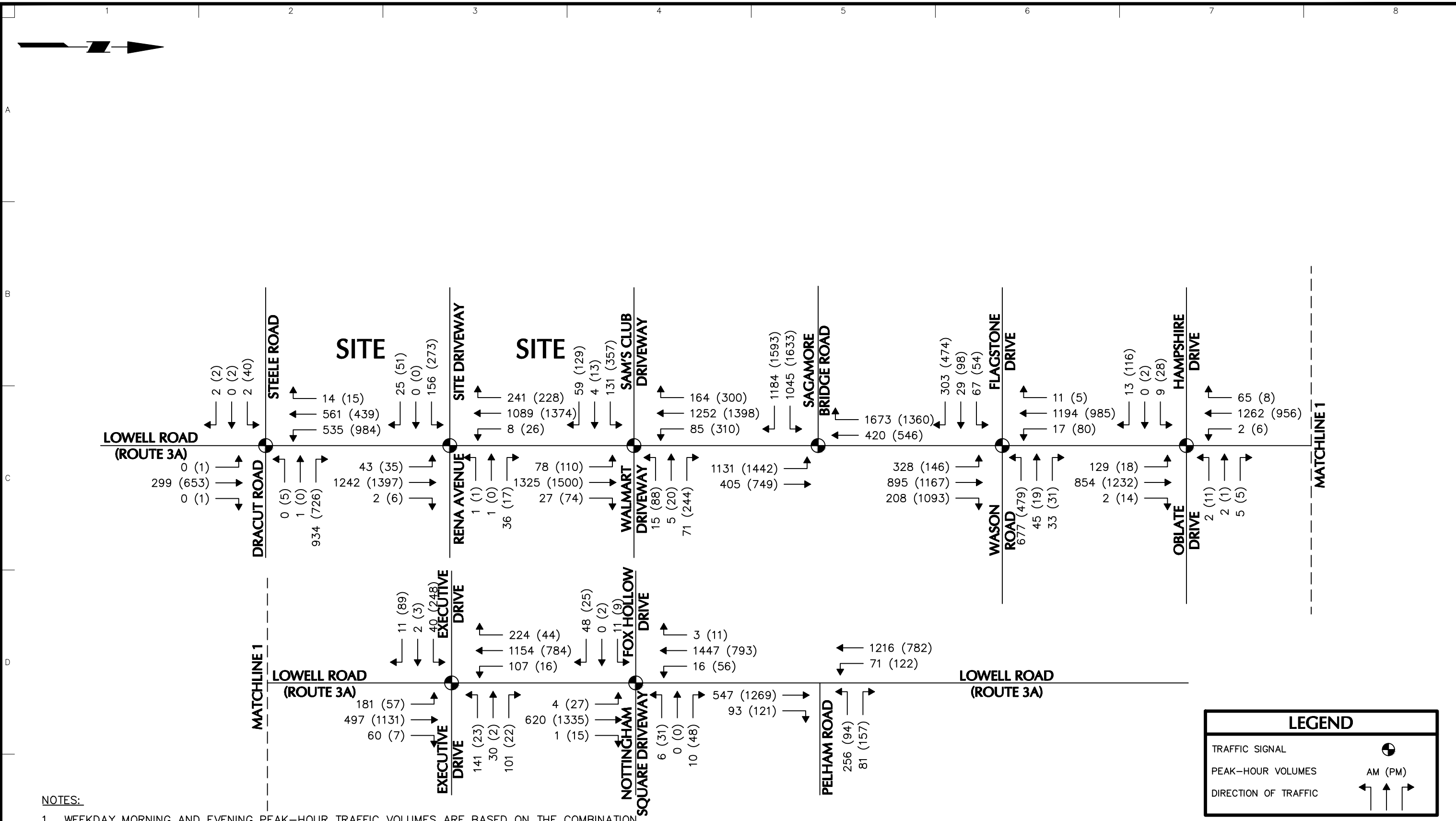
 Langan Engineering and Environmental Services, Inc. www.langan.com	Project HUDSON LOGISTICS CENTER HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE	Drawing Title TRUCK TRIP ASSIGNMENT	Project No. 151010101	Drawing No. FIG. 7A
	Date 08/12/2020	Drawn By BDB	Checked By CJM	Sheet 0 of 18



- NOTES:**
1. WEEKDAY MORNING AND EVENING PEAK-HOUR TRAFFIC VOLUMES ARE BASED ON THE COMBINATION OF TRAFFIC VOLUMES FROM FIGURE 4 AND FIGURE 7 OF THIS REPORT.
 2. MORNING PEAK-HOUR: 7:15 A.M. - 8:15 A.M.
 3. EVENING PEAK-HOUR: 4:30 P.M. - 5:30 P.M.

LEGEND	
TRAFFIC SIGNAL	
PEAK-HOUR VOLUMES	AM (PM)
DIRECTION OF TRAFFIC	

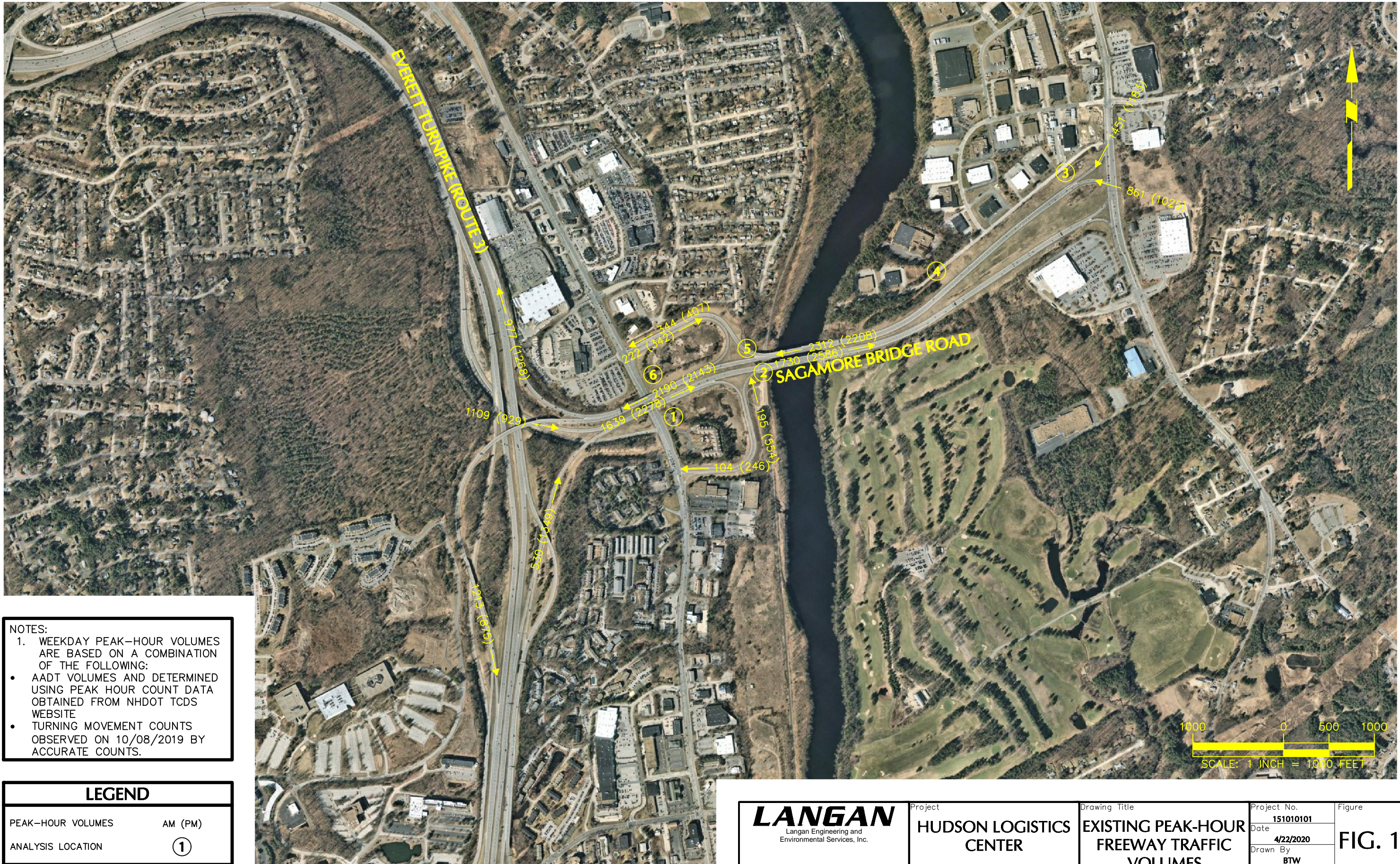
 Langan Engineering and Environmental Services, Inc. www.langan.com	Project HUDSON LOGISTICS CENTER HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE	Drawing Title 2022 BUILD PEAK-HOUR TRAFFIC VOLUMES	Project No. 151010101	Drawing No. FIG. 8
			Date 03/04/2020	
			Drawn By CJM	Sheet 11 of 18
			Checked By LAM	



NOTES:

1. WEEKDAY MORNING AND EVENING PEAK-HOUR TRAFFIC VOLUMES ARE BASED ON THE COMBINATION OF TRAFFIC VOLUMES FROM FIGURE 5 AND FIGURE 7 OF THIS REPORT.
2. MORNING PEAK-HOUR: 7:15 A.M. - 8:15 A.M.
3. EVENING PEAK-HOUR: 4:30 P.M. - 5:30 P.M.

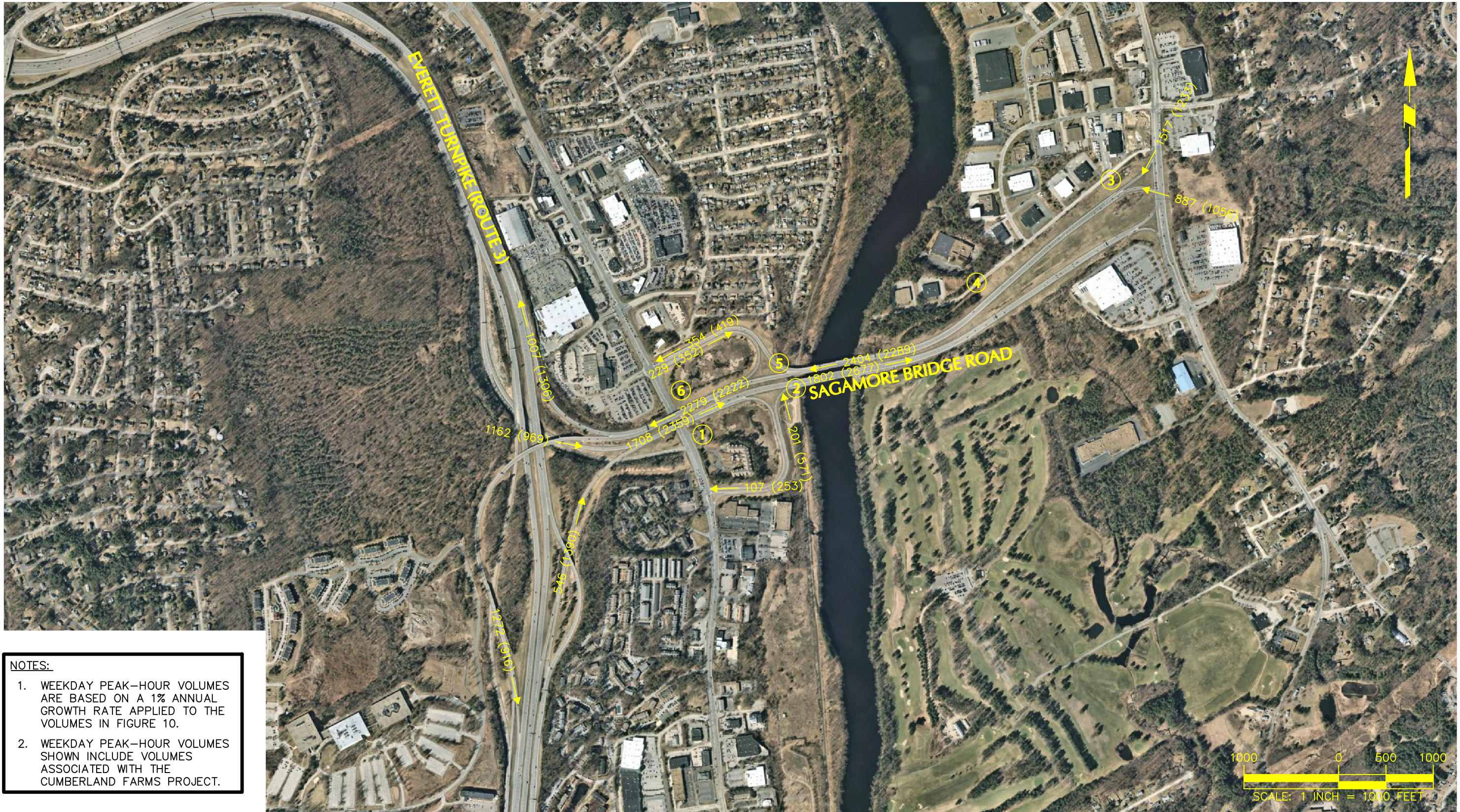
<p>LANGAN Langan Engineering and Environmental Services, Inc. www.langan.com</p>	<p>Project HUDSON LOGISTICS CENTER</p>	<p>Drawing Title 2032 BUILD PEAK-HOUR TRAFFIC VOLUMES</p>	<p>Project No. 151010101</p>	<p>Drawing No. FIG. 9</p>
	<p>HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE</p>	<p>Date 03/04/2020</p>	<p>Drawn By CJM</p>	<p>Checked By LAM</p>



NOTES:
 1. WEEKDAY PEAK-HOUR VOLUMES ARE BASED ON A COMBINATION OF THE FOLLOWING:
 • AADT VOLUMES AND DETERMINED USING PEAK HOUR COUNT DATA OBTAINED FROM NHDOT TCDS WEBSITE
 • TURNING MOVEMENT COUNTS OBSERVED ON 10/08/2019 BY ACCURATE COUNTS.

LEGEND	
PEAK-HOUR VOLUMES	AM (PM)
ANALYSIS LOCATION	①

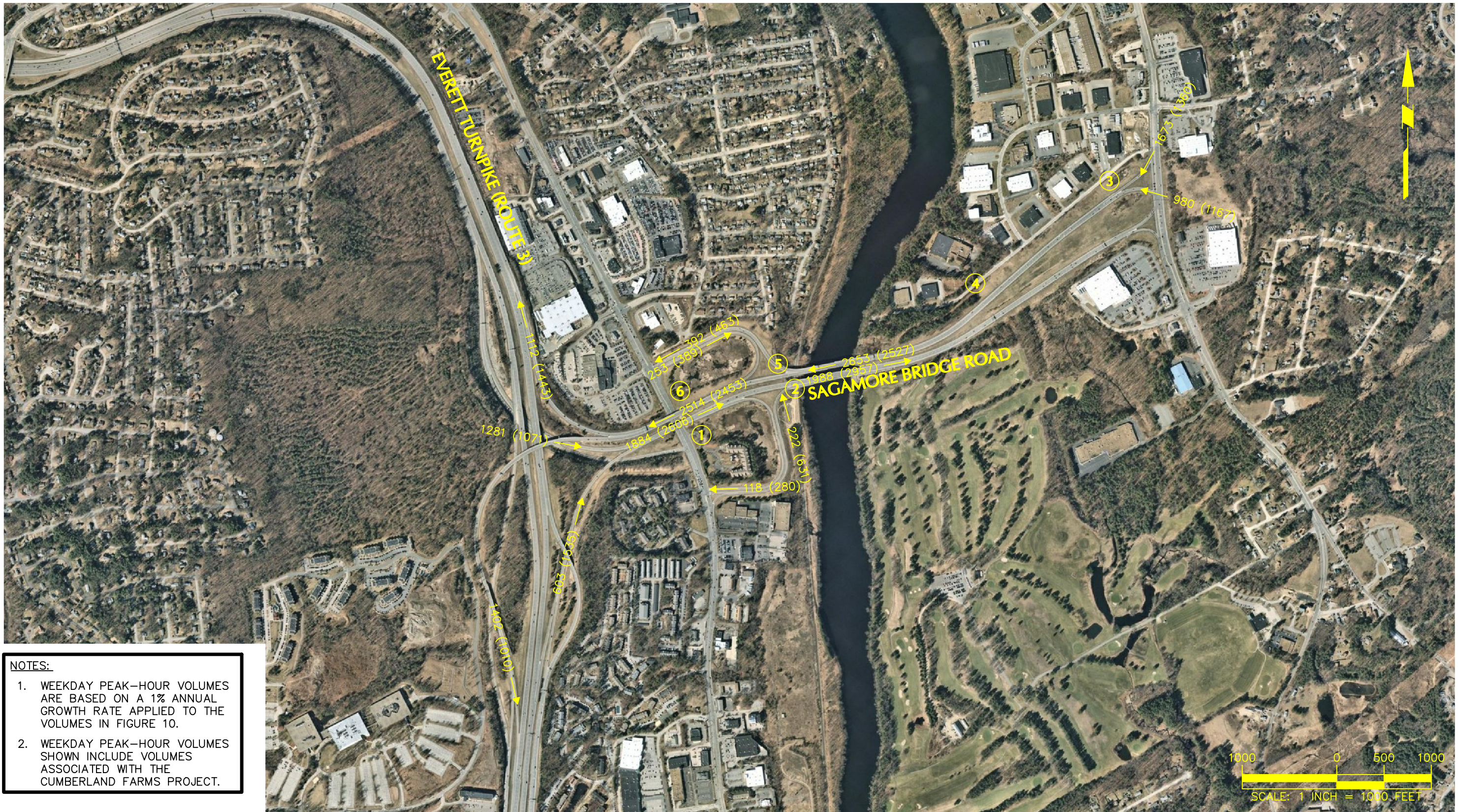
LANGAN Langan Engineering and Environmental Services, Inc. www.langan.com	Project	HUDSON LOGISTICS CENTER	Drawing Title	EXISTING PEAK-HOUR FREEWAY TRAFFIC VOLUMES	Project No.	151010101	Figure	FIG. 10 Sheet 13 of 18
	HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE	Date	4/22/2020	Drawn By	BTW	Checked By	CIM	



- NOTES:**
1. WEEKDAY PEAK-HOUR VOLUMES ARE BASED ON A 1% ANNUAL GROWTH RATE APPLIED TO THE VOLUMES IN FIGURE 10.
 2. WEEKDAY PEAK-HOUR VOLUMES SHOWN INCLUDE VOLUMES ASSOCIATED WITH THE CUMBERLAND FARMS PROJECT.

LEGEND	
PEAK-HOUR VOLUMES	AM (PM)
ANALYSIS LOCATION	①

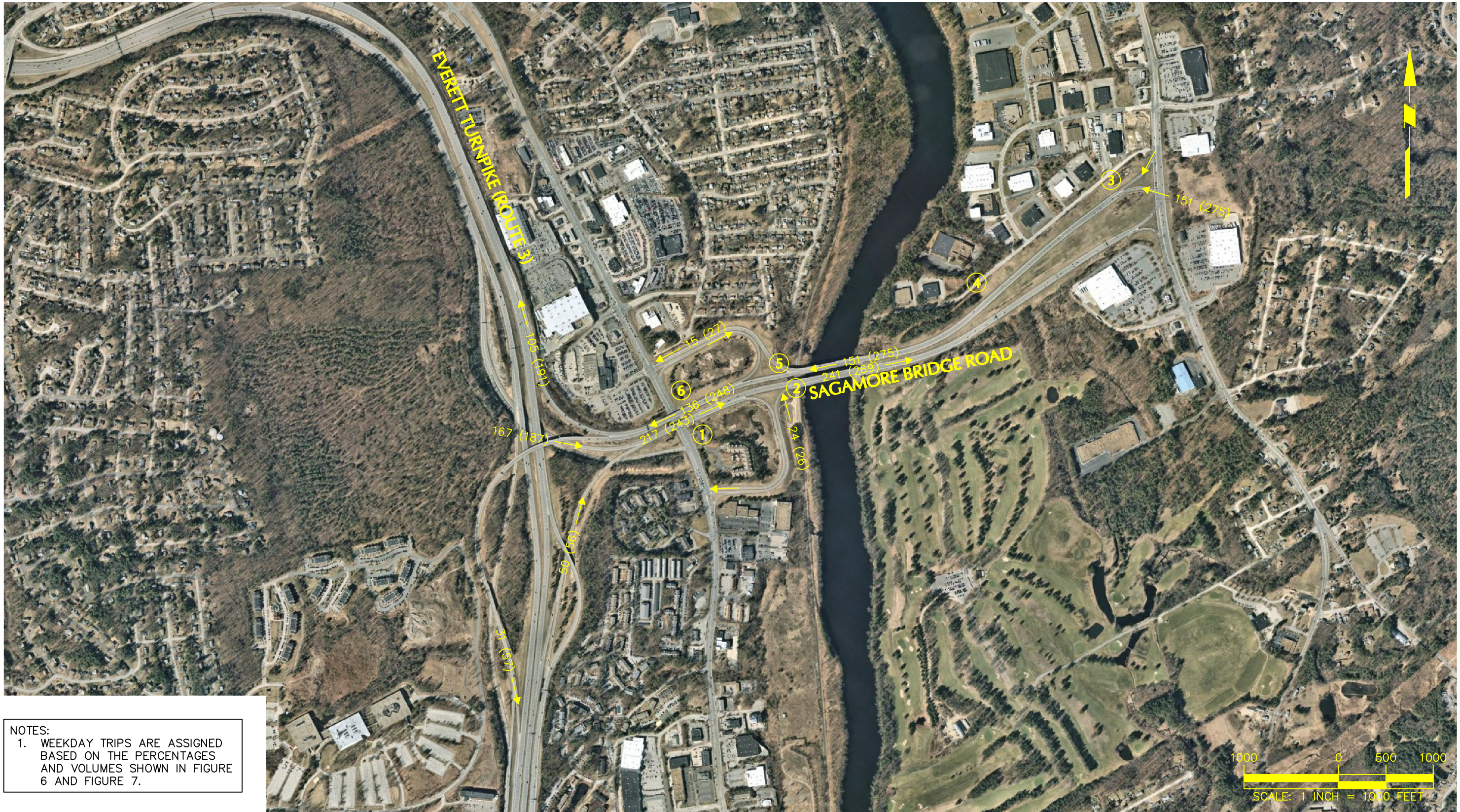
<p>LANGAN Langan Engineering and Environmental Services, Inc. www.langan.com</p>	<p>Project HUDSON LOGISTICS CENTER HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE</p>	<p>Drawing Title 2022 NO-BUILD PEAK-HOUR FREEWAY TRAFFIC VOLUMES</p>	Project No. 151010101	Figure
			Date 6/10/2020	FIG. 11
			Drawn By BTW	Sheet 14 of 18
			Checked By CJM	



- NOTES:**
1. WEEKDAY PEAK-HOUR VOLUMES ARE BASED ON A 1% ANNUAL GROWTH RATE APPLIED TO THE VOLUMES IN FIGURE 10.
 2. WEEKDAY PEAK-HOUR VOLUMES SHOWN INCLUDE VOLUMES ASSOCIATED WITH THE CUMBERLAND FARMS PROJECT.

LEGEND	
PEAK-HOUR VOLUMES	AM (PM)
ANALYSIS LOCATION	①

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			<p>Date 4/22/2020</p>	
			<p>Drawn By BTW</p>	<p>Sheet 15 of 18</p>
			<p>Checked By CJM</p>	



NOTES:
 1. WEEKDAY TRIPS ARE ASSIGNED BASED ON THE PERCENTAGES AND VOLUMES SHOWN IN FIGURE 6 AND FIGURE 7.

LEGEND	
PEAK-HOUR VOLUMES	AM (PM)
ANALYSIS LOCATION	①

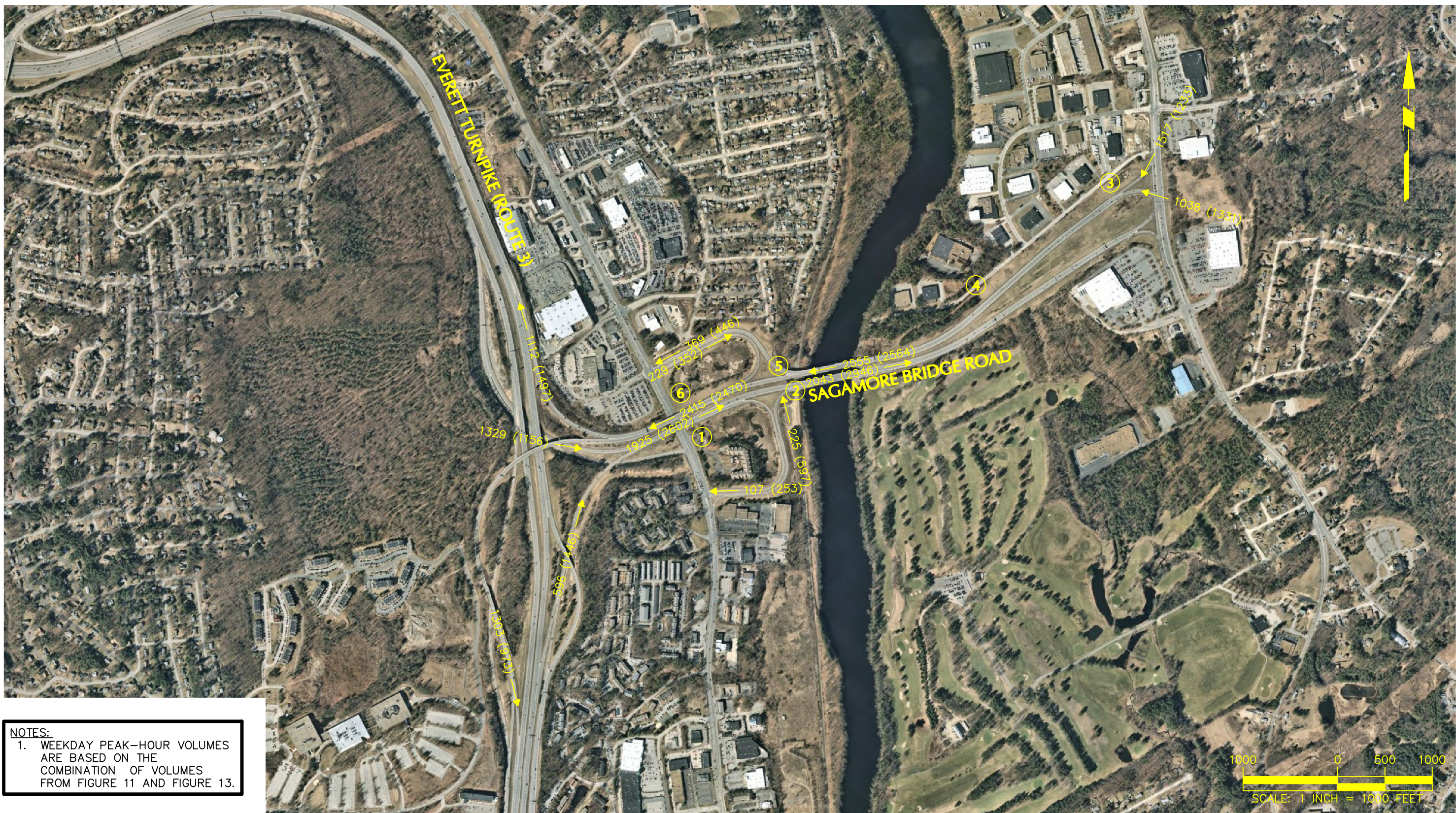
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HUDSON LOGISTICS CENTER
 HUDSON
 HILLSBOROUGH COUNTY NEW HAMPSHIRE

Drawing Title
**TRIP ASSIGNMENT
 FREEWAY TRAFFIC
 VOLUMES**

Project No.
151010101
 Date
4/22/2020
 Drawn By
BTW
 Checked By
CIM

Figure
FIG. 13
 Sheet 16 of 18



NOTES:
 1. WEEKDAY PEAK-HOUR VOLUMES ARE BASED ON THE COMBINATION OF VOLUMES FROM FIGURE 11 AND FIGURE 13.

LEGEND	
PEAK-HOUR VOLUMES	AM (PM)
ANALYSIS LOCATION	①

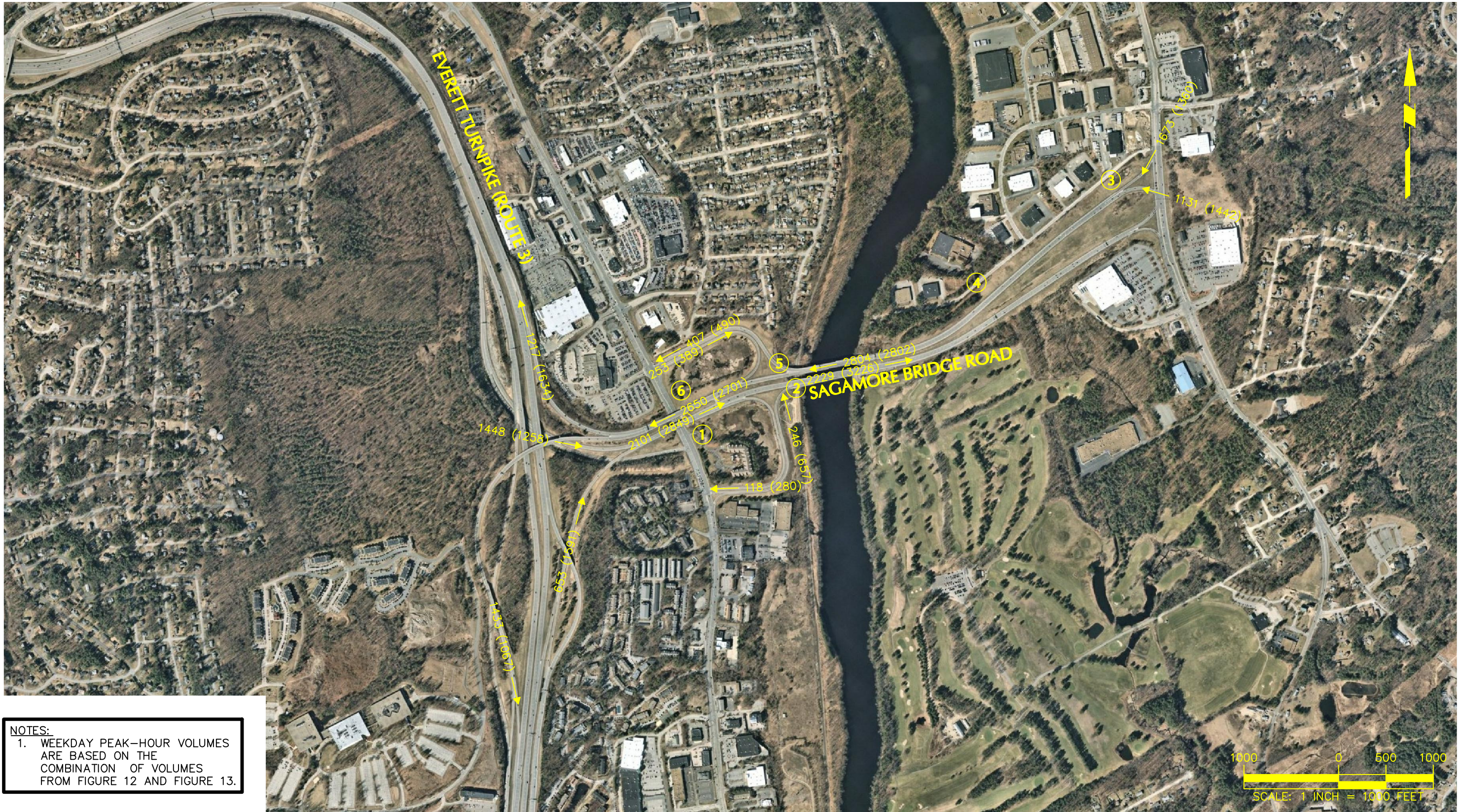
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 HUDSON
 HILLSBOROUGH COUNTY NEW HAMPSHIRE

Drawing Title
2022 BUILD PEAK-HOUR FREEWAY TRAFFIC VOLUMES

Project No.
151010101
 Date
5/5/2020
 Drawn By
BTW
 Checked By
CIM

Drawing No.
FIG. 14
 Sheet 17 of 18



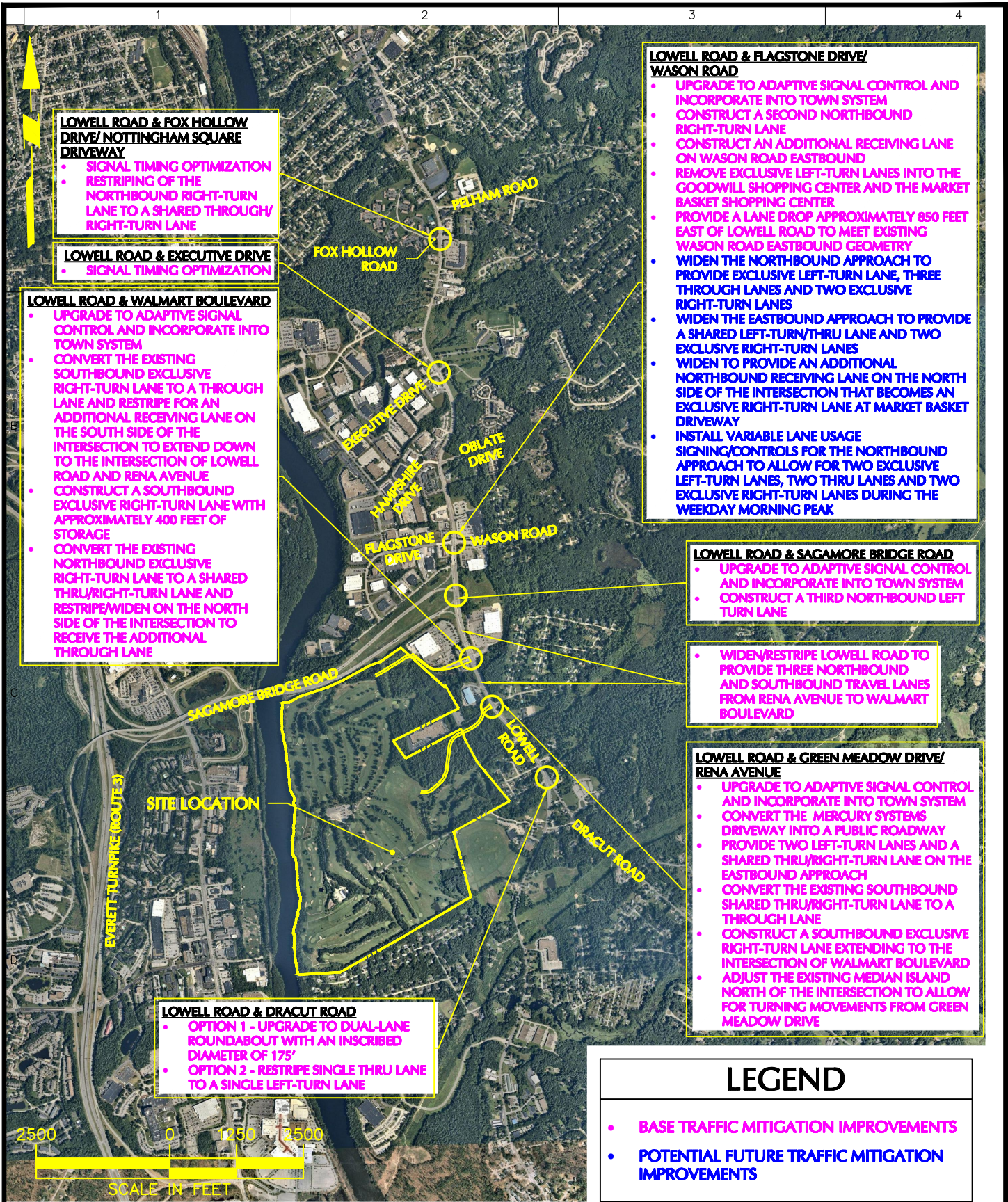
NOTES:
 1. WEEKDAY PEAK-HOUR VOLUMES ARE BASED ON THE COMBINATION OF VOLUMES FROM FIGURE 12 AND FIGURE 13.

LEGEND	
PEAK-HOUR VOLUMES	AM (PM)
ANALYSIS LOCATION	①

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	HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE	2032 BUILD PEAK-HOUR FREEWAY TRAFFIC VOLUMES	151010101	FIG. 15	
	Date	5/5/2020	Drawn By	BTW	Sheet 18 of 18
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Appendix A

Overall Site Plan & Conceptual Improvements Plans



LOWELL ROAD & FOX HOLLOW DRIVE/ NOTTINGHAM SQUARE DRIVEWAY

- SIGNAL TIMING OPTIMIZATION
- RESTRIPING OF THE NORTHBOUND RIGHT-TURN LANE TO A SHARED THROUGH/ RIGHT-TURN LANE

LOWELL ROAD & EXECUTIVE DRIVE

- SIGNAL TIMING OPTIMIZATION

LOWELL ROAD & WALMART BOULEVARD

- UPGRADE TO ADAPTIVE SIGNAL CONTROL AND INCORPORATE INTO TOWN SYSTEM
- CONVERT THE EXISTING SOUTHBOUND EXCLUSIVE RIGHT-TURN LANE TO A THROUGH LANE AND RESTRIPE FOR AN ADDITIONAL RECEIVING LANE ON THE SOUTH SIDE OF THE INTERSECTION TO EXTEND DOWN TO THE INTERSECTION OF LOWELL ROAD AND RENA AVENUE
- CONSTRUCT A SOUTHBOUND EXCLUSIVE RIGHT-TURN LANE WITH APPROXIMATELY 400 FEET OF STORAGE
- CONVERT THE EXISTING NORTHBOUND EXCLUSIVE RIGHT-TURN LANE TO A SHARED THRU/RIGHT-TURN LANE AND RESTRIPE/WIDEN ON THE NORTH SIDE OF THE INTERSECTION TO RECEIVE THE ADDITIONAL THROUGH LANE

LOWELL ROAD & FLAGSTONE DRIVE/ WASON ROAD

- UPGRADE TO ADAPTIVE SIGNAL CONTROL AND INCORPORATE INTO TOWN SYSTEM
- CONSTRUCT A SECOND NORTHBOUND RIGHT-TURN LANE
- CONSTRUCT AN ADDITIONAL RECEIVING LANE ON WASON ROAD EASTBOUND
- REMOVE EXCLUSIVE LEFT-TURN LANES INTO THE GOODWILL SHOPPING CENTER AND THE MARKET BASKET SHOPPING CENTER
- PROVIDE A LANE DROP APPROXIMATELY 850 FEET EAST OF LOWELL ROAD TO MEET EXISTING WASON ROAD EASTBOUND GEOMETRY
- WIDEN THE NORTHBOUND APPROACH TO PROVIDE EXCLUSIVE LEFT-TURN LANE, THREE THROUGH LANES AND TWO EXCLUSIVE RIGHT-TURN LANES
- WIDEN THE EASTBOUND APPROACH TO PROVIDE A SHARED LEFT-TURN/THRU LANE AND TWO EXCLUSIVE RIGHT-TURN LANES
- WIDEN TO PROVIDE AN ADDITIONAL NORTHBOUND RECEIVING LANE ON THE NORTH SIDE OF THE INTERSECTION THAT BECOMES AN EXCLUSIVE RIGHT-TURN LANE AT MARKET BASKET DRIVEWAY
- INSTALL VARIABLE LANE USAGE SIGNING/CONTROLS FOR THE NORTHBOUND APPROACH TO ALLOW FOR TWO EXCLUSIVE LEFT-TURN LANES, TWO THRU LANES AND TWO EXCLUSIVE RIGHT-TURN LANES DURING THE WEEKDAY MORNING PEAK

LOWELL ROAD & SAGAMORE BRIDGE ROAD

- UPGRADE TO ADAPTIVE SIGNAL CONTROL AND INCORPORATE INTO TOWN SYSTEM
- CONSTRUCT A THIRD NORTHBOUND LEFT TURN LANE

- WIDEN/RESTRIPE LOWELL ROAD TO PROVIDE THREE NORTHBOUND AND SOUTHBOUND TRAVEL LANES FROM RENA AVENUE TO WALMART BOULEVARD

LOWELL ROAD & GREEN MEADOW DRIVE/ RENA AVENUE

- UPGRADE TO ADAPTIVE SIGNAL CONTROL AND INCORPORATE INTO TOWN SYSTEM
- CONVERT THE MERCURY SYSTEMS DRIVEWAY INTO A PUBLIC ROADWAY
- PROVIDE TWO LEFT-TURN LANES AND A SHARED THRU/RIGHT-TURN LANE ON THE EASTBOUND APPROACH
- CONVERT THE EXISTING SOUTHBOUND SHARED THRU/RIGHT-TURN LANE TO A THROUGH LANE
- CONSTRUCT A SOUTHBOUND EXCLUSIVE RIGHT-TURN LANE EXTENDING TO THE INTERSECTION OF WALMART BOULEVARD
- ADJUST THE EXISTING MEDIAN ISLAND NORTH OF THE INTERSECTION TO ALLOW FOR TURNING MOVEMENTS FROM GREEN MEADOW DRIVE

LOWELL ROAD & DRACUT ROAD

- OPTION 1 - UPGRADE TO DUAL-LANE ROUNDABOUT WITH AN INSCRIBED DIAMETER OF 175'
- OPTION 2 - RESTRIPE SINGLE THRU LANE TO A SINGLE LEFT-TURN LANE

LEGEND	
•	BASE TRAFFIC MITIGATION IMPROVEMENTS
•	POTENTIAL FUTURE TRAFFIC MITIGATION IMPROVEMENTS

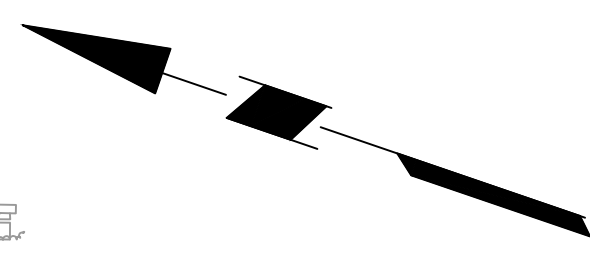
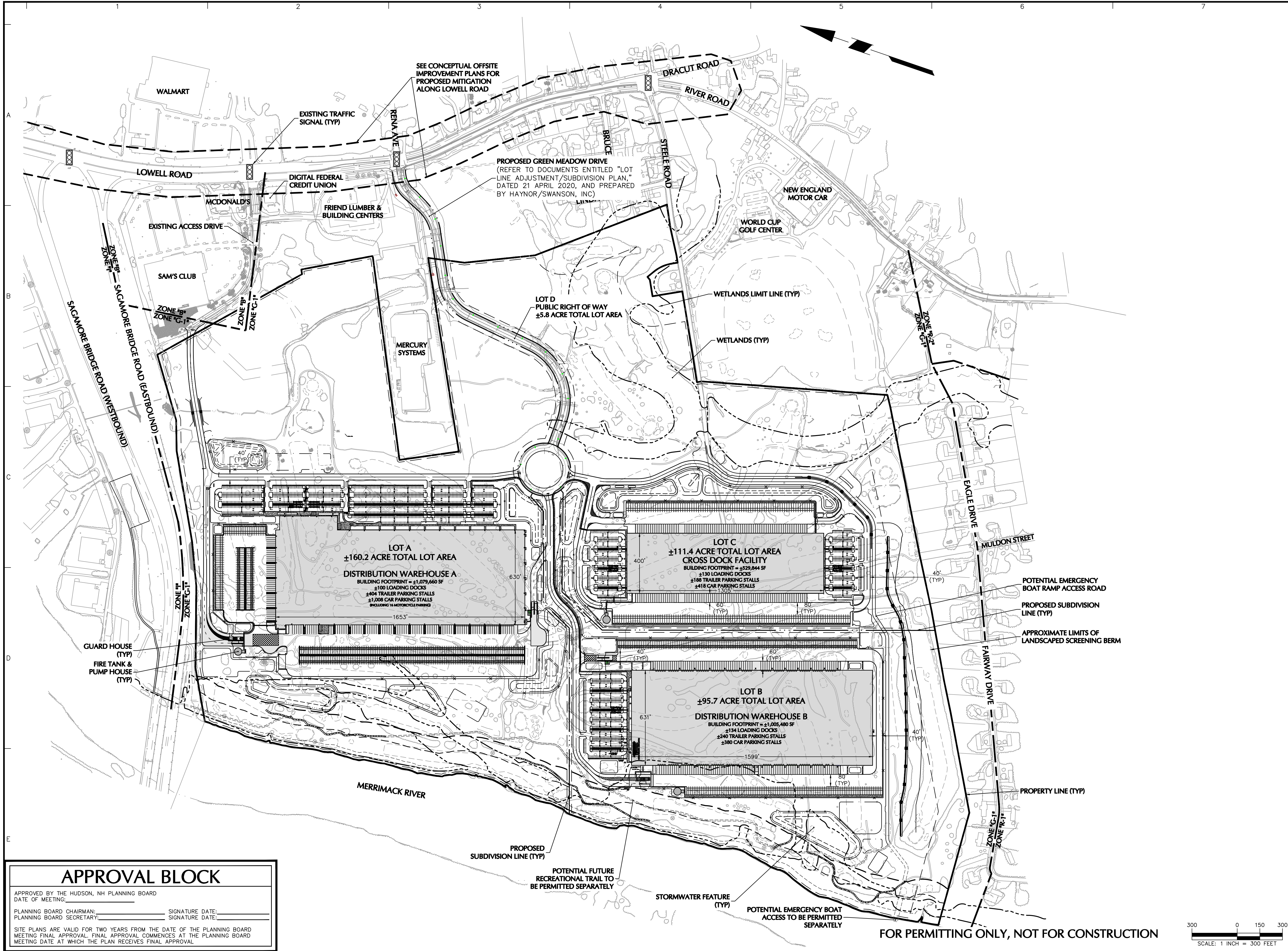
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Drawing Title
TRAFFIC MITIGATION MEASURES

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Figure
IMP-1
Sheet 1 of 17



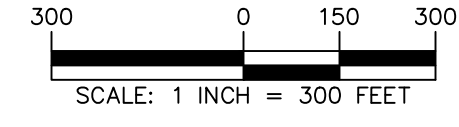
APPROVAL BLOCK

APPROVED BY THE HUDSON, NH PLANNING BOARD
 DATE OF MEETING: _____

PLANNING BOARD CHAIRMAN: _____ SIGNATURE DATE: _____
 PLANNING BOARD SECRETARY: _____ SIGNATURE DATE: _____

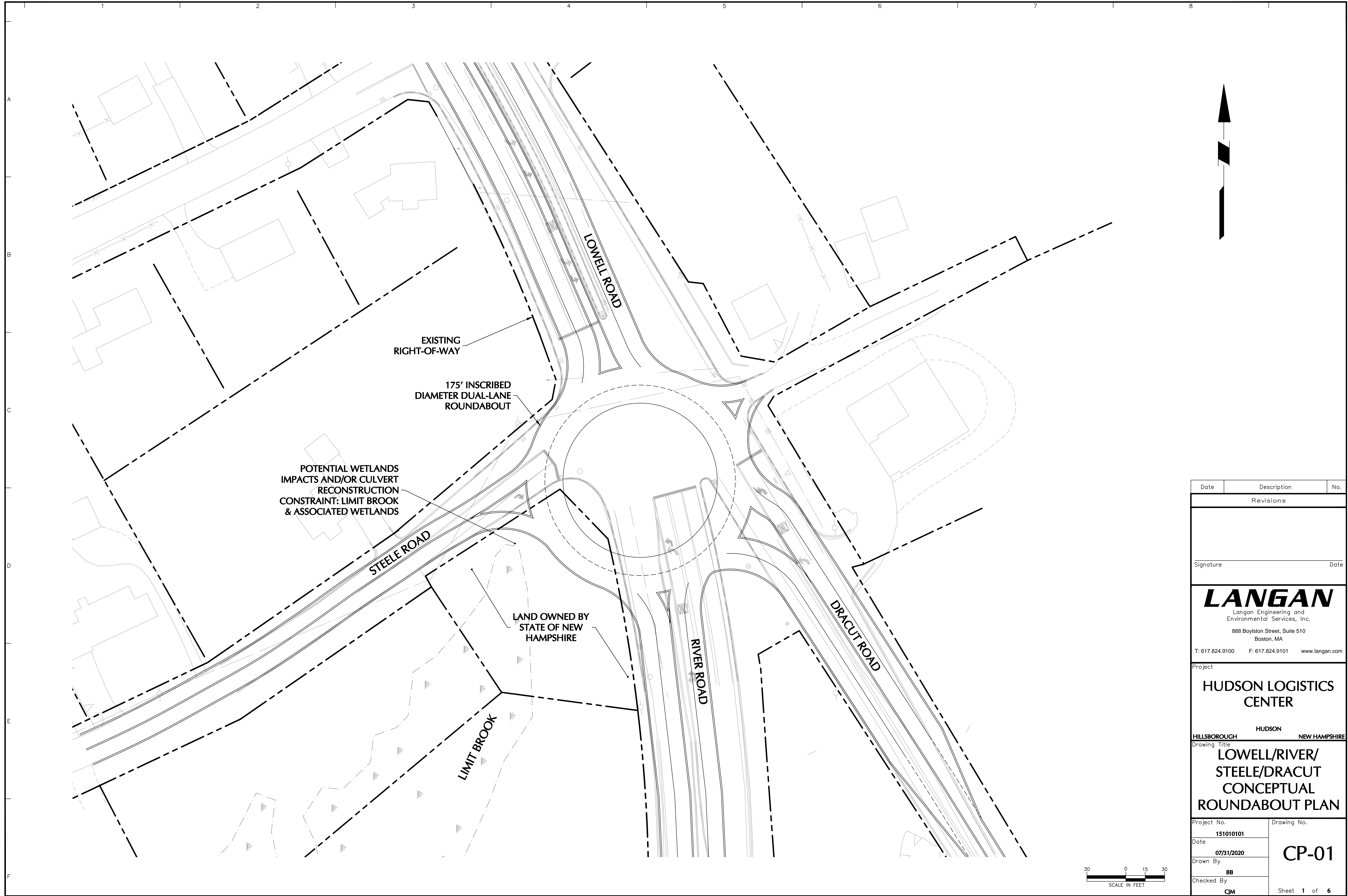
SITE PLANS ARE VALID FOR TWO YEARS FROM THE DATE OF THE PLANNING BOARD MEETING FINAL APPROVAL. FINAL APPROVAL COMMENCES AT THE PLANNING BOARD MEETING DATE AT WHICH THE PLAN RECEIVES FINAL APPROVAL.

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HUDSON LOGISTICS CENTER MAP No. 239, LOT No. 1 HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE		
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OVERALL TRAFFIC SITE PLAN		
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151010101	KS101	
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06-26-2020	CLR	
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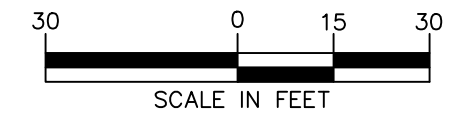


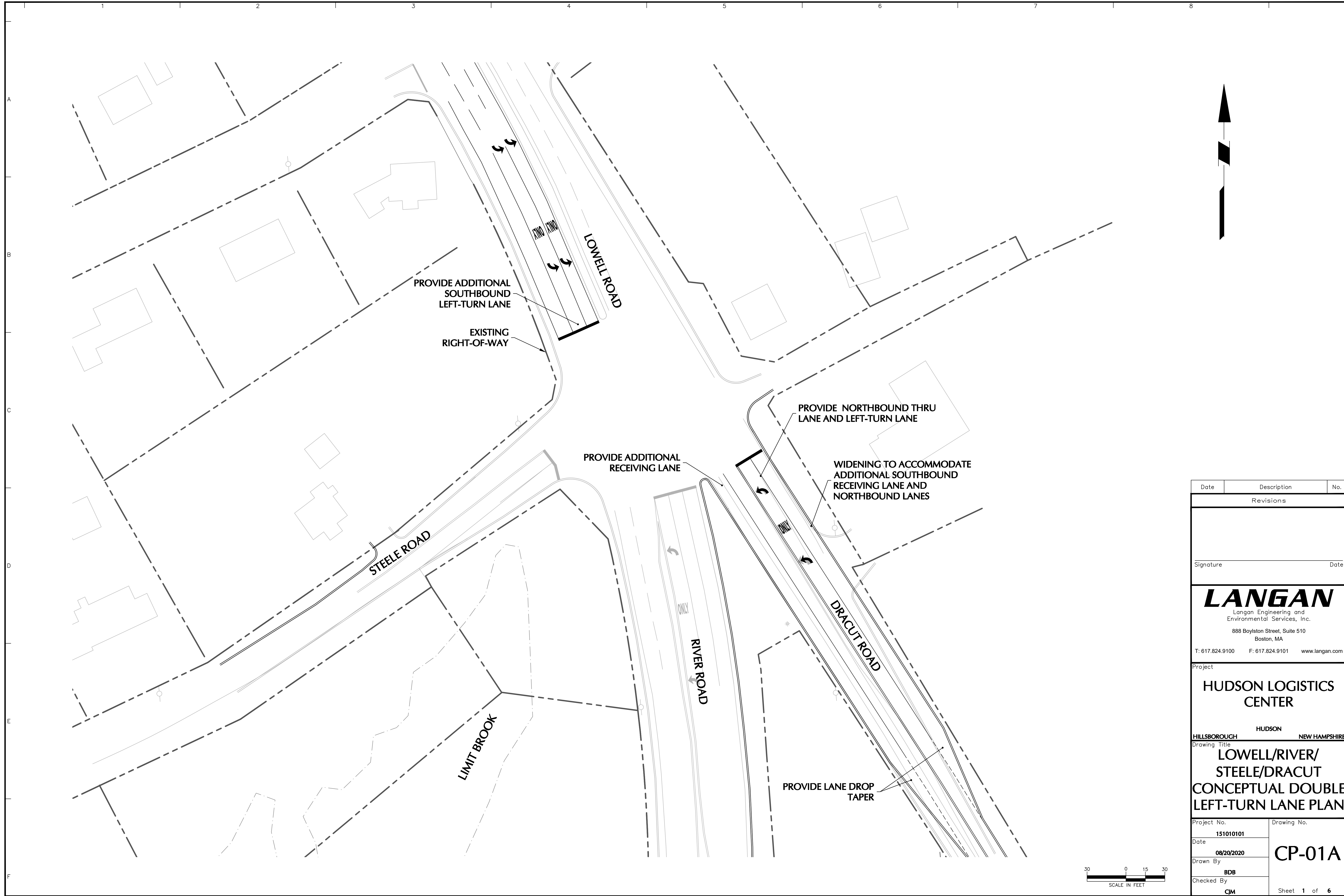
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LOWELL/RIVER/STEELE/DRACUT CONCEPTUAL ROUNDABOUT PLAN		
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151010101		CP-01
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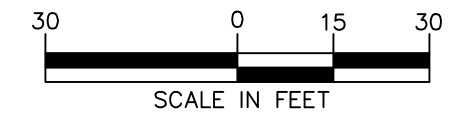
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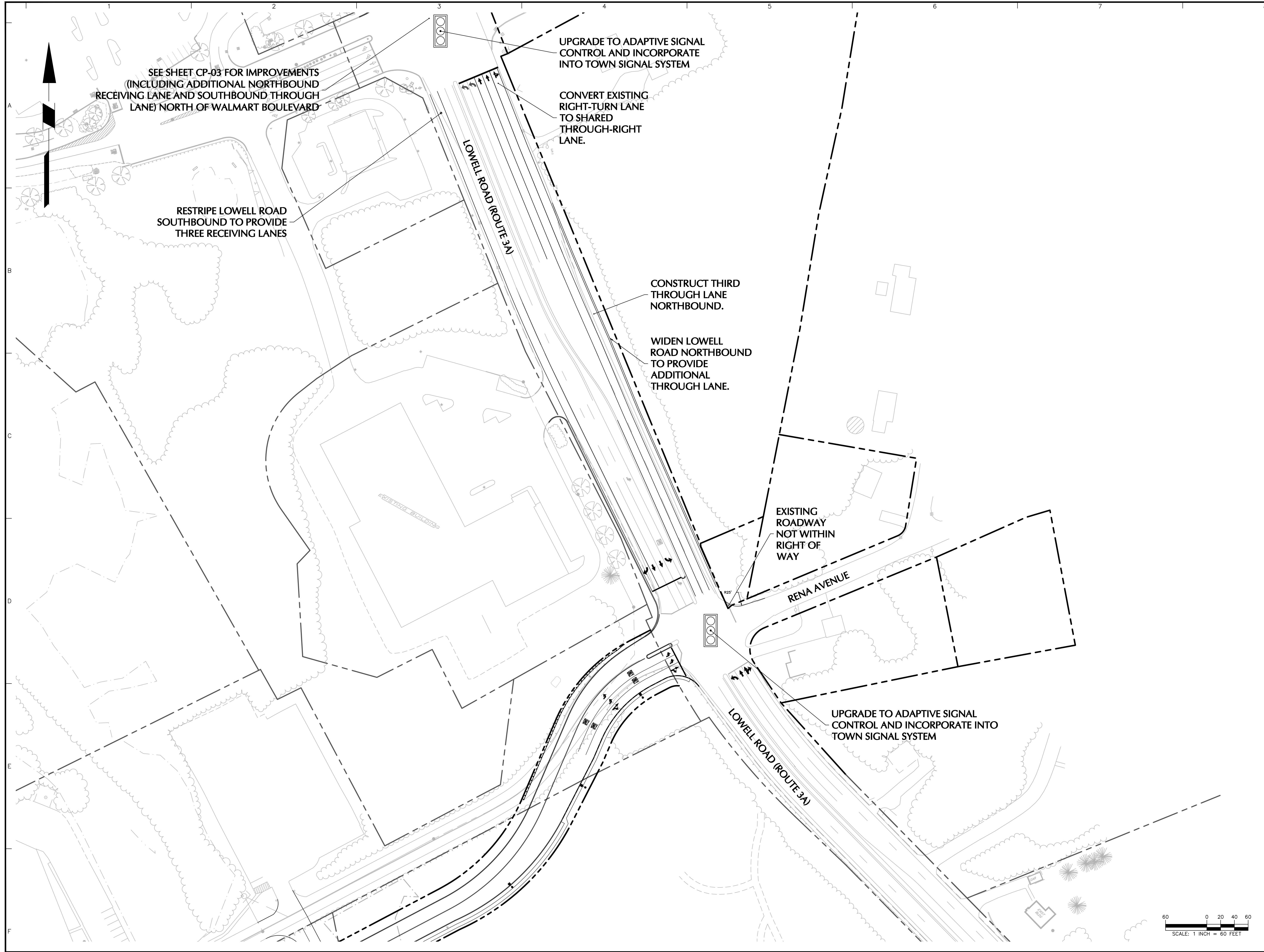
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Drawing Title
LOWELL/RIVER/STEELE/DRACUT CONCEPTUAL DOUBLE LEFT-TURN LANE PLAN

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Date 08/20/2020	1 of 6
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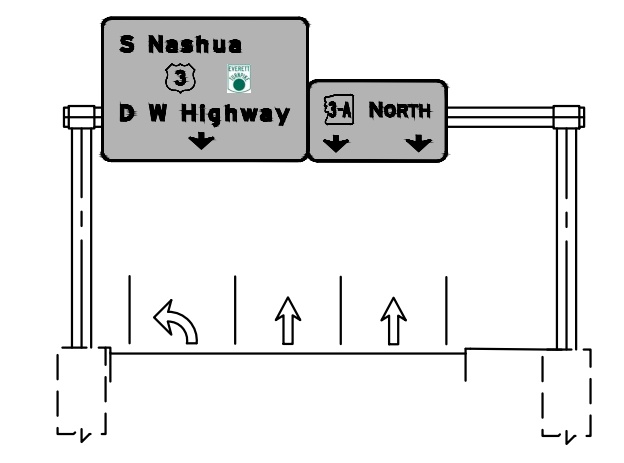
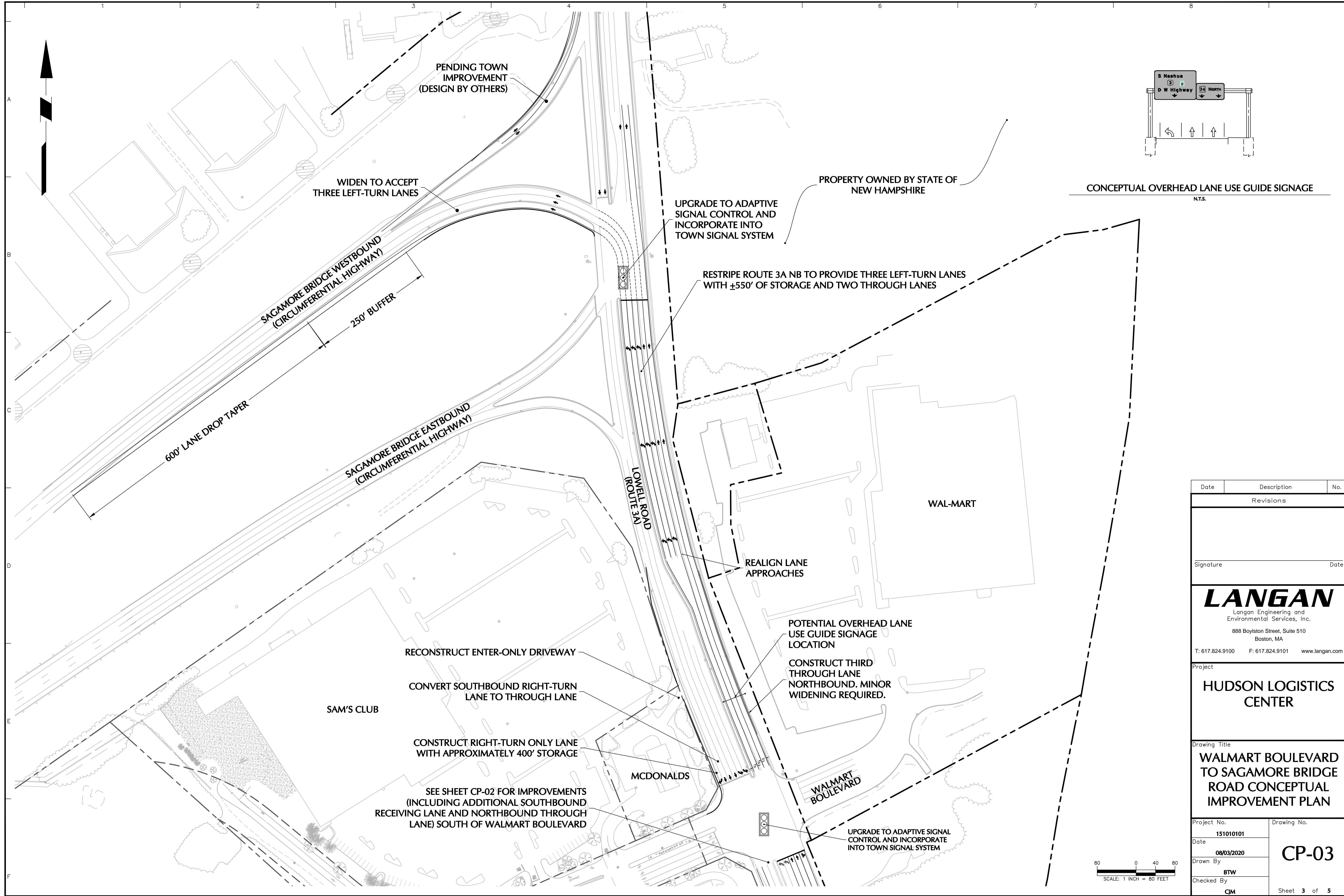
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RENA AVENUE TO WALMART BOULEVARD CONCEPTUAL IMPROVEMENTS PLAN

Project No. 151010101	Drawing No. CP-02
Date 08/03/2020	
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CONCEPTUAL OVERHEAD LANE USE GUIDE SIGNAGE
N.T.S.

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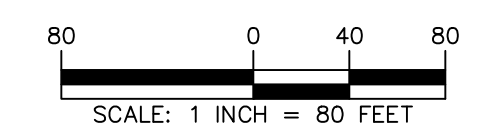
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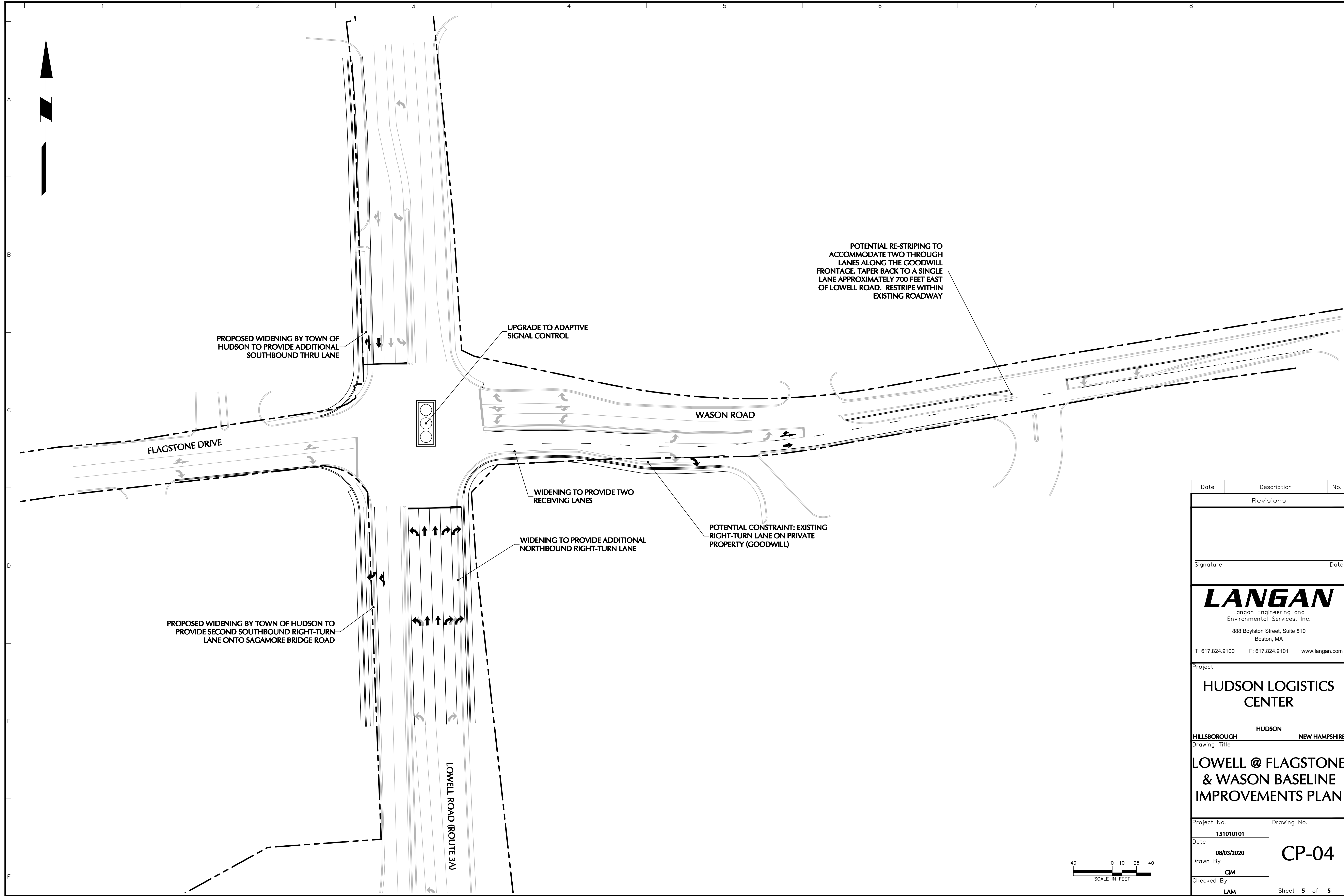
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Drawing Title
WALMART BOULEVARD TO SAGAMORE BRIDGE ROAD CONCEPTUAL IMPROVEMENT PLAN

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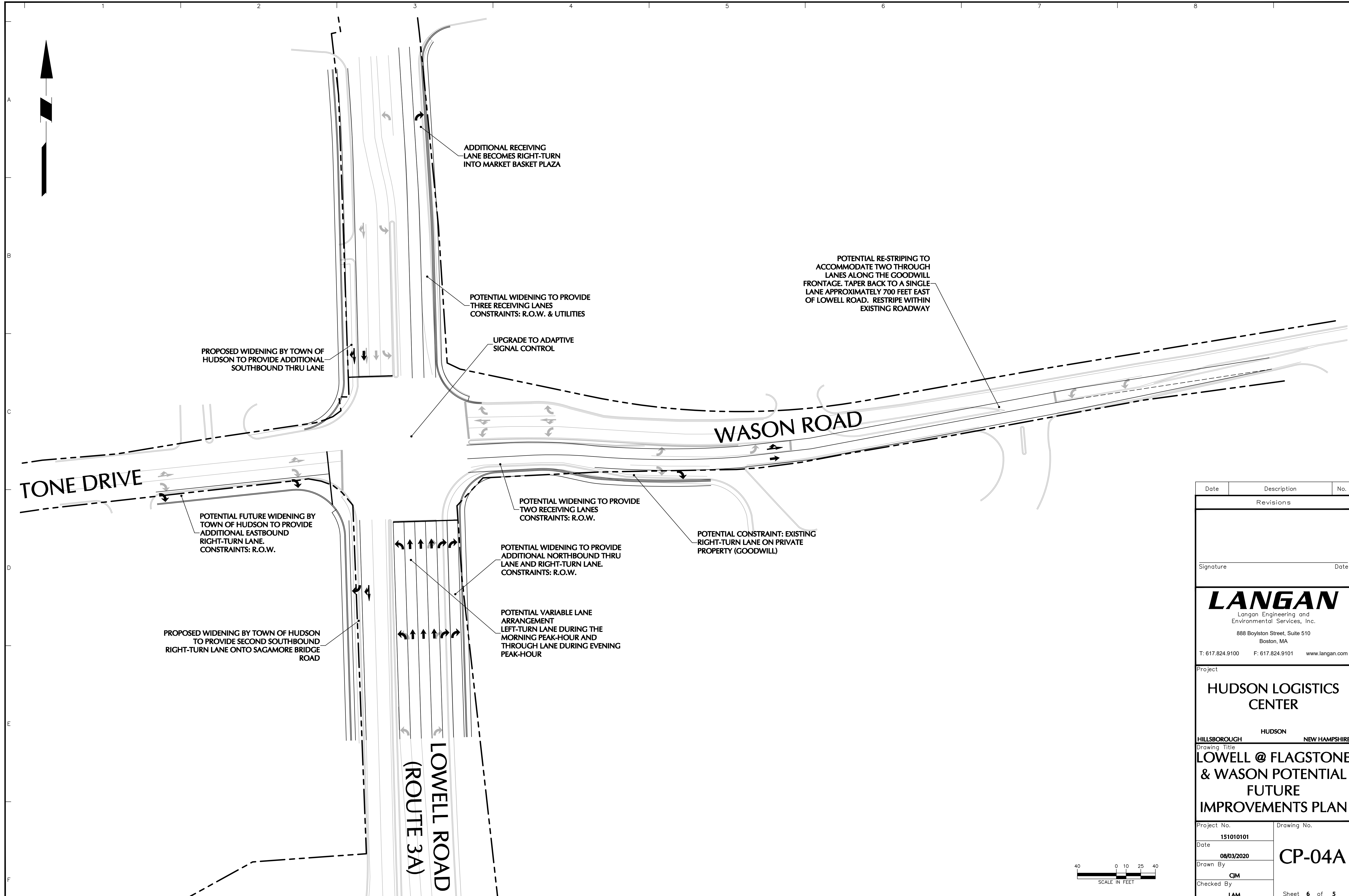
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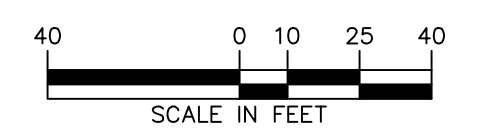
Drawing Title
LOWELL @ FLAGSTONE & WASON BASELINE IMPROVEMENTS PLAN

Project No. 151010101	Drawing No. CP-04
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LOWELL @ FLAGSTONE & WASON POTENTIAL FUTURE IMPROVEMENTS PLAN		
Project No.	Drawing No.	
151010101	CP-04A	
Date		
08/03/2020		
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Appendix B

SimTraffic Queueing Analysis – 2019 Existing Traffic Conditions

2019 Existing Weekday A.M.

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	5458	5283	5381	5384	5235	5346
Vehs Exited	5096	4943	5054	5040	4959	5020
Starting Vehs	486	536	495	461	558	507
Ending Vehs	848	876	822	805	834	836
Travel Distance (mi)	5408	5246	5391	5391	5239	5335
Travel Time (hr)	1064.3	1203.6	1089.2	1144.9	1157.1	1131.8
Total Delay (hr)	877.1	1023.1	903.2	958.4	976.0	947.6
Total Stops	14146	13682	13445	13879	13301	13692
Fuel Used (gal)	386.0	415.7	392.7	406.1	403.0	400.7

Interval #0 Information Seeding

Start Time	6:45
End Time	7:15
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	7:15
End Time	7:30
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1346	1330	1373	1373	1272	1338
Vehs Exited	1273	1262	1306	1287	1203	1265
Starting Vehs	486	536	495	461	558	507
Ending Vehs	559	604	562	547	627	573
Travel Distance (mi)	1363	1373	1424	1372	1349	1376
Travel Time (hr)	168.1	197.2	181.5	179.7	193.1	183.9
Total Delay (hr)	120.9	150.1	132.4	132.3	146.6	136.4
Total Stops	3132	3351	3399	3340	3155	3275
Fuel Used (gal)	75.0	82.9	80.0	78.6	80.6	79.4

Interval #2 Information R2

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1505	1392	1413	1456	1367	1426
Vehs Exited	1268	1265	1224	1255	1271	1258
Starting Vehs	559	604	562	547	627	573
Ending Vehs	796	731	751	748	723	745
Travel Distance (mi)	1383	1343	1297	1356	1334	1343
Travel Time (hr)	240.1	263.0	245.3	252.9	264.1	253.1
Total Delay (hr)	192.3	216.7	200.3	205.8	218.0	206.6
Total Stops	3520	3325	3203	3439	3384	3371
Fuel Used (gal)	91.3	96.9	90.9	94.4	95.9	93.9

Interval #3 Information R3

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1358	1323	1290	1279	1313	1317
Vehs Exited	1288	1202	1290	1311	1243	1266
Starting Vehs	796	731	751	748	723	745
Ending Vehs	866	852	751	716	793	796
Travel Distance (mi)	1334	1260	1361	1397	1275	1325
Travel Time (hr)	308.1	342.3	307.9	330.9	325.5	322.9
Total Delay (hr)	261.9	298.9	261.1	282.6	281.4	277.2
Total Stops	3598	3287	3267	3635	3151	3382
Fuel Used (gal)	105.5	111.1	106.1	112.9	107.9	108.7

Interval #4 Information R4

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1249	1238	1305	1276	1283	1267
Vehs Exited	1267	1214	1234	1187	1242	1227
Starting Vehs	866	852	751	716	793	796
Ending Vehs	848	876	822	805	834	836
Travel Distance (mi)	1328	1270	1309	1267	1281	1291
Travel Time (hr)	348.0	401.1	354.5	381.4	374.4	371.9
Total Delay (hr)	302.1	357.4	309.4	337.7	330.0	327.3
Total Stops	3896	3719	3576	3465	3611	3656
Fuel Used (gal)	114.3	124.9	115.8	120.2	118.6	118.7

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road

Movement	EB	EB	NB	NB	SB	SB	SB	NW	NW
Directions Served	L	R>	T	TR	L	T	TR	<L	R
Maximum Queue (ft)	15	61	195	154	335	98	124	50	546
Average Queue (ft)	1	5	97	42	196	31	51	2	512
95th Queue (ft)	10	28	161	124	313	82	102	26	535
Link Distance (ft)	531		614			1671	1671		487
Upstream Blk Time (%)									100
Queuing Penalty (veh)									0
Storage Bay Dist (ft)		50		300	775			100	
Storage Blk Time (%)		2	0						90
Queuing Penalty (veh)		0	0						1

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	23	50	46	41	138	95	51	231	223
Average Queue (ft)	2	5	17	10	32	19	8	53	45
95th Queue (ft)	15	27	42	33	102	66	31	168	147
Link Distance (ft)	460		503		1671	1671		893	893
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		50		300			350		
Storage Blk Time (%)		1							
Queuing Penalty (veh)		0							

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	100	103	32	85	24	45	32	117	34	69	312	279
Average Queue (ft)	49	30	2	33	4	8	6	51	8	37	199	129
95th Queue (ft)	89	73	16	77	19	31	24	97	31	68	301	236
Link Distance (ft)			336				381				893	893
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)											0	1
Queuing Penalty (veh)											0	0

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB
Directions Served	R	L	L	T	T	R
Maximum Queue (ft)	45	43	84	233	389	63
Average Queue (ft)	9	11	39	112	117	17
95th Queue (ft)	34	34	73	196	262	48
Link Distance (ft)				1093	1093	1093
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	175	350	350			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	L	L	T	T	T	T	R
Maximum Queue (ft)	409	380	308	322	92	119	898	916	250
Average Queue (ft)	273	223	178	194	33	41	260	879	250
95th Queue (ft)	379	337	265	278	71	85	790	968	251
Link Distance (ft)	873	873			1093	1093	890	890	
Upstream Blk Time (%)							0	7	
Queuing Penalty (veh)							2	62	
Storage Bay Dist (ft)			525	525					200
Storage Blk Time (%)								0	16
Queuing Penalty (veh)								0	26

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	LT	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	307	270	250	565	115	635	727	720	332	166	1477	1479
Average Queue (ft)	48	143	193	540	31	329	201	205	26	14	1427	1452
95th Queue (ft)	164	250	346	552	113	571	445	438	136	67	1533	1468
Link Distance (ft)	752			522			890	890			1440	1440
Upstream Blk Time (%)				87							32	60
Queuing Penalty (veh)				0							170	318
Storage Bay Dist (ft)		250	200		75	575			275	175		
Storage Blk Time (%)		3	1	88	0	3	2	5			8	
Queuing Penalty (veh)		1	2	282	0	11	5	10			1	

Intersection: 6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	23	36	30	43	170	180	176	118	1741	1757
Average Queue (ft)	6	8	2	8	75	26	28	7	1550	1565
95th Queue (ft)	20	27	15	32	144	106	110	72	2121	2121
Link Distance (ft)	434		326			1440	1440		1706	1706
Upstream Blk Time (%)									29	37
Queuing Penalty (veh)									161	204
Storage Bay Dist (ft)		100		100	225			225		
Storage Blk Time (%)					0				75	
Queuing Penalty (veh)					0				2	

Intersection: 7: Lowell Road (Route 3A) & Executive Drive

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB	B201	B201
Directions Served	LT	LT	R	L	T	TR	L	T	TR	T	T
Maximum Queue (ft)	108	565	105	350	351	305	200	1198	1210	1370	1366
Average Queue (ft)	29	492	49	186	108	69	142	797	815	557	563
95th Queue (ft)	72	662	128	351	268	189	256	1571	1563	1511	1521
Link Distance (ft)	444	530			1706	1706		1099	1099	1339	1339
Upstream Blk Time (%)		72						51	54	6	6
Queuing Penalty (veh)		0						319	340	37	37
Storage Bay Dist (ft)			80	350			150				
Storage Blk Time (%)		90	8	5			1	59			
Queuing Penalty (veh)		91	12	9			6	63			

Intersection: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	T	R	L	TR
Maximum Queue (ft)	191	76	31	26	28	222	5	154	485
Average Queue (ft)	39	43	6	5	3	68	0	16	255
95th Queue (ft)	135	81	23	19	16	191	4	74	521
Link Distance (ft)	554		215			1339			473
Upstream Blk Time (%)									5
Queuing Penalty (veh)									55
Storage Bay Dist (ft)		50		100	210		325	125	
Storage Blk Time (%)	3	28				1		0	19
Queuing Penalty (veh)	1	3				0		0	3

Intersection: 9: Lowell Road (Route 3A) & Pelham Road

Movement	WB	WB	NB	SB	SB
Directions Served	L	R	TR	L	T
Maximum Queue (ft)	496	125	399	199	988
Average Queue (ft)	308	68	137	84	431
95th Queue (ft)	569	155	325	183	983
Link Distance (ft)	477		473		1258
Upstream Blk Time (%)	24				1
Queuing Penalty (veh)	0				14
Storage Bay Dist (ft)		75		150	
Storage Blk Time (%)	67	4		2	26
Queuing Penalty (veh)	48	10		18	16

Zone Summary

Zone wide Queuing Penalty: 2341

2019 Existing Weekday P.M.

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:00	4:00	4:00	4:00	4:00	4:00
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	6503	6710	6707	6396	6633	6587
Vehs Exited	6213	6290	6430	6230	6185	6269
Starting Vehs	625	698	721	769	729	702
Ending Vehs	915	1118	998	935	1177	1028
Travel Distance (mi)	6141	6291	6496	6118	6220	6253
Travel Time (hr)	1415.2	1552.8	1253.2	1438.9	1475.3	1427.1
Total Delay (hr)	1202.0	1334.7	1027.8	1226.3	1259.2	1210.0
Total Stops	21919	22668	22771	21311	24415	22619
Fuel Used (gal)	500.9	535.6	471.7	503.7	514.6	505.3

Interval #0 Information Seeding

Start Time	4:00
End Time	4:30
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	4:30
End Time	4:45
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1669	1663	1522	1493	1640	1594
Vehs Exited	1528	1562	1553	1530	1549	1546
Starting Vehs	625	698	721	769	729	702
Ending Vehs	766	799	690	732	820	758
Travel Distance (mi)	1565	1618	1640	1499	1580	1580
Travel Time (hr)	225.3	279.9	235.3	243.1	248.4	246.4
Total Delay (hr)	171.0	224.0	178.4	191.0	193.5	191.6
Total Stops	5176	5243	5198	4939	5574	5226
Fuel Used (gal)	96.5	110.5	100.0	97.7	101.7	101.3

Interval #2 Information R2

Start Time	4:45
End Time	5:00
Total Time (min)	15
Volumes adjusted by PHF, Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1710	1744	1877	1679	1813	1763
Vehs Exited	1580	1592	1700	1607	1581	1610
Starting Vehs	766	799	690	732	820	758
Ending Vehs	896	951	867	804	1052	915
Travel Distance (mi)	1462	1565	1647	1540	1579	1559
Travel Time (hr)	331.6	350.2	288.0	323.6	343.7	327.4
Total Delay (hr)	280.7	295.9	230.9	269.8	288.8	273.2
Total Stops	5433	5636	5487	4977	6359	5576
Fuel Used (gal)	118.1	124.8	113.0	118.3	123.3	119.5

Interval #3 Information R3

Start Time	5:00
End Time	5:15
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1592	1644	1652	1543	1564	1597
Vehs Exited	1573	1547	1572	1549	1602	1569
Starting Vehs	896	951	867	804	1052	915
Ending Vehs	915	1048	947	798	1014	939
Travel Distance (mi)	1580	1535	1623	1485	1552	1555
Travel Time (hr)	404.1	430.4	343.0	399.6	414.5	398.3
Total Delay (hr)	349.3	376.9	286.7	348.2	360.5	344.3
Total Stops	5814	5731	5975	5433	6193	5824
Fuel Used (gal)	138.0	142.2	124.7	134.0	139.2	135.6

Interval #4 Information R4

Start Time	5:15
End Time	5:30
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1532	1659	1656	1681	1616	1624
Vehs Exited	1532	1589	1605	1544	1453	1543
Starting Vehs	915	1048	947	798	1014	939
Ending Vehs	915	1118	998	935	1177	1028
Travel Distance (mi)	1534	1572	1586	1595	1510	1559
Travel Time (hr)	454.2	492.3	386.9	472.6	468.7	455.0
Total Delay (hr)	401.1	437.9	331.8	417.3	416.3	400.9
Total Stops	5496	6058	6111	5962	6289	5982
Fuel Used (gal)	148.4	158.2	134.0	153.7	150.4	148.9

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road

Movement	EB	EB	NB	NB	SB	SB	SB	NW	NW
Directions Served	L	R>	T	TR	L	T	TR	<L	R
Maximum Queue (ft)	86	51	335	303	850	1696	1704	87	502
Average Queue (ft)	28	8	224	184	849	1595	1227	8	466
95th Queue (ft)	62	31	312	275	858	1914	2273	53	630
Link Distance (ft)	531		614			1671	1671		487
Upstream Blk Time (%)						35	9		83
Queuing Penalty (veh)						209	53		0
Storage Bay Dist (ft)		50		300	775			100	
Storage Blk Time (%)	9	0	16	0	90	11			86
Queuing Penalty (veh)	0	0	46	0	166	90			3

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	115	69	41	22	631	593	375	838	843
Average Queue (ft)	44	18	13	2	301	273	85	478	434
95th Queue (ft)	91	56	37	12	956	925	320	1050	1049
Link Distance (ft)	460		503		1671	1671		893	893
Upstream Blk Time (%)								6	4
Queuing Penalty (veh)								35	23
Storage Bay Dist (ft)		50		300			350		
Storage Blk Time (%)	15	5			22		0	49	
Queuing Penalty (veh)	3	3			0		0	11	

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	187	200	351	161	94	166	396	250	80	475	834	844
Average Queue (ft)	150	159	219	66	43	40	325	234	26	275	676	633
95th Queue (ft)	227	253	490	148	85	107	559	295	68	628	1079	1076
Link Distance (ft)			336				381				893	893
Upstream Blk Time (%)			49				59				12	7
Queuing Penalty (veh)			0				0				75	47
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)	45	52		2				75			58	37
Queuing Penalty (veh)	57	66		5				80			55	27

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB
Directions Served	R	L	L	T	T	R
Maximum Queue (ft)	250	173	344	956	1064	1157
Average Queue (ft)	63	85	139	288	288	126
95th Queue (ft)	207	150	317	742	808	579
Link Distance (ft)				1093	1093	1093
Upstream Blk Time (%)				0	0	1
Queuing Penalty (veh)				0	0	4
Storage Bay Dist (ft)	175	350	350			
Storage Blk Time (%)				9		
Queuing Penalty (veh)				26		

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	L	L	T	T	T	T	R
Maximum Queue (ft)	891	918	909	575	625	1116	1101	896	912	250
Average Queue (ft)	855	889	889	569	616	974	380	339	894	246
95th Queue (ft)	939	900	898	605	669	1450	1068	861	928	295
Link Distance (ft)	873	873	873			1093	1093	890	890	
Upstream Blk Time (%)	12	55	49			5	0	0	10	
Queuing Penalty (veh)	0	0	0			42	3	1	78	
Storage Bay Dist (ft)				525	525					200
Storage Blk Time (%)				39	57	3			1	16
Queuing Penalty (veh)				118	171	29			7	33

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	LT	R	L	T	T	R	L	T	TR
Maximum Queue (ft)	780	275	250	538	115	152	391	419	388	248	1462	1460
Average Queue (ft)	662	273	193	509	38	63	234	257	185	69	1243	1270
95th Queue (ft)	981	289	340	632	125	126	369	404	397	172	1826	1796
Link Distance (ft)	752			522			890	890			1440	1440
Upstream Blk Time (%)	56			65							32	37
Queuing Penalty (veh)	0			0							144	164
Storage Bay Dist (ft)		250	200		75	575			275	175		
Storage Blk Time (%)	0	80	6	84				7	4	0	22	
Queuing Penalty (veh)	0	64	14	197				65	21	2	15	

Intersection: 6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	201	120	40	34	53	303	333	124	1105	1160
Average Queue (ft)	50	62	8	6	11	92	104	8	519	543
95th Queue (ft)	170	126	31	25	37	240	266	74	1363	1384
Link Distance (ft)	434		326			1440	1440		1706	1706
Upstream Blk Time (%)									1	2
Queuing Penalty (veh)									4	7
Storage Bay Dist (ft)		100		100	225			225		
Storage Blk Time (%)	0	16				1			42	
Queuing Penalty (veh)	0	4				0			2	

Intersection: 7: Lowell Road (Route 3A) & Executive Drive

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	246	131	424	105	87	338	306	45	218	234
Average Queue (ft)	98	6	213	20	33	128	94	9	79	93
95th Queue (ft)	186	58	516	74	78	276	232	33	170	190
Link Distance (ft)	444		530			1706	1706		1099	1099
Upstream Blk Time (%)			14							
Queuing Penalty (veh)			0							
Storage Bay Dist (ft)		225		80	350			150		
Storage Blk Time (%)	1	0	59	1		0			1	
Queuing Penalty (veh)	1	0	13	0		0			0	

Intersection: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Movement	EB	EB	WB	WB	NB	NB	NB	B201	B201	SB	SB
Directions Served	LT	R	LT	R	L	T	R	T		L	TR
Maximum Queue (ft)	111	72	140	113	222	905	252	353	108	153	411
Average Queue (ft)	15	23	31	30	35	317	12	29	4	44	86
95th Queue (ft)	57	60	92	79	128	749	107	237	79	99	267
Link Distance (ft)	554		215				1339		1099	1099	473
Upstream Blk Time (%)			1								0
Queuing Penalty (veh)			0								0
Storage Bay Dist (ft)		50		100	210		325			125	
Storage Blk Time (%)	2	11	2	2		13				0	4
Queuing Penalty (veh)	0	1	1	1		6				1	2

Intersection: 9: Lowell Road (Route 3A) & Pelham Road

Movement	WB	WB	NB	SB	SB
Directions Served	L	R	TR	L	T
Maximum Queue (ft)	390	125	489	200	1273
Average Queue (ft)	167	99	314	194	1213
95th Queue (ft)	333	147	582	206	1466
Link Distance (ft)	477		473		1258
Upstream Blk Time (%)	0		5		38
Queuing Penalty (veh)	0		55		282
Storage Bay Dist (ft)		75		150	
Storage Blk Time (%)	29	43		91	3
Queuing Penalty (veh)	41	36		569	3

Zone Summary

Zone wide Queuing Penalty: 3285

Appendix C

SimTraffic Queueing Analysis – 2022 & 2032 No-Build Traffic Conditions

2022 No-Build Weekday A.M.

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	5671	5514	5694	5435	5909	5647
Vehs Exited	5575	5412	5660	5363	5911	5584
Starting Vehs	463	483	473	476	468	467
Ending Vehs	559	585	507	548	466	533
Travel Distance (mi)	5869	5767	5989	5688	6201	5903
Travel Time (hr)	942.9	1033.7	961.5	1011.6	836.2	957.2
Total Delay (hr)	740.2	834.9	754.7	814.8	621.7	753.3
Total Stops	13390	13409	14423	13149	12914	13462
Fuel Used (gal)	380.6	396.8	388.6	390.2	362.5	383.7

Interval #0 Information Seeding

Start Time	6:45
End Time	7:15
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	7:15
End Time	7:30
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1402	1424	1464	1417	1423	1423
Vehs Exited	1390	1387	1416	1420	1427	1407
Starting Vehs	463	483	473	476	468	467
Ending Vehs	475	520	521	473	464	489
Travel Distance (mi)	1458	1460	1528	1463	1527	1487
Travel Time (hr)	149.7	169.4	169.7	162.3	148.2	159.9
Total Delay (hr)	99.3	119.2	116.9	111.6	95.4	108.5
Total Stops	3145	3419	3463	3161	2876	3208
Fuel Used (gal)	74.7	79.3	81.6	77.9	75.1	77.7

Interval #2 Information R2

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1571	1402	1576	1445	1618	1522
Vehs Exited	1440	1379	1491	1339	1546	1440
Starting Vehs	475	520	521	473	464	489
Ending Vehs	606	543	606	579	536	572
Travel Distance (mi)	1514	1460	1560	1426	1605	1513
Travel Time (hr)	216.7	228.5	213.0	223.2	203.7	217.0
Total Delay (hr)	164.5	178.0	158.9	173.7	148.3	164.7
Total Stops	3466	3324	3723	3466	3586	3514
Fuel Used (gal)	92.1	92.9	92.4	90.7	91.4	91.9

Interval #3 Information R3

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1390	1325	1351	1329	1429	1364
Vehs Exited	1414	1307	1385	1372	1475	1389
Starting Vehs	606	543	606	579	536	572
Ending Vehs	582	561	572	536	490	547
Travel Distance (mi)	1465	1422	1461	1427	1548	1465
Travel Time (hr)	276.5	296.7	269.9	284.6	241.1	273.8
Total Delay (hr)	225.9	247.6	219.5	235.3	187.5	223.2
Total Stops	3379	3426	3647	3342	3197	3399
Fuel Used (gal)	104.8	107.6	102.9	105.0	97.9	103.6

Interval #4 Information R4

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1308	1363	1303	1244	1439	1332
Vehs Exited	1331	1339	1368	1232	1463	1347
Starting Vehs	582	561	572	536	490	547
Ending Vehs	559	585	507	548	466	533
Travel Distance (mi)	1433	1425	1440	1372	1521	1438
Travel Time (hr)	300.0	339.1	308.9	341.5	243.2	306.5
Total Delay (hr)	250.5	290.1	259.4	294.2	190.6	257.0
Total Stops	3400	3240	3590	3180	3255	3333
Fuel Used (gal)	109.0	117.1	111.7	116.6	98.1	110.5

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road

Movement	EB	EB	NB	NB	SB	SB	SB	NW
Directions Served	L	R>	T	TR	L	T	TR	R
Maximum Queue (ft)	20	42	222	174	348	102	132	544
Average Queue (ft)	2	4	107	56	208	38	58	513
95th Queue (ft)	12	21	183	146	331	89	116	535
Link Distance (ft)	531		614			1671	1671	487
Upstream Blk Time (%)								100
Queuing Penalty (veh)								0
Storage Bay Dist (ft)		50		300	775			
Storage Blk Time (%)		0	0					90
Queuing Penalty (veh)		0	1					1

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	21	49	55	50	149	111	47	243	228
Average Queue (ft)	2	4	21	12	27	13	6	58	49
95th Queue (ft)	14	26	46	38	100	61	28	181	164
Link Distance (ft)	460		503		1671	1671		893	893
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		50		300			350		
Storage Blk Time (%)	0	1							
Queuing Penalty (veh)	0	0							

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	86	77	24	90	29	45	28	114	46	73	379	333
Average Queue (ft)	45	24	4	31	4	12	4	51	7	37	211	141
95th Queue (ft)	82	60	17	70	19	37	18	93	29	71	339	271
Link Distance (ft)			336				381				893	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)											1	1
Queuing Penalty (veh)											1	0

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB
Directions Served	R	L	L	T	T	R
Maximum Queue (ft)	48	59	92	230	364	54
Average Queue (ft)	8	13	42	97	99	12
95th Queue (ft)	31	43	75	191	253	39
Link Distance (ft)				1093	1093	1093
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	175	350	350			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	L	L	T	T	T	T	R	R
Maximum Queue (ft)	835	835	738	314	321	130	128	210	905	931	250
Average Queue (ft)	694	674	536	217	184	53	38	95	471	773	129
95th Queue (ft)	1139	1157	1252	287	296	118	93	165	1042	1222	333
Link Distance (ft)	873	873	873				1093	1093	890	890	890
Upstream Blk Time (%)	41	40	34						1	6	
Queuing Penalty (veh)	0	0	0						4	40	
Storage Bay Dist (ft)				525	525						200
Storage Blk Time (%)											0
Queuing Penalty (veh)											0

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	LT	R	L	T	T	R	L	T	T
Maximum Queue (ft)	548	275	250	556	115	750	911	927	134	152	868	947
Average Queue (ft)	202	200	203	538	35	697	744	587	20	22	440	575
95th Queue (ft)	510	315	340	545	119	885	1208	1162	83	87	861	960
Link Distance (ft)	740			522			890	890			1440	1440
Upstream Blk Time (%)	1			85			23	1				
Queuing Penalty (veh)	0			0			150	8				
Storage Bay Dist (ft)		250	200		75	575			275	175		
Storage Blk Time (%)	0	18	1	86	0	77	4	1			12	23
Queuing Penalty (veh)	1	18	3	290	0	300	12	2			2	81

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	SB
Directions Served	TR
Maximum Queue (ft)	350
Average Queue (ft)	339
95th Queue (ft)	382
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	46
Queuing Penalty (veh)	158

Intersection: 6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	36	36	40	30	139	117	142	14	182	271
Average Queue (ft)	5	5	4	7	59	20	26	1	46	88
95th Queue (ft)	23	22	21	27	118	77	91	8	121	204
Link Distance (ft)	434		326			1440	1440		1706	1706
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)		100		100	225			225		
Storage Blk Time (%)									0	
Queuing Penalty (veh)									0	

Intersection: 7: Lowell Road (Route 3A) & Executive Drive

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	89	576	105	263	197	177	185	311	321
Average Queue (ft)	32	509	71	124	92	62	81	160	197
95th Queue (ft)	75	679	143	223	179	144	160	265	296
Link Distance (ft)	444	530			1706	1706		1099	1099
Upstream Blk Time (%)		79							
Queuing Penalty (veh)		0							
Storage Bay Dist (ft)			80	350			150		
Storage Blk Time (%)		79	14				0	7	
Queuing Penalty (veh)		80	24				2	7	

Intersection: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Movement	EB	EB	WB	WB	NB	NB	NB	B201	SB	SB
Directions Served	LT	R	LT	R	L	T	R	T	L	TR
Maximum Queue (ft)	137	72	26	18	28	364	5	4	160	468
Average Queue (ft)	24	39	3	4	2	62	0	0	20	206
95th Queue (ft)	90	77	15	16	14	188	4	3	77	447
Link Distance (ft)	554		215			1339		1099		473
Upstream Blk Time (%)										1
Queuing Penalty (veh)										19
Storage Bay Dist (ft)		50		100	210		325		125	
Storage Blk Time (%)	1	20				1				10
Queuing Penalty (veh)	0	2				0				2

Intersection: 9: Lowell Road (Route 3A) & Pelham Road

Movement	WB	WB	NB	SB	SB
Directions Served	L	R	TR	L	T
Maximum Queue (ft)	503	125	384	193	876
Average Queue (ft)	373	65	145	84	387
95th Queue (ft)	595	153	323	171	758
Link Distance (ft)	477		473		1258
Upstream Blk Time (%)	25		0		
Queuing Penalty (veh)	0		0		
Storage Bay Dist (ft)		75		150	
Storage Blk Time (%)	77	5		2	20
Queuing Penalty (veh)	56	12		18	13

Zone Summary

Zone wide Queuing Penalty: 1308

2022 No-Build Weekday P.M.

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:00	4:00	4:00	4:00	4:00	4:00
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	7032	6845	6709	6731	6917	6844
Vehs Exited	6760	6619	6441	6545	6691	6612
Starting Vehs	673	604	709	616	648	647
Ending Vehs	945	830	977	802	874	883
Travel Distance (mi)	6625	6444	6240	6440	6512	6452
Travel Time (hr)	1422.9	1398.6	1395.9	1277.6	1435.7	1386.1
Total Delay (hr)	1192.0	1173.9	1178.8	1053.4	1209.5	1161.5
Total Stops	24073	20426	23236	20584	22216	22099
Fuel Used (gal)	517.0	504.8	498.3	477.0	516.3	502.7

Interval #0 Information Seeding

Start Time	4:00
End Time	4:30
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	4:30
End Time	4:45
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1718	1714	1657	1638	1677	1676
Vehs Exited	1615	1641	1593	1627	1621	1620
Starting Vehs	673	604	709	616	648	647
Ending Vehs	776	677	773	627	704	707
Travel Distance (mi)	1611	1620	1558	1588	1624	1600
Travel Time (hr)	249.8	243.5	231.7	211.2	240.1	235.3
Total Delay (hr)	193.7	186.9	177.5	156.0	183.3	179.5
Total Stops	4957	4755	5544	4069	4602	4781
Fuel Used (gal)	103.9	102.3	97.7	94.0	101.2	99.8

Interval #2 Information R2

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1882	1782	1820	1873	1830	1836
Vehs Exited	1756	1706	1644	1644	1706	1692
Starting Vehs	776	677	773	627	704	707
Ending Vehs	902	753	949	856	828	855
Travel Distance (mi)	1632	1604	1606	1671	1574	1617
Travel Time (hr)	333.2	317.4	312.3	284.4	339.1	317.3
Total Delay (hr)	276.0	261.4	256.4	226.1	284.4	260.9
Total Stops	5895	5025	5856	5337	5338	5492
Fuel Used (gal)	123.8	119.0	117.6	112.1	123.4	119.2

Interval #3 Information R3

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1778	1620	1565	1711	1737	1680
Vehs Exited	1724	1578	1636	1690	1751	1679
Starting Vehs	902	753	949	856	828	855
Ending Vehs	956	795	878	877	814	861
Travel Distance (mi)	1819	1550	1543	1664	1649	1645
Travel Time (hr)	393.9	396.1	393.3	359.4	408.9	390.3
Total Delay (hr)	330.8	342.3	339.7	301.5	351.6	333.2
Total Stops	6941	4932	5866	6077	6217	6005
Fuel Used (gal)	142.0	135.3	134.6	129.9	141.7	136.7

Interval #4 Information R4

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1654	1729	1667	1509	1673	1646
Vehs Exited	1665	1694	1568	1584	1613	1625
Starting Vehs	956	795	878	877	814	861
Ending Vehs	945	830	977	802	874	883
Travel Distance (mi)	1562	1671	1533	1517	1665	1590
Travel Time (hr)	446.0	441.6	458.6	422.5	447.6	443.3
Total Delay (hr)	391.4	383.3	405.2	369.8	390.1	388.0
Total Stops	6280	5714	5970	5101	6059	5826
Fuel Used (gal)	147.3	148.2	148.4	140.9	150.1	147.0

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road

Movement	EB	EB	NB	NB	SB	SB	SB	NW	NW
Directions Served	L	R>	T	TR	L	T	TR	<L	R
Maximum Queue (ft)	93	54	408	352	850	1700	1702	124	502
Average Queue (ft)	34	5	249	203	841	1608	1427	15	488
95th Queue (ft)	78	27	366	313	926	2128	2270	80	584
Link Distance (ft)	531		614			1671	1671		487
Upstream Blk Time (%)						42	11		91
Queuing Penalty (veh)						262	71		0
Storage Bay Dist (ft)		50		300	775			100	
Storage Blk Time (%)	15	0	24	0	87	11			91
Queuing Penalty (veh)	1	0	71	0	169	92			4

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	118	72	58	166	904	885	314	829	831
Average Queue (ft)	50	22	12	10	444	410	88	561	516
95th Queue (ft)	101	62	38	99	1215	1197	331	1109	1119
Link Distance (ft)	460		503		1671	1671		893	893
Upstream Blk Time (%)						0		12	7
Queuing Penalty (veh)						0		73	43
Storage Bay Dist (ft)		50		300			350		
Storage Blk Time (%)	20	7			35		0	55	
Queuing Penalty (veh)	3	4			1		0	13	

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	187	200	351	195	111	129	396	250	83	475	924	922
Average Queue (ft)	147	141	189	85	44	42	336	238	23	312	761	729
95th Queue (ft)	218	254	463	188	95	99	555	294	64	654	1164	1177
Link Distance (ft)			336				381				893	893
Upstream Blk Time (%)			37				69				18	12
Queuing Penalty (veh)			0				0				120	77
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)	34	36	0	15	1	0		79			63	39
Queuing Penalty (veh)	42	44	0	37	3	0		84			60	29

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB
Directions Served	R	L	L	T	T	R
Maximum Queue (ft)	250	158	394	1060	1071	1188
Average Queue (ft)	71	81	218	416	459	276
95th Queue (ft)	217	141	484	991	1102	1009
Link Distance (ft)				1093	1093	1093
Upstream Blk Time (%)				1	0	4
Queuing Penalty (veh)				3	2	24
Storage Bay Dist (ft)	175	350	350			
Storage Blk Time (%)				30		
Queuing Penalty (veh)				91		

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	L	L	T	T	T	T	R	R
Maximum Queue (ft)	892	918	911	575	625	1112	1118	266	390	874	199
Average Queue (ft)	850	891	889	560	604	912	367	147	140	103	12
95th Queue (ft)	959	905	898	629	693	1479	1042	234	280	536	102
Link Distance (ft)	873	873	873			1093	1093	890	890	890	
Upstream Blk Time (%)	12	55	49			5	1		0	0	
Queuing Penalty (veh)	0	0	0			40	8		0	1	
Storage Bay Dist (ft)				525	525						200
Storage Blk Time (%)				36	53	7					
Queuing Penalty (veh)				114	166	70					

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	LT	R	L	T	T	R	L	T	T
Maximum Queue (ft)	686	275	250	481	115	187	381	493	400	187	403	503
Average Queue (ft)	293	224	143	284	23	93	224	258	209	61	117	203
95th Queue (ft)	648	327	299	455	93	165	356	423	403	134	275	423
Link Distance (ft)	740			522			890	890			1440	1440
Upstream Blk Time (%)	2			1								
Queuing Penalty (veh)	0			0								
Storage Bay Dist (ft)		250	200		75	575			275	175		
Storage Blk Time (%)	1	24	0	52				6	5	0	4	1
Queuing Penalty (veh)	4	36	1	127				58	27	1	3	4

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	SB
Directions Served	TR
Maximum Queue (ft)	348
Average Queue (ft)	221
95th Queue (ft)	365
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	6
Queuing Penalty (veh)	17

Intersection: 6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	47	105	41	30	59	290	320	27	162	231
Average Queue (ft)	14	35	9	5	14	79	91	3	45	70
95th Queue (ft)	37	76	31	22	48	212	233	16	123	167
Link Distance (ft)	434		326			1440	1440		1706	1706
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)		100		100	225			225		
Storage Blk Time (%)		0				1			0	
Queuing Penalty (veh)		0				0			0	

Intersection: 7: Lowell Road (Route 3A) & Executive Drive

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB	B201
Directions Served	LT	R	LT	R	L	T	TR	L	T	TR	T
Maximum Queue (ft)	232	59	423	105	211	379	338	48	194	201	8
Average Queue (ft)	100	4	190	23	42	142	107	12	75	92	0
95th Queue (ft)	175	42	447	84	124	314	263	37	159	183	6
Link Distance (ft)	444		530			1706	1706		1099	1099	1339
Upstream Blk Time (%)			7								
Queuing Penalty (veh)			0								
Storage Bay Dist (ft)		225		80	350			150			
Storage Blk Time (%)	0	0	62	1		0			1		
Queuing Penalty (veh)	0	0	14	0		0			0		

Intersection: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Movement	EB	EB	WB	WB	NB	NB	NB	B201	B201	SB	SB
Directions Served	LT	R	LT	R	L	T	R	T		L	TR
Maximum Queue (ft)	94	72	101	102	256	1099	325	92	11	204	370
Average Queue (ft)	20	28	28	29	39	440	23	9	0	57	97
95th Queue (ft)	68	67	73	77	149	989	165	101	8	131	290
Link Distance (ft)	554		215			1339		1099	1099		473
Upstream Blk Time (%)						1					0
Queuing Penalty (veh)						10					1
Storage Bay Dist (ft)		50		100	210		325			125	
Storage Blk Time (%)	3	14	1	2		18				1	5
Queuing Penalty (veh)	1	2	0	1		8				9	3

Intersection: 9: Lowell Road (Route 3A) & Pelham Road

Movement	WB	WB	NB	SB	SB
Directions Served	L	R	TR	L	T
Maximum Queue (ft)	474	125	490	200	1273
Average Queue (ft)	237	105	314	194	1248
95th Queue (ft)	473	151	613	205	1378
Link Distance (ft)	477		473		1258
Upstream Blk Time (%)	5		6		45
Queuing Penalty (veh)	0		71		345
Storage Bay Dist (ft)		75		150	
Storage Blk Time (%)	40	46		90	3
Queuing Penalty (veh)	59	40		592	3

Zone Summary

Zone wide Queuing Penalty: 3256

2032 No-Build Weekday A.M.

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	5587	5526	5694	5606	5680	5617
Vehs Exited	5500	5470	5647	5603	5660	5575
Starting Vehs	492	545	515	579	561	535
Ending Vehs	579	601	562	582	581	580
Travel Distance (mi)	5874	5870	6047	5934	5982	5942
Travel Time (hr)	1629.0	1485.9	1352.2	1475.3	1467.2	1481.9
Total Delay (hr)	1426.1	1283.9	1143.8	1270.6	1261.1	1277.1
Total Stops	14426	14227	14681	14104	14514	14391
Fuel Used (gal)	537.2	504.2	478.7	504.5	502.6	505.5

Interval #0 Information Seeding

Start Time	6:45
End Time	7:15
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	7:15
End Time	7:30
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1419	1459	1475	1390	1428	1432
Vehs Exited	1353	1444	1479	1400	1431	1422
Starting Vehs	492	545	515	579	561	535
Ending Vehs	558	560	511	569	558	551
Travel Distance (mi)	1478	1512	1567	1463	1511	1506
Travel Time (hr)	268.5	225.1	222.0	237.3	239.6	238.5
Total Delay (hr)	217.5	173.0	167.9	187.1	187.7	186.6
Total Stops	3597	3248	3345	3515	3451	3430
Fuel Used (gal)	102.7	93.4	94.0	95.5	96.8	96.5

Interval #2 Information R2

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1504	1316	1618	1474	1677	1518
Vehs Exited	1440	1277	1442	1469	1569	1441
Starting Vehs	558	560	511	569	558	551
Ending Vehs	622	599	687	574	666	628
Travel Distance (mi)	1516	1387	1575	1539	1648	1533
Travel Time (hr)	363.1	320.4	291.7	327.7	320.9	324.8
Total Delay (hr)	310.7	272.7	237.4	274.4	264.4	271.9
Total Stops	3822	3455	3919	3595	4110	3780
Fuel Used (gal)	125.5	111.7	111.0	118.1	119.6	117.2

Interval #3 Information R3

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1357	1323	1344	1370	1262	1327
Vehs Exited	1396	1299	1438	1353	1316	1359
Starting Vehs	622	599	687	574	666	628
Ending Vehs	583	623	593	591	612	601
Travel Distance (mi)	1466	1427	1517	1402	1420	1446
Travel Time (hr)	459.4	436.2	383.9	416.7	421.3	423.5
Total Delay (hr)	408.8	387.0	331.7	368.3	372.3	373.6
Total Stops	3471	3660	3916	3428	3728	3637
Fuel Used (gal)	146.3	139.6	130.9	135.1	135.8	137.5

Interval #4 Information R4

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1307	1428	1257	1372	1313	1334
Vehs Exited	1311	1450	1288	1381	1344	1355
Starting Vehs	583	623	593	591	612	601
Ending Vehs	579	601	562	582	581	580
Travel Distance (mi)	1415	1543	1388	1531	1403	1456
Travel Time (hr)	538.0	504.2	454.6	493.6	485.4	495.2
Total Delay (hr)	489.1	451.2	406.9	440.8	436.8	445.0
Total Stops	3536	3864	3501	3566	3225	3535
Fuel Used (gal)	162.7	159.5	142.8	155.9	150.3	154.3

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road

Movement	EB	EB	NB	NB	SB	SB	SB	NW	NW
Directions Served	L	R>	T	TR	L	T	TR	<L	R
Maximum Queue (ft)	20	34	240	214	378	122	138	74	546
Average Queue (ft)	2	4	113	66	208	35	51	4	512
95th Queue (ft)	12	22	197	165	353	95	111	38	535
Link Distance (ft)	531		614			1671	1671		487
Upstream Blk Time (%)									100
Queuing Penalty (veh)									0
Storage Bay Dist (ft)		50		300	775			100	
Storage Blk Time (%)	0	1	1						90
Queuing Penalty (veh)	0	0	2						1

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	23	43	49	49	153	108	47	225	202
Average Queue (ft)	3	4	20	9	36	19	8	49	42
95th Queue (ft)	15	23	44	33	113	69	32	157	138
Link Distance (ft)	460		503		1671	1671		893	893
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		50		300			350		
Storage Blk Time (%)		0							
Queuing Penalty (veh)		0							

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	100	62	24	101	29	42	37	107	45	157	405	368
Average Queue (ft)	44	24	3	34	5	9	4	45	7	38	218	129
95th Queue (ft)	84	57	14	78	23	32	20	86	30	107	353	275
Link Distance (ft)			336				381				893	893
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)											1	1
Queuing Penalty (veh)											1	0

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB
Directions Served	R	L	L	T	T	R
Maximum Queue (ft)	56	48	79	388	373	59
Average Queue (ft)	7	9	36	95	97	10
95th Queue (ft)	31	31	70	198	257	35
Link Distance (ft)				1093	1093	1093
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	175	350	350			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	L	L	T	T	T	T	R	R
Maximum Queue (ft)	915	920	921	441	446	365	165	628	932	928	250
Average Queue (ft)	859	855	783	268	243	84	47	109	557	804	126
95th Queue (ft)	1023	1042	1263	407	425	230	118	309	1136	1186	330
Link Distance (ft)	873	873	873			1093	1093	890	890	890	
Upstream Blk Time (%)	59	61	50						1	8	
Queuing Penalty (veh)	0	0	0						8	58	
Storage Bay Dist (ft)				525	525						200
Storage Blk Time (%)				0	0					0	
Queuing Penalty (veh)				0	0					0	

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	LT	R	L	T	T	R	L	T	T
Maximum Queue (ft)	649	275	250	564	115	750	916	940	267	209	1055	1144
Average Queue (ft)	278	230	199	539	27	745	865	674	28	25	603	712
95th Queue (ft)	624	322	342	551	104	782	1068	1177	128	104	1221	1289
Link Distance (ft)	740			522			890	890			1440	1440
Upstream Blk Time (%)	2			88			27	2			0	0
Queuing Penalty (veh)	0			0			190	11			0	1
Storage Bay Dist (ft)		250	200		75	575			275	175		
Storage Blk Time (%)	2	28	2	89	0	92	5	4			16	30
Queuing Penalty (veh)	5	28	10	331	0	399	15	8			3	116

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	SB
Directions Served	TR
Maximum Queue (ft)	350
Average Queue (ft)	336
95th Queue (ft)	394
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	53
Queuing Penalty (veh)	200

Intersection: 6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	31	46	21	46	162	155	161	14	278	296
Average Queue (ft)	6	8	2	8	63	26	26	1	64	97
95th Queue (ft)	23	28	13	31	129	97	96	10	175	231
Link Distance (ft)	434		326			1440	1440		1706	1706
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)		100		100	225			225		
Storage Blk Time (%)					0	0			0	
Queuing Penalty (veh)					0	0			0	

Intersection: 7: Lowell Road (Route 3A) & Executive Drive

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	85	574	105	224	238	201	184	313	351
Average Queue (ft)	35	539	63	122	86	61	72	183	218
95th Queue (ft)	75	586	137	227	195	156	146	294	325
Link Distance (ft)	444	530			1706	1706		1099	1099
Upstream Blk Time (%)		87							
Queuing Penalty (veh)		0							
Storage Bay Dist (ft)			80	350			150		
Storage Blk Time (%)		86	13				1	8	
Queuing Penalty (veh)		87	22				3	9	

Intersection: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	T	R	L	TR
Maximum Queue (ft)	134	75	27	26	17	305	5	101	479
Average Queue (ft)	24	45	4	5	3	89	0	17	209
95th Queue (ft)	91	80	19	19	16	244	4	60	446
Link Distance (ft)	554		215			1339			473
Upstream Blk Time (%)									1
Queuing Penalty (veh)									17
Storage Bay Dist (ft)		50		100	210		325	125	
Storage Blk Time (%)	3	28				2		1	9
Queuing Penalty (veh)	2	3				0		7	2

Intersection: 9: Lowell Road (Route 3A) & Pelham Road

Movement	WB	WB	NB	SB	SB
Directions Served	L	R	TR	L	T
Maximum Queue (ft)	525	125	474	199	1004
Average Queue (ft)	477	67	138	102	450
95th Queue (ft)	580	162	340	196	903
Link Distance (ft)	477		473		1258
Upstream Blk Time (%)	81		0		0
Queuing Penalty (veh)	0		2		0
Storage Bay Dist (ft)		75		150	
Storage Blk Time (%)	83	3		5	21
Queuing Penalty (veh)	67	8		57	15

Zone Summary

Zone wide Queuing Penalty: 1689

2032 No-Build Weekday P.M.

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:00	4:00	4:00	4:00	4:00	4:00
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	6972	6758	6852	6897	6791	6851
Vehs Exited	6720	6494	6660	6682	6583	6630
Starting Vehs	756	733	664	754	767	733
Ending Vehs	1008	997	856	969	975	956
Travel Distance (mi)	6503	6334	6357	6556	6246	6399
Travel Time (hr)	2080.8	2093.4	2031.4	1908.1	2078.4	2038.4
Total Delay (hr)	1854.8	1873.5	1810.3	1679.9	1860.9	1815.9
Total Stops	24451	22944	20777	25096	23474	23351
Fuel Used (gal)	662.5	661.8	648.8	624.0	654.4	650.3

Interval #0 Information Seeding

Start Time	4:00
End Time	4:30
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	4:30
End Time	4:45
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1718	1685	1730	1811	1807	1748
Vehs Exited	1671	1599	1623	1733	1697	1664
Starting Vehs	756	733	664	754	767	733
Ending Vehs	803	819	771	832	877	815
Travel Distance (mi)	1628	1592	1621	1690	1654	1637
Travel Time (hr)	333.2	328.4	335.9	311.6	336.7	329.2
Total Delay (hr)	276.9	273.1	279.7	252.8	279.1	272.3
Total Stops	5592	5120	4845	5652	5881	5415
Fuel Used (gal)	123.6	121.9	123.7	120.3	124.7	122.8

Interval #2 Information R2

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1877	1775	1735	1914	1844	1826
Vehs Exited	1658	1609	1709	1715	1678	1675
Starting Vehs	803	819	771	832	877	815
Ending Vehs	1022	985	797	1031	1043	972
Travel Distance (mi)	1671	1545	1598	1759	1645	1644
Travel Time (hr)	463.4	466.5	446.0	413.9	464.2	450.8
Total Delay (hr)	405.4	412.8	390.5	352.8	406.8	393.6
Total Stops	6098	5820	5260	6763	6114	6010
Fuel Used (gal)	153.4	151.5	148.3	144.8	153.1	150.2

Interval #3 Information R3

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1680	1601	1705	1520	1596	1615
Vehs Exited	1681	1631	1666	1632	1640	1651
Starting Vehs	1022	985	797	1031	1043	972
Ending Vehs	1021	955	836	919	999	940
Travel Distance (mi)	1571	1592	1565	1507	1502	1547
Travel Time (hr)	601.4	600.0	573.7	532.5	589.9	579.5
Total Delay (hr)	546.4	544.9	519.3	480.0	537.7	525.7
Total Stops	6427	6048	5241	6296	5996	5998
Fuel Used (gal)	182.6	182.9	177.0	165.2	178.0	177.1

Interval #4 Information R4

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1697	1697	1682	1652	1544	1658
Vehs Exited	1710	1655	1662	1602	1568	1639
Starting Vehs	1021	955	836	919	999	940
Ending Vehs	1008	997	856	969	975	956
Travel Distance (mi)	1633	1605	1573	1600	1444	1571
Travel Time (hr)	682.8	698.6	675.8	650.0	687.6	679.0
Total Delay (hr)	626.1	642.7	620.8	594.3	637.4	624.2
Total Stops	6334	5956	5431	6385	5483	5915
Fuel Used (gal)	202.9	205.5	199.9	193.7	198.7	200.1

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road

Movement	EB	EB	NB	NB	SB	SB	SB	NW	NW
Directions Served	L	R>	T	TR	L	T	TR	<L	R
Maximum Queue (ft)	97	54	588	400	850	1677	1590	124	502
Average Queue (ft)	33	5	392	301	849	1607	1312	11	502
95th Queue (ft)	76	29	637	439	857	1947	2345	66	502
Link Distance (ft)	531		614			1671	1671		487
Upstream Blk Time (%)			9			43	14		100
Queuing Penalty (veh)			0			293	95		0
Storage Bay Dist (ft)		50		300	775			100	
Storage Blk Time (%)	14	0	54	15	91	10			92
Queuing Penalty (veh)	1	0	175	46	193	95			5

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	118	71	49	155	1575	1565	315	798	790
Average Queue (ft)	41	17	15	6	949	924	119	651	614
95th Queue (ft)	92	50	41	79	1948	1955	391	1213	1196
Link Distance (ft)	460		503		1671	1671		893	893
Upstream Blk Time (%)					0	0		16	8
Queuing Penalty (veh)					2	3		107	56
Storage Bay Dist (ft)		50		300			350		
Storage Blk Time (%)	14	6			67		0	72	
Queuing Penalty (veh)	2	3			1		0	19	

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	187	200	351	180	100	194	396	250	81	475	920	934
Average Queue (ft)	177	187	311	58	41	36	369	244	21	349	880	869
95th Queue (ft)	211	244	484	146	85	102	518	280	58	677	1024	1039
Link Distance (ft)			336				381				893	893
Upstream Blk Time (%)			77				81				28	19
Queuing Penalty (veh)			0				0				206	139
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)	68	76		3				88			77	42
Queuing Penalty (veh)	86	96		8				94			73	31

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB
Directions Served	R	L	L	T	T	R
Maximum Queue (ft)	250	158	396	1082	1088	1180
Average Queue (ft)	80	72	228	518	508	402
95th Queue (ft)	232	137	516	1198	1224	1250
Link Distance (ft)				1093	1093	1093
Upstream Blk Time (%)				2	3	11
Queuing Penalty (veh)				14	20	63
Storage Bay Dist (ft)	175	350	350			
Storage Blk Time (%)				38		
Queuing Penalty (veh)				116		

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	L	L	T	T	T	T	R	R
Maximum Queue (ft)	895	918	913	575	625	1113	1124	290	635	907	250
Average Queue (ft)	819	889	890	574	624	1079	529	162	167	116	25
95th Queue (ft)	1059	899	901	577	629	1248	1265	253	371	564	147
Link Distance (ft)	873	873	873			1093	1093	890	890	890	
Upstream Blk Time (%)	14	60	54			9	1		0	0	
Queuing Penalty (veh)	0	0	0			83	6		0	2	
Storage Bay Dist (ft)				525	525						200
Storage Blk Time (%)				47	64	9				0	0
Queuing Penalty (veh)				163	221	102				0	0

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	LT	R	L	T	T	R	L	T	T
Maximum Queue (ft)	771	275	250	538	115	215	421	555	400	206	482	547
Average Queue (ft)	596	262	181	377	18	96	251	278	230	68	140	218
95th Queue (ft)	976	320	321	570	84	175	387	457	425	140	325	437
Link Distance (ft)	740			522			890	890			1440	1440
Upstream Blk Time (%)	32			8								
Queuing Penalty (veh)	0			0								
Storage Bay Dist (ft)		250	200		75	575			275	175		
Storage Blk Time (%)	4	55	1	59				9	7	0	5	3
Queuing Penalty (veh)	19	86	3	161				102	37	0	4	8

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	SB
Directions Served	TR
Maximum Queue (ft)	350
Average Queue (ft)	228
95th Queue (ft)	361
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	6
Queuing Penalty (veh)	19

Intersection: 6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	88	108	39	34	48	302	320	28	178	213
Average Queue (ft)	15	39	10	5	10	83	95	3	59	78
95th Queue (ft)	49	81	33	24	37	212	239	17	141	174
Link Distance (ft)	434		326			1440	1440		1706	1706
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)		100		100	225			225		
Storage Blk Time (%)		0				1				
Queuing Penalty (veh)		0				0				

Intersection: 7: Lowell Road (Route 3A) & Executive Drive

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	192	72	363	105	114	302	288	43	203	236
Average Queue (ft)	102	4	143	22	36	129	95	9	70	82
95th Queue (ft)	175	32	339	81	81	267	232	32	152	172
Link Distance (ft)	444		530			1706	1706		1099	1099
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)		225		80	350			150		
Storage Blk Time (%)	0		54	0		0			1	
Queuing Penalty (veh)	0		12	0		0			0	

Intersection: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Movement	EB	EB	WB	WB	NB	NB	NB	B201	B201	SB	SB
Directions Served	LT	R	LT	R	L	T	R	T		L	TR
Maximum Queue (ft)	91	68	118	116	259	1212	245	568	219	150	358
Average Queue (ft)	15	26	31	34	34	556	10	99	50	42	58
95th Queue (ft)	57	64	81	86	137	1268	106	578	363	104	208
Link Distance (ft)	554		215			1339		1099	1099		473
Upstream Blk Time (%)						6		1	0		0
Queuing Penalty (veh)						77		4	0		0
Storage Bay Dist (ft)		50		100	210		325			125	
Storage Blk Time (%)	3	13	1	1		22				2	2
Queuing Penalty (veh)	1	1	1	0		9				12	1

Intersection: 9: Lowell Road (Route 3A) & Pelham Road

Movement	WB	WB	NB	SB	SB
Directions Served	L	R	TR	L	T
Maximum Queue (ft)	443	125	488	200	1274
Average Queue (ft)	220	107	332	195	1230
95th Queue (ft)	425	146	640	204	1481
Link Distance (ft)	477		473		1258
Upstream Blk Time (%)	2		6		47
Queuing Penalty (veh)	0		87		398
Storage Bay Dist (ft)		75		150	
Storage Blk Time (%)	33	52		91	1
Queuing Penalty (veh)	52	49		657	2

Zone Summary

Zone wide Queuing Penalty: 4418

Appendix D

SimTraffic Queueing Analysis – 2022 & 2032 Build Traffic Conditions

2022 Build Weekday A.M.

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	5981	6157	5816	5789	6180	5981
Vehs Exited	5793	6113	5774	5601	5966	5849
Starting Vehs	523	578	564	522	491	529
Ending Vehs	711	622	606	710	705	669
Travel Distance (mi)	6054	6268	6040	5895	6214	6094
Travel Time (hr)	1207.3	1109.8	1086.9	1231.1	1057.1	1138.4
Total Delay (hr)	997.2	891.6	877.3	1026.0	840.9	926.6
Total Stops	19336	17930	16173	17113	17285	17561
Fuel Used (gal)	448.8	429.4	417.8	449.2	416.4	432.3

Interval #0 Information Seeding

Start Time	6:45
End Time	7:15
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	7:15
End Time	7:30
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1516	1478	1530	1486	1524	1506
Vehs Exited	1413	1497	1535	1446	1446	1466
Starting Vehs	523	578	564	522	491	529
Ending Vehs	626	559	559	562	569	577
Travel Distance (mi)	1499	1570	1618	1521	1544	1550
Travel Time (hr)	183.8	208.6	198.4	183.0	169.2	188.6
Total Delay (hr)	131.7	154.1	142.1	130.2	115.4	134.7
Total Stops	4369	4025	4090	4208	3484	4037
Fuel Used (gal)	84.9	91.4	90.1	84.8	81.6	86.6

Interval #2 Information R2

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1668	1642	1672	1520	1705	1641
Vehs Exited	1516	1536	1593	1373	1578	1521
Starting Vehs	626	559	559	562	569	577
Ending Vehs	778	665	638	709	696	691
Travel Distance (mi)	1561	1598	1661	1457	1646	1585
Travel Time (hr)	275.6	264.0	233.9	254.6	237.9	253.2
Total Delay (hr)	221.5	208.3	176.4	204.0	180.7	198.2
Total Stops	5036	4696	4661	4224	4523	4627
Fuel Used (gal)	107.1	105.5	100.8	100.3	100.9	102.9

Interval #3 Information R3

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1377	1492	1312	1336	1494	1402
Vehs Exited	1443	1543	1409	1394	1483	1454
Starting Vehs	778	665	638	709	696	691
Ending Vehs	712	614	541	651	707	645
Travel Distance (mi)	1487	1549	1445	1449	1532	1492
Travel Time (hr)	351.9	303.1	284.2	362.1	302.8	320.8
Total Delay (hr)	300.4	249.3	234.2	311.7	249.6	269.0
Total Stops	5133	4578	3753	4312	4703	4495
Fuel Used (gal)	123.2	112.8	105.5	123.8	112.5	115.6

Interval #4 Information R4

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1420	1545	1302	1447	1457	1430
Vehs Exited	1421	1537	1237	1388	1459	1405
Starting Vehs	712	614	541	651	707	645
Ending Vehs	711	622	606	710	705	669
Travel Distance (mi)	1507	1552	1315	1468	1492	1467
Travel Time (hr)	396.0	334.1	370.4	431.4	347.2	375.8
Total Delay (hr)	343.5	279.9	324.5	380.2	295.2	324.7
Total Stops	4798	4631	3669	4369	4575	4404
Fuel Used (gal)	133.6	119.8	121.4	140.3	121.5	127.3

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road

Movement	EB	EB	NB	NB	SB	SB	SB	NW	NW
Directions Served	L	R>	T	TR	L	T	TR	<L	R
Maximum Queue (ft)	25	40	204	171	289	96	110	28	544
Average Queue (ft)	2	4	110	58	147	18	29	1	515
95th Queue (ft)	11	22	186	149	257	65	86	18	538
Link Distance (ft)	531		614			1671	1671		487
Upstream Blk Time (%)									100
Queuing Penalty (veh)									0
Storage Bay Dist (ft)		50		300	775			100	
Storage Blk Time (%)		1	0						89
Queuing Penalty (veh)		0	1						1

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	278	76	70	314	627	562	42	402	403
Average Queue (ft)	126	25	21	53	246	202	6	176	181
95th Queue (ft)	234	77	52	204	648	585	27	333	341
Link Distance (ft)	460		503		1671	1671		893	893
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		50		300			350		
Storage Blk Time (%)	43	5			21			1	
Queuing Penalty (veh)	11	7			9			0	

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	165	148	94	85	23	54	28	129	73	396	843	836
Average Queue (ft)	94	63	42	35	3	12	4	53	14	196	609	542
95th Queue (ft)	177	168	224	75	18	39	19	102	47	543	1077	1073
Link Distance (ft)			336				381				893	893
Upstream Blk Time (%)			10								16	4
Queuing Penalty (veh)			0								98	27
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)	10	11	0								48	10
Queuing Penalty (veh)	6	7	0								37	3

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB
Directions Served	R	L	L	T	T	R
Maximum Queue (ft)	210	50	83	415	589	289
Average Queue (ft)	27	13	39	122	146	42
95th Queue (ft)	126	38	70	244	357	188
Link Distance (ft)				1093	1093	1093
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	175	350	350			
Storage Blk Time (%)				0		
Queuing Penalty (veh)				0		

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	L	L	T	T	T	T	R	R
Maximum Queue (ft)	905	914	912	575	625	1122	1094	801	949	940	250
Average Queue (ft)	695	677	456	565	608	940	504	132	474	802	131
95th Queue (ft)	1081	1095	1188	615	686	1425	1279	406	1074	1197	336
Link Distance (ft)	873	873	873			1093	1093	890	890	890	
Upstream Blk Time (%)	29	32	27			7	1	0	2	8	
Queuing Penalty (veh)	0	0	0			51	8	0	12	53	
Storage Bay Dist (ft)				525	525						200
Storage Blk Time (%)				34	60	13					0
Queuing Penalty (veh)				62	111	130					0

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	LT	R	L	T	T	R	L	T	T
Maximum Queue (ft)	520	274	250	558	115	750	920	934	122	117	1051	1143
Average Queue (ft)	183	202	205	539	31	736	831	643	18	16	485	607
95th Queue (ft)	478	311	332	550	112	809	1127	1187	83	61	907	970
Link Distance (ft)	740			522			890	890			1440	1440
Upstream Blk Time (%)	3			86			24	2				
Queuing Penalty (veh)	0			0			160	10				
Storage Bay Dist (ft)		250	200		75	575			275	175		
Storage Blk Time (%)	1	14	1	88	0	89	6	4		0	13	22
Queuing Penalty (veh)	3	14	3	295	0	363	19	8		0	2	85

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	SB
Directions Served	TR
Maximum Queue (ft)	350
Average Queue (ft)	338
95th Queue (ft)	393
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	48
Queuing Penalty (veh)	177

Intersection: 6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	39	48	21	34	158	148	157	18	272	322
Average Queue (ft)	8	6	3	3	61	20	22	1	65	98
95th Queue (ft)	28	25	16	19	133	78	83	9	192	240
Link Distance (ft)	434		326			1440	1440		1706	1706
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)		100		100	225			225		
Storage Blk Time (%)						0			0	
Queuing Penalty (veh)						0			0	

Intersection: 7: Lowell Road (Route 3A) & Executive Drive

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	103	569	105	287	302	200	199	324	340
Average Queue (ft)	29	490	63	129	98	67	92	189	218
95th Queue (ft)	75	685	137	256	221	162	182	302	315
Link Distance (ft)	444	530			1706	1706		1099	1099
Upstream Blk Time (%)		67							
Queuing Penalty (veh)		0							
Storage Bay Dist (ft)			80	350			150		
Storage Blk Time (%)		81	11	1			1	9	
Queuing Penalty (veh)		83	18	2			6	10	

Intersection: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	T	L	TR
Maximum Queue (ft)	139	75	27	21	37	368	157	482
Average Queue (ft)	25	44	5	5	4	99	26	224
95th Queue (ft)	98	78	20	18	22	264	105	487
Link Distance (ft)	554		215			1339		473
Upstream Blk Time (%)								2
Queuing Penalty (veh)								27
Storage Bay Dist (ft)		50		100	210		125	
Storage Blk Time (%)	3	26				3		10
Queuing Penalty (veh)	1	3				0		2

Intersection: 9: Lowell Road (Route 3A) & Pelham Road

Movement	WB	WB	NB	SB	SB
Directions Served	L	R	TR	L	T
Maximum Queue (ft)	516	125	465	199	879
Average Queue (ft)	443	63	153	104	372
95th Queue (ft)	619	152	364	201	732
Link Distance (ft)	477		473		1258
Upstream Blk Time (%)	68		0		
Queuing Penalty (veh)	0		1		
Storage Bay Dist (ft)		75		150	
Storage Blk Time (%)	81	5		3	21
Queuing Penalty (veh)	59	11		29	13

Zone Summary

Zone wide Queuing Penalty: 2039

2022 Build Weekday P.M.

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:00	4:00	4:00	4:00	4:00	4:00
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	6744	6761	6719	6749	7008	6794
Vehs Exited	6546	6641	6608	6541	6815	6631
Starting Vehs	819	906	850	793	840	839
Ending Vehs	1017	1026	961	1001	1033	1004
Travel Distance (mi)	6195	6326	6264	6227	6474	6297
Travel Time (hr)	2052.1	2094.1	2128.3	2021.8	2185.3	2096.3
Total Delay (hr)	1834.9	1872.2	1909.3	1803.7	1958.3	1875.7
Total Stops	22694	24805	23647	23225	23390	23552
Fuel Used (gal)	646.2	657.7	665.6	637.8	683.3	658.1

Interval #0 Information Seeding

Start Time	4:00
End Time	4:30
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	4:30
End Time	4:45
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1611	1675	1669	1740	1752	1688
Vehs Exited	1612	1582	1599	1628	1700	1623
Starting Vehs	819	906	850	793	840	839
Ending Vehs	818	999	920	905	892	901
Travel Distance (mi)	1519	1566	1543	1549	1640	1563
Travel Time (hr)	326.0	342.4	352.5	322.7	368.0	342.3
Total Delay (hr)	272.8	287.5	298.4	268.2	310.4	287.5
Total Stops	5202	5862	5514	5625	5553	5545
Fuel Used (gal)	118.3	122.5	124.4	117.1	130.3	122.5

Interval #2 Information R2

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1937	1777	1894	1868	1836	1861
Vehs Exited	1680	1729	1747	1717	1753	1726
Starting Vehs	818	999	920	905	892	901
Ending Vehs	1075	1047	1067	1056	975	1038
Travel Distance (mi)	1627	1616	1620	1673	1614	1630
Travel Time (hr)	453.1	471.7	482.7	446.3	499.1	470.6
Total Delay (hr)	395.8	414.8	425.8	387.6	442.2	413.2
Total Stops	5979	6698	6422	6234	5580	6181
Fuel Used (gal)	149.5	153.5	156.8	149.2	160.7	153.9

Interval #3 Information R3

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1573	1684	1545	1539	1689	1607
Vehs Exited	1647	1716	1638	1594	1696	1657
Starting Vehs	1075	1047	1067	1056	975	1038
Ending Vehs	1001	1015	974	1001	968	991
Travel Distance (mi)	1531	1592	1523	1507	1551	1541
Travel Time (hr)	583.2	591.0	604.3	568.9	617.4	593.0
Total Delay (hr)	529.5	535.3	551.0	516.3	563.0	539.0
Total Stops	5848	6201	5767	5586	5721	5823
Fuel Used (gal)	177.1	180.1	181.8	172.3	185.2	179.3

Interval #4 Information R4

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1623	1625	1611	1602	1731	1635
Vehs Exited	1607	1614	1624	1602	1666	1621
Starting Vehs	1001	1015	974	1001	968	991
Ending Vehs	1017	1026	961	1001	1033	1004
Travel Distance (mi)	1517	1552	1578	1499	1669	1563
Travel Time (hr)	689.8	688.9	688.7	683.8	700.9	690.4
Total Delay (hr)	636.9	634.5	634.0	631.6	642.6	635.9
Total Stops	5665	6044	5944	5780	6536	5991
Fuel Used (gal)	201.2	201.6	202.5	199.1	207.1	202.3

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road

Movement	EB	EB	NB	NB	NB	SB	SB	SB	NW	NW
Directions Served	L	R>	L	T	TR	L	T	TR	<L	R
Maximum Queue (ft)	94	55	60	629	400	850	1701	1702	124	502
Average Queue (ft)	35	8	2	547	364	850	1673	1530	14	502
95th Queue (ft)	77	36	44	787	489	850	1757	2132	75	507
Link Distance (ft)	531		614		1671		1671		487	
Upstream Blk Time (%)				62			44	14	99	
Queuing Penalty (veh)				0			285	88	0	
Storage Bay Dist (ft)	50		200	300		775			100	
Storage Blk Time (%)	20	1	87		69	91	12			96
Queuing Penalty (veh)	1	0	259		207	182	104			4

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	468	75	60	375	1699	1701	374	923	926
Average Queue (ft)	325	48	15	184	1654	1655	89	705	691
95th Queue (ft)	534	93	43	489	1768	1775	335	1159	1180
Link Distance (ft)	460	503		1671		1671	893		893
Upstream Blk Time (%)	19				12	11	8		7
Queuing Penalty (veh)	0				78	70	58		53
Storage Bay Dist (ft)	50		300		350				
Storage Blk Time (%)	60	30			98	0		69	
Queuing Penalty (veh)	31	81			34	0		17	

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	187	200	370	188	118	145	396	250	81	475	929	936
Average Queue (ft)	182	196	352	66	42	36	396	250	24	361	906	898
95th Queue (ft)	195	211	363	156	93	91	396	252	63	678	919	936
Link Distance (ft)			336				381				893	893
Upstream Blk Time (%)			88				90				33	20
Queuing Penalty (veh)			0				0				258	156
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)	73	82	0	3	0	0		93			78	42
Queuing Penalty (veh)	102	116	0	10	0	0		100			85	31

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB
Directions Served	R	L	L	T	T	R
Maximum Queue (ft)	250	150	450	1098	1109	1204
Average Queue (ft)	70	78	289	677	694	602
95th Queue (ft)	220	131	575	1317	1346	1475
Link Distance (ft)				1093	1093	1093
Upstream Blk Time (%)				2	3	13
Queuing Penalty (veh)				13	19	86
Storage Bay Dist (ft)	175	350	350			
Storage Blk Time (%)				47		
Queuing Penalty (veh)				143		

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	L	L	T	T	T	T	R	R
Maximum Queue (ft)	894	922	926	575	625	1116	1094	316	402	874	250
Average Queue (ft)	708	891	893	571	620	1035	421	170	177	110	27
95th Queue (ft)	1103	913	910	612	664	1363	1153	285	319	529	153
Link Distance (ft)	873	873	873			1093	1093	890	890	890	
Upstream Blk Time (%)	5	52	54			7	1			0	
Queuing Penalty (veh)	0	0	0			67	7			1	
Storage Bay Dist (ft)				525	525						200
Storage Blk Time (%)				39	60	6					
Queuing Penalty (veh)				135	204	79					

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	LT	R	L	T	T	R	L	T	T
Maximum Queue (ft)	756	275	250	499	113	204	419	483	400	195	404	498
Average Queue (ft)	328	216	149	281	17	96	211	236	188	61	137	217
95th Queue (ft)	748	331	301	439	77	173	361	405	393	129	293	427
Link Distance (ft)	740			522			890	890			1440	1440
Upstream Blk Time (%)	9			0								
Queuing Penalty (veh)	0			0								
Storage Bay Dist (ft)		250	200		75	575			275	175		
Storage Blk Time (%)	1	29	1	51				5	4		4	2
Queuing Penalty (veh)	5	44	2	127				53	22		3	7

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	SB
Directions Served	TR
Maximum Queue (ft)	350
Average Queue (ft)	231
95th Queue (ft)	366
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	5
Queuing Penalty (veh)	17

Intersection: 6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	69	113	45	33	57	265	285	28	172	236
Average Queue (ft)	17	43	11	5	11	82	88	4	58	83
95th Queue (ft)	47	91	34	23	39	218	230	19	138	181
Link Distance (ft)	434		326			1440	1440		1706	1706
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)		100		100	225			225		
Storage Blk Time (%)	0	1					1			
Queuing Penalty (veh)	0	0					0			

Intersection: 7: Lowell Road (Route 3A) & Executive Drive

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	201	41	374	99	104	308	288	48	236	232
Average Queue (ft)	90	4	163	22	31	125	90	10	83	92
95th Queue (ft)	156	25	424	79	74	257	220	34	168	188
Link Distance (ft)	444		530			1706	1706		1099	1099
Upstream Blk Time (%)			2							
Queuing Penalty (veh)			0							
Storage Bay Dist (ft)		225		80	350			150		
Storage Blk Time (%)	0		49	2		0			1	
Queuing Penalty (veh)	0		11	0		0			0	

Intersection: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Movement	EB	EB	WB	WB	NB	NB	NB	B201	SB	SB
Directions Served	LT	R	LT	R	L	T	R	T	L	TR
Maximum Queue (ft)	91	75	95	95	222	1068	180	355	162	428
Average Queue (ft)	15	28	25	26	26	371	13	16	45	83
95th Queue (ft)	53	64	66	67	100	863	123	166	109	258
Link Distance (ft)	554		215			1339		1099		473
Upstream Blk Time (%)						0				0
Queuing Penalty (veh)						2				2
Storage Bay Dist (ft)		50		100	210		325		125	
Storage Blk Time (%)	2	10	1	1		15			1	4
Queuing Penalty (veh)	1	1	0	0		6			9	2

Intersection: 9: Lowell Road (Route 3A) & Pelham Road

Movement	WB	WB	NB	SB	SB
Directions Served	L	R	TR	L	T
Maximum Queue (ft)	447	125	489	200	1272
Average Queue (ft)	233	108	308	194	1233
95th Queue (ft)	441	149	606	207	1425
Link Distance (ft)	477		473		1258
Upstream Blk Time (%)	3		5		43
Queuing Penalty (veh)	0		69		349
Storage Bay Dist (ft)		75		150	
Storage Blk Time (%)	35	51		89	3
Queuing Penalty (veh)	50	44		637	3

Zone Summary

Zone wide Queuing Penalty: 4628

2032 Build Weekday A.M.

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	6163	5980	6152	6152	6364	6160
Vehs Exited	6018	5847	5895	5960	6200	5984
Starting Vehs	615	650	604	636	639	628
Ending Vehs	760	783	861	828	803	803
Travel Distance (mi)	6297	6161	6286	6323	6424	6298
Travel Time (hr)	1657.8	1888.6	1575.7	1854.7	1505.6	1696.5
Total Delay (hr)	1439.7	1674.7	1358.2	1634.9	1282.6	1478.0
Total Stops	19477	20224	21130	20420	20094	20271
Fuel Used (gal)	557.7	605.3	539.5	601.6	525.0	565.8

Interval #0 Information Seeding

Start Time	6:45
End Time	7:15
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	7:15
End Time	7:30
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1556	1399	1546	1412	1675	1518
Vehs Exited	1557	1399	1433	1348	1624	1471
Starting Vehs	615	650	604	636	639	628
Ending Vehs	614	650	717	700	690	674
Travel Distance (mi)	1623	1439	1578	1426	1691	1551
Travel Time (hr)	258.6	304.4	260.1	287.2	258.1	273.7
Total Delay (hr)	202.7	254.3	205.5	237.4	199.3	219.8
Total Stops	4289	4488	4684	4393	4952	4559
Fuel Used (gal)	104.7	110.3	104.2	105.8	107.0	106.4

Interval #2 Information R2

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1602	1549	1690	1595	1743	1636
Vehs Exited	1459	1434	1559	1518	1589	1514
Starting Vehs	614	650	717	700	690	674
Ending Vehs	757	765	848	777	844	796
Travel Distance (mi)	1562	1575	1631	1589	1635	1599
Travel Time (hr)	368.0	432.3	352.4	430.2	339.8	384.5
Total Delay (hr)	313.9	377.7	295.9	375.1	283.1	329.1
Total Stops	4689	4964	5523	5303	5301	5155
Fuel Used (gal)	127.9	142.8	127.2	143.1	123.6	132.9

Interval #3 Information R3

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1521	1539	1404	1557	1453	1493
Vehs Exited	1501	1501	1462	1556	1493	1504
Starting Vehs	757	765	848	777	844	796
Ending Vehs	777	803	790	778	804	790
Travel Distance (mi)	1574	1576	1535	1653	1529	1573
Travel Time (hr)	477.3	533.7	439.7	533.2	431.4	483.1
Total Delay (hr)	422.6	479.0	386.8	475.8	378.6	428.5
Total Stops	5229	5295	5400	5251	4914	5215
Fuel Used (gal)	154.4	166.9	144.4	168.0	141.9	155.1

Interval #4 Information R4

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1484	1493	1512	1588	1493	1515
Vehs Exited	1501	1513	1441	1538	1494	1497
Starting Vehs	777	803	790	778	804	790
Ending Vehs	760	783	861	828	803	803
Travel Distance (mi)	1538	1571	1542	1656	1569	1575
Travel Time (hr)	553.9	618.2	523.6	604.1	476.3	555.2
Total Delay (hr)	500.5	563.6	470.1	546.6	421.7	500.5
Total Stops	5270	5477	5523	5473	4927	5333
Fuel Used (gal)	170.7	185.3	163.6	184.6	152.5	171.4

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road

Movement	EB	EB	NB	NB	SB	SB	SB	NW	NW
Directions Served	L	R>	T	TR	L	T	TR	<L	R
Maximum Queue (ft)	34	57	230	202	347	71	88	99	546
Average Queue (ft)	2	5	125	79	160	11	24	4	511
95th Queue (ft)	18	29	201	180	278	44	70	38	532
Link Distance (ft)	531		614			1671	1671		487
Upstream Blk Time (%)									100
Queuing Penalty (veh)									0
Storage Bay Dist (ft)		50		300	775			100	
Storage Blk Time (%)	0	2	1						90
Queuing Penalty (veh)	0	0	2						1

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	255	77	79	375	1011	968	42	334	344
Average Queue (ft)	118	36	25	130	507	460	8	168	173
95th Queue (ft)	209	88	59	396	1237	1200	32	313	313
Link Distance (ft)	460		503		1671	1671		893	893
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)		50		300			350		
Storage Blk Time (%)	43	7			49			0	
Queuing Penalty (veh)	11	11			20			0	

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	184	194	301	129	29	45	32	156	48	475	930	942
Average Queue (ft)	129	114	142	41	4	11	5	56	12	287	785	740
95th Queue (ft)	218	245	417	94	19	36	23	116	39	648	1127	1152
Link Distance (ft)			336				381				893	893
Upstream Blk Time (%)			29								25	10
Queuing Penalty (veh)			0								173	71
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)	37	34	0	0				0			69	12
Queuing Penalty (veh)	24	22	0	0				0			54	3

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB
Directions Served	R	L	L	T	T	R
Maximum Queue (ft)	250	52	79	415	599	305
Average Queue (ft)	28	10	37	143	157	43
95th Queue (ft)	133	35	69	303	365	186
Link Distance (ft)				1093	1093	1093
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	175	350	350			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	L	L	T	T	T	T	R	R
Maximum Queue (ft)	914	927	927	575	625	1122	1138	828	935	928	250
Average Queue (ft)	840	842	802	571	620	1056	691	141	609	837	133
95th Queue (ft)	1074	1100	1248	607	666	1320	1445	434	1155	1142	337
Link Distance (ft)	873	873	873			1093	1093	890	890	890	
Upstream Blk Time (%)	44	61	54			12	2	0	1	9	
Queuing Penalty (veh)	0	0	0			88	14	1	8	69	
Storage Bay Dist (ft)				525	525						200
Storage Blk Time (%)				43	69	16				0	0
Queuing Penalty (veh)				87	139	179				0	0

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	LT	R	L	T	T	R	L	T	T
Maximum Queue (ft)	676	275	250	558	115	750	918	929	160	134	1347	1358
Average Queue (ft)	262	228	208	538	32	733	823	642	25	22	924	1002
95th Queue (ft)	641	317	330	547	116	831	1137	1170	109	82	1611	1616
Link Distance (ft)	740			522			890	890			1440	1440
Upstream Blk Time (%)	4			87			21	1			5	7
Queuing Penalty (veh)	0			0			151	7			29	43
Storage Bay Dist (ft)		250	200		75	575			275	175		
Storage Blk Time (%)	2	25	2	89	0	88	5	2			21	35
Queuing Penalty (veh)	7	25	8	331	0	394	17	4			4	144

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	SB
Directions Served	TR
Maximum Queue (ft)	350
Average Queue (ft)	346
95th Queue (ft)	373
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	65
Queuing Penalty (veh)	259

Intersection: 6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	31	45	26	38	176	118	157	19	457	510
Average Queue (ft)	4	8	3	7	64	21	25	1	164	206
95th Queue (ft)	19	29	18	28	128	80	99	9	561	614
Link Distance (ft)	434		326			1440	1440		1706	1706
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)		100		100	225			225		
Storage Blk Time (%)					0				10	
Queuing Penalty (veh)					0				0	

Intersection: 7: Lowell Road (Route 3A) & Executive Drive

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	116	569	105	268	239	196	199	305	320
Average Queue (ft)	37	531	60	124	91	65	78	180	212
95th Queue (ft)	86	607	140	228	192	153	162	277	309
Link Distance (ft)	444	530			1706	1706		1099	1099
Upstream Blk Time (%)		85							
Queuing Penalty (veh)		0							
Storage Bay Dist (ft)			80	350			150		
Storage Blk Time (%)		85	13	0			0	9	
Queuing Penalty (veh)		86	22	1			3	10	

Intersection: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	T	R	L	TR
Maximum Queue (ft)	161	75	35	18	69	338	10	120	481
Average Queue (ft)	33	42	3	5	5	111	0	17	219
95th Queue (ft)	112	82	19	17	43	298	5	66	468
Link Distance (ft)	554		215			1339			473
Upstream Blk Time (%)									1
Queuing Penalty (veh)									17
Storage Bay Dist (ft)		50		100	210		325	125	
Storage Blk Time (%)	2	27				3			9
Queuing Penalty (veh)	1	3				0			1

Intersection: 9: Lowell Road (Route 3A) & Pelham Road

Movement	WB	WB	NB	SB	SB
Directions Served	L	R	TR	L	T
Maximum Queue (ft)	522	125	462	200	961
Average Queue (ft)	486	69	162	108	441
95th Queue (ft)	532	160	374	206	867
Link Distance (ft)	477		473		1258
Upstream Blk Time (%)	75		1		0
Queuing Penalty (veh)	0		4		0
Storage Bay Dist (ft)		75		150	
Storage Blk Time (%)	84	3		8	21
Queuing Penalty (veh)	68	9		93	15

Zone Summary

Zone wide Queuing Penalty: 2732

2032 Build Weekday P.M.

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:00	4:00	4:00	4:00	4:00	4:00
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	6958	6669	6803	6497	6872	6760
Vehs Exited	6709	6578	6603	6379	6677	6586
Starting Vehs	855	967	855	923	863	887
Ending Vehs	1104	1058	1055	1041	1058	1061
Travel Distance (mi)	6556	6289	6273	6042	6436	6319
Travel Time (hr)	2621.5	2940.6	2643.4	2850.7	2672.7	2745.8
Total Delay (hr)	2392.1	2720.3	2424.2	2639.2	2448.0	2524.8
Total Stops	24808	24332	23044	23340	24867	24079
Fuel Used (gal)	785.4	852.5	781.9	823.3	793.8	807.4

Interval #0 Information Seeding

Start Time	4:00
End Time	4:30
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	4:30
End Time	4:45
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1813	1704	1738	1687	1813	1749
Vehs Exited	1713	1665	1693	1578	1644	1660
Starting Vehs	855	967	855	923	863	887
Ending Vehs	955	1006	900	1032	1032	985
Travel Distance (mi)	1713	1625	1628	1540	1609	1623
Travel Time (hr)	417.8	468.2	415.3	439.7	401.9	428.6
Total Delay (hr)	357.9	411.2	358.5	385.6	345.5	371.7
Total Stops	6192	6052	5693	5804	6370	6019
Fuel Used (gal)	143.9	153.8	140.9	144.7	137.4	144.1

Interval #2 Information R2

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1859	1751	1894	1723	1796	1806
Vehs Exited	1721	1628	1744	1661	1711	1692
Starting Vehs	955	1006	900	1032	1032	985
Ending Vehs	1093	1129	1050	1094	1117	1094
Travel Distance (mi)	1608	1554	1630	1573	1679	1609
Travel Time (hr)	579.7	648.2	576.2	622.0	594.7	604.2
Total Delay (hr)	523.0	593.7	519.0	566.7	536.0	547.7
Total Stops	6242	6437	5962	6242	6068	6193
Fuel Used (gal)	178.1	192.6	178.0	186.6	183.5	183.8

Interval #3 Information R3

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1592	1537	1581	1506	1661	1571
Vehs Exited	1644	1645	1606	1558	1673	1625
Starting Vehs	1093	1129	1050	1094	1117	1094
Ending Vehs	1041	1021	1025	1042	1105	1044
Travel Distance (mi)	1557	1512	1553	1448	1551	1524
Travel Time (hr)	737.1	828.8	751.0	805.3	771.4	778.7
Total Delay (hr)	682.7	776.0	696.9	754.9	717.4	725.6
Total Stops	5894	5835	5952	5670	6280	5924
Fuel Used (gal)	213.0	232.7	215.7	225.2	220.7	221.4

Interval #4 Information R4

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1694	1677	1590	1581	1602	1626
Vehs Exited	1631	1640	1560	1582	1649	1610
Starting Vehs	1041	1021	1025	1042	1105	1044
Ending Vehs	1104	1058	1055	1041	1058	1061
Travel Distance (mi)	1678	1598	1462	1482	1597	1563
Travel Time (hr)	886.9	995.3	900.9	983.7	904.8	934.3
Total Delay (hr)	828.4	939.4	849.8	932.0	849.2	879.8
Total Stops	6480	6008	5437	5624	6149	5937
Fuel Used (gal)	250.4	273.4	247.3	266.7	252.3	258.0

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road

Movement	EB	EB	NB	NB	SB	SB	SB	NW	NW
Directions Served	L	R>	T	TR	L	T	TR	<L	R
Maximum Queue (ft)	102	50	629	400	850	1698	1699	106	502
Average Queue (ft)	39	6	583	379	850	1670	1557	7	502
95th Queue (ft)	85	28	780	479	852	1784	2118	49	502
Link Distance (ft)	531		614			1671	1671		487
Upstream Blk Time (%)			72			49	16		100
Queuing Penalty (veh)			0			349	116		0
Storage Bay Dist (ft)		50		300	775			100	
Storage Blk Time (%)	22	0	88	78	93	12			96
Queuing Penalty (veh)	1	0	291	257	203	117			5

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	480	75	53	375	1696	1717	374	917	928
Average Queue (ft)	298	46	15	194	1640	1641	108	805	800
95th Queue (ft)	495	88	42	500	1796	1808	377	1165	1183
Link Distance (ft)	460		503		1671	1671		893	893
Upstream Blk Time (%)	8				11	10		11	9
Queuing Penalty (veh)	0				78	72		91	69
Storage Bay Dist (ft)		50		300			350		
Storage Blk Time (%)	61	29			98			81	
Queuing Penalty (veh)	31	79			34			21	

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	187	200	380	173	98	82	396	250	79	475	924	930
Average Queue (ft)	178	195	350	54	40	31	396	250	20	337	905	893
95th Queue (ft)	197	223	363	154	85	69	398	253	58	671	917	953
Link Distance (ft)			336				381				893	893
Upstream Blk Time (%)			90				90				35	19
Queuing Penalty (veh)			0				0				294	164
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)	73	79	2	8				94			78	40
Queuing Penalty (veh)	103	112	9	28				100			85	30

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB
Directions Served	R	L	L	T	T	R
Maximum Queue (ft)	214	136	450	1115	1118	1203
Average Queue (ft)	57	65	332	836	828	785
95th Queue (ft)	196	120	611	1431	1447	1648
Link Distance (ft)				1093	1093	1093
Upstream Blk Time (%)				7	7	25
Queuing Penalty (veh)				48	50	179
Storage Bay Dist (ft)	175	350	350			
Storage Blk Time (%)				67		
Queuing Penalty (veh)				209		

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	L	L	T	T	T	T	R	R
Maximum Queue (ft)	893	920	911	575	625	1118	1117	497	640	882	250
Average Queue (ft)	646	890	891	564	612	984	477	253	275	226	49
95th Queue (ft)	1080	903	904	624	679	1484	1235	516	588	800	210
Link Distance (ft)	873	873	873			1093	1093	890	890	890	
Upstream Blk Time (%)	3	58	67			9	1		0	1	
Queuing Penalty (veh)	0	0	0			97	13		0	5	
Storage Bay Dist (ft)				525	525						200
Storage Blk Time (%)				36	56	6					0
Queuing Penalty (veh)				134	211	92					2

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	L	LT	R	L	T	T	R	L	T	T
Maximum Queue (ft)	754	275	250	538	115	180	369	450	398	193	463	586
Average Queue (ft)	591	259	185	376	27	87	215	235	171	77	165	253
95th Queue (ft)	995	325	324	576	104	165	348	373	364	172	345	483
Link Distance (ft)	740			522			890	890			1440	1440
Upstream Blk Time (%)	43			6								
Queuing Penalty (veh)	0			0								
Storage Bay Dist (ft)		250	200		75	575			275	175		
Storage Blk Time (%)	4	56	2	60				6	4	3	6	3
Queuing Penalty (veh)	17	86	5	162				63	21	9	4	10

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	SB
Directions Served	TR
Maximum Queue (ft)	350
Average Queue (ft)	251
95th Queue (ft)	390
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	300
Storage Blk Time (%)	9
Queuing Penalty (veh)	28

Intersection: 6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	61	96	48	30	50	312	322	28	238	259
Average Queue (ft)	15	38	11	5	11	73	86	3	65	86
95th Queue (ft)	43	76	34	23	36	204	223	16	162	189
Link Distance (ft)	434		326			1440	1440		1706	1706
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)		100		100	225			225		
Storage Blk Time (%)		0				1			0	
Queuing Penalty (veh)		0				0			0	

Intersection: 7: Lowell Road (Route 3A) & Executive Drive

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	263	97	348	105	93	335	320	85	205	238
Average Queue (ft)	103	8	137	26	32	144	110	13	80	96
95th Queue (ft)	205	62	319	89	71	302	257	51	164	191
Link Distance (ft)	444		530			1706	1706		1099	1099
Upstream Blk Time (%)	0									
Queuing Penalty (veh)	0									
Storage Bay Dist (ft)		225		80	350			150		
Storage Blk Time (%)	1	0	54	0		0			1	
Queuing Penalty (veh)	1	0	12	0		0			0	

Intersection: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Movement	EB	EB	WB	WB	NB	NB	NB	B201	B201	SB	SB
Directions Served	LT	R	LT	R	L	T	R	T		L	TR
Maximum Queue (ft)	94	73	142	116	217	1241	399	616	105	133	379
Average Queue (ft)	16	30	38	39	26	525	18	51	2	40	83
95th Queue (ft)	57	67	114	98	112	1250	152	303	29	96	280
Link Distance (ft)	554		215			1339		1099	1099		473
Upstream Blk Time (%)			0			5					0
Queuing Penalty (veh)			0			65					2
Storage Bay Dist (ft)		50		100	210		325			125	
Storage Blk Time (%)	5	10	2	6		19				1	3
Queuing Penalty (veh)	1	1	1	2		8				12	2

Intersection: 9: Lowell Road (Route 3A) & Pelham Road

Movement	WB	WB	NB	SB	SB
Directions Served	L	R	TR	L	T
Maximum Queue (ft)	408	125	490	200	1273
Average Queue (ft)	228	107	351	191	1150
95th Queue (ft)	426	151	625	217	1615
Link Distance (ft)	477		473		1258
Upstream Blk Time (%)	3		7		36
Queuing Penalty (veh)	0		103		329
Storage Bay Dist (ft)		75		150	
Storage Blk Time (%)	39	47		85	2
Queuing Penalty (veh)	60	44		668	3

Zone Summary

Zone wide Queuing Penalty: 5499

Appendix E

SimTraffic Queueing Analysis – 2022 & 2032 Build with Base Improvements Traffic Conditions

2022 Build with Base Improvements Weekday A.M.

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	5582	5574	5583	5557	5462	5554
Vehs Exited	5605	5583	5576	5536	5460	5551
Starting Vehs	272	257	259	225	257	253
Ending Vehs	249	248	266	246	259	250
Travel Distance (mi)	3680	3671	3693	3655	3562	3652
Travel Time (hr)	722.4	630.1	595.8	617.2	566.5	626.4
Total Delay (hr)	595.4	503.3	468.6	490.8	443.4	500.3
Total Stops	9740	9608	9505	9509	9354	9543
Fuel Used (gal)	282.9	262.1	254.5	258.2	244.2	260.4

Interval #0 Information Seeding

Start Time	6:45
End Time	7:15
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	7:15
End Time	7:30
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1374	1414	1330	1317	1272	1341
Vehs Exited	1397	1389	1378	1255	1304	1346
Starting Vehs	272	257	259	225	257	253
Ending Vehs	249	282	211	287	225	251
Travel Distance (mi)	912	919	902	835	835	880
Travel Time (hr)	127.8	118.4	108.8	110.0	88.0	110.6
Total Delay (hr)	96.5	86.6	77.7	81.0	59.1	80.2
Total Stops	2390	2543	2265	2089	2117	2279
Fuel Used (gal)	58.9	56.6	53.9	52.4	46.7	53.7

Interval #2 Information R2

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1443	1449	1483	1465	1527	1474
Vehs Exited	1408	1463	1418	1481	1454	1446
Starting Vehs	249	282	211	287	225	251
Ending Vehs	284	268	276	271	298	280
Travel Distance (mi)	935	971	950	969	967	958
Travel Time (hr)	173.8	145.4	136.6	152.9	139.6	149.6
Total Delay (hr)	141.6	111.9	103.8	119.3	106.2	116.5
Total Stops	2568	2616	2523	2593	2619	2583
Fuel Used (gal)	69.3	64.7	61.5	65.8	63.2	64.9

Interval #3 Information R3

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1410	1337	1377	1369	1325	1364
Vehs Exited	1405	1381	1386	1393	1373	1385
Starting Vehs	284	268	276	271	298	280
Ending Vehs	289	224	267	247	250	250
Travel Distance (mi)	923	888	909	924	885	906
Travel Time (hr)	205.7	169.9	160.6	168.3	157.8	172.4
Total Delay (hr)	173.7	139.2	129.4	136.3	127.1	141.2
Total Stops	2455	2242	2249	2411	2286	2329
Fuel Used (gal)	76.4	67.2	66.1	67.9	64.7	68.5

Interval #4 Information R4

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1355	1374	1393	1406	1338	1371
Vehs Exited	1395	1350	1394	1407	1329	1374
Starting Vehs	289	224	267	247	250	250
Ending Vehs	249	248	266	246	259	250
Travel Distance (mi)	910	894	931	928	875	907
Travel Time (hr)	215.1	196.5	189.8	186.0	181.2	193.7
Total Delay (hr)	183.6	165.6	157.7	154.1	151.0	162.4
Total Stops	2327	2207	2468	2416	2332	2349
Fuel Used (gal)	78.3	73.6	73.0	72.2	69.6	73.3

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Steele Road/Dracut Road

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LTR	R	LT	LT
Maximum Queue (ft)	41	183	156	121	54
Average Queue (ft)	3	77	19	55	2
95th Queue (ft)	21	142	86	103	23
Link Distance (ft)	488	544	544	659	1590
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R
Maximum Queue (ft)	194	165	58	72	89	196	211	43	298	298	196
Average Queue (ft)	91	37	14	22	33	78	79	5	149	150	85
95th Queue (ft)	160	110	41	53	70	148	158	25	264	267	166
Link Distance (ft)	447	447	447	496		1590	1590		883	883	883
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)					300			350			
Storage Blk Time (%)											
Queuing Penalty (veh)											

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB		
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T		
Maximum Queue (ft)	116	118	24	103	16	48	34	122	58	80	344	297		
Average Queue (ft)	47	52	2	34	1	12	4	49	18	43	201	151		
95th Queue (ft)	91	99	11	83	7	38	19	97	48	74	324	273		
Link Distance (ft)			324					373					883	883
Upstream Blk Time (%)														
Queuing Penalty (veh)														
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350				
Storage Blk Time (%)												0		
Queuing Penalty (veh)												0		

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB	SB
Directions Served	TR	L	L	T	T	T	R
Maximum Queue (ft)	234	45	86	138	322	322	83
Average Queue (ft)	98	11	39	76	101	69	23
95th Queue (ft)	193	36	74	125	237	224	62
Link Distance (ft)	883			1092	1092	1092	
Upstream Blk Time (%)							0
Queuing Penalty (veh)							0
Storage Bay Dist (ft)		350	350				400
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	L	L	R	L	L	L	T	T	T	T	R	R	
Maximum Queue (ft)	359	780	530	283	358	353	205	142	353	766	893	250	
Average Queue (ft)	216	300	47	164	210	197	39	59	97	192	443	176	
95th Queue (ft)	319	527	344	257	313	310	122	119	221	552	941	363	
Link Distance (ft)	873	873	873				1092	1092	1092	872	872	872	
Upstream Blk Time (%)		0	0								0	1	
Queuing Penalty (veh)		0	0								0	8	
Storage Bay Dist (ft)				525	525							200	
Storage Blk Time (%)												3	0
Queuing Penalty (veh)												21	0

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	LT	R	L	LT	R	L	T	T	R	R	L	T
Maximum Queue (ft)	178	225	250	550	115	439	324	331	122	50	81	201
Average Queue (ft)	65	109	222	520	38	246	158	174	22	13	12	127
95th Queue (ft)	148	193	335	530	125	423	259	274	101	41	47	223
Link Distance (ft)	733		503		872		872		872			
Upstream Blk Time (%)					89							
Queuing Penalty (veh)					0							
Storage Bay Dist (ft)	250		200		75		275		275		175	
Storage Blk Time (%)	0	1	1	85	0	2						6
Queuing Penalty (veh)	0	1	4	286	0	4						1

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	SB	SB
Directions Served	T	TR
Maximum Queue (ft)	209	230
Average Queue (ft)	190	195
95th Queue (ft)	204	210
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	300	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 325

Intersection: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	TR
Maximum Queue (ft)	164	75	33	28	29	141	131	158	258
Average Queue (ft)	29	42	7	7	3	50	32	20	160
95th Queue (ft)	105	81	27	27	17	116	98	71	324
Link Distance (ft)	558		216			1366	1366		234
Upstream Blk Time (%)								0	9
Queuing Penalty (veh)								0	0
Storage Bay Dist (ft)		50		100	210			125	
Storage Blk Time (%)	2	27							10
Queuing Penalty (veh)	1	3							2

2022 Build with Base Improvements Weekday P.M.

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:00	4:00	4:00	4:00	4:00	4:00
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	6583	6422	6601	6518	6421	6510
Vehs Exited	6611	6431	6553	6513	6426	6507
Starting Vehs	406	372	332	371	367	368
Ending Vehs	378	363	380	376	362	369
Travel Distance (mi)	4244	4132	4235	4191	4121	4185
Travel Time (hr)	1304.4	1346.8	1472.2	1490.9	1368.5	1396.6
Total Delay (hr)	1156.2	1202.2	1324.3	1344.3	1224.3	1250.3
Total Stops	13802	13420	13502	13500	13347	13516
Fuel Used (gal)	438.2	444.2	476.5	478.4	449.4	457.3

Interval #0 Information Seeding

Start Time	4:00
End Time	4:30
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	4:30
End Time	4:45
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1664	1558	1569	1576	1508	1573
Vehs Exited	1698	1599	1532	1597	1574	1600
Starting Vehs	406	372	332	371	367	368
Ending Vehs	372	331	369	350	301	341
Travel Distance (mi)	1100	1034	994	1025	976	1026
Travel Time (hr)	217.1	220.0	249.5	255.5	231.3	234.7
Total Delay (hr)	178.7	183.7	214.8	219.7	197.1	198.8
Total Stops	3525	3231	3033	3226	3099	3225
Fuel Used (gal)	85.9	84.1	90.1	92.3	85.1	87.5

Interval #2 Information R2

Start Time	4:45
End Time	5:00
Total Time (min)	15
Volumes adjusted by PHF, Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1739	1706	1760	1735	1746	1736
Vehs Exited	1692	1623	1704	1705	1637	1672
Starting Vehs	372	331	369	350	301	341
Ending Vehs	419	414	425	380	410	405
Travel Distance (mi)	1089	1041	1102	1101	1065	1080
Travel Time (hr)	290.4	303.9	334.2	344.6	312.3	317.1
Total Delay (hr)	252.4	267.3	295.5	306.0	275.0	279.2
Total Stops	3739	3334	3507	3689	3521	3557
Fuel Used (gal)	102.7	104.0	112.4	114.6	106.5	108.0

Interval #3 Information R3

Start Time	5:00
End Time	5:15
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1541	1542	1640	1547	1567	1564
Vehs Exited	1613	1619	1714	1587	1619	1631
Starting Vehs	419	414	425	380	410	405
Ending Vehs	347	337	351	340	358	342
Travel Distance (mi)	1002	1017	1092	1022	1027	1032
Travel Time (hr)	363.1	376.5	411.7	417.0	389.4	391.6
Total Delay (hr)	328.1	341.0	373.8	381.4	353.6	355.6
Total Stops	3279	3278	3577	3197	3448	3355
Fuel Used (gal)	116.0	119.7	130.4	129.1	123.3	123.7

Interval #4 Information R4

Start Time	5:15
End Time	5:30
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1639	1616	1632	1660	1600	1626
Vehs Exited	1608	1590	1603	1624	1596	1605
Starting Vehs	347	337	351	340	358	342
Ending Vehs	378	363	380	376	362	369
Travel Distance (mi)	1053	1041	1047	1043	1053	1047
Travel Time (hr)	433.8	446.5	476.8	473.7	435.4	453.2
Total Delay (hr)	397.0	410.2	440.2	437.2	398.6	416.7
Total Stops	3259	3577	3385	3388	3279	3375
Fuel Used (gal)	133.7	136.3	143.6	142.4	134.5	138.1

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Steele Road/Dracut Road

Movement	EB	WB	WB	NB	NB	SB
Directions Served	LTR	LTR	R	LT	TR	LT
Maximum Queue (ft)	63	196	179	278	253	205
Average Queue (ft)	20	89	40	167	110	12
95th Queue (ft)	50	159	117	260	246	92
Link Distance (ft)	488	542	542	659		1590
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)					300	
Storage Blk Time (%)				0	0	
Queuing Penalty (veh)				0	0	

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R
Maximum Queue (ft)	227	186	54	39	78	252	264	69	150	143	98
Average Queue (ft)	131	95	17	12	27	132	144	19	66	62	26
95th Queue (ft)	211	182	40	36	63	226	233	54	130	125	72
Link Distance (ft)	447	447	447	496		1590	1590		883	883	883
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)					300			350			
Storage Blk Time (%)											
Queuing Penalty (veh)											

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	187	199	339	163	110	175	270	244	90	107	418	378
Average Queue (ft)	142	149	64	71	11	72	39	149	31	58	261	204
95th Queue (ft)	202	215	259	136	49	138	166	237	72	97	371	318
Link Distance (ft)			324				373				883	883
Upstream Blk Time (%)			4				0					
Queuing Penalty (veh)			0				0					
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)	6	10	0	0	0	0		5			1	
Queuing Penalty (veh)	9	14	0	0	0	0		6			1	

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB	SB
Directions Served	TR	L	L	T	T	T	R
Maximum Queue (ft)	287	172	187	328	1068	546	93
Average Queue (ft)	164	75	99	73	145	67	28
95th Queue (ft)	254	135	155	223	540	297	70
Link Distance (ft)	883			1092	1092	1092	
Upstream Blk Time (%)					0	0	
Queuing Penalty (veh)					0	1	
Storage Bay Dist (ft)		350	350				400
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	L	L	L	T	T	T	T	R	R
Maximum Queue (ft)	895	924	922	489	624	834	625	472	324	346	689	250
Average Queue (ft)	850	892	892	367	476	491	164	266	196	211	175	98
95th Queue (ft)	958	907	907	488	643	706	411	399	302	325	541	298
Link Distance (ft)	873	873	873			1092	1092	1092	871	871	871	
Upstream Blk Time (%)	12	67	55									0
Queuing Penalty (veh)	0	0	0									0
Storage Bay Dist (ft)				525	525							200
Storage Blk Time (%)				0	5	7					3	0
Queuing Penalty (veh)				0	24	61					16	0

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	LT	R	L	LT	R	L	T	T	R	R	L	T
Maximum Queue (ft)	413	275	250	525	115	170	294	301	111	137	158	191
Average Queue (ft)	149	187	220	519	29	84	186	197	53	73	57	88
95th Queue (ft)	316	296	326	570	106	147	264	275	87	114	117	163
Link Distance (ft)	739		510		871		871		871			
Upstream Blk Time (%)				76								
Queuing Penalty (veh)				0								
Storage Bay Dist (ft)	250		200		75				275		175	
Storage Blk Time (%)	0	6	4	82				1		0		1
Queuing Penalty (veh)	0	10	12	201				9		0		1

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	SB	SB
Directions Served	T	TR
Maximum Queue (ft)	195	210
Average Queue (ft)	162	191
95th Queue (ft)	225	206
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	300	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 367

Intersection: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	TR
Maximum Queue (ft)	49	63	83	57	58	324	312	179	249
Average Queue (ft)	8	21	27	21	22	132	121	51	130
95th Queue (ft)	33	50	64	47	52	241	236	110	250
Link Distance (ft)	558		216			1366	1366		234
Upstream Blk Time (%)								0	3
Queuing Penalty (veh)								0	0
Storage Bay Dist (ft)		50		100	210			125	
Storage Blk Time (%)	1	6	0	0		2		1	6
Queuing Penalty (veh)	0	1	0	0		0		9	4

**2022 Build with Base Improvements Weekday A.M.
(NHDOT Alternative @ Lowell/River/Dracut/Steele)**

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	5297	5293	5355	5350	5349	5327
Vehs Exited	5305	5296	5322	5358	5374	5331
Starting Vehs	246	252	263	265	261	257
Ending Vehs	238	249	296	257	236	254
Travel Distance (mi)	3360	3358	3428	3380	3370	3379
Travel Time (hr)	790.1	923.9	868.9	800.5	837.4	844.1
Total Delay (hr)	672.8	806.6	749.3	682.0	719.3	726.0
Total Stops	8976	8975	9338	9070	9117	9094
Fuel Used (gal)	288.9	319.5	308.6	291.2	300.3	301.7

Interval #0 Information Seeding

Start Time	6:45
End Time	7:15
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	7:15
End Time	7:30
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1292	1306	1288	1274	1281	1285
Vehs Exited	1291	1306	1297	1309	1282	1296
Starting Vehs	246	252	263	265	261	257
Ending Vehs	247	252	254	230	260	246
Travel Distance (mi)	815	836	836	818	822	825
Travel Time (hr)	137.7	165.5	146.6	136.4	136.4	144.5
Total Delay (hr)	109.4	136.4	117.4	107.6	107.5	115.7
Total Stops	2203	2249	2352	2238	2156	2240
Fuel Used (gal)	57.8	65.0	60.7	57.5	57.6	59.7

Interval #2 Information R2

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1439	1399	1364	1422	1489	1421
Vehs Exited	1371	1418	1344	1394	1424	1390
Starting Vehs	247	252	254	230	260	246
Ending Vehs	315	233	274	258	325	282
Travel Distance (mi)	875	914	863	878	896	885
Travel Time (hr)	184.6	218.4	195.1	185.7	200.8	196.9
Total Delay (hr)	153.9	186.4	164.9	154.9	169.5	165.9
Total Stops	2469	2435	2250	2438	2587	2437
Fuel Used (gal)	70.3	78.9	72.3	70.6	74.9	73.4

Interval #3 Information R3

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1326	1268	1338	1355	1315	1319
Vehs Exited	1371	1254	1365	1335	1372	1340
Starting Vehs	315	233	274	258	325	282
Ending Vehs	270	247	247	278	268	260
Travel Distance (mi)	876	782	860	864	844	845
Travel Time (hr)	220.8	250.7	246.3	224.5	236.9	235.8
Total Delay (hr)	190.3	223.3	216.3	194.2	207.2	206.3
Total Stops	2289	2016	2361	2210	2349	2244
Fuel Used (gal)	78.6	82.7	83.9	78.9	81.3	81.1

Interval #4 Information R4

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1240	1320	1365	1299	1264	1293
Vehs Exited	1272	1318	1316	1320	1296	1306
Starting Vehs	270	247	247	278	268	260
Ending Vehs	238	249	296	257	236	254
Travel Distance (mi)	795	825	869	819	808	823
Travel Time (hr)	247.0	289.3	280.9	254.0	263.3	266.9
Total Delay (hr)	219.3	260.5	250.8	225.3	235.0	238.2
Total Stops	2015	2275	2375	2184	2025	2174
Fuel Used (gal)	82.2	92.8	91.7	84.2	86.4	87.5

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road

Movement	EB	EB	NB	NB	SB	SB	SB	NW	NW
Directions Served	L	R>	T	TR	L	L	TR	<L	R
Maximum Queue (ft)	23	33	220	177	141	163	268	75	508
Average Queue (ft)	2	3	108	68	59	84	84	3	475
95th Queue (ft)	12	18	200	165	127	142	214	33	498
Link Distance (ft)	537	537	562			1659	1659		449
Upstream Blk Time (%)									100
Queuing Penalty (veh)									0
Storage Bay Dist (ft)				300	775			100	
Storage Blk Time (%)			2						91
Queuing Penalty (veh)			3						1

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R
Maximum Queue (ft)	167	149	55	59	59	182	179	46	295	317	217
Average Queue (ft)	83	35	15	24	24	71	76	5	136	143	77
95th Queue (ft)	158	108	44	52	52	151	154	25	274	275	161
Link Distance (ft)	446	446	446	496		1659	1659		883	883	883
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)					300			350			
Storage Blk Time (%)											
Queuing Penalty (veh)											

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	136	132	24	84	16	48	29	112	51	76	298	253
Average Queue (ft)	49	56	3	28	1	13	3	47	14	38	177	114
95th Queue (ft)	99	107	16	64	8	38	18	89	42	69	266	202
Link Distance (ft)			324				373				883	883
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)		0									0	
Queuing Penalty (veh)		0									0	

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB	SB
Directions Served	TR	L	L	T	T	T	R
Maximum Queue (ft)	164	47	79	153	167	134	86
Average Queue (ft)	75	10	37	81	98	67	20
95th Queue (ft)	146	34	72	135	149	118	56
Link Distance (ft)	883			1092	1092	1092	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		350	350			400	
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	L	L	L	T	T	T	T	R	R
Maximum Queue (ft)	558	612	532	208	256	254	104	152	201	685	864	250
Average Queue (ft)	233	303	53	128	168	150	31	57	79	119	341	148
95th Queue (ft)	395	532	389	209	239	236	77	119	149	351	788	350
Link Distance (ft)	873	873	873			1092	1092	1092	872	872	872	
Upstream Blk Time (%)	0	2	2							0	0	
Queuing Penalty (veh)	0	0	0							0	1	
Storage Bay Dist (ft)				525	525							200
Storage Blk Time (%)												2
Queuing Penalty (veh)												15

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	LT	R	L	LT	R	L	T	T	R	R	L	T
Maximum Queue (ft)	121	215	250	546	115	458	264	294	125	63	38	194
Average Queue (ft)	56	98	224	520	27	255	144	160	18	14	8	129
95th Queue (ft)	103	181	327	532	105	421	223	240	78	45	27	220
Link Distance (ft)	733				503		872		872			
Upstream Blk Time (%)				89								
Queuing Penalty (veh)				0								
Storage Bay Dist (ft)	250		200		75				275		175	
Storage Blk Time (%)	0		0		84		0		1		8	
Queuing Penalty (veh)	0		0		283		0		1		1	

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	SB	SB
Directions Served	T	TR
Maximum Queue (ft)	201	222
Average Queue (ft)	189	195
95th Queue (ft)	198	212
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	300	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 307

Intersection: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	TR
Maximum Queue (ft)	164	75	33	28	29	141	131	158	258
Average Queue (ft)	29	42	7	7	3	50	32	20	160
95th Queue (ft)	105	81	27	27	17	116	98	71	324
Link Distance (ft)	558		216			1366	1366		234
Upstream Blk Time (%)								0	9
Queuing Penalty (veh)								0	0
Storage Bay Dist (ft)		50		100	210			125	
Storage Blk Time (%)	2	27							10
Queuing Penalty (veh)	1	3							2

**2022 Build with Base Improvements Weekday P.M.
(NHDOT Alternative @ Lowell/River/Dracut/Steele)**

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:00	4:00	4:00	4:00	4:00	4:00
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	6328	6348	6278	6285	6425	6334
Vehs Exited	6311	6323	6251	6280	6399	6313
Starting Vehs	371	358	381	350	377	368
Ending Vehs	388	383	408	355	403	388
Travel Distance (mi)	3987	3957	3950	3934	4014	3968
Travel Time (hr)	1725.8	1494.3	1713.4	1591.6	1515.1	1608.0
Total Delay (hr)	1585.8	1354.9	1574.9	1453.3	1374.0	1468.6
Total Stops	12894	12565	12663	12656	13160	12787
Fuel Used (gal)	526.8	473.3	522.6	495.0	478.8	499.3

Interval #0 Information Seeding

Start Time	4:00
End Time	4:30
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	4:30
End Time	4:45
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1574	1531	1489	1488	1533	1519
Vehs Exited	1572	1524	1512	1508	1553	1533
Starting Vehs	371	358	381	350	377	368
Ending Vehs	373	365	358	330	357	356
Travel Distance (mi)	1012	973	970	945	994	979
Travel Time (hr)	276.0	244.7	293.6	271.9	245.1	266.3
Total Delay (hr)	240.5	210.6	259.6	238.5	210.3	231.9
Total Stops	3123	2941	2978	3021	3062	3023
Fuel Used (gal)	96.4	88.4	99.4	93.6	88.9	93.3

Interval #2 Information R2

Start Time	4:45
End Time	5:00
Total Time (min)	15
Volumes adjusted by PHF, Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1688	1648	1657	1739	1735	1693
Vehs Exited	1636	1656	1600	1670	1669	1649
Starting Vehs	373	365	358	330	357	356
Ending Vehs	425	357	415	399	423	404
Travel Distance (mi)	1007	994	993	1038	1015	1009
Travel Time (hr)	390.5	338.9	393.9	360.6	348.3	366.5
Total Delay (hr)	354.9	303.7	358.8	324.1	312.6	330.8
Total Stops	3558	3271	3281	3490	3512	3421
Fuel Used (gal)	122.9	110.9	122.8	117.1	113.2	117.4

Interval #3 Information R3

Start Time	5:00
End Time	5:15
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1470	1568	1596	1538	1577	1546
Vehs Exited	1551	1585	1627	1572	1611	1589
Starting Vehs	425	357	415	399	423	404
Ending Vehs	344	340	384	365	389	362
Travel Distance (mi)	970	981	1024	992	1022	998
Travel Time (hr)	494.1	421.6	479.9	442.6	434.3	454.5
Total Delay (hr)	460.2	387.0	444.3	407.9	398.3	419.6
Total Stops	3113	3126	3260	3121	3370	3197
Fuel Used (gal)	145.4	129.1	143.8	134.4	133.0	137.1

Interval #4 Information R4

Start Time	5:15
End Time	5:30
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1596	1601	1536	1520	1580	1565
Vehs Exited	1552	1558	1512	1530	1566	1543
Starting Vehs	344	340	384	365	389	362
Ending Vehs	388	383	408	355	403	388
Travel Distance (mi)	998	1008	962	960	984	982
Travel Time (hr)	565.1	489.0	546.0	516.5	487.4	520.8
Total Delay (hr)	530.1	453.5	512.3	482.8	452.8	486.3
Total Stops	3100	3227	3144	3024	3216	3139
Fuel Used (gal)	162.1	145.0	156.7	149.9	143.8	151.5

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road

Movement	EB	EB	NB	NB	NB	SB	SB	SB	NW	NW
Directions Served	L	R>	L	T	TR	L	L	TR	<L	R
Maximum Queue (ft)	88	63	60	495	376	188	199	135	106	464
Average Queue (ft)	27	6	2	347	276	87	106	31	8	464
95th Queue (ft)	69	30	44	591	443	168	179	91	56	464
Link Distance (ft)	537		562			1659		1659		449
Upstream Blk Time (%)					11		100			
Queuing Penalty (veh)					0		0			
Storage Bay Dist (ft)	50		200		300		775		100	
Storage Blk Time (%)	9	1	48		19		92			
Queuing Penalty (veh)	0	0	145		56		4			

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R	
Maximum Queue (ft)	206	171	51	48	86	130	131	65	149	142	86	
Average Queue (ft)	122	85	16	14	28	61	69	18	63	51	28	
95th Queue (ft)	190	157	39	40	66	115	117	51	133	110	75	
Link Distance (ft)	446	446	446	496	1659		1659	883		883	883	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)					300		350					
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	187	199	294	160	82	166	280	244	94	116	330	290
Average Queue (ft)	146	155	68	73	20	60	31	147	34	56	215	171
95th Queue (ft)	204	217	261	138	59	122	148	231	76	98	305	261
Link Distance (ft)			324				373				883	883
Upstream Blk Time (%)			4				1					
Queuing Penalty (veh)			0				0					
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)	8	10	0			0		4			0	
Queuing Penalty (veh)	12	15	0			0		5			0	

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB	SB
Directions Served	TR	L	L	T	T	T	R
Maximum Queue (ft)	244	144	160	520	1043	741	92
Average Queue (ft)	139	73	93	101	151	87	30
95th Queue (ft)	215	126	143	375	577	427	73
Link Distance (ft)	883			1092	1092	1092	
Upstream Blk Time (%)					0	0	
Queuing Penalty (veh)					0	1	
Storage Bay Dist (ft)		350	350				400
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	L	L	L	T	T	T	T	R	R
Maximum Queue (ft)	893	921	922	427	535	517	321	379	364	378	656	250
Average Queue (ft)	855	890	891	302	385	389	99	226	202	215	184	98
95th Queue (ft)	947	901	905	409	513	507	222	342	353	376	565	298
Link Distance (ft)	873	873	873				1092	1092	1092	871	871	871
Upstream Blk Time (%)	14	68	54									0
Queuing Penalty (veh)	0	0	0									0
Storage Bay Dist (ft)				525	525							200
Storage Blk Time (%)					0	0					2	0
Queuing Penalty (veh)					2	4					14	0

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	LT	R	L	LT	R	L	T	T	R	R	L	T
Maximum Queue (ft)	584	275	250	525	115	168	283	296	94	119	149	190
Average Queue (ft)	172	201	225	512	34	75	171	184	49	69	57	87
95th Queue (ft)	415	301	320	589	116	145	252	266	78	105	116	170
Link Distance (ft)	739		510		871		871		871			
Upstream Blk Time (%)				73								
Queuing Penalty (veh)				0								
Storage Bay Dist (ft)	250		200		75		275		275		175	
Storage Blk Time (%)	2	7	6	82				1	2			
Queuing Penalty (veh)	13	12	16	201				5	1			

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	SB	SB
Directions Served	T	TR
Maximum Queue (ft)	206	213
Average Queue (ft)	170	192
95th Queue (ft)	224	206
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	300	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 506

Intersection: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	TR
Maximum Queue (ft)	49	63	83	57	58	324	312	179	249
Average Queue (ft)	8	21	27	21	22	132	121	51	130
95th Queue (ft)	33	50	64	47	52	241	236	110	250
Link Distance (ft)	558		216			1366	1366		234
Upstream Blk Time (%)								0	3
Queuing Penalty (veh)								0	0
Storage Bay Dist (ft)		50		100	210			125	
Storage Blk Time (%)	1	6	0	0		2		1	6
Queuing Penalty (veh)	0	1	0	0		0		9	4

2032 Build with Base Improvements Weekday A.M.

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	5654	5720	5699	5671	5857	5721
Vehs Exited	5627	5668	5693	5678	5880	5708
Starting Vehs	301	302	330	377	355	331
Ending Vehs	328	354	336	370	332	343
Travel Distance (mi)	3696	3744	3787	3724	3809	3752
Travel Time (hr)	898.5	1063.8	1047.4	964.5	982.3	991.3
Total Delay (hr)	771.3	934.8	917.5	836.2	851.0	862.1
Total Stops	11381	11319	11411	11394	11801	11463
Fuel Used (gal)	325.6	365.5	363.1	341.6	348.8	348.9

Interval #0 Information Seeding

Start Time	6:45
End Time	7:15
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	7:15
End Time	7:30
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1433	1478	1457	1346	1402	1421
Vehs Exited	1424	1490	1458	1389	1430	1440
Starting Vehs	301	302	330	377	355	331
Ending Vehs	310	290	329	334	327	317
Travel Distance (mi)	951	981	963	899	932	945
Travel Time (hr)	145.1	168.7	170.2	168.4	187.6	168.0
Total Delay (hr)	112.4	134.8	137.2	137.2	155.6	135.4
Total Stops	2702	2798	2682	2691	2749	2725
Fuel Used (gal)	63.7	70.2	70.2	67.5	72.9	68.9

Interval #2 Information R2

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1513	1488	1551	1499	1609	1533
Vehs Exited	1464	1430	1496	1448	1578	1483
Starting Vehs	310	290	329	334	327	317
Ending Vehs	359	348	384	385	358	369
Travel Distance (mi)	973	962	1012	979	1020	989
Travel Time (hr)	197.7	234.9	235.8	236.3	233.4	227.6
Total Delay (hr)	164.2	201.8	201.0	202.7	198.2	193.6
Total Stops	3041	3036	3151	2932	3281	3086
Fuel Used (gal)	76.8	85.3	86.9	86.0	86.8	84.4

Interval #3 Information R3

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1295	1384	1383	1435	1444	1387
Vehs Exited	1362	1399	1445	1485	1468	1433
Starting Vehs	359	348	384	385	358	369
Ending Vehs	292	333	322	335	334	324
Travel Distance (mi)	865	905	949	955	943	923
Travel Time (hr)	255.2	305.4	291.0	267.5	264.4	276.7
Total Delay (hr)	225.3	274.1	258.5	234.7	232.0	244.9
Total Stops	2667	2685	2859	2893	2842	2791
Fuel Used (gal)	86.9	99.6	97.7	92.2	91.6	93.6

Interval #4 Information R4

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1413	1370	1308	1391	1402	1375
Vehs Exited	1377	1349	1294	1356	1404	1354
Starting Vehs	292	333	322	335	334	324
Ending Vehs	328	354	336	370	332	343
Travel Distance (mi)	907	895	864	891	914	894
Travel Time (hr)	300.4	354.9	350.4	292.3	296.8	319.0
Total Delay (hr)	269.4	324.0	320.8	261.6	265.2	288.2
Total Stops	2971	2800	2719	2878	2929	2856
Fuel Used (gal)	98.3	110.4	108.3	95.9	97.4	102.1

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Steele Road/Dracut Road

Movement	EB	WB	WB	NB	NB
Directions Served	LTR	LTR	R	LT	TR
Maximum Queue (ft)	43	208	183	164	113
Average Queue (ft)	3	91	30	61	7
95th Queue (ft)	20	170	117	122	56
Link Distance (ft)	488	537	537	659	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	300				
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R	
Maximum Queue (ft)	168	145	66	74	88	213	216	38	298	301	272	
Average Queue (ft)	85	36	14	26	31	102	105	5	145	145	83	
95th Queue (ft)	151	104	42	55	70	183	190	24	281	274	195	
Link Distance (ft)	447	447	447	496		1590	1590		883	883	883	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)					300				350			
Storage Blk Time (%)									0			
Queuing Penalty (veh)									0			

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	108	109	28	99	5	49	29	129	77	92	308	275
Average Queue (ft)	42	51	3	33	0	10	6	57	18	41	184	142
95th Queue (ft)	81	94	17	79	4	34	24	108	51	73	285	247
Link Distance (ft)			324				373				883	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB	SB
Directions Served	TR	L	L	T	T	T	R
Maximum Queue (ft)	206	41	69	336	361	145	109
Average Queue (ft)	78	10	36	88	108	61	32
95th Queue (ft)	165	32	64	236	252	126	83
Link Distance (ft)	883			1092	1092	1092	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		350	350			400	
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	L	L	L	T	T	T	T	R	R
Maximum Queue (ft)	910	925	927	289	334	427	108	116	550	871	896	250
Average Queue (ft)	827	836	771	191	231	212	41	42	106	324	627	204
95th Queue (ft)	1049	1067	1260	263	308	349	89	88	319	811	1102	362
Link Distance (ft)	873	873	873			1092	1092	1092	872	872	872	
Upstream Blk Time (%)	31	54	49							0	3	
Queuing Penalty (veh)	0	0	0							0	22	
Storage Bay Dist (ft)				525	525							200
Storage Blk Time (%)												4
Queuing Penalty (veh)												32

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	LT	R	L	LT	R	L	T	T	R	R	L	T
Maximum Queue (ft)	335	261	250	552	115	724	829	831	108	45	42	184
Average Queue (ft)	92	135	221	522	39	601	483	408	15	10	8	121
95th Queue (ft)	230	244	338	535	128	882	1058	979	74	36	27	213
Link Distance (ft)	733			504			872		872			
Upstream Blk Time (%)					90		3		0			
Queuing Penalty (veh)					0		23		3			
Storage Bay Dist (ft)	250		200		75		575		275		175	
Storage Blk Time (%)	4		1		86		0		54		3	
Queuing Penalty (veh)	4		5		321		0		242		11	

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	SB	SB
Directions Served	T	TR
Maximum Queue (ft)	202	209
Average Queue (ft)	179	183
95th Queue (ft)	191	196
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	300	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 665

Intersection: 7: Lowell Road (Route 3A) & Executive Drive

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	124	259	105	301	204	163	199	300	309
Average Queue (ft)	38	127	75	158	73	73	83	190	219
95th Queue (ft)	89	228	127	280	146	128	166	286	309
Link Distance (ft)	444	530			1761	1761		1099	1099
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			80	350			150		
Storage Blk Time (%)		25	6	1			1	11	
Queuing Penalty (veh)		27	11	4			4	12	

Intersection: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	TR
Maximum Queue (ft)	172	75	37	36	37	138	143	131	266
Average Queue (ft)	42	47	7	8	4	38	44	21	164
95th Queue (ft)	130	86	26	29	20	103	113	81	340
Link Distance (ft)	554		216			1339	1339		234
Upstream Blk Time (%)								0	11
Queuing Penalty (veh)								0	0
Storage Bay Dist (ft)		50		100	210			125	
Storage Blk Time (%)	4	33							12
Queuing Penalty (veh)	2	4							2

Network Summary

Network wide Queuing Penalty: 64

2032 Build with Base Improvements Weekday P.M.

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:00	4:00	4:00	4:00	4:00	4:00
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	7134	6920	7006	6982	6849	6980
Vehs Exited	7131	6947	7057	6961	6813	6981
Starting Vehs	426	463	464	405	408	431
Ending Vehs	429	436	413	426	444	429
Travel Distance (mi)	4714	4540	4594	4591	4454	4578
Travel Time (hr)	1653.4	1555.2	1644.8	1596.2	1593.8	1608.7
Total Delay (hr)	1489.2	1396.6	1484.5	1436.4	1438.6	1449.1
Total Stops	15443	14542	14872	14512	14386	14752
Fuel Used (gal)	531.2	504.3	526.0	513.8	510.1	517.1

Interval #0 Information Seeding

Start Time	4:00
End Time	4:30
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	4:30
End Time	4:45
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1807	1678	1724	1678	1657	1707
Vehs Exited	1756	1726	1763	1682	1647	1713
Starting Vehs	426	463	464	405	408	431
Ending Vehs	477	415	425	401	418	426
Travel Distance (mi)	1174	1137	1150	1118	1087	1133
Travel Time (hr)	306.8	247.7	281.0	278.9	257.5	274.4
Total Delay (hr)	265.8	207.9	240.9	240.1	219.7	234.9
Total Stops	3736	3379	3754	3423	3412	3538
Fuel Used (gal)	108.5	93.5	101.9	100.0	94.3	99.6

Interval #2 Information R2

Start Time	4:45
End Time	5:00
Total Time (min)	15
Volumes adjusted by PHF, Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1886	1834	1816	1834	1745	1821
Vehs Exited	1865	1784	1776	1745	1690	1772
Starting Vehs	477	415	425	401	418	426
Ending Vehs	498	465	465	490	473	479
Travel Distance (mi)	1245	1175	1163	1145	1103	1166
Travel Time (hr)	380.4	358.6	368.9	364.8	362.3	367.0
Total Delay (hr)	337.1	317.5	328.3	324.8	323.7	326.3
Total Stops	4282	3894	3764	3724	3747	3885
Fuel Used (gal)	127.2	120.2	122.1	120.3	119.1	121.8

Interval #3 Information R3

Start Time	5:00
End Time	5:15
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1728	1633	1762	1693	1676	1696
Vehs Exited	1772	1724	1779	1778	1713	1753
Starting Vehs	498	465	465	490	473	479
Ending Vehs	454	374	448	405	436	421
Travel Distance (mi)	1167	1092	1166	1163	1112	1140
Travel Time (hr)	447.8	428.7	463.5	444.9	451.9	447.4
Total Delay (hr)	407.3	390.6	422.9	404.6	413.2	407.7
Total Stops	3741	3440	3824	3811	3417	3644
Fuel Used (gal)	140.3	134.1	144.4	139.7	139.8	139.7

Interval #4 Information R4

Start Time	5:15
End Time	5:30
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1713	1775	1704	1777	1771	1748
Vehs Exited	1738	1713	1739	1756	1763	1741
Starting Vehs	454	374	448	405	436	421
Ending Vehs	429	436	413	426	444	429
Travel Distance (mi)	1128	1135	1115	1165	1152	1139
Travel Time (hr)	518.4	520.1	531.4	507.6	522.1	519.9
Total Delay (hr)	479.0	480.6	492.4	466.9	482.0	480.2
Total Stops	3684	3829	3530	3554	3810	3677
Fuel Used (gal)	155.3	156.5	157.6	153.7	157.0	156.0

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Steele Road/Dracut Road

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	R	LT	TR	LT	TR
Maximum Queue (ft)	66	196	184	291	261	209	40
Average Queue (ft)	24	108	56	195	151	21	1
95th Queue (ft)	55	180	140	280	275	126	30
Link Distance (ft)	488	546	546	659		1590	1590
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	300						
Storage Blk Time (%)	0						
Queuing Penalty (veh)	0						

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R
Maximum Queue (ft)	238	208	62	38	72	319	321	60	172	173	96
Average Queue (ft)	133	89	18	14	26	166	175	18	77	73	26
95th Queue (ft)	211	179	45	39	61	265	271	52	147	143	71
Link Distance (ft)	447	447	447	496		1590	1590		883	883	883
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	300					350					
Storage Blk Time (%)	0										
Queuing Penalty (veh)	0										

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	185	196	245	161	50	96	388	250	89	106	460	442
Average Queue (ft)	130	138	28	80	14	45	388	250	34	60	267	218
95th Queue (ft)	191	206	150	151	38	87	388	251	74	97	393	348
Link Distance (ft)			324				373				883	883
Upstream Blk Time (%)			0				94					
Queuing Penalty (veh)			0				0					
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)	2	4		1				97				2
Queuing Penalty (veh)	4	6		2				103				2

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB	SB
Directions Served	TR	L	L	T	T	T	R
Maximum Queue (ft)	366	154	162	505	508	547	129
Average Queue (ft)	157	74	95	114	122	77	53
95th Queue (ft)	270	127	144	377	353	283	111
Link Distance (ft)	883			1092	1092	1092	
Upstream Blk Time (%)				0		0	
Queuing Penalty (veh)				0		0	
Storage Bay Dist (ft)		350	350				400
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	L	L	L	T	T	T	T	R	R
Maximum Queue (ft)	918	919	912	455	592	797	385	326	365	798	883	250
Average Queue (ft)	847	891	889	313	407	425	128	172	233	290	358	135
95th Queue (ft)	959	906	899	437	576	654	268	258	413	591	871	339
Link Distance (ft)	873	873	873				1092	1092	1092	873	873	873
Upstream Blk Time (%)	13	55	51								0	1
Queuing Penalty (veh)	0	0	0								1	3
Storage Bay Dist (ft)				525	525							200
Storage Blk Time (%)						2	2					5
Queuing Penalty (veh)						8	19					34

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	WB	WB	WB	B109	NB	NB	NB	NB	NB	SB
Directions Served	LT	R	L	LT	R	T	L	T	T	R	R	L
Maximum Queue (ft)	648	275	250	553	115	314	182	271	272	196	130	151
Average Queue (ft)	250	226	213	553	34	314	91	180	189	113	49	67
95th Queue (ft)	580	315	328	554	117	314	158	245	253	174	100	128
Link Distance (ft)	739			482		299		873	873			
Upstream Blk Time (%)	4			85		94						
Queuing Penalty (veh)	0			0		0						
Storage Bay Dist (ft)		250	200		75		575			275	275	175
Storage Blk Time (%)	2	16	3	85					1			1
Queuing Penalty (veh)	11	26	10	228					6			2

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	SB	SB	SB
Directions Served	T	T	TR
Maximum Queue (ft)	184	190	213
Average Queue (ft)	91	179	186
95th Queue (ft)	190	209	196
Link Distance (ft)			
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			300
Storage Blk Time (%)	5		
Queuing Penalty (veh)	4		

Zone Summary

Zone wide Queuing Penalty: 473

Intersection: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	TR
Maximum Queue (ft)	64	58	72	67	146	386	365	205	251
Average Queue (ft)	10	18	27	25	26	155	145	54	151
95th Queue (ft)	39	46	62	54	82	292	285	131	281
Link Distance (ft)	558		216			1366	1366		234
Upstream Blk Time (%)								0	6
Queuing Penalty (veh)								0	0
Storage Bay Dist (ft)		50		100	210			125	
Storage Blk Time (%)	0	5	0	0		3		0	9
Queuing Penalty (veh)	0	1	0	0		1		4	5

**2032 Build with Base Improvements Weekday A.M.
(NHDOT Alternative @ Lowell/River/Dracut/Steele)**

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	5443	5451	5589	5409	5604	5497
Vehs Exited	5419	5415	5594	5395	5607	5484
Starting Vehs	313	297	329	318	320	315
Ending Vehs	337	333	324	332	317	325
Travel Distance (mi)	3426	3396	3560	3426	3565	3475
Travel Time (hr)	1353.9	1401.2	1222.4	1194.1	1165.8	1267.5
Total Delay (hr)	1234.6	1282.5	1098.1	1074.7	1041.3	1146.3
Total Stops	11621	11332	11299	10943	10243	11087
Fuel Used (gal)	420.9	432.0	394.7	384.3	380.4	402.4

Interval #0 Information Seeding

Start Time	6:45
End Time	7:15
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	7:15
End Time	7:30
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1306	1343	1401	1343	1310	1342
Vehs Exited	1321	1335	1422	1328	1360	1355
Starting Vehs	313	297	329	318	320	315
Ending Vehs	298	305	308	333	270	303
Travel Distance (mi)	824	836	916	851	868	859
Travel Time (hr)	220.9	219.0	204.8	189.1	195.8	205.9
Total Delay (hr)	192.1	189.9	172.8	159.4	165.6	176.0
Total Stops	2693	2631	2744	2686	2530	2659
Fuel Used (gal)	77.1	77.7	75.9	70.8	72.4	74.8

Interval #2 Information R2

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1489	1412	1446	1399	1529	1451
Vehs Exited	1401	1381	1407	1372	1449	1403
Starting Vehs	298	305	308	333	270	303
Ending Vehs	386	336	347	360	350	353
Travel Distance (mi)	915	864	889	876	937	896
Travel Time (hr)	309.0	315.9	269.1	259.7	262.9	283.3
Total Delay (hr)	277.1	285.7	238.0	229.1	230.1	252.0
Total Stops	3190	3023	2955	2868	2828	2975
Fuel Used (gal)	100.6	101.0	90.5	87.9	89.6	93.9

Interval #3 Information R3

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1329	1334	1401	1286	1377	1345
Vehs Exited	1360	1327	1418	1326	1418	1369
Starting Vehs	386	336	347	360	350	353
Ending Vehs	355	343	330	320	309	330
Travel Distance (mi)	860	838	896	831	889	863
Travel Time (hr)	386.0	405.7	347.9	342.4	328.4	362.1
Total Delay (hr)	356.2	376.3	316.8	313.6	297.5	332.1
Total Stops	2922	2868	2859	2588	2439	2735
Fuel Used (gal)	116.3	120.2	108.8	105.2	104.0	110.9

Interval #4 Information R4

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1319	1362	1341	1381	1388	0
Vehs Exited	1337	1372	1347	1369	1380	0
Starting Vehs	355	343	330	320	309	0
Ending Vehs	337	333	324	332	317	0
Travel Distance (mi)	827	858	860	867	872	0
Travel Time (hr)	438.0	460.6	400.6	402.8	378.7	0.0
Total Delay (hr)	409.2	430.6	370.6	372.6	348.1	0.0
Total Stops	2816	2810	2741	2801	2446	0
Fuel Used (gal)	127.0	133.0	119.5	120.4	114.4	0.0

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road

Movement	EB	EB	NB	NB	SB	SB	SB	NW	NW
Directions Served	L	R>	T	TR	L	L	TR	<L	R
Maximum Queue (ft)	19	52	255	217	143	164	284	25	508
Average Queue (ft)	1	4	117	74	75	95	97	1	472
95th Queue (ft)	10	25	220	186	141	158	235	18	492
Link Distance (ft)	537	537	562			1659	1659		449
Upstream Blk Time (%)									100
Queuing Penalty (veh)									0
Storage Bay Dist (ft)				300	775			100	
Storage Blk Time (%)			3	0					92
Queuing Penalty (veh)			4	0					1

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R
Maximum Queue (ft)	157	133	58	64	83	167	161	46	304	302	182
Average Queue (ft)	79	33	15	23	27	77	84	7	135	142	72
95th Queue (ft)	146	98	44	52	60	143	149	31	267	279	156
Link Distance (ft)	446	446	446	496		1659	1659		883	883	883
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)					300			350			
Storage Blk Time (%)										0	
Queuing Penalty (veh)										0	

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	113	114	32	91	16	44	29	137	47	72	298	258
Average Queue (ft)	48	52	3	35	1	11	3	64	13	34	171	124
95th Queue (ft)	96	94	17	75	8	36	18	120	40	66	262	214
Link Distance (ft)			324				373				883	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)												0
Queuing Penalty (veh)												0

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB	SB
Directions Served	TR	L	L	T	T	T	R
Maximum Queue (ft)	161	43	75	176	191	141	126
Average Queue (ft)	78	11	37	84	103	62	35
95th Queue (ft)	143	34	66	154	171	122	91
Link Distance (ft)	883			1092	1092	1092	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		350	350			400	
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	L	L	R	L	L	L	T	T	T	T	R	R	
Maximum Queue (ft)	911	915	926	232	247	258	94	113	356	864	890	250	
Average Queue (ft)	802	812	726	141	176	145	40	40	86	301	638	210	
95th Queue (ft)	1086	1099	1282	211	237	223	79	87	233	784	1108	359	
Link Distance (ft)	873	873	873				1092	1092	1092	872	872	872	
Upstream Blk Time (%)	24	48	44									0	2
Queuing Penalty (veh)	0	0	0									1	17
Storage Bay Dist (ft)				525	525								200
Storage Blk Time (%)												3	0
Queuing Penalty (veh)												27	0

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	LT	R	L	LT	R	L	T	T	R	R	L	T
Maximum Queue (ft)	239	263	250	556	115	657	644	626	111	49	32	179
Average Queue (ft)	88	136	211	522	42	429	210	198	16	11	9	126
95th Queue (ft)	195	242	348	537	132	773	659	607	75	37	27	212
Link Distance (ft)	733		504		872		872					
Upstream Blk Time (%)				91		0						
Queuing Penalty (veh)				0		2						
Storage Bay Dist (ft)	250		200		75		575		275		175	
Storage Blk Time (%)	0	1	0	86	0	19	1	0	8			
Queuing Penalty (veh)	1	1	1	320	0	85	3	1	1			

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	SB	SB
Directions Served	T	TR
Maximum Queue (ft)	205	211
Average Queue (ft)	179	184
95th Queue (ft)	197	199
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	300	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 467

Intersection: 7: Lowell Road (Route 3A) & Executive Drive

Movement	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	LT	R	L	T	TR	L	T	TR
Maximum Queue (ft)	124	259	105	301	204	163	199	300	309
Average Queue (ft)	38	127	75	158	73	73	83	190	219
95th Queue (ft)	89	228	127	280	146	128	166	286	309
Link Distance (ft)	444	530			1761	1761		1099	1099
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			80	350			150		
Storage Blk Time (%)		25	6	1			1	11	
Queuing Penalty (veh)		27	11	4			4	12	

Intersection: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	TR
Maximum Queue (ft)	172	75	37	36	37	138	143	131	266
Average Queue (ft)	42	47	7	8	4	38	44	21	164
95th Queue (ft)	130	86	26	29	20	103	113	81	340
Link Distance (ft)	554		216			1339	1339		234
Upstream Blk Time (%)								0	11
Queuing Penalty (veh)								0	0
Storage Bay Dist (ft)		50		100	210			125	
Storage Blk Time (%)	4	33							12
Queuing Penalty (veh)	2	4							2

Network Summary

Network wide Queuing Penalty: 64

**2032 Build with Base Improvements Weekday P.M.
(NHDOT Alternative @ Lowell/River/Dracut/Steele)**

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:00	4:00	4:00	4:00	4:00	4:00
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	6695	6612	6631	6666	6726	6668
Vehs Exited	6653	6636	6656	6629	6699	6653
Starting Vehs	442	451	465	425	433	440
Ending Vehs	484	427	440	462	460	456
Travel Distance (mi)	4259	4214	4255	4238	4259	4245
Travel Time (hr)	1989.2	1926.6	1977.6	1863.9	1899.0	1931.3
Total Delay (hr)	1839.3	1778.5	1828.1	1714.9	1749.1	1782.0
Total Stops	13230	12655	13170	12976	13272	13059
Fuel Used (gal)	593.9	578.4	591.6	564.1	573.7	580.3

Interval #0 Information Seeding

Start Time	4:00
End Time	4:30
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	4:30
End Time	4:45
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1678	1676	1647	1654	1679	1665
Vehs Exited	1684	1694	1661	1606	1664	1660
Starting Vehs	442	451	465	425	433	440
Ending Vehs	436	433	451	473	448	447
Travel Distance (mi)	1085	1075	1085	1049	1071	1073
Travel Time (hr)	332.1	331.4	327.1	312.6	323.8	325.4
Total Delay (hr)	294.0	293.8	289.0	275.8	286.0	287.7
Total Stops	3290	3239	3225	3064	3318	3228
Fuel Used (gal)	111.0	111.5	110.4	105.5	108.9	109.5

Interval #2 Information R2

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1762	1732	1671	1711	1666	1708
Vehs Exited	1745	1718	1661	1689	1651	1692
Starting Vehs	436	433	451	473	448	447
Ending Vehs	453	447	461	495	463	466
Travel Distance (mi)	1106	1092	1047	1065	1044	1071
Travel Time (hr)	442.4	434.8	434.9	422.5	426.9	432.3
Total Delay (hr)	403.5	396.4	398.0	384.8	390.1	394.6
Total Stops	3696	3325	3308	3379	3353	3415
Fuel Used (gal)	137.7	135.2	134.0	131.2	131.9	134.0

Interval #3 Information R3

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1590	1602	1662	1659	1667	1636
Vehs Exited	1634	1632	1676	1699	1678	1663
Starting Vehs	453	447	461	495	463	466
Ending Vehs	409	417	447	455	452	435
Travel Distance (mi)	1045	1042	1079	1090	1064	1064
Travel Time (hr)	548.7	532.3	560.7	514.7	537.8	538.9
Total Delay (hr)	512.1	495.6	522.7	476.5	500.4	501.5
Total Stops	3070	3113	3355	3359	3321	3244
Fuel Used (gal)	159.8	155.1	163.6	153.3	157.7	157.9

Interval #4 Information R4

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1665	1602	1651	1642	1714	1653
Vehs Exited	1590	1592	1658	1635	1706	1635
Starting Vehs	409	417	447	455	452	435
Ending Vehs	484	427	440	462	460	456
Travel Distance (mi)	1023	1005	1044	1033	1079	1037
Travel Time (hr)	665.9	628.0	654.9	614.2	610.5	634.7
Total Delay (hr)	629.7	592.7	618.3	577.9	572.5	598.2
Total Stops	3174	2978	3282	3174	3280	3179
Fuel Used (gal)	185.4	176.6	183.6	174.1	175.1	179.0

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road

Movement	EB	EB	NB	NB	NB	SB	SB	SB	NW	NW	
Directions Served	L	R>	L	T	TR	L	L	TR	<L	R	
Maximum Queue (ft)	79	70	177	588	400	222	236	120	467	468	
Average Queue (ft)	29	6	6	588	399	101	120	20	458	467	
95th Queue (ft)	64	32	77	588	402	186	197	72	550	467	
Link Distance (ft)	524		573		1659		1659		452	452	
Upstream Blk Time (%)					84					48	100
Queuing Penalty (veh)					0					0	0
Storage Bay Dist (ft)	50		200		300		775				
Storage Blk Time (%)	9	0	91		92						
Queuing Penalty (veh)	0	0	299		300						

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R	
Maximum Queue (ft)	265	232	56	52	61	132	136	64	148	133	92	
Average Queue (ft)	134	94	17	14	20	79	84	19	65	61	26	
95th Queue (ft)	217	194	41	40	52	131	134	50	127	120	74	
Link Distance (ft)	446	446	446	496	1659		1659	883		883	883	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)					300		350					
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	187	199	328	160	61	163	388	250	88	112	332	295
Average Queue (ft)	141	149	84	83	16	37	388	250	25	52	191	150
95th Queue (ft)	206	220	304	150	44	97	389	252	64	92	286	245
Link Distance (ft)			324				373				883	883
Upstream Blk Time (%)			6				95					
Queuing Penalty (veh)			0				0					
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)	9	13	0	1				97			0	
Queuing Penalty (veh)	14	20	1	4				104			0	

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB	SB
Directions Served	TR	L	L	T	T	T	R
Maximum Queue (ft)	244	147	165	839	1050	942	138
Average Queue (ft)	104	76	101	131	196	112	54
95th Queue (ft)	186	131	150	417	655	470	120
Link Distance (ft)	883			1092	1092	1092	
Upstream Blk Time (%)						0	
Queuing Penalty (veh)						1	
Storage Bay Dist (ft)		350	350				400
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	L	L	L	T	T	T	T	R	R
Maximum Queue (ft)	895	912	910	344	404	408	190	238	299	537	896	250
Average Queue (ft)	824	890	889	233	285	290	91	137	186	192	248	108
95th Queue (ft)	968	901	899	314	370	375	158	207	278	321	712	312
Link Distance (ft)	873	873	873				1092	1092	1092	873	873	873
Upstream Blk Time (%)	11	53	50									0
Queuing Penalty (veh)	0	0	0									1
Storage Bay Dist (ft)				525	525							200
Storage Blk Time (%)											3	0
Queuing Penalty (veh)											19	2

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	WB	WB	WB	B109	NB	NB	NB	NB	NB	SB
Directions Served	LT	R	L	LT	R	T	L	T	T	R	R	L
Maximum Queue (ft)	675	275	250	553	115	314	166	216	223	131	80	155
Average Queue (ft)	241	227	222	553	34	314	83	133	144	67	26	66
95th Queue (ft)	556	320	329	554	117	314	146	193	201	112	66	135
Link Distance (ft)	739			482		299		873	873			
Upstream Blk Time (%)	2			84		93						
Queuing Penalty (veh)	0			0		0						
Storage Bay Dist (ft)		250	200		75		575			275	275	175
Storage Blk Time (%)	1	16	4	84								1
Queuing Penalty (veh)	5	27	13	226								2

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	SB	SB	SB
Directions Served	T	T	TR
Maximum Queue (ft)	185	198	214
Average Queue (ft)	94	174	187
95th Queue (ft)	182	212	204
Link Distance (ft)			
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			300
Storage Blk Time (%)	3		
Queuing Penalty (veh)	2		

Zone Summary

Zone wide Queuing Penalty: 1041

Intersection: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LT	R	LT	R	L	T	TR	L	TR
Maximum Queue (ft)	64	58	72	67	146	386	365	205	251
Average Queue (ft)	10	18	27	25	26	155	145	54	151
95th Queue (ft)	39	46	62	54	82	292	285	131	281
Link Distance (ft)	558		216			1366	1366		234
Upstream Blk Time (%)								0	6
Queuing Penalty (veh)								0	0
Storage Bay Dist (ft)		50		100	210			125	
Storage Blk Time (%)	0	5	0	0		3		0	9
Queuing Penalty (veh)	0	1	0	0		1		4	5

Appendix F

SimTraffic Queueing Analysis – 2022 & 2032 Build with Future Improvements Traffic Conditions

2022 Build with Future Improvements Weekday A.M.

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	5412	5372	5455	5370	5427	5408
Vehs Exited	5405	5404	5485	5352	5467	5422
Starting Vehs	252	306	284	255	294	278
Ending Vehs	259	274	254	273	254	263
Travel Distance (mi)	3530	3530	3582	3480	3545	3533
Travel Time (hr)	694.5	869.5	754.7	772.7	806.0	779.5
Total Delay (hr)	572.5	747.5	630.9	652.0	683.5	657.3
Total Stops	10762	10984	10936	10764	10796	10850
Fuel Used (gal)	275.1	314.9	291.2	290.7	301.1	294.6

Interval #0 Information Seeding

Start Time	6:45
End Time	7:15
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	7:15
End Time	7:30
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1289	1274	1331	1288	1352	1309
Vehs Exited	1227	1282	1347	1265	1360	1297
Starting Vehs	252	306	284	255	294	278
Ending Vehs	314	298	268	278	286	287
Travel Distance (mi)	833	859	876	817	875	852
Travel Time (hr)	117.5	147.5	142.4	133.9	155.4	139.4
Total Delay (hr)	88.6	117.8	112.1	105.4	125.3	109.9
Total Stops	2523	2538	2685	2478	2809	2608
Fuel Used (gal)	54.6	61.9	61.5	57.5	64.4	60.0

Interval #2 Information R2

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1552	1400	1439	1452	1544	1475
Vehs Exited	1532	1402	1396	1448	1484	1452
Starting Vehs	314	298	268	278	286	287
Ending Vehs	334	296	311	282	346	313
Travel Distance (mi)	1001	918	927	940	1006	958
Travel Time (hr)	164.6	213.7	184.0	180.5	191.0	186.8
Total Delay (hr)	130.1	182.0	151.9	148.1	156.3	153.7
Total Stops	3176	3002	2760	2824	2969	2945
Fuel Used (gal)	70.3	78.9	72.7	72.2	76.5	74.1

Interval #3 Information R3

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1277	1319	1380	1313	1307	1318
Vehs Exited	1325	1352	1435	1329	1375	1363
Starting Vehs	334	296	311	282	346	313
Ending Vehs	286	263	256	266	278	267
Travel Distance (mi)	841	859	919	873	875	873
Travel Time (hr)	191.1	240.8	204.5	213.7	209.8	212.0
Total Delay (hr)	162.1	211.2	172.9	183.3	179.5	181.8
Total Stops	2638	2663	2871	2764	2613	2705
Fuel Used (gal)	72.0	83.6	77.3	77.1	76.9	77.4

Interval #4 Information R4

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1294	1379	1305	1317	1224	1301
Vehs Exited	1321	1368	1307	1310	1248	1310
Starting Vehs	286	263	256	266	278	267
Ending Vehs	259	274	254	273	254	263
Travel Distance (mi)	855	895	860	850	789	850
Travel Time (hr)	221.3	267.4	223.7	244.6	249.7	241.4
Total Delay (hr)	191.7	236.5	194.1	215.1	222.5	212.0
Total Stops	2425	2781	2620	2698	2405	2581
Fuel Used (gal)	78.1	90.5	79.7	83.8	83.4	83.1

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Steele Road/Dracut Road

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	R	LT	TR	LT	TR
Maximum Queue (ft)	34	178	166	134	58	31	11
Average Queue (ft)	3	71	20	49	2	2	0
95th Queue (ft)	19	139	84	95	30	20	8
Link Distance (ft)	488	544	544	659		1590	1590
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)					300		
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R
Maximum Queue (ft)	179	157	79	56	87	174	173	43	336	341	231
Average Queue (ft)	90	41	19	22	34	74	78	6	153	155	79
95th Queue (ft)	154	112	56	49	70	145	144	27	287	289	165
Link Distance (ft)	447	447	447	496		1590	1590		883	883	883
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)					300			350			
Storage Blk Time (%)									0		
Queuing Penalty (veh)									0		

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	90	117	28	95	10	53	43	123	74	85	318	267
Average Queue (ft)	45	51	3	30	0	13	6	52	17	46	198	142
95th Queue (ft)	85	92	17	72	6	41	25	103	49	78	296	240
Link Distance (ft)			324				373				883	883
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)												0
Queuing Penalty (veh)												0

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB	SB
Directions Served	TR	L	L	T	T	T	R
Maximum Queue (ft)	196	50	70	325	501	132	86
Average Queue (ft)	95	12	38	74	108	54	17
95th Queue (ft)	174	37	67	220	337	117	53
Link Distance (ft)	883			1092	1092	1092	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		350	350			400	
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	L	L	L	T	T	T	T	R	R
Maximum Queue (ft)	906	924	927	347	396	408	180	198	312	656	841	250
Average Queue (ft)	863	895	896	172	216	204	23	78	93	161	370	148
95th Queue (ft)	955	914	916	280	333	338	94	159	217	482	886	349
Link Distance (ft)	873	873	873				1092	1092	1092	865	865	865
Upstream Blk Time (%)	16	75	64								0	0
Queuing Penalty (veh)	0	0	0								0	3
Storage Bay Dist (ft)				525	525							200
Storage Blk Time (%)							0					4
Queuing Penalty (veh)							0					32

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	NB	
Directions Served	LT	R	R	L	LT	R	L	L	T	T	R	R	
Maximum Queue (ft)	139	117	133	250	547	115	173	186	261	275	119	51	
Average Queue (ft)	61	46	64	232	520	34	87	100	149	164	17	13	
95th Queue (ft)	117	89	110	323	529	118	138	159	214	229	75	38	
Link Distance (ft)	733			503			865	865	865	865			
Upstream Blk Time (%)					89								
Queuing Penalty (veh)					0								
Storage Bay Dist (ft)	250		250	200	75					275	275		
Storage Blk Time (%)				1	86					1			
Queuing Penalty (veh)				3	288					1			

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	SB	SB	SB	SB
Directions Served	L	T	T	TR
Maximum Queue (ft)	79	192	204	216
Average Queue (ft)	13	126	190	195
95th Queue (ft)	47	223	209	205
Link Distance (ft)				
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	175			300
Storage Blk Time (%)	7			
Queuing Penalty (veh)	1			

Zone Summary

Zone wide Queuing Penalty: 328

2022 Build with Future Improvements Weekday P.M.

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:00	4:00	4:00	4:00	4:00	4:00
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	6607	6542	6694	6498	6559	6581
Vehs Exited	6628	6551	6683	6481	6549	6579
Starting Vehs	382	344	368	340	362	358
Ending Vehs	361	335	379	357	372	360
Travel Distance (mi)	4253	4194	4307	4141	4193	4217
Travel Time (hr)	1423.1	1423.7	1330.9	1460.8	1393.7	1406.4
Total Delay (hr)	1274.4	1277.1	1180.2	1315.6	1247.1	1258.9
Total Stops	14131	13981	14007	13024	13325	13695
Fuel Used (gal)	465.5	463.8	445.7	470.9	457.1	460.6

Interval #0 Information Seeding

Start Time	4:00
End Time	4:30
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	4:30
End Time	4:45
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1542	1559	1599	1604	1519	1566
Vehs Exited	1603	1555	1628	1623	1601	1602
Starting Vehs	382	344	368	340	362	358
Ending Vehs	321	348	339	321	280	322
Travel Distance (mi)	1013	1027	1044	1036	1024	1029
Travel Time (hr)	246.2	234.8	229.5	262.3	237.7	242.1
Total Delay (hr)	210.9	199.0	193.0	226.2	202.0	206.2
Total Stops	3167	3196	3231	3179	2967	3148
Fuel Used (gal)	90.0	87.5	86.9	94.4	87.9	89.3

Interval #2 Information R2

Start Time	4:45
End Time	5:00
Total Time (min)	15
Volumes adjusted by PHF, Growth Factors.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1778	1776	1809	1692	1806	1773
Vehs Exited	1716	1725	1753	1675	1684	1711
Starting Vehs	321	348	339	321	280	322
Ending Vehs	383	399	395	338	402	386
Travel Distance (mi)	1108	1081	1118	1069	1092	1094
Travel Time (hr)	322.2	327.7	299.4	333.8	322.7	321.1
Total Delay (hr)	283.2	289.8	260.1	296.2	284.4	282.7
Total Stops	3772	3677	3626	3486	3663	3645
Fuel Used (gal)	110.1	111.1	105.1	111.5	109.7	109.5

Interval #3 Information R3

Start Time	5:00
End Time	5:15
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1651	1617	1652	1531	1626	1614
Vehs Exited	1633	1658	1678	1533	1682	1637
Starting Vehs	383	399	395	338	402	386
Ending Vehs	401	358	369	336	346	365
Travel Distance (mi)	1069	1063	1094	979	1064	1054
Travel Time (hr)	404.0	398.7	370.1	402.2	392.7	393.5
Total Delay (hr)	366.7	361.4	332.1	367.9	355.5	356.7
Total Stops	3686	3566	3758	2988	3483	3498
Fuel Used (gal)	127.7	126.0	120.6	124.5	124.9	124.7

Interval #4 Information R4

Start Time	5:15
End Time	5:30
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1636	1590	1634	1671	1608	1628
Vehs Exited	1676	1613	1624	1650	1582	1630
Starting Vehs	401	358	369	336	346	365
Ending Vehs	361	335	379	357	372	360
Travel Distance (mi)	1063	1022	1051	1057	1013	1041
Travel Time (hr)	450.8	462.5	431.9	462.6	440.6	449.7
Total Delay (hr)	413.5	426.8	395.1	425.4	405.2	413.2
Total Stops	3506	3542	3392	3371	3212	3402
Fuel Used (gal)	137.7	139.2	133.1	140.5	134.5	137.0

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Steele Road/Dracut Road

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	R	LT	TR	LT	TR
Maximum Queue (ft)	64	193	159	276	251	178	26
Average Queue (ft)	17	81	36	166	104	13	1
95th Queue (ft)	48	151	100	259	246	83	19
Link Distance (ft)	488	542	542	659		1590	1590
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)					300		
Storage Blk Time (%)				0	0		
Queuing Penalty (veh)				0	0		

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R
Maximum Queue (ft)	222	193	41	30	77	273	276	55	221	171	94
Average Queue (ft)	131	92	17	12	27	139	152	18	64	58	27
95th Queue (ft)	202	177	38	35	63	233	249	48	149	125	74
Link Distance (ft)	447	447	447	496		1590	1590		883	883	883
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)					300			350			
Storage Blk Time (%)						0					
Queuing Penalty (veh)						0					

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	187	198	340	151	81	146	267	240	100	107	400	374
Average Queue (ft)	140	148	67	69	6	69	34	146	34	57	259	208
95th Queue (ft)	208	224	262	130	31	124	136	230	79	97	364	328
Link Distance (ft)			324				373				883	883
Upstream Blk Time (%)			1									
Queuing Penalty (veh)			0									
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)	5	10		0		0		4			1	
Queuing Penalty (veh)	7	14		1		0		4			1	

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB	SB
Directions Served	TR	L	L	T	T	T	R
Maximum Queue (ft)	320	158	172	515	1045	755	104
Average Queue (ft)	166	72	93	74	124	59	31
95th Queue (ft)	264	131	148	227	444	206	80
Link Distance (ft)	883			1092	1092	1092	
Upstream Blk Time (%)				0		0	
Queuing Penalty (veh)				0		1	
Storage Bay Dist (ft)		350	350				400
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	L	L	L	T	T	T	T	R	R
Maximum Queue (ft)	899	922	919	498	621	809	530	435	336	532	876	250
Average Queue (ft)	837	891	891	370	492	504	157	264	197	229	298	124
95th Queue (ft)	948	906	905	486	641	705	403	385	343	456	800	329
Link Distance (ft)	873	873	873				1092	1092	1092	866	866	866
Upstream Blk Time (%)	8	65	56								0	1
Queuing Penalty (veh)	0	0	0								0	3
Storage Bay Dist (ft)				525	525							200
Storage Blk Time (%)				0	5	6					4	0
Queuing Penalty (veh)				0	21	57					23	0

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	NB	
Directions Served	LT	R	R	L	LT	R	L	T	T	T	R	R	
Maximum Queue (ft)	348	266	244	250	512	115	175	190	202	183	86	107	
Average Queue (ft)	116	89	110	205	440	35	80	132	136	114	43	58	
95th Queue (ft)	236	192	186	334	618	120	146	180	186	165	73	94	
Link Distance (ft)	738			497			866	866	866	866			
Upstream Blk Time (%)					42								
Queuing Penalty (veh)					0								
Storage Bay Dist (ft)	250		250	200	75					275	275		
Storage Blk Time (%)	1	0	0	3	77								
Queuing Penalty (veh)	3	1	0	8	190								

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	SB	SB	SB	SB
Directions Served	L	T	T	TR
Maximum Queue (ft)	121	189	201	210
Average Queue (ft)	52	90	174	192
95th Queue (ft)	100	175	220	201
Link Distance (ft)				
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	175			300
Storage Blk Time (%)	2			
Queuing Penalty (veh)	1			

Zone Summary

Zone wide Queuing Penalty: 336

2032 Build with Future Improvements Weekday A.M.

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:45	6:45	6:45	6:45	6:45	6:45
End Time	8:15	8:15	8:15	8:15	8:15	8:15
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	5897	5898	5941	5768	5669	5833
Vehs Exited	5911	5956	5942	5770	5708	5857
Starting Vehs	321	303	308	316	326	314
Ending Vehs	307	245	307	314	287	290
Travel Distance (mi)	3892	3944	3937	3844	3722	3868
Travel Time (hr)	872.5	892.6	1076.9	953.8	917.8	942.7
Total Delay (hr)	738.3	756.8	941.6	821.5	789.4	809.5
Total Stops	11581	11537	11792	11356	11069	11466
Fuel Used (gal)	325.7	331.8	373.5	342.3	329.8	340.6

Interval #0 Information Seeding

Start Time	6:45
End Time	7:15
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	7:15
End Time	7:30
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1448	1489	1365	1392	1391	1418
Vehs Exited	1445	1471	1356	1412	1437	1423
Starting Vehs	321	303	308	316	326	314
Ending Vehs	324	321	317	296	280	306
Travel Distance (mi)	961	988	890	912	939	938
Travel Time (hr)	156.0	169.2	184.5	160.3	158.3	165.7
Total Delay (hr)	122.9	135.2	153.8	128.8	125.8	133.3
Total Stops	2746	3029	2556	2683	2665	2734
Fuel Used (gal)	67.0	71.0	70.9	66.6	66.0	68.3

Interval #2 Information R2

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1548	1578	1530	1567	1541	1552
Vehs Exited	1547	1563	1521	1486	1466	1516
Starting Vehs	324	321	317	296	280	306
Ending Vehs	325	336	326	377	355	341
Travel Distance (mi)	995	1052	1029	1026	971	1015
Travel Time (hr)	201.2	214.2	254.6	224.1	210.8	221.0
Total Delay (hr)	166.9	178.1	219.2	188.8	177.2	186.0
Total Stops	3017	3214	3081	3159	2921	3073
Fuel Used (gal)	78.4	82.8	91.5	84.0	79.4	83.2

Interval #3 Information R3

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1495	1436	1548	1425	1411	1461
Vehs Exited	1482	1472	1521	1482	1455	1483
Starting Vehs	325	336	326	377	355	341
Ending Vehs	338	300	353	320	311	320
Travel Distance (mi)	993	967	1009	980	938	977
Travel Time (hr)	242.5	249.6	302.0	266.1	255.6	263.2
Total Delay (hr)	208.2	216.2	267.3	232.6	223.2	229.5
Total Stops	2956	2740	3126	2838	2861	2901
Fuel Used (gal)	87.2	88.3	101.8	92.3	88.9	91.7

Interval #4 Information R4

Start Time	8:00
End Time	8:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1406	1395	1498	1384	1326	1402
Vehs Exited	1437	1450	1544	1390	1350	1434
Starting Vehs	338	300	353	320	311	320
Ending Vehs	307	245	307	314	287	290
Travel Distance (mi)	943	937	1008	926	874	938
Travel Time (hr)	272.7	259.6	335.9	303.3	293.1	292.9
Total Delay (hr)	240.4	227.3	301.2	271.3	263.1	260.7
Total Stops	2862	2554	3029	2676	2622	2749
Fuel Used (gal)	93.0	89.7	109.3	99.4	95.4	97.4

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Steele Road/Dracut Road

Movement	EB	WB	WB	NB	NB	SB
Directions Served	LTR	LTR	R	LT	TR	LT
Maximum Queue (ft)	36	221	185	143	72	48
Average Queue (ft)	2	98	37	64	3	2
95th Queue (ft)	17	179	134	117	31	27
Link Distance (ft)	488	537	537	659		1590
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)					300	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R
Maximum Queue (ft)	164	162	73	73	85	194	217	40	331	298	207
Average Queue (ft)	83	32	15	27	29	94	100	5	148	144	79
95th Queue (ft)	146	104	45	59	66	174	180	25	280	271	173
Link Distance (ft)	447	447	447	496		1590	1590		883	883	883
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)					300			350			
Storage Blk Time (%)									0		
Queuing Penalty (veh)									0		

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	106	122	24	98	15	45	34	117	60	86	330	297
Average Queue (ft)	45	55	2	38	1	12	3	58	18	42	178	139
95th Queue (ft)	85	100	12	80	7	37	19	108	48	76	286	247
Link Distance (ft)			324				373				883	883
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)		0										0
Queuing Penalty (veh)		0										0

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB	SB
Directions Served	TR	L	L	T	T	T	R
Maximum Queue (ft)	204	51	79	175	371	170	121
Average Queue (ft)	82	8	34	86	115	67	38
95th Queue (ft)	160	32	65	161	259	136	96
Link Distance (ft)	883			1092	1092	1092	
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)		350	350			400	
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	L	L	L	T	T	T	T	R	R
Maximum Queue (ft)	910	928	924	286	362	350	148	130	704	846	885	250
Average Queue (ft)	853	868	838	192	229	209	46	49	106	342	687	219
95th Queue (ft)	1019	1033	1186	262	312	315	105	105	333	830	1102	353
Link Distance (ft)	873	873	873				1092	1092	1092	866	866	866
Upstream Blk Time (%)	25	57	55						0	0	3	
Queuing Penalty (veh)	0	0	0						0	3	22	
Storage Bay Dist (ft)				525	525							200
Storage Blk Time (%)											4	0
Queuing Penalty (veh)											31	0

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB	NB
Directions Served	LT	R	R	L	LT	R	L	L	T	T	R	R
Maximum Queue (ft)	139	109	122	250	552	115	147	160	193	207	34	56
Average Queue (ft)	68	47	71	213	523	37	74	99	75	94	14	12
95th Queue (ft)	130	88	119	343	538	125	126	145	157	176	35	39
Link Distance (ft)	733			505			866		866			
Upstream Blk Time (%)					92							
Queuing Penalty (veh)					0							
Storage Bay Dist (ft)	250		250	200	75		575	575			275	275
Storage Blk Time (%)				0	89	0						
Queuing Penalty (veh)				0	330	0						

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	SB	SB	SB	SB
Directions Served	L	T	T	TR
Maximum Queue (ft)	51	181	197	210
Average Queue (ft)	9	120	179	184
95th Queue (ft)	35	214	192	198
Link Distance (ft)				
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	175			300
Storage Blk Time (%)	6			
Queuing Penalty (veh)	1			

Zone Summary

Zone wide Queuing Penalty: 389

2032 Build with Future Improvements Weekday P.M.

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	4:00	4:00	4:00	4:00	4:00	4:00
End Time	5:30	5:30	5:30	5:30	5:30	5:30
Total Time (min)	90	90	90	90	90	90
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	7267	7135	7277	7067	7046	7155
Vehs Exited	7262	7119	7277	7014	7026	7141
Starting Vehs	441	407	429	378	400	414
Ending Vehs	446	423	429	431	420	431
Travel Distance (mi)	4795	4713	4748	4648	4608	4702
Travel Time (hr)	1632.7	1446.8	1433.9	1539.5	1479.2	1506.4
Total Delay (hr)	1465.8	1282.8	1268.6	1377.5	1318.0	1342.6
Total Stops	15433	15016	15806	14707	14126	15017
Fuel Used (gal)	529.7	484.7	481.9	502.3	488.2	497.4

Interval #0 Information Seeding

Start Time	4:00
End Time	4:30
Total Time (min)	30
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information R1

Start Time	4:30
End Time	4:45
Total Time (min)	15
Volumes adjusted by Growth Factors, Anti PHF.	

Run Number	1	2	3	4	5	Avg
Vehs Entered	1797	1709	1800	1710	1735	1749
Vehs Exited	1788	1715	1809	1676	1729	1743
Starting Vehs	441	407	429	378	400	414
Ending Vehs	450	401	420	412	406	418
Travel Distance (mi)	1189	1120	1151	1107	1142	1142
Travel Time (hr)	286.2	244.6	241.6	255.6	253.6	256.3
Total Delay (hr)	245.1	205.6	201.4	217.0	213.7	216.6
Total Stops	3766	3474	3610	3395	3383	3522
Fuel Used (gal)	104.6	92.3	92.9	94.2	94.9	95.8

Interval #2 Information R2

Start Time	4:45
End Time	5:00
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1902	1888	1895	1873	1826	1871
Vehs Exited	1861	1832	1800	1820	1815	1828
Starting Vehs	450	401	420	412	406	418
Ending Vehs	491	457	515	465	417	472
Travel Distance (mi)	1240	1227	1210	1212	1167	1211
Travel Time (hr)	370.4	331.0	324.2	354.5	341.5	344.3
Total Delay (hr)	327.1	288.4	282.0	312.3	300.5	302.0
Total Stops	4208	3851	4178	4033	3676	3989
Fuel Used (gal)	124.9	115.7	113.1	120.2	115.9	118.0

Interval #3 Information R3

Start Time	5:00
End Time	5:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1781	1706	1789	1730	1772	1757
Vehs Exited	1839	1755	1848	1775	1771	1797
Starting Vehs	491	457	515	465	417	472
Ending Vehs	433	408	456	420	418	429
Travel Distance (mi)	1193	1149	1206	1170	1162	1176
Travel Time (hr)	456.6	409.4	403.2	434.6	414.0	423.6
Total Delay (hr)	415.0	369.4	361.5	393.9	373.5	382.6
Total Stops	3746	3780	4038	3740	3538	3771
Fuel Used (gal)	143.1	131.5	131.2	137.3	133.1	135.2

Interval #4 Information R4

Start Time	5:15
End Time	5:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	1787	1832	1793	1754	1713	1775
Vehs Exited	1774	1817	1820	1743	1711	1774
Starting Vehs	433	408	456	420	418	429
Ending Vehs	446	423	429	431	420	431
Travel Distance (mi)	1174	1216	1181	1160	1138	1174
Travel Time (hr)	519.5	461.9	464.9	494.8	470.1	482.2
Total Delay (hr)	478.6	419.4	423.8	454.4	430.3	441.3
Total Stops	3713	3911	3980	3539	3529	3733
Fuel Used (gal)	157.1	145.2	144.7	150.6	144.3	148.4

Intersection: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Steele Road/Dracut Road

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	R	LT	TR	LT	TR
Maximum Queue (ft)	84	222	192	328	300	224	23
Average Queue (ft)	29	117	71	203	157	23	1
95th Queue (ft)	65	208	169	298	285	136	17
Link Distance (ft)	488	546	546	659		1590	1590
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)					300		
Storage Blk Time (%)				1	0		
Queuing Penalty (veh)				2	0		

Intersection: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Movement	EB	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	L	L	TR	LTR	L	T	TR	L	T	T	R	
Maximum Queue (ft)	237	203	58	47	89	329	327	60	156	157	93	
Average Queue (ft)	131	93	17	15	29	183	192	22	71	67	27	
95th Queue (ft)	206	180	43	40	66	294	296	54	136	130	71	
Link Distance (ft)	447	447	447	496		1590	1590		883	883	883	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)					300				350			
Storage Blk Time (%)							1					
Queuing Penalty (veh)							0					

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	R	L	L	T	R	L	L	T	T
Maximum Queue (ft)	184	199	300	165	53	97	388	250	82	105	400	376
Average Queue (ft)	134	138	48	79	10	39	388	250	33	57	259	205
95th Queue (ft)	200	216	221	150	35	79	388	252	72	98	366	319
Link Distance (ft)			324				373				883	883
Upstream Blk Time (%)			1				95					
Queuing Penalty (veh)			0				0					
Storage Bay Dist (ft)	175	175		175	150	150		200	350	350		
Storage Blk Time (%)	3	6		1				97				2
Queuing Penalty (veh)	5	9		4				104				2

Intersection: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Movement	NB	SB	SB	SB	SB	SB	SB
Directions Served	TR	L	L	T	T	T	R
Maximum Queue (ft)	306	162	186	328	862	343	144
Average Queue (ft)	162	81	102	101	176	80	58
95th Queue (ft)	251	139	159	239	567	241	120
Link Distance (ft)	883			1092	1092	1092	
Upstream Blk Time (%)					0	0	
Queuing Penalty (veh)					0	0	
Storage Bay Dist (ft)		350	350				400
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 4: Lowell Road (Route 3A) & Sagamore Bridge Road

Movement	EB	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	R	L	L	L	T	T	T	T	R	R
Maximum Queue (ft)	895	922	915	460	584	892	448	326	401	645	847	250
Average Queue (ft)	811	891	891	322	421	445	126	185	239	308	394	158
95th Queue (ft)	953	905	905	431	572	693	305	271	391	624	914	356
Link Distance (ft)	873	873	873				1092	1092	1092	866	866	866
Upstream Blk Time (%)	5	46	44								0	1
Queuing Penalty (veh)	0	0	0								1	4
Storage Bay Dist (ft)				525	525							200
Storage Blk Time (%)				0	2	2						5
Queuing Penalty (veh)				0	8	21						37

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	EB	EB	EB	WB	WB	WB	B109	NB	NB	NB	NB	NB
Directions Served	LT	R	R	L	LT	R	T	L	T	T	T	R
Maximum Queue (ft)	263	235	229	250	541	115	314	183	208	199	190	198
Average Queue (ft)	110	98	113	224	540	42	300	95	137	135	122	94
95th Queue (ft)	202	194	191	326	554	131	393	161	188	184	174	158
Link Distance (ft)	738				470		299		866	866	866	
Upstream Blk Time (%)					81		83					
Queuing Penalty (veh)					0		0					
Storage Bay Dist (ft)		250	250	200		75		575				275
Storage Blk Time (%)	0	0	0	5	84							0
Queuing Penalty (veh)	1	0	0	14	227							0

Intersection: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Movement	NB	SB	SB	SB	SB
Directions Served	R	L	T	T	TR
Maximum Queue (ft)	135	160	187	191	212
Average Queue (ft)	42	62	107	179	189
95th Queue (ft)	97	126	204	209	202
Link Distance (ft)					
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	275	175			300
Storage Blk Time (%)		1	6		
Queuing Penalty (veh)		2	5		

Zone Summary

Zone wide Queuing Penalty: 448

Appendix G

Existing Freeway Traffic Volume Data



Volume Count Report

LOCATION INFO	
Location ID	81315305
Type	SPOT
Funct'l Class	3
Located On	Ramp Cicumferential To Daniel Webster Hwy
Loc On Alias	CIRCUMFERENCE RD EB OFF RAMP TO DW HWY
Direction	RAMP
County	HILLSBOROUGH
Community	NASHUA
MPO ID	
HPMS ID	
Agency	New Hampshire DOT

COUNT DATA INFO	
Count Status	Accepted
Start Date	Thu 9/20/2018
End Date	Fri 9/21/2018
Start Time	12:00:00 AM
End Time	12:00:00 AM
Direction	
Notes	nhdot
Station	813153050000
Study	
Speed Limit	
Description	
Sensor Type	Axle/Tube
Source	
Latitude,Longitude	

INTERVAL:60-MIN		Hourly Count
Time		
0:00-1:00		9
1:00-2:00		7
2:00-3:00		4
3:00-4:00		2
4:00-5:00		8
5:00-6:00		27
6:00-7:00		48
7:00-8:00		86
8:00-9:00		104
9:00-10:00		168
10:00-11:00		166
11:00-12:00		158
12:00-13:00		170
13:00-14:00		179
14:00-15:00		187
15:00-16:00		218
16:00-17:00		229
17:00-18:00		246
18:00-19:00		216
19:00-20:00		131
20:00-21:00		88
21:00-22:00		54
22:00-23:00		23
23:00-24:00		27
Total		2,555
AADT		2,228
AM Peak	09:00-10:00	168
PM Peak	17:00-18:00	246



Volume Count Report

LOCATION INFO	
Location ID	81315306
Type	SPOT
Funct'l Class	3
Located On	Ramp Daniel Webster Hwy To Circumferential
Loc On Alias	CIRCUMFERENCE RD EB ON RAMP FROM DW HWY
Direction	1-WAY
County	HILLSBOROUGH
Community	NASHUA
MPO ID	
HPMS ID	
Agency	New Hampshire DOT

COUNT DATA INFO	
Count Status	Accepted
Start Date	Thu 9/20/2018
End Date	Fri 9/21/2018
Start Time	12:00:00 AM
End Time	12:00:00 AM
Direction	
Notes	nhdot
Station	813153060000
Study	
Speed Limit	
Description	
Sensor Type	Axle/Tube
Source	
Latitude,Longitude	

INTERVAL:60-MIN	
Time	Hourly Count
0:00-1:00	9
1:00-2:00	6
2:00-3:00	8
3:00-4:00	8
4:00-5:00	12
5:00-6:00	53
6:00-7:00	100
7:00-8:00	162
8:00-9:00	195
9:00-10:00	235
10:00-11:00	310
11:00-12:00	425
12:00-13:00	499
13:00-14:00	524
14:00-15:00	492
15:00-16:00	514
16:00-17:00	473
17:00-18:00	554
18:00-19:00	443
19:00-20:00	416
20:00-21:00	321
21:00-22:00	207
22:00-23:00	73
23:00-24:00	38
Total	6,077
AADT	5,299
AM Peak	11:00-12:00 425
PM Peak	17:00-18:00 554



Volume Count Report

LOCATION INFO	
Location ID	81315311
Type	SPOT
Funct'l Class	3
Located On	FE Everett Tpke NB Exit 2 On ramp (Circumferential)
Loc On Alias	FEET SB OFF RAMP EXIT 2 TO CIRCUMFERENCE RD EB
Direction	RAMP
County	HILLSBOROUGH
Community	NASHUA
MPO ID	
HPMS ID	
Agency	New Hampshire DOT

COUNT DATA INFO	
Count Status	Accepted
Start Date	Thu 9/20/2018
End Date	Fri 9/21/2018
Start Time	12:00:00 AM
End Time	12:00:00 AM
Direction	
Notes	nhdot
Station	813153110000
Study	
Speed Limit	
Description	
Sensor Type	Axle/Tube
Source	
Latitude,Longitude	

INTERVAL:60-MIN	
Time	Hourly Count
0:00-1:00	41
1:00-2:00	16
2:00-3:00	19
3:00-4:00	18
4:00-5:00	58
5:00-6:00	221
6:00-7:00	609
7:00-8:00	1,022
8:00-9:00	847
9:00-10:00	551
10:00-11:00	491
11:00-12:00	460
12:00-13:00	503
13:00-14:00	504
14:00-15:00	607
15:00-16:00	738
16:00-17:00	781
17:00-18:00	939
18:00-19:00	655
19:00-20:00	403
20:00-21:00	320
21:00-22:00	264
22:00-23:00	155
23:00-24:00	83
Total	10,305
AADT	8,908
AM Peak	07:00-08:00 1,022
PM Peak	17:00-18:00 939



Volume Count Report

LOCATION INFO	
Location ID	81315312
Type	SPOT
Funct'l Class	2
Located On	FE Everett Tpke NB Exit 2 Off ramp (Cicumferential)
Loc On Alias	FEET NB OFF RAMP EXIT 2 TO CIRCUMFERENCE RD EB
Direction	RAMP
County	HILLSBOROUGH
Community	NASHUA
MPO ID	
HPMS ID	
Agency	New Hampshire DOT

COUNT DATA INFO	
Count Status	Accepted
Start Date	Thu 9/20/2018
End Date	Fri 9/21/2018
Start Time	12:00:00 AM
End Time	12:00:00 AM
Direction	
Notes	nhdot
Station	813153120000
Study	
Speed Limit	
Description	
Sensor Type	Axle/Tube
Source	
Latitude,Longitude	

INTERVAL:60-MIN	
Time	Hourly Count
0:00-1:00	60
1:00-2:00	43
2:00-3:00	42
3:00-4:00	34
4:00-5:00	55
5:00-6:00	175
6:00-7:00	364
7:00-8:00	530
8:00-9:00	504
9:00-10:00	509
10:00-11:00	520
11:00-12:00	542
12:00-13:00	636
13:00-14:00	710
14:00-15:00	895
15:00-16:00	1,156
16:00-17:00	1,349
17:00-18:00	1,298
18:00-19:00	957
19:00-20:00	629
20:00-21:00	443
21:00-22:00	362
22:00-23:00	210
23:00-24:00	146
Total	12,169
AADT	10,520
AM Peak	11:00-12:00 542
PM Peak	16:00-17:00 1,349



Transportation Data Management System

Volume Count Report

LOCATION INFO	
Location ID	81315278
Type	SPOT
Funct'l Class	2
Located On	FE Everett Tpke NB Exit 2 On ramp (Cicumferential)
Loc On Alias	FEET NB ON RAMP EXIT 2
Direction	RAMP
County	HILLSBOROUGH
Community	NASHUA
MPO ID	
HPMS ID	
Agency	New Hampshire DOT

COUNT DATA INFO	
Count Status	Accepted
Start Date	Wed 10/3/2018
End Date	Thu 10/4/2018
Start Time	12:00:00 AM
End Time	12:00:00 AM
Direction	
Notes	nhdot
Station	813152780000
Study	
Speed Limit	
Description	
Sensor Type	Axle/Tube
Source	
Latitude,Longitude	

INTERVAL:60-MIN	
Time	Hourly Count
0:00-1:00	37
1:00-2:00	18
2:00-3:00	7
3:00-4:00	25
4:00-5:00	65
5:00-6:00	184
6:00-7:00	460
7:00-8:00	977
8:00-9:00	708
9:00-10:00	512
10:00-11:00	481
11:00-12:00	559
12:00-13:00	663
13:00-14:00	575
14:00-15:00	837
15:00-16:00	1,055
16:00-17:00	1,112
17:00-18:00	1,268
18:00-19:00	872
19:00-20:00	557
20:00-21:00	362
21:00-22:00	242
22:00-23:00	133
23:00-24:00	73
Total	11,782
AADT	10,588
AM Peak	07:00-08:00 977
PM Peak	17:00-18:00 1,268



Transportation Data Management System

Volume Count Report

LOCATION INFO	
Location ID	81315307
Type	SPOT
Funct'l Class	3
Located On	Ramp Circumferential To Daniel Webster Hwy
Loc On Alias	CIRCUMFERENCE RD WB OFF RAMP TO DW HWY
Direction	RAMP
County	HILLSBOROUGH
Community	NASHUA
MPO ID	
HPMS ID	
Agency	New Hampshire DOT

COUNT DATA INFO	
Count Status	Accepted
Start Date	Wed 10/10/2018
End Date	Thu 10/11/2018
Start Time	12:00:00 AM
End Time	12:00:00 AM
Direction	
Notes	nhdot
Station	813153070000
Study	
Speed Limit	
Description	
Sensor Type	Axle/Tube
Source	
Latitude,Longitude	

INTERVAL:60-MIN	
Time	Hourly Count
0:00-1:00	16
1:00-2:00	9
2:00-3:00	6
3:00-4:00	14
4:00-5:00	18
5:00-6:00	45
6:00-7:00	97
7:00-8:00	290
8:00-9:00	344
9:00-10:00	413
10:00-11:00	345
11:00-12:00	434
12:00-13:00	490
13:00-14:00	363
14:00-15:00	356
15:00-16:00	422
16:00-17:00	407
17:00-18:00	399
18:00-19:00	409
19:00-20:00	248
20:00-21:00	149
21:00-22:00	64
22:00-23:00	32
23:00-24:00	29
Total	5,399
AADT	4,803
AM Peak	11:00-12:00 434
PM Peak	12:00-13:00 490



Volume Count Report

LOCATION INFO	
Location ID	81315308
Type	SPOT
Funct'l Class	3
Located On	Ramp Daniel Webster Hwy To Circumferential
Loc On Alias	CIRCUMFERENCE RD WB ON RAMP FROM DW HWY
Direction	RAMP
County	HILLSBOROUGH
Community	NASHUA
MPO ID	
HPMS ID	
Agency	New Hampshire DOT

COUNT DATA INFO	
Count Status	Accepted
Start Date	Thu 9/20/2018
End Date	Fri 9/21/2018
Start Time	12:00:00 AM
End Time	12:00:00 AM
Direction	
Notes	nhdot
Station	813153080000
Study	
Speed Limit	
Description	
Sensor Type	Axle/Tube
Source	
Latitude,Longitude	

INTERVAL:60-MIN	
Time	Hourly Count
0:00-1:00	13
1:00-2:00	3
2:00-3:00	10
3:00-4:00	7
4:00-5:00	37
5:00-6:00	142
6:00-7:00	173
7:00-8:00	222
8:00-9:00	221
9:00-10:00	237
10:00-11:00	241
11:00-12:00	258
12:00-13:00	262
13:00-14:00	304
14:00-15:00	297
15:00-16:00	307
16:00-17:00	309
17:00-18:00	342
18:00-19:00	305
19:00-20:00	267
20:00-21:00	181
21:00-22:00	131
22:00-23:00	47
23:00-24:00	21
Total	4,337
AADT	3,782
AM Peak	11:00-12:00 258
PM Peak	17:00-18:00 342

Analysis Segment						
Circumferential Highway EB Weave (From the FEET to DW Highway)						
Segment	Initial Volume	Distribution	Distribution Volume	Merge Volume	Segment	Final Volume
Everett Turnpike SB	1109	20%	21	21	Sagamore Bridge Road EB_2	1535
Everett Turnpike NB	530	80%	83	447	Daniel Webster Highway Exit	104
Analysis Segment						
Circumferential Highway WB Weave (From DW Highway to FEET)						
Segment	Initial Volume	Distribution	Distribution Volume	Merge Volume	Segment	Final Volume
Sagamore Bridge Road WB_2	1968	60%	133	888	Sagamore Bridge Road WB Exit to Everett Turnpike SB	1213
Daniel Webster Highway Entrance to Sagamore Bridge Road WB	222	40%	89	133	Sagamore Bridge Road WB Exit to Everett Turnpike NB	977
Analysis Segment						
Circumferential Highway WB Weave (From Lowell Rd to DW Highway)						
Segment	Initial Volume	Distribution	Distribution Volume	Merge Volume	Segment	Final Volume
Lowell Road NB to Sagamore Bridge Road WB	861	35%	120	120	Sagamore Bridge Road WB_2	1968
Lowell Road SB to Sagamore Bridge Road WB	1451	65%	224	1227	Daniel Webster Highway Exit	344

Demand Data	Volume
Freeway to Freeway	1088
Ramp to Freeway	447
Ramp to Ramp	83
Freeway to Ramp	21
Freeway to Freeway	1080
Ramp to Freeway	133
Ramp to Ramp	89
Freeway to Ramp	888
Freeway to Freeway	741
Ramp to Freeway	1227
Ramp to Ramp	224
Freeway to Ramp	120

Analysis Segment						
Circumferential Highway EB Weave (From the FEET to DW Highway)						
Segment	Initial Volume	Distribution	Distribution Volume	Merge Volume	Segment	Final Volume
Everett Turnpike SB	929	20%	49	49	Sagamore Bridge Road EB_2	2032
Everett Turnpike NB	1349	80%	197	1152	Daniel Webster Highway Exit	246
Analysis Segment						
Circumferential Highway WB Weave (From DW Highway to FEET)						
Segment	Initial Volume	Distribution	Distribution Volume	Merge Volume	Segment	Final Volume
Sagamore Bridge Road WB_2	1801	60%	205	1131	Sagamore Bridge Road WB Exit to Everett Turnpike SB	875
Daniel Webster Highway Entrance to Sagamore Bridge Road WB	342	40%	137	205	Sagamore Bridge Road WB Exit to Everett Turnpike NB	1268
Analysis Segment						
Circumferential Highway WB Weave (From Lowell Rd to DW Highway)						
Segment	Initial Volume	Distribution	Distribution Volume	Merge Volume	Segment	Final Volume
Lowell Road NB to Sagamore Bridge Road WB	1025	45%	183	183	Sagamore Bridge Road WB_2	1801
Lowell Road SB to Sagamore Bridge Road WB	1183	55%	224	959	Daniel Webster Highway Exit	407

Demand Data	Volume
Freeway to Freeway	880
Ramp to Freeway	1152
Ramp to Ramp	197
Freeway to Ramp	49
Freeway to Freeway	670
Ramp to Freeway	205
Ramp to Ramp	137
Freeway to Ramp	1131
Freeway to Freeway	842
Ramp to Freeway	959
Ramp to Ramp	224
Freeway to Ramp	183

Appendix H

Capacity Analysis – 2019 Existing Freeway Traffic Conditions

2019 Existing Freeway Weekday A.M.

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2019
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	640	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	1088	447	83	21
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	1216	500	93	23
Weaving Flow Rate (wv), pc/h	523	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1309	Density-Based Capacity (ciWL), pc/h/ln		1834
Total Flow Rate (v), pc/h	1832	Demand Flow-Based Capacity (ciW), pc/h		8421
Volume Ratio (VR)	0.285	Weaving Segment Capacity (cw), veh/h		3492
Minimum Lane Change Rate (LCMIN), lc/h	523	Adjusted Weaving Area Capacity, pc/h		3668
Maximum Weaving Length (LMAX), ft	5424	Volume-to-Capacity Ratio (v/c)		0.50

Speed and Density

Non-Weaving Vehicle Index (INW)	84	Average Weaving Speed (SW), mi/h	42.5
Non-Weaving Lane Change Rate (LCNW), lc/h	231	Average Non-Weaving Speed (SNW), mi/h	41.8
Weaving Lane Change Rate (LCW), lc/h	573	Average Speed (S), mi/h	42.0
Weaving Lane Change Rate (LCAII), lc/h	804	Density (D), pc/mi/ln	21.8
Weaving Intensity Factor (W)	0.271	Level of Service (LOS)	C

HCS7 Freeway Merge Report

Project Information

Analyst	CJM	Date	4/21/2020
Agency	Langan	Analysis Year	2019
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	1535	195
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	1715	218
Capacity (c), pc/h	6750	1900
Volume-to-Capacity Ratio (v/c)	0.29	0.11

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.287
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	686
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.600	Outer Lanes Freeway Speed (SO), mi/h	49.3
Flow in Lanes 1 and 2 (v12), pc/h	1029	Ramp Junction Speed (S), mi/h	48.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	1247	Average Density (D), pc/mi/ln	13.3
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	10.2

HCS7 Freeway Merge Report

Project Information

Analyst	CJM	Date	7/8/2020
Agency	Langan	Analysis Year	2019
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	861	1451
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	962	1621
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.57	0.85

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.283
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	962	Ramp Junction Speed (S), mi/h	47.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	2583	Average Density (D), pc/mi/ln	27.1
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	15.5

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2019
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	3600	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	741	1227	224	120
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	828	1371	250	134
Weaving Flow Rate (w), pc/h	1505	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1078	Density-Based Capacity (ciWL), pc/h/ln		1801
Total Flow Rate (v), pc/h	2583	Demand Flow-Based Capacity (ciW), pc/h		4117
Volume Ratio (VR)	0.583	Weaving Segment Capacity (cw), veh/h		3429
Minimum Lane Change Rate (LCMIN), lc/h	1505	Adjusted Weaving Area Capacity, pc/h		3602
Maximum Weaving Length (LMAX), ft	8813	Volume-to-Capacity Ratio (v/c)		0.72

Speed and Density

Non-Weaving Vehicle Index (INW)	388	Average Weaving Speed (SW), mi/h	43.7
Non-Weaving Lane Change Rate (LCNW), lc/h	1788	Average Non-Weaving Speed (SNW), mi/h	33.0
Weaving Lane Change Rate (LCW), lc/h	1661	Average Speed (S), mi/h	38.5
Weaving Lane Change Rate (LCAII), lc/h	3449	Density (D), pc/mi/ln	33.5
Weaving Intensity Factor (W)	0.218	Level of Service (LOS)	D

HCS7 Freeway Diverge Report

Project Information

Analyst	CJM	Date	4/21/2020
Agency	Langan	Analysis Year	2019
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2312	344
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	2584	384
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.57	0.20

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (Ds)	0.528
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	48.1
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	2584	Ramp Junction Speed (S), mi/h	48.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	26.9
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	13.0

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2019
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	820	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	1080	133	89	888
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	1207	149	99	992
Weaving Flow Rate (w), pc/h	1141	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1306	Density-Based Capacity (ciWL), pc/h/ln		1694
Total Flow Rate (v), pc/h	2447	Demand Flow-Based Capacity (ciW), pc/h		5150
Volume Ratio (VR)	0.466	Weaving Segment Capacity (cw), veh/h		3225
Minimum Lane Change Rate (LCMIN), lc/h	1141	Adjusted Weaving Area Capacity, pc/h		3388
Maximum Weaving Length (LMAX), ft	7432	Volume-to-Capacity Ratio (v/c)		0.72

Speed and Density

Non-Weaving Vehicle Index (INW)	107	Average Weaving Speed (SW), mi/h	40.5
Non-Weaving Lane Change Rate (LCNW), lc/h	328	Average Non-Weaving Speed (SNW), mi/h	35.9
Weaving Lane Change Rate (LCW), lc/h	1203	Average Speed (S), mi/h	37.9
Weaving Lane Change Rate (LCAII), lc/h	1531	Density (D), pc/mi/ln	32.3
Weaving Intensity Factor (W)	0.370	Level of Service (LOS)	D

2019 Existing Freeway Weekday P.M.

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2019
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	640	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	880	1152	197	49
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	983	1287	220	55
Weaving Flow Rate (w), pc/h	1342	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1203	Density-Based Capacity (ciWL), pc/h/ln		1626
Total Flow Rate (v), pc/h	2545	Demand Flow-Based Capacity (ciW), pc/h		4554
Volume Ratio (VR)	0.527	Weaving Segment Capacity (cw), veh/h		3096
Minimum Lane Change Rate (LCMIN), lc/h	1342	Adjusted Weaving Area Capacity, pc/h		3252
Maximum Weaving Length (LMAX), ft	8144	Volume-to-Capacity Ratio (v/c)		0.78

Speed and Density

Non-Weaving Vehicle Index (INW)	77	Average Weaving Speed (SW), mi/h	38.9
Non-Weaving Lane Change Rate (LCNW), lc/h	209	Average Non-Weaving Speed (SNW), mi/h	34.2
Weaving Lane Change Rate (LCW), lc/h	1392	Average Speed (S), mi/h	36.5
Weaving Lane Change Rate (LCAII), lc/h	1601	Density (D), pc/mi/ln	34.9
Weaving Intensity Factor (W)	0.466	Level of Service (LOS)	D

HCS7 Freeway Merge Report

Project Information

Analyst	CJM	Date	4/21/2020
Agency	Langan	Analysis Year	2019
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2032	554
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	2271	619
Capacity (c), pc/h	6750	1900
Volume-to-Capacity Ratio (v/c)	0.43	0.33

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.301
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (VOA), pc/mi/ln	908
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.600	Outer Lanes Freeway Speed (SO), mi/h	48.5
Flow in Lanes 1 and 2 (v12), pc/h	1363	Ramp Junction Speed (S), mi/h	47.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	1982	Average Density (D), pc/mi/ln	20.1
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	15.7

HCS7 Freeway Merge Report

Project Information

Analyst	CJM	Date	7/8/2020
Agency	Langan	Analysis Year	2019
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	1025	1183
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	1145	1322
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.55	0.70

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.277
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (VOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.8
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	1145	Ramp Junction Speed (S), mi/h	47.8
Flow Entering Ramp-Infl. Area (vR12), pc/h	2467	Average Density (D), pc/mi/ln	25.8
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	14.8

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2019
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	3600	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	842	959	224	183
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	941	1072	250	204
Weaving Flow Rate (w), pc/h	1276	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1191	Density-Based Capacity (ciWL), pc/h/ln		1861
Total Flow Rate (v), pc/h	2467	Demand Flow-Based Capacity (ciW), pc/h		4642
Volume Ratio (VR)	0.517	Weaving Segment Capacity (cw), veh/h		3543
Minimum Lane Change Rate (LCMIN), lc/h	1276	Adjusted Weaving Area Capacity, pc/h		3722
Maximum Weaving Length (LMAX), ft	8026	Volume-to-Capacity Ratio (v/c)		0.66

Speed and Density

Non-Weaving Vehicle Index (INW)	429	Average Weaving Speed (SW), mi/h	44.0
Non-Weaving Lane Change Rate (LCNW), lc/h	1811	Average Non-Weaving Speed (SNW), mi/h	34.9
Weaving Lane Change Rate (LCW), lc/h	1432	Average Speed (S), mi/h	39.1
Weaving Lane Change Rate (LCAII), lc/h	3243	Density (D), pc/mi/ln	31.5
Weaving Intensity Factor (W)	0.208	Level of Service (LOS)	D

HCS7 Freeway Diverge Report

Project Information

Analyst	CJM	Date	4/21/2020
Agency	Langan	Analysis Year	2019
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2208	407
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	2467	455
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.55	0.24

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (Ds)	0.534
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	48.1
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	2467	Ramp Junction Speed (S), mi/h	48.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	25.6
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	12.0

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2019
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	820	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	670	205	137	1131
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	749	229	153	1264
Weaving Flow Rate (w), pc/h	1493	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	902	Density-Based Capacity (ciWL), pc/h/ln		1551
Total Flow Rate (v), pc/h	2395	Demand Flow-Based Capacity (ciW), pc/h		3852
Volume Ratio (VR)	0.623	Weaving Segment Capacity (cw), veh/h		2953
Minimum Lane Change Rate (LCMIN), lc/h	1493	Adjusted Weaving Area Capacity, pc/h		3102
Maximum Weaving Length (LMAX), ft	9299	Volume-to-Capacity Ratio (v/c)		0.77

Speed and Density

Non-Weaving Vehicle Index (INW)	74	Average Weaving Speed (SW), mi/h	39.6
Non-Weaving Lane Change Rate (LCNW), lc/h	245	Average Non-Weaving Speed (SNW), mi/h	33.5
Weaving Lane Change Rate (LCW), lc/h	1555	Average Speed (S), mi/h	37.1
Weaving Lane Change Rate (LCAII), lc/h	1800	Density (D), pc/mi/ln	32.3
Weaving Intensity Factor (W)	0.420	Level of Service (LOS)	D

Appendix I

Capacity Analysis – 2022 & 2032 No-Build Freeway Traffic Conditions

2022 No-Build Freeway Weekday A.M.

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2022
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	640	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	1141	460	86	21
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	1275	514	96	23
Weaving Flow Rate (w), pc/h	537	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1371	Density-Based Capacity (ciWL), pc/h/ln		1837
Total Flow Rate (v), pc/h	1908	Demand Flow-Based Capacity (ciW), pc/h		8541
Volume Ratio (VR)	0.281	Weaving Segment Capacity (cw), veh/h		3498
Minimum Lane Change Rate (LCMIN), lc/h	537	Adjusted Weaving Area Capacity, pc/h		3674
Maximum Weaving Length (LMAX), ft	5381	Volume-to-Capacity Ratio (v/c)		0.52

Speed and Density

Non-Weaving Vehicle Index (INW)	88	Average Weaving Speed (SW), mi/h	42.4
Non-Weaving Lane Change Rate (LCNW), lc/h	244	Average Non-Weaving Speed (SNW), mi/h	41.6
Weaving Lane Change Rate (LCW), lc/h	587	Average Speed (S), mi/h	41.8
Weaving Lane Change Rate (LCAII), lc/h	831	Density (D), pc/mi/ln	22.8
Weaving Intensity Factor (W)	0.278	Level of Service (LOS)	C

HCS7 Freeway Merge Report

Project Information

Analyst	CJM	Date	4/21/2020
Agency	Langan	Analysis Year	2022
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Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	1601	201
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	1789	225
Capacity (c), pc/h	6750	1900
Volume-to-Capacity Ratio (v/c)	0.30	0.12

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.287
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	716
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.600	Outer Lanes Freeway Speed (SO), mi/h	49.2
Flow in Lanes 1 and 2 (v12), pc/h	1073	Ramp Junction Speed (S), mi/h	48.2
Flow Entering Ramp-Infl. Area (vR12), pc/h	1298	Average Density (D), pc/mi/ln	13.9
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	10.6

HCS7 Freeway Merge Report

Project Information

Analyst	CJM	Date	7/8/2020
Agency	Langan	Analysis Year	2022
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Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	887	1517
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	991	1695
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.60	0.89

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.288
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	991	Ramp Junction Speed (S), mi/h	47.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	2686	Average Density (D), pc/mi/ln	28.2
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	16.3

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
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Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	3600	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	763	1287	230	124
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	853	1438	257	139
Weaving Flow Rate (w), pc/h	1577	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1110	Density-Based Capacity (ciWL), pc/h/ln		1798
Total Flow Rate (v), pc/h	2687	Demand Flow-Based Capacity (ciW), pc/h		4089
Volume Ratio (VR)	0.587	Weaving Segment Capacity (cw), veh/h		3423
Minimum Lane Change Rate (LCMIN), lc/h	1577	Adjusted Weaving Area Capacity, pc/h		3596
Maximum Weaving Length (LMAX), ft	8861	Volume-to-Capacity Ratio (v/c)		0.75

Speed and Density

Non-Weaving Vehicle Index (INW)	400	Average Weaving Speed (SW), mi/h	43.6
Non-Weaving Lane Change Rate (LCNW), lc/h	1795	Average Non-Weaving Speed (SNW), mi/h	32.2
Weaving Lane Change Rate (LCW), lc/h	1733	Average Speed (S), mi/h	38.0
Weaving Lane Change Rate (LCAII), lc/h	3528	Density (D), pc/mi/ln	35.4
Weaving Intensity Factor (W)	0.222	Level of Service (LOS)	E

HCS7 Freeway Diverge Report

Project Information

Analyst	CJM	Date	4/21/2020
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Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2404	354
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	2686	396
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.60	0.21

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (Ds)	0.529
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	48.1
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	2686	Ramp Junction Speed (S), mi/h	48.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	27.9
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	13.9

HCS7 Freeway Weaving Report

Project Information

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Agency	Langan	Analysis Year	2022
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Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	820	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	1135	137	92	915
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	1268	153	103	1022
Weaving Flow Rate (w), pc/h	1175	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1371	Density-Based Capacity (ciWL), pc/h/ln		1698
Total Flow Rate (v), pc/h	2546	Demand Flow-Based Capacity (ciW), pc/h		5195
Volume Ratio (VR)	0.462	Weaving Segment Capacity (cw), veh/h		3233
Minimum Lane Change Rate (LCMIN), lc/h	1175	Adjusted Weaving Area Capacity, pc/h		3396
Maximum Weaving Length (LMAX), ft	7386	Volume-to-Capacity Ratio (v/c)		0.75

Speed and Density

Non-Weaving Vehicle Index (INW)	112	Average Weaving Speed (SW), mi/h	40.4
Non-Weaving Lane Change Rate (LCNW), lc/h	342	Average Non-Weaving Speed (SNW), mi/h	35.4
Weaving Lane Change Rate (LCW), lc/h	1237	Average Speed (S), mi/h	37.5
Weaving Lane Change Rate (LCAII), lc/h	1579	Density (D), pc/mi/ln	33.9
Weaving Intensity Factor (W)	0.379	Level of Service (LOS)	D

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Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	640	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	918	1188	202	51
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	1026	1328	226	57
Weaving Flow Rate (w), pc/h	1385	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1252	Density-Based Capacity (ciWL), pc/h/ln		1628
Total Flow Rate (v), pc/h	2637	Demand Flow-Based Capacity (ciW), pc/h		4571
Volume Ratio (VR)	0.525	Weaving Segment Capacity (cw), veh/h		3100
Minimum Lane Change Rate (LCMIN), lc/h	1385	Adjusted Weaving Area Capacity, pc/h		3256
Maximum Weaving Length (LMAX), ft	8120	Volume-to-Capacity Ratio (v/c)		0.81

Speed and Density

Non-Weaving Vehicle Index (INW)	80	Average Weaving Speed (SW), mi/h	38.7
Non-Weaving Lane Change Rate (LCNW), lc/h	220	Average Non-Weaving Speed (SNW), mi/h	33.7
Weaving Lane Change Rate (LCW), lc/h	1435	Average Speed (S), mi/h	36.2
Weaving Lane Change Rate (LCAII), lc/h	1655	Density (D), pc/mi/ln	36.4
Weaving Intensity Factor (W)	0.478	Level of Service (LOS)	E

HCS7 Freeway Merge Report

Project Information

Analyst	CJM	Date	4/21/2020
Agency	Langan	Analysis Year	2022
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2106	571
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	2353	638
Capacity (c), pc/h	6750	1900
Volume-to-Capacity Ratio (v/c)	0.44	0.34

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.303
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (VOA), pc/mi/ln	941
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.600	Outer Lanes Freeway Speed (SO), mi/h	48.4
Flow in Lanes 1 and 2 (v12), pc/h	1412	Ramp Junction Speed (S), mi/h	47.8
Flow Entering Ramp-Infl. Area (vR12), pc/h	2050	Average Density (D), pc/mi/ln	20.9
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	16.2

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Project Information

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Agency	Langan	Analysis Year	2022
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	1056	1233
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	1180	1378
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.57	0.73

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.281
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (VOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.8
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	1180	Ramp Junction Speed (S), mi/h	47.8
Flow Entering Ramp-Infl. Area (vR12), pc/h	2558	Average Density (D), pc/mi/ln	26.8
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	15.5

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Project Information

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Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	3600	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	867	1003	230	189
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	969	1121	257	211
Weaving Flow Rate (w), pc/h	1332	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1226	Density-Based Capacity (ciWL), pc/h/ln		1858
Total Flow Rate (v), pc/h	2558	Demand Flow-Based Capacity (ciW), pc/h		4607
Volume Ratio (VR)	0.521	Weaving Segment Capacity (cw), veh/h		3538
Minimum Lane Change Rate (LCMIN), lc/h	1332	Adjusted Weaving Area Capacity, pc/h		3716
Maximum Weaving Length (LMAX), ft	8073	Volume-to-Capacity Ratio (v/c)		0.69

Speed and Density

Non-Weaving Vehicle Index (INW)	441	Average Weaving Speed (SW), mi/h	43.9
Non-Weaving Lane Change Rate (LCNW), lc/h	1819	Average Non-Weaving Speed (SNW), mi/h	34.3
Weaving Lane Change Rate (LCW), lc/h	1488	Average Speed (S), mi/h	38.7
Weaving Lane Change Rate (LCAII), lc/h	3307	Density (D), pc/mi/ln	33.0
Weaving Intensity Factor (W)	0.211	Level of Service (LOS)	D

HCS7 Freeway Diverge Report

Project Information

Analyst	CJM	Date	4/21/2020
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Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2289	419
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	2558	468
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.57	0.25

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (Ds)	0.535
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	48.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	2558	Ramp Junction Speed (S), mi/h	48.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	26.6
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	12.8

HCS7 Freeway Weaving Report

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Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	820	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	705	211	141	1165
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	788	236	158	1302
Weaving Flow Rate (w), pc/h	1538	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	946	Density-Based Capacity (ciWL), pc/h/ln		1555
Total Flow Rate (v), pc/h	2484	Demand Flow-Based Capacity (ciW), pc/h		3877
Volume Ratio (VR)	0.619	Weaving Segment Capacity (cw), veh/h		2961
Minimum Lane Change Rate (LCMIN), lc/h	1538	Adjusted Weaving Area Capacity, pc/h		3110
Maximum Weaving Length (LMAX), ft	9250	Volume-to-Capacity Ratio (v/c)		0.80

Speed and Density

Non-Weaving Vehicle Index (INW)	78	Average Weaving Speed (SW), mi/h	39.5
Non-Weaving Lane Change Rate (LCNW), lc/h	254	Average Non-Weaving Speed (SNW), mi/h	33.0
Weaving Lane Change Rate (LCW), lc/h	1600	Average Speed (S), mi/h	36.7
Weaving Lane Change Rate (LCAII), lc/h	1854	Density (D), pc/mi/ln	33.8
Weaving Intensity Factor (W)	0.430	Level of Service (LOS)	D

2032 No-Build Freeway Weekday A.M.

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2032
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	640	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	1257	509	94	24
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	1405	569	105	27
Weaving Flow Rate (w), pc/h	596	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1510	Density-Based Capacity (ciWL), pc/h/ln		1836
Total Flow Rate (v), pc/h	2106	Demand Flow-Based Capacity (ciW), pc/h		8481
Volume Ratio (VR)	0.283	Weaving Segment Capacity (cw), veh/h		3496
Minimum Lane Change Rate (LCMIN), lc/h	596	Adjusted Weaving Area Capacity, pc/h		3672
Maximum Weaving Length (LMAX), ft	5402	Volume-to-Capacity Ratio (v/c)		0.57

Speed and Density

Non-Weaving Vehicle Index (INW)	97	Average Weaving Speed (SW), mi/h	41.9
Non-Weaving Lane Change Rate (LCNW), lc/h	273	Average Non-Weaving Speed (SNW), mi/h	40.7
Weaving Lane Change Rate (LCW), lc/h	646	Average Speed (S), mi/h	41.0
Weaving Lane Change Rate (LCAII), lc/h	919	Density (D), pc/mi/ln	25.7
Weaving Intensity Factor (W)	0.301	Level of Service (LOS)	C

HCS7 Freeway Merge Report

Project Information

Analyst	CJM	Date	4/21/2020
Agency	Langan	Analysis Year	2032
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	1766	222
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	1973	248
Capacity (c), pc/h	6750	1900
Volume-to-Capacity Ratio (v/c)	0.33	0.13

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.289
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	789
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.600	Outer Lanes Freeway Speed (SO), mi/h	49.0
Flow in Lanes 1 and 2 (v12), pc/h	1184	Ramp Junction Speed (S), mi/h	48.2
Flow Entering Ramp-Infl. Area (vR12), pc/h	1432	Average Density (D), pc/mi/ln	15.4
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	11.6

HCS7 Freeway Merge Report

Project Information

Analyst	CJM	Date	7/8/2020
Agency	Langan	Analysis Year	2032
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	980	1673
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	1095	1870
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.66	0.98

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.307
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (VOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.5
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	1095	Ramp Junction Speed (S), mi/h	47.5
Flow Entering Ramp-Infl. Area (vR12), pc/h	2965	Average Density (D), pc/mi/ln	31.2
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	18.4

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2032
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	3600	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	843	1418	255	137
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	942	1585	285	153
Weaving Flow Rate (w), pc/h	1738	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1227	Density-Based Capacity (ciWL), pc/h/ln		1798
Total Flow Rate (v), pc/h	2965	Demand Flow-Based Capacity (ciW), pc/h		4096
Volume Ratio (VR)	0.586	Weaving Segment Capacity (cw), veh/h		3423
Minimum Lane Change Rate (LCMIN), lc/h	1738	Adjusted Weaving Area Capacity, pc/h		3596
Maximum Weaving Length (LMAX), ft	8849	Volume-to-Capacity Ratio (v/c)		0.82

Speed and Density

Non-Weaving Vehicle Index (INW)	442	Average Weaving Speed (SW), mi/h	43.4
Non-Weaving Lane Change Rate (LCNW), lc/h	1819	Average Non-Weaving Speed (SNW), mi/h	30.4
Weaving Lane Change Rate (LCW), lc/h	1894	Average Speed (S), mi/h	36.9
Weaving Lane Change Rate (LCAII), lc/h	3713	Density (D), pc/mi/ln	40.2
Weaving Intensity Factor (W)	0.232	Level of Service (LOS)	E

HCS7 Freeway Diverge Report

Project Information

Analyst	CJM	Date	4/21/2020
Agency	Langan	Analysis Year	2032
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2653	392
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	2965	438
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.66	0.23

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (Ds)	0.532
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	48.1
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	2965	Ramp Junction Speed (S), mi/h	48.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	30.8
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	16.3

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2032
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Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	820	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	1250	152	101	1011
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	1397	170	113	1130
Weaving Flow Rate (w), pc/h	1300	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1510	Density-Based Capacity (ciWL), pc/h/ln		1697
Total Flow Rate (v), pc/h	2810	Demand Flow-Based Capacity (ciW), pc/h		5184
Volume Ratio (VR)	0.463	Weaving Segment Capacity (cw), veh/h		3231
Minimum Lane Change Rate (LCMIN), lc/h	1300	Adjusted Weaving Area Capacity, pc/h		3394
Maximum Weaving Length (LMAX), ft	7397	Volume-to-Capacity Ratio (v/c)		0.83

Speed and Density

Non-Weaving Vehicle Index (INW)	124	Average Weaving Speed (SW), mi/h	39.9
Non-Weaving Lane Change Rate (LCNW), lc/h	370	Average Non-Weaving Speed (SNW), mi/h	33.9
Weaving Lane Change Rate (LCW), lc/h	1362	Average Speed (S), mi/h	36.4
Weaving Lane Change Rate (LCAII), lc/h	1732	Density (D), pc/mi/ln	38.6
Weaving Intensity Factor (W)	0.408	Level of Service (LOS)	E

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HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
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Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	640	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	1015	1311	224	56
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	1134	1465	250	63
Weaving Flow Rate (w), pc/h	1528	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1384	Density-Based Capacity (ciWL), pc/h/ln		1628
Total Flow Rate (v), pc/h	2912	Demand Flow-Based Capacity (ciW), pc/h		4571
Volume Ratio (VR)	0.525	Weaving Segment Capacity (cw), veh/h		3100
Minimum Lane Change Rate (LCMIN), lc/h	1528	Adjusted Weaving Area Capacity, pc/h		3256
Maximum Weaving Length (LMAX), ft	8120	Volume-to-Capacity Ratio (v/c)		0.89

Speed and Density

Non-Weaving Vehicle Index (INW)	89	Average Weaving Speed (SW), mi/h	38.1
Non-Weaving Lane Change Rate (LCNW), lc/h	247	Average Non-Weaving Speed (SNW), mi/h	32.0
Weaving Lane Change Rate (LCW), lc/h	1578	Average Speed (S), mi/h	34.9
Weaving Lane Change Rate (LCAII), lc/h	1825	Density (D), pc/mi/ln	41.7
Weaving Intensity Factor (W)	0.517	Level of Service (LOS)	E

HCS7 Freeway Merge Report

Project Information

Analyst	CJM	Date	4/21/2020
Agency	Langan	Analysis Year	2032
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2326	631
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	2599	705
Capacity (c), pc/h	6750	1900
Volume-to-Capacity Ratio (v/c)	0.49	0.37

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.311
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (VOA), pc/mi/ln	1040
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.5
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.600	Outer Lanes Freeway Speed (SO), mi/h	48.1
Flow in Lanes 1 and 2 (v12), pc/h	1559	Ramp Junction Speed (S), mi/h	47.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	2264	Average Density (D), pc/mi/ln	23.1
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	17.9

HCS7 Freeway Merge Report

Project Information

Analyst	CJM	Date	7/8/2020
Agency	Langan	Analysis Year	2032
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	1167	1360
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	1304	1520
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.63	0.80

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.297
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (VOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	1304	Ramp Junction Speed (S), mi/h	47.6
Flow Entering Ramp-Infl. Area (vR12), pc/h	2824	Average Density (D), pc/mi/ln	29.7
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	17.5

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
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Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	3600	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	959	1105	255	208
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	1072	1235	285	232
Weaving Flow Rate (wv), pc/h	1467	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1357	Density-Based Capacity (ciWL), pc/h/ln		1860
Total Flow Rate (v), pc/h	2824	Demand Flow-Based Capacity (ciW), pc/h		4624
Volume Ratio (VR)	0.519	Weaving Segment Capacity (cw), veh/h		3541
Minimum Lane Change Rate (LCMIN), lc/h	1467	Adjusted Weaving Area Capacity, pc/h		3720
Maximum Weaving Length (LMAX), ft	8049	Volume-to-Capacity Ratio (v/c)		0.76

Speed and Density

Non-Weaving Vehicle Index (INW)	489	Average Weaving Speed (SW), mi/h	43.7
Non-Weaving Lane Change Rate (LCNW), lc/h	1846	Average Non-Weaving Speed (SNW), mi/h	32.7
Weaving Lane Change Rate (LCW), lc/h	1623	Average Speed (S), mi/h	37.6
Weaving Lane Change Rate (LCAII), lc/h	3469	Density (D), pc/mi/ln	37.6
Weaving Intensity Factor (W)	0.219	Level of Service (LOS)	E

HCS7 Freeway Diverge Report

Project Information

Analyst	CJM	Date	4/21/2020
Agency	Langan	Analysis Year	2032
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2527	463
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	2824	517
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.63	0.27

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (Ds)	0.540
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	48.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	2824	Ramp Junction Speed (S), mi/h	48.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	29.4
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	15.0

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2032
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	820	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	777	233	156	1287
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	868	260	174	1438
Weaving Flow Rate (w), pc/h	1698	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1042	Density-Based Capacity (ciWL), pc/h/ln		1554
Total Flow Rate (v), pc/h	2740	Demand Flow-Based Capacity (ciW), pc/h		3871
Volume Ratio (VR)	0.620	Weaving Segment Capacity (cw), veh/h		2959
Minimum Lane Change Rate (LCMIN), lc/h	1698	Adjusted Weaving Area Capacity, pc/h		3108
Maximum Weaving Length (LMAX), ft	9262	Volume-to-Capacity Ratio (v/c)		0.88

Speed and Density

Non-Weaving Vehicle Index (INW)	85	Average Weaving Speed (SW), mi/h	38.9
Non-Weaving Lane Change Rate (LCNW), lc/h	274	Average Non-Weaving Speed (SNW), mi/h	31.2
Weaving Lane Change Rate (LCW), lc/h	1760	Average Speed (S), mi/h	35.6
Weaving Lane Change Rate (LCAII), lc/h	2034	Density (D), pc/mi/ln	38.5
Weaving Intensity Factor (W)	0.463	Level of Service (LOS)	E

Appendix J

Capacity Analysis – 2022 & 2032 Build Freeway Traffic Conditions

2022 Build Freeway Weekday A.M.

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2022
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	640	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	1308	510	86	21
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	1462	570	96	23
Weaving Flow Rate (w), pc/h	593	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1558	Density-Based Capacity (ciWL), pc/h/ln		1841
Total Flow Rate (v), pc/h	2151	Demand Flow-Based Capacity (ciW), pc/h		8696
Volume Ratio (VR)	0.276	Weaving Segment Capacity (cw), veh/h		3505
Minimum Lane Change Rate (LCMIN), lc/h	593	Adjusted Weaving Area Capacity, pc/h		3682
Maximum Weaving Length (LMAX), ft	5328	Volume-to-Capacity Ratio (v/c)		0.58

Speed and Density

Non-Weaving Vehicle Index (INW)	100	Average Weaving Speed (SW), mi/h	41.9
Non-Weaving Lane Change Rate (LCNW), lc/h	283	Average Non-Weaving Speed (SNW), mi/h	40.6
Weaving Lane Change Rate (LCW), lc/h	643	Average Speed (S), mi/h	41.0
Weaving Lane Change Rate (LCAII), lc/h	926	Density (D), pc/mi/ln	26.2
Weaving Intensity Factor (W)	0.302	Level of Service (LOS)	C

HCS7 Freeway Merge Report

Project Information

Analyst	CJM	Date	4/21/2020
Agency	Langan	Analysis Year	2022
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	1818	225
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	2032	251
Capacity (c), pc/h	6750	1900
Volume-to-Capacity Ratio (v/c)	0.34	0.13

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.290
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	813
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.600	Outer Lanes Freeway Speed (SO), mi/h	48.9
Flow in Lanes 1 and 2 (v12), pc/h	1219	Ramp Junction Speed (S), mi/h	48.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	1470	Average Density (D), pc/mi/ln	15.8
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	11.9

HCS7 Freeway Merge Report

Project Information

Analyst	CJM	Date	7/8/2020
Agency	Langan	Analysis Year	2022
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	1038	1517
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	1160	1695
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.63	0.89

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.299
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (VOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	1160	Ramp Junction Speed (S), mi/h	47.6
Flow Entering Ramp-Infl. Area (vR12), pc/h	2855	Average Density (D), pc/mi/ln	30.0
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	17.6

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2022
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	3600	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	899	1287	230	139
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	1005	1438	257	155
Weaving Flow Rate (w), pc/h	1593	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1262	Density-Based Capacity (ciWL), pc/h/ln		1824
Total Flow Rate (v), pc/h	2855	Demand Flow-Based Capacity (ciW), pc/h		4301
Volume Ratio (VR)	0.558	Weaving Segment Capacity (cw), veh/h		3473
Minimum Lane Change Rate (LCMIN), lc/h	1593	Adjusted Weaving Area Capacity, pc/h		3648
Maximum Weaving Length (LMAX), ft	8512	Volume-to-Capacity Ratio (v/c)		0.78

Speed and Density

Non-Weaving Vehicle Index (INW)	454	Average Weaving Speed (SW), mi/h	43.6
Non-Weaving Lane Change Rate (LCNW), lc/h	1826	Average Non-Weaving Speed (SNW), mi/h	31.7
Weaving Lane Change Rate (LCW), lc/h	1749	Average Speed (S), mi/h	37.4
Weaving Lane Change Rate (LCAII), lc/h	3575	Density (D), pc/mi/ln	38.2
Weaving Intensity Factor (W)	0.225	Level of Service (LOS)	E

HCS7 Freeway Diverge Report

Project Information

Analyst	CJM	Date	4/21/2020
Agency	Langan	Analysis Year	2022
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2555	369
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	2855	412
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.63	0.22

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (Ds)	0.530
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	48.1
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	2855	Ramp Junction Speed (S), mi/h	48.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	29.7
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	15.3

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2022
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	820	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	1166	137	92	1020
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	1303	153	103	1140
Weaving Flow Rate (w), pc/h	1293	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1406	Density-Based Capacity (ciWL), pc/h/ln		1683
Total Flow Rate (v), pc/h	2699	Demand Flow-Based Capacity (ciW), pc/h		5010
Volume Ratio (VR)	0.479	Weaving Segment Capacity (cw), veh/h		3204
Minimum Lane Change Rate (LCMIN), lc/h	1293	Adjusted Weaving Area Capacity, pc/h		3366
Maximum Weaving Length (LMAX), ft	7582	Volume-to-Capacity Ratio (v/c)		0.80

Speed and Density

Non-Weaving Vehicle Index (INW)	115	Average Weaving Speed (SW), mi/h	40.0
Non-Weaving Lane Change Rate (LCNW), lc/h	349	Average Non-Weaving Speed (SNW), mi/h	34.2
Weaving Lane Change Rate (LCW), lc/h	1355	Average Speed (S), mi/h	36.8
Weaving Lane Change Rate (LCAII), lc/h	1704	Density (D), pc/mi/ln	36.7
Weaving Intensity Factor (W)	0.402	Level of Service (LOS)	E

2022 Build Freeway Weekday P.M.

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2022
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	640	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	1105	1244	202	51
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	1235	1390	226	57
Weaving Flow Rate (w), pc/h	1447	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1461	Density-Based Capacity (ciWL), pc/h/ln		1652
Total Flow Rate (v), pc/h	2908	Demand Flow-Based Capacity (ciW), pc/h		4819
Volume Ratio (VR)	0.498	Weaving Segment Capacity (cw), veh/h		3145
Minimum Lane Change Rate (LCMIN), lc/h	1447	Adjusted Weaving Area Capacity, pc/h		3304
Maximum Weaving Length (LMAX), ft	7803	Volume-to-Capacity Ratio (v/c)		0.88

Speed and Density

Non-Weaving Vehicle Index (INW)	94	Average Weaving Speed (SW), mi/h	38.3
Non-Weaving Lane Change Rate (LCNW), lc/h	263	Average Non-Weaving Speed (SNW), mi/h	32.6
Weaving Lane Change Rate (LCW), lc/h	1497	Average Speed (S), mi/h	35.2
Weaving Lane Change Rate (LCAII), lc/h	1760	Density (D), pc/mi/ln	41.3
Weaving Intensity Factor (W)	0.502	Level of Service (LOS)	E

HCS7 Freeway Merge Report

Project Information

Analyst	CJM	Date	4/21/2020
Agency	Langan	Analysis Year	2022
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2349	597
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	2625	667
Capacity (c), pc/h	6750	1900
Volume-to-Capacity Ratio (v/c)	0.49	0.35

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.310
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	1050
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.5
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.600	Outer Lanes Freeway Speed (SO), mi/h	48.0
Flow in Lanes 1 and 2 (v12), pc/h	1575	Ramp Junction Speed (S), mi/h	47.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	2242	Average Density (D), pc/mi/ln	23.0
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	17.7

HCS7 Freeway Merge Report

Project Information

Analyst	CJM	Date	7/8/2020
Agency	Langan	Analysis Year	2022
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	1331	1233
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	1487	1378
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.64	0.73

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.299
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (VOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.6
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	1487	Ramp Junction Speed (S), mi/h	47.6
Flow Entering Ramp-Infl. Area (vR12), pc/h	2865	Average Density (D), pc/mi/ln	30.1
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	17.9

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2022
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	3600	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	1115	1003	230	216
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	1246	1121	257	241
Weaving Flow Rate (w), pc/h	1362	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1503	Density-Based Capacity (ciWL), pc/h/ln		1899
Total Flow Rate (v), pc/h	2865	Demand Flow-Based Capacity (ciW), pc/h		5053
Volume Ratio (VR)	0.475	Weaving Segment Capacity (cw), veh/h		3616
Minimum Lane Change Rate (LCMIN), lc/h	1362	Adjusted Weaving Area Capacity, pc/h		3798
Maximum Weaving Length (LMAX), ft	7536	Volume-to-Capacity Ratio (v/c)		0.75

Speed and Density

Non-Weaving Vehicle Index (INW)	541	Average Weaving Speed (SW), mi/h	43.8
Non-Weaving Lane Change Rate (LCNW), lc/h	1876	Average Non-Weaving Speed (SNW), mi/h	33.3
Weaving Lane Change Rate (LCW), lc/h	1518	Average Speed (S), mi/h	37.6
Weaving Lane Change Rate (LCAII), lc/h	3394	Density (D), pc/mi/ln	38.1
Weaving Intensity Factor (W)	0.216	Level of Service (LOS)	E

HCS7 Freeway Diverge Report

Project Information

Analyst	CJM	Date	4/21/2020
Agency	Langan	Analysis Year	2022
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2564	446
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	2865	498
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.64	0.26

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (Ds)	0.538
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	48.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	2865	Ramp Junction Speed (S), mi/h	48.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	29.8
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	15.4

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2022
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	820	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	762	211	141	1356
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	852	236	158	1515
Weaving Flow Rate (w), pc/h	1751	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1010	Density-Based Capacity (ciWL), pc/h/ln		1541
Total Flow Rate (v), pc/h	2761	Demand Flow-Based Capacity (ciW), pc/h		3785
Volume Ratio (VR)	0.634	Weaving Segment Capacity (cw), veh/h		2934
Minimum Lane Change Rate (LCMIN), lc/h	1751	Adjusted Weaving Area Capacity, pc/h		3082
Maximum Weaving Length (LMAX), ft	9434	Volume-to-Capacity Ratio (v/c)		0.90

Speed and Density

Non-Weaving Vehicle Index (INW)	83	Average Weaving Speed (SW), mi/h	38.8
Non-Weaving Lane Change Rate (LCNW), lc/h	267	Average Non-Weaving Speed (SNW), mi/h	30.8
Weaving Lane Change Rate (LCW), lc/h	1813	Average Speed (S), mi/h	35.4
Weaving Lane Change Rate (LCAII), lc/h	2080	Density (D), pc/mi/ln	39.0
Weaving Intensity Factor (W)	0.471	Level of Service (LOS)	E

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HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
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Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	640	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	1424	559	94	24
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	1591	625	105	27
Weaving Flow Rate (wv), pc/h	652	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1696	Density-Based Capacity (ciWL), pc/h/ln		1840
Total Flow Rate (v), pc/h	2348	Demand Flow-Based Capacity (ciW), pc/h		8633
Volume Ratio (VR)	0.278	Weaving Segment Capacity (cw), veh/h		3503
Minimum Lane Change Rate (LCMIN), lc/h	652	Adjusted Weaving Area Capacity, pc/h		3680
Maximum Weaving Length (LMAX), ft	5349	Volume-to-Capacity Ratio (v/c)		0.64

Speed and Density

Non-Weaving Vehicle Index (INW)	109	Average Weaving Speed (SW), mi/h	41.4
Non-Weaving Lane Change Rate (LCNW), lc/h	311	Average Non-Weaving Speed (SNW), mi/h	39.7
Weaving Lane Change Rate (LCW), lc/h	702	Average Speed (S), mi/h	40.2
Weaving Lane Change Rate (LCAII), lc/h	1013	Density (D), pc/mi/ln	29.2
Weaving Intensity Factor (W)	0.325	Level of Service (LOS)	D

HCS7 Freeway Merge Report

Project Information

Analyst	CJM	Date	4/21/2020
Agency	Langan	Analysis Year	2032
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	1983	246
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	2216	275
Capacity (c), pc/h	6750	1900
Volume-to-Capacity Ratio (v/c)	0.37	0.14

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.292
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	886
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.600	Outer Lanes Freeway Speed (SO), mi/h	48.6
Flow in Lanes 1 and 2 (v12), pc/h	1330	Ramp Junction Speed (S), mi/h	48.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	1605	Average Density (D), pc/mi/ln	17.3
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	12.9

HCS7 Freeway Merge Report

Project Information

Analyst	CJM	Date	7/8/2020
Agency	Langan	Analysis Year	2032
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	1131	1673
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	1264	1870
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.70	0.98

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.321
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (VOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.4
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	1264	Ramp Junction Speed (S), mi/h	47.4
Flow Entering Ramp-Infl. Area (vR12), pc/h	3134	Average Density (D), pc/mi/ln	33.1
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	19.7

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2032
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	3600	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	979	1418	255	152
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	1094	1585	285	170
Weaving Flow Rate (w), pc/h	1755	Freeway Max Capacity (cIFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1379	Density-Based Capacity (cIWL), pc/h/ln		1822
Total Flow Rate (v), pc/h	3134	Demand Flow-Based Capacity (cIW), pc/h		4286
Volume Ratio (VR)	0.560	Weaving Segment Capacity (cw), veh/h		3469
Minimum Lane Change Rate (LCMIN), lc/h	1755	Adjusted Weaving Area Capacity, pc/h		3644
Maximum Weaving Length (LMAX), ft	8536	Volume-to-Capacity Ratio (v/c)		0.86

Speed and Density

Non-Weaving Vehicle Index (INW)	-	Average Weaving Speed (SW), mi/h	-
Non-Weaving Lane Change Rate (LCNW), lc/h	-	Average Non-Weaving Speed (SNW), mi/h	-
Weaving Lane Change Rate (LCW), lc/h	-	Average Speed (S), mi/h	-
Weaving Lane Change Rate (LCAII), lc/h	-	Density (D), pc/mi/ln	-
Weaving Intensity Factor (W)	-	Level of Service (LOS)	F

HCS7 Freeway Diverge Report

Project Information

Analyst	CJM	Date	4/21/2020
Agency	Langan	Analysis Year	2032
Jurisdiction	NHDOT	Time Period Analyzed	AM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2804	407
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	3133	455
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.70	0.24

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (Ds)	0.534
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	48.1
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	3133	Ramp Junction Speed (S), mi/h	48.1
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	32.6
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	17.7

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2032
Jurisdiction	NHDOT	Time Period Analyzed	AM
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Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	820	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	1281	152	101	1116
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	1431	170	113	1247
Weaving Flow Rate (w), pc/h	1417	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1544	Density-Based Capacity (ciWL), pc/h/ln		1683
Total Flow Rate (v), pc/h	2961	Demand Flow-Based Capacity (ciW), pc/h		5010
Volume Ratio (VR)	0.479	Weaving Segment Capacity (cw), veh/h		3204
Minimum Lane Change Rate (LCMIN), lc/h	1417	Adjusted Weaving Area Capacity, pc/h		3366
Maximum Weaving Length (LMAX), ft	7582	Volume-to-Capacity Ratio (v/c)		0.88

Speed and Density

Non-Weaving Vehicle Index (INW)	127	Average Weaving Speed (SW), mi/h	39.5
Non-Weaving Lane Change Rate (LCNW), lc/h	377	Average Non-Weaving Speed (SNW), mi/h	32.7
Weaving Lane Change Rate (LCW), lc/h	1479	Average Speed (S), mi/h	35.6
Weaving Lane Change Rate (LCAII), lc/h	1856	Density (D), pc/mi/ln	41.6
Weaving Intensity Factor (W)	0.431	Level of Service (LOS)	E

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HCS7 Freeway Weaving Report

Project Information

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Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	640	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	1202	1367	224	56
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	1343	1528	250	63
Weaving Flow Rate (w), pc/h	1591	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1593	Density-Based Capacity (ciWL), pc/h/ln		1650
Total Flow Rate (v), pc/h	3184	Demand Flow-Based Capacity (ciW), pc/h		4800
Volume Ratio (VR)	0.500	Weaving Segment Capacity (cw), veh/h		3142
Minimum Lane Change Rate (LCMIN), lc/h	1591	Adjusted Weaving Area Capacity, pc/h		3300
Maximum Weaving Length (LMAX), ft	7826	Volume-to-Capacity Ratio (v/c)		0.96

Speed and Density

Non-Weaving Vehicle Index (INW)	-	Average Weaving Speed (SW), mi/h	-
Non-Weaving Lane Change Rate (LCNW), lc/h	-	Average Non-Weaving Speed (SNW), mi/h	-
Weaving Lane Change Rate (LCW), lc/h	-	Average Speed (S), mi/h	-
Weaving Lane Change Rate (LCAII), lc/h	-	Density (D), pc/mi/ln	-
Weaving Intensity Factor (W)	-	Level of Service (LOS)	F

HCS7 Freeway Merge Report

Project Information

Analyst	CJM	Date	4/21/2020
Agency	Langan	Analysis Year	2032
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	3	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	800
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2569	657
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	2871	734
Capacity (c), pc/h	6750	1900
Volume-to-Capacity Ratio (v/c)	0.53	0.39

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	1
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.319
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	1148
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.4
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	0.600	Outer Lanes Freeway Speed (SO), mi/h	47.7
Flow in Lanes 1 and 2 (v12), pc/h	1723	Ramp Junction Speed (S), mi/h	47.5
Flow Entering Ramp-Infl. Area (vR12), pc/h	2457	Average Density (D), pc/mi/ln	25.3
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	19.4

HCS7 Freeway Merge Report

Project Information

Analyst	CJM	Date	7/8/2020
Agency	Langan	Analysis Year	2032
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	50.0	30.0
Segment Length (L) / Acceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	1442	1360
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	1611	1520
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.70	0.80

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.320
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (VOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	47.4
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	1611	Ramp Junction Speed (S), mi/h	47.4
Flow Entering Ramp-Infl. Area (vR12), pc/h	3131	Average Density (D), pc/mi/ln	33.0
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	19.9

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2032
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	3600	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	1207	1105	255	235
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	1349	1235	285	263
Weaving Flow Rate (w), pc/h	1498	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1634	Density-Based Capacity (ciWL), pc/h/ln		1896
Total Flow Rate (v), pc/h	3132	Demand Flow-Based Capacity (ciW), pc/h		5021
Volume Ratio (VR)	0.478	Weaving Segment Capacity (cw), veh/h		3610
Minimum Lane Change Rate (LCMIN), lc/h	1498	Adjusted Weaving Area Capacity, pc/h		3792
Maximum Weaving Length (LMAX), ft	7570	Volume-to-Capacity Ratio (v/c)		0.83

Speed and Density

Non-Weaving Vehicle Index (INW)	588	Average Weaving Speed (SW), mi/h	43.6
Non-Weaving Lane Change Rate (LCNW), lc/h	1903	Average Non-Weaving Speed (SNW), mi/h	31.7
Weaving Lane Change Rate (LCW), lc/h	1654	Average Speed (S), mi/h	36.5
Weaving Lane Change Rate (LCAII), lc/h	3557	Density (D), pc/mi/ln	42.9
Weaving Intensity Factor (W)	0.224	Level of Service (LOS)	E

HCS7 Freeway Diverge Report

Project Information

Analyst	CJM	Date	4/21/2020
Agency	Langan	Analysis Year	2032
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	55.0	30.0
Segment Length (L) / Deceleration Length (LA),ft	1500	1500
Terrain Type	Level	Level
Percent Grade, %	-	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	1.000	1.000
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	2802	490
Peak Hour Factor (PHF)	0.94	0.94
Total Trucks, %	5.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952
Flow Rate (vi),pc/h	3131	548
Capacity (c), pc/h	4500	1900
Volume-to-Capacity Ratio (v/c)	0.70	0.29

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (Ds)	0.542
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	48.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	3131	Ramp Junction Speed (S), mi/h	48.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	32.6
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	17.7

HCS7 Freeway Weaving Report

Project Information

Analyst	LAM	Date	7/8/2020
Agency	Langan	Analysis Year	2032
Jurisdiction	NHDOT	Time Period Analyzed	PM
Project Description	Hudson Logistics Center		

Geometric Data

Number of Lanes (N), ln	2	Segment Type	Freeway
Segment Length (Ls), ft	820	Number of Maneuver Lanes (NWL), ln	2
Weaving Configuration	One-Sided	Ramp-to-Freeway Lane Changes (LCRF), lc	1
Terrain Type	Level	Freeway-to-Ramp Lane Changes (LCFR), lc	1
Percent Grade, %	-	Ramp-to-Ramp Lane Changes (LCRR), lc	0
Interchange Density (ID), int/mi	1.00	Cross Weaving Managed Lane	No

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	1.000
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

	FF	RF	RR	FR
Demand Volume (Vi), veh/h	834	233	156	1478
Peak Hour Factor (PHF)	0.94	0.94	0.94	0.94
Total Trucks, %	5.00	5.00	5.00	5.00
Heavy Vehicle Adjustment Factor (fHV)	0.952	0.952	0.952	0.952
Flow Rate (vi), pc/h	932	260	174	1652
Weaving Flow Rate (w), pc/h	1912	Freeway Max Capacity (ciFL), pc/h/ln		2200
Non-Weaving Flow Rate (vNW), pc/h	1106	Density-Based Capacity (ciWL), pc/h/ln		1541
Total Flow Rate (v), pc/h	3018	Demand Flow-Based Capacity (ciW), pc/h		3785
Volume Ratio (VR)	0.634	Weaving Segment Capacity (cw), veh/h		2934
Minimum Lane Change Rate (LCMIN), lc/h	1912	Adjusted Weaving Area Capacity, pc/h		3082
Maximum Weaving Length (LMAX), ft	9434	Volume-to-Capacity Ratio (v/c)		0.98

Speed and Density

Non-Weaving Vehicle Index (INW)	-	Average Weaving Speed (SW), mi/h	-
Non-Weaving Lane Change Rate (LCNW), lc/h	-	Average Non-Weaving Speed (SNW), mi/h	-
Weaving Lane Change Rate (LCW), lc/h	-	Average Speed (S), mi/h	-
Weaving Lane Change Rate (LCAII), lc/h	-	Density (D), pc/mi/ln	-
Weaving Intensity Factor (W)	-	Level of Service (LOS)	F