

MEMORANDUM

TO: Ms. Lynn Dahlin
Town of Sutton
Zoning Board of Appeals
4 Uxbridge Road
Sutton, MA 01590

FROM: Mr. Shaun P. Kelly *SPK*
Associate
Vanasse & Associates, Inc.
35 New England Business Center Drive,
Suite 140
Andover, MA 01810

DATE: January 25, 2023

RE: 9302

SUBJECT: Response to Transportation Peer Review
Proposed Medical Office Building
15 Pleasant Valley Road
Sutton, Massachusetts

Vanasse & Associates, Inc. (VAI) has prepared this memorandum to respond to comments issued by the Town of Sutton's transportation peer review consultant, Chappell Engineering Associates (CEA), as outlined in their December 7, 2022 peer review letter on the above referenced project.

To facilitate your review, this document follows the general outline of the CEA comment letter. As noted, based on the supplemental information provided, the findings of the initial Transportation Impact Assessment¹ (TIA) remain unchanged, with the proposed medical office building expected to have minimal impact to area traffic operations, with the proposed site access designed to provide the required sight distances to ensure safe access to and from the Project.

TRAFFIC STUDY REVIEW

Comment 1: "The traffic study describes the proposed medical office building to be 5,150 square feet, yet the site plan shows a 5,253 square foot building. **The applicant should clarify the proposed building size.** As described later in this review, the slightly smaller building size assumed in the traffic study will not materially affect the conclusions of the traffic study."

Response: The 5,253 sf building size identified on the site plan reflects the correct building size, which was modified subsequent to the preparation of the initial traffic assessment. VAI concurs with CEA that the minor discrepancy in building size would not affect the findings of the initial assessment, with no additional peak hour trips expected during the weekday morning peak hour, and only one additional peak hour trip during the weekday evening peak hour. However, the updated future Build condition traffic analyses reflect the additional evening peak hour trip.

Comment 2: "The traffic study focused on the following intersections:

¹ *Transportation Impact Assessment – Proposed Medical Office Building, 15 Pleasant Valley Road, Sutton, Massachusetts; Vanasse & Associates, Inc., October 2022.*



- Route 146 at Pleasant Valley Road
- Route 146 at Boston Road
- Pleasant Valley Road at Boston Road and Dudley Road

The traffic study area is appropriate for the proposed project and its expected traffic generation.

Response: Comment noted.

Comment 3: “The study provided a description of the area roadway network. Traffic volume and vehicle speed data were conducted in April and September 2022. Turning movement counts were conducted at the study intersections during the weekday AM peak period (7:00 to 9:00 AM) and the weekday PM peak period (4:00 to 6:00 PM). The counts showed that the weekday AM peak hour generally occurred from 7:00 to 8:00 AM and the weekday PM peak hour generally occurred from 4:30 to 5:30 PM. CEA concurs with the selected time periods used for analysis.

A comparison of the actual count data to the volumes shown on the traffic flow networks shows that the left- and right-turn volumes on the Pleasant Street northbound approach to Boston Road appear to have been flipped during the weekday AM peak hour. This error was then carried through to the future No-Build and Build traffic flow networks as well as the capacity analyses. The traffic flow networks and the affected intersection capacity analyses should be updated to reflect the correct volumes.

Response: VAI concurs with the CEA that the left- and right-turn volumes on the Pleasant Street northbound approach to Boston Road were transposed for the morning peak hour, with the left- and right-turn volumes interchanged. This error has been corrected, with updated capacity analysis results provided as an attachment to this document.

Comment 4: “The study did not make any adjustments to the collected data to represent pre-COVID traffic conditions. However, the new MassDOT *Traffic and Safety Engineering 25% Design Submission Guidelines* note that traffic volume data collected after March 1, 2022 are no longer subject to any adjustments to represent pre-pandemic traffic volume conditions, except in areas where land use is predominantly office. Therefore, since the traffic volume data were collected in April 2022 and land use in the area is predominantly industrial and commercial, COVID adjustments do not need to be applied to the data.

Response: VAI concurs that the unadjusted collected traffic counts are representative of typical traffic conditions and do not require seasonal adjustment.

Comment 5: “Seasonal adjustments were reviewed using MassDOT data. The data indicated that April counts were higher than annual average month conditions and no seasonal adjustments were therefore made to the collected counts. CEA concurs with these findings.”

Response: VAI concurs that traffic counts collected in April are typically higher than average annual conditions, and therefore represent a conservative analysis scenario.

Comment 6: “Accident data were reviewed and summarized within the traffic study. The data include the year 2020, which has not been authorized for use yet by MassDOT. However, the four



years prior provide sufficient information and exceed the three-year minimum required by MassDOT. The intersection of Route 146 and Boston Road is shown to have a crash rate well above the statewide average and is listed as a Highway Safety Improvement Program (HSIP) eligible location. A Road Safety Audit (RSA) was required of this intersection as part of the condition for approval of the Unified warehouse development on Boston Road. The intent of the RSA is to identify any measures to improve safety at the intersection. All other study intersections experienced crash rates below the statewide average.

Response: As noted by CEA, the majority of study area intersections exhibited average crash rates below the state average, with the Unified warehouse development committed to conducting an RSA for the intersection of Route 146 with Boston Road.

Comment 7: “A sight distance analysis was performed at the proposed driveway location based on observed 85th percentile speeds. This analysis shows that a minimum of 261 feet of clear sight distance is required to the south of the driveway to see traffic turning from Route 146 in time to avoid a collision. The applicant submitted a sight line plan and profiles showing that this distance can be achieved after removal of existing vegetation. **It is recommended that the existing grades within the sight triangle (identified on the sight line plan prepared by Vanasse & Associates) be maintained, or if altered through site construction work, assure that the sight lines shown in the profiles are not impacted. It is further recommended that the sight triangle area be kept clear of any obstructions such as landscaping, signs, or fences and be regularly maintained to assure adequate sight distance. The applicant should also ensure that existing vegetation within the Pleasant Valley Road right-of-way to the north of the driveway be trimmed or removed to assure adequate sight distance to the north.**”

Response: As noted by CEA, and consistent with the recommendations provided in the TIA, the proposed grading identified in the sight distance analysis provided in the TIA will be maintained, with regular clearing of vegetation to ensure sight lines are maintained. The applicant also commits to trimming or removing any existing vegetation to the north of the driveway that could impede sight lines in this direction.

Comment 8: “A 7-year design horizon was used for the No-Build and Build condition analyses consistent with MassDOT’s *Transportation Impact Assessment Guidelines*. An annual growth rate of 1.0 percent per year was used to project the future No-Build volumes consistent with other recent traffic studies in the area. CEA concurs with this growth rate.”

Response: Comment noted.

Comment 9: “The traffic study included the following planned developments within the town of Sutton:

- Unified warehouse— approximately 995,000 square foot warehouse distribution center on Boston Road.
- Blackstone Logistics Center (Sutton, Douglas and Uxbridge) – approximately 650,000 square feet of warehouse distribution space.

Based on review of other studies in the area, there are additional developments that could impact traffic within the study area and should be included within the background growth assumptions including:



- Lackey Dam Logistics Center, Sutton and Uxbridge – approximately 180,000 square feet of warehouse distribution space with access on Oakhurst Road and Lackey Dam Road.
- 85 Gilmore Drive, Sutton – approximately 140,000 square feet of industrial manufacturing space and 40,000 square feet of ancillary office space.
- Campanelli Business Park Phase 1, Uxbridge – 800,000 square feet of industrial space on Campanelli Drive.
- Campanelli Business Park Amazon Facility, Uxbridge – an Amazon sortation facility at 515 Douglas Street.
- Gilboa Street, Douglas – 1.1 million square feet of warehouse space on Gilboa Street.

The applicant should contact the towns of Sutton, Uxbridge, and Douglas to determine the status of these and other potential development projects and update the future volume conditions as appropriate.

Response: As requested by CEA, the future year traffic volume projections were updated to reflect traffic associated with the five identified development projects in Sutton, Uxbridge, and Douglas. Specifically, project-related traffic increases associated these Projects were incorporated into the analysis of future No-Build and Build conditions. Background traffic growth calculations have been provided as an attachment to this document.

Comment 10: “The trip generation of the development was estimated using the Institute of Transportation Engineers (ITE) *Trip Generation Manual*¹ for Land Use Code 720 (Medical-Dental Office Building). While the land use code is correct, the trip generation was based on a slightly smaller building size than shown on the site plan. This difference, however, would only increase trip generation by one vehicle during the weekday AM peak hour and would therefore not alter the conclusions of the traffic study. During the weekday PM peak hour, the report for some reason already assumed a higher number (25 trips) than the correct building size would generate (18 trips). Therefore, the trip generation assumptions are acceptable.

Response: The trip generation projections for the Project were revised to reflect the current building square footage, including the weekday evening peak hour. Based on the current plan the Project is expected to generate 16 new vehicle trips (13 entering and 3 exiting) during the weekday morning peak hour and 21 new vehicle trips (6 entering and 15 exiting) during the weekday evening peak hour. Revised capacity analyses included with this response letter reflect the correct peak hour trip generation for the Project.

Comment 11: “The traffic study describes that the trip distribution methodology was based on existing travel patterns with approximately 35 percent to/from each the north and south on Route 140, 20 percent to/from the east on Boston Road, and 10 percent to/from the west on Boston Road. The distribution assumptions appear appropriate for the proposed use.”

Response: Comment noted.

Comment 12: “Capacity analyses were performed at the study area intersections under Existing, No-Build and Build conditions. **As described in Comments 3 and 9 above, the analyses should be updated to reflect the correct turning movements and background development projects. The analysis table for the signalized intersection should also be**



expanded to show the results for each movement (rather than by approach) and should show 95th percentile queue calculations. While the Route 146 and Boston Road intersection shows slightly better results than the recent traffic study prepared by VHB for the Unified warehouse development, the difference lies in the fact that VAI adjusted the lost time (the total of start-up delay plus all of the yellow and red clearance times) down by 2 seconds on each approach. This is reasonable given the very long yellow and all-red intervals and results in more realistic representation of intersection operations. The results of the analyses indicate that the medical office building will not have a significant effect on intersection operations. This should be verified once the capacity analyses have been updated as requested.

Response: As requested, revised capacity analysis results have been provided as an attachment to this document that summarize the v/c ratio, movement delay, level of service and average/maximum queues for all intersection movements. As indicated, the Project is expected to result in no notable impact to traffic operations, with overall delays increasing by approximately one second or less per vehicle at the intersection of Route 146 with Boston Road, with minimal impact to vehicular queuing at all study area locations.

CONCLUSION

As documented in this response, the findings of the initial TIA remain unchanged, with the proposed medical office building expected to have minimal impact to area traffic operations, with the proposed site access designed to provide the required sight distances to ensure safe access to and from the Project.

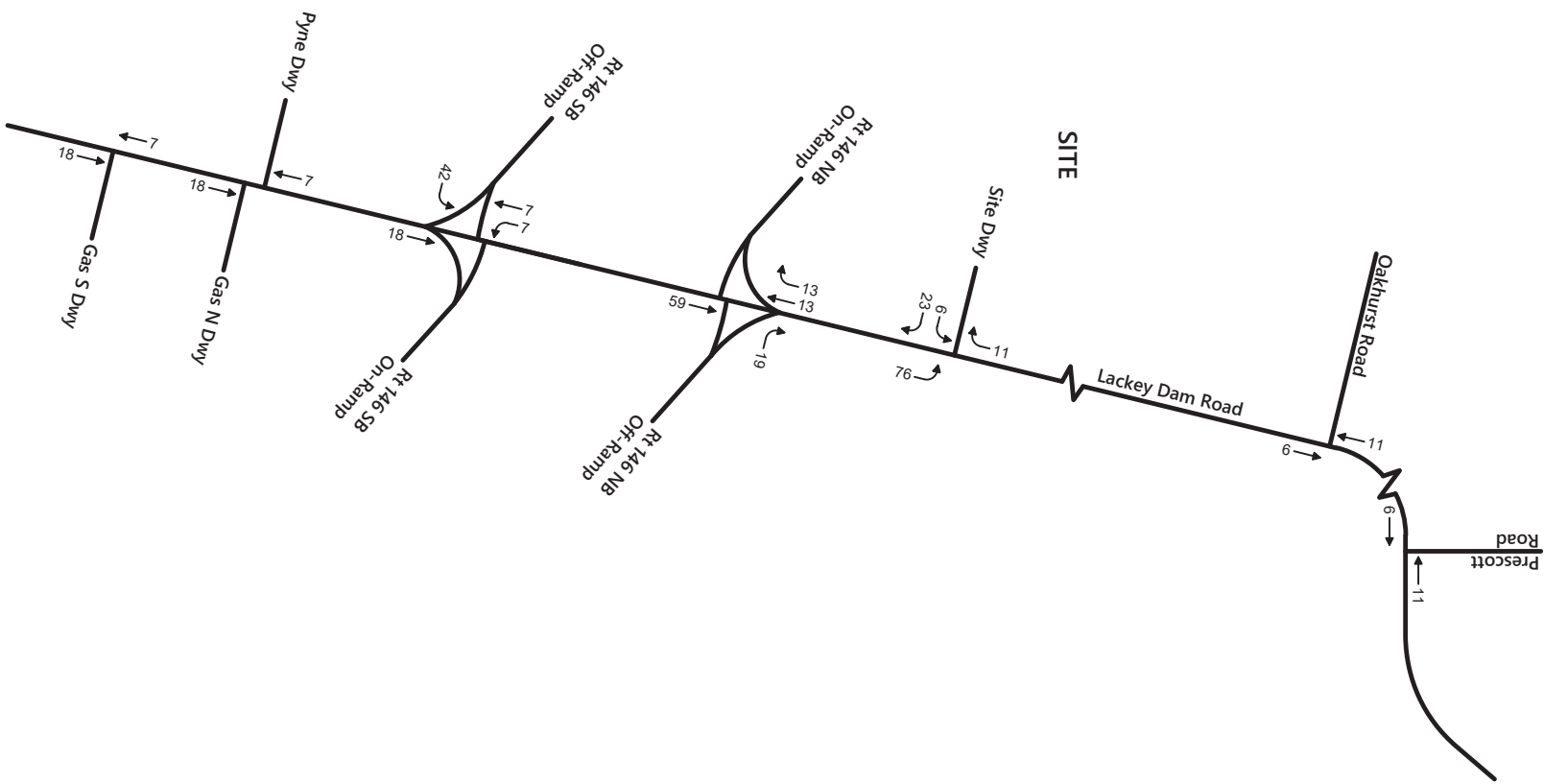


APPENDIX

BACKGROUND DEVELOPMENT PROJECTS
CAPACITY ANALYSIS RESULTS

BACKGROUND DEVELOPMENT PROJECTS

All fractional numbers rounded up, resulting in minor volume discrepancies between intersections.

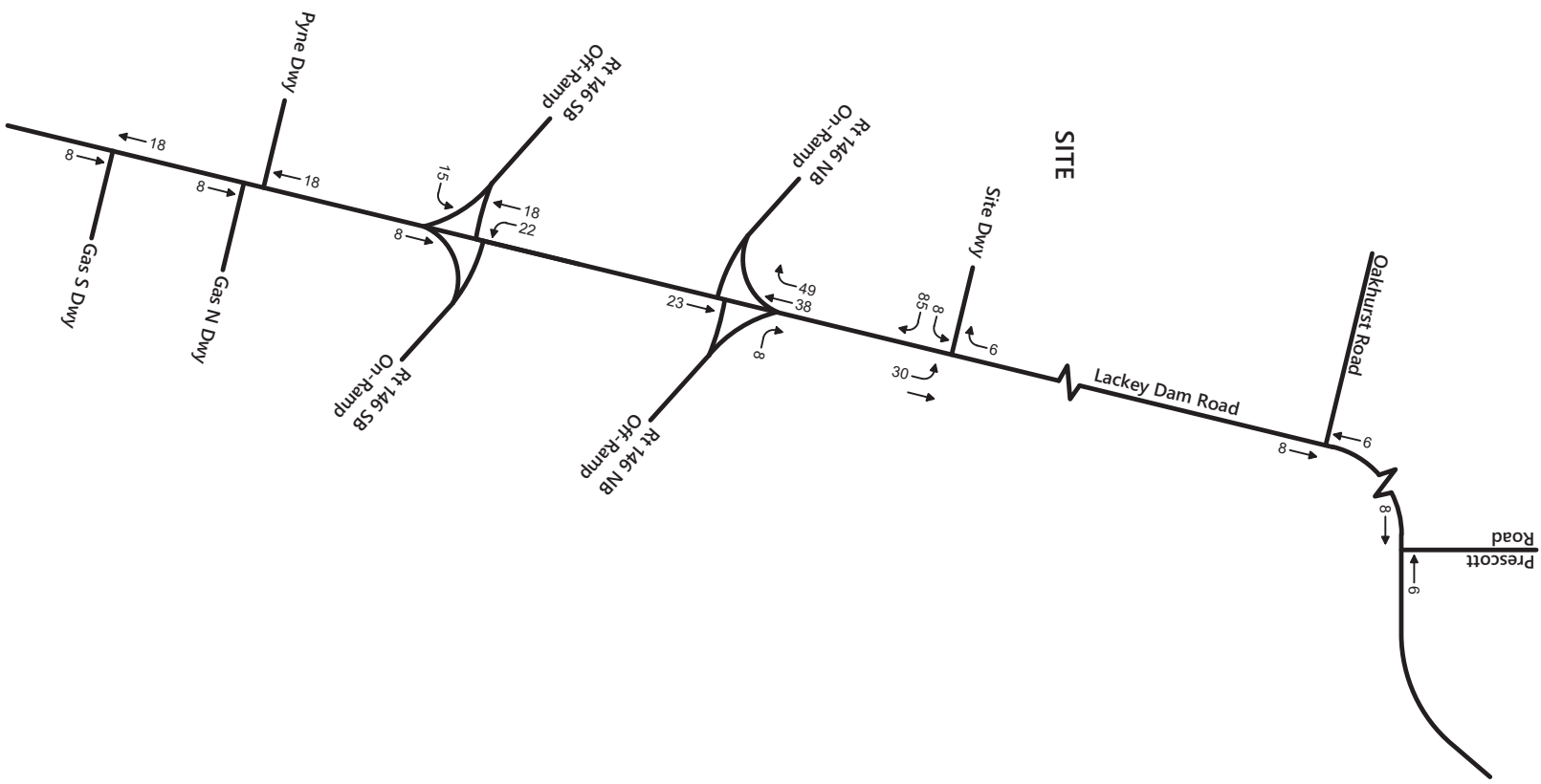


Not to Scale



Figure 7
Site-Generated Traffic Volumes
Weekday Morning Peak Hour
Blackstone Logistics Center
Sutton, Douglas, and Uxbridge, Massachusetts

All fractional numbers rounded up, resulting in minor volume discrepancies between intersections.

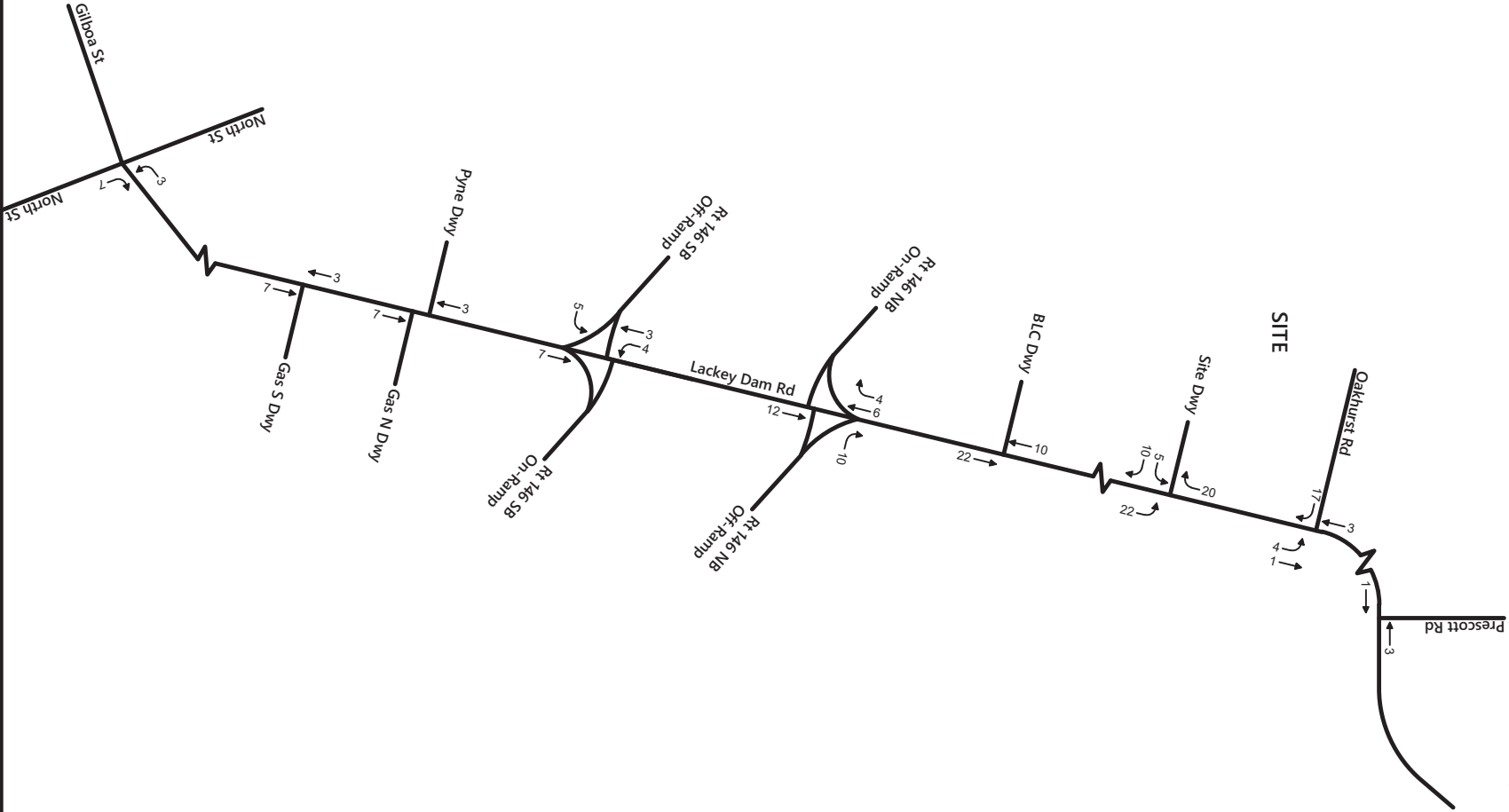


Not to Scale



Figure 8
Site-Generated Traffic Volumes
Weekday Evening Peak Hour
Blackstone Logistics Center
Sutton, Douglas, and Uxbridge, Massachusetts

All fractional numbers rounded up, resulting in minor volume discrepancies between intersections.

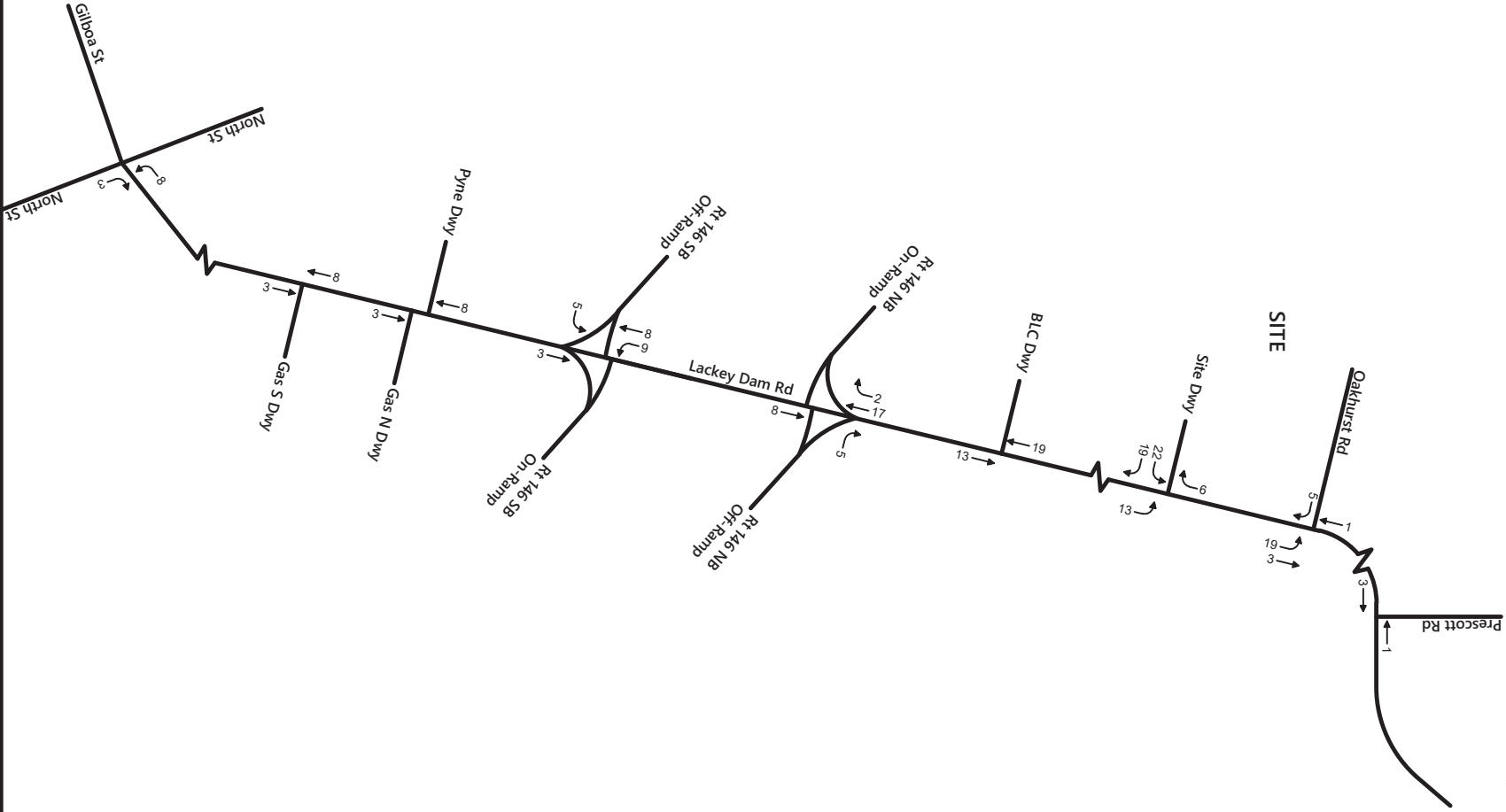


Not to Scale



Figure 7
Site-Generated Traffic Volumes
Weekday Morning Peak Hour
Lackey Dam Road Logistics Center
Sutton and Uxbridge, MA
5/12/2022

All fractional numbers rounded up, resulting in minor volume discrepancies between intersections.



Not to Scale



Figure 8
Site-Generated Traffic Volumes
Weekday Evening Peak Hour
Lackey Dam Road Logistics Center
Sutton and Uxbridge, MA
5/12/2022

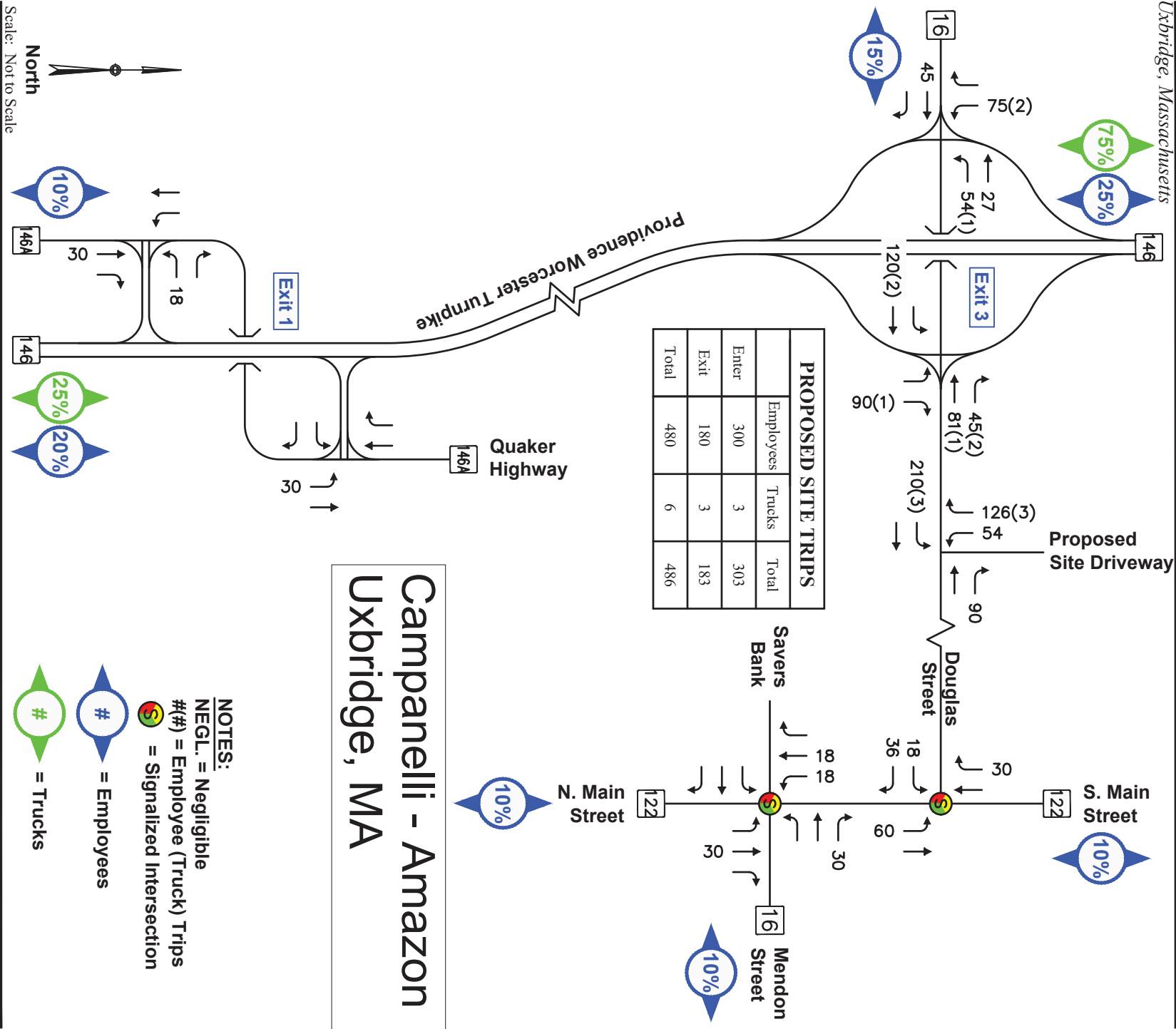


Figure 2

Site Generated Trips
Weekday Morning Peak Hour Volumes
(Empirical)

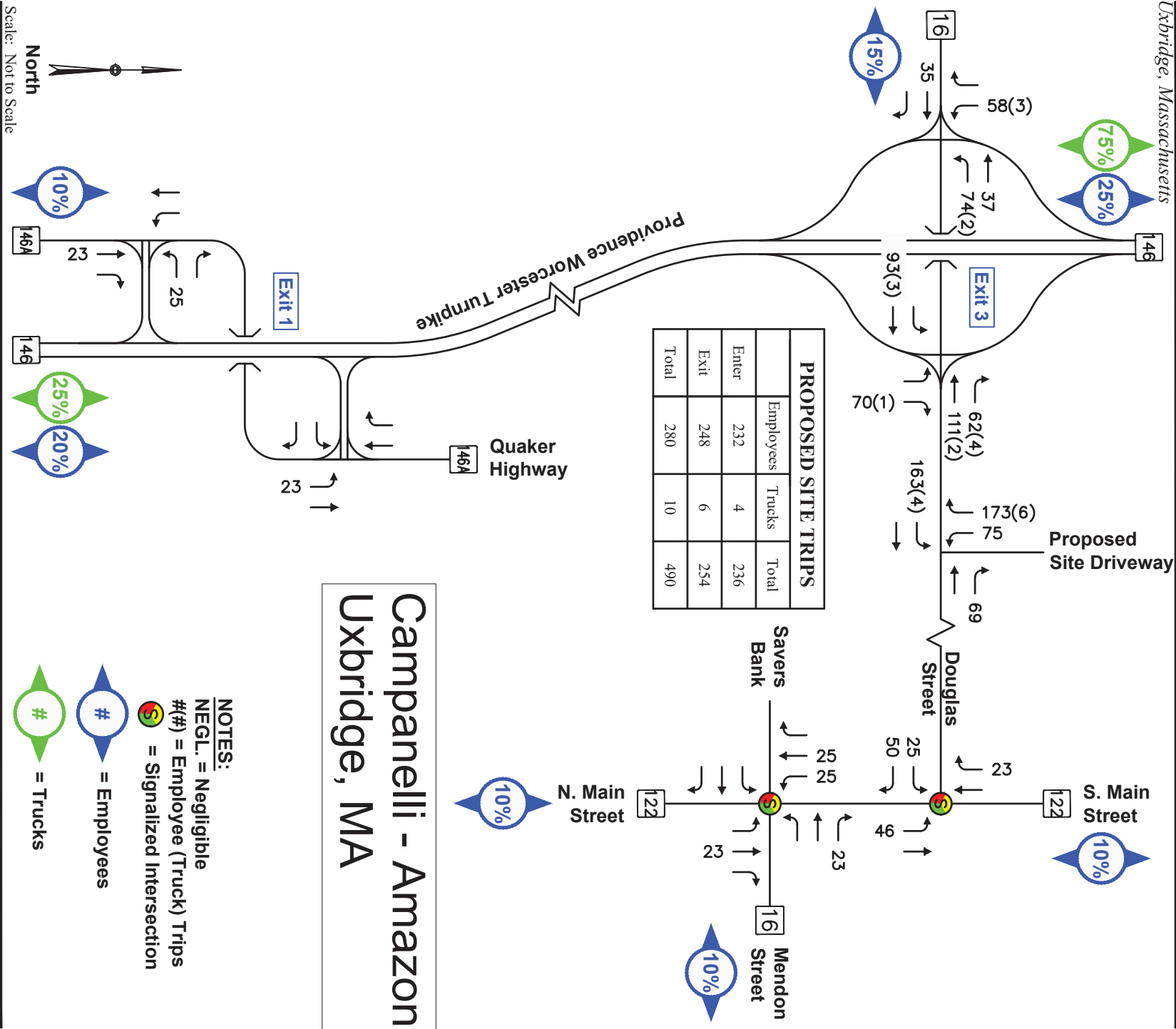
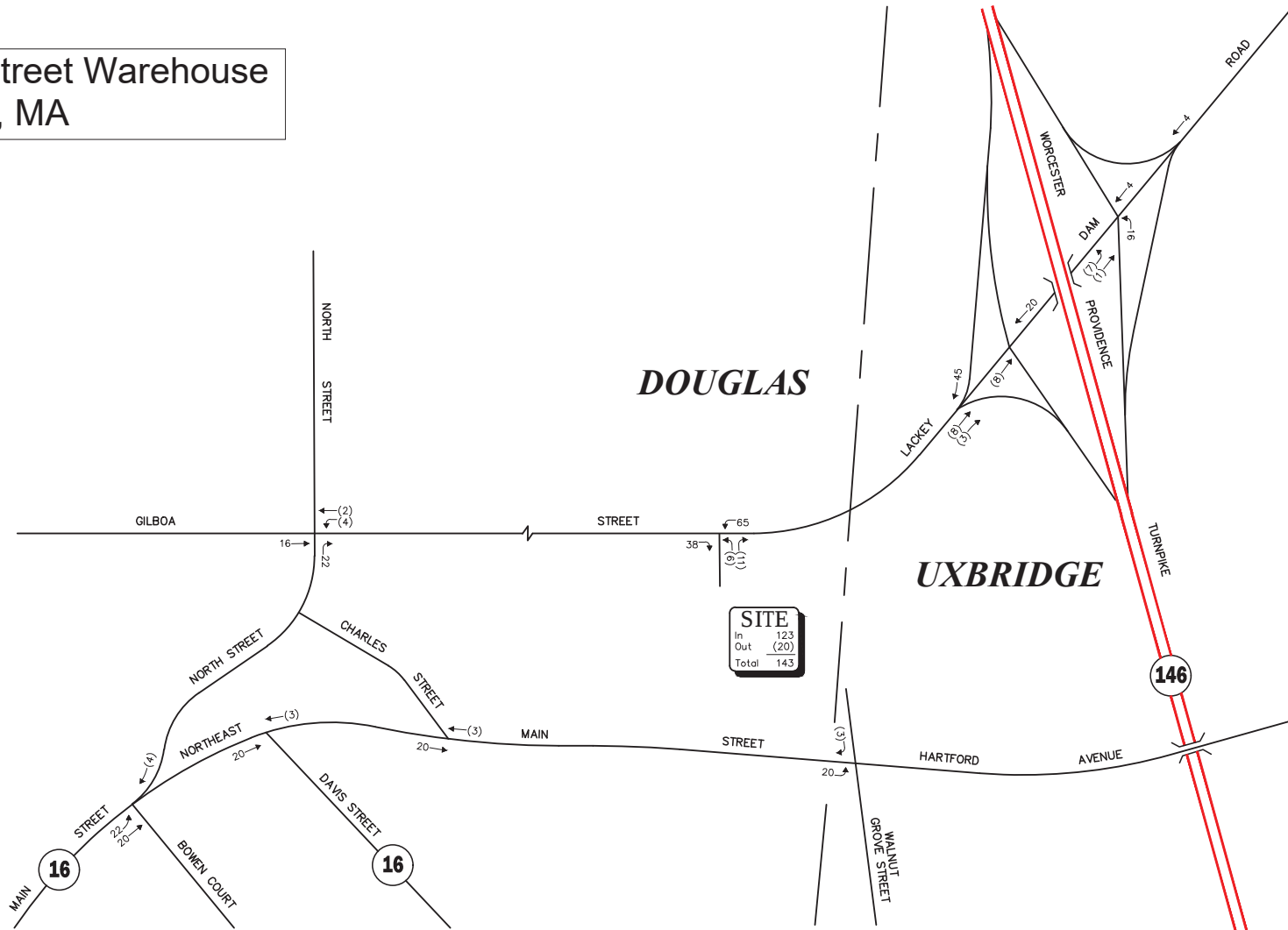


Figure 3

Site Generated Trips
Weekday Evening Peak Hour Volumes
(Empirical)

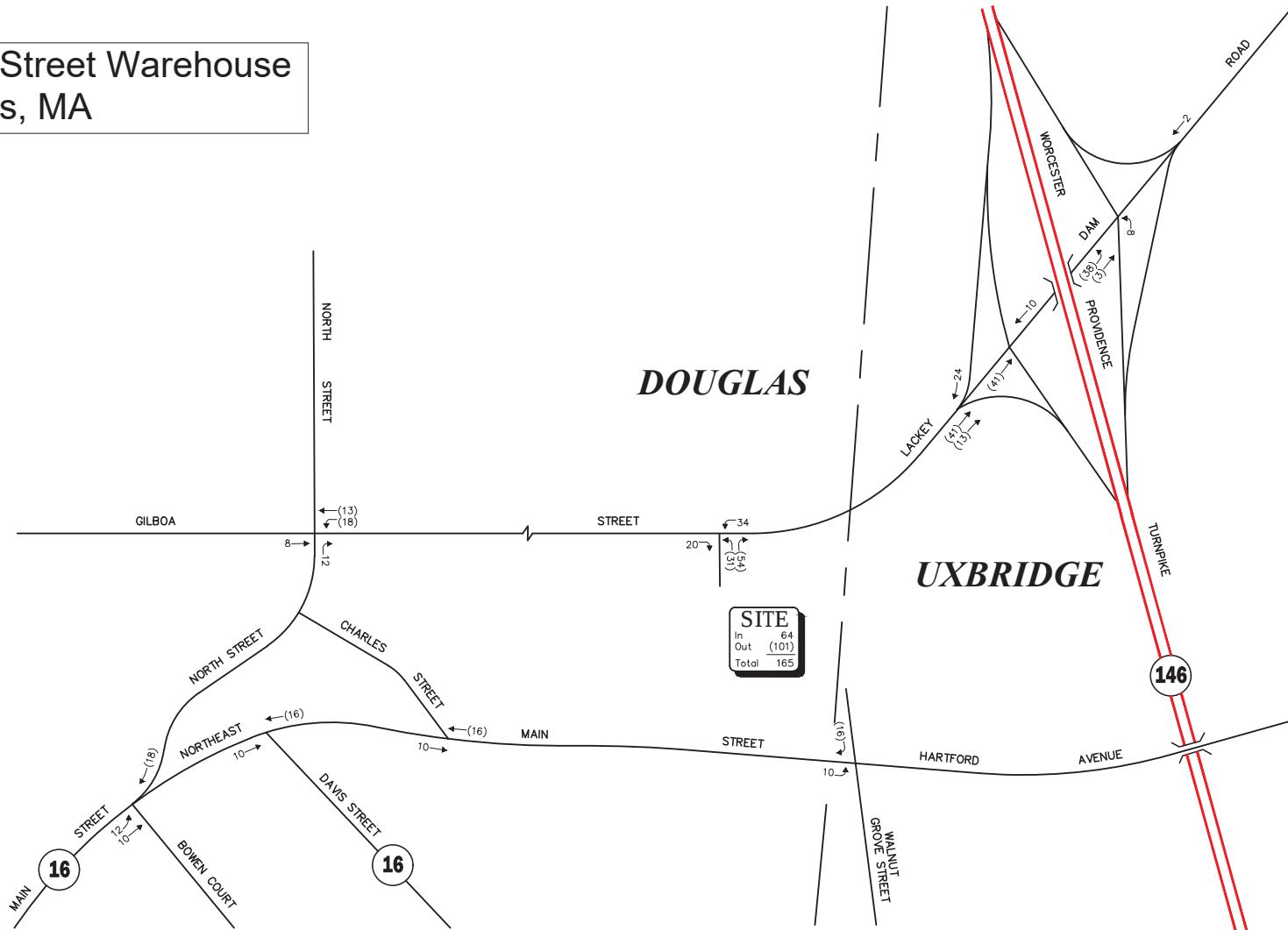
Gilboa Street Warehouse Douglas, MA



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

Figure 9
Project-Generated
Weekday Morning
Passenger Car Trips
Peak-Hour Traffic Volumes

Gilboa Street Warehouse Douglas, MA

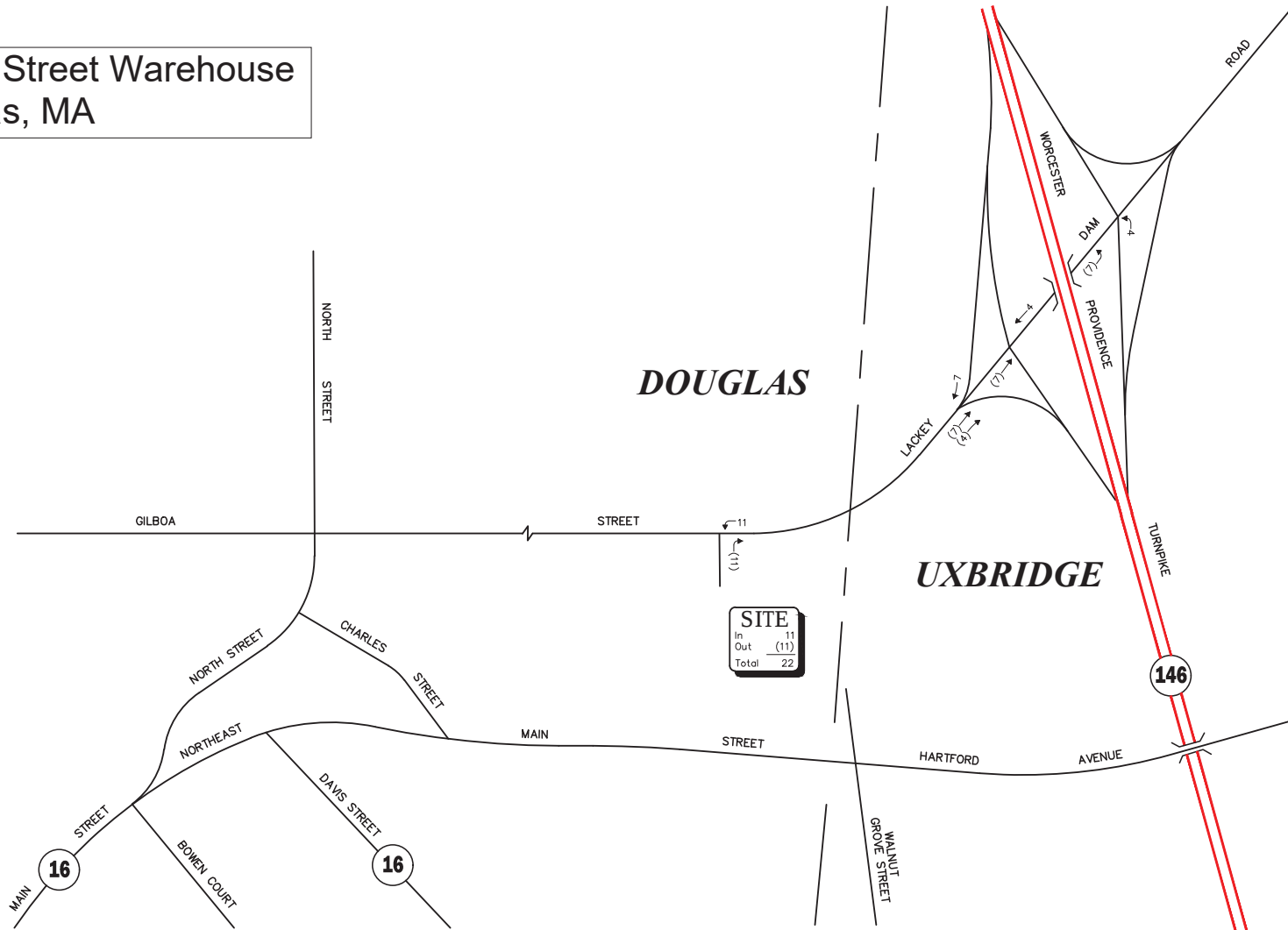


Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.
Not To Scale

Figure 10

Project-Generated
Weekday Evening
Passenger Car Trips
Peak-Hour Traffic Volumes

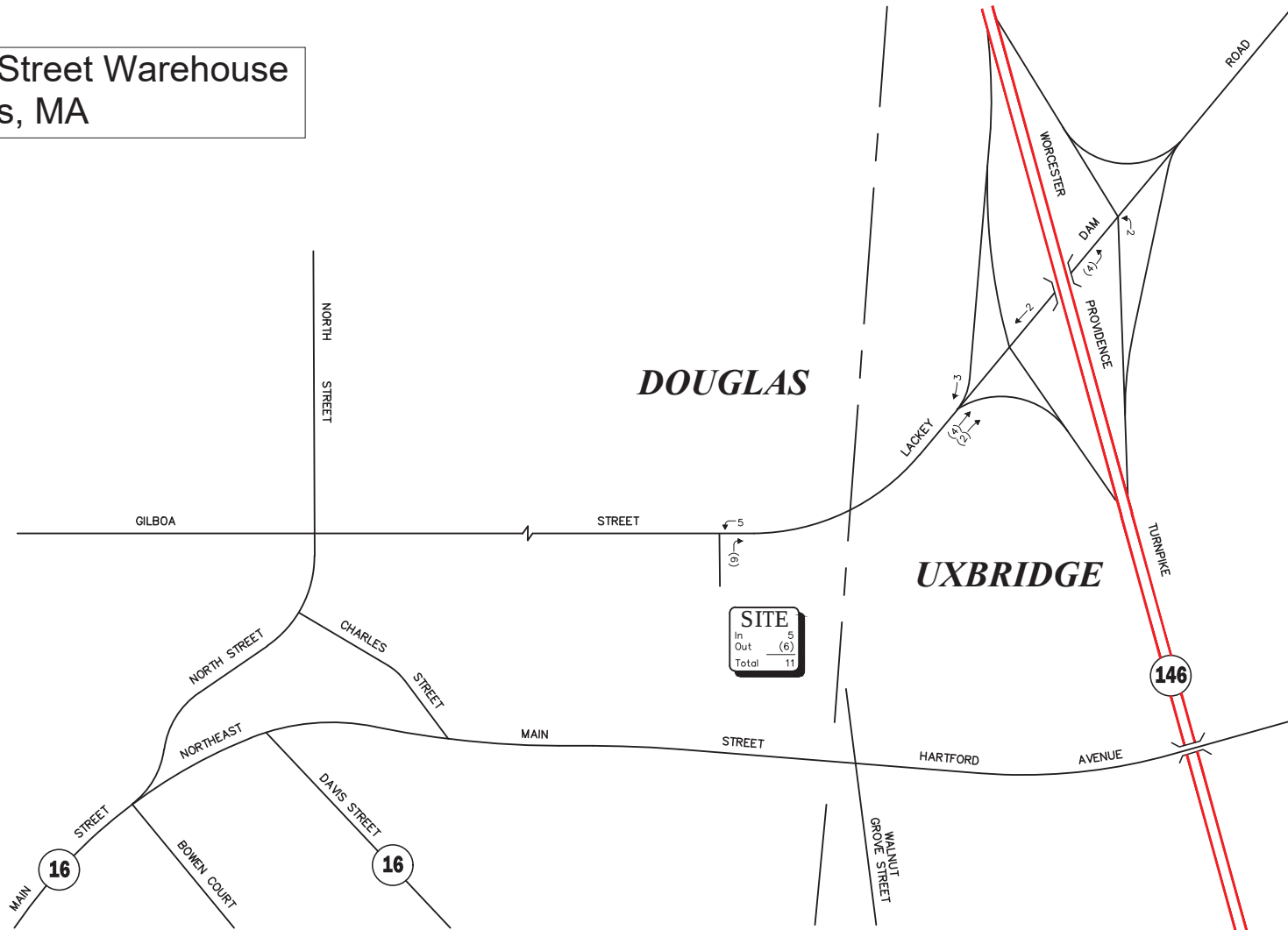
Gilboa Street Warehouse Douglas, MA



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

Figure 11
Project-Generated
Weekday Morning
Truck Trips
Peak-Hour Traffic Volumes

Gilboa Street Warehouse Douglas, MA



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



Figure 12

Project-Generated
Weekday Evening
Truck Trips
Peak-Hour Traffic Volumes

Institute of Transportation Engineers (ITE)
Trip Generation, 11th Edition
Land Use Code (LUC) 140 - Manufacturing

Average Vehicle Trips Ends vs: 1000 Sq. Feet Gross Floor Area
Independent Variable (X): 140.000

AVERAGE WEEKDAY DAILY

$T = 4.75 * (X)$
 $T = 4.75 * 140.00$
 $T = 665.00$
 $T = 666$ vehicle trips
with 50% (333 vph) entering and 50% (333 vph) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

$T = 0.68 * (X)$
 $T = 0.68 * 140.00$
 $T = 95.20$
 $T = 95$ vehicle trips
with 76% (72 vph) entering and 23% (23 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

$T = 0.74 * (X)$
 $T = 0.74 * 140.00$
 $T = 103.60$
 $T = 104$ vehicle trips
with 31% (32 vph) entering and 69% (72 vph) exiting.

SATURDAY DAILY

$T = 1.49 * (X)$
 $T = 1.49 * 140.00$
 $T = 208.60$
 $T = 208$ vehicle trips
with 50% (104 vph) entering and 50% (104 vph) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

$T = 0.18 * (X)$
 $T = 0.18 * 140.00$
 $T = 25.20$
 $T = 25$ vehicle trips
with 52% (13 vph) entering and 48% (12 vph) exiting.

Institute of Transportation Engineers (ITE)
Trip Generation, 11th Edition
Land Use Code (LUC) 710 - General Office Building

Average Vehicle Trips Ends vs: 1,000 Square Feet Gross Floor Area
Independent Variable (X): 40.000

AVERAGE WEEKDAY DAILY

$T = 10.84 * (X)$
 $T = 10.84 * 40.000$
 $T = 433.60$
 $T = 434$ vehicle trips
with 50% (217 vpd) entering and 50% (217 vpd) exiting.

WEEKDAY MORNING PEAK HOUR

$T = 1.52 * (X)$
 $T = 1.52 * 40.000$
 $T = 60.80$
 $T = 61$ vehicle trips
with 88% (54 vph) entering and 12% (7 vph) exiting.

WEEKDAY EVENING PEAK HOUR

$T = 1.44 * (X)$
 $T = 1.44 * 40$
 $T = 57.60$
 $T = 58$ vehicle trips
with 17% (10 vph) entering and 83% (48 vph) exiting.

SATURDAY DAILY

$T = 2.21 * (X)$
 $T = 2.21 * 40.000$
 $T = 88.40$
 $T = 88$ vehicle trips
with 50% (44 vpd) entering and 50% (44 vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

$T = 0.53 * (X)$
 $T = 0.53 * 40.000$
 $T = 21.20$
 $T = 21$ vehicle trips
with 54% (11 vpd) entering and 46% (10 vpd) exiting.

Institute of Transportation Engineers (ITE)
Trip Generation, 11th Edition
Land Use Code (LUC) 130 - Industrial Park

Average Vehicle Trips Ends vs: 1000 Sq. Feet Gross Floor Area
Independent Variable (X): 800.00

AVERAGE WEEKDAY DAILY

$$T = 3.37 * (X)$$

$$T = 3.37 * 800.00$$

$$T = 2696.00$$

$$T = 2,696 \text{ vehicle trips}$$

with 81% (2184 vph) entering and 19% (512 vph) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$T = 0.34 * (X)$$

$$T = 0.34 * 800.00$$

$$T = 272.00$$

$$T = 272 \text{ vehicle trips}$$

with 81% (220 vph) entering and 19% (52 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$T = 0.34 * (X)$$

$$T = 0.34 * 800.00$$

$$T = 272.00$$

$$T = 272 \text{ vehicle trips}$$

with 22% (60 vph) entering and 78% (212 vph) exiting.

Institute of Transportation Engineers (ITE)

Trip Generation, 11th Edition

Land Use Code (LUC) 251 - Senior Adult Housing - Single Family

Average Vehicle Trips Ends vs: Dwelling Units
Independent Variable (X): 93

AVERAGE WEEKDAY DAILY

$$\ln T = 0.85 * \ln(X) + 2.47$$

$$\ln T = 0.85 * \ln 93 + 2.47$$

$$\ln T = 6.32$$

$$T = 557.08$$

$$T = 557 \text{ vehicle trips}$$

with 50% (279 vph) entering and 50% (278 vph) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$\ln T = 0.76 * \ln(X) + 0.16$$

$$\ln T = 0.76 * \ln 93 + 0.16$$

$$\ln T = 3.60$$

$$T = 36.77$$

$$T = 37 \text{ vehicle trips}$$

with 33% (12 vph) entering and 67% (25 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$\ln T = 0.78 * \ln(X) + 0.20$$

$$\ln T = 0.78 * \ln 93 + 0.20$$

$$\ln T = 3.74$$

$$T = 41.91$$

$$T = 42 \text{ vehicle trips}$$

with 61% (26 vph) entering and 39% (16 vph) exiting.

Trip Generation Calculations
86 Gilmore Drive

	Manufacturing	Office	Total
Weekday Morning Peak Hour			
Entering	72	54	126
Exiting	23	7	30
Total	95	61	156
Weekday Evening Peak Hour			
Entering	32	10	42
Exiting	72	48	120
Total	104	58	162

Campanellis Business Park Phase 1

Weekday Morning Peak Hour	
Entering	220
Exiting	52
Total	272
Weekday Evening Peak Hour	
Entering	60
Exiting	212
Total	272

Wedgewood Farms - Armsby Road

Weekday Morning Peak Hour	
Entering	12
Exiting	25
Total	37
Weekday Evening Peak Hour	
Entering	26
Exiting	16
Total	42

CAPACITY ANALYSIS RESULTS

Capacity Analysis Summary - Proposed Medical Office Building - Sutton, Massachusetts

Intersection/Movement

Route 146 at Boston Road

	2022 Existing				2029 No-Build				2029 Build			
	v/c	Delay	LOS	Max Queue (ft)	v/c	Delay	LOS	Max Queue (ft)	v/c	Delay	LOS	Max Queue (ft)
Weekday Morning Peak Hour												
Eastbound LT	0.57	79	E	137	0.60	79	E	145	0.60	79	E	145
Eastbound TH	0.79	95	F	192	0.94	119	F	239	0.95	120	F	242
Eastbound RT	0.18	11	B	21	0.19	13	B	26	0.19	13	B	26
Westbound LT	0.51	74	E	121	0.55	74	E	135	0.55	74	E	135
Westbound TH	1.01	138	F	368	1.08	153	F	408	1.08	153	F	408
Westbound RT	0.99	75	E	372	1.11	115	F	475	1.11	115	F	475
Northbound TH/RT	0.78	30	C	751	0.89	38	D	972	0.89	38	D	1005
Southbound LT	0.52	74	E	127	0.59	74	E	155	0.59	74	E	157
Southbound TH	0.38	11	B	230	0.49	13	B	319	0.49	13	B	319
Southbound RT	0.02	<5	A	<10	0.03	<5	A	<10	0.03	<5	A	<10
Overall	--	38	D	--	--	46	D	--	--	46	D	--

	v/c	Delay	LOS	Max Queue (ft)	v/c	Delay	LOS	Max Queue (ft)	v/c	Delay	LOS	Max Queue (ft)
Weekday Evening Peak Hour												
Eastbound LT	0.36	79	E	88	0.39	82	F	93	0.39	82	F	93
Eastbound TH	0.59	79	E	178	0.63	81	F	200	0.63	81	F	201
Eastbound RT	0.16	9	A	21	0.19	9	A	25	0.17	9	A	25
Westbound LT	0.68	77	E	207	0.78	83	F	253	0.79	84	F	264
Westbound TH	0.6	71	E	298	0.62	71	E	333	0.63	71	E	336
Westbound RT	0.44	10	B	75	0.52	15	B	120	0.52	15	B	120
Northbound TH/RT	0.57	29	C	479	0.72	35	C	655	0.73	35	C	658
Southbound LT	0.73	79	E	232	0.81	85	F	276	0.81	85	F	281
Southbound TH	0.61	16	B	525	0.70	20	B	667	0.70	20	B	668
Southbound RT	0.06	<5	A	15	0.07	<5	A	18	0.07	<5	A	19
Overall	--	32	C	--	--	36	D	--	--	37	D	--

Boston Road at Pleasant Valley Road and Dudley Road

	v/c	Delay	LOS	Max Queue (veh)	v/c	Delay	LOS	Max Queue (veh)	v/c	Delay	LOS	Max Queue (veh)
Weekday Morning Peak Hour												
Eastbound LT/TH/RT	0.01	<5	A	0	0.01	<5	A	0	0.01	<5	A	0
Westbound LT/TH	0.00	<5	A	0	0.00	<5	A	0	0.00	<5	A	0
Westbound RT	0.00	<5	A	0	0.00	<5	A	0	0.00	<5	A	0
Northbound LT/TH/RT	0.25	12	B	1	0.41	16	C	2	0.42	17	C	2
Southbound LT/TH/RT	0.09	12	B	0	0.11	14	B	0	0.11	14	B	0

	v/c	Delay	LOS	Max Queue (veh)	v/c	Delay	LOS	Max Queue (veh)	v/c	Delay	LOS	Max Queue (veh)
Weekday Evening Peak Hour												
Eastbound LT/TH/RT	0.01	<5	A	0	0.01	<5	A	0	0.01	<5	A	0
Westbound LT/TH	0.00	<5	A	0	0.00	<5	A	0	0.01	<5	A	0
Westbound RT	0.00	<5	A	0	0.00	<5	A	0	0.00	<5	A	0
Northbound LT/TH/RT	0.28	15	C	1	0.57	29	D	3	0.61	32	D	4
Southbound LT/TH/RT	0.18	18	C	1	0.28	26	D	1	0.28	26	D	1

Route 146 at Pleasant Valley Road

	v/c	Delay	LOS	Max Queue (veh)	v/c	Delay	LOS	Max Queue (veh)	v/c	Delay	LOS	Max Queue (veh)
Weekday Morning Peak Hour												
Westbound RT	0.02	25	C	0	0.02	29	D	0	0.03	29	D	0

	v/c	Delay	LOS	Max Queue (veh)	v/c	Delay	LOS	Max Queue (veh)	v/c	Delay	LOS	Max Queue (veh)
Weekday Evening Peak Hour												
Eastbound LT/TH/RT	0.03	17	C	0	0.04	21	C	0	0.06	21	C	0

Pleasant Valley Road at Site Driveway

	v/c	Delay	LOS	Max Queue (veh)	v/c	Delay	LOS	Max Queue (veh)	v/c	Delay	LOS	Max Queue (veh)
Weekday Morning Peak Hour												
Westbound LT/TH	--	--	--	--	--	--	--	--	0.01	6	A	0
Northbound LT/RT	--	--	--	--	--	--	--	--	0.00	10	A	0

	v/c	Delay	LOS	Max Queue (veh)	v/c	Delay	LOS	Max Queue (veh)	v/c	Delay	LOS	Max Queue (veh)
Weekday Evening Peak Hour												
Westbound LT/TH	--	--	--	--	--	--	--	--	0.00	<5	A	0
Northbound LT/RT	--	--	--	--	--	--	--	--	0.02	9	A	0

Intersection						
Int Delay, s/veh	0					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	3	1959	159	0	0
Future Vol, veh/h	0	3	1959	159	0	0
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	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	3	2129	173	0	0
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	-	1065	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.14	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.92	-	-	-	-
Pot Cap-1 Maneuver	0	188	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	188	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	24.5	0		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBT		
Capacity (veh/h)	-	188		-		
HCM Lane V/C Ratio	-	0.017		-		
HCM Control Delay (s)	-	24.5		-		
HCM Lane LOS	-	C		-		
HCM 95th %tile Q(veh)	-	0.1		-		

Lanes, Volumes, Timings
13: Boston Road & Route 146

2022 AM EXISTING

01/23/2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	78	112	48	145	164	300	0	1960	2	40	115	1133
Future Volume (vph)	78	112	48	145	164	300	0	1960	2	40	115	1133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	450		275	330		280	0		0		530	
Storage Lanes	1		1	2		1	0		0		2	
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.91	0.91	0.91	0.97	0.91
Frt			0.850			0.850						
Flt Protected	0.950			0.950							0.950	
Satd. Flow (prot)	1805	1810	1495	3242	1776	1583	0	4801	0	0	3272	4590
Flt Permitted	0.950			0.950							0.950	
Satd. Flow (perm)	1805	1810	1495	3242	1776	1583	0	4801	0	0	3272	4590
Right Turn on Red			Yes			Yes			Yes			
Satd. Flow (RTOR)			68			191						
Link Speed (mph)		30			30			30				30
Link Distance (ft)		704			858			716				1707
Travel Time (s)		16.0			19.5			16.3				38.8
Peak Hour Factor	0.71	0.71	0.71	0.92	0.92	0.92	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	5%	8%	8%	7%	2%	0%	8%	50%	10%	6%	13%
Adj. Flow (vph)	110	158	68	158	178	326	0	2108	2	43	124	1218
Shared Lane Traffic (%)												
Lane Group Flow (vph)	110	158	68	158	178	326	0	2110	0	0	167	1218
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	R NA	Left	Left
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	9	15	
Number of Detectors	1	2	1	1	2	1		2		1	1	2
Detector Template	Left	Thru	Right	Left	Thru	Right		Thru		Left	Left	Thru
Leading Detector (ft)	20	100	20	20	100	20		100		20	20	100
Trailing Detector (ft)	0	0	0	0	0	0		0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0		0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20		6		20	20	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Prot	NA	custom	Prot	NA	custom		NA		Prot	Prot	NA
Protected Phases	3	8	8	7	4	4		2		1	1	6

Lane Group	SBR
Left Configurations	Left
Traffic Volume (vph)	26
Future Volume (vph)	26
Ideal Flow (vphpl)	1900
Storage Length (ft)	225
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1615
Flt Permitted	
Satd. Flow (perm)	1615
Right Turn on Red	Yes
Satd. Flow (RTOR)	85
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.93
Heavy Vehicles (%)	0%
Adj. Flow (vph)	28
Shared Lane Traffic (%)	
Lane Group Flow (vph)	28
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Number of Detectors	1
Detector Template	Right
Leading Detector (ft)	20
Trailing Detector (ft)	0
Detector 1 Position(ft)	0
Detector 1 Size(ft)	20
Detector 1 Type	Cl+Ex
Detector 1 Channel	
Detector 1 Extend (s)	0.0
Detector 1 Queue (s)	0.0
Detector 1 Delay (s)	0.0
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	Perm
Protected Phases	

Lanes, Volumes, Timings
13: Boston Road & Route 146

2022 AM EXISTING

01/23/2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Permitted Phases	3			4			2			1		
Detector Phase	3	8	8	7	4	4		2		1	1	6
Switch Phase												
Minimum Initial (s)	6.7	6.7	6.7	6.0	6.0	6.0		20.0		7.0	7.0	20.0
Minimum Split (s)	14.8	14.8	14.8	14.8	14.8	14.8		26.3		13.4	13.4	26.3
Total Split (s)	28.0	22.5	22.5	27.0	21.5	21.5		86.0		27.0	27.0	113.0
Total Split (%)	17.2%	13.8%	13.8%	16.6%	13.2%	13.2%		52.9%		16.6%	16.6%	69.5%
Maximum Green (s)	20.2	14.7	14.7	19.2	13.7	13.7		79.7		20.6	20.6	106.7
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0
All-Red Time (s)	4.8	4.8	4.8	4.8	4.8	4.8		3.3		3.4	3.4	3.3
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0			-2.0	-2.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8		4.3			4.4	4.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag		Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes		Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None		Max		None	None	Max
Act Effect Green (s)	16.7	17.4	34.2	15.0	15.7	15.7		89.0			15.3	108.8
Actuated g/C Ratio	0.11	0.11	0.22	0.10	0.10	0.10		0.57			0.10	0.69
v/c Ratio	0.57	0.79	0.18	0.51	1.01	0.99		0.78			0.52	0.38
Control Delay	78.6	94.7	10.5	73.6	137.5	74.7		29.8			73.6	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	78.6	94.7	10.5	73.6	137.5	74.7		29.8			73.6	10.8
LOS	E	F	B	E	F	E		C			E	B
Approach Delay	72.4			91.3				29.8		18.0		
Approach LOS	E			F				C		B		

Intersection Summary

Area Type: Other

Cycle Length: 162.5

Actuated Cycle Length: 157.1

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 38.3

Intersection LOS: D

Intersection Capacity Utilization 84.8%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 13: Boston Road & Route 146

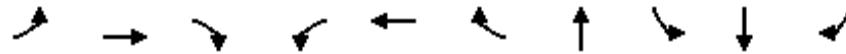
			
Ø1	Ø2	Ø3	Ø4
27 s	86 s	28 s	21.5 s
			
Ø6		Ø7	Ø8
113 s		27 s	22.5 s

Lane Group	SBR
Permitted Phases	6
Detector Phase	6
Switch Phase	
Minimum Initial (s)	20.0
Minimum Split (s)	26.3
Total Split (s)	113.0
Total Split (%)	69.5%
Maximum Green (s)	106.7
Yellow Time (s)	3.0
All-Red Time (s)	3.3
Lost Time Adjust (s)	-2.0
Total Lost Time (s)	4.3
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	Max
Act Effct Green (s)	108.8
Actuated g/C Ratio	0.69
v/c Ratio	0.02
Control Delay	0.0
Queue Delay	0.0
Total Delay	0.0
LOS	A
Approach Delay	
Approach LOS	
Intersection Summary	

Queues
13: Boston Road & Route 146

2022 AM EXISTING

01/23/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	110	158	68	158	178	326	2110	167	1218	28
v/c Ratio	0.57	0.79	0.18	0.51	1.01	0.99	0.78	0.52	0.38	0.02
Control Delay	78.6	94.7	10.5	73.6	137.5	74.7	29.8	73.6	10.8	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.6	94.7	10.5	73.6	137.5	74.7	29.8	73.6	10.8	0.0
Queue Length 50th (ft)	109	161	0	80	~187	150	594	85	179	0
Queue Length 95th (ft)	137	192	21	121	#368	#372	751	127	230	0
Internal Link Dist (ft)		624			778		636		1627	
Turn Bay Length (ft)	450		275	330		280		530		225
Base Capacity (vph)	255	203	379	437	177	330	2720	470	3177	1144
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.78	0.18	0.36	1.01	0.99	0.78	0.36	0.38	0.02

Intersection Summary

~ 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.

Intersection												
Int Delay, s/veh	2.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	222	1	1	453	11	26	11	122	10	1	34
Future Vol, veh/h	6	222	1	1	453	11	26	11	122	10	1	34
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Yield	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	241	1	1	492	12	28	12	133	11	1	37
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	492	0	0	242	0	0	505	750	121	635	750	246
Stage 1	-	-	-	-	-	-	256	256	-	494	494	-
Stage 2	-	-	-	-	-	-	249	494	-	141	256	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1068	-	-	1322	-	-	450	339	908	363	339	754
Stage 1	-	-	-	-	-	-	726	694	-	526	545	-
Stage 2	-	-	-	-	-	-	733	545	-	847	694	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1068	-	-	1322	-	-	424	336	908	299	336	754
Mov Cap-2 Maneuver	-	-	-	-	-	-	424	336	-	299	336	-
Stage 1	-	-	-	-	-	-	720	688	-	522	544	-
Stage 2	-	-	-	-	-	-	695	544	-	705	688	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			0			11.9			12.2		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	696	1068	-	-	1322	-	-	552				
HCM Lane V/C Ratio	0.248	0.006	-	-	0.001	-	-	0.089				
HCM Control Delay (s)	11.9	8.4	0	-	7.7	0	-	12.2				
HCM Lane LOS	B	A	A	-	A	A	-	B				
HCM 95th %tile Q(veh)	1	0	-	-	0	-	-	0.3				

Intersection

Int Delay, s/veh 0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↗↗↗	↗		↗↗↗
Traffic Vol, veh/h	0	9	1361	143	0	0
Future Vol, veh/h	0	9	1361	143	0	0
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	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	10	1479	155	0	0

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	-	740	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	7.14	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.92	-
Pot Cap-1 Maneuver	0	308	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	-	308	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.1	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBT
Capacity (veh/h)	-	-	308
HCM Lane V/C Ratio	-	-	0.032
HCM Control Delay (s)	-	-	17.1
HCM Lane LOS	-	-	C
HCM 95th %tile Q(veh)	-	-	0.1

Lanes, Volumes, Timings
13: Boston Road & Route 146

2022 PM EX
01/23/2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	39	100	42	270	193	191	0	1357	13	42	257	1913
Future Volume (vph)	39	100	42	270	193	191	0	1357	13	42	257	1913
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	450		275	330		280	0		0		530	
Storage Lanes	1		1	2		1	0		0		2	
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.91	0.91	0.91	0.97	0.91
Frt			0.850			0.850		0.999				
Flt Protected	0.950			0.950							0.950	
Satd. Flow (prot)	1805	1881	1583	3467	1881	1599	0	4937	0	0	3433	4940
Flt Permitted	0.950			0.950							0.950	
Satd. Flow (perm)	1805	1881	1583	3467	1881	1599	0	4937	0	0	3433	4940
Right Turn on Red			Yes			Yes			Yes			
Satd. Flow (RTOR)			60			197		1				
Link Speed (mph)		30			30			30				30
Link Distance (ft)		704			858			716				1707
Travel Time (s)		16.0			19.5			16.3				38.8
Peak Hour Factor	0.81	0.81	0.81	0.97	0.97	0.97	0.94	0.94	0.94	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	2%	1%	1%	1%	0%	5%	0%	2%	2%	5%
Adj. Flow (vph)	48	123	52	278	199	197	0	1444	14	44	271	2014
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	123	52	278	199	197	0	1458	0	0	315	2014
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	R NA	Left	Left
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	9	15	
Number of Detectors	1	2	1	1	2	1		2		1	1	2
Detector Template	Left	Thru	Right	Left	Thru	Right		Thru		Left	Left	Thru
Leading Detector (ft)	20	100	20	20	100	20		100		20	20	100
Trailing Detector (ft)	0	0	0	0	0	0		0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0		0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20		6		20	20	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Prot	NA	custom	Prot	NA	custom		NA		Prot	Prot	NA
Protected Phases	3	8	8	7	4	4		2		1	1	6

Lane Group	SBR
▲▲▲ Configurations	▲
Traffic Volume (vph)	64
Future Volume (vph)	64
Ideal Flow (vphpl)	1900
Storage Length (ft)	225
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Right Turn on Red	Yes
Satd. Flow (RTOR)	78
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.95
Heavy Vehicles (%)	2%
Adj. Flow (vph)	67
Shared Lane Traffic (%)	
Lane Group Flow (vph)	67
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Number of Detectors	1
Detector Template	Right
Leading Detector (ft)	20
Trailing Detector (ft)	0
Detector 1 Position(ft)	0
Detector 1 Size(ft)	20
Detector 1 Type	Cl+Ex
Detector 1 Channel	
Detector 1 Extend (s)	0.0
Detector 1 Queue (s)	0.0
Detector 1 Delay (s)	0.0
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	Perm
Protected Phases	

Lanes, Volumes, Timings
13: Boston Road & Route 146

2022 PM EX
01/23/2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Permitted Phases	3			4			2			1	1	6
Detector Phase	3	8	8	7	4	4	2			1	1	6
Switch Phase												
Minimum Initial (s)	6.7	6.7	6.7	6.0	6.0	6.0	20.0			7.0	7.0	20.0
Minimum Split (s)	14.8	14.8	14.8	14.8	14.8	14.8	26.3			13.4	13.4	26.3
Total Split (s)	28.0	37.0	37.0	27.0	36.0	36.0	86.0			26.0	26.0	112.0
Total Split (%)	15.9%	21.0%	21.0%	15.3%	20.5%	20.5%	48.9%			14.8%	14.8%	63.6%
Maximum Green (s)	20.2	29.2	29.2	19.2	28.2	28.2	79.7			19.6	19.6	105.7
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0	3.0
All-Red Time (s)	4.8	4.8	4.8	4.8	4.8	4.8	3.3			3.4	3.4	3.3
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0				-2.0	-2.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	4.3				4.4	4.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag			Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	Max			None	None	Max
Act Effct Green (s)	11.8	17.9	27.9	19.1	28.3	28.3	83.3				20.2	107.8
Actuated g/C Ratio	0.07	0.11	0.17	0.12	0.18	0.18	0.52				0.13	0.67
v/c Ratio	0.36	0.59	0.16	0.68	0.60	0.44	0.57				0.73	0.61
Control Delay	79.7	79.8	8.5	77.2	70.9	10.4	28.5				79.0	16.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0
Total Delay	79.7	79.8	8.5	77.2	70.9	10.4	28.5				79.0	16.3
LOS	E	E	A	E	E	B	C				E	B
Approach Delay	63.1			55.8			28.5			24.2		
Approach LOS	E			E			C			C		

Intersection Summary

Area Type: Other

Cycle Length: 176

Actuated Cycle Length: 160.8

Natural Cycle: 75

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 31.8

Intersection LOS: C

Intersection Capacity Utilization 69.4%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 13: Boston Road & Route 146

 Ø1	 Ø2	 Ø3	 Ø4
26 s	86 s	28 s	36 s
 Ø6		 Ø7	 Ø8
112 s		27 s	37 s

Lane Group	SBR
Permitted Phases	6
Detector Phase	6
Switch Phase	
Minimum Initial (s)	20.0
Minimum Split (s)	26.3
Total Split (s)	112.0
Total Split (%)	63.6%
Maximum Green (s)	105.7
Yellow Time (s)	3.0
All-Red Time (s)	3.3
Lost Time Adjust (s)	-2.0
Total Lost Time (s)	4.3
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	Max
Act Effct Green (s)	107.8
Actuated g/C Ratio	0.67
v/c Ratio	0.06
Control Delay	1.7
Queue Delay	0.0
Total Delay	1.7
LOS	A
Approach Delay	
Approach LOS	
Intersection Summary	

Queues
13: Boston Road & Route 146

2022 PM EX
01/23/2023

										
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	48	123	52	278	199	197	1458	315	2014	67
v/c Ratio	0.36	0.59	0.16	0.68	0.60	0.44	0.57	0.73	0.61	0.06
Control Delay	79.7	79.8	8.5	77.2	70.9	10.4	28.5	79.0	16.3	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.7	79.8	8.5	77.2	70.9	10.4	28.5	79.0	16.3	1.7
Queue Length 50th (ft)	49	126	0	146	200	0	389	166	415	0
Queue Length 95th (ft)	88	178	21	207	298	75	479	232	525	15
Internal Link Dist (ft)		624			778		636		1627	
Turn Bay Length (ft)	450		275	330		280		530		225
Base Capacity (vph)	249	365	450	457	361	465	2556	461	3313	1087
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.34	0.12	0.61	0.55	0.42	0.57	0.68	0.61	0.06
Intersection Summary										

Intersection												
Int Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔		↔			↔	
Traffic Vol, veh/h	8	358	4	4	572	22	32	11	80	26	1	30
Future Vol, veh/h	8	358	4	4	572	22	32	11	80	26	1	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Yield	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	9	389	4	4	622	24	35	12	87	28	1	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	622	0	0	393	0	0	729	1039	197	849	1041	311
Stage 1	-	-	-	-	-	-	409	409	-	630	630	-
Stage 2	-	-	-	-	-	-	320	630	-	219	411	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	955	-	-	1162	-	-	311	229	811	254	229	685
Stage 1	-	-	-	-	-	-	590	594	-	436	473	-
Stage 2	-	-	-	-	-	-	666	473	-	763	593	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	955	-	-	1162	-	-	291	225	811	215	225	685
Mov Cap-2 Maneuver	-	-	-	-	-	-	291	225	-	215	225	-
Stage 1	-	-	-	-	-	-	583	587	-	431	471	-
Stage 2	-	-	-	-	-	-	630	471	-	659	586	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	15.4	18.1
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	478	955	-	-	1162	-	-	337
HCM Lane V/C Ratio	0.28	0.009	-	-	0.004	-	-	0.184
HCM Control Delay (s)	15.4	8.8	0.1	-	8.1	0	-	18.1
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	1.1	0	-	-	0	-	-	0.7

Intersection

Int Delay, s/veh 0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	3	2184	201	0	0
Future Vol, veh/h	0	3	2184	201	0	0
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	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	3	2374	218	0	0

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	-	1187	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	7.14	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.92	-
Pot Cap-1 Maneuver	0	155	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	-	155	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	28.7	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBT
Capacity (veh/h)	-	-	155
HCM Lane V/C Ratio	-	-	0.021
HCM Control Delay (s)	-	-	28.7
HCM Lane LOS	-	-	D
HCM 95th %tile Q(veh)	-	-	0.1

Intersection						
Int Delay, s/veh	0					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	0	0	0
Future Vol, veh/h	0	0	0	0	0	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	0
Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	1	0	2	1
Stage 1	-	-	-	-	1	-
Stage 2	-	-	-	-	1	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1622	-	1021	1084
Stage 1	-	-	-	-	1022	-
Stage 2	-	-	-	-	1022	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1622	-	1021	1084
Mov Cap-2 Maneuver	-	-	-	-	1021	-
Stage 1	-	-	-	-	1022	-
Stage 2	-	-	-	-	1022	-
Approach	EB	WB		NB		
HCM Control Delay, s	0	0		0		
HCM LOS	A					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	-	-	-	1622	-	
HCM Lane V/C Ratio	-	-	-	-	-	
HCM Control Delay (s)	0	-	-	0	-	
HCM Lane LOS	A	-	-	A	-	
HCM 95th %tile Q(veh)	-	-	-	0	-	

Lanes, Volumes, Timings
13: Boston Road & Route 146

2029 AM NB
01/23/2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	84	132	51	165	178	331	0	2185	2	43	156	1442
Future Volume (vph)	84	132	51	165	178	331	0	2185	2	43	156	1442
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	450		275	330		280	0		0		530	
Storage Lanes	1		1	2		1	0		0		2	
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.91	0.91	0.91	0.97	0.91
Frt			0.850			0.850						
Flt Protected	0.950			0.950							0.950	
Satd. Flow (prot)	1805	1810	1495	3242	1776	1583	0	4801	0	0	3277	4590
Flt Permitted	0.950			0.950							0.950	
Satd. Flow (perm)	1805	1810	1495	3242	1776	1583	0	4801	0	0	3277	4590
Right Turn on Red			Yes			Yes			Yes			
Satd. Flow (RTOR)			65			181						
Link Speed (mph)		30			30			30				30
Link Distance (ft)		704			858			716				1707
Travel Time (s)		16.0			19.5			16.3				38.8
Peak Hour Factor	0.71	0.71	0.71	0.92	0.92	0.92	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	5%	8%	8%	7%	2%	0%	8%	50%	10%	6%	13%
Adj. Flow (vph)	118	186	72	179	193	360	0	2349	2	46	168	1551
Shared Lane Traffic (%)												
Lane Group Flow (vph)	118	186	72	179	193	360	0	2351	0	0	214	1551
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	R NA	Left	Left
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	9	15	
Number of Detectors	1	2	1	1	2	1		2		1	1	2
Detector Template	Left	Thru	Right	Left	Thru	Right		Thru		Left	Left	Thru
Leading Detector (ft)	20	100	20	20	100	20		100		20	20	100
Trailing Detector (ft)	0	0	0	0	0	0		0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0		0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20		6		20	20	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Prot	NA	custom	Prot	NA	custom		NA		Prot	Prot	NA
Protected Phases	3	8	8	7	4	4		2		1	1	6

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	28
Future Volume (vph)	28
Ideal Flow (vphpl)	1900
Storage Length (ft)	225
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1615
Flt Permitted	
Satd. Flow (perm)	1615
Right Turn on Red	Yes
Satd. Flow (RTOR)	85
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.93
Heavy Vehicles (%)	0%
Adj. Flow (vph)	30
Shared Lane Traffic (%)	
Lane Group Flow (vph)	30
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Number of Detectors	1
Detector Template	Right
Leading Detector (ft)	20
Trailing Detector (ft)	0
Detector 1 Position(ft)	0
Detector 1 Size(ft)	20
Detector 1 Type	Cl+Ex
Detector 1 Channel	
Detector 1 Extend (s)	0.0
Detector 1 Queue (s)	0.0
Detector 1 Delay (s)	0.0
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	Perm
Protected Phases	

Lanes, Volumes, Timings
13: Boston Road & Route 146

2029 AM NB
01/23/2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Permitted Phases	3			4								
Detector Phase	3	8	8	7	4	4	2			1	1	6
Switch Phase												
Minimum Initial (s)	6.7	6.7	6.7	6.0	6.0	6.0	20.0			7.0	7.0	20.0
Minimum Split (s)	14.8	14.8	14.8	14.8	14.8	14.8	26.3			13.4	13.4	26.3
Total Split (s)	28.0	22.5	22.5	27.0	21.5	21.5	86.0			27.0	27.0	113.0
Total Split (%)	17.2%	13.8%	13.8%	16.6%	13.2%	13.2%	52.9%			16.6%	16.6%	69.5%
Maximum Green (s)	20.2	14.7	14.7	19.2	13.7	13.7	79.7			20.6	20.6	106.7
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0	3.0
All-Red Time (s)	4.8	4.8	4.8	4.8	4.8	4.8	3.3			3.4	3.4	3.3
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0				-2.0	-2.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	4.3				4.4	4.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag			Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	Max			None	None	Max
Act Effct Green (s)	17.3	17.3	34.6	16.0	16.0	16.0	86.7				17.6	108.7
Actuated g/C Ratio	0.11	0.11	0.22	0.10	0.10	0.10	0.55				0.11	0.69
v/c Ratio	0.60	0.94	0.19	0.55	1.08	1.11	0.89				0.59	0.49
Control Delay	79.7	118.6	12.8	74.0	152.9	115.0	37.5				73.5	12.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0
Total Delay	79.7	118.6	12.8	74.0	152.9	115.0	37.5				73.5	12.5
LOS	E	F	B	E	F	F	D				E	B
Approach Delay	86.1			114.9			37.5			19.5		
Approach LOS	F			F			D			B		

Intersection Summary

Area Type: Other

Cycle Length: 162.5

Actuated Cycle Length: 157.9

Natural Cycle: 100

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.11

Intersection Signal Delay: 45.6

Intersection LOS: D

Intersection Capacity Utilization 91.1%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 13: Boston Road & Route 146

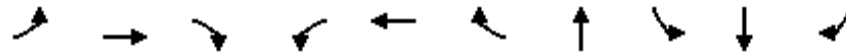
			
Ø1	Ø2	Ø3	Ø4
27 s	86 s	28 s	21.5 s
			
Ø6		Ø7	Ø8
113 s		27 s	22.5 s



Lane Group	SBR
Permitted Phases	6
Detector Phase	6
Switch Phase	
Minimum Initial (s)	20.0
Minimum Split (s)	26.3
Total Split (s)	113.0
Total Split (%)	69.5%
Maximum Green (s)	106.7
Yellow Time (s)	3.0
All-Red Time (s)	3.3
Lost Time Adjust (s)	-2.0
Total Lost Time (s)	4.3
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	Max
Act Effct Green (s)	108.7
Actuated g/C Ratio	0.69
v/c Ratio	0.03
Control Delay	0.0
Queue Delay	0.0
Total Delay	0.0
LOS	A
Approach Delay	
Approach LOS	
Intersection Summary	

Queues
13: Boston Road & Route 146

2029 AM NB
01/23/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	118	186	72	179	193	360	2351	214	1551	30
v/c Ratio	0.60	0.94	0.19	0.55	1.08	1.11	0.89	0.59	0.49	0.03
Control Delay	79.7	118.6	12.8	74.0	152.9	115.0	37.5	73.5	12.5	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.7	118.6	12.8	74.0	152.9	115.0	37.5	73.5	12.5	0.0
Queue Length 50th (ft)	118	194	6	92	~224	~250	764	110	257	0
Queue Length 95th (ft)	145	#239	26	135	#408	#475	#972	155	319	0
Internal Link Dist (ft)		624			778		636		1627	
Turn Bay Length (ft)	450		275	330		280		530		225
Base Capacity (vph)	253	198	378	435	179	323	2637	469	3160	1138
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.94	0.19	0.41	1.08	1.11	0.89	0.46	0.49	0.03

Intersection Summary

~ 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.

Intersection												
Int Delay, s/veh	3.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔		↔			↔	
Traffic Vol, veh/h	6	283	1	1	507	12	28	42	131	11	1	36
Future Vol, veh/h	6	283	1	1	507	12	28	42	131	11	1	36
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Yield	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	308	1	1	551	13	30	46	142	12	1	39

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	551	0	0	309	0	0	601	876	155	744	876	276
Stage 1	-	-	-	-	-	-	323	323	-	553	553	-
Stage 2	-	-	-	-	-	-	278	553	-	191	323	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1015	-	-	1248	-	-	384	286	863	303	286	721
Stage 1	-	-	-	-	-	-	663	649	-	485	513	-
Stage 2	-	-	-	-	-	-	705	513	-	792	649	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1015	-	-	1248	-	-	359	283	863	220	283	721
Mov Cap-2 Maneuver	-	-	-	-	-	-	359	283	-	220	283	-
Stage 1	-	-	-	-	-	-	658	644	-	481	512	-
Stage 2	-	-	-	-	-	-	665	512	-	610	644	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	16.4	13.7
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	531	1015	-	-	1248	-	-	464
HCM Lane V/C Ratio	0.411	0.006	-	-	0.001	-	-	0.112
HCM Control Delay (s)	16.4	8.6	0	-	7.9	0	-	13.7
HCM Lane LOS	C	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	2	0	-	-	0	-	-	0.4

Intersection

Int Delay, s/veh 0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	9	1676	171	0	0
Future Vol, veh/h	0	9	1676	171	0	0
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	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	10	1822	186	0	0

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	-	911	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	7.14	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.92	-
Pot Cap-1 Maneuver	0	238	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	-	238	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.8	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBT
Capacity (veh/h)	-	- 238	-
HCM Lane V/C Ratio	-	- 0.041	-
HCM Control Delay (s)	-	- 20.8	-
HCM Lane LOS	-	- C	-
HCM 95th %tile Q(veh)	-	- 0.1	-

Intersection

Int Delay, s/veh 0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	171	0	4	9	5	9
Future Vol, veh/h	171	0	4	9	5	9
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	186	0	4	10	5	10

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	186
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	1388
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1388
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.3	9.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	828	-	-	1388	-
HCM Lane V/C Ratio	0.018	-	-	0.003	-
HCM Control Delay (s)	9.4	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Lanes, Volumes, Timings
13: Boston Road & Route 146

2029 PM NB
01/23/2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	42	114	45	329	215	241	0	1671	14	45	294	2165
Future Volume (vph)	42	114	45	329	215	241	0	1671	14	45	294	2165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	450		275	330		280	0		0		530	
Storage Lanes	1		1	2		1	0		0		2	
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.91	0.91	0.91	0.97	0.91
Frt			0.850			0.850		0.999				
Flt Protected	0.950			0.950							0.950	
Satd. Flow (prot)	1805	1881	1583	3467	1881	1599	0	4937	0	0	3433	4940
Flt Permitted	0.950			0.950							0.950	
Satd. Flow (perm)	1805	1881	1583	3467	1881	1599	0	4937	0	0	3433	4940
Right Turn on Red			Yes			Yes			Yes			
Satd. Flow (RTOR)			60			218		1				
Link Speed (mph)		30			30			30				30
Link Distance (ft)		704			858			716				1707
Travel Time (s)		16.0			19.5			16.3				38.8
Peak Hour Factor	0.81	0.81	0.81	0.97	0.97	0.97	0.94	0.94	0.94	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	2%	1%	1%	1%	0%	5%	0%	2%	2%	5%
Adj. Flow (vph)	52	141	56	339	222	248	0	1778	15	47	309	2279
Shared Lane Traffic (%)												
Lane Group Flow (vph)	52	141	56	339	222	248	0	1793	0	0	356	2279
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	R NA	Left	Left
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	9	15	
Number of Detectors	1	2	1	1	2	1		2		1	1	2
Detector Template	Left	Thru	Right	Left	Thru	Right		Thru		Left	Left	Thru
Leading Detector (ft)	20	100	20	20	100	20		100		20	20	100
Trailing Detector (ft)	0	0	0	0	0	0		0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0		0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20		6		20	20	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Prot	NA	custom	Prot	NA	custom		NA		Prot	Prot	NA
Protected Phases	3	8	8	7	4	4		2		1	1	6

Lane Group	SBR
Left Configurations	
Traffic Volume (vph)	69
Future Volume (vph)	69
Ideal Flow (vphpl)	1900
Storage Length (ft)	225
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Right Turn on Red	Yes
Satd. Flow (RTOR)	78
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.95
Heavy Vehicles (%)	2%
Adj. Flow (vph)	73
Shared Lane Traffic (%)	
Lane Group Flow (vph)	73
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Number of Detectors	1
Detector Template	Right
Leading Detector (ft)	20
Trailing Detector (ft)	0
Detector 1 Position(ft)	0
Detector 1 Size(ft)	20
Detector 1 Type	Cl+Ex
Detector 1 Channel	
Detector 1 Extend (s)	0.0
Detector 1 Queue (s)	0.0
Detector 1 Delay (s)	0.0
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	Perm
Protected Phases	

Lanes, Volumes, Timings
13: Boston Road & Route 146

2029 PM NB
01/23/2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Permitted Phases	3			4			2			1	1	6
Detector Phase	3	8	8	7	4	4	2			1	1	6
Switch Phase												
Minimum Initial (s)	6.7	6.7	6.7	6.0	6.0	6.0	20.0			7.0	7.0	20.0
Minimum Split (s)	14.8	14.8	14.8	14.8	14.8	14.8	26.3			13.4	13.4	26.3
Total Split (s)	28.0	37.0	37.0	27.0	36.0	36.0	86.0			26.0	26.0	112.0
Total Split (%)	15.9%	21.0%	21.0%	15.3%	20.5%	20.5%	48.9%			14.8%	14.8%	63.6%
Maximum Green (s)	20.2	29.2	29.2	19.2	28.2	28.2	79.7			19.6	19.6	105.7
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0	3.0
All-Red Time (s)	4.8	4.8	4.8	4.8	4.8	4.8	3.3			3.4	3.4	3.3
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0			-2.0		
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	4.3			4.4		
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag			Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	Max			None	None	Max
Act Effct Green (s)	12.2	19.6	29.9	20.5	31.1	31.1	82.4			21.1		
Actuated g/C Ratio	0.07	0.12	0.18	0.13	0.19	0.19	0.50			0.13		
v/c Ratio	0.39	0.63	0.17	0.78	0.62	0.52	0.72			0.81		
Control Delay	81.5	81.3	9.3	83.1	71.1	14.9	34.6			84.6		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0		
Total Delay	81.5	81.3	9.3	83.1	71.1	14.9	34.6			84.6		
LOS	F	F	A	F	E	B	C			F		
Approach Delay	65.1			58.9			34.6			27.9		
Approach LOS	E			E			C			C		

Intersection Summary

Area Type: Other

Cycle Length: 176

Actuated Cycle Length: 163.9

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 36.3

Intersection LOS: D

Intersection Capacity Utilization 79.7%

ICU Level of Service D

Analysis Period (min) 15

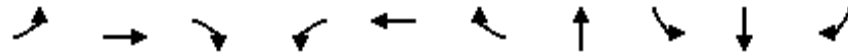
Splits and Phases: 13: Boston Road & Route 146

 Ø1	 Ø2	 Ø3	 Ø4
26 s	86 s	28 s	36 s
 Ø6		 Ø7	 Ø8
112 s		27 s	37 s

Lane Group	SBR
Permitted Phases	6
Detector Phase	6
Switch Phase	
Minimum Initial (s)	20.0
Minimum Split (s)	26.3
Total Split (s)	112.0
Total Split (%)	63.6%
Maximum Green (s)	105.7
Yellow Time (s)	3.0
All-Red Time (s)	3.3
Lost Time Adjust (s)	-2.0
Total Lost Time (s)	4.3
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	Max
Act Effct Green (s)	107.8
Actuated g/C Ratio	0.66
v/c Ratio	0.07
Control Delay	2.1
Queue Delay	0.0
Total Delay	2.1
LOS	A
Approach Delay	
Approach LOS	
Intersection Summary	

Queues
13: Boston Road & Route 146

2029 PM NB
01/23/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	52	141	56	339	222	248	1793	356	2279	73
v/c Ratio	0.39	0.63	0.17	0.78	0.62	0.52	0.72	0.81	0.70	0.07
Control Delay	81.5	81.3	9.3	83.1	71.1	14.9	34.6	84.6	19.9	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	81.5	81.3	9.3	83.1	71.1	14.9	34.6	84.6	19.9	2.1
Queue Length 50th (ft)	54	147	0	184	227	28	548	194	544	0
Queue Length 95th (ft)	93	200	25	#253	333	120	655	#276	667	18
Internal Link Dist (ft)		624			778		636		1627	
Turn Bay Length (ft)	450		275	330		280		530		225
Base Capacity (vph)	244	358	446	448	366	486	2481	452	3249	1067
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.39	0.13	0.76	0.61	0.51	0.72	0.79	0.70	0.07

Intersection Summary

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

Intersection												
Int Delay, s/veh	4.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	409	4	4	697	24	56	29	86	28	1	32
Future Vol, veh/h	9	409	4	4	697	24	56	29	86	28	1	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Yield	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	445	4	4	758	26	61	32	93	30	1	35
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	758	0	0	449	0	0	855	1233	225	1025	1235	379
Stage 1	-	-	-	-	-	-	467	467	-	766	766	-
Stage 2	-	-	-	-	-	-	388	766	-	259	469	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	849	-	-	1108	-	-	252	176	778	189	175	619
Stage 1	-	-	-	-	-	-	545	560	-	361	410	-
Stage 2	-	-	-	-	-	-	607	410	-	723	559	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	849	-	-	1108	-	-	233	172	778	141	171	619
Mov Cap-2 Maneuver	-	-	-	-	-	-	233	172	-	141	171	-
Stage 1	-	-	-	-	-	-	536	551	-	355	408	-
Stage 2	-	-	-	-	-	-	568	408	-	590	550	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			0			29.2			25.9		
HCM LOS							D			D		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	329	849	-	-	1108	-	-	238				
HCM Lane V/C Ratio	0.565	0.012	-	-	0.004	-	-	0.279				
HCM Control Delay (s)	29.2	9.3	0.1	-	8.3	0	-	25.9				
HCM Lane LOS	D	A	A	-	A	A	-	D				
HCM 95th %tile Q(veh)	3.3	0	-	-	0	-	-	1.1				

Intersection

Int Delay, s/veh 0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↑↑↑	↗		↑↑↑
Traffic Vol, veh/h	0	4	2184	206	0	0
Future Vol, veh/h	0	4	2184	206	0	0
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	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	4	2374	224	0	0

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	-	1187	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	7.14	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.92	-
Pot Cap-1 Maneuver	0	155	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	-	155	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	28.9	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBT
Capacity (veh/h)	-	-	155
HCM Lane V/C Ratio	-	-	0.028
HCM Control Delay (s)	-	-	28.9
HCM Lane LOS	-	-	D
HCM 95th %tile Q(veh)	-	-	0.1

Intersection

Int Delay, s/veh 0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	201	5	8	3	1	2
Future Vol, veh/h	201	5	8	3	1	2
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	218	5	9	3	1	2

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	223
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	1346
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1346
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.6	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	791	-	-	1346	-
HCM Lane V/C Ratio	0.004	-	-	0.006	-
HCM Control Delay (s)	9.6	-	-	7.7	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Lanes, Volumes, Timings
13: Boston Road & Route 146

2029 AM BU
01/23/2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	84	133	51	166	178	331	0	2186	2	43	160	1442
Future Volume (vph)	84	133	51	166	178	331	0	2186	2	43	160	1442
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	450		275	330		280	0		0		530	
Storage Lanes	1		1	2		1	0		0		2	
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.91	0.91	0.91	0.97	0.91
Frt			0.850			0.850						
Flt Protected	0.950			0.950							0.950	
Satd. Flow (prot)	1805	1810	1495	3242	1776	1583	0	4801	0	0	3277	4590
Flt Permitted	0.950			0.950							0.950	
Satd. Flow (perm)	1805	1810	1495	3242	1776	1583	0	4801	0	0	3277	4590
Right Turn on Red			Yes			Yes			Yes			
Satd. Flow (RTOR)			65			181						
Link Speed (mph)		30			30			30				30
Link Distance (ft)		704			858			716				1707
Travel Time (s)		16.0			19.5			16.3				38.8
Peak Hour Factor	0.71	0.71	0.71	0.92	0.92	0.92	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	5%	8%	8%	7%	2%	0%	8%	50%	10%	6%	13%
Adj. Flow (vph)	118	187	72	180	193	360	0	2351	2	46	172	1551
Shared Lane Traffic (%)												
Lane Group Flow (vph)	118	187	72	180	193	360	0	2353	0	0	218	1551
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	R NA	Left	Left
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	9	15	
Number of Detectors	1	2	1	1	2	1		2		1	1	2
Detector Template	Left	Thru	Right	Left	Thru	Right		Thru		Left	Left	Thru
Leading Detector (ft)	20	100	20	20	100	20		100		20	20	100
Trailing Detector (ft)	0	0	0	0	0	0		0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0		0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20		6		20	20	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Prot	NA	custom	Prot	NA	custom		NA		Prot	Prot	NA
Protected Phases	3	8	8	7	4	4		2		1	1	6

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	28
Future Volume (vph)	28
Ideal Flow (vphpl)	1900
Storage Length (ft)	225
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1615
Flt Permitted	
Satd. Flow (perm)	1615
Right Turn on Red	Yes
Satd. Flow (RTOR)	85
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.93
Heavy Vehicles (%)	0%
Adj. Flow (vph)	30
Shared Lane Traffic (%)	
Lane Group Flow (vph)	30
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Number of Detectors	1
Detector Template	Right
Leading Detector (ft)	20
Trailing Detector (ft)	0
Detector 1 Position(ft)	0
Detector 1 Size(ft)	20
Detector 1 Type	Cl+Ex
Detector 1 Channel	
Detector 1 Extend (s)	0.0
Detector 1 Queue (s)	0.0
Detector 1 Delay (s)	0.0
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	Perm
Protected Phases	

Lanes, Volumes, Timings
13: Boston Road & Route 146

2029 AM BU
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Permitted Phases	3			4								
Detector Phase	3	8	8	7	4	4	2			1	1	6
Switch Phase												
Minimum Initial (s)	6.7	6.7	6.7	6.0	6.0	6.0	20.0			7.0	7.0	20.0
Minimum Split (s)	14.8	14.8	14.8	14.8	14.8	14.8	26.3			13.4	13.4	26.3
Total Split (s)	28.0	22.5	22.5	27.0	21.5	21.5	86.0			27.0	27.0	113.0
Total Split (%)	17.2%	13.8%	13.8%	16.6%	13.2%	13.2%	52.9%			16.6%	16.6%	69.5%
Maximum Green (s)	20.2	14.7	14.7	19.2	13.7	13.7	79.7			20.6	20.6	106.7
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0	3.0
All-Red Time (s)	4.8	4.8	4.8	4.8	4.8	4.8	3.3			3.4	3.4	3.3
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0				-2.0	-2.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	4.3				4.4	4.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lag			Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	Max			None	None	Max
Act Effct Green (s)	17.3	17.2	34.6	16.1	16.0	16.0	86.6				17.8	108.8
Actuated g/C Ratio	0.11	0.11	0.22	0.10	0.10	0.10	0.55				0.11	0.69
v/c Ratio	0.60	0.95	0.19	0.55	1.08	1.11	0.89				0.59	0.49
Control Delay	79.6	120.4	12.8	73.9	152.9	115.0	37.8				73.4	12.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0
Total Delay	79.6	120.4	12.8	73.9	152.9	115.0	37.8				73.4	12.5
LOS	E	F	B	E	F	F	D				E	B
Approach Delay	87.1			114.9			37.8			19.6		
Approach LOS	F			F			D			B		

Intersection Summary

Area Type: Other

Cycle Length: 162.5

Actuated Cycle Length: 158

Natural Cycle: 100

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.11

Intersection Signal Delay: 45.9

Intersection LOS: D

Intersection Capacity Utilization 91.1%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 13: Boston Road & Route 146

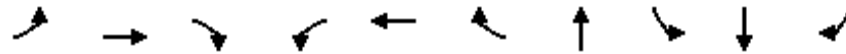
 Ø1	 Ø2	 Ø3	 Ø4
27 s	86 s	28 s	21.5 s
 Ø6		 Ø7	 Ø8
113 s		27 s	22.5 s



Lane Group	SBR
Permitted Phases	6
Detector Phase	6
Switch Phase	
Minimum Initial (s)	20.0
Minimum Split (s)	26.3
Total Split (s)	113.0
Total Split (%)	69.5%
Maximum Green (s)	106.7
Yellow Time (s)	3.0
All-Red Time (s)	3.3
Lost Time Adjust (s)	-2.0
Total Lost Time (s)	4.3
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	Max
Act Effct Green (s)	108.8
Actuated g/C Ratio	0.69
v/c Ratio	0.03
Control Delay	0.0
Queue Delay	0.0
Total Delay	0.0
LOS	A
Approach Delay	
Approach LOS	
Intersection Summary	

Queues
13: Boston Road & Route 146

2029 AM BU
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	118	187	72	180	193	360	2353	218	1551	30
v/c Ratio	0.60	0.95	0.19	0.55	1.08	1.11	0.89	0.59	0.49	0.03
Control Delay	79.6	120.4	12.8	73.9	152.9	115.0	37.8	73.4	12.5	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.6	120.4	12.8	73.9	152.9	115.0	37.8	73.4	12.5	0.0
Queue Length 50th (ft)	118	195	6	92	~224	~250	768	111	257	0
Queue Length 95th (ft)	145	#242	26	135	#408	#475	#1005	157	319	0
Internal Link Dist (ft)		624			778		636		1627	
Turn Bay Length (ft)	450		275	330		280		530		225
Base Capacity (vph)	253	197	377	435	179	323	2630	469	3159	1138
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.95	0.19	0.41	1.08	1.11	0.89	0.46	0.49	0.03

Intersection Summary

~ 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.

Intersection												
Int Delay, s/veh	3.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	283	6	4	507	12	29	42	132	11	1	36
Future Vol, veh/h	6	283	6	4	507	12	29	42	132	11	1	36
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Yield	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	7	308	7	4	551	13	32	46	143	12	1	39
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	551	0	0	315	0	0	610	885	158	750	888	276
Stage 1	-	-	-	-	-	-	326	326	-	559	559	-
Stage 2	-	-	-	-	-	-	284	559	-	191	329	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1015	-	-	1242	-	-	378	282	859	300	281	721
Stage 1	-	-	-	-	-	-	661	647	-	481	509	-
Stage 2	-	-	-	-	-	-	699	509	-	792	645	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1015	-	-	1242	-	-	353	278	859	216	277	721
Mov Cap-2 Maneuver	-	-	-	-	-	-	353	278	-	216	277	-
Stage 1	-	-	-	-	-	-	656	642	-	477	506	-
Stage 2	-	-	-	-	-	-	656	506	-	608	640	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			0.1			16.7			13.8		
HCM LOS							C			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	525	1015	-	-	1242	-	-	459				
HCM Lane V/C Ratio	0.42	0.006	-	-	0.004	-	-	0.114				
HCM Control Delay (s)	16.7	8.6	0	-	7.9	0	-	13.8				
HCM Lane LOS	C	A	A	-	A	A	-	B				
HCM 95th %tile Q(veh)	2.1	0	-	-	0	-	-	0.4				

Intersection

Int Delay, s/veh 0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	14	1676	173	0	0
Future Vol, veh/h	0	14	1676	173	0	0
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	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	15	1822	188	0	0

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	-	911	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	7.14	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.92	-
Pot Cap-1 Maneuver	0	238	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	238	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	21.2	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBT
Capacity (veh/h)	-	- 238	-
HCM Lane V/C Ratio	-	- 0.064	-
HCM Control Delay (s)	-	- 21.2	-
HCM Lane LOS	-	- C	-
HCM 95th %tile Q(veh)	-	- 0.2	-

Intersection

Int Delay, s/veh 0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	171	2	4	9	5	10
Future Vol, veh/h	171	2	4	9	5	10
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	186	2	4	10	5	11

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	188
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	1386
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1386
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.3	9.4
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	829	-	-	1386	-
HCM Lane V/C Ratio	0.02	-	-	0.003	-
HCM Control Delay (s)	9.4	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Lanes, Volumes, Timings
13: Boston Road & Route 146

2029 PM BU
01/23/2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	42	115	45	334	217	241	0	1676	14	45	296	2165
Future Volume (vph)	42	115	45	334	217	241	0	1676	14	45	296	2165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	450		275	330		280	0		0		530	
Storage Lanes	1		1	2		1	0		0		2	
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.91	0.91	0.91	0.97	0.91
Frt			0.850			0.850		0.999				
Flt Protected	0.950			0.950							0.950	
Satd. Flow (prot)	1805	1881	1583	3467	1881	1599	0	4937	0	0	3433	4940
Flt Permitted	0.950			0.950							0.950	
Satd. Flow (perm)	1805	1881	1583	3467	1881	1599	0	4937	0	0	3433	4940
Right Turn on Red			Yes			Yes			Yes			
Satd. Flow (RTOR)			60			218		1				
Link Speed (mph)		30			30			30				30
Link Distance (ft)		704			858			716				1707
Travel Time (s)		16.0			19.5			16.3				38.8
Peak Hour Factor	0.81	0.81	0.81	0.97	0.97	0.97	0.94	0.94	0.94	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	2%	1%	1%	1%	0%	5%	0%	2%	2%	5%
Adj. Flow (vph)	52	142	56	344	224	248	0	1783	15	47	312	2279
Shared Lane Traffic (%)												
Lane Group Flow (vph)	52	142	56	344	224	248	0	1798	0	0	359	2279
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	R NA	Left	Left
Median Width(ft)		24			24			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	9	15	
Number of Detectors	1	2	1	1	2	1		2		1	1	2
Detector Template	Left	Thru	Right	Left	Thru	Right		Thru		Left	Left	Thru
Leading Detector (ft)	20	100	20	20	100	20		100		20	20	100
Trailing Detector (ft)	0	0	0	0	0	0		0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0		0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20		6		20	20	6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Prot	NA	custom	Prot	NA	custom		NA		Prot	Prot	NA
Protected Phases	3	8	8	7	4	4		2		1	1	6

Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	69
Future Volume (vph)	69
Ideal Flow (vphpl)	1900
Storage Length (ft)	225
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Right Turn on Red	Yes
Satd. Flow (RTOR)	78
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.95
Heavy Vehicles (%)	2%
Adj. Flow (vph)	73
Shared Lane Traffic (%)	
Lane Group Flow (vph)	73
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Number of Detectors	1
Detector Template	Right
Leading Detector (ft)	20
Trailing Detector (ft)	0
Detector 1 Position(ft)	0
Detector 1 Size(ft)	20
Detector 1 Type	Cl+Ex
Detector 1 Channel	
Detector 1 Extend (s)	0.0
Detector 1 Queue (s)	0.0
Detector 1 Delay (s)	0.0
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	Perm
Protected Phases	

Lanes, Volumes, Timings
13: Boston Road & Route 146

2029 PM BU
01/23/2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Permitted Phases	3			4			2			1		
Detector Phase	3	8	8	7	4	4		2		1	1	6
Switch Phase												
Minimum Initial (s)	6.7	6.7	6.7	6.0	6.0	6.0		20.0		7.0	7.0	20.0
Minimum Split (s)	14.8	14.8	14.8	14.8	14.8	14.8		26.3		13.4	13.4	26.3
Total Split (s)	28.0	37.0	37.0	27.0	36.0	36.0		86.0		26.0	26.0	112.0
Total Split (%)	15.9%	21.0%	21.0%	15.3%	20.5%	20.5%		48.9%		14.8%	14.8%	63.6%
Maximum Green (s)	20.2	29.2	29.2	19.2	28.2	28.2		79.7		19.6	19.6	105.7
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0
All-Red Time (s)	4.8	4.8	4.8	4.8	4.8	4.8		3.3		3.4	3.4	3.3
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0			-2.0	-2.0
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8		4.3			4.4	4.3
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag		Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes		Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None		Max		None	None	Max
Act Effect Green (s)	12.2	19.7	30.0	20.6	31.2	31.2		82.3			21.1	107.8
Actuated g/C Ratio	0.07	0.12	0.18	0.13	0.19	0.19		0.50			0.13	0.66
v/c Ratio	0.39	0.63	0.17	0.79	0.63	0.52		0.73			0.81	0.70
Control Delay	81.5	81.4	9.2	83.8	71.2	14.8		34.8			85.0	20.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	81.5	81.4	9.2	83.8	71.2	14.8		34.8			85.0	20.0
LOS	F	F	A	F	E	B		C			F	B
Approach Delay	65.3			59.4				34.8		28.1		
Approach LOS	E			E				C		C		

Intersection Summary

Area Type: Other

Cycle Length: 176

Actuated Cycle Length: 164

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 36.5

Intersection LOS: D

Intersection Capacity Utilization 79.8%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 13: Boston Road & Route 146

			
Ø1	Ø2	Ø3	Ø4
26 s	86 s	28 s	36 s
			
Ø6		Ø7	Ø8
112 s		27 s	37 s

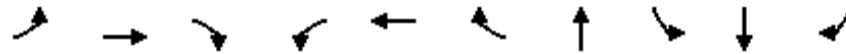
Lane Group	SBR
Permitted Phases	6
Detector Phase	6
Switch Phase	
Minimum Initial (s)	20.0
Minimum Split (s)	26.3
Total Split (s)	112.0
Total Split (%)	63.6%
Maximum Green (s)	105.7
Yellow Time (s)	3.0
All-Red Time (s)	3.3
Lost Time Adjust (s)	-2.0
Total Lost Time (s)	4.3
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	Max
Act Effct Green (s)	107.8
Actuated g/C Ratio	0.66
v/c Ratio	0.07
Control Delay	2.1
Queue Delay	0.0
Total Delay	2.1
LOS	A
Approach Delay	
Approach LOS	
Intersection Summary	

Queues

13: Boston Road & Route 146

2029 PM BU

01/23/2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	52	142	56	344	224	248	1798	359	2279	73
v/c Ratio	0.39	0.63	0.17	0.79	0.63	0.52	0.73	0.81	0.70	0.07
Control Delay	81.5	81.4	9.2	83.8	71.2	14.8	34.8	85.0	20.0	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	81.5	81.4	9.2	83.8	71.2	14.8	34.8	85.0	20.0	2.1
Queue Length 50th (ft)	54	148	0	187	229	28	551	196	545	0
Queue Length 95th (ft)	93	201	25	#264	336	120	658	#281	668	19
Internal Link Dist (ft)		624			778		636		1627	
Turn Bay Length (ft)	450		275	330		280		530		225
Base Capacity (vph)	244	357	445	448	366	487	2477	452	3246	1067
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.40	0.13	0.77	0.61	0.51	0.73	0.79	0.70	0.07

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection												
Int Delay, s/veh	5.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	9	409	7	5	697	24	63	29	89	28	1	32
Future Vol, veh/h	9	409	7	5	697	24	63	29	89	28	1	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	Yield	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	445	8	5	758	26	68	32	97	30	1	35
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	758	0	0	453	0	0	859	1237	227	1027	1241	379
Stage 1	-	-	-	-	-	-	469	469	-	768	768	-
Stage 2	-	-	-	-	-	-	390	768	-	259	473	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	849	-	-	1104	-	-	250	175	776	189	174	619
Stage 1	-	-	-	-	-	-	544	559	-	360	409	-
Stage 2	-	-	-	-	-	-	606	409	-	723	557	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	849	-	-	1104	-	-	231	171	776	139	170	619
Mov Cap-2 Maneuver	-	-	-	-	-	-	231	171	-	139	170	-
Stage 1	-	-	-	-	-	-	535	550	-	354	406	-
Stage 2	-	-	-	-	-	-	566	406	-	587	548	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.3			0.1			31.7			26.1		
HCM LOS							D			D		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	325	849	-	-	1104	-	-	236				
HCM Lane V/C Ratio	0.605	0.012	-	-	0.005	-	-	0.281				
HCM Control Delay (s)	31.7	9.3	0.1	-	8.3	0	-	26.1				
HCM Lane LOS	D	A	A	-	A	A	-	D				
HCM 95th %tile Q(veh)	3.7	0	-	-	0	-	-	1.1				