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January 11, 2020

Mr. Robert Gaynor
Chairman, Zoning Board of Appeals
Halifax Town Hall
499 Plymouth Street
Halifax, MA 02338

**Subject: Country Club Estates, Halifax, MA**
**Response to Traffic Peer Review**

Dear Mr. Gaynor,

On behalf of the applicant, Green International Affiliates, Inc. (Green) has reviewed the traffic related peer review comments[1] submitted by Gillon Associates dated May 28, 2020 and we have prepared this response to those comments. The Gillon review was done in regards to the traffic impact report[2] completed for the project.

In general, the peer review determined that the traffic impact study for the proposed development was done according to standard practices represented a reasonable assessment of impact of the proposed residential development of 30 units of housing. There was general concurrence in regard to the study area, based data and adjustments, site traffic forecasts and the key analysis findings related to site the access.

Mr. Gillon's primary concern revolves around the location of the site access point and the traffic signal operations, both at that point of new access as well as along the 3 signal system. As currently designed, the site drive will essentially be opposite the Stop & Shop (S&S) Drive but with a slight offset in relation to the S&S Drive centerline. Mr. Gillon indicated that signal timing could resolve any issue and requested that we examine a signal timing option that would "split" the signal phases for each drive. He also noted the final signal timing plans should be provided to the town for approval prior to construction and the need for the applicant to commit to design and construction of the modifications at the intersection.

In response, we completed additional signal timing analyses along Plymouth Street incorporating "split" phasing at the site drive intersection as well as testing various timing plans for the signal coordination. The analysis results showed that using split phasing at the site drive will more than adequately address the slight offset in alignment and maintain more than acceptable operating conditions. It will also be better given the large differential in volumes on the two opposite approaches.

Furthermore, the analysis showed that the split phasing along with optimized signal coordination timing would maintain acceptable levels of service at the 3 intersections as well as manage the peak hour vehicle queues as well as possible. The most recent signal analysis calculation sheets are attached.

In concluding, this assessment and review of the proposed 30 unit residential development at 314 Plymouth Street has indicated that the project is a low generator of traffic and will not have a significant impact on the traffic flow in the immediate are of the development. While this assessment has shown minimal anticipated vehicle traffic generation and the project can be safely accessed/egressed, several traffic safety and control related recommendations have been developed and the project can commit to the following building off the original recommendations contained in the October 2019 traffic report:

[1] Gillon Associates, Traffic Study Peer Review Letter, Chapter 40B Development, 314 Plymouth Street, Halifax, MA, dated May 28, 2020.
[2] Green International Affiliates, Inc. Traffic Impact & Access Study, Proposed Halifax 40B Development, 314 Plymouth Street, Halifax, MA, October 2019.

- Upon approval of the project, the traffic signal at the Plymouth Street/Stop & Shop Drive will be modified to include a separate signal phase for the project drive. The applicant will be responsible for the design and construction of these modifications. All traffic control will conform to the MUTCD[3].

- Traffic signal timing plans will be further refined during the design process and submitted for review by the town's peer traffic engineer consultant in order to reach agreement on the optimal signal timing.

- With the construction of the site drive, ADA compliant ramps will need to be constructed at the sidewalk locations and a crosswalk marked across the driveway to facilitate crossing Plymouth Street from the site to the Stop & Shop site.

- Any new vegetation or site signage adjacent to the site driveway on Pine Street should be kept low-lying (less than two feet tall) and/or set back sufficiently to maintain adequate sightlines.

If you have any questions, do not hesitate to contact me at 978-923-0400.

Very truly yours,
***GREEN INTERNATIONAL AFFILIATES, INC.***

William J Scully

William J. Scully, P.E.
Vice President

WJS/-

Attachments

Cc P. Cusson
C. Tobias
J. Gillon

[3] U.S. Department of Transportation, Federal Highway Administration, Manual on Uniform Traffic Control Devices (MUTCD), Washington, D.C., 2009.

**Attachments**

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 165 | 437 | 195 | 86 | 351 | 63 | 160 | 178 | 48 | 61 | 226 | 148 |
| Future Volume (vph) | 165 | 437 | 195 | 86 | 351 | 63 | 160 | 178 | 48 | 61 | 226 | 148 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 220 | | 0 | 120 | | 0 | 120 | | 0 | 150 | | 150 |
| Storage Lanes | 1 | | 0 | 1 | | 0 | 1 | | 0 | 1 | | 0 |
| Taper Length (ft) | 25 | | | 25 | | | 25 | | | 25 | | |
| Satd. Flow (prot) | 1736 | 1800 | 0 | 1787 | 1841 | 0 | 1770 | 1776 | 0 | 1770 | 1863 | 1599 |
| Flt Permitted | 0.358 | | | 0.127 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (perm) | 654 | 1800 | 0 | 239 | 1841 | 0 | 1770 | 1776 | 0 | 1770 | 1863 | 1599 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 33 | | | 13 | | | 15 | | | | 172 |
| Link Speed (mph) | | 25 | | | 25 | | | 25 | | | 25 | |
| Link Distance (ft) | | 405 | | | 1371 | | | 950 | | | 1117 | |
| Travel Time (s) | | 11.0 | | | 37.4 | | | 25.9 | | | 30.5 | |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.82 | 0.82 | 0.82 | 0.93 | 0.93 | 0.93 | 0.86 | 0.86 | 0.86 |
| Heavy Vehicles (%) | 4% | 1% | 0% | 1% | 1% | 0% | 2% | 4% | 2% | 2% | 2% | 1% |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 170 | 652 | 0 | 105 | 505 | 0 | 172 | 243 | 0 | 71 | 263 | 172 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(ft) | | 12 | | | 12 | | | 12 | | | 12 | |
| Link Offset(ft) | | 0 | | | 0 | | | 0 | | | 0 | |
| Crosswalk Width(ft) | | 16 | | | 16 | | | 16 | | | 16 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Number of Detectors | 1 | 2 | | 1 | 2 | | 1 | 2 | | 1 | 2 | 1 |
| Detector Template | Left | Thru | | Left | Thru | | Left | Thru | | Left | Thru | Right |
| Leading Detector (ft) | 20 | 100 | | 20 | 100 | | 20 | 100 | | 20 | 100 | 20 |
| Trailing Detector (ft) | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 |
| Detector 1 Position(ft) | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 |
| Detector 1 Size(ft) | 20 | 6 | | 20 | 6 | | 20 | 6 | | 20 | 6 | 20 |
| Detector 1 Type | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Detector 2 Position(ft) | | 94 | | | 94 | | | 94 | | | 94 | |
| Detector 2 Size(ft) | | 6 | | | 6 | | | 6 | | | 6 | |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | pm+pt | NA | | pm+pt | NA | | Prot | NA | | Prot | NA | Perm |
| Protected Phases | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | | 8 | | | | | | | | 6 |
| Detector Phase | 7 | 4 | | 3 | 8 | | 5 | 2 | | 1 | 6 | 6 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 |



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| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum Split (s) | 8.0 | 22.5 | | 8.0 | 22.5 | | 8.0 | 22.5 | | 8.0 | 22.5 | 22.5 |
| Total Split (s) | 10.0 | 44.0 | | 8.0 | 42.0 | | 15.0 | 26.0 | | 12.0 | 23.0 | 23.0 |
| Total Split (%) | 11.1% | 48.9% | | 8.9% | 46.7% | | 16.7% | 28.9% | | 13.3% | 25.6% | 25.6% |
| Maximum Green (s) | 7.0 | 41.0 | | 5.0 | 39.0 | | 12.0 | 23.0 | | 9.0 | 20.0 | 20.0 |
| Yellow Time (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | 2.0 |
| All-Red Time (s) | 1.0 | 1.0 | | 1.0 | 1.0 | | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 |
| Lost Time Adjust (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Lost Time (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 |
| Lead/Lag | Lag | Lag | | Lead | Lead | | Lead | Lag | | Lead | Lag | Lag |
| Lead-Lag Optimize? | Yes | Yes | | Yes | Yes | | Yes | Yes | | Yes | Yes | Yes |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 |
| Recall Mode | Min | C-Min | | Min | C-Min | | None | None | | None | None | None |
| Walk Time (s) | | 7.0 | | | | | | | | | | |
| Flash Dont Walk (s) | | 12.0 | | | | | | | | | | |
| Pedestrian Calls (#/hr) | | 5 | | | | | | | | | | |
| Act Effct Green (s) | 42.7 | 42.7 | | 38.5 | 38.5 | | 12.0 | 22.6 | | 8.0 | 17.0 | 17.0 |
| Actuated g/C Ratio | 0.47 | 0.47 | | 0.43 | 0.43 | | 0.13 | 0.25 | | 0.09 | 0.19 | 0.19 |
| v/c Ratio | 0.39 | 0.75 | | 0.50 | 0.64 | | 0.73 | 0.53 | | 0.45 | 0.75 | 0.39 |
| Control Delay | 19.6 | 22.9 | | 25.7 | 25.1 | | 56.7 | 32.1 | | 47.9 | 47.9 | 7.6 |
| Queue Delay | 0.0 | 1.1 | | 0.0 | 0.1 | | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 |
| Total Delay | 19.6 | 24.0 | | 25.7 | 25.2 | | 56.7 | 32.1 | | 47.9 | 47.9 | 7.7 |
| LOS | B | C | | C | C | | E | C | | D | D | A |
| Approach Delay | | 23.1 | | | 25.3 | | | 42.3 | | | 34.2 | |
| Approach LOS | | C | | | C | | | D | | | C | |
| Queue Length 50th (ft) | 63 | 107 | | 40 | 243 | | 92 | 111 | | 39 | 141 | 0 |
| Queue Length 95th (ft) | 92 | 212 | | 61 | 276 | | #190 | 186 | | 77 | 207 | 44 |
| Internal Link Dist (ft) | | 325 | | | 1291 | | | 870 | | | 1037 | |
| Turn Bay Length (ft) | 220 | | | 120 | | | 120 | | | 150 | | 150 |
| Base Capacity (vph) | 437 | 884 | | 212 | 841 | | 246 | 469 | | 177 | 414 | 489 |
| Starvation Cap Reductn | 0 | 80 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | | 0 | 27 | | 0 | 0 | | 0 | 0 | 2 |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.39 | 0.81 | | 0.50 | 0.62 | | 0.70 | 0.52 | | 0.40 | 0.64 | 0.35 |

| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Cycle Length: 90 | | | |
| Actuated Cycle Length: 90 | | | |
| Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green, Master Intersection | | | |
| Natural Cycle: 80 | | | |
| Control Type: Actuated-Coordinated | | | |
| Maximum v/c Ratio: 0.75 | | | |
| Intersection Signal Delay: 29.4 | | Intersection LOS: C | |
| Intersection Capacity Utilization 73.7% | | ICU Level of Service D | |
| Analysis Period (min) 15 | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | |
| Queue shown is maximum after two cycles. | | | |



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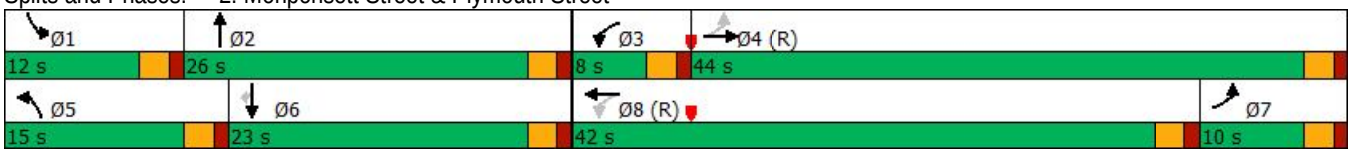
Splits and Phases: 2: Monponsett Street & Plymouth Street



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| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 13 | 653 | 8 | 12 | 685 | 70 | 5 | 0 | 7 | 94 | 0 | 25 |
| Future Volume (vph) | 13 | 653 | 8 | 12 | 685 | 70 | 5 | 0 | 7 | 94 | 0 | 25 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 225 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 |
| Storage Lanes | 1 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 |
| Taper Length (ft) | 25 | | | 25 | | | 25 | | | 25 | | |
| Satd. Flow (prot) | 1805 | 1896 | 0 | 0 | 1875 | 0 | 0 | 1676 | 0 | 0 | 1777 | 0 |
| Flt Permitted | 0.298 | | | | 0.989 | | | | | | 0.762 | |
| Satd. Flow (perm) | 566 | 1896 | 0 | 0 | 1856 | 0 | 0 | 1708 | 0 | 0 | 1407 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 1 | | | 9 | | | 73 | | | 73 | |
| Link Speed (mph) | | 25 | | | 25 | | | 25 | | | 25 | |
| Link Distance (ft) | | 533 | | | 578 | | | 431 | | | 399 | |
| Travel Time (s) | | 14.5 | | | 15.8 | | | 11.8 | | | 10.9 | |
| Peak Hour Factor | 0.88 | 0.88 | 0.92 | 0.92 | 0.87 | 0.87 | 0.92 | 0.92 | 0.92 | 0.67 | 0.92 | 0.67 |
| Heavy Vehicles (%) | 0% | 0% | 2% | 2% | 0% | 0% | 2% | 2% | 2% | 0% | 2% | 0% |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 15 | 751 | 0 | 0 | 880 | 0 | 0 | 13 | 0 | 0 | 177 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(ft) | | 12 | | | 12 | | | 0 | | | 0 | |
| Link Offset(ft) | | 0 | | | 0 | | | 0 | | | 0 | |
| Crosswalk Width(ft) | | 16 | | | 16 | | | 16 | | | 16 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Number of Detectors | 1 | 2 | | 1 | 2 | | 1 | 2 | | 1 | 2 | |
| Detector Template | Left | Thru | | Left | Thru | | Left | Thru | | Left | Thru | |
| Leading Detector (ft) | 20 | 100 | | 20 | 100 | | 20 | 100 | | 20 | 100 | |
| Trailing Detector (ft) | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | |
| Detector 1 Position(ft) | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | |
| Detector 1 Size(ft) | 20 | 6 | | 20 | 6 | | 20 | 6 | | 20 | 6 | |
| Detector 1 Type | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Queue (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Delay (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 2 Position(ft) | | 94 | | | 94 | | | 94 | | | 94 | |
| Detector 2 Size(ft) | | 6 | | | 6 | | | 6 | | | 6 | |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | | Perm | NA | | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Detector Phase | 4 | 4 | | 8 | 8 | | 2 | 2 | | 6 | 6 | |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | | 5.0 | 5.0 | | 7.0 | 7.0 | | 7.0 | 7.0 | |



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| Lane Group | Ø9 |
|---|---|
| Lane Configurations | |
| Traffic Volume (vph) | |
| Future Volume (vph) | |
| Ideal Flow (vphpl) | |
| Storage Length (ft) | |
| Storage Lanes | |
| Taper Length (ft) | |
| Satd. Flow (prot) | |
| Flt Permitted | |
| Satd. Flow (perm) | |
| Right Turn on Red | |
| Satd. Flow (RTOR) | |
| Link Speed (mph) | |
| Link Distance (ft) | |
| Travel Time (s) | |
| Peak Hour Factor | |
| Heavy Vehicles (%) | |
| Shared Lane Traffic (%) | |
| Lane Group Flow (vph) | |
| Enter Blocked Intersection | |
| Lane Alignment | |
| Median Width(ft) | |
| Link Offset(ft) | |
| Crosswalk Width(ft) | |
| Two way Left Turn Lane | |
| Headway Factor | |
| Turning Speed (mph) | |
| Number of Detectors | |
| Detector Template | |
| Leading Detector (ft) | |
| Trailing Detector (ft) | |
| Detector 1 Position(ft) | |
| Detector 1 Size(ft) | |
| Detector 1 Type | |
| Detector 1 Channel | |
| Detector 1 Extend (s) | |
| Detector 1 Queue (s) | |
| Detector 1 Delay (s) | |
| Detector 2 Position(ft) | |
| Detector 2 Size(ft) | |
| Detector 2 Type | |
| Detector 2 Channel | |
| Detector 2 Extend (s) | |
| Turn Type | |
| Protected Phases | 9 |
| Permitted Phases | |
| Detector Phase | |
| Switch Phase | |
| Minimum Initial (s) | 5.0 |



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| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum Split (s) | 29.0 | 29.0 | | 22.5 | 22.5 | | 10.0 | 10.0 | | 10.0 | 10.0 | |
| Total Split (s) | 52.0 | 52.0 | | 52.0 | 52.0 | | 10.0 | 10.0 | | 10.0 | 10.0 | |
| Total Split (%) | 57.8% | 57.8% | | 57.8% | 57.8% | | 11.1% | 11.1% | | 11.1% | 11.1% | |
| Maximum Green (s) | 49.0 | 49.0 | | 49.0 | 49.0 | | 7.0 | 7.0 | | 7.0 | 7.0 | |
| Yellow Time (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| All-Red Time (s) | 1.0 | 1.0 | | 1.0 | 1.0 | | 1.0 | 1.0 | | 1.0 | 1.0 | |
| Lost Time Adjust (s) | 0.0 | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Total Lost Time (s) | 3.0 | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Recall Mode | C-Min | C-Min | | C-Min | C-Min | | None | None | | None | None | |
| Walk Time (s) | | | | | | | | | | | | |
| Flash Dont Walk (s) | | | | | | | | | | | | |
| Pedestrian Calls (#/hr) | | | | | | | | | | | | |
| Act Effct Green (s) | 65.0 | 65.0 | | | 65.0 | | | 7.0 | | | 13.4 | |
| Actuated g/C Ratio | 0.72 | 0.72 | | | 0.72 | | | 0.08 | | | 0.15 | |
| v/c Ratio | 0.04 | 0.55 | | | 0.66 | | | 0.07 | | | 0.65 | |
| Control Delay | 6.7 | 9.6 | | | 6.8 | | | 0.6 | | | 35.6 | |
| Queue Delay | 0.0 | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Total Delay | 6.7 | 9.6 | | | 6.8 | | | 0.6 | | | 35.6 | |
| LOS | A | A | | | A | | | A | | | D | |
| Approach Delay | | 9.5 | | | 6.8 | | | 0.6 | | | 35.6 | |
| Approach LOS | | A | | | A | | | A | | | D | |
| Queue Length 50th (ft) | 2 | 135 | | | 104 | | | 0 | | | 53 | |
| Queue Length 95th (ft) | 13 | 427 | | | #79 | | | 0 | | | #195 | |
| Internal Link Dist (ft) | | 453 | | | 498 | | | 351 | | | 319 | |
| Turn Bay Length (ft) | 225 | | | | | | | | | | | |
| Base Capacity (vph) | 408 | 1369 | | | 1343 | | | 200 | | | 271 | |
| Starvation Cap Reductn | 0 | 0 | | | 0 | | | 0 | | | 0 | |
| Spillback Cap Reductn | 0 | 0 | | | 0 | | | 0 | | | 0 | |
| Storage Cap Reductn | 0 | 0 | | | 0 | | | 0 | | | 0 | |
| Reduced v/c Ratio | 0.04 | 0.55 | | | 0.66 | | | 0.07 | | | 0.65 | |

| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Cycle Length: 90 | | | |
| Actuated Cycle Length: 90 | | | |
| Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green | | | |
| Natural Cycle: 90 | | | |
| Control Type: Actuated-Coordinated | | | |
| Maximum v/c Ratio: 0.66 | | | |
| Intersection Signal Delay: 10.7 | | Intersection LOS: B | |
| Intersection Capacity Utilization 68.6% | | ICU Level of Service C | |
| Analysis Period (min) 15 | | | |
| # 95th percentile volume exceeds capacity, queue may be longer. | | | |
| Queue shown is maximum after two cycles. | | | |



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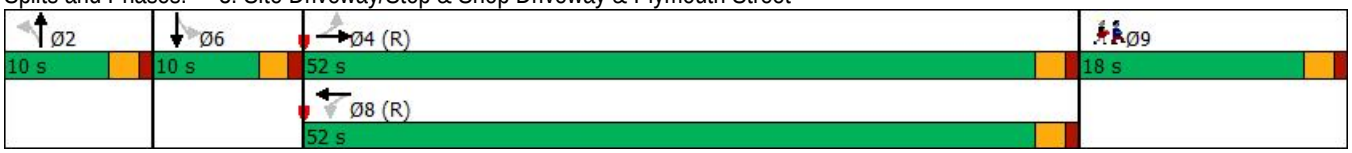
Splits and Phases: 3: Site Driveway/Stop & Shop Driveway & Plymouth Street



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| Lane Group | Ø9 |
|---|---|
| Minimum Split (s) | 18.0 |
| Total Split (s) | 18.0 |
| Total Split (%) | 20% |
| Maximum Green (s) | 15.0 |
| 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) | 5.0 |
| Flash Dont Walk (s) | 10.0 |
| Pedestrian Calls (#/hr) | 5 |
| Act Effct Green (s) | |
| Actuated g/C Ratio | |
| v/c Ratio | |
| Control Delay | |
| Queue Delay | |
| Total Delay | |
| LOS | |
| Approach Delay | |
| Approach LOS | |
| 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 | |

| Intersection Summary |
|---|



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| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 91 | 695 | 12 | 8 | 615 | 121 | 10 | 0 | 2 | 157 | 0 | 23 |
| Future Volume (vph) | 91 | 695 | 12 | 8 | 615 | 121 | 10 | 0 | 2 | 157 | 0 | 23 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Storage Length (ft) | 380 | | 0 | 0 | | 150 | 0 | | 0 | 0 | | 0 |
| Storage Lanes | 1 | | 0 | 0 | | 1 | 0 | | 0 | 1 | | 0 |
| Taper Length (ft) | 25 | | | 25 | | | 25 | | | 25 | | |
| Satd. Flow (prot) | 1787 | 1878 | 0 | 0 | 1880 | 1615 | 0 | 1782 | 0 | 1805 | 1615 | 0 |
| Flt Permitted | 0.214 | | | | 0.991 | | | 0.854 | | 0.742 | | |
| Satd. Flow (perm) | 403 | 1878 | 0 | 0 | 1864 | 1615 | 0 | 1585 | 0 | 1410 | 1615 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 1 | | | | 92 | | 73 | | | 542 | |
| Link Speed (mph) | | 25 | | | 25 | | | 25 | | | 25 | |
| Link Distance (ft) | | 578 | | | 405 | | | 363 | | | 375 | |
| Travel Time (s) | | 15.8 | | | 11.0 | | | 9.9 | | | 10.2 | |
| Peak Hour Factor | 0.89 | 0.89 | 0.89 | 0.87 | 0.87 | 0.87 | 0.50 | 0.50 | 0.50 | 0.79 | 0.79 | 0.79 |
| Heavy Vehicles (%) | 1% | 1% | 0% | 0% | 1% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 102 | 794 | 0 | 0 | 716 | 139 | 0 | 24 | 0 | 199 | 29 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(ft) | | 12 | | | 12 | | | 12 | | | 12 | |
| Link Offset(ft) | | 0 | | | 0 | | | 0 | | | 0 | |
| Crosswalk Width(ft) | | 16 | | | 16 | | | 16 | | | 16 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Turning Speed (mph) | 15 | | 9 | 15 | | 9 | 15 | | 9 | 15 | | 9 |
| Number of Detectors | 1 | 2 | | 1 | 2 | 1 | 1 | 2 | | 1 | 2 | |
| Detector Template | Left | Thru | | Left | Thru | Right | Left | Thru | | Left | Thru | |
| Leading Detector (ft) | 20 | 100 | | 20 | 100 | 20 | 20 | 100 | | 20 | 100 | |
| Trailing Detector (ft) | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Detector 1 Position(ft) | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | |
| Detector 1 Size(ft) | 20 | 6 | | 20 | 6 | 20 | 20 | 6 | | 20 | 6 | |
| Detector 1 Type | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Queue (s) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Delay (s) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 2 Position(ft) | | 94 | | | 94 | | | 94 | | | 94 | |
| Detector 2 Size(ft) | | 6 | | | 6 | | | 6 | | | 6 | |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | pm+pt | NA | | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | 7 | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | 8 | 2 | | | 6 | | |
| Detector Phase | 7 | 4 | | 8 | 8 | 8 | 2 | 2 | | 6 | 6 | |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | 5.0 | |



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| Lane Group | Ø9 |
|---|---|
| Lane Configurations | |
| Traffic Volume (vph) | |
| Future Volume (vph) | |
| Ideal Flow (vphpl) | |
| Storage Length (ft) | |
| Storage Lanes | |
| Taper Length (ft) | |
| Satd. Flow (prot) | |
| Flt Permitted | |
| Satd. Flow (perm) | |
| Right Turn on Red | |
| Satd. Flow (RTOR) | |
| Link Speed (mph) | |
| Link Distance (ft) | |
| Travel Time (s) | |
| Peak Hour Factor | |
| Heavy Vehicles (%) | |
| Shared Lane Traffic (%) | |
| Lane Group Flow (vph) | |
| Enter Blocked Intersection | |
| Lane Alignment | |
| Median Width(ft) | |
| Link Offset(ft) | |
| Crosswalk Width(ft) | |
| Two way Left Turn Lane | |
| Headway Factor | |
| Turning Speed (mph) | |
| Number of Detectors | |
| Detector Template | |
| Leading Detector (ft) | |
| Trailing Detector (ft) | |
| Detector 1 Position(ft) | |
| Detector 1 Size(ft) | |
| Detector 1 Type | |
| Detector 1 Channel | |
| Detector 1 Extend (s) | |
| Detector 1 Queue (s) | |
| Detector 1 Delay (s) | |
| Detector 2 Position(ft) | |
| Detector 2 Size(ft) | |
| Detector 2 Type | |
| Detector 2 Channel | |
| Detector 2 Extend (s) | |
| Turn Type | |
| Protected Phases | 9 |
| Permitted Phases | |
| Detector Phase | |
| Switch Phase | |
| Minimum Initial (s) | 5.0 |



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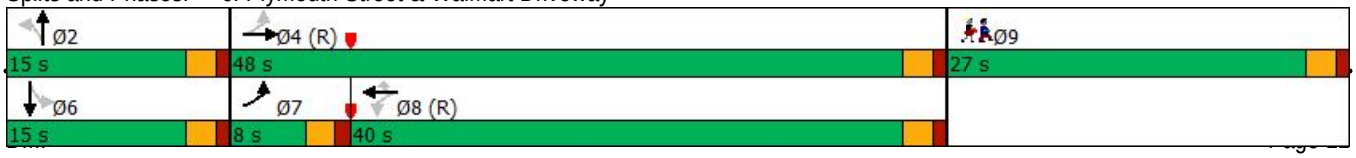
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum Split (s) | 8.0 | 22.5 | | 28.0 | 28.0 | 28.0 | 8.0 | 8.0 | | 8.0 | 8.0 | |
| Total Split (s) | 8.0 | 48.0 | | 40.0 | 40.0 | 40.0 | 15.0 | 15.0 | | 15.0 | 15.0 | |
| Total Split (%) | 8.9% | 53.3% | | 44.4% | 44.4% | 44.4% | 16.7% | 16.7% | | 16.7% | 16.7% | |
| Maximum Green (s) | 5.0 | 45.0 | | 37.0 | 37.0 | 37.0 | 12.0 | 12.0 | | 12.0 | 12.0 | |
| Yellow Time (s) | 2.0 | 2.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 | |
| All-Red Time (s) | 1.0 | 1.0 | | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | 1.0 | |
| Lost Time Adjust (s) | 0.0 | 0.0 | | | 0.0 | 0.0 | | 0.0 | | 0.0 | 0.0 | |
| Total Lost Time (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | | 3.0 | | 3.0 | 3.0 | |
| Lead/Lag | Lead | | | Lag | Lag | 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 | Min | C-Min | | C-Min | C-Min | C-Min | None | None | | None | None | |
| Walk Time (s) | | | | | | | | | | | | |
| Flash Dont Walk (s) | | | | | | | | | | | | |
| Pedestrian Calls (#/hr) | | | | | | | | | | | | |
| Act Effct Green (s) | 62.2 | 62.2 | | | 52.0 | 52.0 | | 21.8 | | 21.8 | 21.8 | |
| Actuated g/C Ratio | 0.69 | 0.69 | | | 0.58 | 0.58 | | 0.24 | | 0.24 | 0.24 | |
| v/c Ratio | 0.26 | 0.61 | | | 0.66 | 0.14 | | 0.05 | | 0.58 | 0.04 | |
| Control Delay | 7.1 | 9.2 | | | 13.5 | 3.1 | | 0.2 | | 37.7 | 0.1 | |
| Queue Delay | 0.0 | 0.1 | | | 1.0 | 0.0 | | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 7.1 | 9.3 | | | 14.5 | 3.1 | | 0.2 | | 37.7 | 0.1 | |
| LOS | A | A | | | B | A | | A | | D | A | |
| Approach Delay | | 9.0 | | | 12.7 | | | 0.3 | | | 32.9 | |
| Approach LOS | | A | | | B | | | A | | | C | |
| Queue Length 50th (ft) | 14 | 122 | | | 158 | 4 | | 0 | | 101 | 0 | |
| Queue Length 95th (ft) | m55 | 307 | | | 243 | m15 | | 0 | | 142 | 0 | |
| Internal Link Dist (ft) | | 498 | | | 325 | | | 283 | | | 295 | |
| Turn Bay Length (ft) | 380 | | | | | 150 | | | | | | |
| Base Capacity (vph) | 389 | 1298 | | | 1077 | 972 | | 438 | | 341 | 801 | |
| Starvation Cap Reductn | 0 | 66 | | | 154 | 0 | | 0 | | 0 | 0 | |
| Spillback Cap Reductn | 0 | 21 | | | 35 | 0 | | 1 | | 0 | 10 | |
| Storage Cap Reductn | 0 | 0 | | | 0 | 0 | | 0 | | 0 | 0 | |
| Reduced v/c Ratio | 0.26 | 0.64 | | | 0.78 | 0.14 | | 0.05 | | 0.58 | 0.04 | |

| Intersection Summary | | | |
|---|---|---|---|
| Area Type: | Other | | |
| Cycle Length: 90 | | | |
| Actuated Cycle Length: 90 | | | |
| Offset: 89 (99%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green | | | |
| Natural Cycle: 90 | | | |
| Control Type: Actuated-Coordinated | | | |
| Maximum v/c Ratio: 0.66 | | | |
| Intersection Signal Delay: 13.2 | | Intersection LOS: B | |
| Intersection Capacity Utilization 89.8% | | ICU Level of Service E | |
| Analysis Period (min) 15 | | | |
| m Volume for 95th percentile queue is metered by upstream signal. | | | |

Splits and Phases: 6: Plymouth Street & WalMart Driveway

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| Lane Group | Ø9 |
|---|---|
| Minimum Split (s) | 27.0 |
| Total Split (s) | 27.0 |
| Total Split (%) | 30% |
| Maximum Green (s) | 24.0 |
| 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) | 8.0 |
| Flash Dont Walk (s) | 16.0 |
| Pedestrian Calls (#/hr) | 0 |
| Act Effct Green (s) | |
| Actuated g/C Ratio | |
| v/c Ratio | |
| Control Delay | |
| Queue Delay | |
| Total Delay | |
| LOS | |
| Approach Delay | |
| Approach LOS | |
| 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 | |

| Intersection Summary |
|---|



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