Memorandum

To: Mr. Chad Reynolds
Sr Vice President
Leggat-McCall Properties
10 Post Office Square
Boston, MA 02109

Date: May 4, 2020

Project #: 13391.02

From: Robert L. Nagi, PE
Principal

Christine M. Trearchis, PE, PTOE
Senior Project Engineer

Re: Traffic Impact Memorandum
Trip Generation Comparison
The Vale – Residential Phase I Program
Woburn, Massachusetts

Introduction

On behalf of Pulte Homes of New England LLC and Montvale Land, LLC, c/o Leggat McCall Properties LLC (the Proponent), VHB has prepared a trip generation and access evaluation in support of the Special Permit in the City of Woburn for the Phase I multi-family residential component of The Vale, the approved master-planned redevelopment project located in Woburn, Massachusetts.

This memorandum includes an evaluation of the trip generation and access needs for the currently proposed first phase of residential development at the Project site. Specifically, this memo focuses on the multi-family residential component and assesses any changes to the program from the previously reviewed and approved development that was the focus of a detailed traffic impact and access study submitted as part of the Environmental Impact Reports[1,2] filed with the Commonwealth through the Massachusetts Environmental Policy Act (MEPA). As detailed herein, the current residential program is generally consistent with the approved master plan redevelopment and is expected to have only minor impacts on local traffic operations.

Project Description

The overall master plan consists of the redevelopment of the Project Site, which encompasses approximately 77-acres in the City of Woburn along Interstate 93, with limited, undeveloped portions of the land extending into the adjacent Towns of Winchester and Stoneham Massachusetts at the site of the former Kraft Food Processing Plant. The full build program for the Project, as described in Table 1, will ultimately consist of up to 1,639,100 square feet of complementary mixed uses, anticipated to include residential, hotel, office/lab/flex/research & development, retail and restaurant uses.

This memo focuses on the traffic impacts associated with the first phase of the development, specifically the Townhomes and multifamily garden style apartment units within the overall development program. The other elements will each be evaluated separately through their own design review process with the City. This portion of the development will include a total of 75 town homes (each town home will have 4 parking spaces available, 2 garage and 2 driveway spaces) and 122 multifamily garden-style apartment units in three buildings. For the multifamily

[1] Final Environmental Impact Report, The Vale, Woburn, MA; VHB, Inc; August 15, 2019.
[2] Draft Environmental Impact Report, The Vale, Woburn, MA; VHB, Inc; April 1, 2019.

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garden apartment units, Buildings 1 and 2 will each have 36 units and will provide 40 garage and 32 surface spaces; Building 3 will house 50 units and will provide 50 garage and 50 surface spaces. In total, the proposal calls for 197 units (112 multifamily garden-style apartments and 75 townhomes) and is shown in the accompanying site plans prepared by the Applicant's civil engineer.

Table 1 Originally Proposed Project Phasing

Development Component	Phase I	Phase II	Phase III / Full Build	Final Development
Townhomes	75 units	-	-	75 units
Apartments	125 units	-	-	125 units
Senior Housing	100 units	-	-	100 units
Assisted Living	105 beds	-	-	105 beds
Medical Office Building	45,000 SF ±	-	-	45,000 SF ±
Hotel	135 keys	-	-	135 keys
R&D/Lab	-	360,000 sf ±	474,200 sf ±	834,200 SF ±
Retail/Restaurant	-	20,000 sf ±	63,200 sf ±	83,200 SF ±

As noted in Table 1, the development of the overall Project was divided into three specific phases. Phase 1 focused on the development of the residential, hotel, and medical office building and formed the basis for the initial buildout of the site. Accompanying the Phase 1 improvements was a series of additional construction activities on the site aimed at decommissioning the former Kraft Food processing plant and constructing access improvements. Phase 2 of the development focused on a significant amount of commercial Research & Development/office space along with some supporting retail uses. The final phase would see the construction of over a half-million SF of the same commercial space on the site. Each phase was accompanied by a series of incremental off-site roadway improvements that have been reviewed and accepted by the Massachusetts Department of Transportation (MassDOT) which was the focus of the transportation sections of the MEPA submissions to the Commonwealth.

Trip Generation Changes

As shown in Table 1 above, the current proposed program for this component includes 75 townhomes and 122 apartments with 472 parking spaces, reflecting a slight decrease (3 less units) in the number of residential units.

The Transportation Study contained in the DEIR included trip generation estimates for the proposed uses, projected using trip generation rates published by the Institute of Transportation Engineers (ITE) Trip Generation, 10th Edition[3].

[3] Trip Generation, 10th Edition, Institute of Transportation Engineers, Washington, D.C., 2017.

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Trip generation estimates were provided for each development Phase as well as the Full Build condition. As it relates to the proposed development, trips were estimated using the following Land Use Codes (LUC):

- LUC 210 (Single Family Detached Housing)
- LUC 220 (Multifamily Housing - Low-Rise)

Table 2, as approved, shows that the currently proposed multi-family component of Phase I results in an estimate of between 81 to 103 peak hour trips to the Project Site. Given the slight decrease in the proposed multi-family residential units, a revised trip generation analysis was conducted for the current proposal of 75 townhomes and 122 apartments. The results of this analysis are presented in Table 2.

- **Table 2 Phase I Trip Generation**

	MEPA Estimates for Multi-Family Residential [b]	Currently Proposed Multi-Family Residential [b]
Weekday		
Enter	603	595
Exit	603	595
Total	1,206	1,190
Weekday Morning		
Enter	20	19
Exit	61	61
Total	81	80
Weekday Evening		
Enter	63	62
Exit	38	38
Total	101	100
Saturday		
Enter	572	565
Exit	572	565
Total	1,144	1,130
Saturday Midday		
Enter	51	50
Exit	52	51
Total	103	101

a As presented in the DEIR. Trip generation for Phase I based on ITE LUC 220 for 75 units, ITE LUC 221 for 125 units, ITE LUC 252 for 100 units, ITE LUC 254 for 105 beds, ITE LUC 720 for 45,000 sf and ITE LUC 310 for 135 rooms, internal trip credit taken.

b Trip generation for Phase I based on ITE LUC 220 for 75 units, ITE LUC 221 for 122 units, no internal trip credit taken.

As shown in Table 2, the currently proposed multi-family program results in slightly fewer trips than the approved Phase I program from the DEIR filing. The slight decrease in program size is expected to result one to two *fewer* trips during each of the peak hours.

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Traffic Operations Analysis

Measuring existing traffic volumes and projecting future traffic volumes quantifies traffic within the study area. To assess quality of flow, roadway capacity analyses were conducted for a revised 2026 Phase I Build condition with only the multi-family residential component of Phase I included at the intersection of Montvale Avenue at Hill Street / I-93 Southbound Off-Ramps. This condition reflects the existing infrastructure Existing conditions at the intersection and the projected 2026 Build traffic volume for the multi-family residential. Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed on them. Calculated levels of service classify roadway operating conditions.

Level-of-Service Criteria

Level of service (LOS) is the term used to denote the different operating conditions that occur on a given roadway segment under various traffic volume loads. It is a qualitative measure that considers a number of factors including roadway geometry, speed, travel delay, freedom to maneuver, and safety. Level of service provides an index to the operational qualities of a roadway segment or an intersection. Level of service designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions.

For signalized intersections, the evaluation criteria used to analyze study area intersections are based on the percentile-delay method (SYNCHRO results).

Intersection Capacity Analysis

Table 3 summarizes the capacity analyses for the signalized intersection of Montvale Avenue at Hill Street / I-93 Southbound Off-Ramp. The Table presents the revised Phase I Build conditions alongside the previously presented 2018 Existing and projected 2026 No-Build conditions.

As shown in Table 3, under 2026 Build conditions, the study area intersection is expected to operate at the same overall LOS than under 2026 No-Build conditions. With the addition of the projected multi-family residential trips, some individual movements are expected to show a slight degradation in LOS, without any proposed roadway mitigation in place. The Hill Street northbound approach experiences the largest increase in delay and queue, with a maximum of five (5) vehicles added to the 95th percentile queue during the peak hours.

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Table 3 Signalized Intersection Capacity Analysis

Location / Movement	2018 Existing Conditions					2026 No-Build Conditions					Phase I Multi-Family Residential Build Conditions				
	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Montvale Avenue at Hill Street and I-93 SB Off-Ramp															
Weekday Morning															
EB T/R	0.57	26	C	133	199	0.65	31	C	187	247	0.66	32	C	195	249
WB L/U	0.37	44	D	29	76	0.65	57	E	81	151	0.68	60	E	88	158
WB T	0.57	18	B	158	234	0.57	19	B	214	278	0.58	20	C	220	278
NB L/T/R	0.49	13	B	0	52	0.76	35	C	65	#177	0.88	49	D	115	#289
SB L	0.94	65	E	205	#501	1.16	>120	F	~336	#596	>1.20	>120	F	~355	#593
SB T	0.94	66	E	207	#504	1.14	>120	F	~331	#586	>1.20	>120	F	~357	#595
SB R	0.91	38	D	138	#414	1.15	116	F	~321	#582	>1.20	>120	F	~366	#612
Overall		**35**	**D**				**65**	**E**				**76**	**E**		
Weekday Evening															
EB T/R	0.80	31	C	306	409	0.95	49	D	393	#528	0.99	**57**	**E**	411	#543
WB L/U	0.35	50	D	28	68	0.65	63	E	81	142	0.72	67	E	97	165
WB T	0.47	19	B	150	220	0.45	20	B	182	233	0.46	20	B	182	233
NB L/T/R	0.54	17	B	5	50	0.84	46	D	93	#231	0.93	61	E	130	#307
SB L	0.61	39	D	158	275	0.72	50	D	196	#333	0.77	54	D	209	#352
SB T	0.61	39	D	160	277	0.72	50	D	196	#331	0.76	54	D	210	#353
SB R	0.82	27	C	139	#352	1.01	69	E	~285	#517	1.06	82	F	~311	#537
Overall		**29**	**C**				**46**	**D**				**54**	**D**		
Saturday Midday															
EB T/R	0.64	28	C	195	282	0.78	36	D	284	341	0.79	36	D	290	348
WB L/U	0.48	50	D	49	104	0.81	71	E	123	#229	0.85	75	E	135	#255
WB T	0.49	17	B	151	223	0.46	18	B	177	227	0.45	18	B	177	227
NB L/T/R	0.61	22	C	25	91	1.01	78	E	~179	#367	1.16	>120	F	~258	#453
SB L	0.46	38	D	96	191	0.59	48	D	126	206	0.61	49	D	131	213
SB T	0.45	38	D	96	190	0.59	48	D	128	208	0.62	49	D	134	216
SB R	0.74	24	C	85	#265	1.01	74	E	~222	#422	1.05	84	F	~239	#439
Overall		**26**	**C**				**44**	**D**				**52**	**D**		

Phase I Traffic Improvements

As part of the proposed redevelopment project, a phased mitigation program has been approved which addresses the specific capacity needs for each of the development phases. Below is a description of the approved Phase I mitigation measures.

At the conclusion of the first phase of roadway upgrades, the improvements will focus on modernizing and upgrading the traffic signal system along Montvale Avenue in front of the Project Site and widening Hill Street. The Proponent has committed to upgrading the following three signalized intersections to provide for a fully adaptive signal system that is compliant with the other adaptive signal systems within the City of Woburn:

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- Montvale Avenue at Hill Street/ I-93 SB Off-Ramp.
- Montvale Avenue at I-93 NB Ramps.
- Montvale Avenue at Maple Street/ Unicorn Park Drive.

Additional intersection improvements will also be implemented during the first phase of development and will focus on upgrading the intersection of Montvale Avenue and the I-93 southbound off-ramps with Hill Street. Specifically, proposed geometric improvements include:

- Widening Hill Street to provide for an adequate cross-section which will provide at least two exit lanes and one entrance lane;
- Pedestrian accommodations along Hill Street that integrate with the current Montvale Avenue pedestrian network; and
- Necessary transitioning from Hill Street onto Montvale Avenue of pedestrian and bicycle accommodations.

These Phase I measures are the responsibility of the master developer of the site (Montvale Land LLC) and they are required to be fully operational prior to full occupancy of the entire Phase I development (see Table 1 previously). The capacity analysis presented in Table 3 indicates that the multi-family residential component will only have minor impacts on the intersection if constructed prior to the implementation of Phase I improvements. At the conclusion of the Phase 1 improvements being in place, all signals and approaches are expected to operate at or above LOS D.

Conclusion & Recommendations

The proposed change in size to the multi-family component of Phase I of the development is expected to result in slightly fewer vehicle trips to and from the Project Site during the peak hours. Based on the revised capacity analysis, the intersection of Montvale Avenue at Hill Street / I-93 Southbound Off-Ramp is expected to operate at the same overall LOS than under 2026 No-Build conditions. With the addition of the projected multi-family residential trips, while some individual movements are expected to show a slight degradation in LOS, overall the intersection has the capacity to accommodate the additional trips. VHB recommends that the Applicant consider the following:

- At 75% occupancy of the proposed residential units, the master developer (Montvale Land LLC) and City should review the signal operations and, if warranted, adjust the signal timings to account for the additional traffic along Hill Street; and
- Develop a clear wayfinding plan for residential visitors and deliveries arriving via Hill Street through the Project site to avoid on-going construction within the site.

From the traffic study outlined above, the proposed residential development is not expected to have a significant traffic delay/impact on the surrounding area roadways.

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Attachments

- Trip Generation
- Intersection Capacity Analyses

PHASE I TRIP GENERATION INPUTS

Land Use	Size	Units
Townhomes	75	dwelling units
Apartments	122	dwelling units
Independent Senior Housing	100	dwelling units
Assisted / Memory Care	105	beds
Medical Office Building	45,000	sf
Lab Space	0	sf
Office	0	sf
Hotel	135	rooms

PHASE I TRIP GENERATION SUMMARY

	Residential								Office				Hotel							
	Townhomes LUC 220 Rate [1]	Apartments LUC 221 Rate [2]	Total Townhouse & Apt	Senior Housing LUC 252 Rate [3]	Assisted Living LUC 254 Rate [4]	Total Gross Residential	Internal Capture	Net Residential	Medical Office LUC 720 Rate [5]	Total Gross Office	Internal Capture	Net Office	Hotel LUC 310 Rate [6]	Internal Capture	Net Hotel	Total Unadjusted Trips	Total Gross New Trips	Total Adjusted Trips	Pass-By	Internal Capture
Weekday Daily																				
Enter	263	332	595	188	137	1,515	12	1,503	821	821	-	821	549	4	545	2,885	2,869	2,869		16
Exit	263	332	595	188	137	1,515	-	1,515	821	821	16	805	549	-	549	2,885	2,869	2,869		16
Total	**526**	**664**	**1,190**	**376**	**274**	**3,030**	**12**	**3,018**	**1,642**	**1,642**	**16**	**1,626**	**1,098**	**4**	**1,094**	**5,770**	**5,738**	**5,738**	**-**	**32**
Weekday Morning - Adjacent Street																				
Enter	8	11	19	7	13	58	-	58	86	86	6	80	37	-	37	181	175	175		6
Exit	28	33	61	13	7	142	3	139	24	24	-	24	25	3	22	191	185	185		6
Total	**36**	**44**	**80**	**20**	**20**	**200**	**3**	**197**	**110**	**110**	**6**	**104**	**62**	**3**	**59**	**372**	**360**	**360**	**-**	**12**
Weekday Evening - Adjacent Street																				
Enter	29	33	62	14	10	148	2	146	44	44	4	40	38	3	35	230	221	221		9
Exit	17	21	38	12	17	105	7	98	112	112	2	110	37	-	37	254	245	245		9
Total	**46**	**54**	**100**	**26**	**27**	**253**	**9**	**244**	**156**	**156**	**6**	**150**	**75**	**3**	**72**	**484**	**466**	**466**	**-**	**18**
Saturday Daily																				
Enter	265	300	565	168	154	1,452	3	1,449	193	193	-	193	502	1	501	2,147	2,143	2,143		4
Exit	265	300	565	168	154	1,452	-	1,452	193	193	4	189	502	-	502	2,147	2,143	2,143		4
Total	**530**	**600**	**1,130**	**336**	**308**	**2,904**	**3**	**2,901**	**386**	**386**	**4**	**382**	**1,004**	**1**	**1,003**	**4,294**	**4,286**	**4,286**	**-**	**8**
Saturday Midday - Peak of Generator																				
Enter	24	26	50	21	13	134	1	133	80	80	5	75	55	4	51	269	259	259		10
Exit	24	27	51	13	15	130	9	121	60	60	1	59	43	-	43	233	223	223		10
Total	**48**	**53**	**101**	**34**	**28**	**264**	**10**	**254**	**140**	**140**	**6**	**134**	**98**	**4**	**94**	**502**	**482**	**482**	**-**	**20**

1 Trip generation rate based on ITE LUC 220 (Multifamily Housing - Low-Rise)
2 Trip generation rate based on ITE LUC 221 (Multifamily Housing - Mid-Rise)
3 Trip generation rate based on ITE LUC 252 (Senior Adult Housing Attached)
4 Trip generation rate based on ITE LUC 254 (Assisted Living)
5 Trip generation rate based on ITE LUC 720 (Medical-Dental Office Building)
6 Trip generation rate based on ITE LUC 310 (Hotel)

SHARED TRIPS [1]

OFFICE - HOTEL

WEEKDAY DAILY

OFFICE	%	#	BALANCED	#	%	HOTEL
EXIT ->		821	**0**			-> ENTER
ENTER <-		821	**0**			<- EXIT

WEEKDAY MORNING

OFFICE	%	#	BALANCED	#	%	HOTEL
EXIT ->	0%	24	**0**	37	0%	-> ENTER
ENTER <-	3%	86	**3**	25	75%	<- EXIT

WEEKDAY EVENING

OFFICE	%	#	BALANCED	#	%	HOTEL
EXIT ->	0%	112	**0**	38	0%	-> ENTER
ENTER <-	0%	44	**0**	37	0%	<- EXIT

SATURDAY DAILY

OFFICE	%	#	BALANCED	#	%	HOTEL
EXIT ->		193	**0**			-> ENTER
ENTER <-		193	**0**			<- EXIT

SATURDAY MIDDAY

OFFICE	%	#	BALANCED	#	%	HOTEL
EXIT ->	0%	60	**0**	55	0%	-> ENTER
ENTER <-	0%	80	**0**	43	0%	<- EXIT

OFFICE - RESIDENTIAL

WEEKDAY DAILY

OFFICE	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	2%	821	**16**	2,064	3%	-> ENTER
ENTER <-	0%	821	**0**	2,064	0%	<- EXIT

WEEKDAY MORNING

OFFICE	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	1%	24	**0**	58	0%	-> ENTER
ENTER <-	3%	86	**3**	142	2%	<- EXIT

WEEKDAY EVENING

OFFICE	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	2%	112	**2**	148	4%	-> ENTER
ENTER <-	57%	44	**4**	105	4%	<- EXIT

SATURDAY DAILY

OFFICE	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	2%	193	**4**	1,954	3%	-> ENTER
ENTER <-	0%	193	**0**	1,954	0%	<- EXIT

SATURDAY MIDDAY

OFFICE	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	2%	60	**1**	134	4%	-> ENTER
ENTER <-	57%	80	**5**	130	4%	<- EXIT

HOTEL - RESIDENTIAL

WEEKDAY DAILY

HOTEL	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->		0	**0**	2,064		-> ENTER
ENTER <-		0	**0**	2,064		<- EXIT

WEEKDAY MORNING

HOTEL	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	0%	25	**0**	58	0%	-> ENTER
ENTER <-	0%	37	**0**	142	0%	<- EXIT

WEEKDAY EVENING

HOTEL	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	2%	37	**0**	148	0%	-> ENTER
ENTER <-	12%	38	**3**	105	3%	<- EXIT

SATURDAY DAILY

HOTEL	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->		0	**0**	1,954		-> ENTER
ENTER <-		0	**0**	1,954		<- EXIT

SATURDAY MIDDAY

HOTEL	%	#	BALANCED	#	%	RESIDENTIAL
EXIT ->	2%	43	**0**	134	0%	-> ENTER
ENTER <-	12%	55	**4**	130	3%	<- EXIT

TOTAL SHARED TRIPS - WEEKDAY DAILY

	ENTER	EXIT	TOTAL
OFFICE	0	16	16
HOTEL	4	0	4
RESID	12	0	12

TOTAL SHARED TRIPS - WEEKDAY MORNING

	ENTER	EXIT	TOTAL
OFFICE	6	0	6
HOTEL	0	3	3
RESID	0	3	3

TOTAL SHARED TRIPS - WEEKDAY EVENING

	ENTER	EXIT	TOTAL
OFFICE	4	2	6
HOTEL	3	0	3
RESID	2	7	9

TOTAL SHARED TRIPS - SATURDAY DAILY

	ENTER	EXIT	TOTAL
OFFICE	0	4	4
HOTEL	1	0	1
RESID	3	0	3

TOTAL SHARED TRIPS - SATURDAY MIDDAY

	ENTER	EXIT	TOTAL
OFFICE	5	1	6
HOTEL	4	0	4
RESID	1	9	10

1 Weekday morning and evening internal capture rates based on NCHRP Report 684, Saturday midday rates assumed to be the same was weekday evening rates. Weekday daily internal capture rates based on ITE Trip Generation Handbook, 2nd Edition, Saturday daily rates assumed to be the same as weekday daily rates
2 For Daily calculations, residential and hotel are included as residential and retail and restaurant are included as retail.

ITE TRIP GENERATION WORKSHEET
(10th Edition, Updated 2017)

LANDUSE: Multi-Family Housing (Low-Rise - 1-2 Story)
LANDUSE CODE: 220 Independent Variable --- Number of Units
SETTING/LOCATION: General Urban/Suburban
JOB NAME: 75 units
JOB NUMBER:

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Low	High	Independent Variable Range Average	Low	High	Directional Distribution Enter	Exit
DAILY	29	0.96	7.32	4.45	10.97	168	5	590	50%	50%
AM PEAK (ADJACENT ST)	42	0.90	0.46	0.18	0.74	199	5	650	23%	77%
PM PEAK (ADJACENT ST)	50	0.86	0.56	0.18	1.25	187	5	650	63%	37%

TRIPS:

	BY AVERAGE Total	Enter	Exit	BY REGRESSION Total	Enter	Exit
DAILY	549	275	275	526	263	263
AM PEAK (ADJACENT ST)	35	8	27	36	8	28
PM PEAK (ADJACENT ST)	42	26	16	46	29	17

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Low	High	Independent Variable Range Average	Low	High	Directional Distribution Enter	Exit
DAILY	5	0.93	8.14	3.36	11.40	89	48	148	50%	50%
PEAK OF GENERATOR	5	0.92	0.70	0.41	0.93	89	48	148	N/A	N/A

TRIPS:

	BY AVERAGE Total	Enter	Exit	BY REGRESSION Total	Enter	Exit	
DAILY	611	305	305	529	265	265	*Caution - Small*
PEAK OF GENERATOR	53	N/A	N/A	48	N/A	N/A	*Caution - Small*

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends Average	Low	High	Independent Variable Range Average	Low	High	Directional Distribution Enter	Exit
DAILY	5	0.96	6.28	2.61	8.22	89	48	148	50%	50%
PEAK OF GENERATOR	5	0.93	0.67	0.36	0.93	89	48	148	N/A	N/A

TRIPS:

	BY AVERAGE Total	Enter	Exit	BY REGRESSION Total	Enter	Exit	
DAILY	471	236	236	418	209	209	*Caution - Small*
PEAK OF GENERATOR	50	N/A	N/A	44	N/A	N/A	*Caution - Small*

ITE TRIP GENERATION WORKSHEET
(10th Edition, Updated 2017)

LANDUSE: Mid-Rise Residential
LANDUSE CODE: 221
SETTING/LOCATION: General Urban/Suburban
JOB NAME:
JOB NUMBER:

Independent Variable --- Number of Units

122 units

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	27	0.77	5.44	1.27	12.50	205	21	494	50%	50%
AM PEAK (ADJACENT ST)	53	0.67	0.36	0.06	1.61	207	26	703	26%	74%
PM PEAK (ADJACENT ST)	60	0.72	0.44	0.15	1.11	208	26	703	61%	39%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	664	332	332	663	332	332
AM PEAK (ADJACENT ST)	44	11	33	42	11	31
PM PEAK (ADJACENT ST)	54	33	21	54	33	21

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	6	0.73	4.91	4.03	8.51	224	111	336	50%	50%
PEAK OF GENERATOR	8	0.89	0.44	0.34	0.73	264	111	462	49%	51%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	599	300	300	788	394	394
PEAK OF GENERATOR	54	26	27	58	28	30

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	6	--	4.09	3.06	8.41	224	111	336	50%	50%
PEAK OF GENERATOR	6	--	0.39	0.26	1.07	224	111	336	62%	38%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	499	249	249	N/A	N/A	N/A
PEAK OF GENERATOR	48	29	18	N/A	N/A	N/A

ITE TRIP GENERATION WORKSHEET
(10th Edition, Updated 2017)

LANDUSE: Senior Adult Housing - Attached
LANDUSE CODE: 252
SETTING/LOCATION: General Urban/Suburban
JOB NAME:
JOB NUMBER:

Independent Variable --- Dwelling Units

DWELLING UNITS (#): 100

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	6	0.99	3.70	2.59	4.79	81	28	256	50%	50%
AM PEAK (ADJACENT ST)	11	0.98	0.20	0.06	0.27	148	28	684	35%	65%
PM PEAK (ADJACENT ST)	11	0.96	0.26	0.08	0.43	148	28	684	55%	45%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	370	185	185	377	188	188
AM PEAK (ADJACENT ST)	20	7	13	20	7	13
PM PEAK (ADJACENT ST)	26	14	12	26	14	12

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	6	0.99	3.23	1.84	4.07	81	28	256	50%	50%
PEAK OF GENERATOR	7	0.99	0.33	0.23	0.43	91	28	256	62%	38%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	323	162	162	337	168	168
PEAK OF GENERATOR	33	20	13	33	21	13

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	6	0.99	3.14	2.20	4.25	81	28	256	50%	50%
PEAK OF GENERATOR	6	0.95	0.36	0.27	0.55	81	28	256	64%	36%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	314	157	157	321	160	160
PEAK OF GENERATOR	36	23	13	35	22	13

ITE TRIP GENERATION WORKSHEET
(10th Edition, Updated 2017)

HAS NOT BEEN REVIEWED (QAQC) - AS OF 07/12/2018

LANDUSE: Assisted Living
LANDUSE CODE: 254
SETTING/LOCATION: General Urban/Suburban
JOB NAME:
JOB NUMBER:

Independent Variable --- Beds

DWELLING UNITS (#): 105

WEEKDAY

RATES:			Total Trip Ends			Independent Variable Range			Directional Distribution	
	# Studies	R^2	Average	Low	High	Average	Low	High	Enter	Exit
DAILY	2	--	2.60	1.86	4.14	135	87	183	50%	50%
AM PEAK (ADJACENT ST)	9	--	0.19	0.08	0.43	123	83	183	63%	37%
PM PEAK (ADJACENT ST)	9	--	0.26	0.11	0.53	123	83	183	38%	62%

TRIPS:	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	273	137	137	--	--	--
AM PEAK (ADJACENT ST)	20	13	7	--	--	--
PM PEAK (ADJACENT ST)	27	10	17	--	--	--

SATURDAY

RATES:			Total Trip Ends			Independent Variable Range			Directional Distribution	
	# Studies	R^2	Average	Low	High	Average	Low	High	Enter	Exit
DAILY	1	--	2.93	2.93	2.93	87	87	87	50%	50%
PEAK OF GENERATOR	6	--	0.27	0.17	0.44	111	83	154	46%	54%

TRIPS:	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	308	154	154	--	--	--
PEAK OF GENERATOR	28	13	15	--	--	--

SUNDAY

RATES:			Total Trip Ends			Independent Variable Range			Directional Distribution	
	# Studies	R^2	Average	Low	High	Average	Low	High	Enter	Exit
DAILY	1	--	3.15	3.15	3.15	87	87	87	50%	50%
PEAK OF GENERATOR	6	--	0.28	0.13	0.36	111	83	154	43%	57%

TRIPS:	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	331	165	165	--	--	--
PEAK OF GENERATOR	29	13	17	--	--	--

ITE TRIP GENERATION WORKSHEET
(10th Edition, Updated 2017)

LANDUSE: Medical-Dental Office Building
LANDUSE CODE: 720
SETTING/LOCATION: General Urban/Suburban
JOB NAME:
JOB NUMBER:

Independent Variable --- 1,000 Sq. Feet Gross Floor Area

FLOOR AREA (KSF): 45

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	28	0.95	34.80	9.14	100.75	24	2	111	50%	50%
AM PEAK OF GENERATOR	36	0.90	3.53	1.21	19.28	27	0	175	62%	38%
PM PEAK OF GENERATOR	42	0.91	4.10	1.49	15.55	26	0	175	39%	61%
AM PEAK (ADJACENT ST)	44	0.80	2.78	0.85	14.30	32	2	112	78%	22%
PM PEAK (ADJACENT ST)	65	0.73	3.46	0.25	8.86	28	2	112	28%	72%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	1,566	783	783	1641	821	821
AM PEAK OF GENERATOR	159	98	60	157	97	60
PM PEAK OF GENERATOR	185	72	113	188	73	114
AM PEAK (ADJACENT ST)	125	98	28	110	86	24
PM PEAK (ADJACENT ST)	156	44	112	155	43	111

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	6	--	8.57	1.10	21.93	41	18	111	50%	50%
PEAK OF GENERATOR	4	0.78	3.10	1.33	4.02	28	18	43	57%	43%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	386	193	193	N/A	N/A	N/A
PEAK OF GENERATOR	140	80	60	172	98	74

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	5	--	1.42	0.39	5.11	44	18	111	50%	50%
PEAK OF GENERATOR	3	--	0.32	0.12	0.63	31	24	43	52%	48%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	64	32	32	N/A	N/A	N/A
PEAK OF GENERATOR	14	7	7	N/A	N/A	N/A

ITE TRIP GENERATION WORKSHEET
(10th Edition, Updated 2017)

LANDUSE: Hotel
LANDUSE CODE: 310
SETTING/LOCATION: General Urban/Suburban
JOB NAME:
JOB NUMBER:

Independent Variable --- Number of Rooms

135 rooms

WEEKDAY

RATES:

	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	6	0.92	8.36	5.31	9.53	146	100	260	50%	50%
AM PEAK OF GENERATOR	30	0.64	0.54	0.25	1.42	288	86	575	54%	46%
PM PEAK OF GENERATOR	29	0.71	0.61	0.22	0.97	292	86	575	58%	42%
AM PEAK (ADJACENT ST)	25	0.85	0.47	0.20	0.84	178	74	426	59%	41%
PM PEAK (ADJACENT ST)	28	0.80	0.60	0.26	1.06	183	74	426	51%	49%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	1,129	564	564	1,097	549	549
AM PEAK OF GENERATOR	73	39	34	79	43	36
PM PEAK OF GENERATOR	82	48	35	83	48	35
AM PEAK (ADJACENT ST)	63	37	26	62	37	25
PM PEAK (ADJACENT ST)	81	41	40	75	38	37

SATURDAY

RATES:

	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	8	0.93	8.19	6.35	9.79	206	100	355	50%	50%
PEAK OF GENERATOR	9	0.80	0.72	0.49	1.23	194	100	355	56%	44%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	1,106	553	553	1,004	502	502
PEAK OF GENERATOR	97	54	43	97	55	43

SUNDAY

RATES:

	# Studies	R^2	Total Trip Ends			Independent Variable Range			Directional Distribution	
			Average	Low	High	Average	Low	High	Enter	Exit
DAILY	8	0.90	5.95	4.01	8.48	206	100	355	50%	50%
PEAK OF GENERATOR	8	0.87	0.56	0.39	0.72	206	100	355	46%	54%

TRIPS:

	BY AVERAGE			BY REGRESSION		
	Total	Enter	Exit	Total	Enter	Exit
DAILY	803	402	402	617	309	309
PEAK OF GENERATOR	76	35	41	65	30	35

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (vph)	0	830	70	5	125	875	0	105	0	190	710	60	510
Future Volume (vph)	0	830	70	5	125	875	0	105	0	190	710	60	510
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		80		180		0	0		0	160		185
Storage Lanes	0		1		1		0	0		0	1		1
Taper Length (ft)	25				25			25			25		
Satd. Flow (prot)	0	4826	0	0	1736	3471	0	0	1672	0	1681	1697	1583
Flt Permitted					0.950				0.983		0.950	0.959	
Satd. Flow (perm)	0	4826	0	0	1734	3471	0	0	1671	0	1681	1697	1561
Right Turn on Red			Yes				Yes			Yes			Yes
Satd. Flow (RTOR)		13							143				160
Link Speed (mph)		30				30			30			30	
Link Distance (ft)		1061				363			744			422	
Travel Time (s)		24.1				8.3			16.9			9.6	
Confl. Peds. (#/hr)			1		1			1					1
Confl. Bikes (#/hr)			1				1						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	6%	6%	4%	4%	4%	4%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)											46%		
Lane Group Flow (vph)	0	978	0	0	141	951	0	0	321	0	417	420	554
Turn Type		NA		Prot	Prot	NA		Split	NA		Split	NA	Perm
Protected Phases		2		1	1	6		3	3		4	4	
Permitted Phases													4
Detector Phase		2		1	1	6		3	3		4	4	4
Switch Phase													
Minimum Initial (s)		10.0		6.0	6.0	20.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)		26.0		11.0	11.0	26.0		11.0	11.0		21.0	21.0	21.0
Total Split (s)		41.0		20.0	20.0	61.0		20.0	20.0		26.0	26.0	26.0
Total Split (%)		38.3%		18.7%	18.7%	57.0%		18.7%	18.7%		24.3%	24.3%	24.3%
Yellow Time (s)		4.0		3.0	3.0	4.0		3.0	3.0		4.0	4.0	4.0
All-Red Time (s)		2.0		2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)		0.0			0.0	0.0			0.0		0.0	0.0	0.0
Total Lost Time (s)		6.0			5.0	6.0			5.0		6.0	6.0	6.0
Lead/Lag		Lag		Lead	Lead			Lead	Lead		Lag	Lag	Lag
Lead-Lag Optimize?		Yes		Yes	Yes			Yes	Yes		Yes	Yes	Yes
Recall Mode		Min		None	None	Min		None	None		Max	Max	Max
Act Effct Green (s)		29.9			11.7	46.6			14.3		20.2	20.2	20.2
Actuated g/C Ratio		0.30			0.12	0.47			0.15		0.21	0.21	0.21
v/c Ratio		0.66			0.68	0.58			0.88		1.21	1.21	1.24
Control Delay		32.0			59.8	20.0			49.4		154.7	153.3	151.7
Queue Delay		0.0			0.0	0.0			0.0		0.0	0.0	0.0
Total Delay		32.0			59.8	20.0			49.4		154.7	153.3	151.7
LOS		C			E	C			D		F	F	F
Approach Delay		32.0				25.2			49.4			153.0	
Approach LOS		C				C			D			F	
Queue Length 50th (ft)		195			88	220			115		~355	~357	~366
Queue Length 95th (ft)		249			158	278			#289		#593	#595	#612
Internal Link Dist (ft)		981				283			664			342	
Turn Bay Length (ft)					180						160		185
Base Capacity (vph)		1742			267	1960			378		345	348	447
Starvation Cap Reductn		0			0	0			0		0	0	0
Spillback Cap Reductn		0			0	0			0		0	0	0
Storage Cap Reductn		0			0	0			0		0	0	0
Reduced v/c Ratio		0.56			0.53	0.49			0.85		1.21	1.21	1.24

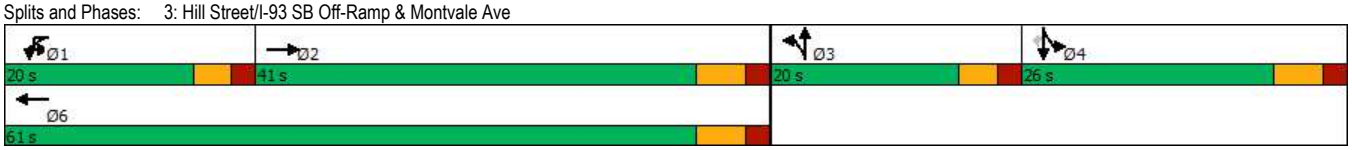
Intersection Summary

Area Type: Other
Cycle Length: 107
Actuated Cycle Length: 98.3
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.24
Intersection Signal Delay: 76.0 Intersection LOS: E
Intersection Capacity Utilization 87.5% ICU Level of Service E
Analysis Period (min) 15

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

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

Splits and Phases: 3: Hill Street/I-93 SB Off-Ramp & Montvale Ave



Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (vph)	0	1395	80	5	125	705	0	95	0	195	490	60	505
Future Volume (vph)	0	1395	80	5	125	705	0	95	0	195	490	60	505
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		80		180		0	0		0	160		185
Storage Lanes	0		1		1		0	0		0	1		1
Taper Length (ft)	25				25			25			25		
Satd. Flow (prot)	0	5038	0	0	1752	3505	0	0	1644	0	1698	1719	1599
Flt Permitted					0.950				0.984		0.950	0.962	
Satd. Flow (perm)	0	5038	0	0	1752	3505	0	0	1644	0	1673	1700	1599
Right Turn on Red			Yes				Yes			Yes			Yes
Satd. Flow (RTOR)		8							136				200
Link Speed (mph)		30				30			30			30	
Link Distance (ft)		1060				363			744			422	
Travel Time (s)		24.1				8.3			16.9			9.6	
Confl. Peds. (#/hr)	1		1		1		1			10	10		
Confl. Bikes (#/hr)			1				1						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	3%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)											44%		
Lane Group Flow (vph)	0	1603	0	0	141	766	0	0	315	0	298	300	549
Turn Type		NA		Prot	Prot	NA		Split	NA		Split	NA	Perm
Protected Phases		2		1	1	6		3	3		4	4	
Permitted Phases													4
Detector Phase		2		1	1	6		3	3		4	4	4
Switch Phase													
Minimum Initial (s)		10.0		6.0	6.0	20.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)		26.0		11.0	11.0	26.0		11.0	11.0		21.0	21.0	21.0
Total Split (s)		41.0		20.0	20.0	61.0		20.0	20.0		31.0	31.0	31.0
Total Split (%)		36.6%		17.9%	17.9%	54.5%		17.9%	17.9%		27.7%	27.7%	27.7%
Yellow Time (s)		4.0		3.0	3.0	4.0		3.0	3.0		4.0	4.0	4.0
All-Red Time (s)		2.0		2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)		0.0			0.0	0.0			0.0		0.0	0.0	0.0
Total Lost Time (s)		6.0			5.0	6.0			5.0		6.0	6.0	6.0
Lead/Lag		Lag		Lead	Lead			Lead	Lead		Lag	Lag	Lag
Lead-Lag Optimize?		Yes		Yes	Yes			Yes	Yes		Yes	Yes	Yes
Recall Mode		Min		None	None	Min		None	None		Max	Max	Max
Act Effct Green (s)		35.0			12.3	52.3			14.8		25.0	25.0	25.0
Actuated g/C Ratio		0.32			0.11	0.48			0.14		0.23	0.23	0.23
v/c Ratio		0.99			0.72	0.46			0.93		0.77	0.76	1.06
Control Delay		57.2			67.1	19.9			60.9		54.3	53.9	82.0
Queue Delay		0.0			0.0	0.0			0.0		0.0	0.0	0.0
Total Delay		57.2			67.1	19.9			60.9		54.3	53.9	82.0
LOS		E			E	B			E		D	D	F
Approach Delay		57.2				27.3			60.9			67.4	
Approach LOS		E				C			E			E	
Queue Length 50th (ft)		411			97	182			130		209	210	~311
Queue Length 95th (ft)		#543			165	233			#307		#352	#353	#537
Internal Link Dist (ft)		980				283			664			342	
Turn Bay Length (ft)					180						160		185
Base Capacity (vph)		1621			240	1767			343		389	393	520
Starvation Cap Reductn		0			0	0			0		0	0	0
Spillback Cap Reductn		0			0	0			0		0	0	0
Storage Cap Reductn		0			0	0			0		0	0	0
Reduced v/c Ratio		0.99			0.59	0.43			0.92		0.77	0.76	1.06

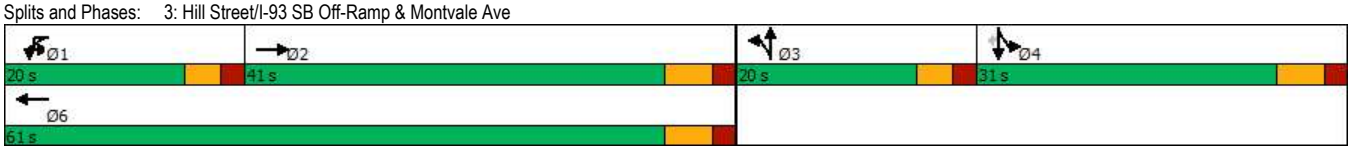
Intersection Summary

Area Type: Other
Cycle Length: 112
Actuated Cycle Length: 109.2
Natural Cycle: 75
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 53.6 Intersection LOS: D
Intersection Capacity Utilization 85.4% ICU Level of Service E
Analysis Period (min) 15

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

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

Splits and Phases: 3: Hill Street/I-93 SB Off-Ramp & Montvale Ave



Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (vph)	0	1095	100	10	175	750	0	145	0	245	305	60	410
Future Volume (vph)	0	1095	100	10	175	750	0	145	0	245	305	60	410
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		80		180		0	0		0	160		185
Storage Lanes	0		1		1		0	0		0	1		1
Taper Length (ft)	25				25			25			25		
Satd. Flow (prot)	0	5008	0	0	1770	3539	0	0	1707	0	1681	1711	1583
Flt Permitted					0.950				0.982		0.950	0.967	
Satd. Flow (perm)	0	5008	0	0	1766	3539	0	0	1706	0	1681	1711	1561
Right Turn on Red			Yes				Yes			Yes			Yes
Satd. Flow (RTOR)		15							143				161
Link Speed (mph)		30				30			30			30	
Link Distance (ft)		1060				363			744			422	
Travel Time (s)		24.1				8.3			16.9			9.6	
Confl. Peds. (#/hr)	1		3		3		1	1					1
Confl. Bikes (#/hr)			1				1						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	0%	0%	0%	2%	2%	2%
Shared Lane Traffic (%)											41%		
Lane Group Flow (vph)	0	1299	0	0	201	815	0	0	424	0	196	201	446
Turn Type		NA		Prot	Prot	NA		Split	NA		Split	NA	Perm
Protected Phases		2		1	1	6		3	3		4	4	
Permitted Phases													4
Detector Phase		2		1	1	6		3	3		4	4	4
Switch Phase													
Minimum Initial (s)		10.0		6.0	6.0	20.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)		26.0		11.0	11.0	26.0		11.0	11.0		21.0	21.0	21.0
Total Split (s)		41.0		20.0	20.0	61.0		20.0	20.0		26.0	26.0	26.0
Total Split (%)		38.3%		18.7%	18.7%	57.0%		18.7%	18.7%		24.3%	24.3%	24.3%
Yellow Time (s)		4.0		3.0	3.0	4.0		3.0	3.0		4.0	4.0	4.0
All-Red Time (s)		2.0		2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)		0.0			0.0	0.0			0.0		0.0	0.0	0.0
Total Lost Time (s)		6.0			5.0	6.0			5.0		6.0	6.0	6.0
Lead/Lag		Lag		Lead	Lead			Lead	Lead		Lag	Lag	Lag
Lead-Lag Optimize?		Yes		Yes	Yes			Yes	Yes		Yes	Yes	Yes
Recall Mode		Min		None	None	Min		None	None		Max	Max	Max
Act Effct Green (s)		34.3			14.1	53.4			15.0		20.0	20.0	20.0
Actuated g/C Ratio		0.33			0.13	0.51			0.14		0.19	0.19	0.19
v/c Ratio		0.79			0.85	0.45			1.16		0.61	0.62	1.05
Control Delay		36.3			75.4	17.6			126.5		49.0	49.1	84.4
Queue Delay		0.0			0.0	0.0			0.0		0.0	0.0	0.0
Total Delay		36.3			75.4	17.6			126.5		49.0	49.1	84.4
LOS		D			E	B			F		D	D	F
Approach Delay		36.3				29.0			126.5			67.7	
Approach LOS		D				C			F			E	
Queue Length 50th (ft)		290			135	177			~258		131	134	~239
Queue Length 95th (ft)		348			#255	227			#453		213	216	#439
Internal Link Dist (ft)		980				283			664			342	
Turn Bay Length (ft)					180						160		185
Base Capacity (vph)		1673			252	1847			365		319	324	426
Starvation Cap Reductn		0			0	0			0		0	0	0
Spillback Cap Reductn		0			0	0			0		0	0	0
Storage Cap Reductn		0			0	0			0		0	0	0
Reduced v/c Ratio		0.78			0.80	0.44			1.16		0.61	0.62	1.05

Intersection Summary

Area Type: Other
Cycle Length: 107
Actuated Cycle Length: 105.5
Natural Cycle: 80
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 1.16
Intersection Signal Delay: 52.3 Intersection LOS: D
Intersection Capacity Utilization 83.5% ICU Level of Service E
Analysis Period (min) 15

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

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

Splits and Phases: 3: Hill Street/I-93 SB Off-Ramp & Montvale Ave