Vanasse & Associates inc
Transportation Engineers & Planners

35 New England Business Center Drive
Suite 140
Andover, MA 01810

Ref: 9026

November 1, 2022

Ms. Valerie Oorthuys
Planning Director
Town of Stow
380 Great Road
Stow, MA 01775

Re: Response to Transportation Peer Review
Proposed Residential Development - Athens Street
Stow, Massachusetts

Dear Ms. Oorthuys:

Vanasse & Associates, Inc. (VAI) is providing responses to the comments that were raised in the October 18, 2022 *Transportation Peer Review* letter prepared by Green International Affiliates, Inc. (Green) concerning their review of the April 19, 2022 *Transportation Impact Assessment* (the "April 2022 TIA") that was prepared by VAI in support of the proposed residential community to be located off Athens Street in Stow, Massachusetts (hereafter referred to as the "Project"). Listed below are the comments that were identified by Green in the subject letter followed by our response on behalf of the Project proponent.

Comment 1: *We consider the study area to be adequate, complying with the MassDOT 2014 Transportation Impact Assessment (TIA) Guidelines.*

Response: No response required

Comment 2: *No seasonal adjustment was made to existing traffic volumes as the data were collected in June, which was found to experience above-average traffic volumes. To account for any impacts on traffic volumes due to the COVID-19 pandemic, traffic volumes from a nearby permanent count station were compared for June 2019 and June 2021. June 2021 traffic volumes were found to be lower than June 2019 traffic volumes. The June 2021 traffic volumes collected for this project were adjusted upward by the difference between the COVID-19 adjustment factor (10.5 percent) and the seasonal adjustment factor (6.9 percent). We concur with this methodology and no further information is required.*

Response: No response required.

Comment 3: No *crashes were reported to have occurred at either the Hudson Road and Athens Street intersection nor the Hudson Road and Edson Road intersection within the five-year review period. 40 total crashes were reported at the intersection of Hudson Road and Route 117, resulting in a crash rate above the MassDOT statewide and districtwide averages for unsignalized intersections. As design of a traffic signal at this intersection is currently underway, no further information is required.*

Response: No response required.

Comment 4: *No-Build conditions were established by projecting existing traffic volumes to Year 2029, a seven-year planning horizon from the date of the TIA. A conservative 1.0 percent compounded annual growth rate was used. Traffic volumes expected to be generated by nearby proposed developments were also added. We concur with this methodology and no further information is required.*

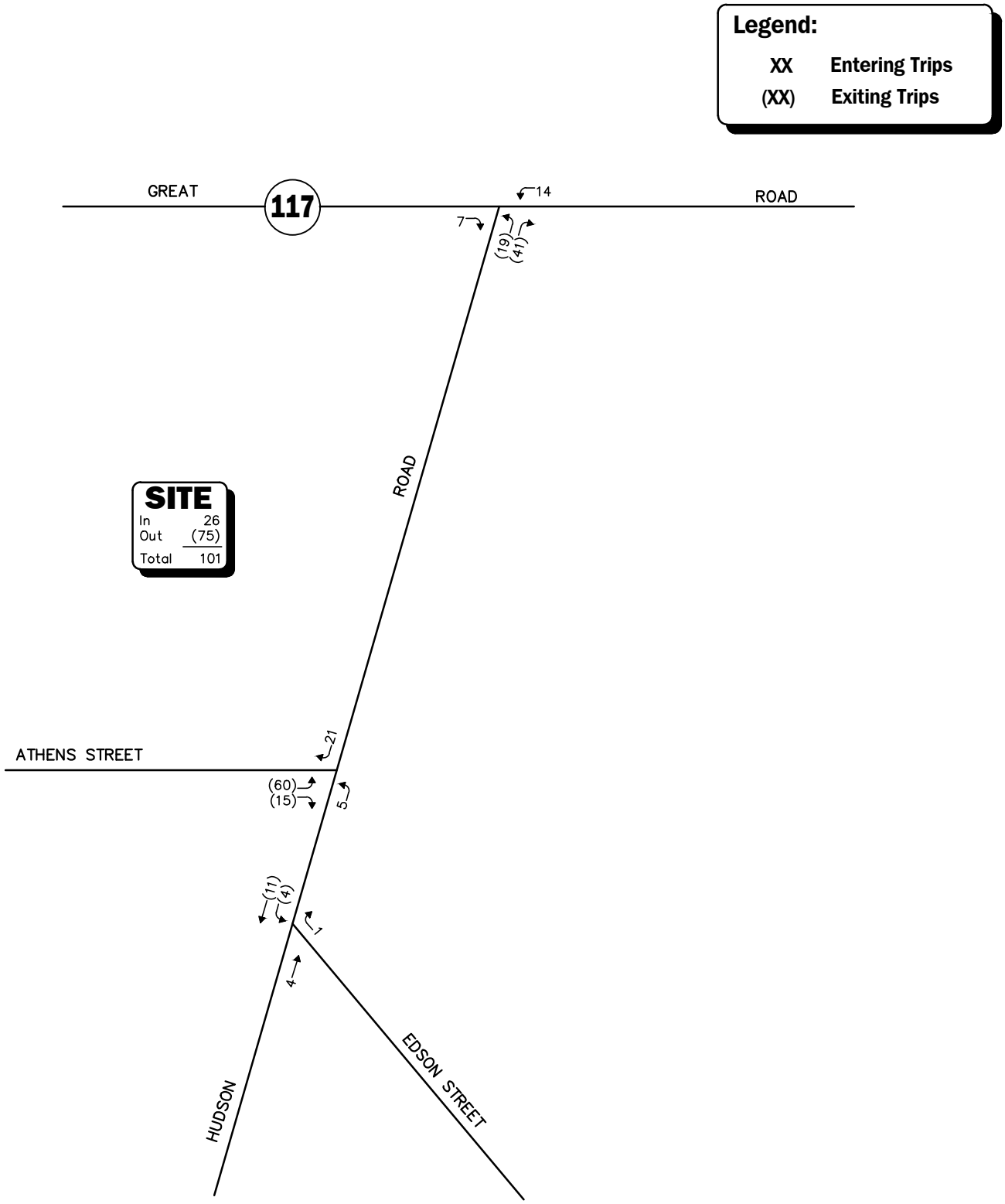
Response: No response required.

Comment 5: *Project-generated traffic was estimate using the ITE Trip Generation Manual methodology for Land Use Code (LUC) 210, Single-Family Detached Housing, and LUC 251, Senior Adult Housing – Single-Family. Because the community will not have an age restriction but will be marketed towards active adults, it was assumed that 50 percent of residential units would be traditional single-family homes (LUC 210) and the remaining 50 percent would be senior housing (LUC 251).*

The description for LUC 251 state that "the development has a specific age restriction for its residents" and that these developments may include amenities such as golf courses and swimming pools. It also advises that "caution should be used when applying trip rates for this land use as it may contain a wide variety of studies ranging from communities with very active, working residents to communities with older, retired residents." The data collected for this land use also includes attached housing such as duplexes and townhouses, which generally result in fewer trips than detached housing. It is also noted that LUC 210, Single-Family Detached Housing accounts for a mix of family types that includes seniors as well as younger adults with/without children. Finally, LUC 251 rates were calculated based on only 15 studies at 6 sites, so the range in the data types will have a greater impact on the results. LUC 210 rates were calculated based on 174 studies and is more accurate for this specific development type.

As this community will not have an age restriction, does not include shared amenities or attached dwelling units, and due to ITE's caution, the Applicant should use LUC 210, Single-Family Detached Housing, for all 141 proposed units.

Response: The trip-generation calculations for the Project have been revised using ITE LUC 210, Single-Family (Detached) Housing, the results of which are summarized in Table 3R and reflect a slight reduction in the number of proposed housing units from 141 to 140. Figures 7R and 8R depict the revised weekday morning and evening peak-hour Project-generated trip assignment, with Figures 9R and 10R depicting the revised 2029 Build weekday morning and evening peak-hour traffic volumes.



Not To Scale

Figure 7R

Project-Generated Weekday Morning Peak-Hour Traffic Volumes

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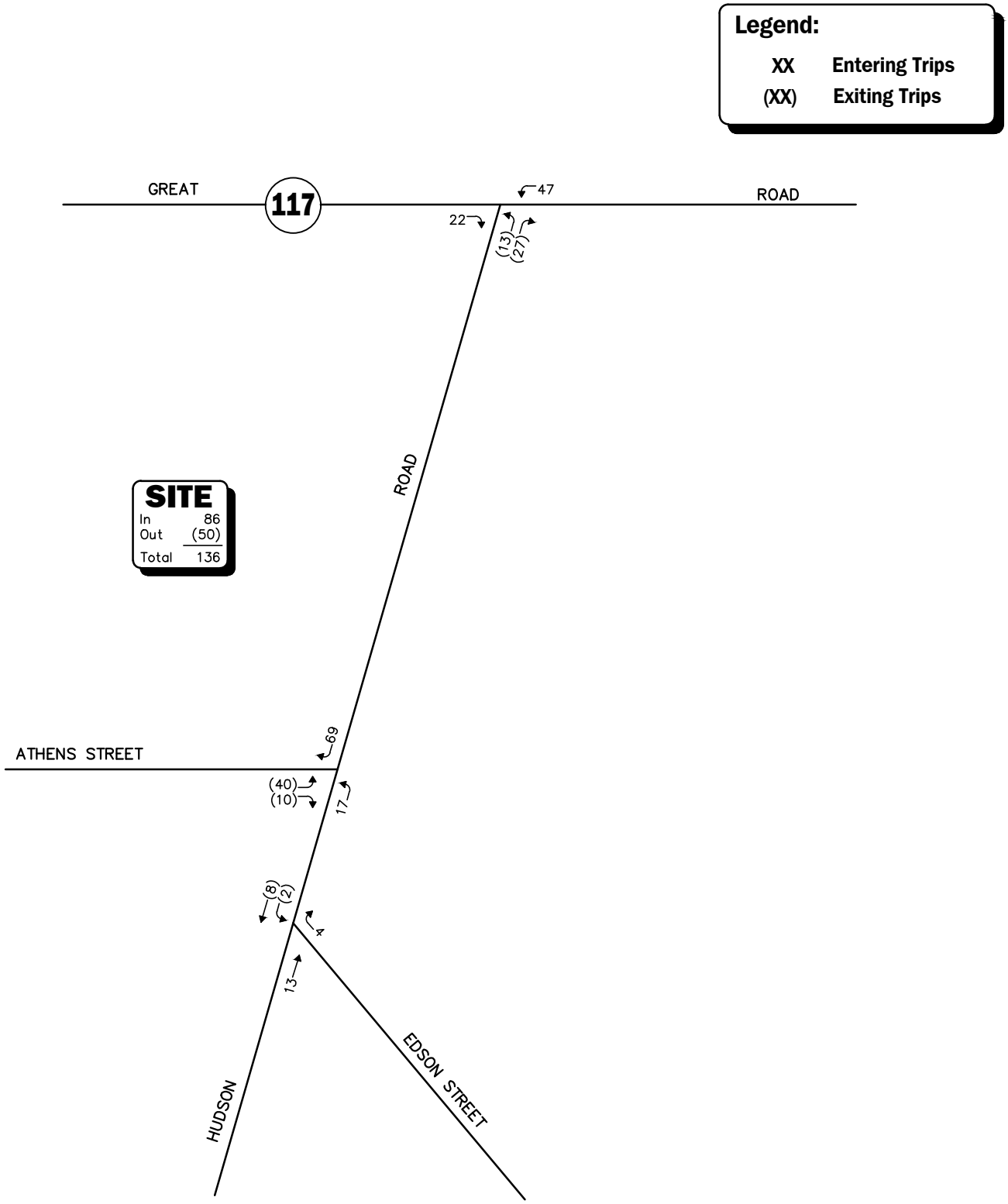

Not To Scale

Figure 8R

Project-Generated Weekday Evening Peak-Hour Traffic Volumes

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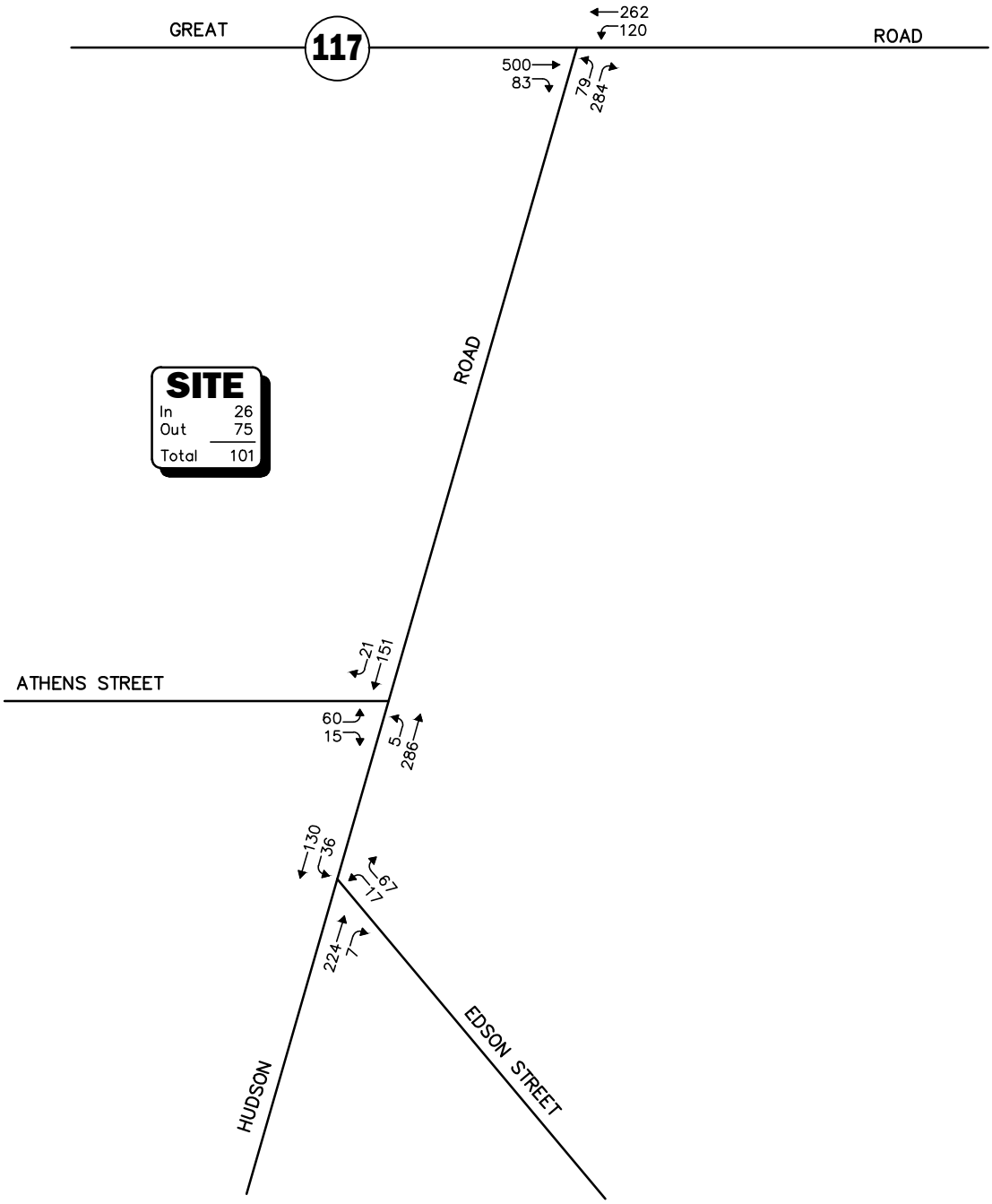

Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not To Scale

Figure 9R

2028 Build
Weekday Morning
Peak-Hour Traffic Volumes

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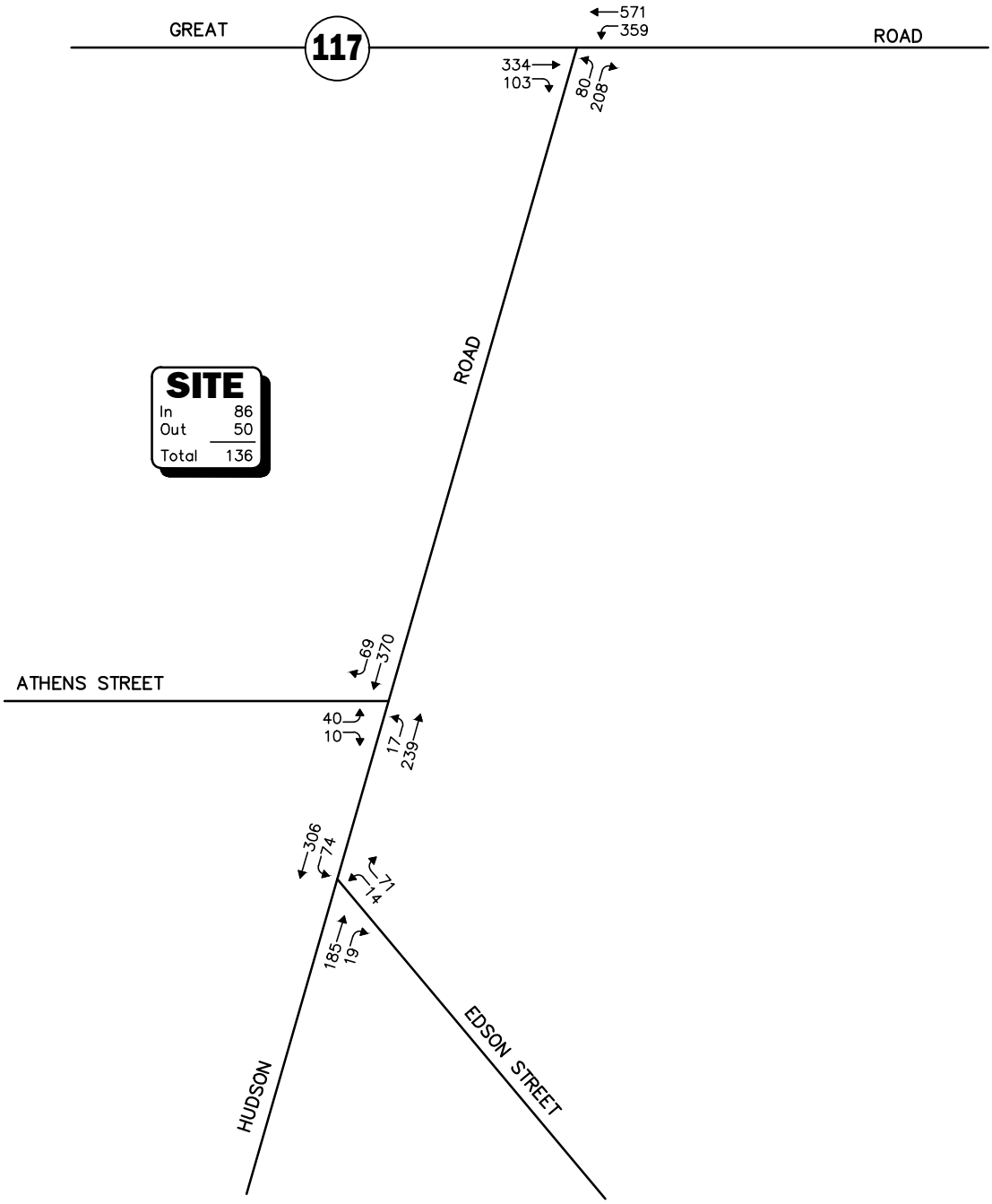

Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not To Scale

Figure 10R

2028 Build
Weekday Evening
Peak-Hour Traffic Volumes

Vanasse & Associates inc

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Table 3R
TRIP-GENERATION SUMMARY

Time Period/Direction	Single-Family Housing (140 Dwellings)[a]
Average Weekday Daily:	
Entering	688
Exiting	688
Total	1,376
Weekday Morning Peak Hour:	
Entering	26
Exiting	75
Total	101
Weekday Evening Peak Hour:	
Entering	86
Exiting	50
Total	136

[a]Based on ITE LUC 210, *Single-Family Detached Housing*.

Comment 6: *Trip distribution for project-generated traffic was determined using U.S. Census Journey-to-Work data for the Town of Stow, which is standard practice for residential developments. The Applicant should clarify during what year the Census data was collected.*

Response: The U.S. Census Journey-to-Work data was obtained from the 2011-2015 American Community Survey.

Comment 7: *A Level of Service (LOS) analysis was conducted for the three study intersections for Existing, No-Build, and Build conditions. The analysis showed negligible differences between the three scenarios for the intersections of Hudson Road with Athens Street and Edson Street. The Hudson Road and Route 117 intersection is expected to experience LOS F during both 2029 No-Build and 2029 Build scenarios. As previously noted, design of a traffic signal at this intersection is currently underway. Traffic signal timing and phasing should take into account trips expected to be generated by this proposed development.*

Response: The 2029 Build condition traffic operations analysis has been revised to reflect the revised trip-generation calculations for the Project as reflected in Table 3R and shown on Figures 9 and 10. Table 4R summarizes the results of the revised analysis for the 2029 Build condition.

A review of Table 4R indicates no significant changes from the results that were reported in Table 4 of the April 2022 TIA. The traffic volume increase on the Hudson Road approach to Route 117 was shown to result in an increase in vehicle queuing over the conditions that were reported in Table 4; however, with the planned installation of a traffic

control signal at the intersection, actual operating conditions at the intersection will be improved from the conditions reported in these tables.

We concur with Green that the design of the traffic signal timing and phasing at the improved, signalized intersection of Route 117 at Hudson Road should reflect the traffic volumes that are expected to be associated with the Project.

Comment 8: *Stopping sight distances (SSD) and intersection sight distances (ISD) were measured at the intersection of Athens Street and Hudson Road. Minimum required sight distances were met in each direction for both stopping sight distance and intersection sight distance. During our site visit, Green confirmed that the minimum sight distances are available; however, vegetation on both corners has the potential to limit sight distance. Please provide a figure showing site triangles that the Applicant will commit to keeping clear of vegetation.*

Response: A sight triangle plan has been prepared for the intersection of Athens Street/Hudson Road intersection and is attached.

Comment 9: *The TIA makes several recommendations for project access, including a minimum width of 22 feet for internal roadways and placing vehicles exiting Athens Street under STOP-sign control. We concur with all these recommendations. During our site visit, Green observed that Athens Street is significantly sloped at its intersection with Hudson Road, which could cause difficulty for drivers exiting Athens Street. Please confirm whether the Applicant plans to regrade Athens Street in this area to reduce the severity of this slope. Additionally, please confirm whether the required ISD should be re-evaluated per Table 9-5 of AASHTO's "A Policy on Geometric Design of Highways and Streets, 7th Edition" based on the slope of the Athens Street approach.*

Response: The Athens Street approach to Hudson Road will be regraded such the slope will not exceed 3 percent within 50 feet of Hudson Road. The sight distance adjustments for approach grade that are shown in Table 9-5 apply to uncontrolled intersections and would not apply to the Project site driveway which will be under STOP-sign control.

Comment 10: *The Applicant will contribute a "fair-share" cost contribution proportionate to the incremental increase in traffic from the project for pedestrian and bicycle improvements along Hudson Road. Please continue to coordinate with the Town regarding this contribution.*

Response: The Project proponent will continue to coordinate with the Town to establish the "fair-share" cost allocation for pedestrian and bicycle improvements along Hudson Road.

Comment 11: *The Applicant has contracted with Toole Design Group to complete a Road Safety Audit at the intersection of Hudson Road and Route 117. We find this acceptable and no further information is required.*

Response: No response required. We note that the final Road Safety Audit for the Route 117/ Hudson Road intersection has been published and is available on MassDOT's website (https://gis.massdot.state.ma.us/roadsafetyaudits/)

Comment 12: *The Applicant will install a STOP sign and STOP line on the Edson Street approach to Hudson Road. Please provide a conceptual layout of the locations of the STOP sign and STOP line for review.*

Response: A conceptual improvement plan depicting the recommended STOP-sign and STOP-line placement on the Edson Street approach to Hudson Road is attached.

Comment 13: *The Applicant commits to improving the intersection of Hudson Road with Walcott Street and Randall Road by upgrading the existing STOP sign and STOP line, trimming vegetation within the sight triangle areas, and installing "Intersection Ahead" warning signs. Please provide a figure showing the sight triangles that will be cleared.*

Response: A conceptual improvement plan depicting the recommended sign, pavement marking and sight line improvements at the Hudson Road/Walcott Street/Randall Road intersection is attached.

Comment 14: *The TIA outlines several transportation demand management (TDM) measures aimed at encouraging the use of alternative modes of transportation to single-occupant vehicles. We concur with the proposed TDM strategies, although we note that the likelihood of transit use is low due to the location of the project site greater than five miles from the nearest commuter rail station.*

Please clarify whether the secure bicycle parking will also be covered to protect bicycles from inclement weather. Additionally, please clarify whether electric vehicle charging stations will be provided within the community.

Response: The residential units will have garages that will provide secure, weather protected bicycle storage. A bicycle rack(s) will be provided at the amenity/community building. The Project proponent will evaluate the installation of electric vehicle (EV) charging accommodations at the amenity/community building. Residents will have the option of installing EV charging units within their garages.

We trust that this information is responsive to the comments that were raised in Green's October 18, 2022 *Transportation Peer Review* letter. If you should have any questions or would like to discuss our responses in more detail, please feel free to contact me.

Sincerely,

VANASSE & ASSOCIATES, INC.

Jeffrey S. Dirk

Jeffrey S. Dirk, P.E., PTOE, FITE
Managing Partner

Professional Engineer in CT, MA, ME, NH, RI and VA

JSD/jsd

Attachments

Table 4R
UNSIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

	2021 Existing				2029 No-Build				2029 Build			
Unsignalized Intersection/Peak Hour/Movement	Demand[a]	Delay[b]	LOS[c]	Queue[d] 95th	Demand	Delay	LOS	Queue 95th	Demand	Delay	LOS	Queue 95th
Route 117 at Hudson Road												
Weekday Morning:												
Route 117 EB: TH/RT	528	0.0	A	0	576	0.0	A	0	583	0.0	A	0
Route 117 WB: LT/TH	331	2.5	A	1	368	2.7	A	1	382	3.0	A	1
Hudson Road NB: LT/RT	239	26.3	D	4	302	>50.0	F	9	363	>50.0	F	16
Weekday Evening:												
Route 117 EB: TH/RT	369	0.0	A	0	415	0.0	A	0	437	0.0	A	0
Route 117 WB: LT/TH	784	2.9	A	1	883	3.4	A	1	930	3.8	A	2
Hudson Road NB: LT/RT	202	>50.0	F	7	248	>50.0	F	17	288	>50.0	F	26
Hudson Road at Athens Street												
Weekday Morning:												
Athens Street EB: LT/RT	0	0.0	A	0	0	0.0	A	0	75	12.3	B	1
Hudson Road NB: LT/TH	222	0.0	A	0	286	0.0	A	0	291	0.1	A	0
Hudson Road SB: TH/RT	126	0.0	A	0	151	0.0	A	0	172	0.0	A	0
Weekday Evening:												
Athens Street EB: LT/RT	0	0.0	A	0	0	0.0	A	0	50	16.6	C	1
Hudson Road NB: LT/TH	193	0.0	A	0	239	0.0	A	0	256	0.5	A	0
Hudson Road SB: TH/RT	295	0.0	A	0	370	0.0	A	0	439	0.0	A	0
Hudson Road at Edson Street												
Weekday Morning:												
Edson Street WB: LT/RT	21	9.7	A	0	83	10.8	B	1	84	10.9	B	1
Hudson Road NB: TH/RT	204	0.0	A	0	227	0.0	A	0	231	0.0	A	0
Hudson Road SB: LT/TH	126	1.0	A	0	151	1.7	A	0	166	1.7	A	0
Weekday Evening:												
Edson Street WB: LT/RT	38	10.1	B	0	81	11.7	B	1	85	12.0	B	1
Hudson Road NB: TH/RT	161	0.0	A	0	191	0.0	A	0	204	0.0	A	0
Hudson Road SB: LT/TH	295	0.5	A	0	370	1.5	A	0	380	1.5	A	0

[a]Demand in vehicles per hour.
[b]Average control delay per vehicle (in seconds).
[c]Level of service.
[d]Queue length in vehicles.
NB = northbound, EB = eastbound; SB = southbound; WB = westbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.

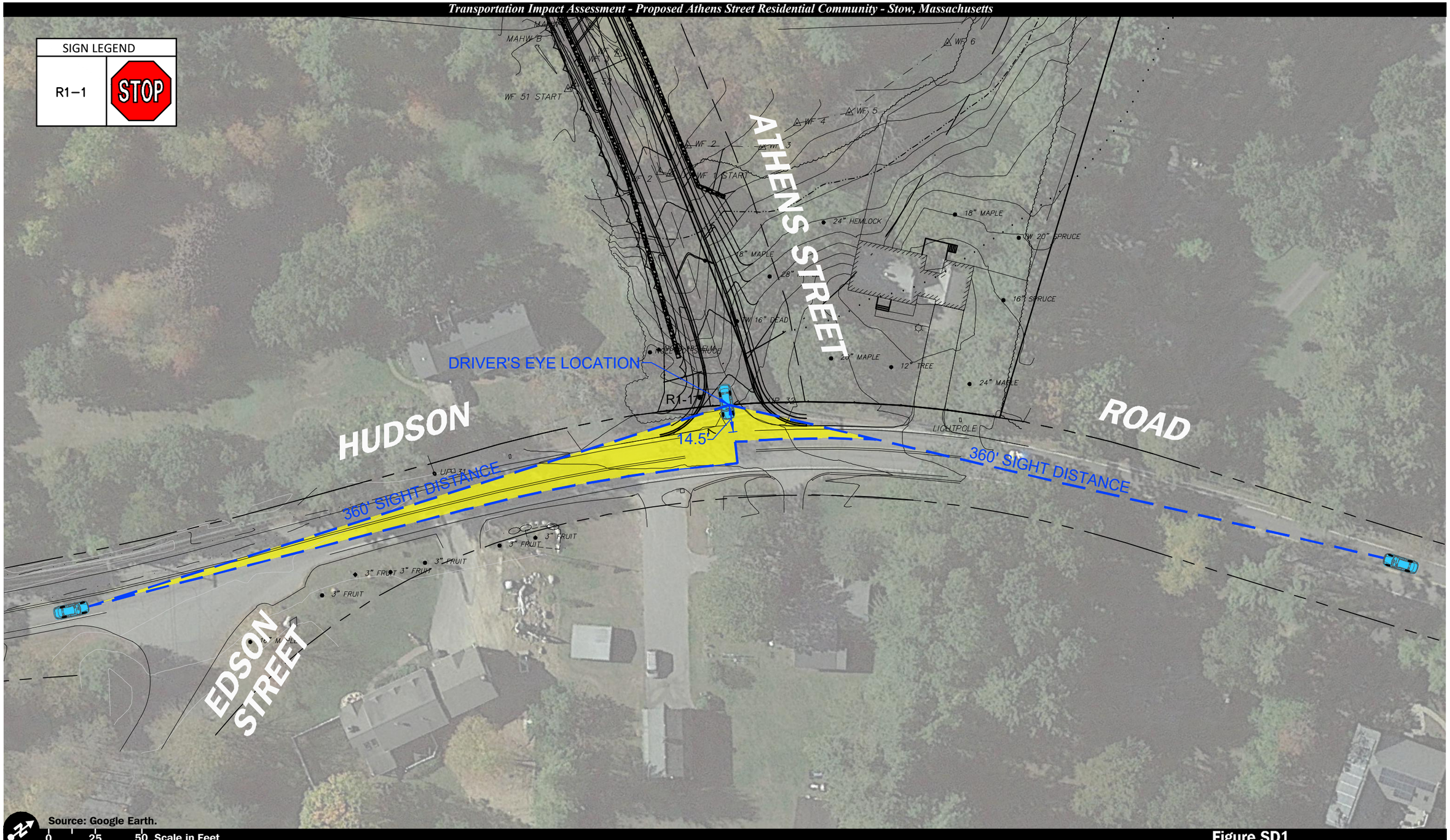

Figure SD1

Sight Distance Plan
Hudson Road at Athens Street

Vanasse & Associates inc

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Source: Google Earth.

Figure CP1

Conceptual Improvement Plan
Hudson Road at Edson Street

Vanasse & Associates inc

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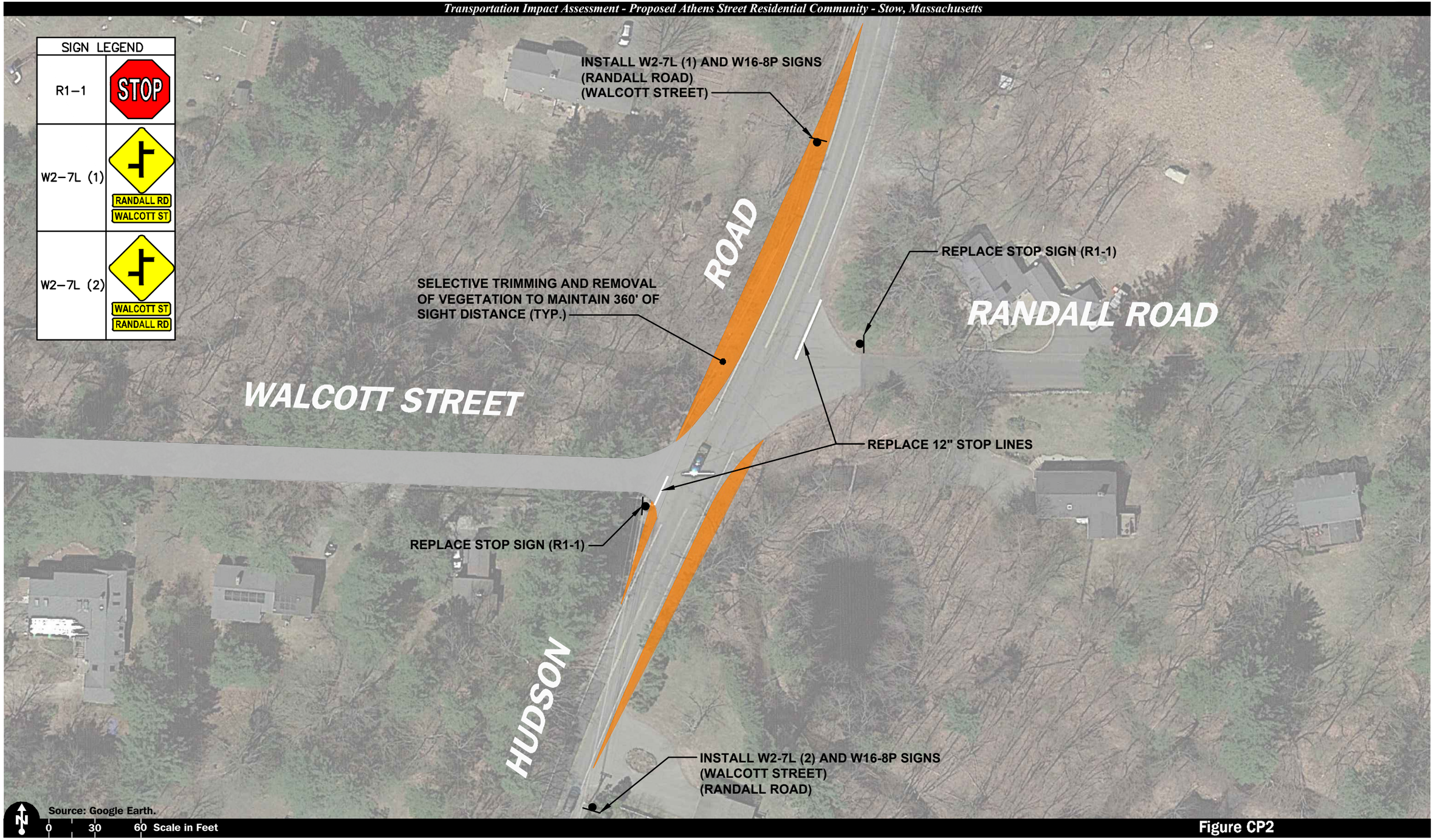

Figure CP2

**Conceptual Improvement Plan
Hudson Road at Randall Road
and Walcott Street**

Vanasse & Associates inc

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APPENDIX

TRIP-GENERATION CALCULATIONS
CAPACITY ANALYSIS WORKSHEETS

TRIP-GENERATION CALCULATIONS

Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
210

LAND USE GROUP:
(200-299) Residential

LAND USE :
210 - Single-Family Detached Housing

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

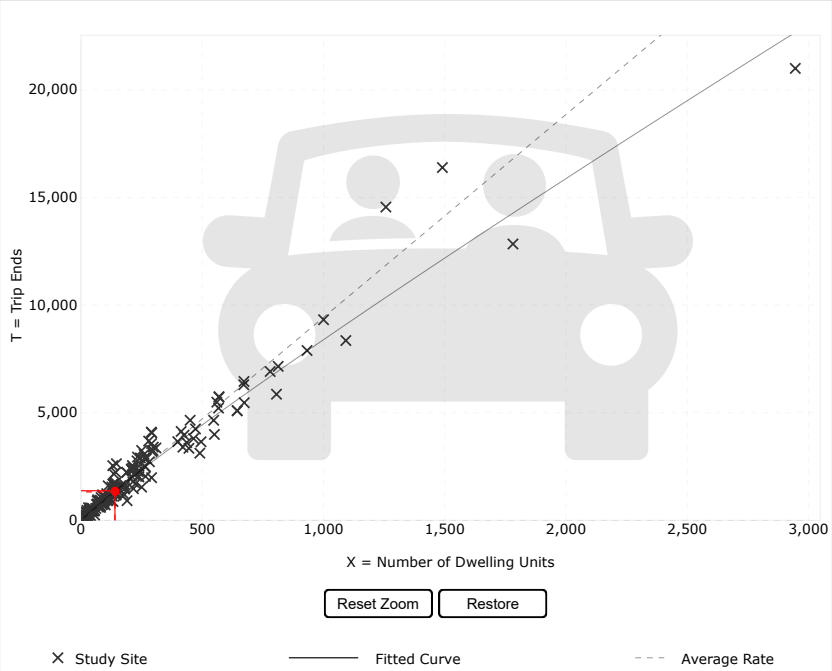
INDEPENDENT VARIABLE (IV):
Dwelling Units

TIME PERIOD:
Weekday

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
140 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Single-Family Detached Housing (210) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
174

Avg. Num. of Dwelling Units:
246

Average Rate:
9.43

Range of Rates:
4.45 - 22.61

Standard Deviation:
2.13

Fitted Curve Equation:
Ln(T) = 0.92 Ln(X) + 2.68

R^2:
0.95

Directional Distribution:
50% entering, 50% exiting

Calculated Trip Ends:
Average Rate: 1320 (Total), 660 (Entry), 660 (Exit)
Fitted Curve: 1375 (Total), 687 (Entry), 688 (Exit)

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Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
210

LAND USE GROUP:
(200-299) Residential

LAND USE :
210 - Single-Family Detached Housing

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

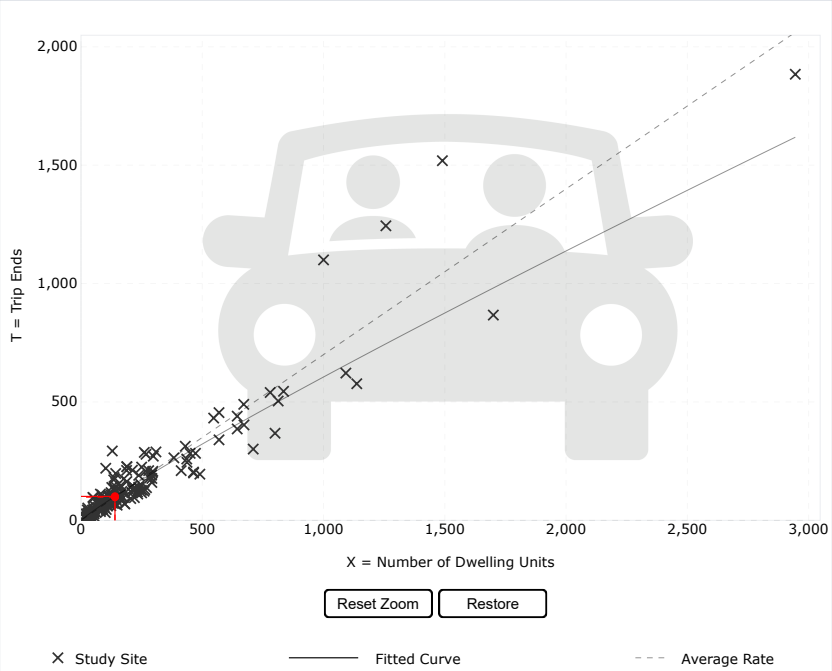
INDEPENDENT VARIABLE (IV):
Dwelling Units

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
140 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Single-Family Detached Housing (210) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
192

Avg. Num. of Dwelling Units:
226

Average Rate:
0.70

Range of Rates:
0.27 - 2.27

Standard Deviation:
0.24

Fitted Curve Equation:
Ln(T) = 0.91 Ln(X) + 0.12

R^2:
0.90

Directional Distribution:
26% entering, 74% exiting

Calculated Trip Ends:
Average Rate: 98 (Total), 25 (Entry), 73 (Exit)
Fitted Curve: 101 (Total), 26 (Entry), 75 (Exit)

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Graph Look Up

Query Filter

DATA SOURCE:
Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
210

LAND USE GROUP:
(200-299) Residential

LAND USE :
210 - Single-Family Detached Housing

LAND USE SUBCATEGORY:
All Sites

SETTING/LOCATION:
General Urban/Suburban

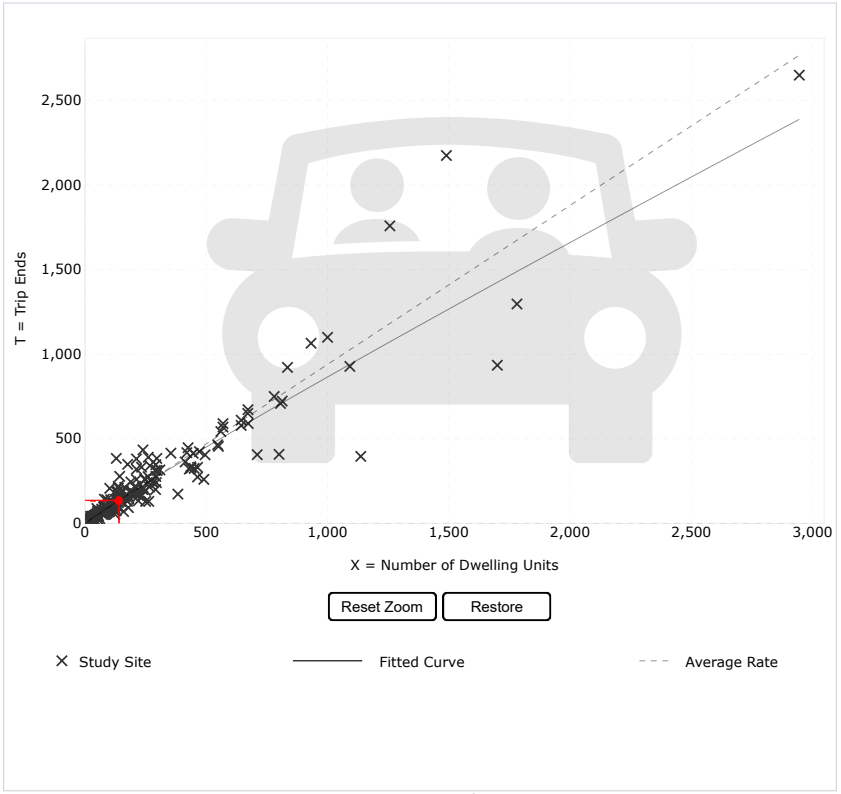
INDEPENDENT VARIABLE (IV):
Dwelling Units

TIME PERIOD:
Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
140 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
Single-Family Detached Housing (210) Click for Description and Data Plots

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
208

Avg. Num. of Dwelling Units:
248

Average Rate:
0.94

Range of Rates:
0.35 - 2.98

Standard Deviation:
0.31

Fitted Curve Equation:
Ln(T) = 0.94 Ln(X) + 0.27

R^2:
0.92

Directional Distribution:
63% entering, 37% exiting

Calculated Trip Ends:
Average Rate: 132 (Total), 83 (Entry), 49 (Exit)
Fitted Curve: 136 (Total), 86 (Entry), 50 (Exit)

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CAPACITY ANALYSIS WORKSHEETS

Route 117 at Hudson Road
Hudson Road at Athens Street
Hudson Road at Edson Street

Route 117 at Hudson Road

Intersection	
Int Delay, s/veh	34.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	500	83	120	262	79	284
Future Vol, veh/h	500	83	120	262	79	284
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	90	90	92	92
Heavy Vehicles, %	6	5	2	8	5	2
Mvmt Flow	575	95	133	291	86	309

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	670	0	1180	623
Stage 1	-	-	-	-	623	-
Stage 2	-	-	-	-	557	-
Critical Hdwy	-	-	4.12	-	6.45	6.22
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.218	-	3.545	3.318
Pot Cap-1 Maneuver	-	-	920	-	207	486
Stage 1	-	-	-	-	529	-
Stage 2	-	-	-	-	568	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	920	-	171	486
Mov Cap-2 Maneuver	-	-	-	-	171	-
Stage 1	-	-	-	-	529	-
Stage 2	-	-	-	-	470	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3	125.3
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	347	-	-	920	-
HCM Lane V/C Ratio	1.137	-	-	0.145	-
HCM Control Delay (s)	125.3	-	-	9.6	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	15.5	-	-	0.5	-

Intersection	
Int Delay, s/veh	112.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	334	103	359	571	80	208
Future Vol, veh/h	334	103	359	571	80	208
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	97	97	90	90
Heavy Vehicles, %	1	2	1	1	0	0
Mvmt Flow	355	110	370	589	89	231

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	465	0	1739	410
Stage 1	-	-	-	-	410	-
Stage 2	-	-	-	-	1329	-
Critical Hdwy	-	-	4.11	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1102	-	97	646
Stage 1	-	-	-	-	674	-
Stage 2	-	-	-	-	250	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1102	-	~ 49	646
Mov Cap-2 Maneuver	-	-	-	-	~ 49	-
Stage 1	-	-	-	-	674	-
Stage 2	-	-	-	-	125	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.8	$ 601.1
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	147	-	-	1102	-
HCM Lane V/C Ratio	2.177	-	-	0.336	-
HCM Control Delay (s)	$ 601.1	-	-	9.9	0
HCM Lane LOS	F	-	-	A	A
HCM 95th %tile Q(veh)	26.2	-	-	1.5	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Hudson Road at Athens Street

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	60	15	5	286	151	21
Future Vol, veh/h	60	15	5	286	151	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	95	86	92
Heavy Vehicles, %	2	2	2	3	7	2
Mvmt Flow	65	16	5	301	176	23

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	499	188	199	0	-	0
Stage 1	188	-	-	-	-	-
Stage 2	311	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	531	854	1373	-	-	-
Stage 1	844	-	-	-	-	-
Stage 2	743	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	529	854	1373	-	-	-
Mov Cap-2 Maneuver	529	-	-	-	-	-
Stage 1	841	-	-	-	-	-
Stage 2	743	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.3	0.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1373	-	573	-	-
HCM Lane V/C Ratio	0.004	-	0.142	-	-
HCM Control Delay (s)	7.6	0	12.3	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	40	10	17	239	370	69
Future Vol, veh/h	40	10	17	239	370	69
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	77	83	92
Heavy Vehicles, %	2	2	2	1	0	2
Mvmt Flow	43	11	18	310	446	75

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	830	484	521	0	-	0
Stage 1	484	-	-	-	-	-
Stage 2	346	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	340	583	1045	-	-	-
Stage 1	620	-	-	-	-	-
Stage 2	716	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	333	583	1045	-	-	-
Mov Cap-2 Maneuver	333	-	-	-	-	-
Stage 1	607	-	-	-	-	-
Stage 2	716	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.6	0.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1045	-	364	-	-
HCM Lane V/C Ratio	0.018	-	0.149	-	-
HCM Control Delay (s)	8.5	0	16.6	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.5	-	-

Hudson Road at Edson Street

Intersection	
Int Delay, s/veh	2.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	67	224	7	36	130
Future Vol, veh/h	17	67	224	7	36	130
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	71	71	97	97	86	86
Heavy Vehicles, %	0	6	3	0	7	7
Mvmt Flow	24	94	231	7	42	151

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	470	235	0	0	238	0
Stage 1	235	-	-	-	-	-
Stage 2	235	-	-	-	-	-
Critical Hdwy	6.4	6.26	-	-	4.17	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.354	-	-	2.263	-
Pot Cap-1 Maneuver	556	794	-	-	1300	-
Stage 1	809	-	-	-	-	-
Stage 2	809	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	537	794	-	-	1300	-
Mov Cap-2 Maneuver	537	-	-	-	-	-
Stage 1	809	-	-	-	-	-
Stage 2	781	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.9	0	1.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	724	1300	-
HCM Lane V/C Ratio	-	-	0.163	0.032	-
HCM Control Delay (s)	-	-	10.9	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0.1	-

Intersection	
Int Delay, s/veh	2.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	14	71	185	19	74	306
Future Vol, veh/h	14	71	185	19	74	306
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	71	71	78	78	83	83
Heavy Vehicles, %	0	6	0	0	0	0
Mvmt Flow	20	100	237	24	89	369

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	796	249	0	0	261	0
Stage 1	249	-	-	-	-	-
Stage 2	547	-	-	-	-	-
Critical Hdwy	6.4	6.26	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.354	-	-	2.2	-
Pot Cap-1 Maneuver	359	780	-	-	1315	-
Stage 1	797	-	-	-	-	-
Stage 2	584	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	328	780	-	-	1315	-
Mov Cap-2 Maneuver	328	-	-	-	-	-
Stage 1	797	-	-	-	-	-
Stage 2	534	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12	0	1.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	636	1315	-
HCM Lane V/C Ratio	-	-	0.188	0.068	-
HCM Control Delay (s)	-	-	12	7.9	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.7	0.2	-