

Ref: 10397

February 27, 2026

Mr. Paul Materazzo  
Director of Planning & Land Use  
Town of Andover  
36 Bartlet Street, First Floor  
Andover, MA 02026

Re: Transportation Impact Assessment Supplement  
Proposed Mixed-Use Development – 100 Old River Road  
Andover, Massachusetts

Dear Director Materazzo:

Vanasse & Associates, Inc. (VAI) is providing supplemental information and analyses in support of the November 2025 *Transportation Impact Assessment* (the “November 2025 TIA”) that was prepared by VAI in support of the proposed construction of a mixed-use development to be located at 100 Old River Road in Andover, Massachusetts (hereafter referred to as the “Project”). This information was requested by Apex Companies, LLC (“Apex”) as a result of their initial review of the November 2025 TIA that is being conducted on behalf of the Town, and supplements the information and analyses that are presented therein. Below is a summary of the information that was requested with the associated materials attached.

Request 1: *Provide the automatic traffic recorder (ATR) count sheets.*

**Response: The ATR count sheets are attached.**

Request 2: *Provide the Existing weekday evening peak-hour capacity analysis worksheets.*

**Response: The 2025 Existing weekday evening peak-hour capacity analysis worksheets are attached.**

Request 3: *Confirm where the peak-hour traffic volumes were balanced between the study area intersections.*

**Response: The peak-hour traffic volumes were balanced upward where necessary between the River Road/Old River Road/Federal Street and River Road/I-93 southbound ramp intersections as there are no driveways or intersecting side streets that would result in a material increase or decrease in traffic volumes along River Road between the intersections.**

Request 4: *Explain the methodology that was used to assign the trips associated with the reoccupancy of the vacant office building.*

**Response: Trips associated with the reoccupancy of the existing vacant office building were assigned to the No-Build condition traffic volume networks based on a review of**

**existing traffic patterns along the River Road corridor as the majority of the uses along the corridor and within the study area are office/commercial uses.**

Request 5: *Review the trip assignments associated with the redevelopment of the Philips Healthcare Campus and revise the peak-hour traffic volume networks, as necessary.*

**Response:** Figure A-4R (attached) reflects the corrected weekday evening peak-hour trip assignment to the left-turn movement from the I-93 southbound off-ramp (68 vehicles vs. 89 vehicles). This correction has been incorporated into the 2032 No-Build and Build condition weekday evening peak-hour traffic volumes and the corrected traffic volume networks are attached (Figures 6R and 11R, respectively).

Request 6: *Explain the reasoning for the application of the pass-by trip rates for the commercial component of the Project.*

**Response:** The Institute of Transportation Engineers (ITE)<sup>1</sup> does not publish a pass-by trip rate for an average weekday or for the weekday morning peak-hour for a retail use. As such, the lower of the published pass-by trip rates for the weekday evening peak-hour (40%) and the Saturday midday peak-hour (31%) was applied to the average weekday and the weekday morning peak-hour traffic volumes for the commercial component of the Project.

Request 7: *Review the trip assignment networks for Project-generated trips and explain/correct, as necessary.*

**Response:** Figure 9 of the November 2025 TIA includes both primary and pass-by trips (commercial use). Pass-by trips are a reassignment of existing trips into the Project site based on the prevailing flow of existing traffic (which is different from the assignment of primary trips) which are then added back to the exiting trips in the same direction that they are removed and occur along Old River Road. This difference in the assignment of pass-by trips vs. primary trips accounts for the minor differences in Project-generated traffic volumes that are shown on Figure 9.

Request 8: *Review and revise the peak-hour factors (PHFs) and heavy vehicle (HV) percentages where necessary.*

**Response:** The PHFs and HV percentages have been reviewed and corrected as necessary (see Tables 10R and 13R).

Request 9: *Review the traffic signal timings for No-Build and Build conditions as they do not match the traffic signal timing plans that were provided in the Appendix.*

**Response:** The traffic signal timing plans that are included in the Appendix reflect the existing (as-built) traffic signal timing plan for the River Road corridor. The traffic signal timings that were used for the No-Build condition reflects the optimization of the traffic signal timing, phasing and coordination (where appropriate) that is a requirement of the 3000 Minuteman Road project (Philips Healthcare campus redevelopment). The resulting optimized traffic signal timing was held constant

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<sup>1</sup>Trip Generation, 12<sup>th</sup> Edition; Institute of Transportation Engineers; Washington, DC; August 2025.



**(unchanged) for the Build condition analysis. The optimized traffic signal timing plan has not yet been designed as the 3000 Minuteman Road project has not advanced to the point where the design plans have been developed.**

Request 10: *Adjust the PHFs for the future analysis conditions (No-Build and Build) to 0.92 in accordance with MassDOT Traffic and Safety Engineering 25% Design Submission Guidelines.*

**Response: The PHFs for the future conditions (No-Build and Build) traffic operations analyses have been revised to reflect the use of a 0.92 PHF (see Tables 10R and 13R).**

Request 11: *Explain the minor changes to traffic operations at the River Road/Shattuck Road/Minuteman Road intersection under the Build with Mitigation condition that occur without changes to the traffic signal timing at the intersection.*

**Response: The River Road/Shattuck Road/Minuteman Road intersection is coordinated with the traffic signals to the east along the River Road corridor. As such, changes to the traffic signal timing, phasing and/or coordination to the other traffic signals within the coordinated system results in minor changes to operating conditions at the River Road/Shattuck Road/Minuteman Road intersection when no changes to the traffic signal timing are implemented at the intersection.**

Request 12: *Review the Build with Mitigation analysis summary table for consistency with the analysis worksheets that are provided in the Appendix for the River Road/North Street/Greater Lawrence Tech driveway intersection.*

**Response: The 2032 Build with Mitigation analysis worksheets that were provided in the Appendix of the November 2025 TIA for the River Road/North Street/Greater Lawrence Tech driveway intersection have been corrected and are attached, and match the information that is presented in Table 13 (now Table 13R).**

Request 13: *Provide an assessment of traffic volumes and operating conditions for a No-Build condition that does not include the reoccupancy of the existing office building that is currently vacant.*

**Response: As requested by way of a sensitivity analysis, 2032 No-Build condition peak-hour traffic volume networks and accompanying analyses have been prepared for a condition that does not include traffic volumes associated with the reoccupancy of the existing vacant office building. The traffic volume networks are attached (Figures 5A and 6A) and the associated traffic operations analysis is summarized in Tables 10A and 13A.**

**A comparison of overall intersection operations between No-Build and Build conditions with or without consideration of the reoccupancy of the existing vacant office building relative to the predicted impact of the Project does not indicate any significant variations from the conditions that were reported in the November 2025 TIA.**



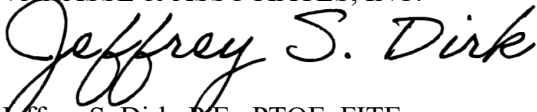
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February 27, 2026  
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**While we have provided the requested sensitivity analysis for context, we note that Massachusetts Environmental Policy Act (MEPA) regulations allow for consideration of the impacts associated with the former use of a property as long as the use was active, in whole or in part, within a two-year period prior to filing with MEPA. MassDOT follows the same guidance when considering impacts to the transportation infrastructure for projects that are subject to a filing under MEPA. Given that the existing, currently vacant office building that occupies the Project site was active within the past two-years, it is appropriate to consider the reoccupancy of the existing office building when comparing the impacts of the Project.**

We trust that this information is responsive to the initial comments that were identified by Apex concerning their review of the November 2025 TIA. 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, P.E., PTOE, FITE  
Managing Partner

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

DCL/jsd

Attachments



## ATTACHMENTS

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Automatic Traffic Recorder Count Data

2025 Existing Weekday Evening Peak-Hour Capacity Analysis Synchro Worksheets

Revised and Amended Figures (6R, 11R, A-4R, 5A and 6A)

Revised and Amended Capacity Analysis Tables (Tables 10R, 13R, 10A and 13A)

Revised and Amended Capacity Analysis Synchro Worksheets

Automatic Traffic Recorder Count Data

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Accurate Counts  
978-664-2565

Location : Old River Road  
Location : North of #91 Old River Road  
City/State: Andover, MA  
Direction: NB,

Site Code: 10379001

10/21/2025	0 - 3	> 3 - 6	> 6 - 9	> 9 - 12	> 12 - 15	> 15 - 18	> 18 - 21	> 21 - 24	> 24 - 27	> 27 - 30	> 30 - 33	> 33 - 36	> 36 - 39	> 39	Total
Time	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	
12:00 AM	0	0	0	0	0	1	0	2	1	0	0	0	0	0	4
1:00	0	0	0	0	0	0	1	2	1	0	0	0	0	0	4
2:00	0	0	1	0	0	0	1	2	0	0	0	0	0	0	4
3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	1	0	3	0	1	0	0	0	0	5
5:00	0	0	0	0	0	0	4	7	2	1	1	0	0	0	15
6:00	0	0	0	0	0	0	10	11	9	2	1	0	0	0	33
7:00	0	0	0	0	0	4	23	87	64	19	5	2	0	0	204
8:00	0	0	0	0	2	9	75	120	84	22	2	0	0	0	314
9:00	0	0	0	0	2	1	30	52	46	20	3	0	0	0	154
10:00	0	0	0	1	1	3	12	17	19	7	1	0	0	0	61
11:00	0	0	0	0	0	1	16	14	12	6	1	0	0	0	50
12:00 PM	0	0	0	1	2	1	24	37	17	5	2	0	0	0	89
1:00	0	0	0	0	2	5	12	29	20	4	1	0	0	0	73
2:00	0	0	0	0	1	2	8	16	14	4	0	0	1	0	46
3:00	0	0	0	0	1	2	9	20	13	6	0	0	1	0	52
4:00	0	0	0	0	1	3	14	30	22	12	6	2	0	0	90
5:00	0	0	0	0	0	2	5	21	28	22	4	0	0	0	82
6:00	0	0	0	0	1	3	10	18	25	5	2	1	0	0	65
7:00	0	0	0	0	0	3	10	24	11	3	0	0	0	0	51
8:00	0	0	0	1	1	6	14	11	8	3	3	1	0	1	49
9:00	0	0	0	0	1	3	14	11	0	1	0	1	0	0	31
10:00	0	0	0	0	1	3	2	7	2	2	2	0	0	0	19
11:00	0	0	0	0	0	1	3	3	0	3	0	0	0	0	10
Total	0	0	1	3	16	54	297	544	398	148	34	7	2	1	1505

Percentile	15th	50th	85th	95th
Speed	19	22	26	28
Mean Speed (Average)	23.7			
10 MPH Pace Speed	19-28			
Number in Pace	1296			
Percent in Pace	86.0%			
Number > 24 MPH	590			
Percent > 24 MPH	39.2%			

Accurate Counts  
978-664-2565

Location : Old River Road  
Location : North of #91 Old River Road  
City/State: Andover, MA  
Direction: NB,

Site Code: 10379001

10/22/2025	0 - 3	> 3 - 6	> 6 - 9	> 9 - 12	> 12 - 15	> 15 - 18	> 18 - 21	> 21 - 24	> 24 - 27	> 27 - 30	> 30 - 33	> 33 - 36	> 36 - 39	> 39	Total
Time	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	
12:00 AM	0	0	0	0	0	0	2	3	3	1	0	0	0	0	9
1:00	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
2:00	0	0	1	0	0	1	0	0	2	0	0	1	0	0	5
3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	1	0	2	0	0	0	0	0	0	3
5:00	0	0	0	0	0	2	7	8	2	0	0	0	0	0	19
6:00	0	0	0	0	0	6	9	15	11	2	1	0	0	0	44
7:00	0	0	0	0	1	13	47	75	54	8	3	1	0	0	202
8:00	0	0	0	1	1	20	101	98	57	16	1	0	0	0	295
9:00	0	0	0	0	1	10	35	68	52	13	3	0	0	0	182
10:00	0	0	0	0	0	0	10	15	24	8	2	1	0	0	60
11:00	0	0	0	0	0	3	11	21	13	4	1	0	0	0	53
12:00 PM	0	0	1	0	0	3	9	29	14	5	2	0	0	0	63
1:00	0	0	0	0	0	1	11	18	19	6	2	0	0	0	57
2:00	0	0	0	0	1	2	10	14	14	4	1	0	1	0	47
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8:00	0	0	0	0	3	3	14	13	9	4	1	0	0	0	47
9:00	0	0	0	0	0	3	9	9	3	3	0	0	0	0	27
10:00	0	0	1	1	1	5	5	4	7	3	0	1	0	0	28
11:00	0	0	0	0	1	2	1	3	3	1	0	0	0	0	11
Total	0	0	3	3	14	80	335	484	387	121	35	5	3	0	1470

Percentile	15th	50th	85th	95th
Speed	18	22	25	28
Mean Speed (Average)	23.4			
10 MPH Pace Speed	19-28			
Number in Pace	1228			
Percent in Pace	86.0%			
Number > 24 MPH	551			
Percent > 24 MPH	37.5%			

Grand Total	0	0	4	6	30	134	632	1028	785	269	69	12	5	1	2975
Stats															
Percentile	15th	50th	85th	95th											
Speed	18	22	26	28											
Mean Speed (Average)	23.6														
10 MPH Pace Speed	19-28														
Number in Pace	2541														
Percent in Pace	86.0%														
Number > 24 MPH	1141														
Percent > 24 MPH	38.4%														

Accurate Counts  
978-664-2565

Location : Old River Road  
Location : North of #91 Old River Road  
City/State: Andover, MA  
Direction: SB,

Site Code: 10379001

10/21/2025	0 - 3	> 3 - 6	> 6 - 9	> 9 - 12	> 12 - 15	> 15 - 18	> 18 - 21	> 21 - 24	> 24 - 27	> 27 - 30	> 30 - 33	> 33 - 36	> 36 - 39	> 39	Total
Time	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	
12:00 AM	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2
1:00	0	0	0	0	2	0	0	2	1	0	0	0	0	0	5
2:00	0	0	0	1	0	0	1	0	0	0	2	0	0	0	4
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2:00	0	0	0	0	1	4	2	14	20	16	5	1	1	0	64
3:00	0	0	0	0	0	2	5	20	33	17	8	1	0	0	86
4:00	0	0	0	0	0	2	23	73	124	65	25	0	0	0	312
5:00	0	0	0	0	3	3	16	49	94	55	20	1	0	0	241
6:00	0	0	0	0	0	2	18	34	39	26	6	2	0	2	129
7:00	0	0	0	0	1	0	8	10	19	4	2	0	0	0	44
8:00	0	0	0	1	1	2	12	14	15	6	1	1	0	0	53
9:00	0	0	2	1	0	2	5	9	7	1	1	0	0	0	28
10:00	0	0	2	1	1	0	2	4	3	1	0	0	0	0	14
11:00	0	0	0	0	0	0	2	1	2	0	0	0	1	0	6
Total	0	0	5	4	11	27	140	338	521	297	104	16	5	4	1472

Percentile	15th	50th	85th	95th
Speed	20	24	28	30
Mean Speed (Average)	25.6			
10 MPH Pace Speed	21-30			
Number in Pace	1207			
Percent in Pace	82.0%			
Number > 24 MPH	947			
Percent > 24 MPH	64.3%			

Accurate Counts  
978-664-2565

Location : Old River Road  
Location : North of #91 Old River Road  
City/State: Andover, MA  
Direction: SB,

Site Code: 10379001

10/22/2025	0 - 3	> 3 - 6	> 6 - 9	> 9 - 12	> 12 - 15	> 15 - 18	> 18 - 21	> 21 - 24	> 24 - 27	> 27 - 30	> 30 - 33	> 33 - 36	> 36 - 39	> 39	Total
Time	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	
12:00 AM	0	0	0	0	0	1	1	0	2	0	0	0	0	0	4
1:00	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
4:00	0	0	0	0	0	0	1	0	3	1	1	1	1	0	8
5:00	0	0	0	0	1	0	0	0	5	2	1	0	0	0	9
6:00	0	0	0	0	0	2	3	6	13	5	3	0	0	0	32
7:00	0	0	0	0	2	1	6	15	31	20	2	1	0	0	78
8:00	0	0	0	0	0	1	6	17	35	26	12	2	1	2	102
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10:00	0	0	0	0	0	0	3	12	12	11	6	0	2	0	46
11:00	0	0	0	0	0	2	4	12	23	9	8	5	0	0	63
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2:00	0	0	0	0	0	1	5	15	27	9	11	0	0	1	69
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4:00	0	0	3	5	8	14	35	64	104	54	23	2	0	0	312
5:00	0	0	0	0	2	3	10	40	95	56	16	1	0	0	223
6:00	0	0	0	0	1	1	10	23	40	26	2	0	0	0	103
7:00	0	0	1	2	0	2	12	10	17	9	1	0	0	0	54
8:00	0	0	1	1	5	1	9	6	8	3	1	0	0	0	35
9:00	0	0	0	0	0	1	9	7	5	0	1	0	0	0	23
10:00	0	0	1	2	0	1	3	11	1	0	0	0	0	0	19
11:00	0	0	0	0	1	1	7	4	1	0	0	0	0	0	14
Total	0	0	6	10	25	39	141	307	526	300	107	18	4	3	1486

Percentile	15th	50th	85th	95th
Speed	20	24	28	30
Mean Speed (Average)	25.4			
10 MPH Pace Speed	21-30			
Number in Pace	1163			
Percent in Pace	80.0%			
Number > 24 MPH	958			
Percent > 24 MPH	64.5%			

Grand Total	0	0	11	14	36	66	281	645	1047	597	211	34	9	7	2958
Stats															
Percentile					15th	50th	85th	95th							
Speed					20	24	28	30							
Mean Speed (Average)					25.5										
10 MPH Pace Speed					21-30										
Number in Pace					2383										
Percent in Pace					81.0%										
Number > 24 MPH					1905										
Percent > 24 MPH					64.4%										

Accurate Counts  
978-664-2565

Location : Old River Road  
Location : North of #91 Old River Road  
City/State: Andover, MA  
Direction: Combined

Site Code: 10379001

10/21/2025	0 - 3	> 3 - 6	> 6 - 9	> 9 - 12	> 12 - 15	> 15 - 18	> 18 - 21	> 21 - 24	> 24 - 27	> 27 - 30	> 30 - 33	> 33 - 36	> 36 - 39	> 39	Total
Time	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	
12:00 AM	0	0	0	0	0	1	1	3	1	0	0	0	0	0	6
1:00	0	0	0	0	2	0	1	4	2	0	0	0	0	0	9
2:00	0	0	1	1	0	0	2	2	0	0	2	0	0	0	8
3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	2	0	3	0	2	0	0	0	0	7
5:00	0	0	0	0	0	0	4	10	4	2	2	0	1	0	23
6:00	0	0	0	0	0	0	12	15	14	9	4	2	0	0	56
7:00	0	0	0	0	0	5	28	96	97	34	8	4	1	1	274
8:00	0	0	0	0	2	11	79	132	110	43	13	3	0	0	393
9:00	0	0	0	0	2	2	35	60	68	33	5	0	0	0	205
10:00	0	0	0	1	1	5	16	30	35	19	4	0	0	0	111
11:00	0	0	0	0	1	3	28	25	28	18	5	0	1	0	109
12:00 PM	0	0	0	1	3	2	30	66	45	22	9	0	0	1	179
1:00	0	0	1	0	2	5	19	47	36	11	1	3	0	0	125
2:00	0	0	0	0	2	6	10	30	34	20	5	1	2	0	110
3:00	0	0	0	0	1	4	14	40	46	23	8	1	1	0	138
4:00	0	0	0	0	1	5	37	103	146	77	31	2	0	0	402
5:00	0	0	0	0	3	5	21	70	122	77	24	1	0	0	323
6:00	0	0	0	0	1	5	28	52	64	31	8	3	0	2	194
7:00	0	0	0	0	1	3	18	34	30	7	2	0	0	0	95
8:00	0	0	0	2	2	8	26	25	23	9	4	2	0	1	102
9:00	0	0	2	1	1	5	19	20	7	2	1	1	0	0	59
10:00	0	0	2	1	2	3	4	11	5	3	2	0	0	0	33
11:00	0	0	0	0	0	1	5	4	2	3	0	0	1	0	16
Total	0	0	6	7	27	81	437	882	919	445	138	23	7	5	2977

Percentile	15th	50th	85th	95th
Speed	20	23	27	29
Mean Speed (Average)	24.6			
10 MPH Pace Speed	20-29			
Number in Pace	2411			
Percent in Pace	81.0%			
Number > 24 MPH	1537			
Percent > 24 MPH	51.6%			

Accurate Counts  
978-664-2565

Location : Old River Road  
Location : North of #91 Old River Road  
City/State: Andover, MA  
Direction: Combined

Site Code: 10379001

10/22/2025	0 - 3	> 3 - 6	> 6 - 9	> 9 - 12	> 12 - 15	> 15 - 18	> 18 - 21	> 21 - 24	> 24 - 27	> 27 - 30	> 30 - 33	> 33 - 36	> 36 - 39	> 39	Total
Time	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	
12:00 AM	0	0	0	0	0	1	3	3	5	1	0	0	0	0	13
1:00	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2
2:00	0	0	1	0	0	1	0	0	2	0	0	1	0	0	5
3:00	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
4:00	0	0	0	0	0	1	1	2	3	1	1	1	1	0	11
5:00	0	0	0	0	1	2	7	8	7	2	1	0	0	0	28
6:00	0	0	0	0	0	8	12	21	24	7	4	0	0	0	76
7:00	0	0	0	0	3	14	53	90	85	28	5	2	0	0	280
8:00	0	0	0	1	1	21	107	115	92	42	13	2	1	2	397
9:00	0	0	0	0	4	15	42	78	69	22	4	1	0	0	235
10:00	0	0	0	0	0	0	13	27	36	19	8	1	2	0	106
11:00	0	0	0	0	0	5	15	33	36	13	9	5	0	0	116
12:00 PM	0	0	1	0	0	5	12	51	46	28	9	1	0	0	153
1:00	0	0	0	0	1	1	13	30	41	17	6	0	0	0	109
2:00	0	0	0	0	1	3	15	29	41	13	12	0	1	1	116
3:00	0	0	0	0	0	0	16	35	55	38	7	4	1	0	156
4:00	0	0	3	5	9	16	47	85	132	66	26	3	1	0	393
5:00	0	0	0	0	2	4	26	65	120	62	23	1	0	0	303
6:00	0	0	0	0	2	1	18	38	54	36	7	0	0	0	156
7:00	0	0	1	3	3	4	19	22	27	12	4	0	0	0	95
8:00	0	0	1	1	8	4	23	19	17	7	2	0	0	0	82
9:00	0	0	0	0	0	4	18	16	8	3	1	0	0	0	50
10:00	0	0	2	3	1	6	8	15	8	3	0	1	0	0	47
11:00	0	0	0	0	2	3	8	7	4	1	0	0	0	0	25
Total	0	0	9	13	39	119	476	791	913	421	142	23	7	3	2956

Percentile	15th	50th	85th	95th
Speed	19	23	27	29
Mean Speed (Average)	24.4			
10 MPH Pace Speed	19-28			
Number in Pace	2279			
Percent in Pace	79.0%			
Number > 24 MPH	1509			
Percent > 24 MPH	51.0%			

Grand Total	0	0	15	20	66	200	913	1673	1832	866	280	46	14	8	5933
Stats	Percentile	15th	50th	85th	95th										
	Speed	19	23	27	29										
	Mean Speed (Average)	24.5													
	10 MPH Pace Speed	20-29													
	Number in Pace	4716													
	Percent in Pace	80.0%													
	Number > 24 MPH	3046													
	Percent > 24 MPH	51.3%													

Accurate Counts  
978-664-2565

Location : Old River Road  
Location : North of #91 Old River Road  
City/State: Andover, MA

Site Code: 10379001

10/21/2025 Time	NB,		Hour Totals		SB,		Hour Totals		Combined Totals	
	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	0	14			0	29				
12:15	1	18			1	23				
12:30	2	26			0	17				
12:45	1	31	4	89	1	21	2	90	6	179
1:00	1	22			3	16				
1:15	2	19			0	13				
1:30	1	16			2	15				
1:45	0	16	4	73	0	8	5	52	9	125
2:00	2	13			1	27				
2:15	0	15			1	11				
2:30	1	7			0	11				
2:45	1	11	4	46	2	15	4	64	8	110
3:00	0	14			0	20				
3:15	0	12			0	16				
3:30	0	7			0	27				
3:45	0	19	0	52	0	23	0	86	0	138
4:00	0	15			1	53				
4:15	0	19			0	70				
4:30	2	21			0	124				
4:45	3	35	5	90	1	65	2	312	7	402
5:00	1	26			0	53				
5:15	5	25			3	64				
5:30	4	19			2	65				
5:45	5	12	15	82	3	59	8	241	23	323
6:00	6	17			4	44				
6:15	5	16			5	35				
6:30	8	17			6	26				
6:45	14	15	33	65	8	24	23	129	56	194
7:00	28	9			10	23				
7:15	43	15			17	9				
7:30	52	16			21	4				
7:45	81	11	204	51	22	8	70	44	274	95
8:00	116	16			32	15				
8:15	72	14			13	17				
8:30	72	12			22	16				
8:45	54	7	314	49	12	5	79	53	393	102
9:00	64	8			17	10				
9:15	42	6			16	9				
9:30	21	7			10	4				
9:45	27	10	154	31	8	5	51	28	205	59
10:00	17	7			15	5				
10:15	15	5			12	5				
10:30	12	2			5	3				
10:45	17	5	61	19	18	1	50	14	111	33
11:00	16	2			18	1				
11:15	11	2			13	3				
11:30	10	3			15	2				
11:45	13	3	50	10	13	0	59	6	109	16
Total	848	657			353	1119			1201	1776
Percent	56.3%	43.7%			24.0%	76.0%			40.3%	59.7%

Accurate Counts  
978-664-2565

Location : Old River Road  
Location : North of #91 Old River Road  
City/State: Andover, MA

Site Code: 10379001

10/22/2025 Time	NB,		Hour Totals		SB,		Hour Totals		Combined Totals	
	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	5	9			3	34				
12:15	2	18			1	18				
12:30	2	18			0	21				
12:45	0	18	9	63	0	17	4	90	13	153
1:00	0	21			0	11				
1:15	0	16			0	13				
1:30	1	12			0	13				
1:45	0	8	1	57	1	15	1	52	2	109
2:00	0	18			0	15				
2:15	1	8			0	13				
2:30	1	6			0	13				
2:45	3	15	5	47	0	28	0	69	5	116
3:00	0	12			2	17				
3:15	0	10			0	18				
3:30	0	17			0	15				
3:45	0	23	0	62	0	44	2	94	2	156
4:00	1	11			4	42				
4:15	1	26			1	52				
4:30	0	19			1	147				
4:45	1	25	3	81	2	71	8	312	11	393
5:00	5	14			0	76				
5:15	3	31			3	77				
5:30	5	19			4	37				
5:45	6	16	19	80	2	33	9	223	28	303
6:00	7	13			7	23				
6:15	3	10			5	27				
6:30	8	15			8	32				
6:45	26	15	44	53	12	21	32	103	76	156
7:00	28	11			10	28				
7:15	33	7			15	9				
7:30	53	13			34	9				
7:45	88	10	202	41	19	8	78	54	280	95
8:00	103	17			28	11				
8:15	77	8			29	13				
8:30	52	12			20	8				
8:45	63	10	295	47	25	3	102	35	397	82
9:00	61	7			14	7				
9:15	49	6			10	6				
9:30	37	8			10	5				
9:45	35	6	182	27	19	5	53	23	235	50
10:00	14	9			14	5				
10:15	9	9			10	10				
10:30	18	3			10	3				
10:45	19	7	60	28	12	1	46	19	106	47
11:00	7	6			9	9				
11:15	12	0			17	1				
11:30	17	3			21	3				
11:45	17	2	53	11	16	1	63	14	116	25
Total	873	597			398	1088			1271	1685
Percent	59.4%	40.6%			26.8%	73.2%			43.0%	57.0%
Grand Total	1721	1254			751	2207			2472	3461
Percent	57.8%	42.2%			25.4%	74.6%			41.7%	58.3%

ADT

ADT: 2,966

AADT: 2,966

Accurate Counts  
978-664-2565

Location : Old River Road  
Location : North of #91 Old River Road  
City/State: Andover, MA

Site Code: 10379001

10/20/2025	Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday		Week Average	
Time	NB,	SB,	NB,	SB,	NB,	SB,	NB,	SB,	NB,	SB,	NB,	SB,	NB,	SB,	NB,	SB,
12:00 AM	*	*	4	2	9	4	*	*	*	*	*	*	*	*	6	3
1:00	*	*	4	5	1	1	*	*	*	*	*	*	*	*	2	3
2:00	*	*	4	4	5	0	*	*	*	*	*	*	*	*	4	2
3:00	*	*	0	0	0	2	*	*	*	*	*	*	*	*	0	1
4:00	*	*	5	2	3	8	*	*	*	*	*	*	*	*	4	5
5:00	*	*	15	8	19	9	*	*	*	*	*	*	*	*	17	8
6:00	*	*	33	23	44	32	*	*	*	*	*	*	*	*	38	28
7:00	*	*	204	70	202	78	*	*	*	*	*	*	*	*	203	74
8:00	*	*	314	79	295	102	*	*	*	*	*	*	*	*	304	90
9:00	*	*	154	51	182	53	*	*	*	*	*	*	*	*	168	52
10:00	*	*	61	50	60	46	*	*	*	*	*	*	*	*	60	48
11:00	*	*	50	59	53	63	*	*	*	*	*	*	*	*	52	61
12:00 PM	*	*	89	90	63	90	*	*	*	*	*	*	*	*	76	90
1:00	*	*	73	52	57	52	*	*	*	*	*	*	*	*	65	52
2:00	*	*	46	64	47	69	*	*	*	*	*	*	*	*	46	66
3:00	*	*	52	86	62	94	*	*	*	*	*	*	*	*	57	90
4:00	*	*	90	312	81	312	*	*	*	*	*	*	*	*	86	312
5:00	*	*	82	241	80	223	*	*	*	*	*	*	*	*	81	232
6:00	*	*	65	129	53	103	*	*	*	*	*	*	*	*	59	116
7:00	*	*	51	44	41	54	*	*	*	*	*	*	*	*	46	49
8:00	*	*	49	53	47	35	*	*	*	*	*	*	*	*	48	44
9:00	*	*	31	28	27	23	*	*	*	*	*	*	*	*	29	26
10:00	*	*	19	14	28	19	*	*	*	*	*	*	*	*	24	16
11:00	*	*	10	6	11	14	*	*	*	*	*	*	*	*	10	10
Total	0	0	1505	1472	1470	1486	0	0	0	0	0	0	0	0	1485	1478
Day	0		2977		2956		0		0		0		0		2963	
AM Peak			8:00	8:00	8:00	8:00									8:00	8:00
Volume			314	79	295	102									304	90
PM Peak			4:00	4:00	4:00	4:00									4:00	4:00
Volume			90	312	81	312									86	312
Comb Total	0		2977		2956		0		0		0		0		2963	
ADT	ADT: 2,966		AADT: 2,966													

2025 Existing Weekday Evening Peak-Hour Capacity Analysis Synchro Worksheets

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\_2 - 2025 Existing Weekday Evening

1: North Street/Greater Lawrence Tech & River Road

11/18/2025



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗↗	↖	↖	↗↗		↖	↗		↖	↗	
Traffic Volume (vph)	29	467	259	22	717	12	185	21	24	16	14	14
Future Volume (vph)	29	467	259	22	717	12	185	21	24	16	14	14
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.998			0.919			0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1532	3355	1546	1745	3415	0	1711	1616	0	1745	1699	0
Flt Permitted	0.950			0.950			0.738			0.722		
Satd. Flow (perm)	1532	3355	1546	1745	3415	0	1329	1616	0	1326	1699	0
Satd. Flow (RTOR)			270		1			29			15	
Adj. Flow (vph)	30	486	270	26	844	14	223	25	29	17	15	15
Lane Group Flow (vph)	30	486	270	26	858	0	223	54	0	17	30	0
Turn Type	Prot	NA	Free	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases			Free				4			8		
Detector Phase	5	2		1	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	11.0	16.0		11.0	16.0		10.0	10.0		10.0	10.0	
Total Split (s)	25.0	49.0		12.0	36.0		25.0	25.0		25.0	25.0	
Total Split (%)	22.9%	45.0%		11.0%	33.0%		22.9%	22.9%		22.9%	22.9%	
Maximum Green (s)	19.0	43.0		6.0	30.0		20.0	20.0		20.0	20.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Min		None	Min		None	None		None	None	
Walk Time (s)												
Flash Don't Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio	0.13	0.32	0.17	0.11	0.58		0.54	0.10		0.04	0.06	
Control Delay (s/veh)	33.0	14.8	0.2	35.1	18.8		29.8	15.2		24.3	17.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	33.0	14.8	0.2	35.1	18.8		29.8	15.2		24.3	17.1	
Queue Length 50th (ft)	9	48	0	8	96		53	5		3	3	
Queue Length 95th (ft)	49	171	0	40	313		#227	42		27	32	
Internal Link Dist (ft)		1435			1194			1039			1055	
Turn Bay Length (ft)	150		200	130						100		
Base Capacity (vph)	564	2614	1546	244	1917		489	613		488	635	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.05	0.19	0.17	0.11	0.45		0.46	0.09		0.03	0.05	

Intersection Summary

Cycle Length: 109

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Satd. Flow (RTOR)	
Adj. Flow (vph)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	23.0
Total Split (s)	23.0
Total Split (%)	21%
Maximum Green (s)	20.0
Yellow Time (s)	2.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Don't Walk (s)	13.0
Pedestrian Calls (#/hr)	4
v/c Ratio	
Control Delay (s/veh)	
Queue Delay	
Total Delay (s/veh)	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
<b>Intersection Summary</b>	

Actuated Cycle Length: 62.9

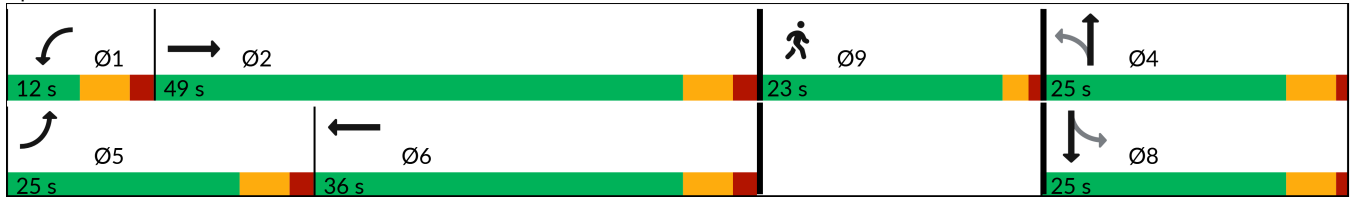
Natural Cycle: 80

Control Type: Actuated-Uncoordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: North Street/Greater Lawrence Tech & River Road



\_2 - 2025 Existing Weekday Evening

1: North Street/Greater Lawrence Tech & River Road

11/18/2025



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	467	259	22	717	12	185	21	24	16	14	14
Future Volume (vph)	29	467	259	22	717	12	185	21	24	16	14	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	11	11	11	11	11	11	11	11	11
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.92		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1532	3355	1546	1745	3414		1711	1617		1745	1699	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.74	1.00		0.72	1.00	
Satd. Flow (perm)	1532	3355	1546	1745	3414		1328	1617		1326	1699	
Peak-hour factor, PHF	0.96	0.96	0.96	0.85	0.85	0.85	0.83	0.83	0.83	0.92	0.92	0.92
Adj. Flow (vph)	30	486	270	26	844	14	223	25	29	17	15	15
RTOR Reduction (vph)	0	0	0	0	1	0	0	21	0	0	11	0
Lane Group Flow (vph)	30	486	270	26	857	0	223	33	0	17	19	0
Heavy Vehicles (%)	10%	4%	1%	0%	2%	0%	2%	5%	4%	0%	0%	0%
Turn Type	Prot	NA	Free	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases			Free				4			8		
Actuated Green, G (s)	2.6	25.9	68.6	1.8	25.1		18.4	18.4		18.4	18.4	
Effective Green, g (s)	4.6	27.9	68.6	3.8	27.1		19.4	19.4		19.4	19.4	
Actuated g/C Ratio	0.07	0.41	1.00	0.06	0.40		0.28	0.28		0.28	0.28	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	102	1364	1546	96	1348		375	457		374	480	
v/s Ratio Prot	0.02	0.14		0.01	c0.25			0.02			0.01	
v/s Ratio Perm			c0.17				c0.17			0.01		
v/c Ratio	0.29	0.36	0.17	0.27	0.64		0.59	0.07		0.05	0.04	
Uniform Delay, d1	30.5	14.1	0.0	31.1	16.8		21.2	18.0		17.9	17.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	0.2	0.2	1.5	1.0		2.5	0.1		0.1	0.0	
Delay (s)	32.1	14.3	0.2	32.6	17.8		23.7	18.1		17.9	17.9	
Level of Service	C	B	A	C	B		C	B		B	B	
Approach Delay (s/veh)		10.1			18.2			22.6			17.9	
Approach LOS		B			B			C			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay (s/veh)			15.6				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			68.6				Sum of lost time (s)				15.0	
Intersection Capacity Utilization			47.7%				ICU Level of Service				A	
Analysis Period (min)			15									

c Critical Lane Group

\_2 - 2025 Existing Weekday Evening  
 2: Federal Street/Old River Road & River Road

11/18/2025



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	3	76	688	46	5	805	47	280	5	58	76	1
Future Volume (vph)	3	76	688	46	5	805	47	280	5	58	76	1
Lane Util. Factor	0.95	0.97	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00
Fr <sub>t</sub>			0.991			0.992				0.850		
Fl <sub>t</sub> Protected		0.950			0.950				0.953			0.953
Satd. Flow (prot)	0	3403	3448	0	1685	3398	0	0	1871	1615	0	1758
Fl <sub>t</sub> Permitted		0.950			0.950				0.648			0.497
Satd. Flow (perm)	0	3403	3448	0	1685	3398	0	0	1272	1615	0	917
Satd. Flow (RTOR)			13			11				164		
Adj. Flow (vph)	3	80	724	48	5	847	49	318	6	66	113	1
Lane Group Flow (vph)	0	83	772	0	5	896	0	0	324	66	0	114
Turn Type	Prot	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA
Protected Phases	5	5	2		1	6			8			3
Permitted Phases								8		8	3	
Detector Phase	5	5	2		1	6		8	8	8	3	3
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	11.0	11.0	11.0		11.0	11.0		11.0	11.0	11.0	11.0	11.0
Total Split (s)	12.0	12.0	47.0		12.0	47.0		21.0	21.0	21.0	21.0	21.0
Total Split (%)	15.0%	15.0%	58.8%		15.0%	58.8%		26.3%	26.3%	26.3%	26.3%	26.3%
Maximum Green (s)	7.0	7.0	42.0		7.0	42.0		16.0	16.0	16.0	16.0	16.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)		-1.0	-1.0		-1.0	-1.0			-1.0	-1.0		-1.0
Total Lost Time (s)		4.0	4.0		4.0	4.0			4.0	4.0		4.0
Lead/Lag	Lead	Lead	Lead		Lag	Lag						
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0
Recall Mode	None	None	C-Min		None	C-Min		None	None	None	None	None
v/c Ratio		0.26	0.48		0.03	0.68			0.64	0.09		0.31
Control Delay (s/veh)		42.7	16.5		31.2	23.1			29.7	0.2		22.3
Queue Delay		0.0	0.0		0.0	0.0			0.0	0.0		0.0
Total Delay (s/veh)		42.7	16.5		31.2	23.1			29.7	0.2		22.3
Queue Length 50th (ft)		23	73		2	200			128	0		38
Queue Length 95th (ft)		46	238		12	227			#285	0		65
Internal Link Dist (ft)			654			1435			1094			310
Turn Bay Length (ft)		500			170					165		
Base Capacity (vph)		340	1867		186	1831			507	743		366
Starvation Cap Reductn		0	0		0	0			0	0		0
Spillback Cap Reductn		0	0		0	0			0	0		0
Storage Cap Reductn		0	0		0	0			0	0		0
Reduced v/c Ratio		0.24	0.41		0.03	0.49			0.64	0.09		0.31

Intersection Summary

Cycle Length: 80  
 Actuated Cycle Length: 80  
 Offset: 42 (53%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 55



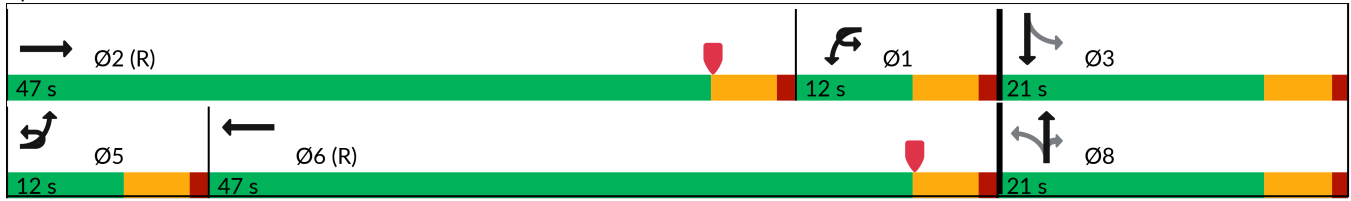
Lane Group	SBR
Lane Configurations	↗
Traffic Volume (vph)	312
Future Volume (vph)	312
Lane Util. Factor	1.00
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1830
Flt Permitted	
Satd. Flow (perm)	1830
Satd. Flow (RTOR)	247
Adj. Flow (vph)	466
Lane Group Flow (vph)	466
Turn Type	Free
Protected Phases	
Permitted Phases	Free
Detector Phase	
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Maximum Green (s)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	
Recall Mode	
v/c Ratio	0.25
Control Delay (s/veh)	0.3
Queue Delay	0.0
Total Delay (s/veh)	0.3
Queue Length 50th (ft)	0
Queue Length 95th (ft)	0
Internal Link Dist (ft)	
Turn Bay Length (ft)	100
Base Capacity (vph)	1830
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.25
<b>Intersection Summary</b>	

Control Type: Actuated-Coordinated

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

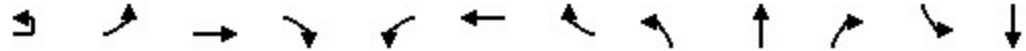
Queue shown is maximum after two cycles.

Splits and Phases: 2: Federal Street/Old River Road & River Road



2 - 2025 Existing Weekday Evening  
2: Federal Street/Old River Road & River Road

11/18/2025



Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	3	76	688	46	5	805	47	280	5	58	76	1
Future Volume (vph)	3	76	688	46	5	805	47	280	5	58	76	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	11	11	13	13	12	12	12
Total Lost time (s)		4.0	4.0		4.0	4.0			4.0	4.0		4.0
Lane Util. Factor		0.97	0.95		1.00	0.95			1.00	1.00		1.00
Frt		1.00	0.99		1.00	0.99			1.00	0.85		1.00
Flt Protected		0.95	1.00		0.95	1.00			0.95	1.00		0.95
Satd. Flow (prot)		3403	3447		1685	3397			1871	1615		1758
Flt Permitted		0.95	1.00		0.95	1.00			0.65	1.00		0.50
Satd. Flow (perm)		3403	3447		1685	3397			1273	1615		917
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.88	0.88	0.88	0.67	0.67
Adj. Flow (vph)	3	80	724	48	5	847	49	318	6	66	113	1
RTOR Reduction (vph)	0	0	8	0	0	7	0	0	0	40	0	0
Lane Group Flow (vph)	0	83	764	0	5	889	0	0	324	26	0	114
Heavy Vehicles (%)	0%	3%	4%	0%	0%	2%	0%	0%	0%	0%	3%	0%
Turn Type	Prot	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA
Protected Phases	5	5	2		1	6			8			3
Permitted Phases								8		8	3	
Actuated Green, G (s)		5.3	31.8		2.3	28.8			30.9	30.9		30.9
Effective Green, g (s)		6.3	32.8		3.3	29.8			31.9	31.9		31.9
Actuated g/C Ratio		0.08	0.41		0.04	0.37			0.40	0.40		0.40
Clearance Time (s)		5.0	5.0		5.0	5.0			5.0	5.0		5.0
Vehicle Extension (s)		2.0	2.0		2.0	2.0			2.0	2.0		2.0
Lane Grp Cap (vph)		267	1413		69	1265			507	643		365
v/s Ratio Prot		0.02	c0.22		0.00	c0.26						
v/s Ratio Perm									c0.25	0.02		0.12
v/c Ratio		0.31	0.54		0.07	0.70			0.64	0.04		0.31
Uniform Delay, d1		34.8	17.9		36.9	21.3			19.4	14.7		16.5
Progression Factor		1.21	1.03		1.00	1.00			1.00	1.00		1.00
Incremental Delay, d2		0.2	1.4		0.2	3.3			2.0	0.0		0.2
Delay (s)		42.3	19.9		37.0	24.6			21.4	14.7		16.7
Level of Service		D	B		D	C			C	B		B
Approach Delay (s/veh)			22.1			24.7			20.2			3.6
Approach LOS			C			C			C			A

Intersection Summary		
HCM 2000 Control Delay (s/veh)	18.7	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.68	B
Actuated Cycle Length (s)	80.0	Sum of lost time (s)
Intersection Capacity Utilization	61.2%	13.0
Analysis Period (min)	15	ICU Level of Service
		B

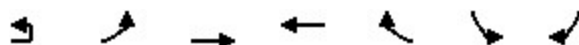
c Critical Lane Group



Movement	SBR
Lane Configurations	7
Traffic Volume (vph)	312
Future Volume (vph)	312
Ideal Flow (vphpl)	1900
Lane Width	16
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1830
Flt Permitted	1.00
Satd. Flow (perm)	1830
Peak-hour factor, PHF	0.67
Adj. Flow (vph)	466
RTOR Reduction (vph)	0
Lane Group Flow (vph)	466
Heavy Vehicles (%)	0%
Turn Type	Free
Protected Phases	
Permitted Phases	Free
Actuated Green, G (s)	80.0
Effective Green, g (s)	80.0
Actuated g/C Ratio	1.00
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	1830
v/s Ratio Prot	
v/s Ratio Perm	0.25
v/c Ratio	0.25
Uniform Delay, d1	0.0
Progression Factor	1.00
Incremental Delay, d2	0.3
Delay (s)	0.3
Level of Service	A
Approach Delay (s/veh)	
Approach LOS	
<b>Intersection Summary</b>	

\_2 - 2025 Existing Weekday Evening  
 3: River Road & I-93 Northbound Ramps

11/18/2025



Lane Group	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑	↑↑	↑	↔↔	↔↔
Traffic Volume (vph)	1	548	673	682	717	139	111
Future Volume (vph)	1	548	673	682	717	139	111
Lane Util. Factor	0.95	0.97	0.95	0.95	1.00	0.97	0.88
Frt					0.850		0.850
Flt Protected		0.950				0.950	
Satd. Flow (prot)	0	3319	3505	3539	1599	3367	2733
Flt Permitted		0.950				0.950	
Satd. Flow (perm)	0	3319	3505	3539	1599	3367	2733
Satd. Flow (RTOR)					575		
Adj. Flow (vph)	1	645	792	874	919	164	131
Lane Group Flow (vph)	0	646	792	874	919	164	131
Turn Type	Prot	Prot	NA	NA	Free	Prot	pt+ov
Protected Phases	5!	5	2	6		3	3 5!
Permitted Phases					Free		
Detector Phase	5	5	2	6		3	3 5
Switch Phase							
Minimum Initial (s)	6.0	6.0	6.0	6.0		6.0	
Minimum Split (s)	11.0	11.0	11.0	11.0		11.0	
Total Split (s)	42.0	42.0	65.0	23.0		15.0	
Total Split (%)	52.5%	52.5%	81.3%	28.8%		18.8%	
Maximum Green (s)	37.0	37.0	60.0	18.0		10.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0		1.0	
Lost Time Adjust (s)		-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)		4.0	4.0	4.0		4.0	
Lead/Lag	Lead	Lead		Lag			
Lead-Lag Optimize?							
Vehicle Extension (s)	2.0	2.0	2.0	2.0		2.0	
Recall Mode	None	None	C-Min	C-Min		Min	
v/c Ratio		0.71	0.29	0.53	0.57	0.43	0.11
Control Delay (s/veh)		21.5	4.4	17.6	2.7	36.1	12.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)		21.5	4.4	17.6	2.7	36.1	12.1
Queue Length 50th (ft)		158	130	183	41	41	22
Queue Length 95th (ft)		69	23	222	13	65	30
Internal Link Dist (ft)			1040	654		885	
Turn Bay Length (ft)		650					650
Base Capacity (vph)		1576	2753	1638	1599	462	1700
Starvation Cap Reductn		0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0
Reduced v/c Ratio		0.41	0.29	0.53	0.57	0.35	0.08

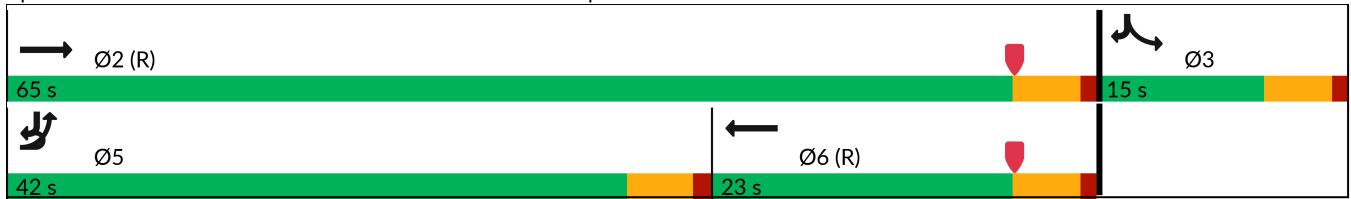
Intersection Summary

Cycle Length: 80  
 Actuated Cycle Length: 80  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 50

Control Type: Actuated-Coordinated

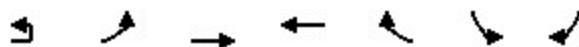
! Phase conflict between lane groups.

Splits and Phases: 3: River Road & I-93 Northbound Ramps



\_2 - 2025 Existing Weekday Evening  
 3: River Road & I-93 Northbound Ramps

11/18/2025



Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↕↕	↕↕	↗	↔↔	↔↔
Traffic Volume (vph)	1	548	673	682	717	139	111
Future Volume (vph)	1	548	673	682	717	139	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	12
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		0.97	0.95	0.95	1.00	0.97	0.88
Frt		1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected		0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		3319	3505	3539	1599	3367	2733
Flt Permitted		0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		3319	3505	3539	1599	3367	2733
Peak-hour factor, PHF	0.85	0.85	0.85	0.78	0.78	0.85	0.85
Adj. Flow (vph)	1	645	792	874	919	164	131
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	646	792	874	919	164	131
Heavy Vehicles (%)	0%	2%	3%	2%	1%	4%	4%
Turn Type	Prot	Prot	NA	NA	Free	Prot	pt+ov
Protected Phases	5!	5	2	6		3	3 5!
Permitted Phases					Free		
Actuated Green, G (s)		20.8	61.8	36.0	80.0	8.2	34.0
Effective Green, g (s)		21.8	62.8	37.0	80.0	9.2	35.0
Actuated g/C Ratio		0.27	0.78	0.46	1.00	0.12	0.44
Clearance Time (s)		5.0	5.0	5.0		5.0	
Vehicle Extension (s)		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)		904	2751	1636	1599	387	1195
v/s Ratio Prot		c0.19	0.23	0.25		0.05	0.05
v/s Ratio Perm					c0.57		
v/c Ratio		0.71	0.29	0.53	0.57	0.42	0.11
Uniform Delay, d1		26.3	2.4	15.3	0.0	32.9	13.3
Progression Factor		0.66	1.66	0.97	1.00	1.00	1.00
Incremental Delay, d2		2.1	0.2	1.2	1.4	0.3	0.0
Delay (s)		19.4	4.2	16.1	1.4	33.2	13.3
Level of Service		B	A	B	A	C	B
Approach Delay (s/veh)			11.1	8.6		24.4	
Approach LOS			B	A		C	
<b>Intersection Summary</b>							
HCM 2000 Control Delay (s/veh)			10.9		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio			0.70				
Actuated Cycle Length (s)			80.0		Sum of lost time (s)		13.0
Intersection Capacity Utilization			49.5%		ICU Level of Service		A
Analysis Period (min)			15				
! Phase conflict between lane groups.							
c Critical Lane Group							

\_2 - 2025 Existing Weekday Evening  
4: I-93 Southbound Ramps & River Road

11/18/2025



Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↔	↑↑	↔	↑
Traffic Volume (vph)	701	405	3	433	358	246	518
Future Volume (vph)	701	405	3	433	358	246	518
Lane Util. Factor	0.95	1.00	0.95	0.97	0.95	0.97	1.00
Frt		0.850					0.850
Flt Protected				0.950		0.950	
Satd. Flow (prot)	3574	1830	0	3352	3574	3467	1794
Flt Permitted				0.950		0.950	
Satd. Flow (perm)	3574	1830	0	3352	3574	3467	1794
Satd. Flow (RTOR)		460					632
Adj. Flow (vph)	797	460	3	456	377	300	632
Lane Group Flow (vph)	797	460	0	459	377	300	632
Turn Type	NA	Free	Prot	Prot	NA	Prot	Free
Protected Phases	2		1	1	6	8	
Permitted Phases		Free					Free
Detector Phase	2		1	1	6	8	
Switch Phase							
Minimum Initial (s)	6.0		6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0		11.0	11.0	11.0	27.0	
Total Split (s)	32.0		20.0	20.0	52.0	28.0	
Total Split (%)	40.0%		25.0%	25.0%	65.0%	35.0%	
Maximum Green (s)	27.0		15.0	15.0	47.0	23.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-1.0			-1.0	-1.0	-1.0	
Total Lost Time (s)	4.0			4.0	4.0	4.0	
Lead/Lag	Lag		Lead	Lead			
Lead-Lag Optimize?							
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	
Recall Mode	C-Min		None	None	C-Min	Min	
Walk Time (s)						6.0	
Flash Don't Walk (s)						16.0	
Pedestrian Calls (#/hr)						0	
v/c Ratio	0.45	0.25		0.68	0.14	0.56	0.35
Control Delay (s/veh)	15.5	0.3		52.2	1.0	35.2	0.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay (s/veh)	15.5	0.3		52.2	1.0	35.2	0.5
Queue Length 50th (ft)	112	0		130	11	73	0
Queue Length 95th (ft)	223	0		143	4	95	0
Internal Link Dist (ft)	1168				1040	800	
Turn Bay Length (ft)		430		250			480
Base Capacity (vph)	1770	1830		721	2667	1040	1794
Starvation Cap Reductn	0	0		0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0
Reduced v/c Ratio	0.45	0.25		0.64	0.14	0.29	0.35

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 32 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Splits and Phases: 4: I-93 Southbound Ramps & River Road





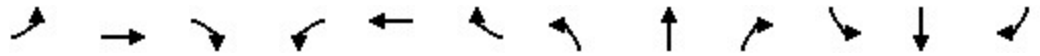
Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑	↑↑	↑↑	↑
Traffic Volume (vph)	701	405	3	433	358	246	518
Future Volume (vph)	701	405	3	433	358	246	518
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	11	11	12	12	16
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00		0.97	0.95	0.97	1.00
Frt	1.00	0.85		1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3574	1830		3352	3574	3467	1794
Flt Permitted	1.00	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3574	1830		3352	3574	3467	1794
Peak-hour factor, PHF	0.88	0.88	0.95	0.95	0.95	0.82	0.82
Adj. Flow (vph)	797	460	3	456	377	300	632
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	797	460	0	459	377	300	632
Heavy Vehicles (%)	1%	0%	0%	1%	1%	1%	2%
Turn Type	NA	Free	Prot	Prot	NA	Prot	Free
Protected Phases	2		1	1	6	8	
Permitted Phases		Free					Free
Actuated Green, G (s)	38.6	80.0		15.1	58.7	11.3	80.0
Effective Green, g (s)	39.6	80.0		16.1	59.7	12.3	80.0
Actuated g/C Ratio	0.50	1.00		0.20	0.75	0.15	1.00
Clearance Time (s)	5.0			5.0	5.0	5.0	
Vehicle Extension (s)	2.0			2.0	2.0	2.0	
Lane Grp Cap (vph)	1769	1830		674	2667	533	1794
v/s Ratio Prot	c0.22			c0.14	0.11	c0.09	
v/s Ratio Perm		0.25					0.35
v/c Ratio	0.45	0.25		0.68	0.14	0.56	0.35
Uniform Delay, d1	13.1	0.0		29.6	2.9	31.4	0.0
Progression Factor	1.02	1.00		1.62	0.30	1.00	1.00
Incremental Delay, d2	0.7	0.3		2.0	0.1	0.8	0.5
Delay (s)	14.1	0.3		49.9	1.0	32.2	0.5
Level of Service	B	A		D	A	C	A
Approach Delay (s/veh)	9.0				27.8	10.7	
Approach LOS	A				C	B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

\_2 - 2025 Existing Weekday Evening  
 5: Shattuck Road/Minuteman Road & River Road

11/18/2025



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	410	38	106	315	37	51	2	487	150	4	8
Future Volume (vph)	9	410	38	106	315	37	51	2	487	150	4	8
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	0.88	0.95	0.95	1.00
Frt		0.987				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.954		0.950	0.955	
Satd. Flow (prot)	1805	3499	0	3351	1863	1417	0	1692	2748	1665	1676	1615
Flt Permitted	0.950			0.950				0.954		0.950	0.955	
Satd. Flow (perm)	1805	3499	0	3351	1863	1417	0	1692	2748	1665	1676	1615
Satd. Flow (RTOR)		11				232						232
Adj. Flow (vph)	11	506	47	133	394	46	85	3	812	211	6	11
Lane Group Flow (vph)	11	553	0	133	394	46	0	88	812	108	109	11
Turn Type	Prot	NA		Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	5	2		1	6		8	8	8 1	3	3	
Permitted Phases						Free						Free
Detector Phase	5	2		1	6		8	8	8 1	3	3	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Total Split (s)	12.0	18.0		12.0	18.0		22.0	22.0		28.0	28.0	
Total Split (%)	15.0%	22.5%		15.0%	22.5%		27.5%	27.5%		35.0%	35.0%	
Maximum Green (s)	7.0	13.0		7.0	13.0		17.0	17.0		23.0	23.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0		-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	
v/c Ratio	0.07	0.58		0.40	0.54	0.03		0.18	0.66	0.48	0.48	0.01
Control Delay (s/veh)	34.6	30.5		44.0	26.6	0.1		20.8	20.1	38.6	38.6	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 (s/veh)	34.6	30.5		44.0	26.6	0.1		20.8	20.1	38.6	38.6	0.0
Queue Length 50th (ft)	5	123		38	126	0		33	176	54	53	0
Queue Length 95th (ft)	19	#194		59	#339	0		40	123	76	75	0
Internal Link Dist (ft)		1189			1168			1114			744	
Turn Bay Length (ft)	80			350					200			150
Base Capacity (vph)	180	954		352	732	1417		498	1235	499	502	1615
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	0.06	0.58		0.38	0.54	0.03		0.18	0.66	0.22	0.22	0.01

Intersection Summary

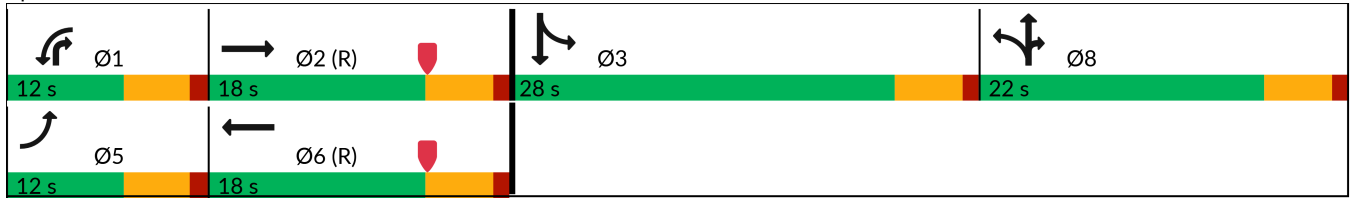
Cycle Length: 80  
 Actuated Cycle Length: 80  
 Offset: 29 (36%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 55

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 5: Shattuck Road/Minuteman Road & River Road



\_2 - 2025 Existing Weekday Evening  
5: Shattuck Road/Minuteman Road & River Road

11/18/2025



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	410	38	106	315	37	51	2	487	150	4	8
Future Volume (vph)	9	410	38	106	315	37	51	2	487	150	4	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	12	12	10	10	11	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.95	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1805	3500		3351	1863	1417		1692	2748	1665	1676	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.95	1.00	0.95	0.95	1.00
Satd. Flow (perm)	1805	3500		3351	1863	1417		1692	2748	1665	1676	1615
Peak-hour factor, PHF	0.81	0.81	0.81	0.80	0.80	0.80	0.60	0.60	0.60	0.71	0.71	0.71
Adj. Flow (vph)	11	506	47	132	394	46	85	3	812	211	6	11
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	11	545	0	133	394	46	0	88	812	108	109	11
Heavy Vehicles (%)	0%	2%	0%	1%	2%	14%	0%	0%	0%	3%	0%	0%
Turn Type	Prot	NA		Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	5	2		1	6		8	8	8 1	3		3
Permitted Phases						Free						Free
Actuated Green, G (s)	1.2	20.7		7.0	26.5	80.0		22.6	34.6	9.7	9.7	80.0
Effective Green, g (s)	2.2	21.7		8.0	27.5	80.0		23.6	35.6	10.7	10.7	80.0
Actuated g/C Ratio	0.03	0.27		0.10	0.34	1.00		0.30	0.45	0.13	0.13	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	49	949		335	640	1417		499	1222	222	224	1615
v/s Ratio Prot	0.01	0.16		0.04	c0.21			0.05	c0.30	0.06	c0.07	
v/s Ratio Perm						0.03						0.01
v/c Ratio	0.22	0.57		0.40	0.62	0.03		0.18	0.66	0.49	0.49	0.01
Uniform Delay, d1	38.1	25.2		33.7	21.9	0.0		21.0	17.5	32.1	32.1	0.0
Progression Factor	1.00	1.00		1.20	0.97	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	2.5		0.3	4.3	0.0		0.1	1.1	0.6	0.6	0.0
Delay (s)	38.9	27.7		40.9	25.6	0.0		21.0	18.6	32.7	32.7	0.0
Level of Service	D	C		D	C	A		C	B	C	C	A
Approach Delay (s/veh)		27.9			27.1			18.8			31.1	
Approach LOS		C			C			B			C	

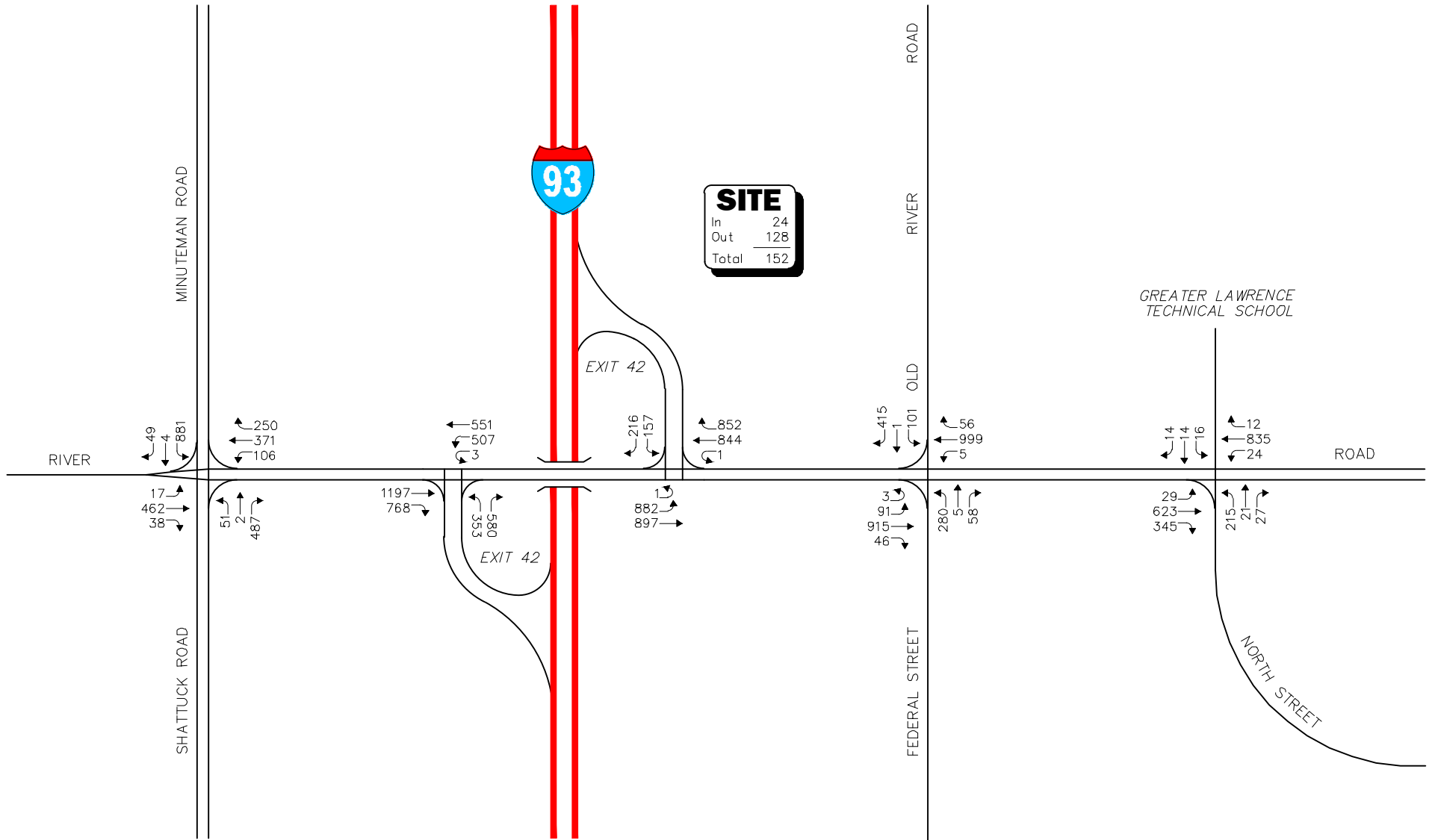
Intersection Summary

HCM 2000 Control Delay (s/veh)	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	44.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Revised and Amended Figures (6R, 11R, A-4R, 5A and 6A)

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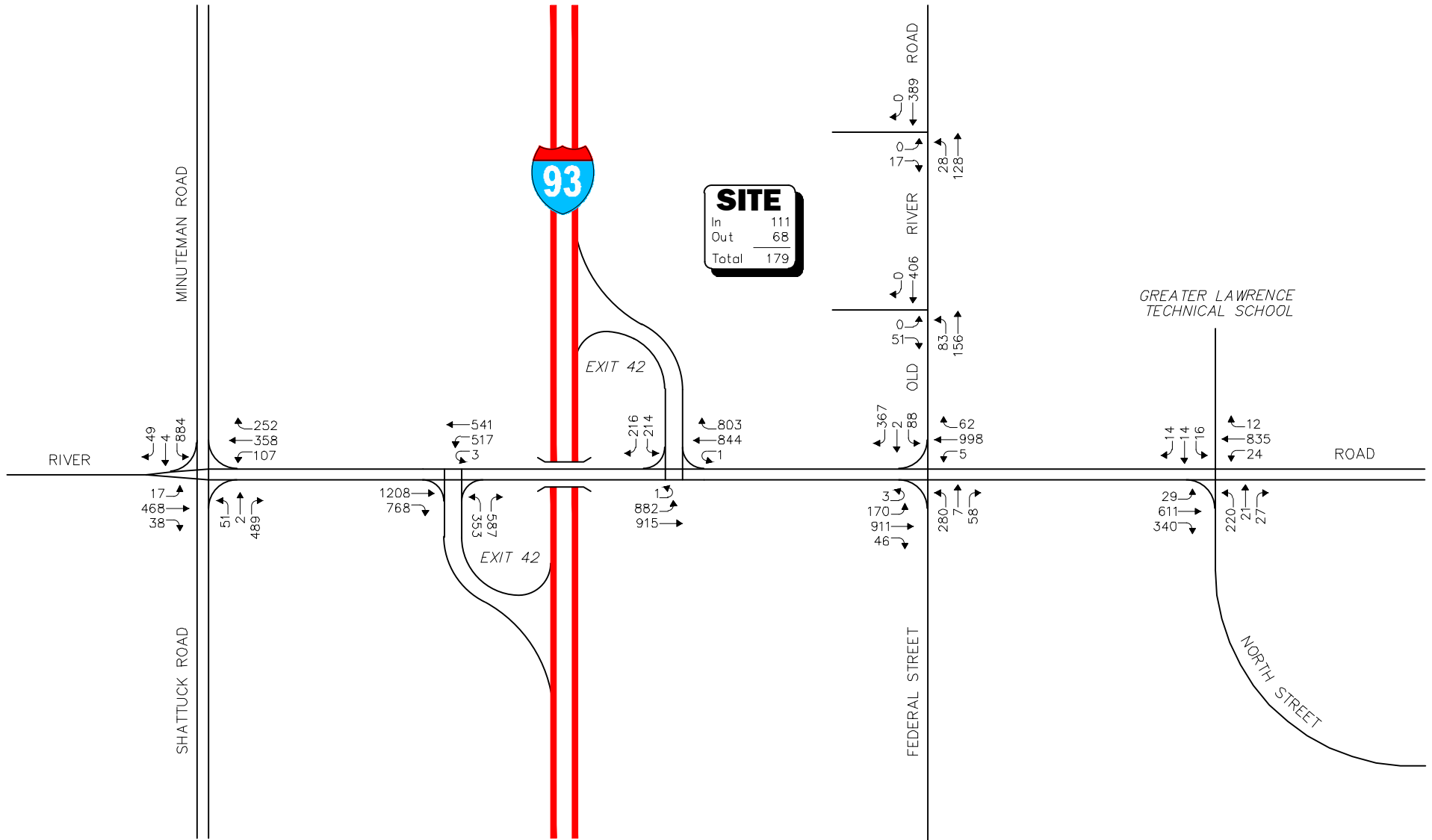
Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not to Scale



Figure 6R

2032 No-Build  
 Weekday Evening  
 Peak-Hour Traffic Volumes



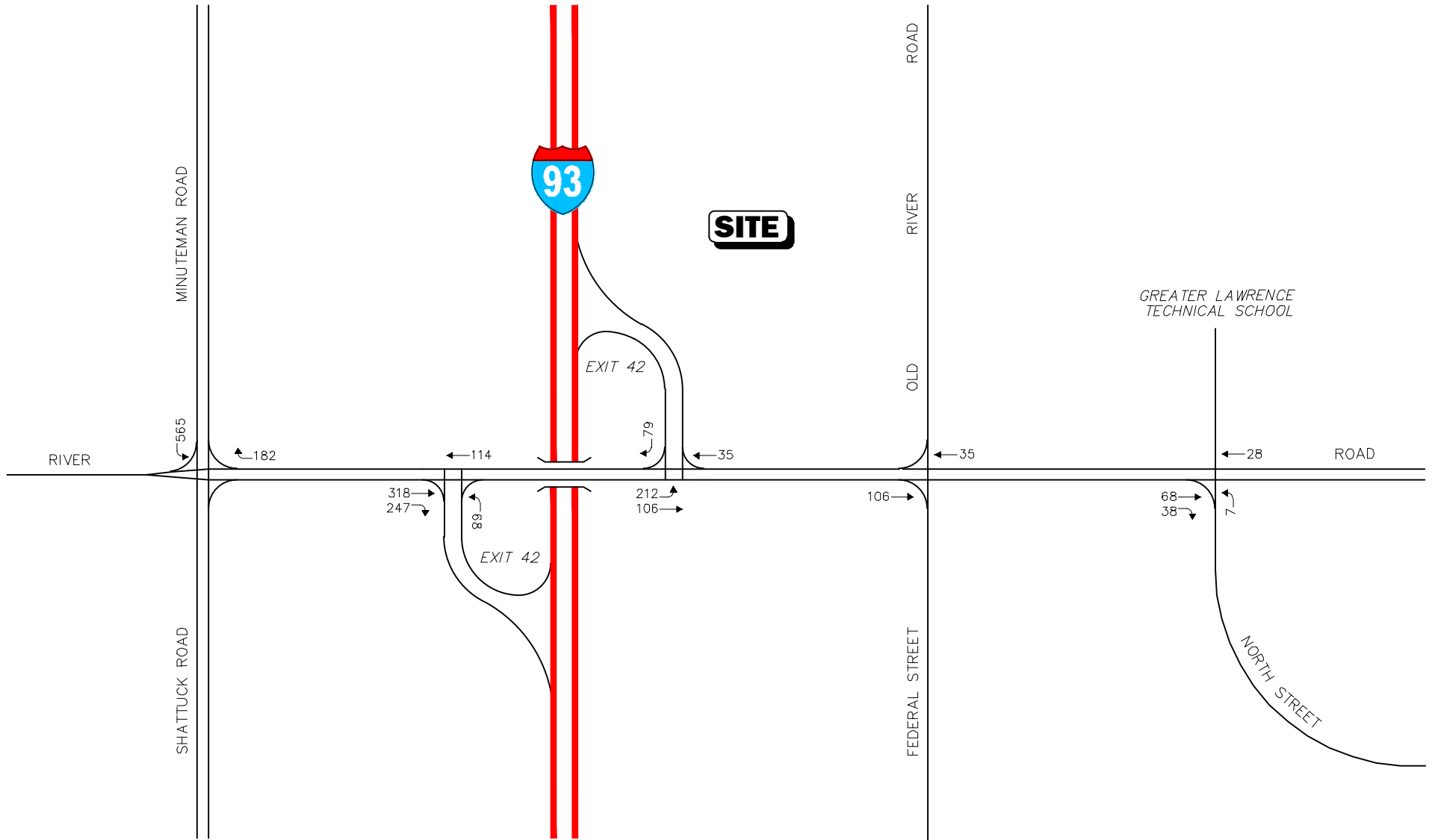
Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not to Scale



Figure 11R

2032 Build  
Weekday Evening  
Peak-Hour Traffic Volumes



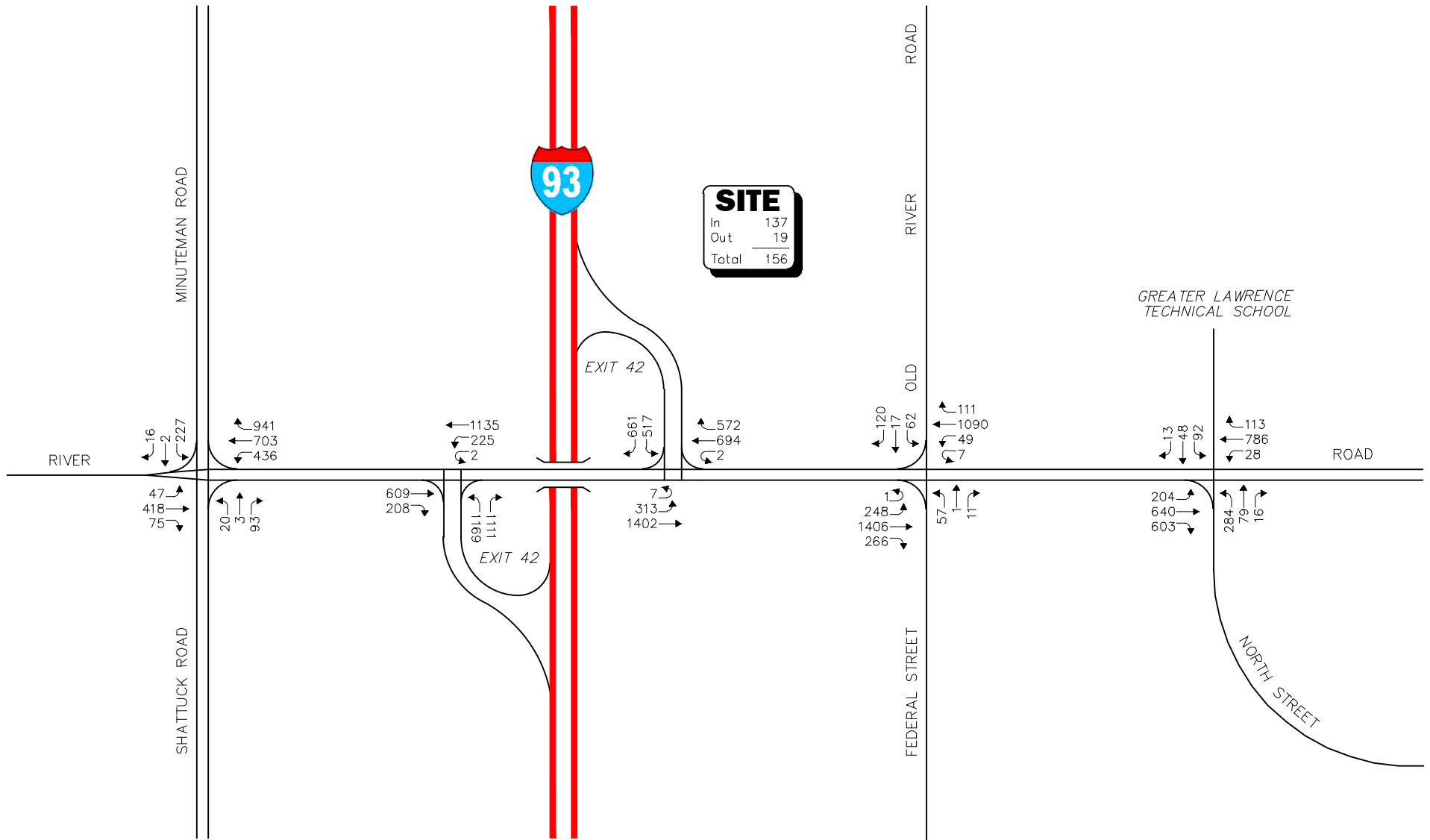
Not to Scale



Figure A-4R

Phillips Healthcare Campus  
Redevelopment  
3000 Minuteman Road  
Weekday Evening  
Peak-Hour Traffic Volumes

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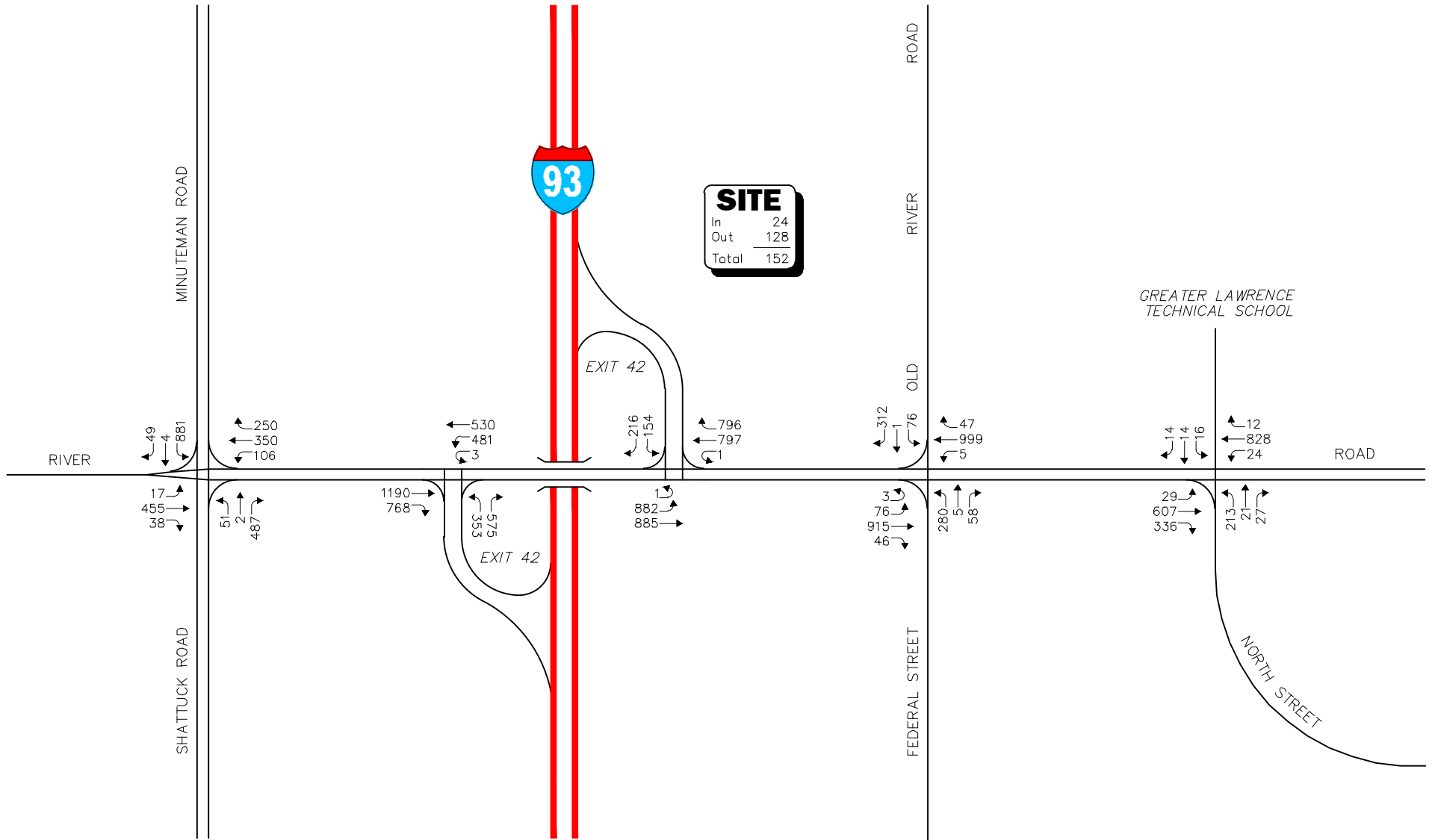
Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not to Scale



Figure 5A

2032 No-Build  
Weekday Morning  
Peak-Hour Traffic Volumes  
(No Project Site Reoccupancy)



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

Not to Scale



Figure 6A

2032 No-Build  
Weekday Evening  
Peak-Hour Traffic Volumes  
(No Project Site Reoccupancy)

Revised and Amended Capacity Analysis Tables (Tables 10R, 13R, 10A and 13A)

**Table 10R – Revised PHFs, HV% and Future Condition PHF Set to 0.92**  
**SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak-Hour/Movement	2025 Existing				2032 No-Build				2032 Build			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b><i>River Road at North Street and Greater Lawrence Tech Driveway</i></b>												
<i>Weekday Morning:</i>												
River Road EB LT	0.72	40.0	D	5/9	0.70	42.3	D	4/10	0.70	42.3	D	4/10
River Road EB TH	0.41	13.6	B	3/9	0.43	15.6	B	4/11	0.43	15.6	B	4/11
River Road EB RT	0.44	0.9	A	0/0	0.43	0.9	A	0/0	0.43	0.9	A	0/0
River Road WB LT	0.39	44.5	D	1/2	0.40	46.8	D	1/2	0.40	46.8	D	1/2
River Road WB TH/RT	0.69	27.0	C	8/15	0.90	38.7	D	11/25	0.87	36.3	D	11/24
North Street NB LT	0.93	68.4	E	5/15	0.93	64.8	E	7/18	0.91	59.2	E	6/17
North Street NB TH/RT	0.24	28.0	C	2/5	0.20	26.5	C	2/4	0.20	26.5	C	2/4
Greater Lawrence Tech SB LT	0.60	33.9	C	3/4	0.30	27.5	C	2/5	0.30	27.5	C	2/5
Greater Lawrence Tech SB TH/RT	0.26	28.1	C	2/3	0.12	25.8	C	1/3	0.12	25.8	C	1/3
<b>Overall</b>	--	<b>23.5</b>	<b>C</b>	--	--	<b>27.8</b>	<b>C</b>	--	--	<b>26.3</b>	<b>C</b>	--
<i>Weekday Evening:</i>												
River Road EB LT	0.29	32.1	C	1/2	0.42	35.6	D	1/3	0.42	38.0	D	1/3
River Road EB TH	0.36	14.3	B	2/7	0.48	14.9	B	3/11	0.45	15.7	B	3/11
River Road EB RT	0.17	0.2	A	0/0	0.24	0.4	A	0/0	0.23	0.3	A	0/0
River Road WB LT	0.27	32.6	C	1/2	0.30	33.6	C	1/2	0.34	36.5	D	1/2
River Road WB TH/RT	0.64	17.8	B	4/13	0.64	17.0	B	4/15	0.70	19.2	B	4/15
North Street NB LT	0.59	23.7	C	2/9	0.63	25.3	C	3/10	0.67	27.2	C	3/10
North Street NB TH/RT	0.07	18.1	B	0/2	0.07	18.4	B	0/2	0.07	18.6	B	0/2
Greater Lawrence Tech SB LT	0.05	17.9	B	0/1	0.05	18.3	B	0/1	0.04	18.5	B	0/1
Greater Lawrence Tech SB TH/RT	0.04	17.9	B	0/2	0.04	18.3	B	0/2	0.04	18.4	B	0/2
<b>Overall</b>	--	<b>15.6</b>	<b>B</b>	--	--	<b>15.1</b>	<b>B</b>	--	--	<b>16.8</b>	<b>B</b>	--

See notes at end of Table.

**Table 10R (Continued) – Revised PHFs, HV% and Future Condition PHF Set to 0.92**  
**SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak-Hour/Movement	2025 Existing				2032 No-Build				2032 Build			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b><i>River Road at Old River Road and Federal Street</i></b>												
<i>Weekday Morning:</i>												
River Road EB LT	0.55	31.1	C	3/4	0.73	32.3	C	4/5	0.64	30.0	C	3/4
River Road EB TH/RT	0.79	15.2	B	10/17	0.78	8.5	A	3/12	0.79	8.3	A	4/12
River Road WB LT	0.30	32.3	C	1/3	0.55	35.1	D	1/3	0.55	35.1	D	1/3
River Road WB TH/RT	0.57	11.4	B	7/11	0.71	12.4	B	9/12	0.68	11.8	B	8/11
Federal Street NB LT/TH	0.54	35.8	D	2/3	0.52	31.6	C	1/3	0.52	31.5	C	1/3
Federal Street NB RT	0.01	31.5	C	0/0	0.01	28.6	C	0/0	0.01	28.5	C	0/0
Old River Road SB LT/TH	0.63	39.7	D	2/4	0.72	46.2	D	2/4	0.82	60.6	E	2/5
Old River Road SB RT	0.08	0.1	A	0/0	0.08	0.1	A	0/0	0.14	0.2	A	0/0
<b>Overall</b>	--	<b>16.2</b>	<b>B</b>	--	--	<b>13.6</b>	<b>B</b>	--	--	<b>12.9</b>	<b>B</b>	--
<i>Weekday Evening:</i>												
River Road EB LT	0.31	42.3	D	1/2	0.39	41.9	D	1/2	0.55	40.1	D	2/3
River Road EB TH/RT	0.54	19.9	B	3/10	0.57	6.0	A	3/4	0.57	6.2	A	3/5
River Road WB LT	0.07	37.0	D	0/1	0.11	38.3	D	0/1	0.11	38.3	D	0/1
River Road WB TH/RT	0.70	24.6	C	8/9	0.70	19.1	B	10/15	0.74	21.3	C	11/15
Federal Street NB LT/TH	0.64	21.4	C	5/12	0.82	38.4	D	6/9	0.82	38.2	D	6/9
Federal Street NB RT	0.04	14.7	B	0/0	0.04	20.1	C	0/0	0.04	20.1	C	0/0
Old River Road SB LT/TH	0.31	16.7	B	2/3	0.51	24.0	C	2/4	0.42	23.2	C	2/3
Old River Road SB RT	0.25	0.3	A	0/0	0.25	0.3	A	0/0	0.22	0.3	A	0/0
<b>Overall</b>	--	<b>18.7</b>	<b>B</b>	--	--	<b>15.0</b>	<b>B</b>	--	--	<b>16.7</b>	<b>B</b>	--
<b><i>River Road at the I-93 Northbound Ramps</i></b>												
<i>Weekday Morning:</i>												
River Road EB LT	0.54	40.0	D	3/4	0.62	32.9	C	3/4	0.62	32.3	C	3/4
River Road EB TH	0.58	4.8	A	4/5	0.71	6.9	A	5/6	0.68	6.5	A	4/6
River Road WB TH	0.34	23.3	C	5/9	0.55	11.5	B	3/5	0.62	12.3	B	3/6
River Road WB RT	0.35	0.6	A	0/0	0.41	0.6	A	0/0	0.41	0.7	A	0/0
I-93 NB Ramps SB LT	0.74	31.1	C	6/7	0.69	25.8	C	5/7	0.69	25.8	C	5/7
I-93 NB Ramps SB RT	0.35	15.1	B	3/3	0.54	13.0	B	5/6	0.54	13.0	B	5/6
<b>Overall</b>	--	<b>14.7</b>	<b>B</b>	--	--	<b>12.1</b>	<b>B</b>	--	--	<b>12.1</b>	<b>B</b>	--
<i>Weekday Evening:</i>												
River Road EB LT	0.71	19.4	B	3/7	0.84	16.7	B	3/4	0.84	15.9	B	4/4
River Road EB TH	0.29	4.2	A	1/5	0.35	1.0	A	1/1	0.36	1.2	A	1/1
River Road WB TH	0.53	16.1	B	8/9	0.64	14.6	B	5/6	0.66	14.5	B	5/6
River Road WB RT	0.57	1.4	A	1/2	0.58	1.3	A	2/6	0.55	1.1	A	1/2
I-93 NB Ramps SB LT	0.42	33.2	C	2/3	0.50	34.5	C	2/3	0.62	36.0	D	3/5
I-93 NB Ramps SB RT	0.11	13.3	B	1/1	0.17	11.2	B	2/2	0.17	10.7	B	1/2
<b>Overall</b>	--	<b>10.9</b>	<b>B</b>	--	--	<b>9.6</b>	<b>A</b>	--	--	<b>9.9</b>	<b>A</b>	--

See notes at end of Table.

**Table 10R (Continued) – Revised PHFs, HV% and Future Condition PHF Set to 0.92**  
**SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak-Hour/Movement	2025 Existing				2032 No-Build				2032 Build			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b><i>River Road at the I-93 Southbound Ramps</i></b>												
<i>Weekday Morning:</i>												
River Road EB TH	0.44	13.1	B	3/3	0.68	18.0	B	5/7	0.69	19.0	B	5/7
River Road EB RT	0.09	0.1	A	0/0	0.13	0.1	A	0/0	0.13	0.1	A	0/0
River Road WB LT	0.51	36.4	D	3/4	0.67	31.4	C	2/4	0.80	35.6	D	3/6
River Road WB TH	0.35	11.5	B	4/7	0.76	15.0	B	8/12	0.76	14.8	B	9/13
I-93 SB Ramps NB LT	0.87	34.1	C	9/14	0.89	26.2	C	10/15	0.89	26.5	C	10/15
I-93 SB Ramps NB RT	0.61	1.6	A	0/0	0.69	2.2	A	0/0	0.67	2.0	A	0/0
<b>Overall</b>	--	<b>15.4</b>	<b>B</b>	--	--	<b>15.2</b>	<b>B</b>	--	--	<b>15.9</b>	<b>B</b>	--
<i>Weekday Evening:</i>												
River Road EB TH	0.45	14.1	B	5/9	0.85	21.4	C	9/18	0.87	22.5	C	9/19
River Road EB RT	0.25	0.3	A	0/0	0.46	0.6	A	0/0	0.46	0.6	A	0/0
River Road WB LT	0.68	49.9	D	5/6	0.68	37.7	D	5/8	0.67	38.9	D	6/8
River Road WB TH	0.14	1.0	A	0/1	0.23	1.2	A	1/1	0.23	1.2	A	1/1
I-93 SB Ramps NB LT	0.56	32.2	C	3/4	0.62	31.9	C	4/5	0.62	31.9	C	4/5
I-93 SB Ramps NB RT	0.35	0.5	A	0/0	0.35	0.5	A	0/0	0.36	0.6	A	0/0
<b>Overall</b>	--	<b>14.8</b>	<b>B</b>	--	--	<b>14.5</b>	<b>B</b>	--	--	<b>15.1</b>	<b>B</b>	--

See notes at end of Table.

**Table 10R (Continued) – Revised PHFs, HV% and Future Condition PHF Set to 0.92**  
**SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak-Hour/Movement	2025 Existing				2032 No-Build				2032 Build			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b><i>River Road at Shattuck Road and Minuteman Road</i></b>												
<i>Weekday Morning:</i>												
River Road EB LT	0.33	39.5	D	1/1	0.43	32.4	C	1/2	0.43	32.4	C	1/2
River Road EB TH/RT	0.42	17.2	B	5/6	0.42	17.3	B	4/6	0.41	17.2	B	4/5
Eiver Road WB LT	0.69	36.8	D	5/5	0.69	25.4	C	4/5	0.69	25.8	C	4/5
River Road WB TH	0.63	6.9	A	3/15	0.81	19.5	B	12/19	0.82	19.9	B	12/19
River Road WB RT	0.19	0.2	A	0/0	0.64	1.1	A	0/0	0.64	1.1	A	0/0
Shattuck Road NB LT/TH	0.20	34.5	C	1/2	0.18	30.1	C	1/2	0.18	30.1	C	1/2
Shattuck Road NB RT	0.12	17.9	B	1/2	0.11	15.7	B	1/1	0.11	15.6	B	1/2
Minuteman Road SB LT	0.30	34.8	C	1/2	0.70	39.9	D	3/6	0.71	40.2	D	3/6
Minuteman Road SB LT/TH	0.30	34.8	C	1/2	0.72	41.0	D	2/6	0.72	41.0	D	2/6
Minuteman Road SB RT	0.01	0.0	A	0/0	0.01	0.0	A	0/0	0.01	0.0	A	0/0
<b>Overall</b>	--	<b>16.9</b>	<b>B</b>	--	--	<b>15.9</b>	<b>B</b>	--	--	<b>16.0</b>	<b>B</b>	--
<i>Weekday Evening:</i>												
River Road EB LT	0.22	38.9	D	0/1	0.37	39.9	D	1/1	0.37	39.9	D	1/1
River Road EB TH/RT	0.57	27.7	C	5/8	0.65	31.6	C	5/8	0.66	31.6	C	6/8
Eiver Road WB LT	0.40	40.9	D	2/3	0.39	35.6	D	1/2	0.40	35.2	D	1/2
River Road WB TH	0.62	25.6	C	5/14	0.73	27.7	C	5/15	0.71	25.8	C	5/14
River Road WB RT	0.03	0.0	A	0/0	0.19	0.3	A	0/0	0.19	0.3	A	0/0
Shattuck Road NB LT/TH	0.18	21.0	C	2/2	0.23	30.3	C	1/3	0.23	30.4	C	1/3
Shattuck Road NB RT	0.66	18.6	B	5/7	0.68	27.3	C	6/8	0.69	27.6	C	6/8
Minuteman Road SB LT	0.49	32.7	C	2/3	0.87	38.4	D	9/17	0.87	38.8	D	10/17
Minuteman Road SB LT/TH	0.49	32.7	C	2/3	0.87	39.0	D	9/16	0.88	39.4	D	9/16
Minuteman Road SB RT	0.01	0.0	A	0/0	0.03	0.0	A	0/0	0.03	0.0	A	0/0
<b>Overall</b>	--	<b>24.4</b>	<b>C</b>	--	--	<b>29.3</b>	<b>C</b>	--	--	<b>29.3</b>	<b>C</b>	--

<sup>a</sup>Volume-to-capacity ratio.

<sup>b</sup>Control (signal) delay per vehicle in seconds.

<sup>c</sup>Level of service.

<sup>d</sup>Queue length in vehicles.

LT = left-turning movements; TH = through movements; RT = right-turning movements; NB = northbound; SB = southbound; EB = eastbound; WB = westbound.

**Table 11R – Revised PHFs, HV% and Future Condition PHF Set to 0.92  
UN SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Unsignalized Intersection/Peak-Hour/Movement	2025 Existing				2032 No-Build				2032 Build			
	Demand <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 95 <sup>th</sup>	Demand	Delay	LOS	Queue 95 <sup>th</sup>	Demand	Delay	LOS	Queue 95 <sup>th</sup>
<b>Old River Road at the South Project Site Driveway</b>												
<i>Weekday Morning:</i>												
Project Site Driveway EB LT/RT	--	--	--	--	--	--	--	--	103	10.3	B	1
Old River Road NB LT/TH	--	--	--	--	--	--	--	--	404	0.6	A	0
Old River Road SB TH/RT	--	--	--	--	--	--	--	--	223	0.0	A	0
<i>Weekday Evening:</i>												
Project Site Driveway EB LT/RT	--	--	--	--	--	--	--	--	51	11.4	B	1
Old River Road NB LT/TH	--	--	--	--	--	--	--	--	239	3.0	A	1
Old River Road SB TH/RT	--	--	--	--	--	--	--	--	406	0.0	A	0
<b>Old River Road at the North Project Site Driveway</b>												
<i>Weekday Morning:</i>												
Project Site Driveway EB LT/RT	--	--	--	--	--	--	--	--	34	9.5	A	0
Old River Road NB LT/TH	--	--	--	--	--	--	--	--	371	0.2	A	0
Old River Road SB TH/RT	--	--	--	--	--	--	--	--	189	0.0	A	0
<i>Weekday Evening:</i>												
Project Site Driveway EB LT/RT	--	--	--	--	--	--	--	--	17	10.9	B	0
Old River Road NB LT/TH	--	--	--	--	--	--	--	--	156	1.5	A	0
Old River Road SB TH/RT	--	--	--	--	--	--	--	--	389	0.0	A	0

<sup>a</sup>Demand in vehicles per hour.

<sup>b</sup>Average control delay per vehicle (in seconds).

<sup>c</sup>Level of service.

<sup>d</sup>Queue length in vehicles.

NB = northbound; NEB = northeastbound; SWB = southwestbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.

**Table 13R – Revised PHFs, HV% and Future Condition PHF Set to 0.92  
MITIGATED SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak-Hour/Movement	2032 No-Build				2032 Build				2032 Build Mitigated			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b><i>River Road at North Street and Greater Lawrence Tech Driveway</i></b>												
<i>Weekday Morning:</i>												
River Road EB LT	0.70	42.3	D	4/10	0.70	42.3	D	4/10	0.72	44.6	D	5/11
River Road EB TH	0.43	15.6	B	4/11	0.43	15.6	B	4/11	0.44	16.7	B	4/11
River Road EB RT	0.43	0.9	A	0/0	0.43	0.9	A	0/0	0.43	0.9	A	0/0
River Road WB LT	0.40	46.8	D	1/2	0.40	46.8	D	1/2	0.41	47.8	D	1/2
River Road WB TH/RT	0.90	38.7	D	11/25	0.87	36.3	D	11/24	0.89	39.4	D	11/24
North Street NB LT	0.93	64.8	E	7/18	0.91	59.2	E	6/17	0.85	49.4	D	6/17
North Street NB TH/RT	0.20	26.5	C	2/4	0.20	26.5	C	2/4	0.19	25.8	C	2/4
Greater Lawrence Tech SB LT	0.30	27.5	C	2/5	0.30	27.5	C	2/5	0.28	26.7	C	2/5
Greater Lawrence Tech SB TH/RT	0.12	25.8	C	1/3	0.12	25.8	C	1/3	0.11	25.1	C	1/3
<b>Overall</b>	--	<b>27.8</b>	<b>C</b>	--	--	<b>26.3</b>	<b>C</b>	--	--	<b>26.6</b>	<b>C</b>	--
<i>Weekday Evening:</i>												
River Road EB LT	0.42	35.6	D	1/3	0.42	38.0	D	1/3	0.43	35.9	D	1/3
River Road EB TH	0.48	14.9	B	3/11	0.45	15.7	B	3/11	0.47	14.9	B	3/11
River Road EB RT	0.24	0.4	A	0/0	0.23	0.3	A	0/0	0.24	0.4	A	0/0
River Road WB LT	0.30	33.6	C	1/2	0.34	36.5	D	1/2	0.31	33.9	C	1/2
River Road WB TH/RT	0.64	17.0	B	4/15	0.70	19.2	B	4/15	0.65	17.1	B	4/16
North Street NB LT	0.63	25.3	C	3/10	0.67	27.2	C	3/10	0.64	25.3	C	3/10
North Street NB TH/RT	0.07	18.4	B	0/2	0.07	18.6	B	0/2	0.07	18.2	B	0/2
Greater Lawrence Tech SB LT	0.05	18.3	B	0/1	0.04	18.5	B	0/1	0.05	18.1	B	0/1
Greater Lawrence Tech SB TH/RT	0.04	18.3	B	0/2	0.04	18.4	B	0/2	0.04	18.1	B	0/1
<b>Overall</b>	--	<b>15.1</b>	<b>B</b>	--	--	<b>16.8</b>	<b>B</b>	--	--	<b>15.2</b>	<b>B</b>	--

See notes at end of Table.

**Table 13R (Continued) – Revised PHFs, HV% and Future Condition PHF Set to 0.92**  
**MITIGATED SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak-Hour/Movement	2032 No-Build				2032 Build				2032 Build Mitigated			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b><i>River Road at Old River Road and Federal Street</i></b>												
<i>Weekday Morning:</i>												
River Road EB LT	0.73	32.3	C	4/5	0.64	30.0	C	3/4	0.74	34.2	C	0/6
River Road EB TH/RT	0.78	8.5	A	3/12	0.79	8.3	A	4/12	0.79	8.4	A	4/12
River Road WB LT	0.55	35.1	D	1/3	0.55	35.1	D	1/3	0.55	35.1	D	1/3
River Road WB TH/RT	0.71	12.4	B	9/12	0.68	11.8	B	8/11	0.66	10.7	B	7/10
Federal Street NB LT/TH	0.52	31.6	C	1/3	0.52	31.5	C	1/3	0.52	31.5	C	1/3
Federal Street NB RT	0.01	28.6	C	0/0	0.01	28.5	C	0/0	0.01	28.5	C	0/0
Old River Road SB LT/TH	0.72	46.2	D	2/4	0.82	60.6	E	2/5	0.82	60.6	E	2/5
Old River Road SB RT	0.08	0.1	A	0/0	0.14	0.2	A	0/0	0.14	0.2	A	0/0
<b>Overall</b>	--	<b>13.6</b>	<b>B</b>	--	--	<b>12.9</b>	<b>B</b>	--	--	<b>12.9</b>	<b>B</b>	--
<i>Weekday Evening:</i>												
River Road EB LT	0.39	41.9	D	1/2	0.55	40.1	D	2/3	0.55	41.7	D	2/3
River Road EB TH/RT	0.57	6.0	A	3/4	0.57	6.2	A	3/5	0.57	5.9	A	3/5
River Road WB LT	0.11	38.3	D	0/1	0.11	38.3	D	0/1	0.11	38.3	D	0/1
River Road WB TH/RT	0.70	19.1	B	10/15	0.74	21.3	C	11/15	0.71	21.3	C	11/15
Federal Street NB LT/TH	0.82	38.4	D	6/9	0.82	38.2	D	6/9	0.82	38.2	D	6/9
Federal Street NB RT	0.04	20.1	C	0/0	0.04	20.1	C	0/0	0.04	20.1	C	0/0
Old River Road SB LT/TH	0.51	24.0	C	2/4	0.42	23.2	C	2/3	0.42	23.2	C	2/3
Old River Road SB RT	0.25	0.3	A	0/0	0.22	0.3	A	0/0	0.22	0.3	A	0/0
<b>Overall</b>	--	<b>15.0</b>	<b>B</b>	--	--	<b>16.7</b>	<b>B</b>	--	--	<b>16.7</b>	<b>B</b>	--
<b><i>River Road at the I-93 Northbound Ramps</i></b>												
<i>Weekday Morning:</i>												
River Road EB LT	0.62	32.9	C	3/4	0.62	32.3	C	3/4	0.62	32.3	C	3/4
River Road EB TH	0.71	6.9	A	5/6	0.68	6.5	A	4/6	0.68	6.5	A	4/6
River Road WB TH	0.55	11.5	B	3/5	0.62	12.3	B	3/6	0.62	12.4	B	4/6
River Road WB RT	0.41	0.6	A	0/0	0.41	0.7	A	0/0	0.41	0.7	A	0/0
I-93 NB Ramps SB LT	0.69	25.8	C	5/7	0.69	25.8	C	5/7	0.69	25.8	C	5/7
I-93 NB Ramps SB RT	0.54	13.0	B	5/6	0.54	13.0	B	5/6	0.54	13.0	B	5/6
<b>Overall</b>	--	<b>12.1</b>	<b>B</b>	--	--	<b>12.1</b>	<b>B</b>	--	--	<b>12.1</b>	<b>B</b>	--
<i>Weekday Evening:</i>												
River Road EB LT	0.84	16.7	B	3/4	0.84	15.9	B	4/4	0.84	16.2	B	4/5
River Road EB TH	0.35	1.0	A	1/1	0.36	1.2	A	1/1	0.36	1.3	A	1/1
River Road WB TH	0.64	14.6	B	5/6	0.66	14.5	B	5/6	0.66	14.6	B	5/7
River Road WB RT	0.58	1.3	A	2/6	0.55	1.1	A	1/2	0.55	1.1	A	1/2
I-93 NB Ramps SB LT	0.50	34.5	C	2/3	0.62	36.0	D	3/5	0.62	36.0	D	3/5
I-93 NB Ramps SB RT	0.17	11.2	B	2/2	0.17	10.7	B	1/2	0.17	10.7	B	1/2
<b>Overall</b>	--	<b>9.6</b>	<b>A</b>	--	--	<b>9.9</b>	<b>A</b>	--	--	<b>10.0</b>	<b>A</b>	--

See notes at end of Table.

**Table 13R (Continued) – Revised PHFs, HV% and Future Condition PHF Set to 0.92**  
**MITIGATED SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak-Hour/Movement	2032 No-Build				2032 Build				2032 Build Mitigated			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b><i>River Road at the I-93 Southbound Ramps</i></b>												
<i>Weekday Morning:</i>												
River Road EB TH	0.68	18.0	B	5/7	0.69	19.0	B	5/7	0.69	18.9	B	5/7
River Road EB RT	0.13	0.1	A	0/0	0.13	0.1	A	0/0	0.13	0.1	A	0/0
River Road WB LT	0.67	31.4	C	2/4	0.80	35.6	D	3/6	0.77	32.6	C	3/6
River Road WB TH	0.76	15.0	B	8/12	0.76	14.8	B	9/13	0.76	14.5	B	9/13
I-93 SB Ramps NB LT	0.89	26.2	C	10/15	0.89	26.5	C	10/15	0.90	27.6	C	10/16
I-93 SB Ramps NB RT	0.69	2.2	A	0/0	0.67	2.0	A	0/0	0.67	2.0	A	0/0
<b>Overall</b>	--	<b>15.2</b>	<b>B</b>	--	--	<b>15.9</b>	<b>B</b>	--	--	<b>15.9</b>	<b>B</b>	--
<i>Weekday Evening:</i>												
River Road EB TH	0.85	21.4	C	9/18	0.87	22.5	C	9/19	0.85	21.4	C	9/19
River Road EB RT	0.46	0.6	A	0/0	0.46	0.6	A	0/0	0.46	0.6	A	0/0
River Road WB LT	0.68	37.7	D	5/8	0.67	38.9	D	6/8	0.70	41.2	D	6/8
River Road WB TH	0.23	1.2	A	1/1	0.23	1.2	A	1/1	0.23	1.3	A	1/1
I-93 SB Ramps NB LT	0.62	31.9	C	4/5	0.62	31.9	C	4/5	0.62	31.9	C	4/5
I-93 SB Ramps NB RT	0.35	0.5	A	0/0	0.36	0.6	A	0/0	0.36	0.6	A	0/0
<b>Overall</b>	--	<b>14.5</b>	<b>B</b>	--	--	<b>15.1</b>	<b>B</b>	--	--	<b>15.1</b>	<b>B</b>	--

See notes at end of Table.

**Table 13R (Continued) – Revised PHFs, HV% and Future Condition PHF Set to 0.92**  
**MITIGATED SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak-Hour/Movement	2032 No-Build				2032 Build				2032 Build Mitigated			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b><i>River Road at Shattuck Road and Minuteman Road</i></b>												
<i>Weekday Morning:</i>												
River Road EB LT	0.43	32.4	C	1/2	0.43	32.4	C	1/2	0.43	32.4	C	1/2
River Road EB TH/RT	0.42	17.3	B	4/6	0.41	17.2	B	4/5	0.41	17.2	B	4/5
Eiver Road WB LT	0.69	25.4	C	4/5	0.69	25.8	C	4/5	0.69	25.8	C	4/5
River Road WB TH	0.81	19.5	B	12/19	0.82	19.9	B	12/19	0.82	19.9	B	12/19
River Road WB RT	0.64	1.1	A	0/0	0.64	1.1	A	0/0	0.64	1.1	A	0/0
Shattuck Road NB LT/TH	0.18	30.1	C	1/2	0.18	30.1	C	1/2	0.18	30.1	C	1/2
Shattuck Road NB RT	0.11	15.7	B	1/1	0.11	15.6	B	1/2	0.11	15.6	B	1/2
Minuteman Road SB LT	0.70	39.9	D	3/6	0.71	40.2	D	3/6	0.71	40.2	D	3/6
Minuteman Road SB LT/TH	0.72	41.0	D	2/6	0.72	41.0	D	2/6	0.72	41.0	D	2/6
Minuteman Road SB RT	0.01	0.0	A	0/0	0.01	0.0	A	0/0	0.01	0.0	A	0/0
<b>Overall</b>	--	<b>15.9</b>	<b>B</b>	--	--	<b>16.0</b>	<b>B</b>	--	--	<b>16.0</b>	<b>B</b>	--
<i>Weekday Evening:</i>												
River Road EB LT	0.37	39.9	D	1/1	0.37	39.9	D	1/1	0.37	39.9	D	1/1
River Road EB TH/RT	0.65	31.6	C	5/8	0.66	31.6	C	6/8	0.66	31.6	C	6/8
Eiver Road WB LT	0.39	35.6	D	1/2	0.40	35.2	D	1/2	0.40	35.0	C	1/2
River Road WB TH	0.73	27.7	C	5/15	0.71	25.8	C	5/14	0.71	25.6	C	5/14
River Road WB RT	0.19	0.3	A	0/0	0.19	0.3	A	0/0	0.19	0.3	A	0/0
Shattuck Road NB LT/TH	0.23	30.3	C	1/3	0.23	30.4	C	1/3	0.23	30.4	C	1/3
Shattuck Road NB RT	0.68	27.3	C	6/8	0.69	27.6	C	6/8	0.69	27.6	C	6/8
Minuteman Road SB LT	0.87	38.4	D	9/17	0.87	38.8	D	10/17	0.87	38.8	D	10/17
Minuteman Road SB LT/TH	0.87	39.0	D	9/16	0.88	39.4	D	9/16	0.88	39.4	D	9/16
Minuteman Road SB RT	0.03	0.0	A	0/0	0.03	0.0	A	0/0	0.03	0.0	A	0/0
<b>Overall</b>	--	<b>29.3</b>	<b>C</b>	--	--	<b>29.3</b>	<b>C</b>	--	--	<b>29.2</b>	<b>C</b>	--

<sup>a</sup>Volume-to-capacity ratio.

<sup>b</sup>Control (signal) delay per vehicle in seconds.

<sup>c</sup>Level of service.

<sup>d</sup>Queue length in vehicles.

LT = left-turning movements; TH = through movements; RT = right-turning movements; NB = northbound; SB = southbound; EB = eastbound; WB = westbound.

**Table 10A – Without Existing Office Space Re-occupancy and Future Condition PHF Set to 0.92  
SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak-Hour/Movement	2025 Existing				2032 No-Build				2032 Build			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b><i>River Road at North Street and Greater Lawrence Tech Driveway</i></b>												
<i>Weekday Morning:</i>												
River Road EB LT	0.72	40.0	D	5/9	0.70	42.3	D	4/10	0.70	42.3	D	4/10
River Road EB TH	0.41	13.6	B	3/9	0.42	15.5	B	4/11	0.43	15.6	B	4/11
River Road EB RT	0.44	0.9	A	0/0	0.43	0.9	A	0/0	0.43	0.9	A	0/0
River Road WB LT	0.39	44.5	D	1/2	0.40	46.8	D	1/2	0.40	46.8	D	1/2
River Road WB TH/RT	0.69	27.0	C	8/15	0.87	35.9	D	11/24	0.87	36.3	D	11/24
North Street NB LT	0.93	68.4	E	5/15	0.90	57.5	E	6/17	0.91	59.2	E	6/17
North Street NB TH/RT	0.24	28.0	C	2/5	0.20	26.5	C	2/4	0.20	26.5	C	2/4
Greater Lawrence Tech SB LT	0.60	33.9	C	3/4	0.30	27.5	C	2/5	0.30	27.5	C	2/5
Greater Lawrence Tech SB TH/RT	0.26	28.1	C	2/3	0.12	25.8	C	1/3	0.12	25.8	C	1/3
<b>Overall</b>	--	<b>23.5</b>	<b>C</b>	--	--	<b>26.0</b>	<b>C</b>	--	--	<b>26.3</b>	<b>C</b>	--
<i>Weekday Evening:</i>												
River Road EB LT	0.29	32.1	C	1/2	0.42	35.4	D	1/3	0.42	38.0	D	1/3
River Road EB TH	0.36	14.3	B	2/7	0.47	14.7	B	3/11	0.45	15.7	B	3/11
River Road EB RT	0.17	0.2	A	0/0	0.24	0.4	A	0/0	0.23	0.3	A	0/0
River Road WB LT	0.27	32.6	C	1/2	0.30	33.5	C	1/2	0.34	36.5	D	1/2
River Road WB TH/RT	0.64	17.8	B	4/13	0.64	16.8	B	4/15	0.70	19.2	B	4/15
North Street NB LT	0.59	23.7	C	2/9	0.63	25.1	C	3/10	0.67	27.2	C	3/10
North Street NB TH/RT	0.07	18.1	B	0/2	0.07	18.4	B	0/2	0.07	18.6	B	0/2
Greater Lawrence Tech SB LT	0.05	17.9	B	0/1	0.05	18.2	B	0/1	0.04	18.5	B	0/1
Greater Lawrence Tech SB TH/RT	0.04	17.9	B	0/2	0.04	18.2	B	0/2	0.04	18.4	B	0/2
<b>Overall</b>	--	<b>15.6</b>	<b>B</b>	--	--	<b>15.0</b>	<b>B</b>	--	--	<b>16.8</b>	<b>B</b>	--

See notes at end of Table.

**Table 10A (Continued) – Without Existing Office Space Re-occupancy and Future Condition PHF Set to 0.92**  
**SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak-Hour/Movement	2025 Existing				2032 No-Build				2032 Build			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b><i>River Road at Old River Road and Federal Street</i></b>												
<i>Weekday Morning:</i>												
River Road EB LT	0.55	31.1	C	3/4	0.57	29.1	C	3/4	0.64	30.0	C	3/4
River Road EB TH/RT	0.79	15.2	B	10/17	0.78	8.1	A	3/12	0.79	8.3	A	4/12
River Road WB LT	0.30	32.3	C	1/3	0.55	35.1	D	1/3	0.55	35.1	D	1/3
River Road WB TH/RT	0.57	11.4	B	7/11	0.67	11.3	B	8/11	0.68	11.8	B	8/11
Federal Street NB LT/TH	0.54	35.8	D	2/3	0.52	32.1	C	1/3	0.52	31.5	C	1/3
Federal Street NB RT	0.01	31.5	C	0/0	0.01	28.7	C	0/0	0.01	28.5	C	0/0
Old River Road SB LT/TH	0.63	39.7	D	2/4	0.66	40.2	D	2/4	0.82	60.6	E	2/5
Old River Road SB RT	0.08	0.1	A	0/0	0.07	0.1	A	0/0	0.14	0.2	A	0/0
<b>Overall</b>	--	<b>16.2</b>	<b>B</b>	--	--	<b>12.1</b>	<b>B</b>	--	--	<b>12.9</b>	<b>B</b>	--
<i>Weekday Evening:</i>												
River Road EB LT	0.31	42.3	D	1/2	0.33	42.0	D	1/2	0.55	40.1	D	2/3
River Road EB TH/RT	0.54	19.9	B	3/10	0.57	5.8	A	3/4	0.57	6.2	A	3/5
River Road WB LT	0.07	37.0	D	0/1	0.11	38.3	D	0/1	0.11	38.3	D	0/1
River Road WB TH/RT	0.70	24.6	C	8/9	0.69	18.6	B	10/14	0.74	21.3	C	11/15
Federal Street NB LT/TH	0.64	21.4	C	5/12	0.81	37.3	D	6/9	0.82	38.2	D	6/9
Federal Street NB RT	0.04	14.7	B	0/0	0.04	20.3	C	0/0	0.04	20.1	C	0/0
Old River Road SB LT/TH	0.31	16.7	B	2/3	0.34	22.6	C	2/3	0.42	23.2	C	2/3
Old River Road SB RT	0.25	0.3	A	0/0	0.19	0.2	A	0/0	0.22	0.3	A	0/0
<b>Overall</b>	--	<b>18.7</b>	<b>B</b>	--	--	<b>14.9</b>	<b>B</b>	--	--	<b>16.7</b>	<b>B</b>	--
<b><i>River Road at the I-93 Northbound Ramps</i></b>												
<i>Weekday Morning:</i>												
River Road EB LT	0.54	40.0	D	3/4	0.61	32.5	C	3/4	0.62	32.3	C	3/4
River Road EB TH	0.58	4.8	A	4/5	0.68	6.5	A	4/6	0.68	6.5	A	4/6
River Road WB TH	0.34	23.3	C	5/9	0.55	11.5	B	3/4	0.62	12.3	B	3/6
River Road WB RT	0.35	0.6	A	0/0	0.40	0.6	A	0/0	0.41	0.7	A	0/0
I-93 NB Ramps SB LT	0.74	31.1	C	6/7	0.65	24.8	C	5/7	0.69	25.8	C	5/7
I-93 NB Ramps SB RT	0.35	15.1	B	3/3	0.53	12.7	B	5/6	0.54	13.0	B	5/6
<b>Overall</b>	--	<b>14.7</b>	<b>B</b>	--	--	<b>11.8</b>	<b>B</b>	--	--	<b>12.1</b>	<b>B</b>	--
<i>Weekday Evening:</i>												
River Road EB LT	0.71	19.4	B	3/7	0.84	17.6	B	4/5	0.84	15.9	B	4/4
River Road EB TH	0.29	4.2	A	1/5	0.34	1.1	A	1/1	0.36	1.2	A	1/1
River Road WB TH	0.53	16.1	B	8/9	0.61	13.9	B	4/5	0.66	14.5	B	5/6
River Road WB RT	0.57	1.4	A	1/2	0.54	1.1	A	1/2	0.55	1.1	A	1/2
I-93 NB Ramps SB LT	0.42	33.2	C	2/3	0.48	34.2	C	2/3	0.62	36.0	D	3/5
I-93 NB Ramps SB RT	0.11	13.3	B	1/1	0.17	11.1	B	2/2	0.17	10.7	B	1/2
<b>Overall</b>	--	<b>10.9</b>	<b>B</b>	--	--	<b>9.7</b>	<b>A</b>	--	--	<b>9.9</b>	<b>A</b>	--

See notes at end of Table.

**Table 10A (Continued) – Without Existing Office Space Re-occupancy and Future Condition PHF Set to 0.92**  
**SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak-Hour/Movement	2025 Existing				2032 No-Build				2032 Build			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b><i>River Road at the I-93 Southbound Ramps</i></b>												
<i>Weekday Morning:</i>												
River Road EB TH	0.44	13.1	B	3/3	0.65	17.6	B	5/7	0.69	19.0	B	5/7
River Road EB RT	0.09	0.1	A	0/0	0.13	0.1	A	0/0	0.13	0.1	A	0/0
River Road WB LT	0.51	36.4	D	3/4	0.67	31.5	C	2/4	0.80	35.6	D	3/6
River Road WB TH	0.35	11.5	B	4/7	0.75	14.4	B	8/12	0.76	14.8	B	9/13
I-93 SB Ramps NB LT	0.87	34.1	C	9/14	0.89	26.2	C	10/15	0.89	26.5	C	10/15
I-93 SB Ramps NB RT	0.61	1.6	A	0/0	0.67	2.0	A	0/0	0.67	2.0	A	0/0
<b>Overall</b>	--	<b>15.4</b>	<b>B</b>	--	--	<b>15.0</b>	<b>B</b>	--	--	<b>15.9</b>	<b>B</b>	--
<i>Weekday Evening:</i>												
River Road EB TH	0.45	14.1	B	5/9	0.82	19.6	B	9/18	0.87	22.5	C	9/19
River Road EB RT	0.25	0.3	A	0/0	0.46	0.6	A	0/0	0.46	0.6	A	0/0
River Road WB LT	0.68	49.9	D	5/6	0.68	38.5	D	5/8	0.67	38.9	D	6/8
River Road WB TH	0.14	1.0	A	0/1	0.22	1.2	A	1/1	0.23	1.2	A	1/1
I-93 SB Ramps NB LT	0.56	32.2	C	3/4	0.62	31.9	C	4/5	0.62	31.9	C	4/5
I-93 SB Ramps NB RT	0.35	0.5	A	0/0	0.35	0.5	A	0/0	0.36	0.6	A	0/0
<b>Overall</b>	--	<b>14.8</b>	<b>B</b>	--	--	<b>14.0</b>	<b>B</b>	--	--	<b>15.1</b>	<b>B</b>	--

See notes at end of Table.

**Table 10A (Continued) – Without Existing Office Space Re-occupancy and Future Condition PHF Set to 0.92**  
**SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak-Hour/Movement	2025 Existing				2032 No-Build				2032 Build			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b><i>River Road at Shattuck Road and Minuteman Road</i></b>												
<i>Weekday Morning:</i>												
River Road EB LT	0.33	39.5	D	1/1	0.43	32.4	C	1/2	0.43	32.4	C	1/2
River Road EB TH/RT	0.42	17.2	B	5/6	0.40	17.1	B	4/5	0.41	17.2	B	4/5
Eiver Road WB LT	0.69	36.8	D	5/5	0.69	25.5	C	4/5	0.69	25.8	C	4/5
River Road WB TH	0.63	6.9	A	3/15	0.80	19.3	B	11/9	0.82	19.9	B	12/19
River Road WB RT	0.19	0.2	A	0/0	0.64	1.1	A	0/0	0.64	1.1	A	0/0
Shattuck Road NB LT/TH	0.20	34.5	C	1/2	0.18	30.1	C	1/2	0.18	30.1	C	1/2
Shattuck Road NB RT	0.12	17.9	B	1/2	0.11	15.7	B	1/1	0.11	15.6	B	1/2
Minuteman Road SB LT	0.30	34.8	C	1/2	0.70	39.9	D	3/6	0.71	40.2	D	3/6
Minuteman Road SB LT/TH	0.30	34.8	C	1/2	0.72	41.0	D	2/6	0.72	41.0	D	2/6
Minuteman Road SB RT	0.01	0.0	A	0/0	0.01	0.0	A	0/0	0.01	0.0	A	0/0
<b>Overall</b>	--	<b>16.9</b>	<b>B</b>	--	--	<b>15.8</b>	<b>B</b>	--	--	<b>16.0</b>	<b>B</b>	--
<i>Weekday Evening:</i>												
River Road EB LT	0.22	38.9	D	0/1	0.37	39.9	D	1/1	0.37	39.9	D	1/1
River Road EB TH/RT	0.57	27.7	C	5/8	0.64	31.2	C	5/8	0.66	31.6	C	6/8
Eiver Road WB LT	0.40	40.9	D	2/3	0.39	36.0	D	1/2	0.40	35.2	D	1/2
River Road WB TH	0.62	25.6	C	5/14	0.69	26.0	C	5/13	0.71	25.8	C	5/14
River Road WB RT	0.03	0.0	A	0/0	0.19	0.3	A	0/0	0.19	0.3	A	0/0
Shattuck Road NB LT/TH	0.18	21.0	C	2/2	0.23	30.4	C	1/3	0.23	30.4	C	1/3
Shattuck Road NB RT	0.66	18.6	B	5/7	0.68	27.5	C	6/8	0.69	27.6	C	6/8
Minuteman Road SB LT	0.49	32.7	C	2/3	0.87	38.4	D	9/17	0.87	38.8	D	10/17
Minuteman Road SB LT/TH	0.49	32.7	C	2/3	0.87	39.0	D	9/16	0.88	39.4	D	9/16
Minuteman Road SB RT	0.01	0.0	A	0/0	0.03	0.0	A	0/0	0.03	0.0	A	0/0
<b>Overall</b>	--	<b>24.4</b>	<b>C</b>	--	--	<b>29.1</b>	<b>C</b>	--	--	<b>29.3</b>	<b>C</b>	--

<sup>a</sup>Volume-to-capacity ratio.

<sup>b</sup>Control (signal) delay per vehicle in seconds.

<sup>c</sup>Level of service.

<sup>d</sup>Queue length in vehicles.

LT = left-turning movements; TH = through movements; RT = right-turning movements; NB = northbound; SB = southbound; EB = eastbound; WB = westbound.

**Table 13A – Without Existing Office Space Re-occupancy and Future Condition PHF Set to 0.92  
MITIGATED SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak-Hour/Movement	2032 No-Build				2032 Build				2032 Build Mitigated			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b><i>River Road at North Street and Greater Lawrence Tech Driveway</i></b>												
<i>Weekday Morning:</i>												
River Road EB LT	0.70	42.3	D	4/10	0.70	42.3	D	4/10	0.72	44.6	D	5/11
River Road EB TH	0.42	15.5	B	4/11	0.43	15.6	B	4/11	0.44	16.7	B	4/11
River Road EB RT	0.43	0.9	A	0/0	0.43	0.9	A	0/0	0.43	0.9	A	0/0
River Road WB LT	0.40	46.8	D	1/2	0.40	46.8	D	1/2	0.41	47.8	D	1/2
River Road WB TH/RT	0.87	35.9	D	11/24	0.87	36.3	D	11/24	0.89	39.4	D	11/24
North Street NB LT	0.90	57.5	E	6/17	0.91	59.2	E	6/17	0.85	49.4	D	6/17
North Street NB TH/RT	0.20	26.5	C	2/4	0.20	26.5	C	2/4	0.19	25.8	C	2/4
Greater Lawrence Tech SB LT	0.30	27.5	C	2/5	0.30	27.5	C	2/5	0.28	26.7	C	2/5
Greater Lawrence Tech SB TH/RT	0.12	25.8	C	1/3	0.12	25.8	C	1/3	0.11	25.1	C	1/3
<b>Overall</b>	--	<b>26.0</b>	<b>C</b>	--	--	<b>26.3</b>	<b>C</b>	--	--	<b>26.6</b>	<b>C</b>	--
<i>Weekday Evening:</i>												
River Road EB LT	0.42	35.4	D	1/3	0.42	38.0	D	1/3	0.43	35.9	D	1/3
River Road EB TH	0.47	14.7	B	3/11	0.45	15.7	B	3/11	0.47	14.9	B	3/11
River Road EB RT	0.24	0.4	A	0/0	0.23	0.3	A	0/0	0.24	0.4	A	0/0
River Road WB LT	0.30	33.5	C	1/2	0.34	36.5	D	1/2	0.31	33.9	C	1/2
River Road WB TH/RT	0.64	16.8	B	4/15	0.70	19.2	B	4/15	0.65	17.1	B	4/16
North Street NB LT	0.63	25.1	C	3/10	0.67	27.2	C	3/10	0.64	25.3	C	3/10
North Street NB TH/RT	0.07	18.4	B	0/2	0.07	18.6	B	0/2	0.07	18.2	B	0/2
Greater Lawrence Tech SB LT	0.05	18.2	B	0/1	0.04	18.5	B	0/1	0.05	18.1	B	0/1
Greater Lawrence Tech SB TH/RT	0.04	18.2	B	0/2	0.04	18.4	B	0/2	0.04	18.1	B	0/1
<b>Overall</b>	--	<b>15.0</b>	<b>B</b>	--	--	<b>16.8</b>	<b>B</b>	--	--	<b>15.2</b>	<b>B</b>	--

See notes at end of Table.

**Table 13A (Continued) – Without Existing Office Space Re-occupancy and Future Condition PHF Set to 0.92**  
**MITIGATED SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak-Hour/Movement	2032 No-Build				2032 Build				2032 Build Mitigated			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b><i>River Road at Old River Road and Federal Street</i></b>												
<i>Weekday Morning:</i>												
River Road EB LT	0.57	29.1	C	3/4	0.64	30.0	C	3/4	0.74	34.2	C	0/6
River Road EB TH/RT	0.78	8.1	A	3/12	0.79	8.3	A	4/12	0.79	8.4	A	4/12
River Road WB LT	0.55	35.1	D	1/3	0.55	35.1	D	1/3	0.55	35.1	D	1/3
River Road WB TH/RT	0.67	11.3	B	8/11	0.68	11.8	B	8/11	0.66	10.7	B	7/10
Federal Street NB LT/TH	0.52	32.1	C	1/3	0.52	31.5	C	1/3	0.52	31.5	C	1/3
Federal Street NB RT	0.01	28.7	C	0/0	0.01	28.5	C	0/0	0.01	28.5	C	0/0
Old River Road SB LT/TH	0.66	40.2	D	2/4	0.82	60.6	E	2/5	0.82	60.6	E	2/5
Old River Road SB RT	0.07	0.1	A	0/0	0.14	0.2	A	0/0	0.14	0.2	A	0/0
<b>Overall</b>	--	<b>12.1</b>	<b>B</b>	--	--	<b>12.9</b>	<b>B</b>	--	--	<b>12.9</b>	<b>B</b>	--
<i>Weekday Evening:</i>												
River Road EB LT	0.33	42.0	D	1/2	0.55	40.1	D	2/3	0.55	41.7	D	2/3
River Road EB TH/RT	0.57	5.8	A	3/4	0.57	6.2	A	3/5	0.57	5.9	A	3/5
River Road WB LT	0.11	38.3	D	0/1	0.11	38.3	D	0/1	0.11	38.3	D	0/1
River Road WB TH/RT	0.69	18.6	B	10/14	0.74	21.3	C	11/15	0.71	21.3	C	11/15
Federal Street NB LT/TH	0.81	37.3	D	6/9	0.82	38.2	D	6/9	0.82	38.2	D	6/9
Federal Street NB RT	0.04	20.3	C	0/0	0.04	20.1	C	0/0	0.04	20.1	C	0/0
Old River Road SB LT/TH	0.34	22.6	C	2/3	0.42	23.2	C	2/3	0.42	23.2	C	2/3
Old River Road SB RT	0.19	0.2	A	0/0	0.22	0.3	A	0/0	0.22	0.3	A	0/0
<b>Overall</b>	--	<b>14.9</b>	<b>B</b>	--	--	<b>16.7</b>	<b>B</b>	--	--	<b>16.7</b>	<b>B</b>	--
<b><i>River Road at the I-93 Northbound Ramps</i></b>												
<i>Weekday Morning:</i>												
River Road EB LT	0.61	32.5	C	3/4	0.62	32.3	C	3/4	0.62	32.3	C	3/4
River Road EB TH	0.68	6.5	A	4/6	0.68	6.5	A	4/6	0.68	6.5	A	4/6
River Road WB TH	0.55	11.5	B	3/4	0.62	12.3	B	3/6	0.62	12.4	B	4/6
River Road WB RT	0.40	0.6	A	0/0	0.41	0.7	A	0/0	0.41	0.7	A	0/0
I-93 NB Ramps SB LT	0.65	24.8	C	5/7	0.69	25.8	C	5/7	0.69	25.8	C	5/7
I-93 NB Ramps SB RT	0.53	12.7	B	5/6	0.54	13.0	B	5/6	0.54	13.0	B	5/6
<b>Overall</b>	--	<b>11.8</b>	<b>B</b>	--	--	<b>12.1</b>	<b>B</b>	--	--	<b>12.1</b>	<b>B</b>	--
<i>Weekday Evening:</i>												
River Road EB LT	0.84	17.6	B	4/5	0.84	15.9	B	4/4	0.84	16.2	B	4/5
River Road EB TH	0.34	1.1	A	1/1	0.36	1.2	A	1/1	0.36	1.3	A	1/1
River Road WB TH	0.61	13.9	B	4/5	0.66	14.5	B	5/6	0.66	14.6	B	5/7
River Road WB RT	0.54	1.1	A	1/2	0.55	1.1	A	1/2	0.55	1.1	A	1/2
I-93 NB Ramps SB LT	0.48	34.2	C	2/3	0.62	36.0	D	3/5	0.62	36.0	D	3/5
I-93 NB Ramps SB RT	0.17	11.1	B	2/2	0.17	10.7	B	1/2	0.17	10.7	B	1/2
<b>Overall</b>	--	<b>9.7</b>	<b>A</b>	--	--	<b>9.9</b>	<b>A</b>	--	--	<b>10.0</b>	<b>A</b>	--

See notes at end of Table.

**Table 13A (Continued) – Without Existing Office Space Re-occupancy and Future Condition PHF Set to 0.92  
MITIGATED SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak-Hour/Movement	2032 No-Build				2032 Build				2032 Build Mitigated			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b><i>River Road at the I-93 Southbound Ramps</i></b>												
<i>Weekday Morning:</i>												
River Road EB TH	0.65	17.6	B	5/7	0.69	19.0	B	5/7	0.69	18.9	B	5/7
River Road EB RT	0.13	0.1	A	0/0	0.13	0.1	A	0/0	0.13	0.1	A	0/0
River Road WB LT	0.67	31.5	C	2/4	0.80	35.6	D	3/6	0.77	32.6	C	3/6
River Road WB TH	0.75	14.4	B	8/12	0.76	14.8	B	9/13	0.76	14.5	B	9/13
I-93 SB Ramps NB LT	0.89	26.2	C	10/15	0.89	26.5	C	10/15	0.90	27.6	C	10/16
I-93 SB Ramps NB RT	0.67	2.0	A	0/0	0.67	2.0	A	0/0	0.67	2.0	A	0/0
<b>Overall</b>	--	<b>15.0</b>	<b>B</b>	--	--	<b>15.9</b>	<b>B</b>	--	--	<b>15.9</b>	<b>B</b>	--
<i>Weekday Evening:</i>												
River Road EB TH	0.82	19.6	B	9/18	0.87	22.5	C	9/19	0.85	21.4	C	9/19
River Road EB RT	0.46	0.6	A	0/0	0.46	0.6	A	0/0	0.46	0.6	A	0/0
River Road WB LT	0.68	38.5	D	5/8	0.67	38.9	D	6/8	0.70	41.2	D	6/8
River Road WB TH	0.22	1.2	A	1/1	0.23	1.2	A	1/1	0.23	1.3	A	1/1
I-93 SB Ramps NB LT	0.62	31.9	C	4/5	0.62	31.9	C	4/5	0.62	31.9	C	4/5
I-93 SB Ramps NB RT	0.35	0.5	A	0/0	0.36	0.6	A	0/0	0.36	0.6	A	0/0
<b>Overall</b>	--	<b>14.0</b>	<b>B</b>	--	--	<b>15.1</b>	<b>B</b>	--	--	<b>15.1</b>	<b>B</b>	--

See notes at end of Table.

**Table 13A (Continued) – Without Existing Office Space Re-occupancy and Future Condition PHF Set to 0.92  
MITIGATED SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Signalized Intersection/Peak-Hour/Movement	2032 No-Build				2032 Build				2032 Build Mitigated			
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
<b><i>River Road at Shattuck Road and Minuteman Road</i></b>												
<i>Weekday Morning:</i>												
River Road EB LT	0.43	32.4	C	1/2	0.43	32.4	C	1/2	0.43	32.4	C	1/2
River Road EB TH/RT	0.40	17.1	B	4/5	0.41	17.2	B	4/5	0.41	17.2	B	4/5
Eiver Road WB LT	0.69	25.5	C	4/5	0.69	25.8	C	4/5	0.69	25.8	C	4/5
River Road WB TH	0.80	19.3	B	11/9	0.82	19.9	B	12/19	0.82	19.9	B	12/19
River Road WB RT	0.64	1.1	A	0/0	0.64	1.1	A	0/0	0.64	1.1	A	0/0
Shattuck Road NB LT/TH	0.18	30.1	C	1/2	0.18	30.1	C	1/2	0.18	30.1	C	1/2
Shattuck Road NB RT	0.11	15.7	B	1/1	0.11	15.6	B	1/2	0.11	15.6	B	1/2
Minuteman Road SB LT	0.70	39.9	D	3/6	0.71	40.2	D	3/6	0.71	40.2	D	3/6
Minuteman Road SB LT/TH	0.72	41.0	D	2/6	0.72	41.0	D	2/6	0.72	41.0	D	2/6
Minuteman Road SB RT	0.01	0.0	A	0/0	0.01	0.0	A	0/0	0.01	0.0	A	0/0
<b>Overall</b>	--	<b>15.8</b>	<b>B</b>	--	--	<b>16.0</b>	<b>B</b>	--	--	<b>16.0</b>	<b>B</b>	--
<i>Weekday Evening:</i>												
River Road EB LT	0.37	39.9	D	1/1	0.37	39.9	D	1/1	0.37	39.9	D	1/1
River Road EB TH/RT	0.64	31.2	C	5/8	0.66	31.6	C	6/8	0.66	31.6	C	6/8
Eiver Road WB LT	0.39	36.0	D	1/2	0.40	35.2	D	1/2	0.40	35.0	C	1/2
River Road WB TH	0.69	26.0	C	5/13	0.71	25.8	C	5/14	0.71	25.6	C	5/14
River Road WB RT	0.19	0.3	A	0/0	0.19	0.3	A	0/0	0.19	0.3	A	0/0
Shattuck Road NB LT/TH	0.23	30.4	C	1/3	0.23	30.4	C	1/3	0.23	30.4	C	1/3
Shattuck Road NB RT	0.68	27.5	C	6/8	0.69	27.6	C	6/8	0.69	27.6	C	6/8
Minuteman Road SB LT	0.87	38.4	D	9/17	0.87	38.8	D	10/17	0.87	38.8	D	10/17
Minuteman Road SB LT/TH	0.87	39.0	D	9/16	0.88	39.4	D	9/16	0.88	39.4	D	9/16
Minuteman Road SB RT	0.03	0.0	A	0/0	0.03	0.0	A	0/0	0.03	0.0	A	0/0
<b>Overall</b>	--	<b>29.1</b>	<b>C</b>	--	--	<b>29.3</b>	<b>C</b>	--	--	<b>29.2</b>	<b>C</b>	--

<sup>a</sup>Volume-to-capacity ratio.

<sup>b</sup>Control (signal) delay per vehicle in seconds.

<sup>c</sup>Level of service.

<sup>d</sup>Queue length in vehicles.

LT = left-turning movements; TH = through movements; RT = right-turning movements; NB = northbound; SB = southbound; EB = eastbound; WB = westbound.

Revised and Amended Capacity Analysis Synchro Worksheets

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1 – Revised PHFs, HV% and 0.92 Future PHFs)

2 – Revised PHFs, HV%, No Re-Occupancy and 0.92 Future PHFs)

1 – Revised PHFs, HV% and 0.92 Future PHFS)

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	204	644	606	28	817	113	295	79	16	92	48	13	
Future Volume (vph)	204	644	606	28	817	113	295	79	16	92	48	13	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850		0.982			0.975			0.968		
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1685	3355	1531	1678	3228	0	1694	1756	0	1728	1778	0	
Flt Permitted	0.950			0.950			0.714			0.687			
Satd. Flow (perm)	1685	3355	1531	1678	3228	0	1273	1756	0	1249	1778	0	
Satd. Flow (RTOR)			532		13			8			12		
Adj. Flow (vph)	222	700	659	30	888	123	321	86	17	100	52	14	
Lane Group Flow (vph)	222	700	659	30	1011	0	321	103	0	100	66	0	
Turn Type	Prot	NA	Free	Prot	NA		Perm	NA		Perm	NA		
Protected Phases	5	2		1	6			4			8		9
Permitted Phases			Free				4			8			
Detector Phase	5	2		1	6		4	4		8	8		
Switch Phase													
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	5.0		5.0	5.0		5.0
Minimum Split (s)	11.0	16.0		11.0	16.0		10.0	10.0		10.0	10.0		23.0
Total Split (s)	25.0	45.0		12.0	32.0		29.0	29.0		29.0	29.0		23.0
Total Split (%)	22.9%	41.3%		11.0%	29.4%		26.6%	26.6%		26.6%	26.6%		21%
Maximum Green (s)	19.0	39.0		6.0	26.0		24.0	24.0		24.0	24.0		20.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		2.0
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0		1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.0	-1.0		-1.0	-1.0		
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		
Lead/Lag	Lead	Lag		Lead	Lag								
Lead-Lag Optimize?	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
Recall Mode	None	Min		None	Min		None	None		None	None		None
Walk Time (s)													7.0
Flash Don't Walk (s)													13.0
Pedestrian Calls (#/hr)													4
v/c Ratio	0.65	0.40	0.43	0.19	0.95		0.87	0.20		0.28	0.13		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Control Delay (s/veh)	43.3	15.9	0.9	44.0	49.3		56.2	25.7		29.7	23.4		
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0		
Total Delay (s/veh)	43.3	15.9	0.9	44.0	49.3		56.2	25.7		29.7	23.4		
Queue Length 50th (ft)	105	90	0	15	275		159	37		40	20		
Queue Length 95th (ft)	#233	268	0	53	#618		#441	104		112	68		
Internal Link Dist (ft)		1435			1194			1039			1055		
Turn Bay Length (ft)	150		200	130						100			
Base Capacity (vph)	411	1760	1531	156	1060		369	515		363	525		
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0		
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0		
Storage Cap Reductn	0	0	0	0	0		0	0		0	0		
Reduced v/c Ratio	0.54	0.40	0.43	0.19	0.95		0.87	0.20		0.28	0.13		

Intersection Summary

Cycle Length: 109

Actuated Cycle Length: 87.2

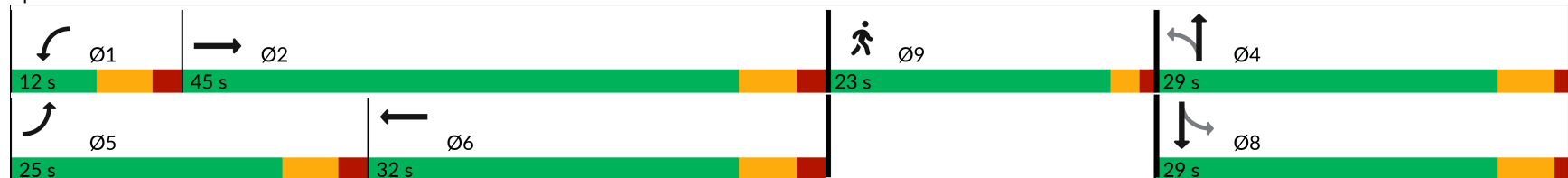
Natural Cycle: 100

Control Type: Actuated-Uncoordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: North Street/Greater Lawrence Tech & River Road





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	204	644	606	28	817	113	295	79	16	92	48	13
Future Volume (vph)	204	644	606	28	817	113	295	79	16	92	48	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	11	11	11	11	11	11	11	11	11
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1685	3355	1531	1678	3228		1694	1756		1728	1778	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.71	1.00		0.69	1.00	
Satd. Flow (perm)	1685	3355	1531	1678	3228		1273	1756		1249	1778	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	222	700	659	30	888	123	321	86	17	100	52	14
RTOR Reduction (vph)	0	0	0	0	9	0	0	6	0	0	9	0
Lane Group Flow (vph)	222	700	659	30	1002	0	321	97	0	100	57	0
Heavy Vehicles (%)	0%	4%	2%	4%	7%	0%	3%	1%	7%	1%	0%	0%
Turn Type	Prot	NA	Free	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4				8
Permitted Phases			Free				4			8		
Actuated Green, G (s)	15.6	43.7	93.4	2.2	30.3		24.3	24.3		24.3	24.3	
Effective Green, g (s)	17.6	45.7	93.4	4.2	32.3		25.3	25.3		25.3	25.3	
Actuated g/C Ratio	0.19	0.49	1.00	0.04	0.35		0.27	0.27		0.27	0.27	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	317	1641	1531	75	1116		344	475		338	481	
v/s Ratio Prot	c0.13	0.21		0.02	c0.31			0.06			0.03	
v/s Ratio Perm			c0.43				c0.25			0.08		
v/c Ratio	0.70	0.43	0.43	0.40	0.90		0.93	0.20		0.30	0.12	
Uniform Delay, d1	35.4	15.4	0.0	43.4	29.0		33.2	26.3		27.0	25.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.8	0.2	0.9	3.5	9.7		31.6	0.2		0.5	0.1	
Delay (s)	42.3	15.6	0.9	46.8	38.7		64.8	26.5		27.5	25.8	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service	D	B	A	D	D		E	C		C	C	
Approach Delay (s/veh)		13.2			38.9			55.5			26.8	
Approach LOS		B			D			E			C	

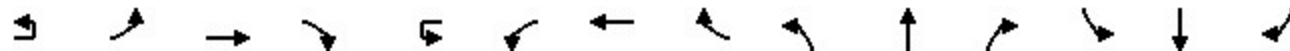
Intersection Summary

HCM 2000 Control Delay (s/veh)	27.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	93.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	70.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

\_3 - 2032 No-Build Weekday Morning  
 2: Federal Street/Old River Road & River Road

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Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (vph)	1	343	1406	266	7	49	1090	153	57	1	11	69	17	132
Future Volume (vph)	1	343	1406	266	7	49	1090	153	57	1	11	69	17	132
Lane Util. Factor	0.95	0.97	0.95	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.976				0.982				0.850			0.850
Flt Protected		0.950				0.950				0.953			0.961	
Satd. Flow (prot)	0	3502	3437	0	0	1685	3229	0	0	1835	1615	0	1797	1812
Flt Permitted		0.950				0.950				0.662			0.725	
Satd. Flow (perm)	0	3502	3437	0	0	1685	3229	0	0	1275	1615	0	1356	1812
Satd. Flow (RTOR)			58				37				187			265
Adj. Flow (vph)	1	373	1528	289	8	53	1185	166	62	1	12	75	18	143
Lane Group Flow (vph)	0	374	1817	0	0	61	1351	0	0	63	12	0	93	143
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA	Perm	Perm	NA	Free
Protected Phases	5	5	2		1	1	6			8			3	
Permitted Phases									8		8	3		Free
Detector Phase	5	5	2		1	1	6		8	8	8	3	3	
Switch Phase														
Minimum Initial (s)	6.0	6.0	6.0		6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	11.0	11.0		11.0	11.0	11.0		11.0	11.0	11.0	11.0	11.0	
Total Split (s)	14.0	14.0	47.0		11.0	11.0	44.0		12.0	12.0	12.0	12.0	12.0	
Total Split (%)	20.0%	20.0%	67.1%		15.7%	15.7%	62.9%		17.1%	17.1%	17.1%	17.1%	17.1%	
Maximum Green (s)	9.0	9.0	42.0		6.0	6.0	39.0		7.0	7.0	7.0	7.0	7.0	
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		-1.0	-1.0			-1.0	-1.0			-1.0	-1.0		-1.0	
Total Lost Time (s)		4.0	4.0			4.0	4.0			4.0	4.0		4.0	
Lead/Lag	Lead	Lead	Lead		Lag	Lag	Lag							
Lead-Lag Optimize?														
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	None	C-Min		None	None	C-Min		None	None	None	None	None	
v/c Ratio		0.73	0.73			0.36	0.69			0.44	0.03		0.61	0.08
Control Delay (s/veh)		36.5	8.6			36.0	12.4			39.1	0.2		48.5	0.1
Queue Delay		0.0	0.0			0.0	0.0			0.0	0.0		0.0	0.0
Total Delay (s/veh)		36.5	8.6			36.0	12.4			39.1	0.2		48.5	0.1

\_3 - 2032 No-Build Weekday Morning  
 2: Federal Street/Old River Road & River Road

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Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		84	77			25	207			26	0		39	0
Queue Length 95th (ft)		m#131	304			60	288			62	0		#100	0
Internal Link Dist (ft)			654				1435			1094			310	
Turn Bay Length (ft)		500				170					165			100
Base Capacity (vph)		515	2493			168	1975			148	353		157	1812
Starvation Cap Reductn		0	0			0	0			0	0		0	0
Spillback Cap Reductn		0	0			0	0			0	0		0	0
Storage Cap Reductn		0	0			0	0			0	0		0	0
Reduced v/c Ratio		0.73	0.73			0.36	0.68			0.43	0.03		0.59	0.08

Intersection Summary

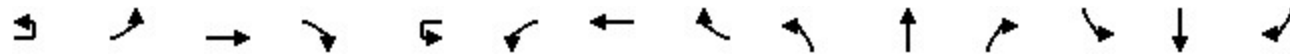
Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 60 (86%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Federal Street/Old River Road & River Road



\_3 - 2032 No-Build Weekday Morning  
 2: Federal Street/Old River Road & River Road

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Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		RT	LT			RT	LT			RT	LT		RT	LT
Traffic Volume (vph)	1	343	1406	266	7	49	1090	153	57	1	11	69	17	132
Future Volume (vph)	1	343	1406	266	7	49	1090	153	57	1	11	69	17	132
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10	11	11	13	13	12	12	12	16
Total Lost time (s)		4.0	4.0			4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.97	0.95			1.00	0.95			1.00	1.00		1.00	1.00
Frt		1.00	0.98			1.00	0.98			1.00	0.85		1.00	0.85
Flt Protected		0.95	1.00			0.95	1.00			0.95	1.00		0.96	1.00
Satd. Flow (prot)		3502	3437			1685	3227			1835	1615		1797	1812
Flt Permitted		0.95	1.00			0.95	1.00			0.66	1.00		0.72	1.00
Satd. Flow (perm)		3502	3437			1685	3227			1275	1615		1355	1812
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	373	1528	289	8	53	1185	166	62	1	12	75	18	143
RTOR Reduction (vph)	0	0	19	0	0	0	15	0	0	0	11	0	0	0
Lane Group Flow (vph)	0	374	1798	0	0	61	1336	0	0	63	1	0	93	143
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	7%	0%	2%	0%	0%	2%	0%	1%
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA	Perm	Perm	NA	Free
Protected Phases	5	5	2		1	1	6			8			3	
Permitted Phases									8		8	3		Free
Actuated Green, G (s)		9.2	45.7			3.6	40.1			5.7	5.7		5.7	70.0
Effective Green, g (s)		10.2	46.7			4.6	41.1			6.7	6.7		6.7	70.0
Actuated g/C Ratio		0.15	0.67			0.07	0.59			0.10	0.10		0.10	1.00
Clearance Time (s)		5.0	5.0			5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		2.0	2.0			2.0	2.0			2.0	2.0		2.0	
Lane Grp Cap (vph)		510	2292			110	1894			122	154		129	1812
v/s Ratio Prot		0.11	c0.52			0.04	c0.41							
v/s Ratio Perm										0.05	0.00		c0.07	0.08
v/c Ratio		0.73	0.78			0.55	0.71			0.52	0.01		0.72	0.08
Uniform Delay, d1		28.6	8.1			31.7	10.2			30.1	28.6		30.7	0.0
Progression Factor		1.01	0.80			1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		3.4	2.0			3.4	2.2			1.5	0.0		15.4	0.1
Delay (s)		32.3	8.5			35.1	12.4			31.6	28.6		46.2	0.1



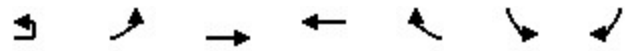
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service		C	A			D	B			C	C		D	A
Approach Delay (s/veh)			12.6				13.4			31.2			18.2	
Approach LOS			B			B				C			B	

Intersection Summary	
HCM 2000 Control Delay (s/veh)	13.6 HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio	0.81
Actuated Cycle Length (s)	70.0 Sum of lost time (s) 13.0
Intersection Capacity Utilization	75.7% ICU Level of Service D
Analysis Period (min)	15

c Critical Lane Group

\_3 - 2032 No-Build Weekday Morning  
 3: River Road & I-93 Northbound Ramps

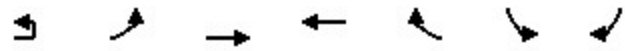
02/24/2026



Lane Group	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑	↑↑	↔	↔↔	↔↔
Traffic Volume (vph)	7	313	1471	700	578	543	661
Future Volume (vph)	7	313	1471	700	578	543	661
Lane Util. Factor	0.95	0.97	0.95	0.95	1.00	0.97	0.88
Frt					0.850		0.850
Flt Protected		0.950				0.950	
Satd. Flow (prot)	0	3258	3539	3406	1538	3400	2787
Flt Permitted		0.950				0.950	
Satd. Flow (perm)	0	3258	3539	3406	1538	3400	2787
Satd. Flow (RTOR)					628		
Adj. Flow (vph)	8	340	1599	761	628	590	718
Lane Group Flow (vph)	0	348	1599	761	628	590	718
Turn Type	Prot	Prot	NA	NA	Free	Prot	pt+ov
Protected Phases	5!	5	2	6		3	3 5!
Permitted Phases					Free		
Detector Phase	5	5	2	6		3	3 5
Switch Phase							
Minimum Initial (s)	6.0	6.0	6.0	6.0		6.0	
Minimum Split (s)	11.0	11.0	11.0	11.0		11.0	
Total Split (s)	17.0	17.0	47.0	30.0		23.0	
Total Split (%)	24.3%	24.3%	67.1%	42.9%		32.9%	
Maximum Green (s)	12.0	12.0	42.0	25.0		18.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0		1.0	
Lost Time Adjust (s)		-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)		4.0	4.0	4.0		4.0	
Lead/Lag	Lead	Lead		Lag			
Lead-Lag Optimize?							
Vehicle Extension (s)	2.0	2.0	2.0	2.0		2.0	
Recall Mode	None	None	C-Min	C-Min		Min	
v/c Ratio		0.62	0.71	0.55	0.41	0.70	0.54
Control Delay (s/veh)		35.5	7.4	12.1	0.6	28.5	14.2
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)		35.5	7.4	12.1	0.6	28.5	14.2

\_3 - 2032 No-Build Weekday Morning  
 3: River Road & I-93 Northbound Ramps

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Lane Group	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		76	111	74	0	119	108
Queue Length 95th (ft)		m101	143	108	0	169	156
Internal Link Dist (ft)			1040	654		885	
Turn Bay Length (ft)		650					650
Base Capacity (vph)		610	2251	1389	1538	922	1332
Starvation Cap Reductn		0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0
Reduced v/c Ratio		0.57	0.71	0.55	0.41	0.64	0.54

Intersection Summary

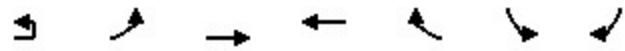
Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 40  
 Control Type: Actuated-Coordinated  
 m Volume for 95th percentile queue is metered by upstream signal.  
 ! Phase conflict between lane groups.

Splits and Phases: 3: River Road & I-93 Northbound Ramps

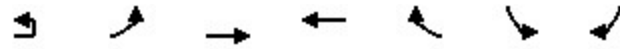


\_3 - 2032 No-Build Weekday Morning  
 3: River Road & I-93 Northbound Ramps

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Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑	↑↑	↔	↔↔	↔↔
Traffic Volume (vph)	7	313	1471	700	578	543	661
Future Volume (vph)	7	313	1471	700	578	543	661
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	12
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		0.97	0.95	0.95	1.00	0.97	0.88
Frt		1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected		0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		3258	3539	3406	1538	3400	2787
Flt Permitted		0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		3258	3539	3406	1538	3400	2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	340	1599	761	628	590	718
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	348	1599	761	628	590	718
Heavy Vehicles (%)	0%	4%	2%	6%	5%	3%	2%
Turn Type	Prot	Prot	NA	NA	Free	Prot	pt+ov
Protected Phases	5!	5	2	6		3	3 5!
Permitted Phases					Free		
Actuated Green, G (s)		11.0	43.5	27.5	70.0	16.5	32.5
Effective Green, g (s)		12.0	44.5	28.5	70.0	17.5	33.5
Actuated g/C Ratio		0.17	0.64	0.41	1.00	0.25	0.48
Clearance Time (s)		5.0	5.0	5.0		5.0	
Vehicle Extension (s)		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)		558	2249	1386	1538	850	1333
v/s Ratio Prot		0.11	c0.45	0.22		c0.17	0.26
v/s Ratio Perm					0.41		
v/c Ratio		0.62	0.71	0.55	0.41	0.69	0.54
Uniform Delay, d1		26.9	8.5	15.8	0.0	23.8	12.8
Progression Factor		1.18	0.65	0.65	1.00	1.00	1.00
Incremental Delay, d2		1.1	1.4	1.2	0.6	2.0	0.2
Delay (s)		32.9	6.9	11.5	0.6	25.8	13.0



Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Level of Service		C	A	B	A	C	B
Approach Delay (s/veh)			11.6	6.6		18.8	
Approach LOS			B	A		B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group

\_3 - 2032 No-Build Weekday Morning  
 4: I-93 Southbound Ramps & River Road

02/24/2026

	→	↘	↙	↗	←	↖	↗
Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗		↘↗	↑↑	↘↗	↗
Traffic Volume (vph)	631	208	2	226	1146	1169	1158
Future Volume (vph)	631	208	2	226	1146	1169	1158
Lane Util. Factor	0.95	1.00	0.95	0.97	0.95	0.97	1.00
Frt		0.850					0.850
Flt Protected				0.950		0.950	
Satd. Flow (prot)	3438	1711	0	3136	3505	3433	1812
Flt Permitted				0.950		0.950	
Satd. Flow (perm)	3438	1711	0	3136	3505	3433	1812
Satd. Flow (RTOR)		226					726
Adj. Flow (vph)	686	226	2	246	1246	1271	1259
Lane Group Flow (vph)	686	226	0	248	1246	1271	1259
Turn Type	NA	Free	Prot	Prot	NA	Prot	Free
Protected Phases	2		1	1	6	8	
Permitted Phases		Free					Free
Detector Phase	2		1	1	6	8	
Switch Phase							
Minimum Initial (s)	6.0		6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0		11.0	11.0	11.0	27.0	
Total Split (s)	24.0		12.0	12.0	36.0	34.0	
Total Split (%)	34.3%		17.1%	17.1%	51.4%	48.6%	
Maximum Green (s)	19.0		7.0	7.0	31.0	29.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-1.0			-1.0	-1.0	-1.0	
Total Lost Time (s)	4.0			4.0	4.0	4.0	
Lead/Lag	Lag		Lead	Lead			
Lead-Lag Optimize?							
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	
Recall Mode	C-Min		None	None	C-Min	Min	
Walk Time (s)						6.0	
Flash Don't Walk (s)						16.0	
Pedestrian Calls (#/hr)						0	
v/c Ratio	0.68	0.13		0.67	0.76	0.89	0.69

\_3 - 2032 No-Build Weekday Morning  
 4: I-93 Southbound Ramps & River Road

02/24/2026

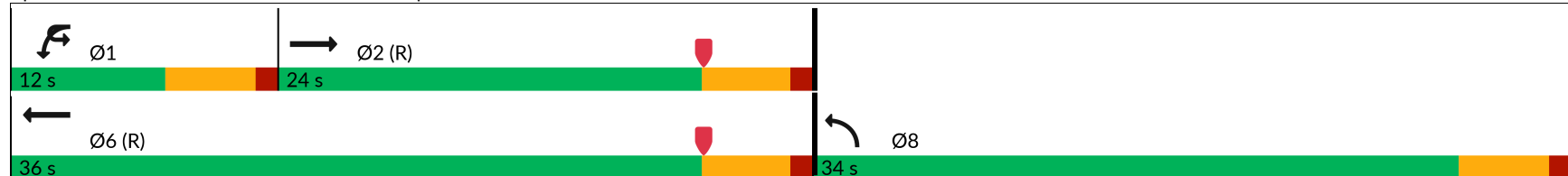


Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Control Delay (s/veh)	18.4	0.1		37.4	15.5	28.5	2.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay (s/veh)	18.4	0.1		37.4	15.5	28.5	2.2
Queue Length 50th (ft)	120	0		56	204	247	0
Queue Length 95th (ft)	166	m0		#105	306	#378	0
Internal Link Dist (ft)	1168				1040	800	
Turn Bay Length (ft)		430		250			480
Base Capacity (vph)	1026	1711		373	1651	1473	1812
Starvation Cap Reductn	0	0		0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0
Reduced v/c Ratio	0.67	0.13		0.66	0.75	0.86	0.69

Intersection Summary

Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 34 (49%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-93 Southbound Ramps & River Road



\_3 - 2032 No-Build Weekday Morning  
4: I-93 Southbound Ramps & River Road

02/24/2026

	→	↘	↙	↗	←	↖	↗
Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗		↘↗	↑↑	↘↗	↗
Traffic Volume (vph)	631	208	2	226	1146	1169	1158
Future Volume (vph)	631	208	2	226	1146	1169	1158
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	11	11	12	12	16
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00		0.97	0.95	0.97	1.00
Frt	1.00	0.85		1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3438	1711		3136	3505	3433	1812
Flt Permitted	1.00	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3438	1711		3136	3505	3433	1812
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	686	226	2	246	1246	1271	1259
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	686	226	0	248	1246	1271	1259
Heavy Vehicles (%)	5%	7%	0%	8%	3%	2%	1%
Turn Type	NA	Free	Prot	Prot	NA	Prot	Free
Protected Phases	2		1	1	6	8	
Permitted Phases		Free					Free
Actuated Green, G (s)	19.6	70.0		7.3	31.9	28.1	70.0
Effective Green, g (s)	20.6	70.0		8.3	32.9	29.1	70.0
Actuated g/C Ratio	0.29	1.00		0.12	0.47	0.42	1.00
Clearance Time (s)	5.0			5.0	5.0	5.0	
Vehicle Extension (s)	2.0			2.0	2.0	2.0	
Lane Grp Cap (vph)	1011	1711		371	1647	1427	1812
v/s Ratio Prot	0.20			0.08	c0.36	c0.37	
v/s Ratio Perm		0.13					c0.69
v/c Ratio	0.68	0.13		0.67	0.76	0.89	0.69
Uniform Delay, d1	21.8	0.0		29.5	15.3	19.0	0.0
Progression Factor	0.67	1.00		0.96	0.80	1.00	1.00
Incremental Delay, d2	3.4	0.1		3.0	2.8	7.2	2.2
Delay (s)	18.0	0.1		31.4	15.0	26.2	2.2



Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Level of Service	B	A		C	B	C	A
Approach Delay (s/veh)	13.6				17.7	14.3	
Approach LOS	B				B	B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	71.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

\_3 - 2032 No-Build Weekday Morning  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	440	75	436	708	941	20	3	93	227	2	16
Future Volume (vph)	47	440	75	436	708	941	20	3	93	227	2	16
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	0.88	0.95	0.95	1.00
Frt		0.978				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.958		0.950	0.953	
Satd. Flow (prot)	1805	3471	0	3351	1863	1599	0	1699	2668	1573	1580	1615
Flt Permitted	0.950			0.950				0.958		0.950	0.953	
Satd. Flow (perm)	1805	3471	0	3351	1863	1599	0	1699	2668	1573	1580	1615
Satd. Flow (RTOR)		30				752						343
Adj. Flow (vph)	51	478	82	474	770	1023	22	3	101	247	2	17
Lane Group Flow (vph)	51	560	0	474	770	1023	0	25	101	123	126	17
Turn Type	Prot	NA		Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	5	2		1	6		8	8	8 1	3	3	
Permitted Phases						Free						Free
Detector Phase	5	2		1	6		8	8	8 1	3	3	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Total Split (s)	11.0	28.0		20.0	37.0		11.0	11.0		11.0	11.0	
Total Split (%)	15.7%	40.0%		28.6%	52.9%		15.7%	15.7%		15.7%	15.7%	
Maximum Green (s)	6.0	23.0		15.0	32.0		6.0	6.0		6.0	6.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0			-1.0		-1.0	-1.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	
v/c Ratio	0.28	0.41		0.69	0.75	0.64		0.15	0.11	0.71	0.72	0.01
Control Delay (s/veh)	33.6	17.0		27.1	19.7	1.1		31.1	14.7	55.4	56.5	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 (s/veh)	33.6	17.0		27.1	19.7	1.1		31.1	14.7	55.4	56.5	0.0

\_3 - 2032 No-Build Weekday Morning  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	21	91		88	284	0		10	15	60	56	0
Queue Length 95th (ft)	52	136		m120	m#464	m0		32	31	#155	#147	0
Internal Link Dist (ft)		1189			1168			1114			744	
Turn Bay Length (ft)	80			350					200			150
Base Capacity (vph)	180	1368		765	1033	1599		169	945	174	175	1615
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	0.28	0.41		0.62	0.75	0.64		0.15	0.11	0.71	0.72	0.01

Intersection Summary

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 2 (3%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 65

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Shattuck Road/Minuteman Road & River Road



\_3 - 2032 No-Build Weekday Morning  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	440	75	436	708	941	20	3	93	227	2	16
Future Volume (vph)	47	440	75	436	708	941	20	3	93	227	2	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	12	12	10	10	11	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1805	3471		3351	1863	1599		1699	2668	1573	1580	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (perm)	1805	3471		3351	1863	1599		1699	2668	1573	1580	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	478	82	474	770	1023	22	3	101	247	2	17
RTOR Reduction (vph)	0	19	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	51	541	0	474	770	1023	0	25	101	123	126	17
Heavy Vehicles (%)	0%	2%	0%	1%	2%	1%	0%	0%	3%	9%	0%	0%
Turn Type	Prot	NA		Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	5	2		1	6		8	8	8 1	3	3	
Permitted Phases						Free						Free
Actuated Green, G (s)	3.6	25.1		13.3	34.8	70.0		4.8	23.1	6.8	6.8	70.0
Effective Green, g (s)	4.6	26.1		14.3	35.8	70.0		5.8	24.1	7.8	7.8	70.0
Actuated g/C Ratio	0.07	0.37		0.20	0.51	1.00		0.08	0.34	0.11	0.11	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	118	1294		684	952	1599		140	918	175	176	1615
v/s Ratio Prot	0.03	0.16		0.14	c0.41			0.01	0.04	0.08	0.08	
v/s Ratio Perm						c0.64						0.01
v/c Ratio	0.43	0.42		0.69	0.81	0.64		0.18	0.11	0.70	0.72	0.01
Uniform Delay, d1	31.4	16.3		25.8	14.2	0.0		29.9	15.6	30.0	30.0	0.0
Progression Factor	1.00	1.00		0.93	1.07	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	1.0		1.4	4.3	1.1		0.2	0.0	10.0	10.9	0.0
Delay (s)	32.4	17.3		25.4	19.5	1.1		30.1	15.7	39.9	41.0	0.0

\_3 - 2032 No-Build Weekday Morning  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service	C	B		C	B	A		C	B	D	D	A
Approach Delay (s/veh)		18.6			12.4			18.5			37.9	
Approach LOS		B			B			B			D	

Intersection Summary		
HCM 2000 Control Delay (s/veh)	15.9	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.92	
Actuated Cycle Length (s)	70.0	Sum of lost time (s)
Intersection Capacity Utilization	65.3%	ICU Level of Service
Analysis Period (min)	15	

c Critical Lane Group

\_4 - 2032 No-Build Weekday Evening

1: North Street/Greater Lawrence Tech & River Road

02/24/2026



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	29	623	345	24	835	12	215	21	27	16	14	14	
Future Volume (vph)	29	623	345	24	835	12	215	21	27	16	14	14	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850		0.998			0.916			0.925		
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1532	3355	1546	1745	3415	0	1711	1611	0	1745	1699	0	
Flt Permitted	0.950			0.950			0.738			0.723			
Satd. Flow (perm)	1532	3355	1546	1745	3415	0	1329	1611	0	1328	1699	0	
Satd. Flow (RTOR)			313		1			29			15		
Adj. Flow (vph)	32	677	375	26	908	13	234	23	29	17	15	15	
Lane Group Flow (vph)	32	677	375	26	921	0	234	52	0	17	30	0	
Turn Type	Prot	NA	Free	Prot	NA		Perm	NA		Perm	NA		
Protected Phases	5	2		1	6			4			8		9
Permitted Phases			Free				4			8			
Detector Phase	5	2		1	6		4	4		8	8		
Switch Phase													
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	5.0		5.0	5.0		5.0
Minimum Split (s)	11.0	16.0		11.0	16.0		10.0	10.0		10.0	10.0		23.0
Total Split (s)	11.0	43.0		11.0	43.0		32.0	32.0		32.0	32.0		23.0
Total Split (%)	10.1%	39.4%		10.1%	39.4%		29.4%	29.4%		29.4%	29.4%		21%
Maximum Green (s)	5.0	37.0		5.0	37.0		27.0	27.0		27.0	27.0		20.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		2.0
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0		1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.0	-1.0		-1.0	-1.0		
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		
Lead/Lag	Lead	Lag		Lead	Lag								
Lead-Lag Optimize?	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
Recall Mode	None	Min		None	Min		None	None		None	None		None
Walk Time (s)													7.0
Flash Don't Walk (s)													13.0
Pedestrian Calls (#/hr)													4
v/c Ratio	0.17	0.44	0.24	0.12	0.59		0.58	0.10		0.04	0.06		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Control Delay (s/veh)	39.3	16.3	0.4	39.0	18.2		30.2	14.5		23.6	16.6		
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0		
Total Delay (s/veh)	39.3	16.3	0.4	39.0	18.2		30.2	14.5		23.6	16.6		
Queue Length 50th (ft)	10	68	0	8	100		61	5		4	3		
Queue Length 95th (ft)	58	266	0	46	378		243	45		27	32		
Internal Link Dist (ft)		1435			1194			1039			1055		
Turn Bay Length (ft)	150		200	130						100			
Base Capacity (vph)	192	2348	1546	219	2390		668	824		667	861		
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0		
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0		
Storage Cap Reductn	0	0	0	0	0		0	0		0	0		
Reduced v/c Ratio	0.17	0.29	0.24	0.12	0.39		0.35	0.06		0.03	0.03		

Intersection Summary

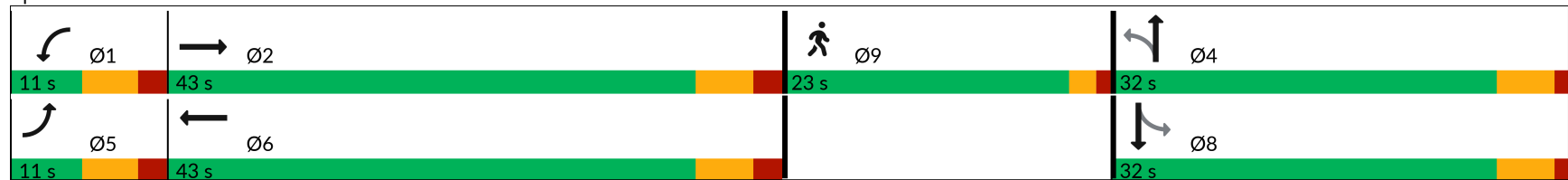
Cycle Length: 109

Actuated Cycle Length: 64.1

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Splits and Phases: 1: North Street/Greater Lawrence Tech & River Road



\_4 - 2032 No-Build Weekday Evening

1: North Street/Greater Lawrence Tech & River Road

02/24/2026



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	623	345	24	835	12	215	21	27	16	14	14
Future Volume (vph)	29	623	345	24	835	12	215	21	27	16	14	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	11	11	11	11	11	11	11	11	11
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.92		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1532	3355	1546	1745	3415		1711	1611		1745	1699	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.74	1.00		0.72	1.00	
Satd. Flow (perm)	1532	3355	1546	1745	3415		1328	1611		1328	1699	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	677	375	26	908	13	234	23	29	17	15	15
RTOR Reduction (vph)	0	0	0	0	1	0	0	21	0	0	11	0
Lane Group Flow (vph)	32	677	375	26	920	0	234	31	0	17	19	0
Heavy Vehicles (%)	10%	4%	1%	0%	2%	0%	2%	5%	4%	0%	0%	0%
Turn Type	Prot	NA	Free	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4				8
Permitted Phases			Free				4			8		
Actuated Green, G (s)	1.5	27.1	69.4	1.5	27.1		18.4	18.4		18.4	18.4	
Effective Green, g (s)	3.5	29.1	69.4	3.5	29.1		19.4	19.4		19.4	19.4	
Actuated g/C Ratio	0.05	0.42	1.00	0.05	0.42		0.28	0.28		0.28	0.28	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	77	1406	1546	88	1431		371	450		371	474	
v/s Ratio Prot	0.02	0.20		0.01	c0.27			0.02			0.01	
v/s Ratio Perm			c0.24				c0.18			0.01		
v/c Ratio	0.42	0.48	0.24	0.30	0.64		0.63	0.07		0.05	0.04	
Uniform Delay, d1	32.0	14.7	0.0	31.8	16.0		21.9	18.4		18.2	18.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.6	0.3	0.4	1.9	1.0		3.5	0.1		0.1	0.0	
Delay (s)	35.6	14.9	0.4	33.6	17.0		25.3	18.4		18.3	18.3	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service	D	B	A	C	B		C	B		B	B	
Approach Delay (s/veh)		10.5			17.5			24.1			18.3	
Approach LOS		B			B			C			B	

Intersection Summary		
HCM 2000 Control Delay (s/veh)	15.1	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.63	B
Actuated Cycle Length (s)	69.4	Sum of lost time (s)
Intersection Capacity Utilization	49.3%	15.0
Analysis Period (min)	15	ICU Level of Service
		A

c Critical Lane Group

\_4 - 2032 No-Build Weekday Evening  
 2: Federal Street/Old River Road & River Road

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Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕		↔	↕			↕	↕		↕	↕
Traffic Volume (vph)	3	91	915	46	5	999	56	280	5	58	101	1	415
Future Volume (vph)	3	91	915	46	5	999	56	280	5	58	101	1	415
Lane Util. Factor	0.95	0.97	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.993			0.992				0.850			0.850
Flt Protected		0.950			0.950				0.953			0.953	
Satd. Flow (prot)	0	3403	3453	0	1685	3397	0	0	1871	1615	0	1758	1830
Flt Permitted		0.950			0.950				0.650			0.401	
Satd. Flow (perm)	0	3403	3453	0	1685	3397	0	0	1276	1615	0	740	1830
Satd. Flow (RTOR)			8			8				164			288
Adj. Flow (vph)	3	99	995	50	5	1086	61	304	5	63	110	1	451
Lane Group Flow (vph)	0	102	1045	0	5	1147	0	0	309	63	0	111	451
Turn Type	Prot	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Free
Protected Phases	5	5	2		1	6			8			3	
Permitted Phases								8		8	3		Free
Detector Phase	5	5	2		1	6		8	8	8	3	3	
Switch Phase													
Minimum Initial (s)	6.0	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	11.0	11.0		11.0	11.0		11.0	11.0	11.0	11.0	11.0	
Total Split (s)	11.0	11.0	36.0		11.0	36.0		33.0	33.0	33.0	33.0	33.0	
Total Split (%)	13.8%	13.8%	45.0%		13.8%	45.0%		41.3%	41.3%	41.3%	41.3%	41.3%	
Maximum Green (s)	6.0	6.0	31.0		6.0	31.0		28.0	28.0	28.0	28.0	28.0	
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		-1.0	-1.0		-1.0	-1.0			-1.0	-1.0		-1.0	
Total Lost Time (s)		4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lead/Lag	Lead	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?													
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	None	C-Min		None	C-Min		None	None	None	None	None	
v/c Ratio		0.33	0.52		0.03	0.69			0.82	0.11		0.51	0.25
Control Delay (s/veh)		43.3	5.5		34.0	20.8			43.2	0.4		30.5	0.3
Queue Delay		0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay (s/veh)		43.3	5.5		34.0	20.8			43.2	0.4		30.5	0.3

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Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		24	65		2	246			139	0		45	0
Queue Length 95th (ft)		46	101		13	#358			220	0		88	0
Internal Link Dist (ft)			654			1435			1094			310	
Turn Bay Length (ft)		500			170					165			100
Base Capacity (vph)		310	1992		147	1667			462	689		268	1830
Starvation Cap Reductn		0	0		0	0			0	0		0	0
Spillback Cap Reductn		0	0		0	0			0	0		0	0
Storage Cap Reductn		0	0		0	0			0	0		0	0
Reduced v/c Ratio		0.33	0.52		0.03	0.69			0.67	0.09		0.41	0.25

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 58 (73%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

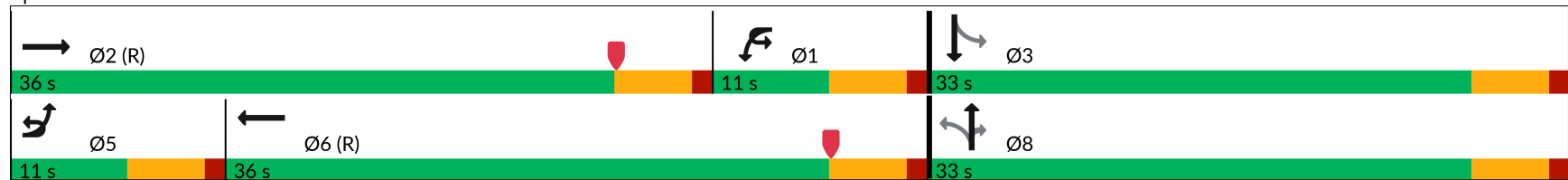
Natural Cycle: 60

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Federal Street/Old River Road & River Road



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 2: Federal Street/Old River Road & River Road

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Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		RT	LT		RT	LT			LT	RT		LT	RT
Traffic Volume (vph)	3	91	915	46	5	999	56	280	5	58	101	1	415
Future Volume (vph)	3	91	915	46	5	999	56	280	5	58	101	1	415
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	11	11	13	13	12	12	12	16
Total Lost time (s)		4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.97	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt		1.00	0.99		1.00	0.99			1.00	0.85		1.00	0.85
Flt Protected		0.95	1.00		0.95	1.00			0.95	1.00		0.95	1.00
Satd. Flow (prot)		3403	3453		1685	3397			1871	1615		1758	1830
Flt Permitted		0.95	1.00		0.95	1.00			0.65	1.00		0.40	1.00
Satd. Flow (perm)		3403	3453		1685	3397			1276	1615		740	1830
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	99	995	50	5	1086	61	304	5	63	110	1	451
RTOR Reduction (vph)	0	0	4	0	0	4	0	0	0	44	0	0	0
Lane Group Flow (vph)	0	102	1041	0	5	1143	0	0	309	19	0	111	451
Heavy Vehicles (%)	0%	3%	4%	0%	0%	2%	0%	0%	0%	0%	3%	0%	0%
Turn Type	Prot	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Free
Protected Phases	5	5	2		1	6			8			3	
Permitted Phases								8		8	3		Free
Actuated Green, G (s)		5.1	41.1		1.2	37.2			22.7	22.7		22.7	80.0
Effective Green, g (s)		6.1	42.1		2.2	38.2			23.7	23.7		23.7	80.0
Actuated g/C Ratio		0.08	0.53		0.03	0.48			0.30	0.30		0.30	1.00
Clearance Time (s)		5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		2.0	2.0		2.0	2.0			2.0	2.0		2.0	
Lane Grp Cap (vph)		259	1817		46	1622			378	478		219	1830
v/s Ratio Prot		0.03	c0.30		0.00	c0.34							
v/s Ratio Perm									c0.24	0.01		0.15	0.25
v/c Ratio		0.39	0.57		0.11	0.70			0.82	0.04		0.51	0.25
Uniform Delay, d1		35.2	12.9		37.9	16.5			26.1	20.0		23.3	0.0
Progression Factor		1.18	0.37		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		0.3	1.3		0.4	2.6			12.2	0.0		0.7	0.3
Delay (s)		41.9	6.0		38.3	19.1			38.4	20.1		24.0	0.3

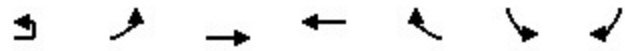


Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service		D	A		D	B			D	C		C	A
Approach Delay (s/veh)			9.2			19.1			35.3			5.0	
Approach LOS			A			B			D			A	
<b>Intersection Summary</b>													
HCM 2000 Control Delay (s/veh)			15.0			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio			0.76										
Actuated Cycle Length (s)			80.0			Sum of lost time (s)			13.0				
Intersection Capacity Utilization			66.8%			ICU Level of Service			C				
Analysis Period (min)			15										

c Critical Lane Group

\_4 - 2032 No-Build Weekday Evening  
 3: River Road & I-93 Northbound Ramps

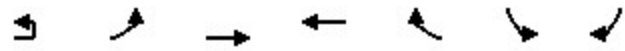
02/24/2026



Lane Group	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑	↑↑	↔	↔↔	↔↔
Traffic Volume (vph)	1	882	897	844	852	157	216
Future Volume (vph)	1	882	897	844	852	157	216
Lane Util. Factor	0.95	0.97	0.95	0.95	1.00	0.97	0.88
Frt					0.850		0.850
Flt Protected		0.950				0.950	
Satd. Flow (prot)	0	3319	3505	3539	1599	3367	2733
Flt Permitted		0.950				0.950	
Satd. Flow (perm)	0	3319	3505	3539	1599	3367	2733
Satd. Flow (RTOR)					620		
Adj. Flow (vph)	1	959	975	917	926	171	235
Lane Group Flow (vph)	0	960	975	917	926	171	235
Turn Type	Prot	Prot	NA	NA	Free	Prot	pt+ov
Protected Phases	5!	5	2	6		3	3 5!
Permitted Phases					Free		
Detector Phase	5	5	2	6		3	3 5
Switch Phase							
Minimum Initial (s)	6.0	6.0	6.0	6.0		6.0	
Minimum Split (s)	11.0	11.0	11.0	11.0		11.0	
Total Split (s)	34.0	34.0	69.0	35.0		11.0	
Total Split (%)	42.5%	42.5%	86.3%	43.8%		13.8%	
Maximum Green (s)	29.0	29.0	64.0	30.0		6.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0		1.0	
Lost Time Adjust (s)		-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)		4.0	4.0	4.0		4.0	
Lead/Lag	Lead	Lead		Lag			
Lead-Lag Optimize?							
Vehicle Extension (s)	2.0	2.0	2.0	2.0		2.0	
Recall Mode	None	None	C-Min	C-Min		Min	
v/c Ratio		0.84	0.35	0.64	0.58	0.50	0.17
Control Delay (s/veh)		18.2	1.0	15.2	2.9	39.7	11.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)		18.2	1.0	15.2	2.9	39.7	11.1

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 3: River Road & I-93 Northbound Ramps

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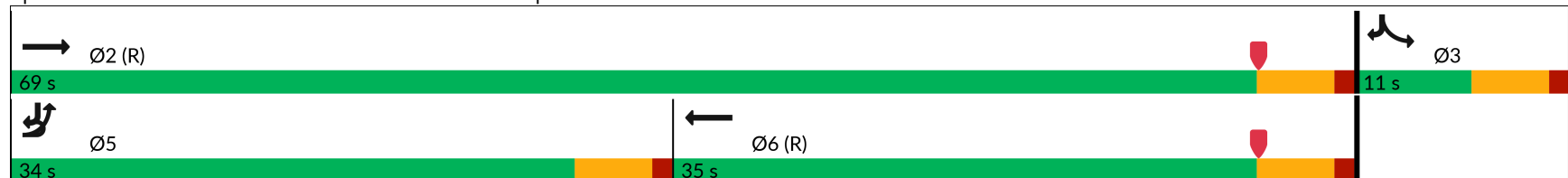


Lane Group	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		77	14	108	34	42	32
Queue Length 95th (ft)		m104	m14	153	136	76	56
Internal Link Dist (ft)			1040	654		885	
Turn Bay Length (ft)		650					650
Base Capacity (vph)		1244	2847	1458	1599	340	1438
Starvation Cap Reductn		0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0
Reduced v/c Ratio		0.77	0.34	0.63	0.58	0.50	0.16

Intersection Summary

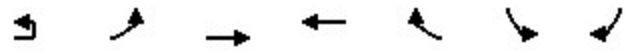
Cycle Length: 80  
 Actuated Cycle Length: 80  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 m Volume for 95th percentile queue is metered by upstream signal.  
 ! Phase conflict between lane groups.

Splits and Phases: 3: River Road & I-93 Northbound Ramps

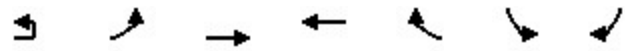


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 3: River Road & I-93 Northbound Ramps

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Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑	↑↑	↔	↔↔	↔↔
Traffic Volume (vph)	1	882	897	844	852	157	216
Future Volume (vph)	1	882	897	844	852	157	216
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	12
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		0.97	0.95	0.95	1.00	0.97	0.88
Frt		1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected		0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		3319	3505	3539	1599	3367	2733
Flt Permitted		0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		3319	3505	3539	1599	3367	2733
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	959	975	917	926	171	235
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	960	975	917	926	171	235
Heavy Vehicles (%)	0%	2%	3%	2%	1%	4%	4%
Turn Type	Prot	Prot	NA	NA	Free	Prot	pt+ov
Protected Phases	5!	5	2	6		3	3 5!
Permitted Phases					Free		
Actuated Green, G (s)		26.5	62.9	31.4	80.0	7.1	38.6
Effective Green, g (s)		27.5	63.9	32.4	80.0	8.1	39.6
Actuated g/C Ratio		0.34	0.80	0.41	1.00	0.10	0.50
Clearance Time (s)		5.0	5.0	5.0		5.0	
Vehicle Extension (s)		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)		1140	2799	1433	1599	340	1352
v/s Ratio Prot		c0.29	0.28	0.26		0.05	0.09
v/s Ratio Perm					c0.58		
v/c Ratio		0.84	0.35	0.64	0.58	0.50	0.17
Uniform Delay, d1		24.2	2.2	19.1	0.0	34.0	11.2
Progression Factor		0.52	0.35	0.67	1.00	1.00	1.00
Incremental Delay, d2		4.1	0.2	1.8	1.3	0.4	0.0
Delay (s)		16.7	1.0	14.6	1.3	34.5	11.2










Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Level of Service		B	A	B	A	C	B
Approach Delay (s/veh)			8.8	7.9		21.0	
Approach LOS			A	A		C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		
! Phase conflict between lane groups.			
c Critical Lane Group			

\_4 - 2032 No-Build Weekday Evening  
4: I-93 Southbound Ramps & River Road

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Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↓	↑↑	↓	↑
Traffic Volume (vph)	1197	768	3	508	551	353	580
Future Volume (vph)	1197	768	3	508	551	353	580
Lane Util. Factor	0.95	1.00	0.95	0.97	0.95	0.97	1.00
Frt		0.850					0.850
Flt Protected				0.950		0.950	
Satd. Flow (prot)	3574	1830	0	3352	3574	3467	1794
Flt Permitted				0.950		0.950	
Satd. Flow (perm)	3574	1830	0	3352	3574	3467	1794
Satd. Flow (RTOR)		835					572
Adj. Flow (vph)	1301	835	3	552	599	384	630
Lane Group Flow (vph)	1301	835	0	555	599	384	630
Turn Type	NA	Free	Prot	Prot	NA	Prot	Free
Protected Phases	2		1	1	6	8	
Permitted Phases		Free					Free
Detector Phase	2		1	1	6	8	
Switch Phase							
Minimum Initial (s)	6.0		6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0		11.0	11.0	11.0	27.0	
Total Split (s)	36.0		17.0	17.0	53.0	27.0	
Total Split (%)	45.0%		21.3%	21.3%	66.3%	33.8%	
Maximum Green (s)	31.0		12.0	12.0	48.0	22.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-1.0			-1.0	-1.0	-1.0	
Total Lost Time (s)	4.0			4.0	4.0	4.0	
Lead/Lag	Lag		Lead	Lead			
Lead-Lag Optimize?							
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	
Recall Mode	C-Min		None	None	C-Min	Min	
Walk Time (s)						6.0	
Flash Don't Walk (s)						16.0	
Pedestrian Calls (#/hr)						0	
v/c Ratio	0.85	0.46		0.67	0.23	0.62	0.35

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4: I-93 Southbound Ramps & River Road

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Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Control Delay (s/veh)	23.0	0.6		40.6	1.3	34.7	0.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay (s/veh)	23.0	0.6		40.6	1.3	34.7	0.5
Queue Length 50th (ft)	221	0		126	7	93	0
Queue Length 95th (ft)	#450	m0		198	24	128	0
Internal Link Dist (ft)	1168				1040	800	
Turn Bay Length (ft)		430		250			480
Base Capacity (vph)	1526	1830		823	2582	996	1794
Starvation Cap Reductn	0	0		0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0
Reduced v/c Ratio	0.85	0.46		0.67	0.23	0.39	0.35

Intersection Summary








Cycle Length: 80  
 Actuated Cycle Length: 80  
 Offset: 26 (33%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-93 Southbound Ramps & River Road



\_4 - 2032 No-Build Weekday Evening  
4: I-93 Southbound Ramps & River Road

02/24/2026

							
Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↔	↑↑	↔	↑
Traffic Volume (vph)	1197	768	3	508	551	353	580
Future Volume (vph)	1197	768	3	508	551	353	580
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	11	11	12	12	16
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00		0.97	0.95	0.97	1.00
Frt	1.00	0.85		1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3574	1830		3352	3574	3467	1794
Flt Permitted	1.00	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3574	1830		3352	3574	3467	1794
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1301	835	3	552	599	384	630
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	1301	835	0	555	599	384	630
Heavy Vehicles (%)	1%	0%	0%	1%	1%	1%	2%
Turn Type	NA	Free	Prot	Prot	NA	Prot	Free
Protected Phases	2		1	1	6	8	
Permitted Phases		Free					Free
Actuated Green, G (s)	33.2	80.0		18.6	56.8	13.2	80.0
Effective Green, g (s)	34.2	80.0		19.6	57.8	14.2	80.0
Actuated g/C Ratio	0.43	1.00		0.25	0.72	0.18	1.00
Clearance Time (s)	5.0			5.0	5.0	5.0	
Vehicle Extension (s)	2.0			2.0	2.0	2.0	
Lane Grp Cap (vph)	1527	1830		821	2582	615	1794
v/s Ratio Prot	c0.36			c0.17	0.17	c0.11	
v/s Ratio Perm		0.46					0.35
v/c Ratio	0.85	0.46		0.68	0.23	0.62	0.35
Uniform Delay, d1	20.6	0.0		27.3	3.7	30.4	0.0
Progression Factor	0.82	1.00		1.32	0.27	1.00	1.00
Incremental Delay, d2	4.5	0.6		1.5	0.2	1.4	0.5
Delay (s)	21.4	0.6		37.7	1.2	31.9	0.5

























Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Level of Service	C	A		D	A	C	A
Approach Delay (s/veh)	13.3				18.7	12.4	
Approach LOS	B				B	B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	14.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

\_4 - 2032 No-Build Weekday Evening  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	462	38	106	371	250	51	2	487	881	4	49
Future Volume (vph)	17	462	38	106	371	250	51	2	487	881	4	49
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	0.88	0.95	0.95	1.00
Frt		0.989				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.954		0.950	0.953	
Satd. Flow (prot)	1805	3505	0	3351	1863	1417	0	1692	2748	1665	1670	1615
Flt Permitted	0.950			0.950				0.954		0.950	0.953	
Satd. Flow (perm)	1805	3505	0	3351	1863	1417	0	1692	2748	1665	1670	1615
Satd. Flow (RTOR)		10				272						232
Adj. Flow (vph)	18	502	41	115	403	272	55	2	529	958	4	53
Lane Group Flow (vph)	18	543	0	115	403	272	0	57	529	479	483	53
Turn Type	Prot	NA		Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	5	2		1	6		8	8	8 1	3	3	
Permitted Phases						Free						Free
Detector Phase	5	2		1	6		8	8	8 1	3	3	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Total Split (s)	11.0	22.0		11.0	22.0		15.0	15.0		32.0	32.0	
Total Split (%)	13.8%	27.5%		13.8%	27.5%		18.8%	18.8%		40.0%	40.0%	
Maximum Green (s)	6.0	17.0		6.0	17.0		10.0	10.0		27.0	27.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0			-1.0		-1.0	-1.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	
v/c Ratio	0.11	0.65		0.39	0.63	0.19		0.23	0.68	0.87	0.87	0.03
Control Delay (s/veh)	35.5	31.7		39.4	25.0	0.3		33.5	30.9	43.0	43.5	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 (s/veh)	35.5	31.7		39.4	25.0	0.3		33.5	30.9	43.0	43.5	0.0

\_4 - 2032 No-Build Weekday Evening  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	9	131		31	128	0		26	134	231	228	0
Queue Length 95th (ft)	28	185		55	#361	0		60	194	#407	#401	0
Internal Link Dist (ft)		1189			1168			1114			744	
Turn Bay Length (ft)	80			350					200			150
Base Capacity (vph)	157	833		293	643	1417		246	778	582	584	1615
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	0.11	0.65		0.39	0.63	0.19		0.23	0.68	0.82	0.83	0.03

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 60 (75%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 70

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 5: Shattuck Road/Minuteman Road & River Road



\_4 - 2032 No-Build Weekday Evening  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	462	38	106	371	250	51	2	487	881	4	49
Future Volume (vph)	17	462	38	106	371	250	51	2	487	881	4	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	12	12	10	10	11	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.95	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1805	3504		3351	1863	1417		1692	2748	1665	1670	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.95	1.00	0.95	0.95	1.00
Satd. Flow (perm)	1805	3504		3351	1863	1417		1692	2748	1665	1670	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	502	41	115	403	272	55	2	529	958	4	53
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	18	535	0	115	403	272	0	57	529	479	483	53
Heavy Vehicles (%)	0%	2%	0%	1%	2%	14%	0%	0%	0%	3%	0%	0%
Turn Type	Prot	NA		Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	5	2		1	6		8	8	8 1	3	3	
Permitted Phases						Free						Free
Actuated Green, G (s)	1.2	17.8		6.0	22.6	80.0		10.7	21.7	25.5	25.5	80.0
Effective Green, g (s)	2.2	18.8		7.0	23.6	80.0		11.7	22.7	26.5	26.5	80.0
Actuated g/C Ratio	0.03	0.24		0.09	0.30	1.00		0.15	0.28	0.33	0.33	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	49	823		293	549	1417		247	779	551	553	1615
v/s Ratio Prot	0.01	0.15		0.03	c0.22			0.03	c0.19	0.29	c0.29	
v/s Ratio Perm						0.19						0.03
v/c Ratio	0.37	0.65		0.39	0.73	0.19		0.23	0.68	0.87	0.87	0.03
Uniform Delay, d1	38.2	27.6		34.5	25.4	0.0		30.2	25.4	25.1	25.2	0.0
Progression Factor	1.00	1.00		1.02	0.77	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	4.0		0.3	8.2	0.3		0.2	1.9	13.3	13.8	0.0
Delay (s)	39.9	31.6		35.6	27.7	0.3		30.3	27.3	38.4	39.0	0.0

\_4 - 2032 No-Build Weekday Evening  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service	D	C		D	C	A		C	C	D	D	A
Approach Delay (s/veh)		31.9			19.4			27.6			36.7	
Approach LOS		C			B			C			D	
<b>Intersection Summary</b>												
HCM 2000 Control Delay (s/veh)			29.3			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			80.0			Sum of lost time (s)			17.0			
Intersection Capacity Utilization			65.7%			ICU Level of Service			C			
Analysis Period (min)			15									

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	204	649	611	28	789	113	287	79	16	92	48	13	
Future Volume (vph)	204	649	611	28	789	113	287	79	16	92	48	13	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850		0.981			0.975			0.968		
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1685	3355	1531	1678	3226	0	1694	1756	0	1728	1778	0	
Flt Permitted	0.950			0.950			0.714			0.687			
Satd. Flow (perm)	1685	3355	1531	1678	3226	0	1273	1756	0	1249	1778	0	
Satd. Flow (RTOR)			532		14			8			12		
Adj. Flow (vph)	222	705	664	30	858	123	312	86	17	100	52	14	
Lane Group Flow (vph)	222	705	664	30	981	0	312	103	0	100	66	0	
Turn Type	Prot	NA	Free	Prot	NA		Perm	NA		Perm	NA		
Protected Phases	5	2		1	6			4			8		9
Permitted Phases			Free				4			8			
Detector Phase	5	2		1	6		4	4		8	8		
Switch Phase													
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	5.0		5.0	5.0		5.0
Minimum Split (s)	11.0	16.0		11.0	16.0		10.0	10.0		10.0	10.0		23.0
Total Split (s)	25.0	45.0		12.0	32.0		29.0	29.0		29.0	29.0		23.0
Total Split (%)	22.9%	41.3%		11.0%	29.4%		26.6%	26.6%		26.6%	26.6%		21%
Maximum Green (s)	19.0	39.0		6.0	26.0		24.0	24.0		24.0	24.0		20.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		2.0
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0		1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.0	-1.0		-1.0	-1.0		
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		
Lead/Lag	Lead	Lag		Lead	Lag								
Lead-Lag Optimize?	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
Recall Mode	None	Min		None	Min		None	None		None	None		None
Walk Time (s)													7.0
Flash Don't Walk (s)													13.0
Pedestrian Calls (#/hr)													4
v/c Ratio	0.65	0.40	0.43	0.19	0.93		0.85	0.20		0.28	0.13		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Control Delay (s/veh)	43.3	15.9	0.9	44.0	44.9		53.2	25.7		29.7	23.4		
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0		
Total Delay (s/veh)	43.3	15.9	0.9	44.0	44.9		53.2	25.7		29.7	23.4		
Queue Length 50th (ft)	105	91	0	15	263		153	37		40	20		
Queue Length 95th (ft)	#233	270	0	53	#592		#426	104		112	68		
Internal Link Dist (ft)		1435			1194			1039			1055		
Turn Bay Length (ft)	150		200	130						100			
Base Capacity (vph)	411	1760	1531	156	1060		369	515		363	525		
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0		
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0		
Storage Cap Reductn	0	0	0	0	0		0	0		0	0		
Reduced v/c Ratio	0.54	0.40	0.43	0.19	0.93		0.85	0.20		0.28	0.13		

Intersection Summary

Cycle Length: 109

Actuated Cycle Length: 87.2

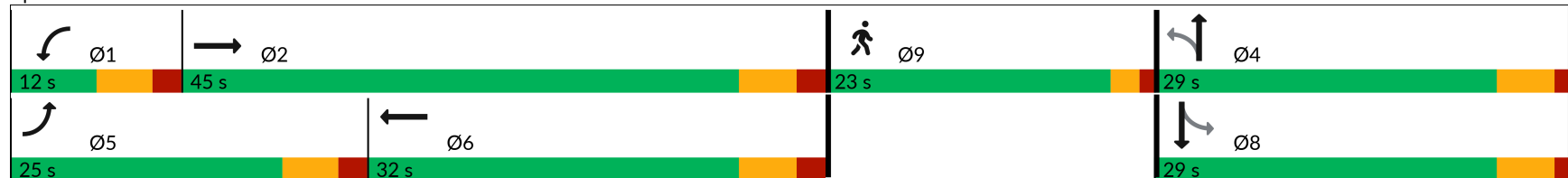
Natural Cycle: 100

Control Type: Actuated-Uncoordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: North Street/Greater Lawrence Tech & River Road





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	204	649	611	28	789	113	287	79	16	92	48	13
Future Volume (vph)	204	649	611	28	789	113	287	79	16	92	48	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	11	11	11	11	11	11	11	11	11
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1685	3355	1531	1678	3226		1694	1756		1728	1778	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.71	1.00		0.69	1.00	
Satd. Flow (perm)	1685	3355	1531	1678	3226		1273	1756		1249	1778	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	222	705	664	30	858	123	312	86	17	100	52	14
RTOR Reduction (vph)	0	0	0	0	9	0	0	6	0	0	9	0
Lane Group Flow (vph)	222	705	664	30	972	0	312	97	0	100	57	0
Heavy Vehicles (%)	0%	4%	2%	4%	7%	0%	3%	1%	7%	1%	0%	0%
Turn Type	Prot	NA	Free	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4				8
Permitted Phases			Free				4			8		
Actuated Green, G (s)	15.6	43.7	93.4	2.2	30.3		24.3	24.3		24.3	24.3	
Effective Green, g (s)	17.6	45.7	93.4	4.2	32.3		25.3	25.3		25.3	25.3	
Actuated g/C Ratio	0.19	0.49	1.00	0.04	0.35		0.27	0.27		0.27	0.27	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	317	1641	1531	75	1115		344	475		338	481	
v/s Ratio Prot	c0.13	0.21		0.02	c0.30			0.06			0.03	
v/s Ratio Perm			c0.43				c0.25			0.08		
v/c Ratio	0.70	0.43	0.43	0.40	0.87		0.91	0.20		0.30	0.12	
Uniform Delay, d1	35.4	15.4	0.0	43.4	28.6		32.9	26.3		27.0	25.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.8	0.2	0.9	3.5	7.7		26.3	0.2		0.5	0.1	
Delay (s)	42.3	15.6	0.9	46.8	36.3		59.2	26.5		27.5	25.8	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service	D	B	A	D	D		E	C		C	C	
Approach Delay (s/veh)		13.2				36.6		51.1			26.8	
Approach LOS		B			D			D			C	

Intersection Summary		
HCM 2000 Control Delay (s/veh)	26.3	HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio	0.84	
Actuated Cycle Length (s)	93.4	Sum of lost time (s) 15.0
Intersection Capacity Utilization	69.3%	ICU Level of Service C
Analysis Period (min)	15	

c Critical Lane Group

\_5 - 2032 Build Weekday Morning  
 2: Federal Street/Old River Road & River Road

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Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕			↕	↕			↕	↕		↕	↕
Traffic Volume (vph)	1	286	1405	266	7	49	1090	117	57	1	11	80	20	236
Future Volume (vph)	1	286	1405	266	7	49	1090	117	57	1	11	80	20	236
Lane Util. Factor	0.95	0.97	0.95	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.976				0.985				0.850			0.850
Flt Protected		0.950				0.950				0.953			0.962	
Satd. Flow (prot)	0	3502	3437	0	0	1685	3233	0	0	1835	1615	0	1799	1812
Flt Permitted		0.950				0.950				0.645			0.727	
Satd. Flow (perm)	0	3502	3437	0	0	1685	3233	0	0	1242	1615	0	1360	1812
Satd. Flow (RTOR)			58				27				187			265
Adj. Flow (vph)	1	311	1527	289	8	53	1185	127	62	1	12	87	22	257
Lane Group Flow (vph)	0	312	1816	0	0	61	1312	0	0	63	12	0	109	257
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA	Perm	Perm	NA	Free
Protected Phases	5	5	2		1	1	6			8			3	
Permitted Phases									8		8	3		Free
Detector Phase	5	5	2		1	1	6		8	8	8	3	3	
Switch Phase														
Minimum Initial (s)	6.0	6.0	6.0		6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	11.0	11.0		11.0	11.0	11.0		11.0	11.0	11.0	11.0	11.0	
Total Split (s)	14.0	14.0	47.0		11.0	11.0	44.0		12.0	12.0	12.0	12.0	12.0	
Total Split (%)	20.0%	20.0%	67.1%		15.7%	15.7%	62.9%		17.1%	17.1%	17.1%	17.1%	17.1%	
Maximum Green (s)	9.0	9.0	42.0		6.0	6.0	39.0		7.0	7.0	7.0	7.0	7.0	
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		-1.0	-1.0			-1.0	-1.0			-1.0	-1.0		-1.0	
Total Lost Time (s)		4.0	4.0			4.0	4.0			4.0	4.0		4.0	
Lead/Lag	Lead	Lead	Lead		Lag	Lag	Lag							
Lead-Lag Optimize?														
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	None	C-Min		None	None	C-Min		None	None	None	None	None	
v/c Ratio		0.64	0.73			0.36	0.67			0.44	0.03		0.69	0.14
Control Delay (s/veh)		33.3	8.3			36.0	12.0			39.1	0.2		54.8	0.2
Queue Delay		0.0	0.0			0.0	0.0			0.0	0.0		0.0	0.0
Total Delay (s/veh)		33.3	8.3			36.0	12.0			39.1	0.2		54.8	0.2

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 2: Federal Street/Old River Road & River Road

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Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		63	84			25	199			26	0		46	0
Queue Length 95th (ft)		m100	283			60	275			62	0		#120	0
Internal Link Dist (ft)			654				1435			1094			310	
Turn Bay Length (ft)		500				170					165			100
Base Capacity (vph)		502	2484			168	1983			147	357		162	1812
Starvation Cap Reductn		0	0			0	0			0	0		0	0
Spillback Cap Reductn		0	0			0	0			0	0		0	0
Storage Cap Reductn		0	0			0	0			0	0		0	0
Reduced v/c Ratio		0.62	0.73			0.36	0.66			0.43	0.03		0.67	0.14

Intersection Summary

Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 60 (86%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Federal Street/Old River Road & River Road



\_5 - 2032 Build Weekday Morning  
 2: Federal Street/Old River Road & River Road

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Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕			↔	↕			↔	↕		↔	↕
Traffic Volume (vph)	1	286	1405	266	7	49	1090	117	57	1	11	80	20	236
Future Volume (vph)	1	286	1405	266	7	49	1090	117	57	1	11	80	20	236
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10	11	11	13	13	12	12	12	16
Total Lost time (s)		4.0	4.0			4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.97	0.95			1.00	0.95			1.00	1.00		1.00	1.00
Frt		1.00	0.98			1.00	0.99			1.00	0.85		1.00	0.85
Flt Protected		0.95	1.00			0.95	1.00			0.95	1.00		0.96	1.00
Satd. Flow (prot)		3502	3437			1685	3234			1835	1615		1798	1812
Flt Permitted		0.95	1.00			0.95	1.00			0.64	1.00		0.73	1.00
Satd. Flow (perm)		3502	3437			1685	3234			1241	1615		1359	1812
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	311	1527	289	8	53	1185	127	62	1	12	87	22	257
RTOR Reduction (vph)	0	0	19	0	0	0	11	0	0	0	11	0	0	0
Lane Group Flow (vph)	0	312	1797	0	0	61	1301	0	0	63	1	0	109	257
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	7%	0%	2%	0%	0%	2%	0%	1%
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA	Perm	Perm	NA	Free
Protected Phases	5	5	2		1	1	6			8			3	
Permitted Phases									8		8	3		Free
Actuated Green, G (s)		8.7	45.5			3.6	40.4			5.9	5.9		5.9	70.0
Effective Green, g (s)		9.7	46.5			4.6	41.4			6.9	6.9		6.9	70.0
Actuated g/C Ratio		0.14	0.66			0.07	0.59			0.10	0.10		0.10	1.00
Clearance Time (s)		5.0	5.0			5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		2.0	2.0			2.0	2.0			2.0	2.0		2.0	
Lane Grp Cap (vph)		485	2283			110	1912			122	159		133	1812
v/s Ratio Prot		0.09	c0.52			0.04	c0.40							
v/s Ratio Perm										0.05	0.00		c0.08	0.14
v/c Ratio		0.64	0.79			0.55	0.68			0.52	0.01		0.82	0.14
Uniform Delay, d1		28.5	8.3			31.7	9.8			30.0	28.5		30.9	0.0
Progression Factor		0.99	0.76			1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		1.6	2.1			3.4	2.0			1.5	0.0		29.6	0.2
Delay (s)		30.0	8.3			35.1	11.8			31.5	28.5		60.6	0.2



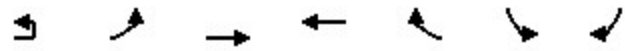
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service		C	A			D	B			C	C		E	A
Approach Delay (s/veh)			11.5				12.8			31.0			18.2	
Approach LOS			B				B			C			B	

Intersection Summary														
HCM 2000 Control Delay (s/veh)			12.9			HCM 2000 Level of Service					B			
HCM 2000 Volume to Capacity ratio			0.83											
Actuated Cycle Length (s)			70.0			Sum of lost time (s)					13.0			
Intersection Capacity Utilization			76.1%			ICU Level of Service					D			
Analysis Period (min)			15											

c Critical Lane Group

\_5 - 2032 Build Weekday Morning  
 3: River Road & I-93 Northbound Ramps

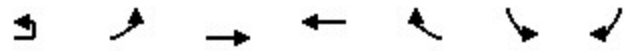
02/24/2026



Lane Group	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑	↑↑	↔	↔↔	↔↔
Traffic Volume (vph)	7	313	1414	795	587	542	661
Future Volume (vph)	7	313	1414	795	587	542	661
Lane Util. Factor	0.95	0.97	0.95	0.95	1.00	0.97	0.88
Frt					0.850		0.850
Flt Protected		0.950				0.950	
Satd. Flow (prot)	0	3258	3539	3406	1538	3400	2787
Flt Permitted		0.950				0.950	
Satd. Flow (perm)	0	3258	3539	3406	1538	3400	2787
Satd. Flow (RTOR)					638		
Adj. Flow (vph)	8	340	1537	864	638	589	718
Lane Group Flow (vph)	0	348	1537	864	638	589	718
Turn Type	Prot	Prot	NA	NA	Free	Prot	pt+ov
Protected Phases	5!	5	2	6		3	3 5!
Permitted Phases					Free		
Detector Phase	5	5	2	6		3	3 5
Switch Phase							
Minimum Initial (s)	6.0	6.0	6.0	6.0		6.0	
Minimum Split (s)	11.0	11.0	11.0	11.0		11.0	
Total Split (s)	17.0	17.0	47.0	30.0		23.0	
Total Split (%)	24.3%	24.3%	67.1%	42.9%		32.9%	
Maximum Green (s)	12.0	12.0	42.0	25.0		18.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0		1.0	
Lost Time Adjust (s)		-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)		4.0	4.0	4.0		4.0	
Lead/Lag	Lead	Lead		Lag			
Lead-Lag Optimize?							
Vehicle Extension (s)	2.0	2.0	2.0	2.0		2.0	
Recall Mode	None	None	C-Min	C-Min		Min	
v/c Ratio		0.62	0.68	0.62	0.41	0.69	0.54
Control Delay (s/veh)		34.9	6.9	13.0	0.7	28.4	14.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)		34.9	6.9	13.0	0.7	28.4	14.1

\_5 - 2032 Build Weekday Morning  
 3: River Road & I-93 Northbound Ramps

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Lane Group	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		70	104	80	0	119	108
Queue Length 95th (ft)		102	134	140	0	169	156
Internal Link Dist (ft)			1040	654		885	
Turn Bay Length (ft)		650					650
Base Capacity (vph)		610	2249	1387	1538	922	1333
Starvation Cap Reductn		0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0
Reduced v/c Ratio		0.57	0.68	0.62	0.41	0.64	0.54

Intersection Summary

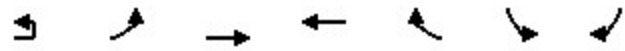
Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 45  
 Control Type: Actuated-Coordinated  
 ! Phase conflict between lane groups.

Splits and Phases: 3: River Road & I-93 Northbound Ramps

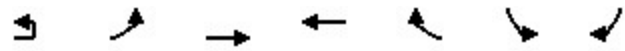


\_5 - 2032 Build Weekday Morning  
 3: River Road & I-93 Northbound Ramps

02/24/2026



Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑	↑↑	↔	↔↔	↔↔
Traffic Volume (vph)	7	313	1414	795	587	542	661
Future Volume (vph)	7	313	1414	795	587	542	661
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	12
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		0.97	0.95	0.95	1.00	0.97	0.88
Frt		1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected		0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		3258	3539	3406	1538	3400	2787
Flt Permitted		0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		3258	3539	3406	1538	3400	2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	340	1537	864	638	589	718
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	348	1537	864	638	589	718
Heavy Vehicles (%)	0%	4%	2%	6%	5%	3%	2%
Turn Type	Prot	Prot	NA	NA	Free	Prot	pt+ov
Protected Phases	5!	5	2	6		3	3 5!
Permitted Phases					Free		
Actuated Green, G (s)		11.0	43.5	27.5	70.0	16.5	32.5
Effective Green, g (s)		12.0	44.5	28.5	70.0	17.5	33.5
Actuated g/C Ratio		0.17	0.64	0.41	1.00	0.25	0.48
Clearance Time (s)		5.0	5.0	5.0		5.0	
Vehicle Extension (s)		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)		558	2249	1386	1538	850	1333
v/s Ratio Prot		0.11	c0.43	0.25		c0.17	0.26
v/s Ratio Perm					0.41		
v/c Ratio		0.62	0.68	0.62	0.41	0.69	0.54
Uniform Delay, d1		26.9	8.2	16.5	0.0	23.8	12.8
Progression Factor		1.16	0.64	0.64	1.00	1.00	1.00
Incremental Delay, d2		1.2	1.3	1.8	0.7	2.0	0.2
Delay (s)		32.3	6.5	12.3	0.7	25.8	13.0



Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Level of Service		C	A	B	A	C	B
Approach Delay (s/veh)			11.3	7.4		18.8	
Approach LOS			B	A		B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		
! Phase conflict between lane groups.			
c Critical Lane Group			

\_5 - 2032 Build Weekday Morning  
4: I-93 Southbound Ramps & River Road

02/24/2026

	→	↘	↙	↗	←	↖	↗
Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗		↘↗	↑↑	↘↗	↗
Traffic Volume (vph)	616	208	2	303	1158	1169	1116
Future Volume (vph)	616	208	2	303	1158	1169	1116
Lane Util. Factor	0.95	1.00	0.95	0.97	0.95	0.97	1.00
Frt		0.850					0.850
Flt Protected				0.950		0.950	
Satd. Flow (prot)	3438	1711	0	3136	3505	3433	1812
Flt Permitted				0.950		0.950	
Satd. Flow (perm)	3438	1711	0	3136	3505	3433	1812
Satd. Flow (RTOR)		226					727
Adj. Flow (vph)	670	226	2	329	1259	1271	1213
Lane Group Flow (vph)	670	226	0	331	1259	1271	1213
Turn Type	NA	Free	Prot	Prot	NA	Prot	Free
Protected Phases	2		1	1	6	8	
Permitted Phases		Free					Free
Detector Phase	2		1	1	6	8	
Switch Phase							
Minimum Initial (s)	6.0		6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0		11.0	11.0	11.0	27.0	
Total Split (s)	24.0		12.0	12.0	36.0	34.0	
Total Split (%)	34.3%		17.1%	17.1%	51.4%	48.6%	
Maximum Green (s)	19.0		7.0	7.0	31.0	29.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-1.0			-1.0	-1.0	-1.0	
Total Lost Time (s)	4.0			4.0	4.0	4.0	
Lead/Lag	Lag		Lead	Lead			
Lead-Lag Optimize?							
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	
Recall Mode	C-Min		None	None	C-Min	Min	
Walk Time (s)						6.0	
Flash Don't Walk (s)						16.0	
Pedestrian Calls (#/hr)						0	
v/c Ratio	0.69	0.13		0.80	0.76	0.89	0.67

\_5 - 2032 Build Weekday Morning  
 4: I-93 Southbound Ramps & River Road

02/24/2026

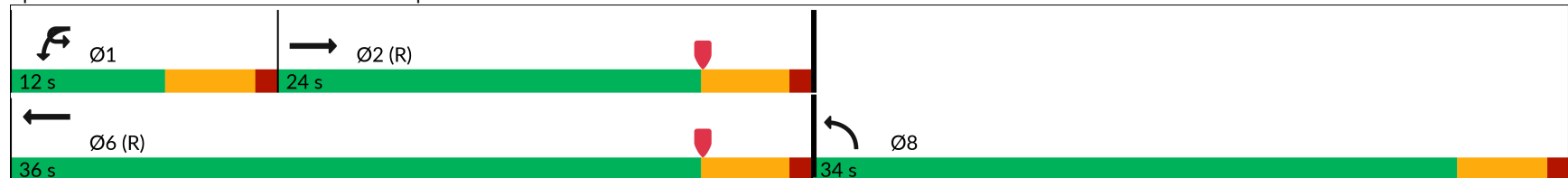


Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Control Delay (s/veh)	19.2	0.1		43.8	15.4	28.6	2.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay (s/veh)	19.2	0.1		43.8	15.4	28.6	2.0
Queue Length 50th (ft)	115	0		77	220	248	0
Queue Length 95th (ft)	161	m0		#154	315	#378	0
Internal Link Dist (ft)	1168				1040	800	
Turn Bay Length (ft)		430		250			480
Base Capacity (vph)	999	1711		414	1651	1472	1812
Starvation Cap Reductn	0	0		0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0
Reduced v/c Ratio	0.67	0.13		0.80	0.76	0.86	0.67

Intersection Summary








Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 34 (49%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-93 Southbound Ramps & River Road



\_5 - 2032 Build Weekday Morning  
4: I-93 Southbound Ramps & River Road

02/24/2026

							
Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↔	↑↑	↔	↑
Traffic Volume (vph)	616	208	2	303	1158	1169	1116
Future Volume (vph)	616	208	2	303	1158	1169	1116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	11	11	12	12	16
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00		0.97	0.95	0.97	1.00
Frt	1.00	0.85		1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3438	1711		3136	3505	3433	1812
Flt Permitted	1.00	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3438	1711		3136	3505	3433	1812
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	670	226	2	329	1259	1271	1213
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	670	226	0	331	1259	1271	1213
Heavy Vehicles (%)	5%	7%	0%	8%	3%	2%	1%
Turn Type	NA	Free	Prot	Prot	NA	Prot	Free
Protected Phases	2		1	1	6	8	
Permitted Phases		Free					Free
Actuated Green, G (s)	18.7	70.0		8.3	32.0	28.0	70.0
Effective Green, g (s)	19.7	70.0		9.3	33.0	29.0	70.0
Actuated g/C Ratio	0.28	1.00		0.13	0.47	0.41	1.00
Clearance Time (s)	5.0			5.0	5.0	5.0	
Vehicle Extension (s)	2.0			2.0	2.0	2.0	
Lane Grp Cap (vph)	967	1711		416	1652	1422	1812
v/s Ratio Prot	0.19			0.11	c0.36	c0.37	
v/s Ratio Perm		0.13					c0.67
v/c Ratio	0.69	0.13		0.80	0.76	0.89	0.67
Uniform Delay, d1	22.4	0.0		29.4	15.3	19.1	0.0
Progression Factor	0.68	1.00		0.94	0.79	1.00	1.00
Incremental Delay, d2	3.8	0.1		7.9	2.8	7.4	2.0
Delay (s)	19.0	0.1		35.6	14.8	26.5	2.0



Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Level of Service	B	A		D	B	C	A
Approach Delay (s/veh)	14.2				19.1	14.5	
Approach LOS	B				B	B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	15.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

\_5 - 2032 Build Weekday Morning  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	423	75	439	719	945	20	3	94	228	2	16
Future Volume (vph)	47	423	75	439	719	945	20	3	94	228	2	16
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	0.88	0.95	0.95	1.00
Frt		0.977				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.958		0.950	0.953	
Satd. Flow (prot)	1805	3468	0	3351	1863	1599	0	1699	2668	1573	1580	1615
Flt Permitted	0.950			0.950				0.958		0.950	0.953	
Satd. Flow (perm)	1805	3468	0	3351	1863	1599	0	1699	2668	1573	1580	1615
Satd. Flow (RTOR)		32				743						343
Adj. Flow (vph)	51	460	82	477	782	1027	22	3	102	248	2	17
Lane Group Flow (vph)	51	542	0	477	782	1027	0	25	102	124	126	17
Turn Type	Prot	NA		Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	5	2		1	6		8	8	8 1	3	3	
Permitted Phases						Free						Free
Detector Phase	5	2		1	6		8	8	8 1	3	3	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Total Split (s)	11.0	28.0		20.0	37.0		11.0	11.0		11.0	11.0	
Total Split (%)	15.7%	40.0%		28.6%	52.9%		15.7%	15.7%		15.7%	15.7%	
Maximum Green (s)	6.0	23.0		15.0	32.0		6.0	6.0		6.0	6.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0			-1.0		-1.0	-1.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	
v/c Ratio	0.28	0.40		0.69	0.76	0.64		0.15	0.12	0.71	0.72	0.01
Control Delay (s/veh)	33.6	16.8		27.6	20.1	1.1		31.1	14.7	55.7	56.4	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 (s/veh)	33.6	16.8		27.6	20.1	1.1		31.1	14.7	55.7	56.4	0.0

\_5 - 2032 Build Weekday Morning  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	21	87		90	290	0		10	16	60	56	0
Queue Length 95th (ft)	52	131		m121	m#477	m0		32	32	#156	#147	0
Internal Link Dist (ft)		1189			1168			1114			744	
Turn Bay Length (ft)	80			350					200			150
Base Capacity (vph)	180	1368		765	1032	1599		169	945	175	176	1615
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	0.28	0.40		0.62	0.76	0.64		0.15	0.11	0.71	0.72	0.01

Intersection Summary

Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 2 (3%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 70  
 Control Type: Actuated-Coordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Shattuck Road/Minuteman Road & River Road



\_5 - 2032 Build Weekday Morning  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	423	75	439	719	945	20	3	94	228	2	16
Future Volume (vph)	47	423	75	439	719	945	20	3	94	228	2	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	12	12	10	10	11	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1805	3469		3351	1863	1599		1699	2668	1573	1580	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (perm)	1805	3469		3351	1863	1599		1699	2668	1573	1580	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	460	82	477	782	1027	22	3	102	248	2	17
RTOR Reduction (vph)	0	20	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	51	522	0	477	782	1027	0	25	102	124	126	17
Heavy Vehicles (%)	0%	2%	0%	1%	2%	1%	0%	0%	3%	9%	0%	0%
Turn Type	Prot	NA		Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	5	2		1	6		8	8	8 1	3	3	
Permitted Phases						Free						Free
Actuated Green, G (s)	3.6	25.0		13.4	34.8	70.0		4.8	23.2	6.8	6.8	70.0
Effective Green, g (s)	4.6	26.0		14.4	35.8	70.0		5.8	24.2	7.8	7.8	70.0
Actuated g/C Ratio	0.07	0.37		0.21	0.51	1.00		0.08	0.35	0.11	0.11	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	118	1288		689	952	1599		140	922	175	176	1615
v/s Ratio Prot	0.03	0.15		0.14	c0.42			0.01	0.04	0.08	0.08	
v/s Ratio Perm						c0.64						0.01
v/c Ratio	0.43	0.41		0.69	0.82	0.64		0.18	0.11	0.71	0.72	0.01
Uniform Delay, d1	31.4	16.3		25.7	14.4	0.0		29.9	15.6	30.0	30.0	0.0
Progression Factor	1.00	1.00		0.95	1.06	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.9		1.4	4.6	1.1		0.2	0.0	10.2	10.9	0.0
Delay (s)	32.4	17.2		25.8	19.9	1.1		30.1	15.6	40.2	41.0	0.0



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service	C	B		C	B	A		C	B	D	D	A
Approach Delay (s/veh)		18.5			12.7			18.5			38.0	
Approach LOS		B			B			B			D	

Intersection Summary		
HCM 2000 Control Delay (s/veh)	16.0	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.93	
Actuated Cycle Length (s)	70.0	Sum of lost time (s)
Intersection Capacity Utilization	65.9%	ICU Level of Service
Analysis Period (min)	15	

c Critical Lane Group



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	29	611	340	24	835	12	220	21	27	16	14	14	
Future Volume (vph)	29	611	340	24	835	12	220	21	27	16	14	14	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850		0.998			0.916			0.925		
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1532	3355	1546	1745	3415	0	1711	1611	0	1745	1699	0	
Flt Permitted	0.950			0.950			0.738			0.723			
Satd. Flow (perm)	1532	3355	1546	1745	3415	0	1329	1611	0	1328	1699	0	
Satd. Flow (RTOR)			315		1			29			15		
Adj. Flow (vph)	32	664	370	26	908	13	239	23	29	17	15	15	
Lane Group Flow (vph)	32	664	370	26	921	0	239	52	0	17	30	0	
Turn Type	Prot	NA	Free	Prot	NA		Perm	NA		Perm	NA		
Protected Phases	5	2		1	6			4			8		9
Permitted Phases			Free				4			8			
Detector Phase	5	2		1	6		4	4		8	8		
Switch Phase													
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	5.0		5.0	5.0		5.0
Minimum Split (s)	11.0	16.0		11.0	16.0		10.0	10.0		10.0	10.0		23.0
Total Split (s)	11.0	43.0		11.0	43.0		32.0	32.0		32.0	32.0		23.0
Total Split (%)	10.1%	39.4%		10.1%	39.4%		29.4%	29.4%		29.4%	29.4%		21%
Maximum Green (s)	5.0	37.0		5.0	37.0		27.0	27.0		27.0	27.0		20.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		2.0
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0		1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.0	-1.0		-1.0	-1.0		
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		
Lead/Lag	Lead	Lag		Lead	Lag								
Lead-Lag Optimize?	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
Recall Mode	None	Min		None	Min		None	None		None	None		None
Walk Time (s)													7.0
Flash Don't Walk (s)													13.0
Pedestrian Calls (#/hr)													4
v/c Ratio	0.17	0.43	0.24	0.12	0.59		0.58	0.10		0.04	0.06		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Control Delay (s/veh)	39.5	16.4	0.4	39.1	18.4		30.2	14.5		23.5	16.5		
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0		
Total Delay (s/veh)	39.5	16.4	0.4	39.1	18.4		30.2	14.5		23.5	16.5		
Queue Length 50th (ft)	11	68	0	8	103		63	5		4	3		
Queue Length 95th (ft)	58	261	0	46	378		#254	45		27	32		
Internal Link Dist (ft)		1435			1194			1039			1055		
Turn Bay Length (ft)	150		200	130						100			
Base Capacity (vph)	191	2338	1546	218	2380		665	820		664	857		
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0		
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0		
Storage Cap Reductn	0	0	0	0	0		0	0		0	0		
Reduced v/c Ratio	0.17	0.28	0.24	0.12	0.39		0.36	0.06		0.03	0.04		

Intersection Summary

Cycle Length: 109

Actuated Cycle Length: 64.4

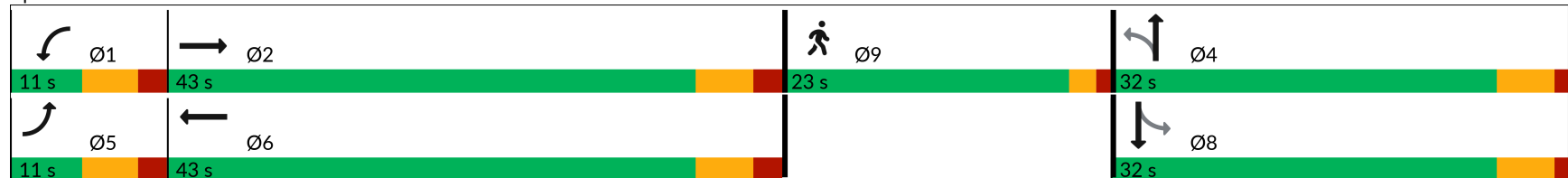
Natural Cycle: 80

Control Type: Actuated-Uncoordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: North Street/Greater Lawrence Tech & River Road





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	611	340	24	835	12	220	21	27	16	14	14
Future Volume (vph)	29	611	340	24	835	12	220	21	27	16	14	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	11	11	11	11	11	11	11	11	11
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.92		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1532	3355	1546	1745	3415		1711	1611		1745	1699	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.74	1.00		0.72	1.00	
Satd. Flow (perm)	1532	3355	1546	1745	3415		1328	1611		1328	1699	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	664	370	26	908	13	239	23	29	17	15	15
RTOR Reduction (vph)	0	0	0	0	1	0	0	21	0	0	11	0
Lane Group Flow (vph)	32	664	370	26	920	0	239	31	0	17	19	0
Heavy Vehicles (%)	10%	4%	1%	0%	2%	0%	2%	5%	4%	0%	0%	0%
Turn Type	Prot	NA	Free	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases			Free				4			8		
Actuated Green, G (s)	1.5	27.0	69.7	1.5	27.0		18.8	18.8		18.8	18.8	
Effective Green, g (s)	3.5	29.0	69.7	3.5	29.0		19.8	19.8		19.8	19.8	
Actuated g/C Ratio	0.05	0.42	1.00	0.05	0.42		0.28	0.28		0.28	0.28	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	76	1395	1546	87	1420		377	457		377	482	
v/s Ratio Prot	0.02	0.20		0.01	c0.27			0.02			0.01	
v/s Ratio Perm			c0.24				c0.18			0.01		
v/c Ratio	0.42	0.48	0.24	0.30	0.65		0.63	0.07		0.05	0.04	
Uniform Delay, d1	32.1	14.8	0.0	31.9	16.3		21.8	18.2		18.1	18.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.7	0.3	0.4	1.9	1.0		3.5	0.1		0.0	0.0	
Delay (s)	35.9	15.1	0.4	33.8	17.3		25.3	18.3		18.1	18.1	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service	D	B	A	C	B		C	B		B	B	
Approach Delay (s/veh)		10.6			17.8			24.0			18.1	
Approach LOS		B			B			C			B	

Intersection Summary		
HCM 2000 Control Delay (s/veh)	15.3	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.63	B
Actuated Cycle Length (s)	69.7	Sum of lost time (s)
Intersection Capacity Utilization	49.6%	15.0
Analysis Period (min)	15	ICU Level of Service
		A

c Critical Lane Group

\_6 - 2032 Build Weekday Evening  
 2: Federal Street/Old River Road & River Road

02/24/2026



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕		↔	↕			↕	↕		↕	↕
Traffic Volume (vph)	3	170	911	46	5	998	62	280	7	58	88	2	367
Future Volume (vph)	3	170	911	46	5	998	62	280	7	58	88	2	367
Lane Util. Factor	0.95	0.97	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.993			0.991				0.850			0.850
Flt Protected		0.950			0.950				0.954			0.953	
Satd. Flow (prot)	0	3401	3453	0	1685	3394	0	0	1873	1615	0	1759	1830
Flt Permitted		0.950			0.950				0.661			0.425	
Satd. Flow (perm)	0	3401	3453	0	1685	3394	0	0	1298	1615	0	784	1830
Satd. Flow (RTOR)			8			9				164			288
Adj. Flow (vph)	3	185	990	50	5	1085	67	304	8	63	96	2	399
Lane Group Flow (vph)	0	188	1040	0	5	1152	0	0	312	63	0	98	399
Turn Type	Prot	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Free
Protected Phases	5	5	2		1	6			8			3	
Permitted Phases								8		8	3		Free
Detector Phase	5	5	2		1	6		8	8	8	3	3	
Switch Phase													
Minimum Initial (s)	6.0	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	11.0	11.0		11.0	11.0		11.0	11.0	11.0	11.0	11.0	
Total Split (s)	11.0	11.0	36.0		11.0	36.0		33.0	33.0	33.0	33.0	33.0	
Total Split (%)	13.8%	13.8%	45.0%		13.8%	45.0%		41.3%	41.3%	41.3%	41.3%	41.3%	
Maximum Green (s)	6.0	6.0	31.0		6.0	31.0		28.0	28.0	28.0	28.0	28.0	
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		-1.0	-1.0		-1.0	-1.0			-1.0	-1.0		-1.0	
Total Lost Time (s)		4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lead/Lag	Lead	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?													
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	None	C-Min		None	C-Min		None	None	None	None	None	
v/c Ratio		0.55	0.52		0.03	0.75			0.81	0.11		0.42	0.22
Control Delay (s/veh)		45.6	5.7		34.0	23.1			42.8	0.4		27.2	0.3
Queue Delay		0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay (s/veh)		45.6	5.7		34.0	23.1			42.8	0.4		27.2	0.3

\_6 - 2032 Build Weekday Evening  
 2: Federal Street/Old River Road & River Road

02/24/2026

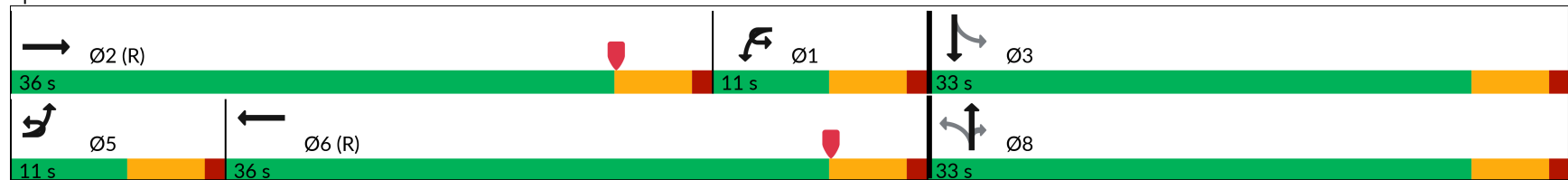


Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		45	77		2	260			141	0		38	0
Queue Length 95th (ft)		#77	114		13	#363			220	0		76	0
Internal Link Dist (ft)			654			1435			1094			310	
Turn Bay Length (ft)		500			170					165			100
Base Capacity (vph)		344	1996		147	1544			470	689		284	1830
Starvation Cap Reductn		0	0		0	0			0	0		0	0
Spillback Cap Reductn		0	0		0	0			0	0		0	0
Storage Cap Reductn		0	0		0	0			0	0		0	0
Reduced v/c Ratio		0.55	0.52		0.03	0.75			0.66	0.09		0.35	0.22

Intersection Summary

Cycle Length: 80  
 Actuated Cycle Length: 80  
 Offset: 58 (73%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Federal Street/Old River Road & River Road



\_6 - 2032 Build Weekday Evening  
 2: Federal Street/Old River Road & River Road

02/24/2026



Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕		↔	↕			↕	↕		↕	↕
Traffic Volume (vph)	3	170	911	46	5	998	62	280	7	58	88	2	367
Future Volume (vph)	3	170	911	46	5	998	62	280	7	58	88	2	367
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	11	11	13	13	12	12	12	16
Total Lost time (s)		4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.97	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt		1.00	0.99		1.00	0.99			1.00	0.85		1.00	0.85
Flt Protected		0.95	1.00		0.95	1.00			0.95	1.00		0.95	1.00
Satd. Flow (prot)		3401	3453		1685	3395			1872	1615		1760	1830
Flt Permitted		0.95	1.00		0.95	1.00			0.66	1.00		0.42	1.00
Satd. Flow (perm)		3401	3453		1685	3395			1298	1615		784	1830
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	185	990	50	5	1085	67	304	8	63	96	2	399
RTOR Reduction (vph)	0	0	4	0	0	5	0	0	0	44	0	0	0
Lane Group Flow (vph)	0	188	1036	0	5	1147	0	0	312	19	0	98	399
Heavy Vehicles (%)	0%	3%	4%	0%	0%	2%	0%	0%	0%	0%	3%	0%	0%
Turn Type	Prot	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Free
Protected Phases	5	5	2		1	6			8			3	
Permitted Phases								8		8	3		Free
Actuated Green, G (s)		7.1	41.2		1.2	35.3			22.6	22.6		22.6	80.0
Effective Green, g (s)		8.1	42.2		2.2	36.3			23.6	23.6		23.6	80.0
Actuated g/C Ratio		0.10	0.53		0.03	0.45			0.30	0.30		0.30	1.00
Clearance Time (s)		5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		2.0	2.0		2.0	2.0			2.0	2.0		2.0	
Lane Grp Cap (vph)		344	1821		46	1540			382	476		231	1830
v/s Ratio Prot		0.06	c0.30		0.00	c0.34							
v/s Ratio Perm								c0.24	0.01			0.13	0.22
v/c Ratio		0.55	0.57		0.11	0.74			0.82	0.04		0.42	0.22
Uniform Delay, d1		34.2	12.8		37.9	18.0			26.2	20.1		22.7	0.0
Progression Factor		1.15	0.39		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		0.9	1.2		0.4	3.3			12.1	0.0		0.5	0.3
Delay (s)		40.1	6.2		38.3	21.3			38.2	20.1		23.2	0.3



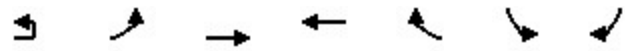
Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service		D	A		D	C			D	C		C	A
Approach Delay (s/veh)			11.4			21.4			35.2			4.8	
Approach LOS			B			C			D			A	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

\_6 - 2032 Build Weekday Evening  
 3: River Road & I-93 Northbound Ramps

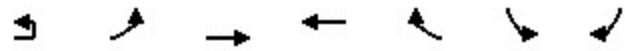
02/24/2026



Lane Group	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑	↑↑	↗	↔↔	↔↔
Traffic Volume (vph)	1	882	915	844	803	214	216
Future Volume (vph)	1	882	915	844	803	214	216
Lane Util. Factor	0.95	0.97	0.95	0.95	1.00	0.97	0.88
Frt					0.850		0.850
Flt Protected		0.950				0.950	
Satd. Flow (prot)	0	3319	3505	3539	1599	3367	2733
Flt Permitted		0.950				0.950	
Satd. Flow (perm)	0	3319	3505	3539	1599	3367	2733
Satd. Flow (RTOR)					620		
Adj. Flow (vph)	1	959	995	917	873	233	235
Lane Group Flow (vph)	0	960	995	917	873	233	235
Turn Type	Prot	Prot	NA	NA	Free	Prot	pt+ov
Protected Phases	5!	5	2	6		3	3 5!
Permitted Phases					Free		
Detector Phase	5	5	2	6		3	3 5
Switch Phase							
Minimum Initial (s)	6.0	6.0	6.0	6.0		6.0	
Minimum Split (s)	11.0	11.0	11.0	11.0		11.0	
Total Split (s)	34.0	34.0	69.0	35.0		11.0	
Total Split (%)	42.5%	42.5%	86.3%	43.8%		13.8%	
Maximum Green (s)	29.0	29.0	64.0	30.0		6.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0		1.0	
Lost Time Adjust (s)		-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)		4.0	4.0	4.0		4.0	
Lead/Lag	Lead	Lead		Lag			
Lead-Lag Optimize?							
Vehicle Extension (s)	2.0	2.0	2.0	2.0		2.0	
Recall Mode	None	None	C-Min	C-Min		Min	
v/c Ratio		0.84	0.36	0.66	0.55	0.62	0.17
Control Delay (s/veh)		17.4	1.2	15.0	2.2	43.0	10.7
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)		17.4	1.2	15.0	2.2	43.0	10.7

\_6 - 2032 Build Weekday Evening  
 3: River Road & I-93 Northbound Ramps

02/24/2026

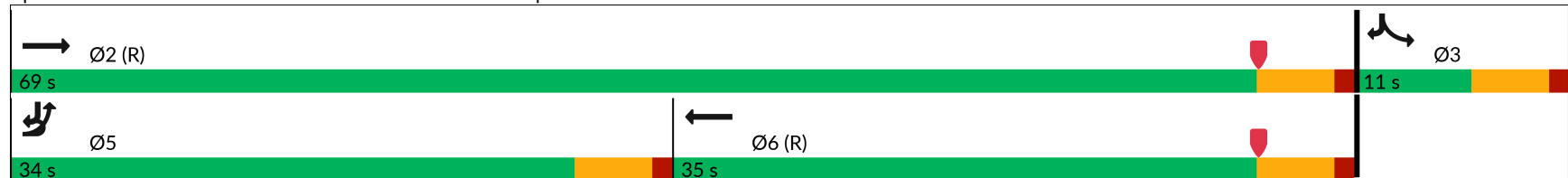


Lane Group	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		88	17	114	22	58	31
Queue Length 95th (ft)		m100	m14	148	48	#120	56
Internal Link Dist (ft)			1040	654		885	
Turn Bay Length (ft)		650					650
Base Capacity (vph)		1244	2847	1436	1599	378	1469
Starvation Cap Reductn		0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0
Reduced v/c Ratio		0.77	0.35	0.64	0.55	0.62	0.16

Intersection Summary

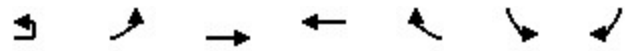
Cycle Length: 80  
 Actuated Cycle Length: 80  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.  
 ! Phase conflict between lane groups.

Splits and Phases: 3: River Road & I-93 Northbound Ramps

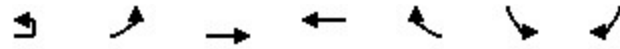


\_6 - 2032 Build Weekday Evening  
 3: River Road & I-93 Northbound Ramps

02/24/2026



Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑	↑↑	↔	↔↔	↔↔
Traffic Volume (vph)	1	882	915	844	803	214	216
Future Volume (vph)	1	882	915	844	803	214	216
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	12
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		0.97	0.95	0.95	1.00	0.97	0.88
Frt		1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected		0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		3319	3505	3539	1599	3367	2733
Flt Permitted		0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		3319	3505	3539	1599	3367	2733
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	959	995	917	873	233	235
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	960	995	917	873	233	235
Heavy Vehicles (%)	0%	2%	3%	2%	1%	4%	4%
Turn Type	Prot	Prot	NA	NA	Free	Prot	pt+ov
Protected Phases	5!	5	2	6		3	3 5!
Permitted Phases					Free		
Actuated Green, G (s)		26.5	62.0	30.5	80.0	8.0	39.5
Effective Green, g (s)		27.5	63.0	31.5	80.0	9.0	40.5
Actuated g/C Ratio		0.34	0.79	0.39	1.00	0.11	0.51
Clearance Time (s)		5.0	5.0	5.0		5.0	
Vehicle Extension (s)		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)		1140	2760	1393	1599	378	1383
v/s Ratio Prot		c0.29	0.28	c0.26		0.07	0.09
v/s Ratio Perm					c0.55		
v/c Ratio		0.84	0.36	0.66	0.55	0.62	0.17
Uniform Delay, d1		24.2	2.5	19.8	0.0	33.9	10.7
Progression Factor		0.49	0.37	0.63	1.00	1.00	1.00
Incremental Delay, d2		4.0	0.3	1.9	1.1	2.1	0.0
Delay (s)		15.9	1.2	14.5	1.1	36.0	10.7










Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Level of Service		B	A	B	A	D	B
Approach Delay (s/veh)			8.4	7.9		23.3	
Approach LOS			A	A		C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		
! Phase conflict between lane groups.			
c Critical Lane Group			

\_6 - 2032 Build Weekday Evening  
4: I-93 Southbound Ramps & River Road

02/24/2026

							
Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↓	↑↑	↓	↑
Traffic Volume (vph)	1208	768	3	517	541	353	587
Future Volume (vph)	1208	768	3	517	541	353	587
Lane Util. Factor	0.95	1.00	0.95	0.97	0.95	0.97	1.00
Frt		0.850					0.850
Flt Protected				0.950		0.950	
Satd. Flow (prot)	3574	1830	0	3352	3574	3467	1794
Flt Permitted				0.950		0.950	
Satd. Flow (perm)	3574	1830	0	3352	3574	3467	1794
Satd. Flow (RTOR)		835					572
Adj. Flow (vph)	1313	835	3	562	588	384	638
Lane Group Flow (vph)	1313	835	0	565	588	384	638
Turn Type	NA	Free	Prot	Prot	NA	Prot	Free
Protected Phases	2		1	1	6	8	
Permitted Phases		Free					Free
Detector Phase	2		1	1	6	8	
Switch Phase							
Minimum Initial (s)	6.0		6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0		11.0	11.0	11.0	27.0	
Total Split (s)	36.0		17.0	17.0	53.0	27.0	
Total Split (%)	45.0%		21.3%	21.3%	66.3%	33.8%	
Maximum Green (s)	31.0		12.0	12.0	48.0	22.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-1.0			-1.0	-1.0	-1.0	
Total Lost Time (s)	4.0			4.0	4.0	4.0	
Lead/Lag	Lag		Lead	Lead			
Lead-Lag Optimize?							
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	
Recall Mode	C-Min		None	None	C-Min	Min	
Walk Time (s)						6.0	
Flash Don't Walk (s)						16.0	
Pedestrian Calls (#/hr)						0	
v/c Ratio	0.87	0.46		0.67	0.23	0.62	0.36

\_6 - 2032 Build Weekday Evening  
 4: I-93 Southbound Ramps & River Road

02/24/2026



Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Control Delay (s/veh)	24.2	0.6		42.0	1.3	34.7	0.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay (s/veh)	24.2	0.6		42.0	1.3	34.7	0.6
Queue Length 50th (ft)	224	0		141	7	93	0
Queue Length 95th (ft)	#458	m0		202	24	128	0
Internal Link Dist (ft)	1168				1040	800	
Turn Bay Length (ft)		430		250			480
Base Capacity (vph)	1508	1830		839	2582	996	1794
Starvation Cap Reductn	0	0		0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0
Reduced v/c Ratio	0.87	0.46		0.67	0.23	0.39	0.36

Intersection Summary








Cycle Length: 80  
 Actuated Cycle Length: 80  
 Offset: 26 (33%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-93 Southbound Ramps & River Road



\_6 - 2032 Build Weekday Evening  
4: I-93 Southbound Ramps & River Road

02/24/2026

							
Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↔	↑↑	↔	↑
Traffic Volume (vph)	1208	768	3	517	541	353	587
Future Volume (vph)	1208	768	3	517	541	353	587
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	11	11	12	12	16
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00		0.97	0.95	0.97	1.00
Frt	1.00	0.85		1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3574	1830		3352	3574	3467	1794
Flt Permitted	1.00	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3574	1830		3352	3574	3467	1794
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1313	835	3	562	588	384	638
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	1313	835	0	565	588	384	638
Heavy Vehicles (%)	1%	0%	0%	1%	1%	1%	2%
Turn Type	NA	Free	Prot	Prot	NA	Prot	Free
Protected Phases	2		1	1	6	8	
Permitted Phases		Free					Free
Actuated Green, G (s)	32.8	80.0		19.0	56.8	13.2	80.0
Effective Green, g (s)	33.8	80.0		20.0	57.8	14.2	80.0
Actuated g/C Ratio	0.42	1.00		0.25	0.72	0.18	1.00
Clearance Time (s)	5.0			5.0	5.0	5.0	
Vehicle Extension (s)	2.0			2.0	2.0	2.0	
Lane Grp Cap (vph)	1510	1830		838	2582	615	1794
v/s Ratio Prot	c0.37			c0.17	0.16	c0.11	
v/s Ratio Perm		0.46					0.36
v/c Ratio	0.87	0.46		0.67	0.23	0.62	0.36
Uniform Delay, d1	21.1	0.0		27.1	3.7	30.4	0.0
Progression Factor	0.82	1.00		1.38	0.27	1.00	1.00
Incremental Delay, d2	5.2	0.6		1.4	0.2	1.4	0.6
Delay (s)	22.5	0.6		38.9	1.2	31.9	0.6

























Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Level of Service	C	A		D	A	C	A
Approach Delay (s/veh)	14.0				19.7	12.3	
Approach LOS	B				B	B	
<b>Intersection Summary</b>							
HCM 2000 Control Delay (s/veh)			15.1		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio			0.77				
Actuated Cycle Length (s)			80.0		Sum of lost time (s)		13.0
Intersection Capacity Utilization			68.3%		ICU Level of Service		C
Analysis Period (min)			15				

c Critical Lane Group

\_6 - 2032 Build Weekday Evening  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	468	38	107	358	252	51	2	489	884	4	49
Future Volume (vph)	17	468	38	107	358	252	51	2	489	884	4	49
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	0.88	0.95	0.95	1.00
Frt		0.989				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.954		0.950	0.953	
Satd. Flow (prot)	1805	3505	0	3351	1863	1417	0	1692	2748	1665	1670	1615
Flt Permitted	0.950			0.950				0.954		0.950	0.953	
Satd. Flow (perm)	1805	3505	0	3351	1863	1417	0	1692	2748	1665	1670	1615
Satd. Flow (RTOR)		10				274						232
Adj. Flow (vph)	18	509	41	116	389	274	55	2	532	961	4	53
Lane Group Flow (vph)	18	550	0	116	389	274	0	57	532	480	485	53
Turn Type	Prot	NA		Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	5	2		1	6		8	8	8 1	3	3	
Permitted Phases						Free						Free
Detector Phase	5	2		1	6		8	8	8 1	3	3	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Total Split (s)	11.0	22.0		11.0	22.0		15.0	15.0		32.0	32.0	
Total Split (%)	13.8%	27.5%		13.8%	27.5%		18.8%	18.8%		40.0%	40.0%	
Maximum Green (s)	6.0	17.0		6.0	17.0		10.0	10.0		27.0	27.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0			-1.0		-1.0	-1.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	
v/c Ratio	0.11	0.66		0.40	0.60	0.19		0.23	0.69	0.87	0.88	0.03
Control Delay (s/veh)	35.5	31.9		39.1	23.8	0.3		33.6	31.1	43.0	43.7	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 (s/veh)	35.5	31.9		39.1	23.8	0.3		33.6	31.1	43.0	43.7	0.0



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	9	133		30	123	0		26	135	232	229	0
Queue Length 95th (ft)	28	188		55	#342	0		60	195	#408	#403	0
Internal Link Dist (ft)		1189			1168			1114			744	
Turn Bay Length (ft)	80			350					200			150
Base Capacity (vph)	157	834		293	644	1417		245	776	582	584	1615
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	0.11	0.66		0.40	0.60	0.19		0.23	0.69	0.82	0.83	0.03

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 60 (75%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

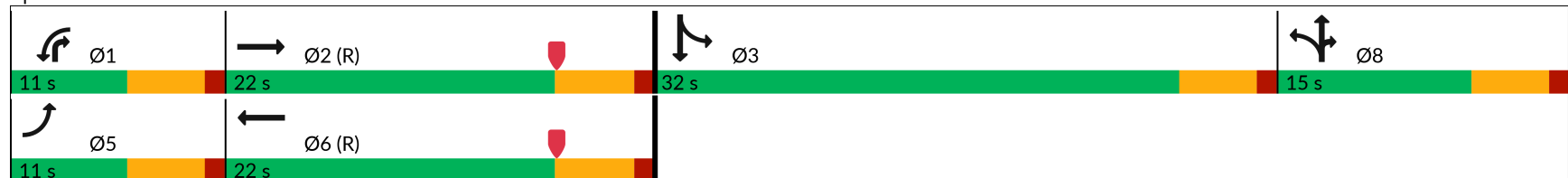
Natural Cycle: 75

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 5: Shattuck Road/Minuteman Road & River Road



\_6 - 2032 Build Weekday Evening  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	468	38	107	358	252	51	2	489	884	4	49
Future Volume (vph)	17	468	38	107	358	252	51	2	489	884	4	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	12	12	10	10	11	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.95	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1805	3505		3351	1863	1417		1692	2748	1665	1670	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.95	1.00	0.95	0.95	1.00
Satd. Flow (perm)	1805	3505		3351	1863	1417		1692	2748	1665	1670	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	509	41	116	389	274	55	2	532	961	4	53
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	18	542	0	116	389	274	0	57	532	480	485	53
Heavy Vehicles (%)	0%	2%	0%	1%	2%	14%	0%	0%	0%	3%	0%	0%
Turn Type	Prot	NA		Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	5	2		1	6		8	8	8 1	3	3	
Permitted Phases						Free						Free
Actuated Green, G (s)	1.2	17.9		6.0	22.7	80.0		10.6	21.6	25.5	25.5	80.0
Effective Green, g (s)	2.2	18.9		7.0	23.7	80.0		11.6	22.6	26.5	26.5	80.0
Actuated g/C Ratio	0.03	0.24		0.09	0.30	1.00		0.14	0.28	0.33	0.33	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	49	828		293	551	1417		245	776	551	553	1615
v/s Ratio Prot	0.01	0.15		0.03	c0.21			0.03	c0.19	0.29	c0.29	
v/s Ratio Perm						0.19						0.03
v/c Ratio	0.37	0.66		0.40	0.71	0.19		0.23	0.69	0.87	0.88	0.03
Uniform Delay, d1	38.2	27.6		34.5	25.0	0.0		30.3	25.5	25.1	25.2	0.0
Progression Factor	1.00	1.00		1.01	0.74	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	4.0		0.3	7.2	0.3		0.2	2.0	13.7	14.2	0.0
Delay (s)	39.9	31.6		35.2	25.8	0.3		30.4	27.6	38.8	39.4	0.0

\_6 - 2032 Build Weekday Evening  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service	D	C		D	C	A		C	C	D	D	A
Approach Delay (s/veh)		31.9			18.2			27.8			37.1	
Approach LOS		C			B			C			D	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	29.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

\_7.1 - 2032 Build Weekday Morning

1: North Street/Greater Lawrence Tech & River Road

02/24/2026



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	204	649	611	28	789	113	287	79	16	92	48	13	
Future Volume (vph)	204	649	611	28	789	113	287	79	16	92	48	13	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850		0.981			0.975			0.968		
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1685	3355	1531	1678	3226	0	1694	1756	0	1728	1778	0	
Flt Permitted	0.950			0.950			0.714			0.688			
Satd. Flow (perm)	1685	3355	1531	1678	3226	0	1273	1756	0	1251	1778	0	
Satd. Flow (RTOR)			532		14			9			12		
Adj. Flow (vph)	222	705	664	30	858	123	312	86	17	100	52	14	
Lane Group Flow (vph)	222	705	664	30	981	0	312	103	0	100	66	0	
Turn Type	Prot	NA	Free	Prot	NA		Perm	NA		Perm	NA		
Protected Phases	5	2		1	6			4			8		9
Permitted Phases			Free				4			8			
Detector Phase	5	2		1	6		4	4		8	8		
Switch Phase													
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	5.0		5.0	5.0		5.0
Minimum Split (s)	11.0	16.0		11.0	16.0		10.0	10.0		10.0	10.0		23.0
Total Split (s)	23.0	43.0		12.0	32.0		31.0	31.0		31.0	31.0		23.0
Total Split (%)	21.1%	39.4%		11.0%	29.4%		28.4%	28.4%		28.4%	28.4%		21%
Maximum Green (s)	17.0	37.0		6.0	26.0		26.0	26.0		26.0	26.0		20.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		2.0
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0		1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.0	-1.0		-1.0	-1.0		
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		
Lead/Lag	Lead	Lag		Lead	Lag								
Lead-Lag Optimize?	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
Recall Mode	None	Min		None	Min		None	None		None	None		None
Walk Time (s)													7.0
Flash Don't Walk (s)													13.0
Pedestrian Calls (#/hr)													4
v/c Ratio	0.67	0.41	0.43	0.20	0.95		0.80	0.19		0.26	0.12		

\_7.1 - 2032 Build Weekday Morning

1: North Street/Greater Lawrence Tech & River Road

02/24/2026



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Control Delay (s/veh)	45.9	17.1	0.9	44.6	48.8		47.3	24.4		28.4	22.4		
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0		
Total Delay (s/veh)	45.9	17.1	0.9	44.6	48.8		47.3	24.4		28.4	22.4		
Queue Length 50th (ft)	108	97	0	16	278		156	37		40	21		
Queue Length 95th (ft)	#263	279	0	53	#592		#408	100		109	66		
Internal Link Dist (ft)		1435			1194			1039			1055		
Turn Bay Length (ft)	150		200	130						100			
Base Capacity (vph)	364	1710	1531	152	1037		390	545		384	554		
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0		
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0		
Storage Cap Reductn	0	0	0	0	0		0	0		0	0		
Reduced v/c Ratio	0.61	0.41	0.43	0.20	0.95		0.80	0.19		0.26	0.12		

Intersection Summary

Cycle Length: 109

Actuated Cycle Length: 88.9

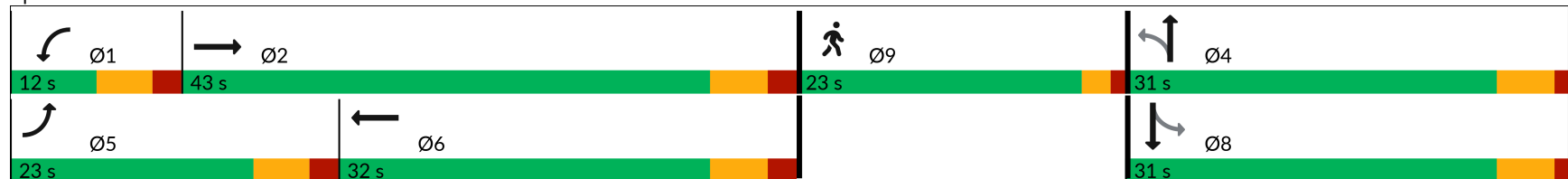
Natural Cycle: 100

Control Type: Actuated-Uncoordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: North Street/Greater Lawrence Tech & River Road



\_7.1 - 2032 Build Weekday Morning

1: North Street/Greater Lawrence Tech & River Road

02/24/2026



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	204	649	611	28	789	113	287	79	16	92	48	13
Future Volume (vph)	204	649	611	28	789	113	287	79	16	92	48	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	11	11	11	11	11	11	11	11	11
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1685	3355	1531	1678	3226		1694	1756		1728	1778	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.71	1.00		0.69	1.00	
Satd. Flow (perm)	1685	3355	1531	1678	3226		1273	1756		1250	1778	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	222	705	664	30	858	123	312	86	17	100	52	14
RTOR Reduction (vph)	0	0	0	0	9	0	0	6	0	0	9	0
Lane Group Flow (vph)	222	705	664	30	972	0	312	97	0	100	57	0
Heavy Vehicles (%)	0%	4%	2%	4%	7%	0%	3%	1%	7%	1%	0%	0%
Turn Type	Prot	NA	Free	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4			8	
Permitted Phases			Free				4			8		
Actuated Green, G (s)	15.4	43.3	95.1	2.2	30.1		26.3	26.3		26.3	26.3	
Effective Green, g (s)	17.4	45.3	95.1	4.2	32.1		27.3	27.3		27.3	27.3	
Actuated g/C Ratio	0.18	0.48	1.00	0.04	0.34		0.29	0.29		0.29	0.29	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	308	1598	1531	74	1088		365	504		358	510	
v/s Ratio Prot	c0.13	0.21		0.02	c0.30			0.05			0.03	
v/s Ratio Perm			c0.43				c0.25			0.08		
v/c Ratio	0.72	0.44	0.43	0.41	0.89		0.85	0.19		0.28	0.11	
Uniform Delay, d1	36.6	16.5	0.0	44.2	29.9		32.0	25.6		26.3	25.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.1	0.2	0.9	3.6	9.5		17.4	0.2		0.4	0.1	
Delay (s)	44.6	16.7	0.9	47.8	39.4		49.4	25.8		26.7	25.1	



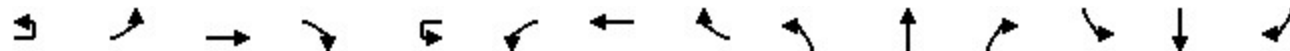
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service	D	B	A	D	D		D	C		C	C	
Approach Delay (s/veh)		14.0			39.6			43.6			26.1	
Approach LOS		B			D			D			C	

Intersection Summary		
HCM 2000 Control Delay (s/veh)	26.6	HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio	0.84	
Actuated Cycle Length (s)	95.1	Sum of lost time (s) 15.0
Intersection Capacity Utilization	69.3%	ICU Level of Service C
Analysis Period (min)	15	

c Critical Lane Group

\_7.1 - 2032 Build Weekday Morning  
 2: Federal Street/Old River Road & River Road

02/24/2026



Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		RT	LT			RT	LT			RT	LT		RT	LT
Traffic Volume (vph)	1	286	1405	266	7	49	1090	117	57	1	11	80	20	236
Future Volume (vph)	1	286	1405	266	7	49	1090	117	57	1	11	80	20	236
Lane Util. Factor	0.95	0.97	0.95	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.976				0.985				0.850			0.850
Flt Protected		0.950				0.950				0.953			0.962	
Satd. Flow (prot)	0	3502	3437	0	0	1685	3233	0	0	1835	1615	0	1799	1812
Flt Permitted		0.950				0.950				0.645			0.727	
Satd. Flow (perm)	0	3502	3437	0	0	1685	3233	0	0	1242	1615	0	1360	1812
Satd. Flow (RTOR)			58				30				187			265
Adj. Flow (vph)	1	311	1527	289	8	53	1185	127	62	1	12	87	22	257
Lane Group Flow (vph)	0	312	1816	0	0	61	1312	0	0	63	12	0	109	257
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA	Perm	Perm	NA	Free
Protected Phases	5	5	2		1	1	6			8			3	
Permitted Phases									8		8	3		Free
Detector Phase	5	5	2		1	1	6		8	8	8	3	3	
Switch Phase														
Minimum Initial (s)	6.0	6.0	6.0		6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	11.0	11.0		11.0	11.0	11.0		11.0	11.0	11.0	11.0	11.0	
Total Split (s)	11.0	11.0	47.0		11.0	11.0	47.0		12.0	12.0	12.0	12.0	12.0	
Total Split (%)	15.7%	15.7%	67.1%		15.7%	15.7%	67.1%		17.1%	17.1%	17.1%	17.1%	17.1%	
Maximum Green (s)	6.0	6.0	42.0		6.0	6.0	42.0		7.0	7.0	7.0	7.0	7.0	
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		-1.0	-1.0			-1.0	-1.0			-1.0	-1.0		-1.0	
Total Lost Time (s)		4.0	4.0			4.0	4.0			4.0	4.0		4.0	
Lead/Lag	Lead	Lead	Lead		Lag	Lag	Lag							
Lead-Lag Optimize?														
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	None	C-Min		None	None	C-Min		None	None	None	None	None	
v/c Ratio		0.75	0.73			0.36	0.65			0.44	0.03		0.69	0.14
Control Delay (s/veh)		41.5	8.4			36.0	10.5			39.1	0.2		54.8	0.2
Queue Delay		0.0	0.0			0.0	0.0			0.0	0.0		0.0	0.0
Total Delay (s/veh)		41.5	8.4			36.0	10.5			39.1	0.2		54.8	0.2

\_7.1 - 2032 Build Weekday Morning  
 2: Federal Street/Old River Road & River Road

02/24/2026



Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		64	83			25	174			26	0		46	0
Queue Length 95th (ft)		m#135	283			60	240			62	0		#120	0
Internal Link Dist (ft)			654				1435			1094			310	
Turn Bay Length (ft)		500				170					165			100
Base Capacity (vph)		418	2484			168	2084			147	357		162	1812
Starvation Cap Reductn		0	0			0	0			0	0		0	0
Spillback Cap Reductn		0	0			0	0			0	0		0	0
Storage Cap Reductn		0	0			0	0			0	0		0	0
Reduced v/c Ratio		0.75	0.73			0.36	0.63			0.43	0.03		0.67	0.14

Intersection Summary

Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 60 (86%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Federal Street/Old River Road & River Road



\_7.1 - 2032 Build Weekday Morning  
 2: Federal Street/Old River Road & River Road

02/24/2026



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		RT	LT			RT	LT			LT	RT		LT	RT
Traffic Volume (vph)	1	286	1405	266	7	49	1090	117	57	1	11	80	20	236
Future Volume (vph)	1	286	1405	266	7	49	1090	117	57	1	11	80	20	236
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10	11	11	13	13	12	12	12	16
Total Lost time (s)		4.0	4.0			4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.97	0.95			1.00	0.95			1.00	1.00		1.00	1.00
Frt		1.00	0.98			1.00	0.99			1.00	0.85		1.00	0.85
Flt Protected		0.95	1.00			0.95	1.00			0.95	1.00		0.96	1.00
Satd. Flow (prot)		3502	3437			1685	3234			1835	1615		1798	1812
Flt Permitted		0.95	1.00			0.95	1.00			0.64	1.00		0.73	1.00
Satd. Flow (perm)		3502	3437			1685	3234			1241	1615		1359	1812
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	311	1527	289	8	53	1185	127	62	1	12	87	22	257
RTOR Reduction (vph)	0	0	19	0	0	0	12	0	0	0	11	0	0	0
Lane Group Flow (vph)	0	312	1797	0	0	61	1300	0	0	63	1	0	109	257
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	7%	0%	2%	0%	0%	2%	0%	1%
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA	Perm	Perm	NA	Free
Protected Phases	5	5	2		1	1	6			8			3	
Permitted Phases									8		8	3		Free
Actuated Green, G (s)		7.4	45.5			3.6	41.7			5.9	5.9		5.9	70.0
Effective Green, g (s)		8.4	46.5			4.6	42.7			6.9	6.9		6.9	70.0
Actuated g/C Ratio		0.12	0.66			0.07	0.61			0.10	0.10		0.10	1.00
Clearance Time (s)		5.0	5.0			5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		2.0	2.0			2.0	2.0			2.0	2.0		2.0	
Lane Grp Cap (vph)		420	2283			110	1972			122	159		133	1812
v/s Ratio Prot		0.09	c0.52			0.04	c0.40							
v/s Ratio Perm										0.05	0.00		c0.08	0.14
v/c Ratio		0.74	0.79			0.55	0.66			0.52	0.01		0.82	0.14
Uniform Delay, d1		29.8	8.3			31.7	8.9			30.0	28.5		30.9	0.0
Progression Factor		0.99	0.76			1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		4.5	2.1			3.4	1.7			1.5	0.0		29.6	0.2
Delay (s)		34.2	8.4			35.1	10.7			31.5	28.5		60.6	0.2

\_7.1 - 2032 Build Weekday Morning  
 2: Federal Street/Old River Road & River Road

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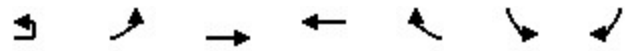
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service		C	A			D	B			C	C		E	A
Approach Delay (s/veh)			12.2				11.7			31.0			18.2	
Approach LOS			B			B				C			B	

Intersection Summary	
HCM 2000 Control Delay (s/veh)	12.9 HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio	0.82
Actuated Cycle Length (s)	70.0 Sum of lost time (s) 13.0
Intersection Capacity Utilization	76.1% ICU Level of Service D
Analysis Period (min)	15

c Critical Lane Group

\_7.1 - 2032 Build Weekday Morning  
 3: River Road & I-93 Northbound Ramps

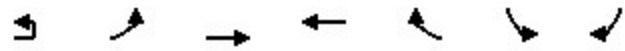
02/24/2026



Lane Group	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑	↑↑	↗	↔↔	↔↔
Traffic Volume (vph)	7	313	1414	795	587	542	661
Future Volume (vph)	7	313	1414	795	587	542	661
Lane Util. Factor	0.95	0.97	0.95	0.95	1.00	0.97	0.88
Frt					0.850		0.850
Flt Protected		0.950				0.950	
Satd. Flow (prot)	0	3258	3539	3406	1538	3400	2787
Flt Permitted		0.950				0.950	
Satd. Flow (perm)	0	3258	3539	3406	1538	3400	2787
Satd. Flow (RTOR)					638		
Adj. Flow (vph)	8	340	1537	864	638	589	718
Lane Group Flow (vph)	0	348	1537	864	638	589	718
Turn Type	Prot	Prot	NA	NA	Free	Prot	pt+ov
Protected Phases	5!	5	2	6		3	3 5!
Permitted Phases					Free		
Detector Phase	5	5	2	6		3	3 5
Switch Phase							
Minimum Initial (s)	6.0	6.0	6.0	6.0		6.0	
Minimum Split (s)	11.0	11.0	11.0	11.0		11.0	
Total Split (s)	17.0	17.0	47.0	30.0		23.0	
Total Split (%)	24.3%	24.3%	67.1%	42.9%		32.9%	
Maximum Green (s)	12.0	12.0	42.0	25.0		18.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0		1.0	
Lost Time Adjust (s)		-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)		4.0	4.0	4.0		4.0	
Lead/Lag	Lead	Lead		Lag			
Lead-Lag Optimize?							
Vehicle Extension (s)	2.0	2.0	2.0	2.0		2.0	
Recall Mode	None	None	C-Min	C-Min		Min	
v/c Ratio		0.62	0.68	0.62	0.41	0.69	0.54
Control Delay (s/veh)		35.0	6.9	13.1	0.7	28.4	14.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)		35.0	6.9	13.1	0.7	28.4	14.1

\_7.1 - 2032 Build Weekday Morning  
 3: River Road & I-93 Northbound Ramps

02/24/2026



Lane Group	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		70	104	83	0	119	108
Queue Length 95th (ft)		102	134	154	0	169	156
Internal Link Dist (ft)			1040	654		885	
Turn Bay Length (ft)		650					650
Base Capacity (vph)		610	2249	1387	1538	922	1333
Starvation Cap Reductn		0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0
Reduced v/c Ratio		0.57	0.68	0.62	0.41	0.64	0.54

Intersection Summary

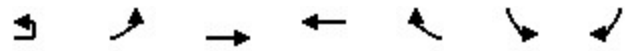
Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 45  
 Control Type: Actuated-Coordinated  
 ! Phase conflict between lane groups.

Splits and Phases: 3: River Road & I-93 Northbound Ramps



\_7.1 - 2032 Build Weekday Morning  
 3: River Road & I-93 Northbound Ramps

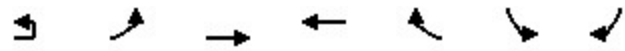
02/24/2026



Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑	↑↑	↔	↔↔	↔↔
Traffic Volume (vph)	7	313	1414	795	587	542	661
Future Volume (vph)	7	313	1414	795	587	542	661
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	12
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		0.97	0.95	0.95	1.00	0.97	0.88
Frt		1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected		0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		3258	3539	3406	1538	3400	2787
Flt Permitted		0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		3258	3539	3406	1538	3400	2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	340	1537	864	638	589	718
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	348	1537	864	638	589	718
Heavy Vehicles (%)	0%	4%	2%	6%	5%	3%	2%
Turn Type	Prot	Prot	NA	NA	Free	Prot	pt+ov
Protected Phases	5!	5	2	6		3	3 5!
Permitted Phases					Free		
Actuated Green, G (s)		11.0	43.5	27.5	70.0	16.5	32.5
Effective Green, g (s)		12.0	44.5	28.5	70.0	17.5	33.5
Actuated g/C Ratio		0.17	0.64	0.41	1.00	0.25	0.48
Clearance Time (s)		5.0	5.0	5.0		5.0	
Vehicle Extension (s)		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)		558	2249	1386	1538	850	1333
v/s Ratio Prot		0.11	c0.43	0.25		c0.17	0.26
v/s Ratio Perm					0.41		
v/c Ratio		0.62	0.68	0.62	0.41	0.69	0.54
Uniform Delay, d1		26.9	8.2	16.5	0.0	23.8	12.8
Progression Factor		1.16	0.64	0.64	1.00	1.00	1.00
Incremental Delay, d2		1.2	1.3	1.8	0.7	2.0	0.2
Delay (s)		32.3	6.5	12.4	0.7	25.8	13.0

\_7.1 - 2032 Build Weekday Morning  
 3: River Road & I-93 Northbound Ramps

02/24/2026



Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Level of Service		C	A	B	A	C	B
Approach Delay (s/veh)			11.3	7.4		18.8	
Approach LOS			B	A		B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		
! Phase conflict between lane groups.			
c Critical Lane Group			

\_7.1 - 2032 Build Weekday Morning  
4: I-93 Southbound Ramps & River Road

02/24/2026

	→	↘	↙	↗	←	↖	↗
Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗		↘↗	↑↑	↘↗	↗
Traffic Volume (vph)	616	208	2	303	1158	1169	1116
Future Volume (vph)	616	208	2	303	1158	1169	1116
Lane Util. Factor	0.95	1.00	0.95	0.97	0.95	0.97	1.00
Frt		0.850					0.850
Flt Protected				0.950		0.950	
Satd. Flow (prot)	3438	1711	0	3136	3505	3433	1812
Flt Permitted				0.950		0.950	
Satd. Flow (perm)	3438	1711	0	3136	3505	3433	1812
Satd. Flow (RTOR)		226					727
Adj. Flow (vph)	670	226	2	329	1259	1271	1213
Lane Group Flow (vph)	670	226	0	331	1259	1271	1213
Turn Type	NA	Free	Prot	Prot	NA	Prot	Free
Protected Phases	2		1	1	6	8	
Permitted Phases		Free					Free
Detector Phase	2		1	1	6	8	
Switch Phase							
Minimum Initial (s)	6.0		6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0		11.0	11.0	11.0	27.0	
Total Split (s)	24.0		13.0	13.0	37.0	33.0	
Total Split (%)	34.3%		18.6%	18.6%	52.9%	47.1%	
Maximum Green (s)	19.0		8.0	8.0	32.0	28.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-1.0			-1.0	-1.0	-1.0	
Total Lost Time (s)	4.0			4.0	4.0	4.0	
Lead/Lag	Lag		Lead	Lead			
Lead-Lag Optimize?							
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	
Recall Mode	C-Min		None	None	C-Min	Min	
Walk Time (s)						6.0	
Flash Don't Walk (s)						16.0	
Pedestrian Calls (#/hr)						0	
v/c Ratio	0.69	0.13		0.77	0.75	0.90	0.67

\_7.1 - 2032 Build Weekday Morning  
 4: I-93 Southbound Ramps & River Road

02/24/2026

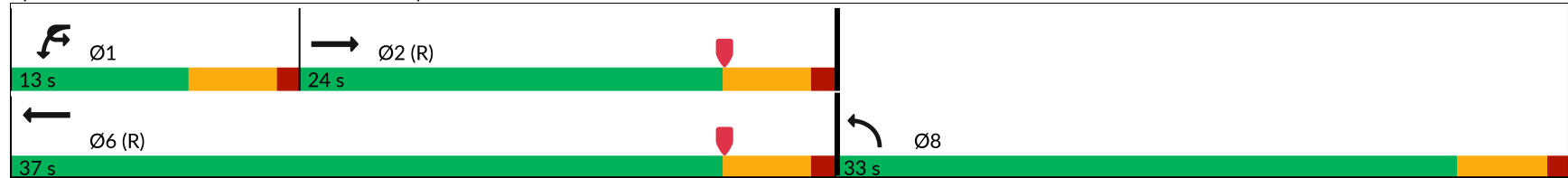


Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Control Delay (s/veh)	19.3	0.1		38.9	15.0	30.2	2.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay (s/veh)	19.3	0.1		38.9	15.0	30.2	2.0
Queue Length 50th (ft)	116	0		75	219	250	0
Queue Length 95th (ft)	161	m0		#142	314	#390	0
Internal Link Dist (ft)	1168				1040	800	
Turn Bay Length (ft)		430		250			480
Base Capacity (vph)	1007	1711		432	1684	1438	1812
Starvation Cap Reductn	0	0		0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0
Reduced v/c Ratio	0.67	0.13		0.77	0.75	0.88	0.67

Intersection Summary

Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 34 (49%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-93 Southbound Ramps & River Road



\_7.1 - 2032 Build Weekday Morning  
4: I-93 Southbound Ramps & River Road

02/24/2026

	→	↘	↙	↗	←	↖	↗
Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↘↗	↑↑	↘↗	↑
Traffic Volume (vph)	616	208	2	303	1158	1169	1116
Future Volume (vph)	616	208	2	303	1158	1169	1116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	11	11	12	12	16
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00		0.97	0.95	0.97	1.00
Frt	1.00	0.85		1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3438	1711		3136	3505	3433	1812
Flt Permitted	1.00	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3438	1711		3136	3505	3433	1812
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	670	226	2	329	1259	1271	1213
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	670	226	0	331	1259	1271	1213
Heavy Vehicles (%)	5%	7%	0%	8%	3%	2%	1%
Turn Type	NA	Free	Prot	Prot	NA	Prot	Free
Protected Phases	2		1	1	6	8	
Permitted Phases		Free					Free
Actuated Green, G (s)	18.7	70.0		8.6	32.3	27.7	70.0
Effective Green, g (s)	19.7	70.0		9.6	33.3	28.7	70.0
Actuated g/C Ratio	0.28	1.00		0.14	0.48	0.41	1.00
Clearance Time (s)	5.0			5.0	5.0	5.0	
Vehicle Extension (s)	2.0			2.0	2.0	2.0	
Lane Grp Cap (vph)	967	1711		430	1667	1407	1812
v/s Ratio Prot	0.19			0.11	c0.36	c0.37	
v/s Ratio Perm		0.13					c0.67
v/c Ratio	0.69	0.13		0.77	0.76	0.90	0.67
Uniform Delay, d1	22.4	0.0		29.1	15.0	19.4	0.0
Progression Factor	0.67	1.00		0.91	0.79	1.00	1.00
Incremental Delay, d2	3.8	0.1		6.1	2.7	8.2	2.0
Delay (s)	18.9	0.1		32.6	14.5	27.6	2.0

\_7.1 - 2032 Build Weekday Morning  
 4: I-93 Southbound Ramps & River Road

02/24/2026



Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Level of Service	B	A		C	B	C	A
Approach Delay (s/veh)	14.2				18.3	15.1	
Approach LOS	B				B	B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	15.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

\_7.1 - 2032 Build Weekday Morning  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	423	75	439	719	945	20	3	94	228	2	16
Future Volume (vph)	47	423	75	439	719	945	20	3	94	228	2	16
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	0.88	0.95	0.95	1.00
Frt		0.977				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.958		0.950	0.953	
Satd. Flow (prot)	1805	3468	0	3351	1863	1599	0	1699	2668	1573	1580	1615
Flt Permitted	0.950			0.950				0.958		0.950	0.953	
Satd. Flow (perm)	1805	3468	0	3351	1863	1599	0	1699	2668	1573	1580	1615
Satd. Flow (RTOR)		32				743						343
Adj. Flow (vph)	51	460	82	477	782	1027	22	3	102	248	2	17
Lane Group Flow (vph)	51	542	0	477	782	1027	0	25	102	124	126	17
Turn Type	Prot	NA		Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	5	2		1	6		8	8	8 1	3	3	
Permitted Phases						Free						Free
Detector Phase	5	2		1	6		8	8	8 1	3	3	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Total Split (s)	11.0	28.0		20.0	37.0		11.0	11.0		11.0	11.0	
Total Split (%)	15.7%	40.0%		28.6%	52.9%		15.7%	15.7%		15.7%	15.7%	
Maximum Green (s)	6.0	23.0		15.0	32.0		6.0	6.0		6.0	6.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0			-1.0		-1.0	-1.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	
v/c Ratio	0.28	0.40		0.69	0.76	0.64		0.15	0.12	0.71	0.72	0.01
Control Delay (s/veh)	33.6	16.8		27.5	20.1	1.1		31.1	14.7	55.7	56.4	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 (s/veh)	33.6	16.8		27.5	20.1	1.1		31.1	14.7	55.7	56.4	0.0

7.1 - 2032 Build Weekday Morning  
**5: Shattuck Road/Minuteman Road & River Road**

02/24/2026



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	21	87		93	284	0		10	16	60	56	0
Queue Length 95th (ft)	52	131		m120	m#465	m0		32	32	#156	#147	0
Internal Link Dist (ft)		1189			1168			1114			744	
Turn Bay Length (ft)	80			350					200			150
Base Capacity (vph)	180	1368		765	1032	1599		169	945	175	176	1615
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	0.28	0.40		0.62	0.76	0.64		0.15	0.11	0.71	0.72	0.01

**Intersection Summary**

Cycle Length: 70

Actuated Cycle Length: 70

Offset: 2 (3%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 70

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

**Splits and Phases: 5: Shattuck Road/Minuteman Road & River Road**



\_7.1 - 2032 Build Weekday Morning  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	423	75	439	719	945	20	3	94	228	2	16
Future Volume (vph)	47	423	75	439	719	945	20	3	94	228	2	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	12	12	10	10	11	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1805	3469		3351	1863	1599		1699	2668	1573	1580	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (perm)	1805	3469		3351	1863	1599		1699	2668	1573	1580	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	460	82	477	782	1027	22	3	102	248	2	17
RTOR Reduction (vph)	0	20	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	51	522	0	477	782	1027	0	25	102	124	126	17
Heavy Vehicles (%)	0%	2%	0%	1%	2%	1%	0%	0%	3%	9%	0%	0%
Turn Type	Prot	NA		Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	5	2		1	6		8	8	8 1	3	3	
Permitted Phases						Free						Free
Actuated Green, G (s)	3.6	25.0		13.4	34.8	70.0		4.8	23.2	6.8	6.8	70.0
Effective Green, g (s)	4.6	26.0		14.4	35.8	70.0		5.8	24.2	7.8	7.8	70.0
Actuated g/C Ratio	0.07	0.37		0.21	0.51	1.00		0.08	0.35	0.11	0.11	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	118	1288		689	952	1599		140	922	175	176	1615
v/s Ratio Prot	0.03	0.15		0.14	c0.42			0.01	0.04	0.08	0.08	
v/s Ratio Perm						c0.64						0.01
v/c Ratio	0.43	0.41		0.69	0.82	0.64		0.18	0.11	0.71	0.72	0.01
Uniform Delay, d1	31.4	16.3		25.7	14.4	0.0		29.9	15.6	30.0	30.0	0.0
Progression Factor	1.00	1.00		0.95	1.07	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.9		1.3	4.5	1.1		0.2	0.0	10.2	10.9	0.0
Delay (s)	32.4	17.2		25.8	19.9	1.1		30.1	15.6	40.2	41.0	0.0

\_7.1 - 2032 Build Weekday Morning  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service	C	B		C	B	A		C	B	D	D	A
Approach Delay (s/veh)		18.5			12.7			18.5			38.0	
Approach LOS		B			B			B			D	

Intersection Summary		
HCM 2000 Control Delay (s/veh)	16.0	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.93	
Actuated Cycle Length (s)	70.0	Sum of lost time (s)
Intersection Capacity Utilization	65.9%	ICU Level of Service
Analysis Period (min)	15	

c Critical Lane Group

\_8.1 - 2032 Build Mitigated Weekday Evening  
 1: North Street/Greater Lawrence Tech & River Road

02/24/2026

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	29	611	340	24	835	12	220	21	27	16	14	14	
Future Volume (vph)	29	611	340	24	835	12	220	21	27	16	14	14	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850		0.998			0.916			0.925		
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1532	3355	1546	1745	3415	0	1711	1611	0	1745	1699	0	
Flt Permitted	0.950			0.950			0.738			0.723			
Satd. Flow (perm)	1532	3355	1546	1745	3415	0	1329	1611	0	1328	1699	0	
Satd. Flow (RTOR)			315		1			29			15		
Adj. Flow (vph)	32	664	370	26	908	13	239	23	29	17	15	15	
Lane Group Flow (vph)	32	664	370	26	921	0	239	52	0	17	30	0	
Turn Type	Prot	NA	Free	Prot	NA		Perm	NA		Perm	NA		
Protected Phases	5	2		1	6			4			8		9
Permitted Phases			Free				4			8			
Detector Phase	5	2		1	6		4	4		8	8		
Switch Phase													
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	5.0		5.0	5.0		5.0
Minimum Split (s)	11.0	16.0		11.0	16.0		10.0	10.0		10.0	10.0		23.0
Total Split (s)	11.0	42.0		11.0	42.0		33.0	33.0		33.0	33.0		23.0
Total Split (%)	10.1%	38.5%		10.1%	38.5%		30.3%	30.3%		30.3%	30.3%		21%
Maximum Green (s)	5.0	36.0		5.0	36.0		28.0	28.0		28.0	28.0		20.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		2.0
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0		1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.0	-1.0		-1.0	-1.0		
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		
Lead/Lag	Lead	Lag		Lead	Lag								
Lead-Lag Optimize?	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
Recall Mode	None	Min		None	Min		None	None		None	None		None
Walk Time (s)													7.0
Flash Don't Walk (s)													13.0
Pedestrian Calls (#/hr)													4
v/c Ratio	0.17	0.43	0.24	0.12	0.59		0.58	0.10		0.04	0.06		

\_8.1 - 2032 Build Mitigated Weekday Evening  
 1: North Street/Greater Lawrence Tech & River Road

02/24/2026

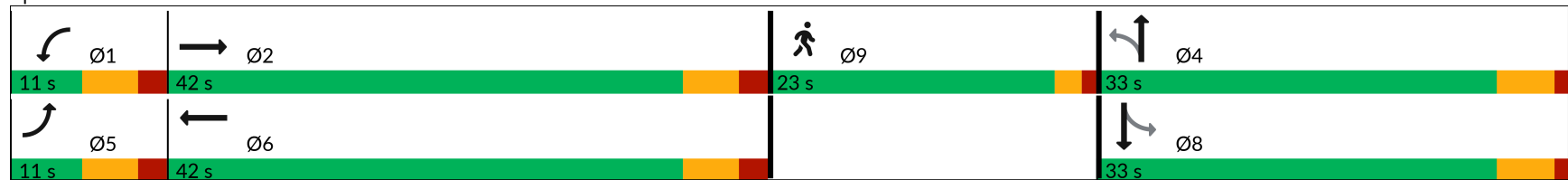


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Control Delay (s/veh)	39.4	16.5	0.4	39.0	18.5		30.1	14.4		23.3	16.4		
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0		
Total Delay (s/veh)	39.4	16.5	0.4	39.0	18.5		30.1	14.4		23.3	16.4		
Queue Length 50th (ft)	11	67	0	8	101		62	5		4	3		
Queue Length 95th (ft)	58	264	0	46	384		245	44		27	31		
Internal Link Dist (ft)		1435			1194			1039			1055		
Turn Bay Length (ft)	150		200	130						100			
Base Capacity (vph)	192	2293	1546	219	2335		693	854		692	893		
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0		
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0		
Storage Cap Reductn	0	0	0	0	0		0	0		0	0		
Reduced v/c Ratio	0.17	0.29	0.24	0.12	0.39		0.34	0.06		0.02	0.03		

Intersection Summary

Cycle Length: 109  
 Actuated Cycle Length: 64.1  
 Natural Cycle: 80  
 Control Type: Actuated-Uncoordinated

Splits and Phases: 1: North Street/Greater Lawrence Tech & River Road



\_8.1 - 2032 Build Mitigated Weekday Evening  
 1: North Street/Greater Lawrence Tech & River Road

02/24/2026



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	611	340	24	835	12	220	21	27	16	14	14
Future Volume (vph)	29	611	340	24	835	12	220	21	27	16	14	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	11	11	11	11	11	11	11	11	11
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.92		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1532	3355	1546	1745	3415		1711	1611		1745	1699	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.74	1.00		0.72	1.00	
Satd. Flow (perm)	1532	3355	1546	1745	3415		1328	1611		1328	1699	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	664	370	26	908	13	239	23	29	17	15	15
RTOR Reduction (vph)	0	0	0	0	1	0	0	21	0	0	11	0
Lane Group Flow (vph)	32	664	370	26	920	0	239	31	0	17	19	0
Heavy Vehicles (%)	10%	4%	1%	0%	2%	0%	2%	5%	4%	0%	0%	0%
Turn Type	Prot	NA	Free	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4				8
Permitted Phases			Free				4			8		
Actuated Green, G (s)	1.4	26.9	69.3	1.4	26.9		18.6	18.6		18.6	18.6	
Effective Green, g (s)	3.4	28.9	69.3	3.4	28.9		19.6	19.6		19.6	19.6	
Actuated g/C Ratio	0.05	0.42	1.00	0.05	0.42		0.28	0.28		0.28	0.28	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	75	1399	1546	85	1424		375	455		375	480	
v/s Ratio Prot	0.02	0.20		0.01	c0.27			0.02			0.01	
v/s Ratio Perm			c0.24				c0.18			0.01		
v/c Ratio	0.43	0.47	0.24	0.31	0.65		0.64	0.07		0.05	0.04	
Uniform Delay, d1	32.0	14.7	0.0	31.8	16.1		21.7	18.2		18.1	18.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.9	0.3	0.4	2.0	1.0		3.5	0.1		0.1	0.0	
Delay (s)	35.9	14.9	0.4	33.9	17.1		25.3	18.2		18.1	18.1	

\_8.1 - 2032 Build Mitigated Weekday Evening  
 1: North Street/Greater Lawrence Tech & River Road

02/24/2026



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service	D	B	A	C	B		C	B		B	B	
Approach Delay (s/veh)		10.5			17.6			24.0			18.1	
Approach LOS		B			B			C			B	

Intersection Summary		
HCM 2000 Control Delay (s/veh)	15.2	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.63	
Actuated Cycle Length (s)	69.3	Sum of lost time (s)
Intersection Capacity Utilization	49.6%	ICU Level of Service
Analysis Period (min)	15	

c Critical Lane Group

\_8.1 - 2032 Build Mitigated Weekday Evening  
 2: Federal Street/Old River Road & River Road

02/24/2026



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Volume (vph)	3	170	911	46	5	998	62	280	7	58	88	2	367
Future Volume (vph)	3	170	911	46	5	998	62	280	7	58	88	2	367
Lane Util. Factor	0.95	0.97	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.993			0.991				0.850			0.850
Flt Protected		0.950			0.950				0.954			0.953	
Satd. Flow (prot)	0	3401	3453	0	1685	3394	0	0	1873	1615	0	1759	1830
Flt Permitted		0.950			0.950				0.661			0.425	
Satd. Flow (perm)	0	3401	3453	0	1685	3394	0	0	1298	1615	0	784	1830
Satd. Flow (RTOR)			8			9				164			288
Adj. Flow (vph)	3	185	990	50	5	1085	67	304	8	63	96	2	399
Lane Group Flow (vph)	0	188	1040	0	5	1152	0	0	312	63	0	98	399
Turn Type	Prot	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Free
Protected Phases	5	5	2		1	6			8			3	
Permitted Phases								8		8	3		Free
Detector Phase	5	5	2		1	6		8	8	8	3	3	
Switch Phase													
Minimum Initial (s)	6.0	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	11.0	11.0		11.0	11.0		11.0	11.0	11.0	11.0	11.0	
Total Split (s)	11.0	11.0	36.0		11.0	36.0		33.0	33.0	33.0	33.0	33.0	
Total Split (%)	13.8%	13.8%	45.0%		13.8%	45.0%		41.3%	41.3%	41.3%	41.3%	41.3%	
Maximum Green (s)	6.0	6.0	31.0		6.0	31.0		28.0	28.0	28.0	28.0	28.0	
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		-1.0	-1.0		-1.0	-1.0			-1.0	-1.0		-1.0	
Total Lost Time (s)		4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lead/Lag	Lead	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?													
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	None	C-Min		None	C-Min		None	None	None	None	None	
v/c Ratio		0.55	0.52		0.03	0.75			0.81	0.11		0.42	0.22
Control Delay (s/veh)		47.2	5.4		34.0	23.1			42.8	0.4		27.2	0.3
Queue Delay		0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay (s/veh)		47.2	5.4		34.0	23.1			42.8	0.4		27.2	0.3

\_8.1 - 2032 Build Mitigated Weekday Evening  
 2: Federal Street/Old River Road & River Road

02/24/2026



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		46	77		2	260			141	0		38	0
Queue Length 95th (ft)		#80	114		13	#363			220	0		76	0
Internal Link Dist (ft)			654			1435			1094			310	
Turn Bay Length (ft)		500			170					165			100
Base Capacity (vph)		344	1996		147	1544			470	689		284	1830
Starvation Cap Reductn		0	0		0	0			0	0		0	0
Spillback Cap Reductn		0	0		0	0			0	0		0	0
Storage Cap Reductn		0	0		0	0			0	0		0	0
Reduced v/c Ratio		0.55	0.52		0.03	0.75			0.66	0.09		0.35	0.22

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 58 (73%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

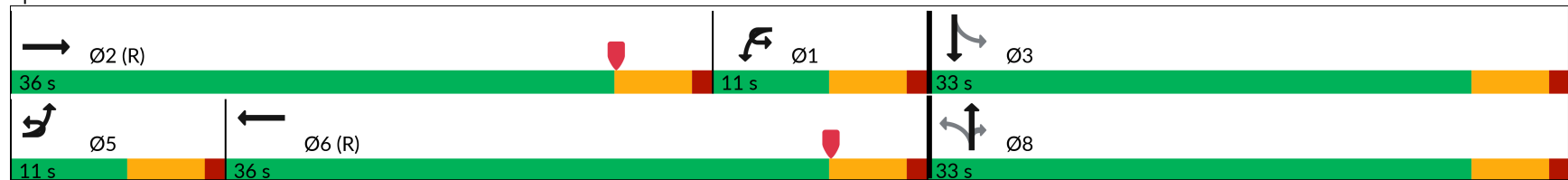
Natural Cycle: 60

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Federal Street/Old River Road & River Road



\_8.1 - 2032 Build Mitigated Weekday Evening  
 2: Federal Street/Old River Road & River Road

02/24/2026



Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕		↔	↕			↕	↕		↕	↕
Traffic Volume (vph)	3	170	911	46	5	998	62	280	7	58	88	2	367
Future Volume (vph)	3	170	911	46	5	998	62	280	7	58	88	2	367
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	11	11	13	13	12	12	12	16
Total Lost time (s)		4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.97	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt		1.00	0.99		1.00	0.99			1.00	0.85		1.00	0.85
Flt Protected		0.95	1.00		0.95	1.00			0.95	1.00		0.95	1.00
Satd. Flow (prot)		3401	3453		1685	3395			1872	1615		1760	1830
Flt Permitted		0.95	1.00		0.95	1.00			0.66	1.00		0.42	1.00
Satd. Flow (perm)		3401	3453		1685	3395			1298	1615		784	1830
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	185	990	50	5	1085	67	304	8	63	96	2	399
RTOR Reduction (vph)	0	0	4	0	0	5	0	0	0	44	0	0	0
Lane Group Flow (vph)	0	188	1036	0	5	1147	0	0	312	19	0	98	399
Heavy Vehicles (%)	0%	3%	4%	0%	0%	2%	0%	0%	0%	0%	3%	0%	0%
Turn Type	Prot	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Free
Protected Phases	5	5	2		1	6			8			3	
Permitted Phases								8		8	3		Free
Actuated Green, G (s)		7.1	41.2		1.2	35.3			22.6	22.6		22.6	80.0
Effective Green, g (s)		8.1	42.2		2.2	36.3			23.6	23.6		23.6	80.0
Actuated g/C Ratio		0.10	0.53		0.03	0.45			0.30	0.30		0.30	1.00
Clearance Time (s)		5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		2.0	2.0		2.0	2.0			2.0	2.0		2.0	
Lane Grp Cap (vph)		344	1821		46	1540			382	476		231	1830
v/s Ratio Prot		0.06	c0.30		0.00	c0.34							
v/s Ratio Perm								c0.24	0.01			0.13	0.22
v/c Ratio		0.55	0.57		0.11	0.74			0.82	0.04		0.42	0.22
Uniform Delay, d1		34.2	12.8		37.9	18.0			26.2	20.1		22.7	0.0
Progression Factor		1.19	0.36		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		0.9	1.2		0.4	3.3			12.1	0.0		0.5	0.3
Delay (s)		41.7	5.9		38.3	21.3			38.2	20.1		23.2	0.3

\_8.1 - 2032 Build Mitigated Weekday Evening  
 2: Federal Street/Old River Road & River Road

02/24/2026

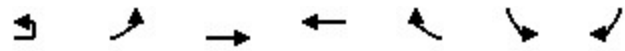


Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Level of Service		D	A		D	C			D	C		C	A	
Approach Delay (s/veh)			11.3			21.4			35.2			4.8		
Approach LOS			B			C			D			A		
<b>Intersection Summary</b>														
HCM 2000 Control Delay (s/veh)			16.7		HCM 2000 Level of Service					B				
HCM 2000 Volume to Capacity ratio			0.77											
Actuated Cycle Length (s)			80.0		Sum of lost time (s)					13.0				
Intersection Capacity Utilization			67.1%		ICU Level of Service					C				
Analysis Period (min)			15											

c Critical Lane Group

\_8.1 - 2032 Build Mitigated Weekday Evening  
 3: River Road & I-93 Northbound Ramps

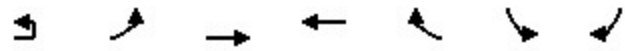
02/24/2026



Lane Group	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑	↑↑	↗	↔↔	↔↔
Traffic Volume (vph)	1	882	915	844	803	214	216
Future Volume (vph)	1	882	915	844	803	214	216
Lane Util. Factor	0.95	0.97	0.95	0.95	1.00	0.97	0.88
Frt					0.850		0.850
Flt Protected		0.950				0.950	
Satd. Flow (prot)	0	3319	3505	3539	1599	3367	2733
Flt Permitted		0.950				0.950	
Satd. Flow (perm)	0	3319	3505	3539	1599	3367	2733
Satd. Flow (RTOR)					620		
Adj. Flow (vph)	1	959	995	917	873	233	235
Lane Group Flow (vph)	0	960	995	917	873	233	235
Turn Type	Prot	Prot	NA	NA	Free	Prot	pt+ov
Protected Phases	5!	5	2	6		3	3 5!
Permitted Phases					Free		
Detector Phase	5	5	2	6		3	3 5
Switch Phase							
Minimum Initial (s)	6.0	6.0	6.0	6.0		6.0	
Minimum Split (s)	11.0	11.0	11.0	11.0		11.0	
Total Split (s)	34.0	34.0	68.0	34.0		12.0	
Total Split (%)	42.5%	42.5%	85.0%	42.5%		15.0%	
Maximum Green (s)	29.0	29.0	63.0	29.0		7.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0		1.0	
Lost Time Adjust (s)		-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)		4.0	4.0	4.0		4.0	
Lead/Lag	Lead	Lead		Lag			
Lead-Lag Optimize?							
Vehicle Extension (s)	2.0	2.0	2.0	2.0		2.0	
Recall Mode	None	None	C-Min	C-Min		Min	
v/c Ratio		0.84	0.36	0.66	0.55	0.61	0.17
Control Delay (s/veh)		17.7	1.3	15.2	2.2	42.0	10.6
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)		17.7	1.3	15.2	2.2	42.0	10.6

\_8.1 - 2032 Build Mitigated Weekday Evening  
 3: River Road & I-93 Northbound Ramps

02/24/2026

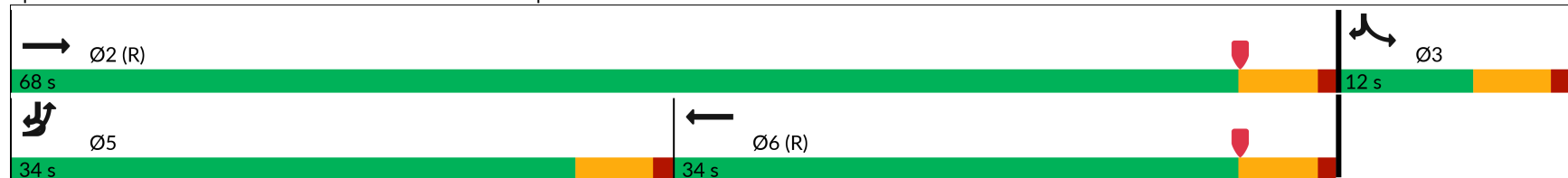


Lane Group	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		102	17	117	22	58	31
Queue Length 95th (ft)		m107	m16	165	48	#108	54
Internal Link Dist (ft)			1040	654		885	
Turn Bay Length (ft)		650					650
Base Capacity (vph)		1244	2804	1414	1599	380	1470
Starvation Cap Reductn		0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0
Reduced v/c Ratio		0.77	0.35	0.65	0.55	0.61	0.16

Intersection Summary

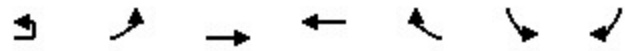
Cycle Length: 80  
 Actuated Cycle Length: 80  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.  
 ! Phase conflict between lane groups.

Splits and Phases: 3: River Road & I-93 Northbound Ramps



\_8.1 - 2032 Build Mitigated Weekday Evening  
 3: River Road & I-93 Northbound Ramps

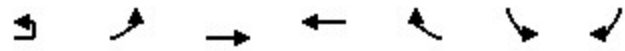
02/24/2026



Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (vph)	1	882	915	844	803	214	216
Future Volume (vph)	1	882	915	844	803	214	216
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	12
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		0.97	0.95	0.95	1.00	0.97	0.88
Frt		1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected		0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		3319	3505	3539	1599	3367	2733
Flt Permitted		0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		3319	3505	3539	1599	3367	2733
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	959	995	917	873	233	235
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	960	995	917	873	233	235
Heavy Vehicles (%)	0%	2%	3%	2%	1%	4%	4%
Turn Type	Prot	Prot	NA	NA	Free	Prot	pt+ov
Protected Phases	5!	5	2	6		3	3 5!
Permitted Phases					Free		
Actuated Green, G (s)		26.5	62.0	30.5	80.0	8.0	39.5
Effective Green, g (s)		27.5	63.0	31.5	80.0	9.0	40.5
Actuated g/C Ratio		0.34	0.79	0.39	1.00	0.11	0.51
Clearance Time (s)		5.0	5.0	5.0		5.0	
Vehicle Extension (s)		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)		1140	2760	1393	1599	378	1383
v/s Ratio Prot		c0.29	0.28	c0.26		0.07	0.09
v/s Ratio Perm					c0.55		
v/c Ratio		0.84	0.36	0.66	0.55	0.62	0.17
Uniform Delay, d1		24.2	2.5	19.8	0.0	33.9	10.7
Progression Factor		0.50	0.42	0.64	1.00	1.00	1.00
Incremental Delay, d2		4.1	0.3	1.9	1.1	2.1	0.0
Delay (s)		16.2	1.3	14.6	1.1	36.0	10.7

\_8.1 - 2032 Build Mitigated Weekday Evening  
 3: River Road & I-93 Northbound Ramps

02/24/2026










Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Level of Service		B	A	B	A	D	B
Approach Delay (s/veh)			8.6	8.0		23.3	
Approach LOS			A	A		C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	10.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		
! Phase conflict between lane groups.			
c Critical Lane Group			

\_8.1 - 2032 Build Mitigated Weekday Evening  
4: I-93 Southbound Ramps & River Road

02/24/2026

							
Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↓	↑↑	↓	↑
Traffic Volume (vph)	1208	768	3	517	541	353	587
Future Volume (vph)	1208	768	3	517	541	353	587
Lane Util. Factor	0.95	1.00	0.95	0.97	0.95	0.97	1.00
Frt		0.850					0.850
Flt Protected				0.950		0.950	
Satd. Flow (prot)	3574	1830	0	3352	3574	3467	1794
Flt Permitted				0.950		0.950	
Satd. Flow (perm)	3574	1830	0	3352	3574	3467	1794
Satd. Flow (RTOR)		835					588
Adj. Flow (vph)	1313	835	3	562	588	384	638
Lane Group Flow (vph)	1313	835	0	565	588	384	638
Turn Type	NA	Free	Prot	Prot	NA	Prot	Free
Protected Phases	2		1	1	6	8	
Permitted Phases		Free					Free
Detector Phase	2		1	1	6	8	
Switch Phase							
Minimum Initial (s)	6.0		6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0		11.0	11.0	11.0	27.0	
Total Split (s)	35.0		18.0	18.0	53.0	27.0	
Total Split (%)	43.8%		22.5%	22.5%	66.3%	33.8%	
Maximum Green (s)	30.0		13.0	13.0	48.0	22.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-1.0			-1.0	-1.0	-1.0	
Total Lost Time (s)	4.0			4.0	4.0	4.0	
Lead/Lag	Lag		Lead	Lead			
Lead-Lag Optimize?							
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	
Recall Mode	C-Min		None	None	C-Min	Min	
Walk Time (s)						6.0	
Flash Don't Walk (s)						16.0	
Pedestrian Calls (#/hr)						0	
v/c Ratio	0.85	0.46		0.70	0.23	0.62	0.36

\_8.1 - 2032 Build Mitigated Weekday Evening  
 4: I-93 Southbound Ramps & River Road

02/24/2026



Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Control Delay (s/veh)	23.6	0.6		43.9	1.4	34.7	0.6
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay (s/veh)	23.6	0.6		43.9	1.4	34.7	0.6
Queue Length 50th (ft)	224	0		149	7	93	0
Queue Length 95th (ft)	#471	m0		201	23	128	0
Internal Link Dist (ft)	1168				1040	800	
Turn Bay Length (ft)		430		250			480
Base Capacity (vph)	1542	1830		806	2582	996	1794
Starvation Cap Reductn	0	0		0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0
Reduced v/c Ratio	0.85	0.46		0.70	0.23	0.39	0.36

Intersection Summary








Cycle Length: 80  
 Actuated Cycle Length: 80  
 Offset: 26 (33%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-93 Southbound Ramps & River Road



\_8.1 - 2032 Build Mitigated Weekday Evening  
4: I-93 Southbound Ramps & River Road

02/24/2026

							
Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↔	↑↑	↔	↑
Traffic Volume (vph)	1208	768	3	517	541	353	587
Future Volume (vph)	1208	768	3	517	541	353	587
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	11	11	12	12	16
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00		0.97	0.95	0.97	1.00
Frt	1.00	0.85		1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3574	1830		3352	3574	3467	1794
Flt Permitted	1.00	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3574	1830		3352	3574	3467	1794
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1313	835	3	562	588	384	638
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	1313	835	0	565	588	384	638
Heavy Vehicles (%)	1%	0%	0%	1%	1%	1%	2%
Turn Type	NA	Free	Prot	Prot	NA	Prot	Free
Protected Phases	2		1	1	6	8	
Permitted Phases		Free					Free
Actuated Green, G (s)	33.5	80.0		18.3	56.8	13.2	80.0
Effective Green, g (s)	34.5	80.0		19.3	57.8	14.2	80.0
Actuated g/C Ratio	0.43	1.00		0.24	0.72	0.18	1.00
Clearance Time (s)	5.0			5.0	5.0	5.0	
Vehicle Extension (s)	2.0			2.0	2.0	2.0	
Lane Grp Cap (vph)	1541	1830		808	2582	615	1794
v/s Ratio Prot	c0.37			c0.17	0.16	c0.11	
v/s Ratio Perm		0.46					0.36
v/c Ratio	0.85	0.46		0.70	0.23	0.62	0.36
Uniform Delay, d1	20.5	0.0		27.7	3.7	30.4	0.0
Progression Factor	0.83	1.00		1.42	0.29	1.00	1.00
Incremental Delay, d2	4.5	0.6		1.8	0.2	1.4	0.6
Delay (s)	21.4	0.6		41.2	1.3	31.9	0.6

\_8.1 - 2032 Build Mitigated Weekday Evening  
 4: I-93 Southbound Ramps & River Road

02/24/2026



Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Level of Service	C	A		D	A	C	A
Approach Delay (s/veh)	13.3				20.8	12.3	
Approach LOS	B				C	B	
<b>Intersection Summary</b>							
HCM 2000 Control Delay (s/veh)			15.1			HCM 2000 Level of Service	
						B	
HCM 2000 Volume to Capacity ratio			0.77				
Actuated Cycle Length (s)			80.0			Sum of lost time (s)	
						13.0	
Intersection Capacity Utilization			68.3%			ICU Level of Service	
						C	
Analysis Period (min)			15				

c Critical Lane Group

\_8.1 - 2032 Build Mitigated Weekday Evening  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	468	38	107	358	252	51	2	489	884	4	49
Future Volume (vph)	17	468	38	107	358	252	51	2	489	884	4	49
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	0.88	0.95	0.95	1.00
Frt		0.989				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.954		0.950	0.953	
Satd. Flow (prot)	1805	3505	0	3351	1863	1417	0	1692	2748	1665	1670	1615
Flt Permitted	0.950			0.950				0.954		0.950	0.953	
Satd. Flow (perm)	1805	3505	0	3351	1863	1417	0	1692	2748	1665	1670	1615
Satd. Flow (RTOR)		10				274						232
Adj. Flow (vph)	18	509	41	116	389	274	55	2	532	961	4	53
Lane Group Flow (vph)	18	550	0	116	389	274	0	57	532	480	485	53
Turn Type	Prot	NA		Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	5	2		1	6		8	8	8 1	3	3	
Permitted Phases						Free						Free
Detector Phase	5	2		1	6		8	8	8 1	3	3	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Total Split (s)	11.0	22.0		11.0	22.0		15.0	15.0		32.0	32.0	
Total Split (%)	13.8%	27.5%		13.8%	27.5%		18.8%	18.8%		40.0%	40.0%	
Maximum Green (s)	6.0	17.0		6.0	17.0		10.0	10.0		27.0	27.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0			-1.0		-1.0	-1.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	
v/c Ratio	0.11	0.66		0.40	0.60	0.19		0.23	0.69	0.87	0.88	0.03
Control Delay (s/veh)	35.5	31.9		38.9	23.6	0.3		33.6	31.1	43.0	43.7	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 (s/veh)	35.5	31.9		38.9	23.6	0.3		33.6	31.1	43.0	43.7	0.0

\_8.1 - 2032 Build Mitigated Weekday Evening  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	9	133		30	122	0		26	135	232	229	0
Queue Length 95th (ft)	28	188		54	#342	0		60	195	#408	#403	0
Internal Link Dist (ft)		1189			1168			1114			744	
Turn Bay Length (ft)	80			350					200			150
Base Capacity (vph)	157	834		293	644	1417		245	776	582	584	1615
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	0.11	0.66		0.40	0.60	0.19		0.23	0.69	0.82	0.83	0.03

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 60 (75%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

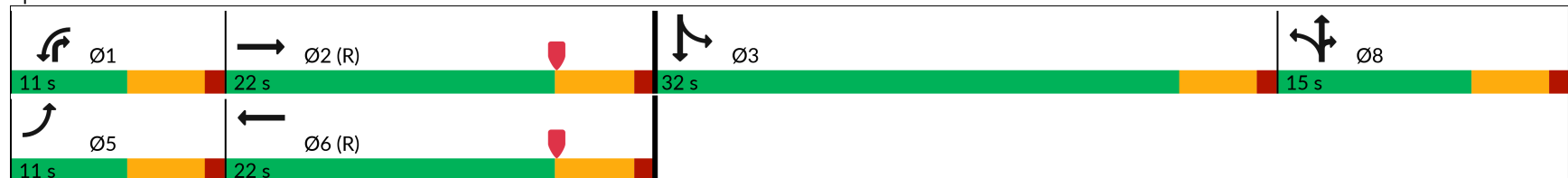
Natural Cycle: 75

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 5: Shattuck Road/Minuteman Road & River Road



\_8.1 - 2032 Build Mitigated Weekday Evening  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	468	38	107	358	252	51	2	489	884	4	49
Future Volume (vph)	17	468	38	107	358	252	51	2	489	884	4	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	12	12	10	10	11	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.95	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1805	3505		3351	1863	1417		1692	2748	1665	1670	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.95	1.00	0.95	0.95	1.00
Satd. Flow (perm)	1805	3505		3351	1863	1417		1692	2748	1665	1670	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	509	41	116	389	274	55	2	532	961	4	53
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	18	542	0	116	389	274	0	57	532	480	485	53
Heavy Vehicles (%)	0%	2%	0%	1%	2%	14%	0%	0%	0%	3%	0%	0%
Turn Type	Prot	NA		Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	5	2		1	6		8	8	8 1	3	3	
Permitted Phases						Free						Free
Actuated Green, G (s)	1.2	17.9		6.0	22.7	80.0		10.6	21.6	25.5	25.5	80.0
Effective Green, g (s)	2.2	18.9		7.0	23.7	80.0		11.6	22.6	26.5	26.5	80.0
Actuated g/C Ratio	0.03	0.24		0.09	0.30	1.00		0.14	0.28	0.33	0.33	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	49	828		293	551	1417		245	776	551	553	1615
v/s Ratio Prot	0.01	0.15		0.03	c0.21			0.03	c0.19	0.29	c0.29	
v/s Ratio Perm						0.19						0.03
v/c Ratio	0.37	0.66		0.40	0.71	0.19		0.23	0.69	0.87	0.88	0.03
Uniform Delay, d1	38.2	27.6		34.5	25.0	0.0		30.3	25.5	25.1	25.2	0.0
Progression Factor	1.00	1.00		1.00	0.73	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	4.0		0.3	7.2	0.3		0.2	2.0	13.7	14.2	0.0
Delay (s)	39.9	31.6		35.0	25.6	0.3		30.4	27.6	38.8	39.4	0.0

\_8.1 - 2032 Build Mitigated Weekday Evening  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service	D	C		C	C	A		C	C	D	D	A
Approach Delay (s/veh)		31.9			18.1			27.8			37.1	
Approach LOS		C			B			C			D	

Intersection Summary		
HCM 2000 Control Delay (s/veh)	29.2	HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio	0.85	
Actuated Cycle Length (s)	80.0	Sum of lost time (s) 17.0
Intersection Capacity Utilization	65.8%	ICU Level of Service C
Analysis Period (min)	15	

c Critical Lane Group

2 – Revised PHFs, HV%, No Re-Occupancy and 0.92 Future PHFs)

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\_3 - 2032 No-Build Weekday Morning

1: North Street/Greater Lawrence Tech & River Road

02/24/2026



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	204	640	603	28	786	113	284	79	16	92	48	13	
Future Volume (vph)	204	640	603	28	786	113	284	79	16	92	48	13	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850		0.981			0.975			0.968		
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1685	3355	1531	1678	3226	0	1694	1756	0	1728	1778	0	
Flt Permitted	0.950			0.950			0.714			0.687			
Satd. Flow (perm)	1685	3355	1531	1678	3226	0	1273	1756	0	1249	1778	0	
Satd. Flow (RTOR)			532		14			8			12		
Adj. Flow (vph)	222	696	655	30	854	123	309	86	17	100	52	14	
Lane Group Flow (vph)	222	696	655	30	977	0	309	103	0	100	66	0	
Turn Type	Prot	NA	Free	Prot	NA		Perm	NA		Perm	NA		
Protected Phases	5	2		1	6			4			8		9
Permitted Phases			Free				4			8			
Detector Phase	5	2		1	6		4	4		8	8		
Switch Phase													
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	5.0		5.0	5.0		5.0
Minimum Split (s)	11.0	16.0		11.0	16.0		10.0	10.0		10.0	10.0		23.0
Total Split (s)	25.0	45.0		12.0	32.0		29.0	29.0		29.0	29.0		23.0
Total Split (%)	22.9%	41.3%		11.0%	29.4%		26.6%	26.6%		26.6%	26.6%		21%
Maximum Green (s)	19.0	39.0		6.0	26.0		24.0	24.0		24.0	24.0		20.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		2.0
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0		1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.0	-1.0		-1.0	-1.0		
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		
Lead/Lag	Lead	Lag		Lead	Lag								
Lead-Lag Optimize?	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
Recall Mode	None	Min		None	Min		None	None		None	None		None
Walk Time (s)													7.0
Flash Don't Walk (s)													13.0
Pedestrian Calls (#/hr)													4
v/c Ratio	0.65	0.40	0.43	0.19	0.92		0.84	0.20		0.28	0.13		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Control Delay (s/veh)	43.3	15.9	0.9	44.0	44.4		52.3	25.7		29.7	23.4		
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0		
Total Delay (s/veh)	43.3	15.9	0.9	44.0	44.4		52.3	25.7		29.7	23.4		
Queue Length 50th (ft)	105	89	0	15	261		151	37		40	20		
Queue Length 95th (ft)	#233	266	0	53	#588		#421	104		112	68		
Internal Link Dist (ft)		1435			1194			1039			1055		
Turn Bay Length (ft)	150		200	130						100			
Base Capacity (vph)	411	1760	1531	156	1060		369	515		363	525		
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0		
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0		
Storage Cap Reductn	0	0	0	0	0		0	0		0	0		
Reduced v/c Ratio	0.54	0.40	0.43	0.19	0.92		0.84	0.20		0.28	0.13		

Intersection Summary

Cycle Length: 109

Actuated Cycle Length: 87.2

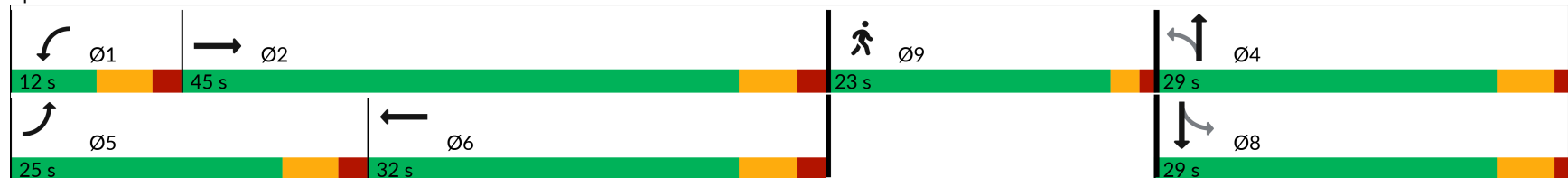
Natural Cycle: 100

Control Type: Actuated-Uncoordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: North Street/Greater Lawrence Tech & River Road





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	204	640	603	28	786	113	284	79	16	92	48	13
Future Volume (vph)	204	640	603	28	786	113	284	79	16	92	48	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	11	11	11	11	11	11	11	11	11
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1685	3355	1531	1678	3226		1694	1756		1728	1778	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.71	1.00		0.69	1.00	
Satd. Flow (perm)	1685	3355	1531	1678	3226		1273	1756		1249	1778	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	222	696	655	30	854	123	309	86	17	100	52	14
RTOR Reduction (vph)	0	0	0	0	9	0	0	6	0	0	9	0
Lane Group Flow (vph)	222	696	655	30	968	0	309	97	0	100	57	0
Heavy Vehicles (%)	0%	4%	2%	4%	7%	0%	3%	1%	7%	1%	0%	0%
Turn Type	Prot	NA	Free	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4				8
Permitted Phases			Free				4			8		
Actuated Green, G (s)	15.6	43.7	93.4	2.2	30.3		24.3	24.3		24.3	24.3	
Effective Green, g (s)	17.6	45.7	93.4	4.2	32.3		25.3	25.3		25.3	25.3	
Actuated g/C Ratio	0.19	0.49	1.00	0.04	0.35		0.27	0.27		0.27	0.27	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	317	1641	1531	75	1115		344	475		338	481	
v/s Ratio Prot	c0.13	0.21		0.02	c0.30			0.06			0.03	
v/s Ratio Perm			c0.43				c0.24			0.08		
v/c Ratio	0.70	0.42	0.43	0.40	0.87		0.90	0.20		0.30	0.12	
Uniform Delay, d1	35.4	15.4	0.0	43.4	28.6		32.8	26.3		27.0	25.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.8	0.2	0.9	3.5	7.3		24.7	0.2		0.5	0.1	
Delay (s)	42.3	15.5	0.9	46.8	35.9		57.5	26.5		27.5	25.8	



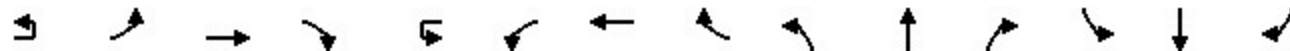
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service	D	B	A	D	D		E	C		C	C	
Approach Delay (s/veh)		13.2			36.2			49.8			26.8	
Approach LOS		B			D			D			C	

Intersection Summary		
HCM 2000 Control Delay (s/veh)	26.0	HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio	0.84	
Actuated Cycle Length (s)	93.4	Sum of lost time (s) 15.0
Intersection Capacity Utilization	69.0%	ICU Level of Service C
Analysis Period (min)	15	

c Critical Lane Group

\_3 - 2032 No-Build Weekday Morning  
 2: Federal Street/Old River Road & River Road

02/24/2026



Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations														
Traffic Volume (vph)	1	248	1406	266	7	49	1090	111	57	1	11	62	17	120
Future Volume (vph)	1	248	1406	266	7	49	1090	111	57	1	11	62	17	120
Lane Util. Factor	0.95	0.97	0.95	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.976				0.986				0.850			0.850
Flt Protected		0.950				0.950				0.953			0.962	
Satd. Flow (prot)	0	3502	3437	0	0	1685	3235	0	0	1835	1615	0	1799	1812
Flt Permitted		0.950				0.950				0.668			0.729	
Satd. Flow (perm)	0	3502	3437	0	0	1685	3235	0	0	1286	1615	0	1364	1812
Satd. Flow (RTOR)			58				26				187			265
Adj. Flow (vph)	1	270	1528	289	8	53	1185	121	62	1	12	67	18	130
Lane Group Flow (vph)	0	271	1817	0	0	61	1306	0	0	63	12	0	85	130
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA	Perm	Perm	NA	Free
Protected Phases	5	5	2		1	1	6			8			3	
Permitted Phases									8		8	3		Free
Detector Phase	5	5	2		1	1	6		8	8	8	3	3	
Switch Phase														
Minimum Initial (s)	6.0	6.0	6.0		6.0	6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	11.0	11.0		11.0	11.0	11.0		11.0	11.0	11.0	11.0	11.0	
Total Split (s)	14.0	14.0	47.0		11.0	11.0	44.0		12.0	12.0	12.0	12.0	12.0	
Total Split (%)	20.0%	20.0%	67.1%		15.7%	15.7%	62.9%		17.1%	17.1%	17.1%	17.1%	17.1%	
Maximum Green (s)	9.0	9.0	42.0		6.0	6.0	39.0		7.0	7.0	7.0	7.0	7.0	
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		-1.0	-1.0			-1.0	-1.0			-1.0	-1.0		-1.0	
Total Lost Time (s)		4.0	4.0			4.0	4.0			4.0	4.0		4.0	
Lead/Lag	Lead	Lead	Lead		Lag	Lag	Lag							
Lead-Lag Optimize?														
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	None	C-Min		None	None	C-Min		None	None	None	None	None	
v/c Ratio		0.57	0.73			0.36	0.66			0.44	0.03		0.56	0.07
Control Delay (s/veh)		32.2	8.2			36.0	11.5			39.3	0.2		45.2	0.1
Queue Delay		0.0	0.0			0.0	0.0			0.0	0.0		0.0	0.0
Total Delay (s/veh)		32.2	8.2			36.0	11.5			39.3	0.2		45.2	0.1

\_3 - 2032 No-Build Weekday Morning  
 2: Federal Street/Old River Road & River Road

02/24/2026



Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		58	76			25	198			26	0		35	0
Queue Length 95th (ft)		m85	291			60	273			62	0		#89	0
Internal Link Dist (ft)			654				1435			1094			310	
Turn Bay Length (ft)		500				170					165			100
Base Capacity (vph)		500	2499			168	1993			146	350		155	1812
Starvation Cap Reductn		0	0			0	0			0	0		0	0
Spillback Cap Reductn		0	0			0	0			0	0		0	0
Storage Cap Reductn		0	0			0	0			0	0		0	0
Reduced v/c Ratio		0.54	0.73			0.36	0.66			0.43	0.03		0.55	0.07

Intersection Summary

Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 60 (86%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Federal Street/Old River Road & River Road

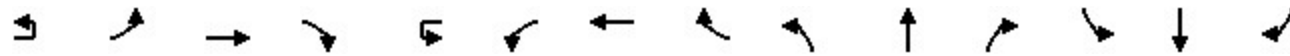


\_3 - 2032 No-Build Weekday Morning  
 2: Federal Street/Old River Road & River Road

02/24/2026



Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		RT	LT			RT	LT			LT	RT		LT	RT
Traffic Volume (vph)	1	248	1406	266	7	49	1090	111	57	1	11	62	17	120
Future Volume (vph)	1	248	1406	266	7	49	1090	111	57	1	11	62	17	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	10	11	11	13	13	12	12	12	16
Total Lost time (s)		4.0	4.0			4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.97	0.95			1.00	0.95			1.00	1.00		1.00	1.00
Frt		1.00	0.98			1.00	0.99			1.00	0.85		1.00	0.85
Flt Protected		0.95	1.00			0.95	1.00			0.95	1.00		0.96	1.00
Satd. Flow (prot)		3502	3437			1685	3236			1835	1615		1800	1812
Flt Permitted		0.95	1.00			0.95	1.00			0.67	1.00		0.73	1.00
Satd. Flow (perm)		3502	3437			1685	3236			1286	1615		1364	1812
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	270	1528	289	8	53	1185	121	62	1	12	67	18	130
RTOR Reduction (vph)	0	0	19	0	0	0	10	0	0	0	11	0	0	0
Lane Group Flow (vph)	0	271	1798	0	0	61	1296	0	0	63	1	0	85	130
Heavy Vehicles (%)	0%	0%	3%	0%	0%	0%	7%	0%	2%	0%	0%	2%	0%	1%
Turn Type	Prot	Prot	NA		Prot	Prot	NA		Perm	NA	Perm	Perm	NA	Free
Protected Phases	5	5	2		1	1	6			8			3	
Permitted Phases									8		8	3		Free
Actuated Green, G (s)		8.5	45.8			3.6	40.9			5.6	5.6		5.6	70.0
Effective Green, g (s)		9.5	46.8			4.6	41.9			6.6	6.6		6.6	70.0
Actuated g/C Ratio		0.14	0.67			0.07	0.60			0.09	0.09		0.09	1.00
Clearance Time (s)		5.0	5.0			5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		2.0	2.0			2.0	2.0			2.0	2.0		2.0	
Lane Grp Cap (vph)		475	2297			110	1936			121	152		128	1812
v/s Ratio Prot		0.08	c0.52			0.04	c0.40							
v/s Ratio Perm										0.05	0.00		c0.06	0.07
v/c Ratio		0.57	0.78			0.55	0.67			0.52	0.01		0.66	0.07
Uniform Delay, d1		28.3	8.1			31.7	9.4			30.2	28.7		30.6	0.0
Progression Factor		1.00	0.75			1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		0.8	2.1			3.4	1.9			1.9	0.0		9.6	0.1
Delay (s)		29.1	8.1			35.1	11.3			32.1	28.7		40.2	0.1



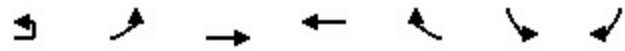
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service		C	A			D	B			C	C		D	A
Approach Delay (s/veh)			10.8				12.3			31.5			16.0	
Approach LOS			B			B				C			B	

Intersection Summary	
HCM 2000 Control Delay (s/veh)	12.1 HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio	0.80
Actuated Cycle Length (s)	70.0 Sum of lost time (s) 13.0
Intersection Capacity Utilization	75.7% ICU Level of Service D
Analysis Period (min)	15

c Critical Lane Group

\_3 - 2032 No-Build Weekday Morning  
 3: River Road & I-93 Northbound Ramps

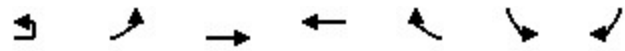
02/24/2026



Lane Group	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑	↑↑	↗	↔↔	↔↔
Traffic Volume (vph)	7	313	1402	694	572	517	661
Future Volume (vph)	7	313	1402	694	572	517	661
Lane Util. Factor	0.95	0.97	0.95	0.95	1.00	0.97	0.88
Frt					0.850		0.850
Flt Protected		0.950				0.950	
Satd. Flow (prot)	0	3258	3539	3406	1538	3400	2787
Flt Permitted		0.950				0.950	
Satd. Flow (perm)	0	3258	3539	3406	1538	3400	2787
Satd. Flow (RTOR)					622		
Adj. Flow (vph)	8	340	1524	754	622	562	718
Lane Group Flow (vph)	0	348	1524	754	622	562	718
Turn Type	Prot	Prot	NA	NA	Free	Prot	pt+ov
Protected Phases	5!	5	2	6		3	3 5!
Permitted Phases					Free		
Detector Phase	5	5	2	6		3	3 5
Switch Phase							
Minimum Initial (s)	6.0	6.0	6.0	6.0		6.0	
Minimum Split (s)	11.0	11.0	11.0	11.0		11.0	
Total Split (s)	17.0	17.0	47.0	30.0		23.0	
Total Split (%)	24.3%	24.3%	67.1%	42.9%		32.9%	
Maximum Green (s)	12.0	12.0	42.0	25.0		18.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0		1.0	
Lost Time Adjust (s)		-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)		4.0	4.0	4.0		4.0	
Lead/Lag	Lead	Lead		Lag			
Lead-Lag Optimize?							
Vehicle Extension (s)	2.0	2.0	2.0	2.0		2.0	
Recall Mode	None	None	C-Min	C-Min		Min	
v/c Ratio		0.61	0.68	0.55	0.40	0.66	0.53
Control Delay (s/veh)		35.0	6.9	12.3	0.6	27.2	13.7
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)		35.0	6.9	12.3	0.6	27.2	13.7

\_3 - 2032 No-Build Weekday Morning  
 3: River Road & I-93 Northbound Ramps

02/24/2026



Lane Group	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		77	104	71	0	112	107
Queue Length 95th (ft)		102	134	96	0	160	156
Internal Link Dist (ft)			1040	654		885	
Turn Bay Length (ft)		650					650
Base Capacity (vph)		626	2249	1389	1538	931	1352
Starvation Cap Reductn		0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0
Reduced v/c Ratio		0.56	0.68	0.54	0.40	0.60	0.53

Intersection Summary

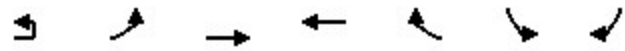
Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 40  
 Control Type: Actuated-Coordinated  
 ! Phase conflict between lane groups.

Splits and Phases: 3: River Road & I-93 Northbound Ramps

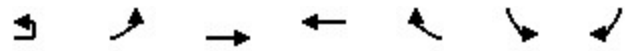


\_3 - 2032 No-Build Weekday Morning  
 3: River Road & I-93 Northbound Ramps

02/24/2026



Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑	↑↑	↔	↔↔	↔↔
Traffic Volume (vph)	7	313	1402	694	572	517	661
Future Volume (vph)	7	313	1402	694	572	517	661
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	12
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		0.97	0.95	0.95	1.00	0.97	0.88
Frt		1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected		0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		3258	3539	3406	1538	3400	2787
Flt Permitted		0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		3258	3539	3406	1538	3400	2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	340	1524	754	622	562	718
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	348	1524	754	622	562	718
Heavy Vehicles (%)	0%	4%	2%	6%	5%	3%	2%
Turn Type	Prot	Prot	NA	NA	Free	Prot	pt+ov
Protected Phases	5!	5	2	6		3	3 5!
Permitted Phases					Free		
Actuated Green, G (s)		11.3	43.3	27.0	70.0	16.7	33.0
Effective Green, g (s)		12.3	44.3	28.0	70.0	17.7	34.0
Actuated g/C Ratio		0.18	0.63	0.40	1.00	0.25	0.49
Clearance Time (s)		5.0	5.0	5.0		5.0	
Vehicle Extension (s)		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)		572	2239	1362	1538	859	1353
v/s Ratio Prot		0.11	c0.43	0.22		c0.17	0.26
v/s Ratio Perm					0.40		
v/c Ratio		0.61	0.68	0.55	0.40	0.65	0.53
Uniform Delay, d1		26.6	8.3	16.2	0.0	23.4	12.5
Progression Factor		1.19	0.63	0.63	1.00	1.00	1.00
Incremental Delay, d2		0.9	1.3	1.3	0.6	1.4	0.2
Delay (s)		32.5	6.5	11.5	0.6	24.8	12.7



Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Level of Service		C	A	B	A	C	B
Approach Delay (s/veh)			11.3	6.6		18.0	
Approach LOS			B	A		B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	61.4%	ICU Level of Service	B
Analysis Period (min)	15		
! Phase conflict between lane groups.			
c Critical Lane Group			

\_3 - 2032 No-Build Weekday Morning  
4: I-93 Southbound Ramps & River Road

02/24/2026

	→	↘	↙	↗	←	↖	↗
Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↗		↘↗	↑↑	↘↗	↗
Traffic Volume (vph)	609	208	2	225	1135	1169	1111
Future Volume (vph)	609	208	2	225	1135	1169	1111
Lane Util. Factor	0.95	1.00	0.95	0.97	0.95	0.97	1.00
Frt		0.850					0.850
Flt Protected				0.950		0.950	
Satd. Flow (prot)	3438	1711	0	3136	3505	3433	1812
Flt Permitted				0.950		0.950	
Satd. Flow (perm)	3438	1711	0	3136	3505	3433	1812
Satd. Flow (RTOR)		226					728
Adj. Flow (vph)	662	226	2	245	1234	1271	1208
Lane Group Flow (vph)	662	226	0	247	1234	1271	1208
Turn Type	NA	Free	Prot	Prot	NA	Prot	Free
Protected Phases	2		1	1	6	8	
Permitted Phases		Free					Free
Detector Phase	2		1	1	6	8	
Switch Phase							
Minimum Initial (s)	6.0		6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0		11.0	11.0	11.0	27.0	
Total Split (s)	24.0		12.0	12.0	36.0	34.0	
Total Split (%)	34.3%		17.1%	17.1%	51.4%	48.6%	
Maximum Green (s)	19.0		7.0	7.0	31.0	29.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-1.0			-1.0	-1.0	-1.0	
Total Lost Time (s)	4.0			4.0	4.0	4.0	
Lead/Lag	Lag		Lead	Lead			
Lead-Lag Optimize?							
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	
Recall Mode	C-Min		None	None	C-Min	Min	
Walk Time (s)						6.0	
Flash Don't Walk (s)						16.0	
Pedestrian Calls (#/hr)						0	
v/c Ratio	0.66	0.13		0.66	0.75	0.89	0.67

\_3 - 2032 No-Build Weekday Morning  
 4: I-93 Southbound Ramps & River Road

02/24/2026

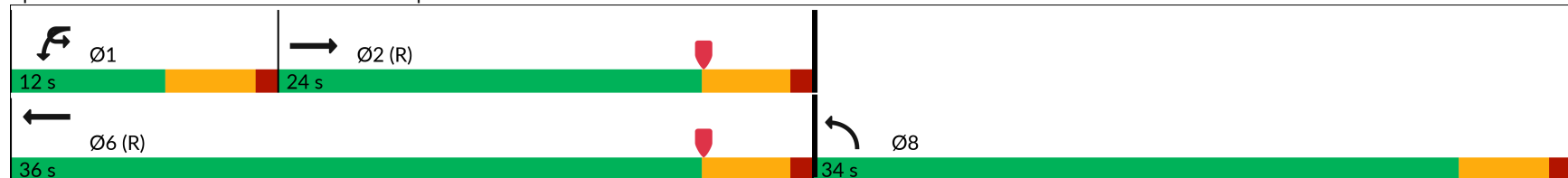


Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Control Delay (s/veh)	18.1	0.1		37.4	15.0	28.4	2.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay (s/veh)	18.1	0.1		37.4	15.0	28.4	2.0
Queue Length 50th (ft)	114	0		56	204	246	0
Queue Length 95th (ft)	158	m0		#104	303	#378	0
Internal Link Dist (ft)	1168				1040	800	
Turn Bay Length (ft)		430		250			480
Base Capacity (vph)	1026	1711		373	1651	1476	1812
Starvation Cap Reductn	0	0		0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0
Reduced v/c Ratio	0.65	0.13		0.66	0.75	0.86	0.67

Intersection Summary

Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 34 (49%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 55  
 Control Type: Actuated-Coordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-93 Southbound Ramps & River Road



\_3 - 2032 No-Build Weekday Morning  
4: I-93 Southbound Ramps & River Road

02/24/2026

	→	↘	↙	↗	←	↖	↗
Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↘↗	↑↑	↘↗	↑
Traffic Volume (vph)	609	208	2	225	1135	1169	1111
Future Volume (vph)	609	208	2	225	1135	1169	1111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	11	11	12	12	16
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00		0.97	0.95	0.97	1.00
Frt	1.00	0.85		1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3438	1711		3136	3505	3433	1812
Flt Permitted	1.00	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3438	1711		3136	3505	3433	1812
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	662	226	2	245	1234	1271	1208
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	662	226	0	247	1234	1271	1208
Heavy Vehicles (%)	5%	7%	0%	8%	3%	2%	1%
Turn Type	NA	Free	Prot	Prot	NA	Prot	Free
Protected Phases	2		1	1	6	8	
Permitted Phases		Free					Free
Actuated Green, G (s)	19.6	70.0		7.3	31.9	28.1	70.0
Effective Green, g (s)	20.6	70.0		8.3	32.9	29.1	70.0
Actuated g/C Ratio	0.29	1.00		0.12	0.47	0.42	1.00
Clearance Time (s)	5.0			5.0	5.0	5.0	
Vehicle Extension (s)	2.0			2.0	2.0	2.0	
Lane Grp Cap (vph)	1011	1711		371	1647	1427	1812
v/s Ratio Prot	0.19			0.08	c0.35	c0.37	
v/s Ratio Perm		0.13					c0.67
v/c Ratio	0.65	0.13		0.67	0.75	0.89	0.67
Uniform Delay, d1	21.6	0.0		29.5	15.2	19.0	0.0
Progression Factor	0.67	1.00		0.97	0.77	1.00	1.00
Incremental Delay, d2	3.1	0.1		3.0	2.7	7.2	2.0
Delay (s)	17.6	0.1		31.5	14.4	26.2	2.0



Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Level of Service	B	A		C	B	C	A
Approach Delay (s/veh)	13.1				17.3	14.4	
Approach LOS	B				B	B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

\_3 - 2032 No-Build Weekday Morning  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	418	75	436	703	941	20	3	93	227	2	16
Future Volume (vph)	47	418	75	436	703	941	20	3	93	227	2	16
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	0.88	0.95	0.95	1.00
Frt		0.977				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.958		0.950	0.953	
Satd. Flow (prot)	1805	3468	0	3351	1863	1599	0	1699	2668	1573	1580	1615
Flt Permitted	0.950			0.950				0.958		0.950	0.953	
Satd. Flow (perm)	1805	3468	0	3351	1863	1599	0	1699	2668	1573	1580	1615
Satd. Flow (RTOR)		32				757						343
Adj. Flow (vph)	51	454	82	474	764	1023	22	3	101	247	2	17
Lane Group Flow (vph)	51	536	0	474	764	1023	0	25	101	123	126	17
Turn Type	Prot	NA		Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	5	2		1	6		8	8	8 1	3	3	
Permitted Phases						Free						Free
Detector Phase	5	2		1	6		8	8	8 1	3	3	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Total Split (s)	11.0	28.0		20.0	37.0		11.0	11.0		11.0	11.0	
Total Split (%)	15.7%	40.0%		28.6%	52.9%		15.7%	15.7%		15.7%	15.7%	
Maximum Green (s)	6.0	23.0		15.0	32.0		6.0	6.0		6.0	6.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0			-1.0		-1.0	-1.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	
v/c Ratio	0.28	0.39		0.69	0.74	0.64		0.15	0.11	0.71	0.72	0.01
Control Delay (s/veh)	33.6	16.7		27.2	19.5	1.1		31.1	14.7	55.4	56.5	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 (s/veh)	33.6	16.7		27.2	19.5	1.1		31.1	14.7	55.4	56.5	0.0

\_3 - 2032 No-Build Weekday Morning  
 5: Shattuck Road/Minuteman Road & River Road

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	21	85		87	279	0		10	15	60	56	0
Queue Length 95th (ft)	52	130		m121	m#457	m0		32	31	#155	#147	0
Internal Link Dist (ft)		1189			1168			1114			744	
Turn Bay Length (ft)	80			350					200			150
Base Capacity (vph)	180	1369		765	1033	1599		169	945	174	175	1615
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	0.28	0.39		0.62	0.74	0.64		0.15	0.11	0.71	0.72	0.01

Intersection Summary

Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 2 (3%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 65  
 Control Type: Actuated-Coordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Shattuck Road/Minuteman Road & River Road



\_3 - 2032 No-Build Weekday Morning  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	418	75	436	703	941	20	3	93	227	2	16
Future Volume (vph)	47	418	75	436	703	941	20	3	93	227	2	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	12	12	10	10	11	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	0.98		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1805	3468		3351	1863	1599		1699	2668	1573	1580	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.96	1.00	0.95	0.95	1.00
Satd. Flow (perm)	1805	3468		3351	1863	1599		1699	2668	1573	1580	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	454	82	474	764	1023	22	3	101	247	2	17
RTOR Reduction (vph)	0	20	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	51	516	0	474	764	1023	0	25	101	123	126	17
Heavy Vehicles (%)	0%	2%	0%	1%	2%	1%	0%	0%	3%	9%	0%	0%
Turn Type	Prot	NA		Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	5	2		1	6		8	8	8 1	3	3	
Permitted Phases						Free						Free
Actuated Green, G (s)	3.6	25.1		13.3	34.8	70.0		4.8	23.1	6.8	6.8	70.0
Effective Green, g (s)	4.6	26.1		14.3	35.8	70.0		5.8	24.1	7.8	7.8	70.0
Actuated g/C Ratio	0.07	0.37		0.20	0.51	1.00		0.08	0.34	0.11	0.11	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	118	1293		684	952	1599		140	918	175	176	1615
v/s Ratio Prot	0.03	0.15		0.14	c0.41			0.01	0.04	0.08	0.08	
v/s Ratio Perm						c0.64						0.01
v/c Ratio	0.43	0.40		0.69	0.80	0.64		0.18	0.11	0.70	0.72	0.01
Uniform Delay, d1	31.4	16.2		25.8	14.2	0.0		29.9	15.6	30.0	30.0	0.0
Progression Factor	1.00	1.00		0.93	1.07	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.9		1.4	4.2	1.1		0.2	0.0	10.0	10.9	0.0
Delay (s)	32.4	17.1		25.5	19.3	1.1		30.1	15.7	39.9	41.0	0.0

\_3 - 2032 No-Build Weekday Morning  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service	C	B		C	B	A		C	B	D	D	A
Approach Delay (s/veh)		18.4			12.4			18.5			37.9	
Approach LOS		B			B			B			D	

Intersection Summary		
HCM 2000 Control Delay (s/veh)	15.8	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.91	
Actuated Cycle Length (s)	70.0	Sum of lost time (s)
Intersection Capacity Utilization	65.0%	ICU Level of Service
Analysis Period (min)	15	

c Critical Lane Group

\_4 - 2032 No-Build Weekday Evening

1: North Street/Greater Lawrence Tech & River Road

02/24/2026

													Ø9
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	29	607	336	24	828	12	213	21	27	16	14	14	
Future Volume (vph)	29	607	336	24	828	12	213	21	27	16	14	14	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Frt			0.850		0.998			0.916			0.925		
Flt Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1532	3355	1546	1745	3415	0	1711	1611	0	1745	1699	0	
Flt Permitted	0.950			0.950			0.738			0.723			
Satd. Flow (perm)	1532	3355	1546	1745	3415	0	1329	1611	0	1328	1699	0	
Satd. Flow (RTOR)			313		1			29			15		
Adj. Flow (vph)	32	660	365	26	900	13	232	23	29	17	15	15	
Lane Group Flow (vph)	32	660	365	26	913	0	232	52	0	17	30	0	
Turn Type	Prot	NA	Free	Prot	NA		Perm	NA		Perm	NA		
Protected Phases	5	2		1	6			4			8		9
Permitted Phases			Free				4			8			
Detector Phase	5	2		1	6		4	4		8	8		
Switch Phase													
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	5.0		5.0	5.0		5.0
Minimum Split (s)	11.0	16.0		11.0	16.0		10.0	10.0		10.0	10.0		23.0
Total Split (s)	11.0	43.0		11.0	43.0		32.0	32.0		32.0	32.0		23.0
Total Split (%)	10.1%	39.4%		10.1%	39.4%		29.4%	29.4%		29.4%	29.4%		21%
Maximum Green (s)	5.0	37.0		5.0	37.0		27.0	27.0		27.0	27.0		20.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		2.0
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0		1.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-1.0	-1.0		-1.0	-1.0		
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		
Lead/Lag	Lead	Lag		Lead	Lag								
Lead-Lag Optimize?	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
Recall Mode	None	Min		None	Min		None	None		None	None		None
Walk Time (s)													7.0
Flash Don't Walk (s)													13.0
Pedestrian Calls (#/hr)													4
v/c Ratio	0.17	0.43	0.24	0.12	0.58		0.57	0.10		0.04	0.06		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Control Delay (s/veh)	39.3	16.1	0.4	38.8	18.1		30.0	14.5		23.6	16.6		
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0		
Total Delay (s/veh)	39.3	16.1	0.4	38.8	18.1		30.0	14.5		23.6	16.6		
Queue Length 50th (ft)	10	65	0	8	97		59	5		4	3		
Queue Length 95th (ft)	58	258	0	46	374		240	45		27	32		
Internal Link Dist (ft)		1435			1194			1039			1055		
Turn Bay Length (ft)	150		200	130						100			
Base Capacity (vph)	193	2361	1546	220	2404		671	828		671	865		
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0		
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0		
Storage Cap Reductn	0	0	0	0	0		0	0		0	0		
Reduced v/c Ratio	0.17	0.28	0.24	0.12	0.38		0.35	0.06		0.03	0.03		

Intersection Summary

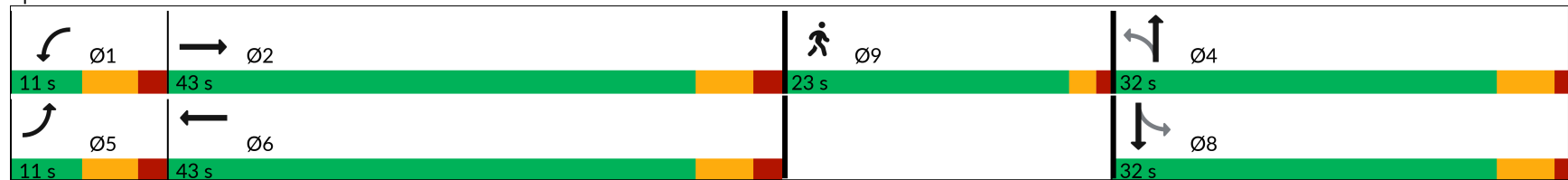
Cycle Length: 109

Actuated Cycle Length: 63.8

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Splits and Phases: 1: North Street/Greater Lawrence Tech & River Road



\_4 - 2032 No-Build Weekday Evening

1: North Street/Greater Lawrence Tech & River Road

02/24/2026



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	607	336	24	828	12	213	21	27	16	14	14
Future Volume (vph)	29	607	336	24	828	12	213	21	27	16	14	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	11	11	11	11	11	11	11	11	11	11	11
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.92		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1532	3355	1546	1745	3415		1711	1611		1745	1699	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.74	1.00		0.72	1.00	
Satd. Flow (perm)	1532	3355	1546	1745	3415		1328	1611		1328	1699	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	660	365	26	900	13	232	23	29	17	15	15
RTOR Reduction (vph)	0	0	0	0	1	0	0	21	0	0	11	0
Lane Group Flow (vph)	32	660	365	26	912	0	232	31	0	17	19	0
Heavy Vehicles (%)	10%	4%	1%	0%	2%	0%	2%	5%	4%	0%	0%	0%
Turn Type	Prot	NA	Free	Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			4				8
Permitted Phases			Free				4			8		
Actuated Green, G (s)	1.5	27.0	69.1	1.5	27.0		18.3	18.3		18.3	18.3	
Effective Green, g (s)	3.5	29.0	69.1	3.5	29.0		19.3	19.3		19.3	19.3	
Actuated g/C Ratio	0.05	0.42	1.00	0.05	0.42		0.28	0.28		0.28	0.28	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	77	1408	1546	88	1433		370	449		370	474	
v/s Ratio Prot	0.02	0.20		0.01	c0.27			0.02			0.01	
v/s Ratio Perm			c0.24				c0.17			0.01		
v/c Ratio	0.42	0.47	0.24	0.30	0.64		0.63	0.07		0.05	0.04	
Uniform Delay, d1	31.8	14.5	0.0	31.6	15.9		21.8	18.3		18.2	18.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.6	0.2	0.4	1.9	0.9		3.3	0.1		0.1	0.0	
Delay (s)	35.4	14.7	0.4	33.5	16.8		25.1	18.4		18.2	18.2	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service	D	B	A	C	B		C	B		B	B	
Approach Delay (s/veh)		10.4			17.3			23.8			18.2	
Approach LOS		B			B			C			B	

Intersection Summary		
HCM 2000 Control Delay (s/veh)	15.0	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.62	
Actuated Cycle Length (s)	69.1	Sum of lost time (s)
Intersection Capacity Utilization	49.2%	ICU Level of Service
Analysis Period (min)	15	

c Critical Lane Group

\_4 - 2032 No-Build Weekday Evening  
 2: Federal Street/Old River Road & River Road

02/24/2026



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕		↔	↕			↕	↕		↕	↕
Traffic Volume (vph)	3	76	915	46	5	999	47	280	5	58	76	1	312
Future Volume (vph)	3	76	915	46	5	999	47	280	5	58	76	1	312
Lane Util. Factor	0.95	0.97	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.993			0.993				0.850			0.850
Flt Protected		0.950			0.950				0.953			0.953	
Satd. Flow (prot)	0	3403	3453	0	1685	3400	0	0	1871	1615	0	1759	1830
Flt Permitted		0.950			0.950				0.668			0.454	
Satd. Flow (perm)	0	3403	3453	0	1685	3400	0	0	1312	1615	0	838	1830
Satd. Flow (RTOR)			8			7				164			288
Adj. Flow (vph)	3	83	995	50	5	1086	51	304	5	63	83	1	339
Lane Group Flow (vph)	0	86	1045	0	5	1137	0	0	309	63	0	84	339
Turn Type	Prot	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Free
Protected Phases	5	5	2		1	6			8			3	
Permitted Phases								8		8	3		Free
Detector Phase	5	5	2		1	6		8	8	8	3	3	
Switch Phase													
Minimum Initial (s)	6.0	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0	11.0	11.0		11.0	11.0		11.0	11.0	11.0	11.0	11.0	
Total Split (s)	11.0	11.0	36.0		11.0	36.0		33.0	33.0	33.0	33.0	33.0	
Total Split (%)	13.8%	13.8%	45.0%		13.8%	45.0%		41.3%	41.3%	41.3%	41.3%	41.3%	
Maximum Green (s)	6.0	6.0	31.0		6.0	31.0		28.0	28.0	28.0	28.0	28.0	
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		-1.0	-1.0		-1.0	-1.0			-1.0	-1.0		-1.0	
Total Lost Time (s)		4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lead/Lag	Lead	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?													
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Recall Mode	None	None	C-Min		None	C-Min		None	None	None	None	None	
v/c Ratio		0.28	0.52		0.03	0.68			0.81	0.11		0.34	0.19
Control Delay (s/veh)		42.8	5.4		34.0	20.3			42.2	0.4		24.6	0.2
Queue Delay		0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay (s/veh)		42.8	5.4		34.0	20.3			42.2	0.4		24.6	0.2

\_4 - 2032 No-Build Weekday Evening  
 2: Federal Street/Old River Road & River Road

02/24/2026



Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		21	64		2	237			140	0		32	0
Queue Length 95th (ft)		41	101		13	351			216	0		65	0
Internal Link Dist (ft)			654			1435			1094			310	
Turn Bay Length (ft)		500			170					165			100
Base Capacity (vph)		311	2008		147	1683			475	689		303	1830
Starvation Cap Reductn		0	0		0	0			0	0		0	0
Spillback Cap Reductn		0	0		0	0			0	0		0	0
Storage Cap Reductn		0	0		0	0			0	0		0	0
Reduced v/c Ratio		0.28	0.52		0.03	0.68			0.65	0.09		0.28	0.19

Intersection Summary

Cycle Length: 80

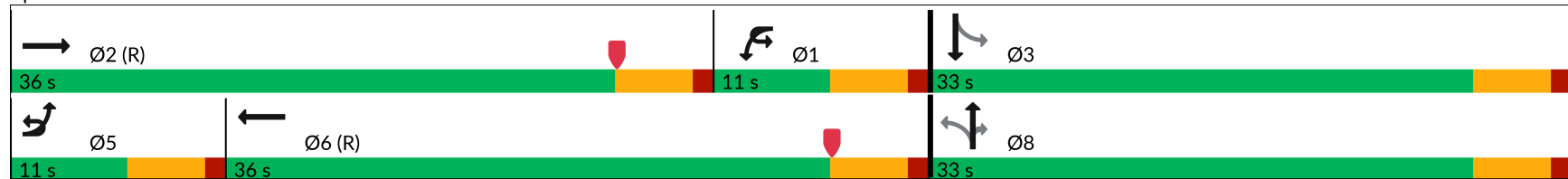
Actuated Cycle Length: 80

Offset: 58 (73%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Splits and Phases: 2: Federal Street/Old River Road & River Road



\_4 - 2032 No-Build Weekday Evening  
 2: Federal Street/Old River Road & River Road

02/24/2026



Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕		↔	↕			↕	↕		↕	↕
Traffic Volume (vph)	3	76	915	46	5	999	47	280	5	58	76	1	312
Future Volume (vph)	3	76	915	46	5	999	47	280	5	58	76	1	312
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	10	11	11	13	13	12	12	12	16
Total Lost time (s)		4.0	4.0		4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor		0.97	0.95		1.00	0.95			1.00	1.00		1.00	1.00
Frt		1.00	0.99		1.00	0.99			1.00	0.85		1.00	0.85
Flt Protected		0.95	1.00		0.95	1.00			0.95	1.00		0.95	1.00
Satd. Flow (prot)		3403	3453		1685	3401			1871	1615		1758	1830
Flt Permitted		0.95	1.00		0.95	1.00			0.67	1.00		0.45	1.00
Satd. Flow (perm)		3403	3453		1685	3401			1312	1615		838	1830
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	83	995	50	5	1086	51	304	5	63	83	1	339
RTOR Reduction (vph)	0	0	4	0	0	4	0	0	0	45	0	0	0
Lane Group Flow (vph)	0	86	1041	0	5	1133	0	0	309	18	0	84	339
Heavy Vehicles (%)	0%	3%	4%	0%	0%	2%	0%	0%	0%	0%	3%	0%	0%
Turn Type	Prot	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Free
Protected Phases	5	5	2		1	6			8			3	
Permitted Phases								8		8	3		Free
Actuated Green, G (s)		5.1	41.4		1.2	37.5			22.4	22.4		22.4	80.0
Effective Green, g (s)		6.1	42.4		2.2	38.5			23.4	23.4		23.4	80.0
Actuated g/C Ratio		0.08	0.53		0.03	0.48			0.29	0.29		0.29	1.00
Clearance Time (s)		5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		2.0	2.0		2.0	2.0			2.0	2.0		2.0	
Lane Grp Cap (vph)		259	1830		46	1636			383	472		245	1830
v/s Ratio Prot		0.03	c0.30		0.00	c0.33							
v/s Ratio Perm								c0.24	0.01			0.10	0.19
v/c Ratio		0.33	0.57		0.11	0.69			0.81	0.04		0.34	0.19
Uniform Delay, d1		35.0	12.7		37.9	16.1			26.2	20.3		22.3	0.0
Progression Factor		1.19	0.37		1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2		0.3	1.2		0.4	2.4			11.1	0.0		0.3	0.2
Delay (s)		42.0	5.8		38.3	18.6			37.3	20.3		22.6	0.2

\_4 - 2032 No-Build Weekday Evening  
 2: Federal Street/Old River Road & River Road

02/24/2026

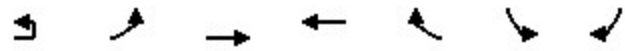


Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service		D	A		D	B			D	C		C	A
Approach Delay (s/veh)			8.6			18.7			34.4			4.7	
Approach LOS			A			B			C			A	
<b>Intersection Summary</b>													
HCM 2000 Control Delay (s/veh)			14.9			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio			0.74										
Actuated Cycle Length (s)			80.0			Sum of lost time (s)			13.0				
Intersection Capacity Utilization			62.9%			ICU Level of Service			B				
Analysis Period (min)			15										

c Critical Lane Group

\_4 - 2032 No-Build Weekday Evening  
 3: River Road & I-93 Northbound Ramps

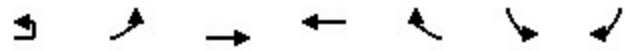
02/24/2026



Lane Group	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑	↑↑	↗	↔↔	↔↔
Traffic Volume (vph)	1	882	885	797	796	154	216
Future Volume (vph)	1	882	885	797	796	154	216
Lane Util. Factor	0.95	0.97	0.95	0.95	1.00	0.97	0.88
Frt					0.850		0.850
Flt Protected		0.950				0.950	
Satd. Flow (prot)	0	3319	3505	3539	1599	3367	2733
Flt Permitted		0.950				0.950	
Satd. Flow (perm)	0	3319	3505	3539	1599	3367	2733
Satd. Flow (RTOR)					620		
Adj. Flow (vph)	1	959	962	866	865	167	235
Lane Group Flow (vph)	0	960	962	866	865	167	235
Turn Type	Prot	Prot	NA	NA	Free	Prot	pt+ov
Protected Phases	5!	5	2	6		3	3 5!
Permitted Phases					Free		
Detector Phase	5	5	2	6		3	3 5
Switch Phase							
Minimum Initial (s)	6.0	6.0	6.0	6.0		6.0	
Minimum Split (s)	11.0	11.0	11.0	11.0		11.0	
Total Split (s)	34.0	34.0	69.0	35.0		11.0	
Total Split (%)	42.5%	42.5%	86.3%	43.8%		13.8%	
Maximum Green (s)	29.0	29.0	64.0	30.0		6.0	
Yellow Time (s)	4.0	4.0	4.0	4.0		4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0		1.0	
Lost Time Adjust (s)		-1.0	-1.0	-1.0		-1.0	
Total Lost Time (s)		4.0	4.0	4.0		4.0	
Lead/Lag	Lead	Lead		Lag			
Lead-Lag Optimize?							
Vehicle Extension (s)	2.0	2.0	2.0	2.0		2.0	
Recall Mode	None	None	C-Min	C-Min		Min	
v/c Ratio		0.84	0.34	0.61	0.54	0.48	0.17
Control Delay (s/veh)		19.2	1.1	14.5	2.4	38.9	11.0
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)		19.2	1.1	14.5	2.4	38.9	11.0

\_4 - 2032 No-Build Weekday Evening  
 3: River Road & I-93 Northbound Ramps

02/24/2026

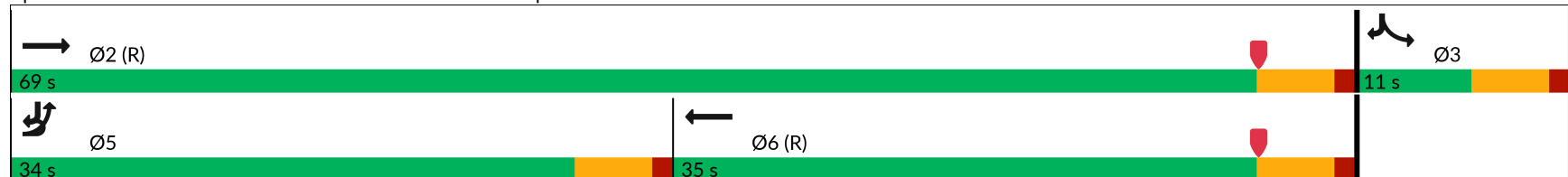


Lane Group	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Queue Length 50th (ft)		86	14	97	25	41	33
Queue Length 95th (ft)		113	14	126	53	75	56
Internal Link Dist (ft)			1040	654		885	
Turn Bay Length (ft)		650					650
Base Capacity (vph)		1244	2847	1458	1599	348	1444
Starvation Cap Reductn		0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0
Reduced v/c Ratio		0.77	0.34	0.59	0.54	0.48	0.16

Intersection Summary

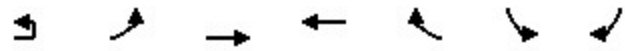
Cycle Length: 80  
 Actuated Cycle Length: 80  
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow, Master Intersection  
 Natural Cycle: 60  
 Control Type: Actuated-Coordinated  
 ! Phase conflict between lane groups.

Splits and Phases: 3: River Road & I-93 Northbound Ramps

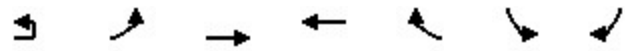


\_4 - 2032 No-Build Weekday Evening  
 3: River Road & I-93 Northbound Ramps

02/24/2026



Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔↔	↑↑	↑↑	↔	↔↔	↔↔
Traffic Volume (vph)	1	882	885	797	796	154	216
Future Volume (vph)	1	882	885	797	796	154	216
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	12	12	12	12	12
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		0.97	0.95	0.95	1.00	0.97	0.88
Frt		1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected		0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		3319	3505	3539	1599	3367	2733
Flt Permitted		0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		3319	3505	3539	1599	3367	2733
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	959	962	866	865	167	235
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	960	962	866	865	167	235
Heavy Vehicles (%)	0%	2%	3%	2%	1%	4%	4%
Turn Type	Prot	Prot	NA	NA	Free	Prot	pt+ov
Protected Phases	5!	5	2	6		3	3 5!
Permitted Phases					Free		
Actuated Green, G (s)		26.5	62.7	31.2	80.0	7.3	38.8
Effective Green, g (s)		27.5	63.7	32.2	80.0	8.3	39.8
Actuated g/C Ratio		0.34	0.80	0.40	1.00	0.10	0.50
Clearance Time (s)		5.0	5.0	5.0		5.0	
Vehicle Extension (s)		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)		1140	2790	1424	1599	349	1359
v/s Ratio Prot		c0.29	0.27	0.24		0.05	0.09
v/s Ratio Perm					c0.54		
v/c Ratio		0.84	0.34	0.61	0.54	0.48	0.17
Uniform Delay, d1		24.2	2.3	18.9	0.0	33.8	11.1
Progression Factor		0.55	0.37	0.65	1.00	1.00	1.00
Incremental Delay, d2		4.2	0.3	1.6	1.1	0.4	0.0
Delay (s)		17.6	1.1	13.9	1.1	34.2	11.1










Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Level of Service		B	A	B	A	C	B
Approach Delay (s/veh)			9.4	7.5		20.7	
Approach LOS			A	A		C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		
! Phase conflict between lane groups.			
c Critical Lane Group			

\_4 - 2032 No-Build Weekday Evening  
4: I-93 Southbound Ramps & River Road

02/24/2026

							
Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↓	↑↑	↓	↑
Traffic Volume (vph)	1190	768	3	481	530	353	575
Future Volume (vph)	1190	768	3	481	530	353	575
Lane Util. Factor	0.95	1.00	0.95	0.97	0.95	0.97	1.00
Frt		0.850					0.850
Flt Protected				0.950		0.950	
Satd. Flow (prot)	3574	1830	0	3352	3574	3467	1794
Flt Permitted				0.950		0.950	
Satd. Flow (perm)	3574	1830	0	3352	3574	3467	1794
Satd. Flow (RTOR)		835					572
Adj. Flow (vph)	1293	835	3	523	576	384	625
Lane Group Flow (vph)	1293	835	0	526	576	384	625
Turn Type	NA	Free	Prot	Prot	NA	Prot	Free
Protected Phases	2		1	1	6	8	
Permitted Phases		Free					Free
Detector Phase	2		1	1	6	8	
Switch Phase							
Minimum Initial (s)	6.0		6.0	6.0	6.0	6.0	
Minimum Split (s)	11.0		11.0	11.0	11.0	27.0	
Total Split (s)	36.0		17.0	17.0	53.0	27.0	
Total Split (%)	45.0%		21.3%	21.3%	66.3%	33.8%	
Maximum Green (s)	31.0		12.0	12.0	48.0	22.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-1.0			-1.0	-1.0	-1.0	
Total Lost Time (s)	4.0			4.0	4.0	4.0	
Lead/Lag	Lag		Lead	Lead			
Lead-Lag Optimize?							
Vehicle Extension (s)	2.0		2.0	2.0	2.0	2.0	
Recall Mode	C-Min		None	None	C-Min	Min	
Walk Time (s)						6.0	
Flash Don't Walk (s)						16.0	
Pedestrian Calls (#/hr)						0	
v/c Ratio	0.82	0.46		0.68	0.22	0.62	0.35

\_4 - 2032 No-Build Weekday Evening  
4: I-93 Southbound Ramps & River Road

02/24/2026



Lane Group	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Control Delay (s/veh)	21.3	0.6		41.3	1.3	34.7	0.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0
Total Delay (s/veh)	21.3	0.6		41.3	1.3	34.7	0.5
Queue Length 50th (ft)	218	0		115	7	93	0
Queue Length 95th (ft)	#445	m0		189	25	128	0
Internal Link Dist (ft)	1168				1040	800	
Turn Bay Length (ft)		430		250			480
Base Capacity (vph)	1581	1830		770	2582	996	1794
Starvation Cap Reductn	0	0		0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0
Reduced v/c Ratio	0.82	0.46		0.68	0.22	0.39	0.35

Intersection Summary








Cycle Length: 80  
 Actuated Cycle Length: 80  
 Offset: 26 (33%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow  
 Natural Cycle: 80  
 Control Type: Actuated-Coordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.  
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: I-93 Southbound Ramps & River Road



\_4 - 2032 No-Build Weekday Evening  
4: I-93 Southbound Ramps & River Road

02/24/2026

							
Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↔	↑↑	↔	↑
Traffic Volume (vph)	1190	768	3	481	530	353	575
Future Volume (vph)	1190	768	3	481	530	353	575
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	11	11	12	12	16
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00		0.97	0.95	0.97	1.00
Frt	1.00	0.85		1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3574	1830		3352	3574	3467	1794
Flt Permitted	1.00	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3574	1830		3352	3574	3467	1794
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1293	835	3	523	576	384	625
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	1293	835	0	526	576	384	625
Heavy Vehicles (%)	1%	0%	0%	1%	1%	1%	2%
Turn Type	NA	Free	Prot	Prot	NA	Prot	Free
Protected Phases	2		1	1	6	8	
Permitted Phases		Free					Free
Actuated Green, G (s)	34.4	80.0		17.4	56.8	13.2	80.0
Effective Green, g (s)	35.4	80.0		18.4	57.8	14.2	80.0
Actuated g/C Ratio	0.44	1.00		0.23	0.72	0.18	1.00
Clearance Time (s)	5.0			5.0	5.0	5.0	
Vehicle Extension (s)	2.0			2.0	2.0	2.0	
Lane Grp Cap (vph)	1581	1830		770	2582	615	1794
v/s Ratio Prot	c0.36			c0.16	0.16	c0.11	
v/s Ratio Perm		0.46					0.35
v/c Ratio	0.82	0.46		0.68	0.22	0.62	0.35
Uniform Delay, d1	19.5	0.0		28.1	3.7	30.4	0.0
Progression Factor	0.83	1.00		1.30	0.28	1.00	1.00
Incremental Delay, d2	3.5	0.6		1.8	0.2	1.4	0.5
Delay (s)	19.6	0.6		38.5	1.2	31.9	0.5



Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Level of Service	B	A		D	A	C	A
Approach Delay (s/veh)	12.1				19.0	12.5	
Approach LOS	B				B	B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

\_4 - 2032 No-Build Weekday Evening  
 5: Shattuck Road/Minuteman Road & River Road

02/24/2026

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	455	38	106	350	250	51	2	487	881	4	49
Future Volume (vph)	17	455	38	106	350	250	51	2	487	881	4	49
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	0.88	0.95	0.95	1.00
Frt		0.989				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.954		0.950	0.953	
Satd. Flow (prot)	1805	3506	0	3351	1863	1417	0	1692	2748	1665	1670	1615
Flt Permitted	0.950			0.950				0.954		0.950	0.953	
Satd. Flow (perm)	1805	3506	0	3351	1863	1417	0	1692	2748	1665	1670	1615
Satd. Flow (RTOR)		10				272						232
Adj. Flow (vph)	18	495	41	115	380	272	55	2	529	958	4	53
Lane Group Flow (vph)	18	536	0	115	380	272	0	57	529	479	483	53
Turn Type	Prot	NA		Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	5	2		1	6		8	8	8 1	3	3	
Permitted Phases						Free						Free
Detector Phase	5	2		1	6		8	8	8 1	3	3	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Minimum Split (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Total Split (s)	11.0	22.0		11.0	22.0		15.0	15.0		32.0	32.0	
Total Split (%)	13.8%	27.5%		13.8%	27.5%		18.8%	18.8%		40.0%	40.0%	
Maximum Green (s)	6.0	17.0		6.0	17.0		10.0	10.0		27.0	27.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0			-1.0		-1.0	-1.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	
v/c Ratio	0.11	0.64		0.39	0.59	0.19		0.23	0.68	0.87	0.87	0.03
Control Delay (s/veh)	35.5	31.4		39.9	24.0	0.3		33.6	31.0	43.0	43.5	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 (s/veh)	35.5	31.4		39.9	24.0	0.3		33.6	31.0	43.0	43.5	0.0

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 5: Shattuck Road/Minuteman Road & River Road

02/24/2026



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	9	128		31	118	0		26	134	231	228	0
Queue Length 95th (ft)	28	183		55	#331	0		60	194	#407	#401	0
Internal Link Dist (ft)		1189			1168			1114			744	
Turn Bay Length (ft)	80			350					200			150
Base Capacity (vph)	157	836		293	645	1417		244	775	582	584	1615
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	0.11	0.64		0.39	0.59	0.19		0.23	0.68	0.82	0.83	0.03

Intersection Summary

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 60 (75%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

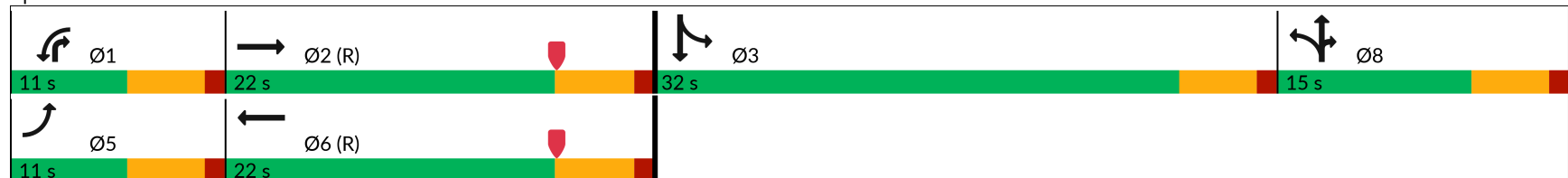
Natural Cycle: 70

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 5: Shattuck Road/Minuteman Road & River Road



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 5: Shattuck Road/Minuteman Road & River Road

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	455	38	106	350	250	51	2	487	881	4	49
Future Volume (vph)	17	455	38	106	350	250	51	2	487	881	4	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	12	12	10	10	11	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00		1.00	0.88	0.95	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.95	1.00	0.95	0.95	1.00
Satd. Flow (prot)	1805	3504		3351	1863	1417		1692	2748	1665	1670	1615
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.95	1.00	0.95	0.95	1.00
Satd. Flow (perm)	1805	3504		3351	1863	1417		1692	2748	1665	1670	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	495	41	115	380	272	55	2	529	958	4	53
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	18	528	0	115	380	272	0	57	529	479	483	53
Heavy Vehicles (%)	0%	2%	0%	1%	2%	14%	0%	0%	0%	3%	0%	0%
Turn Type	Prot	NA		Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	5	2		1	6		8	8	8 1	3	3	
Permitted Phases						Free						Free
Actuated Green, G (s)	1.2	17.9		6.0	22.7	80.0		10.6	21.6	25.5	25.5	80.0
Effective Green, g (s)	2.2	18.9		7.0	23.7	80.0		11.6	22.6	26.5	26.5	80.0
Actuated g/C Ratio	0.03	0.24		0.09	0.30	1.00		0.14	0.28	0.33	0.33	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	49	827		293	551	1417		245	776	551	553	1615
v/s Ratio Prot	0.01	0.15		0.03	c0.20			0.03	c0.19	0.29	c0.29	
v/s Ratio Perm						0.19						0.03
v/c Ratio	0.37	0.64		0.39	0.69	0.19		0.23	0.68	0.87	0.87	0.03
Uniform Delay, d1	38.2	27.5		34.5	24.9	0.0		30.3	25.5	25.1	25.2	0.0
Progression Factor	1.00	1.00		1.03	0.77	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.7	3.8		0.3	6.7	0.3		0.2	2.0	13.3	13.8	0.0
Delay (s)	39.9	31.2		36.0	26.0	0.3		30.4	27.5	38.4	39.0	0.0

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 5: Shattuck Road/Minuteman Road & River Road

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Level of Service	D	C		D	C	A		C	C	D	D	A
Approach Delay (s/veh)		31.5			18.4			27.8			36.7	
Approach LOS		C			B			C			D	

Intersection Summary		
HCM 2000 Control Delay (s/veh)	29.1	HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio	0.85	
Actuated Cycle Length (s)	80.0	Sum of lost time (s) 17.0
Intersection Capacity Utilization	65.3%	ICU Level of Service C
Analysis Period (min)	15	

c Critical Lane Group