

FRIARS DRIVE INDUSTRIAL FACILITY

5 WAY REALTY TRUST SITE PLAN

SITE PLAN APPLICATION #10-21

STAFF REPORT

September 22, 2021

SITE: 161 Lowell Road; Map 209 Lot 001-000

ZONING: General (G), Industrial (I)*

*All proposed work is within the G zone.

PURPOSE OF PLANS: Site Plan for a 504,000 square foot warehouse building.

PLANS UNDER REVIEW:

Site Plan, Friars Drive, Parcel 209-001-000, @ Sagamore Industrial Park, Hudson, New Hampshire; prepared by the Dubai Group, Inc., 136 Harvey Rd, Bldg B101, Londonderry, NH 03053; prepared for owners: GFI Partners / Lowell Road Property Owner, LLC, 133 Pearl Street #300, Boston, MA 02110 & 5 Way Realty Trust (Peter Home, Trustee) PO Box 1435, N. Hampton, NH 03862; consisting of 100 sheets (including proposed elevations prepared by aF+S), with general notes 1-10 on Sheet 4; dated August 3, 2021.

ATTACHMENTS:

- A. Peer Review Comments, by Fuss & O'Neill, dated August 27, 2021
- B. Department Comments
- C. Traffic Impact and Access Study, prepared by TF Moran; prepared for GFI Partners, received September 7, 2021.

APPLICATION TRACKING:

- August 3, 2021 – Application received.
- September 7, 2021 - Traffic Impact and Access Study received.
- September 22, 2021 – Public hearing scheduled.

COMMENTS & RECOMMENDATIONS:

BACKGROUND

The existing lot is densely wooded almost in its entirety, except for an area along Friars Drive that was cleared for road and utilities work, and the area underneath the powerline easement along the Merrimack River. Third Brook cuts across the western part of the lot and flows into the Merrimack River, separating the riverfront portion of the lot from the rest of the lot.

The applicant's wetland scientist delineated wetland along the Third Brook and the applicant's land surveyor identified several areas of steep slope across the lot. The wetland and steep slope areas are shown on the submitted plan set.

The lot is located within the Sagamore Industrial Park. The applicant is proposing a new 504,000-SF industrial facility, planned and designed to attract local and industrial users including but not limited to warehouse distribution, light industrial, and light manufacturing. The facility will be serviced by a driveway off of Friars Drive.

STAFF COMMENTS

1. **Use (§ 334-21):** The application narrative states the proposed facility "is planned and designed to attract local and regional industrial users including but not limited to warehouse distribution, light industrial, and light manufacturing."

Wholesale, warehouse, self-storage mini-warehouse, or distribution facility; includes parking of recreational vehicles, buses and/or boats (E.8*) Manufacturing (E.6*), as well as any Retail sale of products manufactured on the premises (E.7*), are all permitted in the General (G) and Industrial (I) zones.

Staff recommends further clarification of the proposed use. Additionally, staff has suggested to the Applicant, GFI Partners, present similar developments in their portfolio for the Board's understanding of implementation and operation.

2. **Dimensional Requirements (§ 334-27):** The submitted site plan conforms to all dimensional requirements within the Zoning Ordinance.
3. **Additional Setback to Residential Use [§ 276-11.1:B(12)(a)]:** Requirement met – 200' buffer from the residential property line to any improved part of the industrial development.
4. **Open Space Requirement [§ 276-11.1:B.24(b)]:** Requirement met – with the lot located within the area bounded by the Merrimack River, 35% open space is required. The plan shows an open space area of 64%.
5. **Off-Street Parking (§ 275-6:D):**
 - a. **Parking Calculation [§ 275-8:C(2)]:** Per § 275-8:C(2)(g), for industrial use, one space for each 600 square feet of gross floor space or 0.75 space per employee of the combined employment of the two largest successive shifts, whichever is larger. 840 spaces would be required for the proposed 504,000-s.f. industrial building.

The applicant is proposing 362 parking spaces, including 12 ADA spaces. A note at the center of Sheet 36 states:

362 spaces provided which are fully adequate and consistent for warehouse use per typical industry functionality.

The approval by the planning board reduces impervious areas and is allowed to be reduced in accordance with 275.8.C.2.

Parking is also flexibly cross-managed by owner between tenants.

Total employees typically accommodated per 275.8.C.2.G is 0.75 spaces per employee of the combined employment of the two largest successive shifts = $3 \times (362 / 0.75) / 2 = 724$ employees or 241 employees per shift.

§ 275-8:C(2) allows the Planning Board to vary parking requirements if the applicant can demonstrate that fewer spaces than required are consistent with the proposed use. Staff recommends the Board to evaluate whether the applicant has demonstrated that 362 parking spaces are adequate for the proposed development.

6. **Plan Notes:** In addition to the ordinary plan notes that are not currently provided, the following are also suggested to be added:
 - a. All signs are subject to approval by the Zoning Administrator prior to installation.
 - b. Hours of operation
 - c. Hours of refuse removal shall be exclusive to the hours between 7:00 A.M. and 7:00 P.M., Monday through Friday only.
 - d. Sheet 11 – Site Specific Soils Plan is missing from the submittal.

7. **Landscape & Buffering:** The Applicant has provided a Landscape Overview Plan on Sheet 26, showing a spectrum of landscape treatment between the proposed building and the property lines. The spectrum includes the retention of existing trees around the site. This is discussed further in Item #8 below.

Site Sections are provided on Sheet 37, showing five (5) cross sections that illustrate sight lines from abutting properties. The location of each section line can be found as follows:

Site Section	Sheet
A	34
B	32
C	31
D	30
E	29

8. **Site Walk:** Staff highly recommends that the Planning Board conduct a site walk for this application. Further, Staff recommends that the Applicant stake out the areas corresponding to the Landscape Overview Plan so that the Board may observe the proposed tree line/vegetation to be retained.

9. **Noise Study** – Staff recommends that the Board require a noise study as part of this application.

10. Other Departments – See **Attachment B** for staff comments from other Town departments.

PEER REVIEW COMMENTS & APPLICANT’S RESPONSE

See **Attachment A** for the Town’s peer review comments after the first-round review of the plan set. Several comments require the Applicant’s attention:

1. Outdoor dumpsters/solid waste disposal not shown – Applicant should clarify.
2. Proposed grading not shown for some areas.
3. Several engineering details that need to be provided and reviewed prior to consideration of approval.
4. Conformance of the building height has not yet been satisfactorily demonstrated to the peer reviewer.

Under item c.7, the peer reviewer identifies an area they believe to require a conditional use permit. However, Staff has verified the grading proposed in the submitted site plan was part of the CUP application previously approved by the Planning Board (CUP# 01-21 Friars Dr Utilities Connection).

The Traffic Impact and Access Study (Attachment C) and the Stormwater Management report are currently under review.

DRAFT MOTIONS

ACCEPT the site plan application:

I move to accept the site plan application #10-21, for the Friars Drive Industrial Facility at 161 Lowell Road; Map 209 Lot 001-000.

Motion by: _____ Second: _____ Carried/Failed: _____

To GRANT a waiver:

I move to grant a waiver from § 275-8:C(2)(g), to allow for a reduction in required parking spaces, based on the Board’s discussion, the testimony of the Applicant’s representative, and in accordance with the language included in the submitted Waiver Request Form for said waiver.

Motion by: _____ Second: _____ Carried/Failed: _____

CONTINUE the public hearing to a date certain:

I move to continue the public hearing for the site plan application #10-21 for the Friars Drive Industrial Facility at 161 Lowell Road; Map 209 Lot 001-000 to date certain, _____, 2021.

Motion by: _____ Second: _____ Carried/Failed: _____

PROJECT NARRATIVE

Date: August 3, 2021
To: Brian Groth, Hudson Town Planner
Hudson Planning Board
From: Hayley Marsh, Project Manager, Lowell Road Property Owner, LLC
Subject: Friars Drive Industrial Facility

Site Plan Application

Our team is pleased to commence the Site Plan Application process on behalf of our affiliate Lowell Road Property Owner, LLC. The Site Plan consists of a new 504,000 SF state-of-the-art industrial facility. It is planned and designed to attract local and regional industrial users including but not limited to warehouse distribution, light industrial, and light manufacturing. The project site, Lot 209-001-000, (presently referred to as 161 Lowell Road) is located on Friars Drive in the Sagamore Industrial Park. The 75-acre lot represents one of the last remaining vacant parcels of master-planned industrial/general zoned land and is included in Hudson's Sagamore Park Economic Revitalization Zone.

Planning Approach & Goals

From the beginning, this project has been specifically planned and designed with the following goals:

- (1) building a facility that is allowed by right by Hudson regulations,
- (2) locating on a site that has been included in the master plan for this use for decades,
- (3) providing the required protective buffer designs to abutting properties,
- (4) protecting wetlands and their buffers,
- (5) avoiding unnecessary waivers or special permits,
- (6) designing an essentially balanced site relative to earthworks,
- (7) providing drainage systems that will protect, treat, and replenish the natural systems, and
- (8) providing quality tax revenue benefits with no net impacts to the school budget or services.

Site Design Summary

The single-story industrial facility includes the design of a 504,000 SF multi-tenanted building with 104 loading doors on two sides, 362 car parking spaces and 71 trailer spaces. The building will comply with Hudson's fifty-foot building height restriction and feature main office entrances on the east and west portions of the building. Other site improvements include a complete landscaping and buffer design, a dark sky friendly lighting plan with zero footcandle cut offs, and a full stormwater management system.

The new driveway is designed to provide full circulation for the users and fire department. Access for the property will be directly via the newly constructed Friars Drive with a majority of traffic circulating through the Sagamore Industrial Park. Our traffic engineer is conducting a full traffic study including analysis of the facilities and roadway networks as required by the Town. Mitigation measures includes full access off Friars Drive for vehicles, while restricting trucks from turning left onto Friars Drive and a restricted right

in and right out at the intersection of Friars Drive and Lowell Road. Detailed results of the traffic study will be formally presented to the board following the completion of the report.

We look forward to working together with the Planning Board, Town Departments, and Staff as we proceed with final design details.

State Permits & Utilities

NHDES Permits will include a straightforward gravity sewer connection from the building to the existing main that already services the site, and an Alteration of Terrain permit (required for any project with over 2.3 acres of earthwork). There is no work within the Shoreland or Flood Zones. Underground power and telecom will be provided, as well as service connection to natural gas. Water will be connected from the new main loop at Friars Drive, and pressurized/stored via on site pumping and storage facilities.

Master Planning

We believe the proposed development aligns perfectly with the Sagamore Industrial Park Master Plan and the town's overall economic development goals. With this type of commercial development, our experience shows that it will provide substantial tax revenues, attract new businesses, and encourage growth in employment for Hudson's residents—while limiting negative impacts to Town resources. Our team looks forward to continuing our quality work with the Town in delivering on these goals with the project.

About the Developer

Lowell Road Property Owner, LLC is an affiliate of GFI Partners, LLC, a full-service real estate developer based in Boston, Massachusetts (www.gfipartners.com). Founded in 1997, GFI has evolved into one of the largest and most experienced real estate developers in the northeast with a proven track record of successful developments. As a fully integrated firm, GFI is involved in every stage of a project's life cycle from acquisition to permitting, construction and final stabilization. GFI has developed over 17 million square feet across all asset classes including industrial, manufacturing, biotech, residential, healthcare, and education. GFI has been repositioning underutilized assets, reinventing communities, and bringing together companies and their people for over 25 years. GFI Partners current portfolio includes over 10 million square feet of real estate and is actively permitting over 6 million square feet of commercial space across the northeast.

GFI believes in the Town of Hudson and is committed to the growth, job creation and economic development opportunities that the community provides and looks forward to introducing the new Friars Drive project to the board members and their neighbors.

SITE PLAN APPLICATION

Date of Application: August 3, 2021 Tax Map #: 209 Lot #: 001-000

Site Address: Friars Drive (161 Lowell Road to be re-assigned)

Name of Project: 5 Way Realty Trust Site Plan

Zoning District: General (G) & Industrial (I) General SP#: 10-21
(For Town Use Only)

Z.B.A. Action: n/a

PROPERTY OWNER:

DEVELOPER:

Name: 5 Way Realty Trust - Peter Horne, Trustee

Lowell Road Property Owner, LLC - Steven E. Goodman

Address: PO Box 1435

133 Pearl Street #300

Address: North Hampton, NH, 03862

Boston, MA, 02110

Telephone # (use authorized developer contact)

617-292-0101

Email: (use authorized developer contact)

sgoodman@gfipartners.com

PROJECT ENGINEER:

SURVEYOR:

Name: The Dubai Group Inc.

(same)

Address: 136 Harvey Road Bldg B101

Address: Londonderry, NH, 03053

Telephone # (Direct) 603-247-8766

Email: Karl@thedubaygroup.com

PURPOSE OF PLAN:

Site Plan for a 504 ksf warehouse building.

(For Town Use Only)

Routing Date: 8/6/21 Deadline Date: 8/20/21 Meeting Date: TBD

I have no comments I have comments (attach to form)

(Initials) Title: _____ Date: _____

Department: _____

Zoning: Engineering: Assessor: Police: Fire: DPW: Consultant:

SITE DATA SHEET

PLAN NAME: 5 Way Realty Trust Site Plan

PLAN TYPE: SITE PLAN

LEGAL DESCRIPTION: MAP 209 LOT 001-000

DATE: _____

Location by Street: Friars Drive

Zoning: General & Industrial

Proposed Land Use: Warehouse

Existing Use: Vacant within Sagamore Industrial Park

Surrounding Land Use(s): Commercial & Residential

Number of Lots Occupied: One

Existing Area Covered by Building: None

Existing Buildings to be removed: None

Proposed Area Covered by Building: 504 KSF

Open Space Proposed: 64% of the total lot = 2,101,750 SF

Open Space Required: 36% of the total lot = 1,158,499 SF

Total Area: S.F.: 3,260,249 Acres: 74.845

Area in Wetland: (existing) 71,325 SF Area Steep Slopes: 221,902 SF

Required Lot Size: 43,560 SF

Existing Frontage: 468 LF

Required Frontage: 150 LF

Building Setbacks:	<u>Required*</u>	<u>Proposed</u>
Front:	<u>30 FT</u>	<u>431 FT (existing)</u>
Side:	<u>15 FT</u>	<u>287 FT</u>
Rear:	<u>15 FT</u>	<u>246 FT</u>

SITE DATA SHEET

(Continued)

FEMA Map: 33011C0652E Date: April 18, 2011

Flood Zone Reference:

(No Impacts) FEMA Map: 33011C0656D Date: September 25, 2009

Width of Driveways:

32 to 56 FT (see plans)

Number of Curb Cuts:

One (with protected turning & walkway islands)

Proposed Parking Spaces:

362

Required Parking Spaces:

362 as proposed (Refer to Parking Summary Plan and per 275-8.C.2)

Basis of Required Parking (Use):

(Refer to Parking Summary Plan and per 275-8.C.2)

Dates/Case #/Description/Stipulations
of ZBA, Conservation Commission,

NH Wetlands Board Actions:

n/a - unknown

(Attach stipulations on separate sheet)

Waiver Requests

Town Code Reference:

Regulation Description:

(none anticipated at this time, to be confirmed as plan review commences)

(For Town Use Only)

Data Sheets Checked By: _____ Date: _____

SITE PLAN APPLICATION AUTHORIZATION

I hereby apply for *Site Plan* Review and acknowledge I will comply with all of the Ordinances of the Town of Hudson, New Hampshire State Laws, as well as any stipulations of the Planning Board, in development and construction of this project. I understand that if any of the items listed under the *Site Plan* specifications or application form are incomplete, the application will be considered rejected.

Pursuant to RSA 674:1-IV, the owner(s) by the filing of this application as indicated above, hereby given permission for any member of the Hudson Planning Board, the Town Planner, the Town Engineer, and such agents or employees of the Town or other persons as the Planning Board may authorize, to enter upon the property which is the subject of this application at all reasonable times for the purpose of such examinations, surveys, tests and inspections as may be appropriate. The owner(s) release(s) any claim to or right he/she (they) may now or hereafter possess against any of the above individuals as a result of any examinations, surveys, tests and/or inspections conducted on his/her (their) property in connection with this applications.

Signature of Owner: Peter W. Horne Date: 7-28-2021

Print Name of Owner: Peter Horne, Trustee for 5 Way Realty Trust

- ❖ If other than an individual, indicate name of organization and its principal owner, partners, or corporate officers.

Signature of Developer:  Date: 7-29-2021

Print Name of Developer: Steven E. Goodman, for Lowell Road Property Owner, LLC

- ❖ The developer/individual in charge must have control over all project work and be available to the Code Enforcement Officer/Building Inspector during the construction phase of the project. The individual in charge of the project must notify the Code Enforcement Officer/Building Inspector within two (2) working days of any change.

WAIVER REQUEST FORM

Name of ~~Subdivision~~/Site Plan: 5 Way Realty Trust Site Plan

Street Address: Friars Drive (161 Lowell Road to be re-assigned)

I Karl Dubay, P.E. hereby request that the Planning Board waive the requirements of item (to be determined, if any) of the Hudson Land Use Regulations in reference to a plan presented by The Dubay Group, Inc.
(name of surveyor and engineer) dated August 2021 for property tax map(s) 209 and lot(s) 001-000 in the Town of Hudson, NH.

As the aforementioned applicant, I, herein, acknowledge that this waiver is requested in accordance with the provisions set forth in RSA 674:36, II (n), i.e., without the Planning Board granting said waiver, it would pose an unnecessary hardship upon me (the applicant), and the granting of this waiver would not be contrary to the spirit and intent of the Land Use Regulations.

Hardship reason(s) for granting this waiver (if additional space is needed please attach the appropriate documentation hereto):

Reason(s) for granting this waiver, relative to not being contrary to the spirit and intent of the Land Use Regulations: (if additional space is needed please attach the appropriate documentation hereto):

Signed: 
Applicant or Authorized Agent
Karl Dubay, P.E., Authorized Agent

SCHEDULE OF FEES

A. REVIEW FEES:

<u>1. Site Plan Use</u>	<u>Project Size/Fee</u>	
Multi-Family	\$105.00/unit for 3-50 units \$78.50/unit for each additional unit over 50	\$ <u>n/a</u>
Commercial/Semi Public/Civic or Recreational	\$157.00/1,000 sq. ft. for first 100,000 sq.ft. (bldg. area): \$78.50/1,000 sq.ft. thereafter.	\$ <u>n/a</u>
Industrial (use 504 ksf)	\$150.00/1,000 sq.ft for first 100,000 sq.ft. (bldg. area); (\$15,000+ \$31,714) \$78.50/1,000 sq.ft thereafter.	\$ <u>46,714</u>
No Buildings	\$30.00 per 1,000 sq.ft. of proposed developed area	\$ <u>n/a</u>

CONSULTANT REVIEW FEE: (Separate Check)

Total 60 developed acres @ \$600.00 per acre, or \$1,250.00, whichever is greater. (measurement consists of parcel less WCD areas and portions south of those areas.)
This is an estimate for cost of consultant review. The fee is expected to cover the amount. A complex project may require additional funds. A simple project may result in a refund.

\$ 36,000

LEGAL FEE:

The applicant shall be charged attorney costs billed to the Town for the Town's attorney review of any application plan set documents.

(continued on next page)

SCHEDULE OF FEES

(Continued)

B. POSTAGE:

<u>34</u> Direct Abutters @\$4.15 (or Current Certified Mail Rate)	\$ <u>142</u>
<u>16</u> Indirect Abutters (property owners within 200 feet) @\$0.55 (or Current First Class Rate)	\$ <u>9</u>

C. ON SITE SIGNAGE: \$ 15.00

E. TAX MAP UPDATING FEE: (FLAT FEE) \$ 275.00

Total = \$36,000 escrow check plus \$47,155 app fee check = **TOTAL** \$ 83,155

(For Town Use)

AMOUNT RECEIVED: \$ <u>83,155.00</u>	DATE RECEIVED: <u>8/3/21</u>
RECEIPT NO.: _____	RECEIVED BY: <u>BROOKE</u>

NOTE: fees below apply only upon plan approval, not collected at time of application.

F. RECORDING FEES:

The applicant shall pay the costs of recording the final site plan layout prior to final site plan approval, in accordance with fees established by the County. Recording fees must be paid prior to recording.

Recording of Plan @ \$24.00/sheet + \$2.00/surcharge plan
Land & Community Heritage Investment Program (LCHIP) fee @ \$25.00
Easements/Agreements @\$10.00/first sheet, \$4.00/each sheet thereafter +
\$2.00/surcharge/doc. + First Class return postage rate

G. COST ALLOCATION PROCEDURE AMOUNT CONTRIBUTION AND OTHER IMPACT FEE PAYMENTS:

To be determined by the Planning Board at time of plan approval and shall be paid by the applicant at the time of submittal of the Certificate of Occupancy Permit requests.

*****The applicant shall be responsible for all fees incurred by the town for processing and review of the applicant's application, plan and related materials.*****

M E M O R A N D U M

TO: File

FROM: Steven W. Reichert PE

DATE: August 27, 2021 *SWR*

RE: Town of Hudson Planning Board Review
Friars Drive Industrial Facility Site Plan
Tax Map 209, Lot 1; Acct. #1350-975
Fuss & O'Neill Reference No. 20030249.2060

The following list itemizes the set of documents reviewed related to the Friars Drive Industrial Facility Site Plan, located at 161 Lowell Road in Hudson, New Hampshire.

- Email correspondence between the Town of Hudson and Fuss & O'Neill, dated on August 10, 2021.
- Package from the Dubai Group, Inc. received by Fuss & O'Neill on August 10, 2021, including the following:
 1. Copy of *Project Narrative*, prepared by GFI Partners, dated August 3, 2021.
 2. Copy of *Town of Hudson, Site Plan Application*, signed July 29, 2021.
 3. Copy of *Traffic Memorandum*, prepared by TFM, dated August 3, 2021.
 4. Copy of *Site Plan, Friars Drive, Parcel 209-001-000 @ Sagamore Industrial Park, Hudson, New Hampshire*, prepared by the Dubai Group, Inc., dated August 3, 2021, with no revisions noted, unless otherwise noted, including the following:
 - a. *Title Sheet*, Sheet 1.
 - b. *Zoning Ordinance Compliance Notes*, Sheet 2.
 - c. *Site Regulations Compliance Notes*, Sheet 3.
 - d. *Existing Conditions Overview Plan*, Sheet 4.
 - e. *Existing Conditions Plan - A to G*, Sheets 5 to 11.
 - f. *Tract Overview Plan*, Sheet 13.
 - g. *Site Overview Plan*, Sheet 14.
 - h. *Site Plan - A to H*, Sheets 15 to 22.
 - i. *Access Summary*, Sheet 23.
 - j. *Main Entrance Detail*, Sheet 24.
 - k. *Site Circulation Plan*, Sheet 25.
 - l. *Landscape Overview*, Sheet 26.
 - m. *Landscape Plan - A to H*, Sheets 27 to 34.
 - n. *Landscape Details*, Sheet 35.
 - o. *Parking Compliance & Landscape Summary*, Sheet 36.
 - p. *Site Sections*, Sheet 37.
 - q. *Green Space & Impervious Area Summary*, Sheet 38.
 - r. *Grading & Drainage Overview Plan*, Sheet 39.
 - s. *Cut/Fill Balance Plan*, Sheet 40.
 - t. *Drainage & Grading Plan - A to H*, Sheets 41 to 48.
 - u. *Utility Overview Plan*, Sheet 49.
 - v. *Utility Plan - A to H*, Sheets 50 to 57.

Memo to File

Fuss & O'Neill Reference No. 20030249.2060

August 27, 2021

Page 2 of 2

- w. *Lighting Overview Plan*, Sheet 58.
- x. *Lighting Plan* - 1 to 4, Sheets 59 to 62.
- y. *Lighting Details*, Sheet 63.
- z. *Sewer Service Overview Plan*, Sheet 64.
- aa. *Sewer Plan* - A to C, Sheets 65 to 67.
- bb. *Sewer Profile* - A to C, Sheets 68 to 70.
- cc. *Sewer Details*, Sheet 71.
- dd. *Site Details* - 1 to 17, Sheet D1 to D17.
- ee. *Proposed East and West Elevations*, Sheet A101, prepared by Applied Form+Space, dated August 2, 2021.
- ff. *Proposed North and South Elevations Building Sections*, Sheet A102, prepared by Applied Form+Space, dated August 2, 2021.

SWR:elc

cc: Brian Groth – Town of Hudson
Town of Hudson Engineering Division – File



August 27, 2021

Mr. Brian Groth
Town Planner
Town of Hudson
12 School Street
Hudson, NH 03051

Re: Town of Hudson Planning Board Review
Friars Drive Industrial Facility Site Plan, 161 Lowell Road
Tax Map 209 Lot 1; Acct. #1350-975
Reference No. 20030249.2060

Dear Mr. Groth:

Fuss & O'Neill (F&O) has reviewed the first submission of the materials received on August 10, 2021, related to the above-referenced project. Authorization to proceed was received on August 10, 2021. A list of items reviewed is enclosed. The scope of our review is based on the Site Plan Review Codes, Stormwater Codes, Driveway Review Codes, Sewer Use Ordinance 77, Zoning Regulations, and criteria outlined in the CLD Consulting Engineers Proposal approved September 16, 2003, revised September 20, 2004, June 4, 2007, September 3, 2008, and October 2015.

We have included a copy of Fuss & O'Neill's evaluation of the checklist for your reference. We note that several items could not be verified by Fuss & O'Neill and require action by the Town.

The project appears to consist of the development of a 504,000 square foot industrial building project on a previously undeveloped site. Proposed improvements to the site also include the construction of a driveway, parking areas, drainage improvements, landscaping, lighting and other associated site improvements. The proposed buildings will be serviced by public water and sewer.

The following items are noted:

1. Site Plan Review Codes (HR 275)

- a. Hudson Regulation (HR) 275-6.C. The applicant has proposed a sidewalk along Friars Drive that will tie into the existing sidewalk in front of 22 Friars Drive.
- b. HR 275-6.I. The scope of this review does not include the adequacy of any fire protection provisions for the proposed buildings. Multiple fire service connections to the buildings are shown along with multiple fire hydrants and a water pumping station with storage onsite. We note that details for the tank and pump station were not provided for review.
- c. HR 275-6.V. The applicant has not shown any outside dumpster enclosures. The applicant should provide information on how trash will be stored/disposed of.
- d. HR 275-8.C.(2) and Zoning Ordinance (ZO) 334-15.A. The applicant has provided parking calculations on the plan set. The applicant has noted that 840 parking spaces are required based on 1 space per 600 square feet or 0.75 spaces per employee for the 2 largest shifts combined. The applicant has proposed 362 spaces and has noted that a maximum

50 Commercial Street
Manchester, NH
03101
t 603.668.8223
800.286.2469
www.fando.com

California
Connecticut
Maine
Massachusetts
New Hampshire
Rhode Island
Vermont

Mr. Brian Groth
August 27, 2021
Page 2 of 5

employee count would be controlled by the building owner at 241 employees per shift to meet the 362 spaces. We note that the applicant should update the parking space number for Lot C on Sheet 36 as it appears 51 spaces are provided and 40 spaces are noted.

- e. HR 275-8.C.(6). The applicant has noted 51 loading spaces are required for the site and has provided more than required. The applicant has also met the size requirements and demonstrated maneuverability on the site circulation plan.
- f. HR 275-9.C.(11). The applicant has provided twelve handicap spaces for the site which exceeds the eight spaces required.
- g. HR 275-9.F. The applicant did not provide copies of any easements or deeds as part of the package received for review, and has not shown any existing or proposed easements on the plans.

2. Administrative Review Codes (HR 276)

- a. HR 276-11.1.B.(6). The owner's signature is not shown on the plan set.
- b. HR 276-11.1.B.(9). The surveyor has stamped the existing conditions plans but has not signed the certification statement.
- c. HR 276-11.1.B.(12).(b). The applicant has provided the required 200 foot distance from abutting residential use. The applicant has also provided a Site Sections plan which shows sight lines from abutting buildings.
- d. HR 276-11.1.B.(13). The applicant has not included details for any proposed site signage other than traffic signs. The applicant should include a note stating that, "All signs are subject to approval by the Hudson PLANNING BOARD prior to installation thereof."
- e. HR 276-11.1.B.(17). We were unable to locate benchmarks upon the plans.
- f. HR 276-11.1.B.(18). The applicant has not shown proposed grading in the majority of the paved areas around the building.
- g. HR 276-11.1.B.(23). The applicant has not noted any pertinent highway projects on the plan set.
- h. HR 276-15. The applicant should add the Dig Safe logo and/or phone number to the plan set.

3. Driveway Review Codes (HR 275-8.B. (34)/Chapter 193)

- a. HR 193.10.E. The applicant should provide sight distance information for the proposed driveway connection to Friars Drive on the plan set.

4. Traffic

- a. HR 275-9.B. The applicant has noted that a full Traffic Study for the site will be completed in the near future. Comments from our review of that Traffic Study will be provided separately.

5. Utility Design/Conflicts

- a. HR 275-9.E and 276-13. The applicant has proposed a water tank and pump system for the water system on site but has not provided any details for these systems on the plans.

Mr. Brian Groth

August 27, 2021

Page 3 of 5

- b. Engineering Technical Guideline & Typical Details (ETGTD) Section 825.2.13. The applicant has noted 'Approved Fire Hydrant' on the Hydrant Installation detail but has not noted the proposed hydrant brand or model. Hydrant models approved for use in Hudson are included in the referenced technical specification.
 - c. The applicant should include a pavement patch detail in the plans for the water service connection at Friars Drive.
 - d. ETGTD Section 720. The applicant should provide anticipated sewer flows for the facility if available so the Town can verify that capacity exists within the adjacent existing sewer system to accommodate those flows.
 - e. Town of Hudson Sewer Use Ordinance (SUO) 77. The applicant has noted that there may be an industrial use or uses within the proposed building. Any industrial user discharging to the Town sewer system must be permitted for that discharge. The individual industries will need to coordinate with the Town for this permitting approval.
 - f. The applicant is proposing an invert in at existing SMH E1 (125.02) that is higher than the proposed invert out of SMH 1 (124.50).
6. Drainage Design/Stormwater Management (HR 275-9.A./Chapter 290)
- a. HR 275-9.A. & 290. Drainage design comments will be provided separately once the design is complete and submitted by the applicant.
 - b. ETGTD Details D-1 and D-2. We note that the Typical Drain Manhole and Typical Catch Basin Details included in the plans show flat tops, whereas the Town's standard details require an eccentric cone section at the tops of these structures.
 - c. ETGTD Detail D-4. The Nyloplast Envirohood Detail doesn't agree with the Town's Oil-Grease Separator detail D-4. The applicant should review this with the Town for acceptance.
 - d. HR 290-7.B.(16). The applicant has not shown snow storage locations on the plans.
7. Zoning (ZO 334)
- a. ZO 334-14.A. The applicant has provided building elevations showing the proposed maximum building height of 50 feet. However, the Ordinance measures the building height from an average elevation within 5 feet of the building. The grading plans do not include proposed grading around the buildings so the 50 foot building height cannot be verified.
 - b. ZO 334-17 & 334-21. The applicant has noted that the subject parcel is located within the General (G) zoning district. The applicant has noted that the building may be used for industrial and/or manufacturing uses. These proposed uses are all allowed in the district.
 - c. ZO 334-33. The applicant has shown wetlands within the site but has not proposed any impacts to the wetlands. The applicant has proposed some grading and drainage work within the wetlands buffer in the drainage easement to the south of the driveway. These impacts appear to be a conditional use of the wetlands buffer.
 - d. ZO 334-60. The applicant has noted size information and locations for proposed site signage. We note that they appear to meet the Ordinance. Details of the proposed signs were not provided for review and the applicant has noted that a sign permit application will be completed.

Mr. Brian Groth
August 27, 2021
Page 4 of 5

- e. ZO 334-83 and HR 218-4.E. The applicant has noted that a portion of the site is located within a designated flood hazard area along the Merrimack River. We note that the applicant has not proposed any impacts or changes within the 100 year flood zone.
8. Erosion Control/Wetland Impacts
- a. The applicant has not included erosion and sedimentation control plans in the current plan review submission. Fuss & O'Neill will review these with a future submission when provided.
 - b. The Town of Hudson should reserve the right to require any additional erosion control measures as needed.
9. Landscaping (HR 275-8.C.(7) & 276-11.1.B.(20)) and Lighting (HR 276-11.1.B.(14))
- a. HR 275-8.C.(7). The applicant has met the landscaping requirements for parking lot areas. We note that some lots are single access lanes and therefore exempt, however, the applicant met the requirements in those lots as well.
 - b. HR 275-8.C.(8). The applicant has provided screening for the residential use to the east by adding a line of large evergreen trees and maintaining some of the existing tree line. The applicant has proposed to maintain the existing vegetation on the north and east sides of the site.
 - c. HR 276-11.1.B.(14). The applicant has shown lighting fixture locations on the plans with details and photometric information, and it appears that the light locations have been coordinated with the Landscape plans.
 - d. HR 276-11.1.B.(14). The applicant is proposing 32 foot light poles mounted on foundations with 3' exposed bases, for a total height of 35 feet. We recommend the applicant include the light poles on the Site Sections plan to demonstrate the site lines from abutting properties to these lights.
10. State and Local Permits (HR 275-9.G.)
- a. HR 275-9.G. The applicant has listed required permits and their statuses on the plan set.
 - b. HR 275-9.G. The applicant did not provide copies of any applicable Town, State or Federal approvals or permits in the review package.
 - c. Additional local and state permitting may be required, including for the proposed underground propane storage tanks.
11. Other
- a. The applicant has included a retaining wall detail in the plans. The applicant should provide a copy of that wall design, signed and stamped by a New Hampshire registered professional engineer, to the Town for their records.
 - b. The applicant has provided a guardrail detail on the plan set but has not shown the location for this guardrail on the plans.
 - c. The applicant has not provided spot grades on the parking lot. They are currently shown as "x"s. We will continue our grading review once the information is complete.
 - d. The applicant should review the building square footage labels on sheet 13. It appears that

Mr. Brian Groth
August 27, 2021
Page 5 of 5

- the "k" in "ksf" should be removed.
- e. ETGTD Section 565.1.1. The applicant is reminded of Town of Hudson requirements for the importing of off-site fill materials for use in constructing this project. It is recommended that these requirements be stated on the plans for the Contractors attention.

Please feel free to call if you have any questions.

Very truly yours,



Steven W. Reichert, P.E.

SWR:

Enclosure

cc: Town of Hudson Engineering Division – File
The Dubay Group – karl@thedubaygroup.com

**APPLICATION FOR SITE PLAN REVIEW
TOWN OF HUDSON, NEW HAMPSHIRE**

**Friars Drive Industrial Facility Site Plan
Town of Hudson
Fuss & O'Neill Reference No. 03-0249.2060
Reviewed August 24, 2021**

Thirty (30) days prior to Planning Board Meeting, a complete site plan to include all supporting materials/documents must be submitted in final form. The site plan shall comply with the following specifications/requirements.

Applicant Initials		Staff Initials	
_____	a) Submission of nine (9) full sets of Site Plans (sheet size: 24" x 34") at the time of application filing, followed by the submission of seventeen (17) 11" x 17" plan sets (revised if applicable) to the Community Development Department no later than 10:00 AM Tuesday of the week prior to the scheduled public hearing/conceptual review date.	_____	a) One full size set received by Fuss & O'Neill.
_____	b) A Site Plan narrative, describing the purpose, locations, long range plans, impacts on traffic, schools and utilities.	_____	Fuss & O'Neill/SWR
_____	c) Plan scale at not less the one inch equals fifty feet (1" = 50')	_____	Fuss & O'Neill/SWR
_____	d) Locus plan with 1,000' minimum radius of site to surrounding area	_____	Fuss & O'Neill/SWR
_____	e) Plan date by day/month/year	_____	Fuss & O'Neill/SWR
_____	f) Revision block inscribed on the plan	_____	Fuss & O'Neill/SWR
_____	g) Planning Board approval block inscribed on the plan	_____	Fuss & O'Neill/SWR
_____	h) Title of project inscribed on the plan	_____	Fuss & O'Neill/SWR
_____	i) Names and addresses of property owners and their signatures inscribed on the plan	_____	i) Signature not provided on plan.
_____	j) North point inscribed on the plan	_____	Fuss & O'Neill/SWR
_____	k) Property lines: exact locations and dimensions	_____	Fuss & O'Neill/SWR
_____	l) Square feet and acreage of site	_____	Fuss & O'Neill/SWR
_____	m) Square feet of each building (existing & proposed)	_____	Fuss & O'Neill/SWR
_____	n) Names and addresses of bordering abutters, as shown on Tax Assessor's records not more than five (5) days prior to application date to be listed on the plan	_____	n) Unable to verify 5-day update criteria.

Applicant Initials		Staff Initials	
_____	o) Location of all structures, roads, wetlands, hydrants, wells, septic systems, 4k reserve areas, floodways/floodplains, driveways, travel areas, parking areas and natural features within 200 feet of the tract	<u>Fuss & O'Neill/SWR</u>	
_____	p) Locations of existing and proposed permanent monuments and benchmarks within 200 feet of the development tract	_____	p) Benchmarks not shown on the plan.
_____	q) Pertinent highway projects	_____	q) None are noted
_____	r) Assessor's Map and Lot number(s)	<u>Fuss & O'Neill/SWR</u>	
_____	s) Waiver application form shall be submitted with the site plan application, note on plan listing waivers requested/granted; and all waivers granted to the site plan regulations shall be listed on the final plan; waivers to checklist shall be reduced to writing and be signed by the Planning Board Chairman and Planning Board Secretary and recorded with the plan.	_____	s) No waivers noted.
_____	t) Delineate zoning district on the plan	<u>Fuss & O'Neill/SWR</u>	
_____	u) Stormwater drainage plan	_____	u) Sotrmwater Drainage Plan to be provided once complete.
_____	v) Topographical elevations at 2-foot intervals contours: existing and proposed	_____	v) contours in paved area of building mostly missing
_____	w) Utilities: existing and proposed	<u>Fuss & O'Neill/SWR</u>	Existing utilites servicing the site not shown.
_____	x) Parking: existing and proposed	<u>Fuss & O'Neill/SWR</u>	
_____	y) Parking space: length and width	<u>Fuss & O'Neill/SWR</u>	
_____	z) Aisle width/maneuvering space	<u>Fuss & O'Neill/SWR</u>	
_____	aa) Landscaping: existing and proposed	<u>Fuss & O'Neill/SWR</u>	Existing landscaping not shown.
_____	ab) Building and wetland setback lines	<u>Fuss & O'Neill/SWR</u>	
_____	ac) Curb cuts	<u>Fuss & O'Neill/SWR</u>	
_____	ad) Rights of way: existing and proposed	<u>Fuss & O'Neill/SWR</u>	
_____	ae) Sidewalks: existing and proposed	<u>Fuss & O'Neill/SWR</u>	
_____	af) Exterior lighting plan	<u>Fuss & O'Neill/SWR</u>	
_____	ag) Sign locations: size and design	_____	ag) Detail not provided.
_____	ah) Water mains and sewerage lines	<u>Fuss & O'Neill/SWR</u>	
_____	ai) Location of dumpsters on concrete pads	_____	ai) No exterior dumpsters shown.
_____	aj) All notes from plats	_____	aj) See other comments.

Applicant Initials		Staff Initials	
_____	ak) Buffer as required by site plan regulations	<u>Fuss & O'Neil/SWR</u>	
_____	al) Green and open space requirements met with percentages of both types of spaces inscribed on the plan	<u>Fuss & O'Neil/SWR</u>	
_____	am) Soil types and boundaries, Note: if site contains marginal or questionable soils, a High Intensity Soil Survey (HISS) may be deemed necessary to submit as part of the application. Said HISS, if required, shall be performed by a State of New Hampshire certified Soil Scientist, who shall affix his/her stamp and signature shall be inscribed on the plan.	_____	am) Soils plan not yet provided.
_____	an) Wetlands (and poorly-drained and very poorly-drained soils), also identified as Class 5 and Class 6 High Intensity Soil Survey (HISS soils), and permanent and seasonal wetlands shall be identified on the plan by a New Hampshire certified Wetland or Soil Scientist, who shall affix his/her stamp and signature to the respective plan.	<u>Fuss & O'Neil/SWR</u>	
_____	ao) "Valid for one year after approval" statement inscribed on the plan	_____	ao) Two years noted on the plan.
_____	ap) Loading bays/docks	<u>Fuss & O'Neil/SWR</u>	
_____	aq) State of New Hampshire engineer's stamp, signature, surveyor's stamp, and signature	<u>Fuss & O'Neil/SWR</u>	
_____	ar) Error of closure (1 in 10,000 or better)	<u>Fuss & O'Neil/SWR</u>	
_____	as) Drafting errors/omissions	_____	as) Not stated.
_____	at) Developer names, addresses, telephone numbers and signatures	_____	at) Signature and phone number not provided on the plan.
_____	au) Photographs, electronic/digital display or video of site and area	_____	au) Not provided.
_____	av) Attach one (1) copy of the building elevations	<u>Fuss & O'Neil/SWR</u>	
_____	aw) Fiscal impact study	_____	aw) Not provided.
_____	ax) Traffic study	<u>Fuss & O'Neil/SWR</u>	ax) Memo provided. Fuss study being prepared.
_____	ay) Noise study	_____	ay) Not provided.

Applicant
Initials

Staff
Initials

- _____ az) Copies of any proposed or existing easements, covenants, deed restrictions, right of way agreements or other similar documents
- _____ ba) Copy of applicable Town, State, Federal approval/permits to include but not limited to the following:
 - industrial discharge application
 - sewer application
 - flood plain permit
 - wetlands special exception
 - variance
 - erosion control permit (149:8a)
 - septic construction approval
 - dredge and fill permit
 - curb cut permit
 - shoreland protection certification in accordance with RSA483-B
 - if applicable, review application with Lower Merrimack River Local Advisory Committee (LMRLAC) and attach LMRLAC project comments hereto.
- _____ bb) Presentation plan (colored, with color coded bar chart)
- _____ bc) Fees paid to clerk
- _____ bd) Five (5) 22" x 34" copies of the plan shall be brought to the Planning Board meeting and distributed to the Planning Board members at the meeting. Note: for all subsequent meetings involving revised plans, five 22" x 34" copies of said plan shall be brought to the meeting for distribution to the board members.

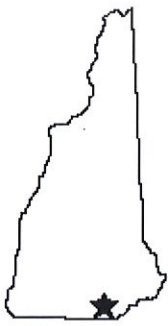
- _____ az) None provided as part of the review package.
- _____ ba) None provided.
- _____ bb) No presentation plan received, requires a Town action.
- _____ bc) Requires Town action.
- _____ bd) Requires Town action.

* Under the purview of the Planning Board any and all items may be waived.

TOWN OF HUDSON

FIRE DEPARTMENT

39 FERRY STREET, HUDSON, NEW HAMPSHIRE 03051



Emergency 911
Business 603-886-6021
Fax 603-594-1164

Robert M. Buxton
Chief of Department

TO: Brian Groth
Town Planner

FR: Robert M. Buxton
Fire Chief

DT: September 14, 2021

RE: Friars Drive Parcel 209-001-000

The following is a list of site plan concerns for this project. This review was completed utilizing plans submitted by The Dubay Group dated August 3, 2021.

1. Please provide the markings for fire apparatus access in accordance with **NFPA 1**.
2. The project shall obtain site addressing from the Hudson Fire Department.
3. The common driveway shall have a permanent sign approved by the Hudson Fire Department noting the addresses of the buildings that are accessed from that driveway. These signs shall be approved and installed before issuance of any building permits.
4. Please make sure that the proposed snow storage area shown on the plan does not impede parking or travel paths.
5. The Fire Department will require three copies of the fire hydrant layout for the full site.
 - a. The Fire Department would request that a hydrant be located minimum of 100', with a maximum of 200' away from the buildings to support the fire department connection.
 - b. The Fire Department would further like to see a hydraulic review for the site. The site is proposed with a private supply and fire pump. This review can be handled once a final building permit is submitted. In concept, the proposed plan is reasonable for this facility. Once final fire flow is calculated, the tank, pump and pipe sizing can be finalized.

****The following life safety and fire protection concerns provided are for informational purposes to the applicant and Planning Board for this project. Final determinations on these issues occur after further review of the project.**

- A. The proposed building will require an approved sprinkler system. The Hudson Fire Department upon review of the building plans shall conduct this review. This requirement is in accordance with the **International Building Code (IBC)** and **Hudson Town Code**

(HTC), current revision, Chapter 210, Article VI. Any fire protection system shall be monitored by an approved fire alarm system.

- B. The fire alarm system shall be connected to the Hudson Fire Department's municipal fire alarm system or a substantially equivalent system in accordance with the **Hudson Town Code, Chapter 210**. A site plan detailing the aerial or underground layout to the municipal fire alarm connection must be provided before the utilities are completed for this project.
- C. Any required fire alarm system component must remain accessible and visible at all times.
- D. Due to the size of each of the buildings, the Fire Department will require an emergency communication system review by our radio system vendor. The vendor shall review the need for signal amplification for first responder communication signals to be received and transmitted from inside the building; additionally, a review of transmission from the site to the Town of Hudson radio system will also be required. As outlined in the Building and Fire Code, the AHJ shall determine the acceptable level of coverage for the site. Any improvements identified shall be at the cost of the developer.
- E. A blasting permit will be required for any blasting on the site in accordance with the **Hudson Town Code, Chapter 202**.
- F. Will there be inside or outside storage above the exempt amounts of hazardous materials, liquids or chemicals presenting a physical or health hazard as listed in the **International Building Code, Sections 307, 414 or 415**? All Tier II reporting requirements shall be followed each year for all facilities.
- G. All storage either inside or outside of hazardous materials, liquids or chemicals presenting a physical or health hazard as listed in **NFPA 1, Section 20.15.2.2** shall be in accordance with the applicable portions of the following:

NFPA 13, Standard for the Installation of Sprinkler Systems
NFPA 30, Flammable and Combustible Liquids Code
NFPA 30B, Code for the Manufacture and Storage of Aerosol Products
NFPA 230, Standard for the Fire Protection of Storage
NFPA 430, Code for the Storage of Liquid and Solid Oxidizers
NFPA 432, Code for the Storage of Organic Peroxide Formulations
NFPA 434, Code for the Storage of Pesticides

cc: Project Engineer
File

Groth, Brian

From: Dhima, Elvis
Sent: Tuesday, September 14, 2021 4:18 PM
To: Groth, Brian
Subject: RE: SP3 10-21 Friars Drive Industrial Facility

Brian

I have the following preliminary comments

1. Water line service will be subject to final Engineering review and final BOS approval. At this time a water modeling review is taking place related to domestic and fire protection.
2. Sewer line service will be subject to final Engineering review.
3. Sewer allocations related to the ultimate use of the proposed facility will be subject to Engineering review and BOS approval
4. Applicant shall meet volume and peak flows related to storm water runoffs
5. Currently there are no off-site improvements shown along Lowell Road entrance.
6. Engineering Department reserves the right for additional comments in the future

Thanks

E

Elvis Dhima, P.E.
Town Engineer

12 School Street
Hudson, NH 03051
Phone: (603) 886-6008
Mobile: (603) 318-8286



From: Groth, Brian <bgroth@hudsonnh.gov>
Sent: Tuesday, September 14, 2021 1:54 PM
To: Dhima, Elvis <edhima@hudsonnh.gov>
Subject: FW: SP3 10-21 Friars Drive Industrial Facility

Have you provided comments yet?

From: Dubowik, Brooke <bdubowik@hudsonnh.gov>
Sent: Friday, August 6, 2021 12:30 PM
To: Bianchi, Dave <dbianchi@hudsonnh.gov>; Buttrick, Bruce <bbuttrick@hudsonnh.gov>; Buxton, Robert <RBuxton@hudsonnh.gov>; Caleb Chang <calebc@nashuarpc.org>; Dhima, Elvis <edhima@hudsonnh.gov>; Kirkland, Donald <dkirkland@hudsonnh.gov>; Forrence, Jess <jforrence@hudsonnh.gov>; Groth, Brian <bgroth@hudsonnh.gov>; Michaud, Jim <jmichaud@hudsonnh.gov>
Subject: SP3 10-21 Friars Drive Industrial Facility



TOWN OF HUDSON

Land Use Division



12 School Street • Hudson, New Hampshire 03051 • Tel: 603-886-6008 • Fax: 603-594-1142

Site Plan Review

August 6, 2021

Re: Map 209 Lot 001-000
Address: 161 Lowell Road
Zoning district: G and I
Site Plan review for two tenant warehouse facility

Submitted plan: Sheet 13 dated Aug3, 2021

1) Please verify that the height of the proposed building will satisfy §334-14.

Sincerely,

Bruce Buttrick,
Zoning Administrator/Code Enforcement Officer

cc: Public Folder
B. Groth - Town Planner
file

NOTE: this determination may be appealed to the Hudson Zoning Board of Adjustment within 30 days of the receipt of this letter.

Traffic Report



Traffic Impact and Access Study

Proposed Distribution Warehouse

Friars Drive

Hudson, New Hampshire

TFM Project #16415.08

September 7, 2021

Prepared for:
GFI Partners

Prepared by:



Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
Scientists

48 Constitution Drive, Bedford, NH 03110
(603) 472-4488 www.tfmoran.com

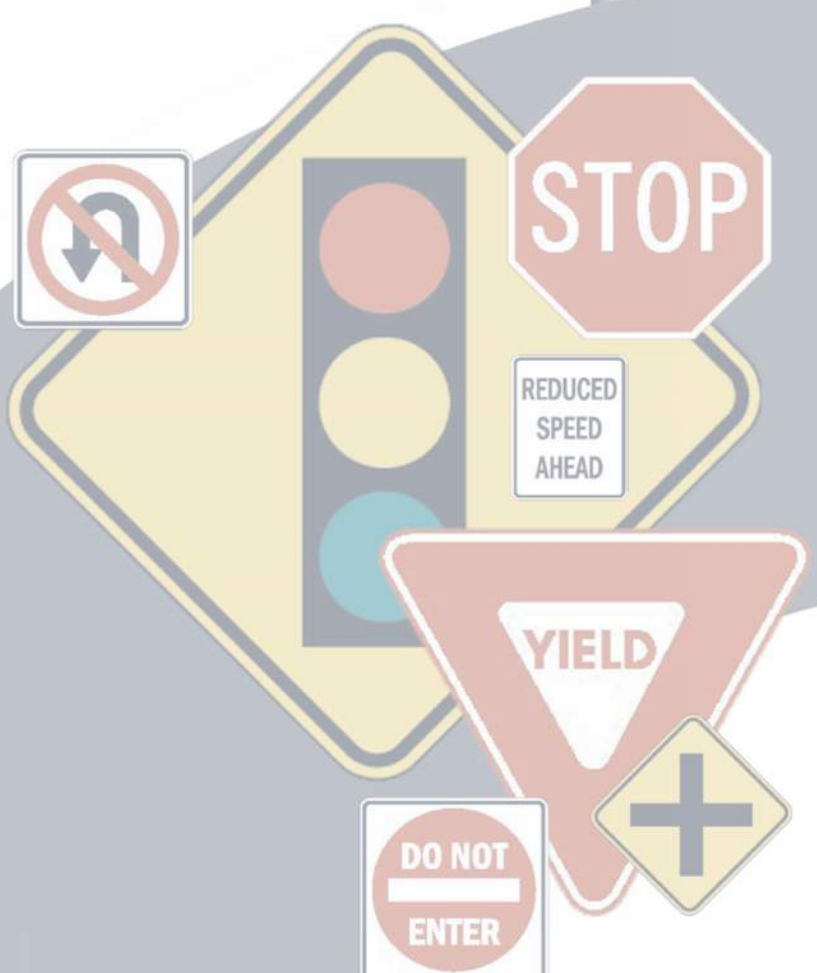


Table of Contents

1.	Introduction	1
2.	Existing Conditions	3
3.	Background Volumes	8
4.	No-Build Volumes	9
5.	Trip Generation	14
6.	Trip Generation vs Parking	14
7.	Holiday Trip Generation	14
8.	Trip Composition and Distribution	15
9.	Build Volumes	22
10.	Level of Service/Queue Analysis	27
11.	Mitigation	36
12.	Conclusion	37

Appendix

Appendix

APPENDIX A	Trip Generation Calculations <ul style="list-style-type: none">• ITE 10th Edition Supplement for Cars & Trucks
APPENDIX B	Daily Shift Schedule Summary
APPENDIX C	Trip Distribution Calculations (AM/PM)
APPENDIX D	Truck Volume Calculations (AM/PM)
APPENDIX E	Other Development Site Trips (AM/PM)
APPENDIX F	Volume Calculations (AM/PM)
APPENDIX G	<u>AM Networks (Synchro)</u> 2022 NoBuild & Build 2032 NoBuild & Build
APPENDIX H	<u>PM Networks (Synchro)</u> 2022 NoBuild & Build 2032 NoBuild & Build
APPENDIX I	<u>Mitigation Networks (Synchro)</u> 2022 Build Mit (AM)
APPENDIX J	Report Resource – Langan Traffic Impact Study for Hudson Logistics Center <ul style="list-style-type: none">• Journey to Work calculations• Figure 8 – 2022 Build Peak-Hour Traffic Volumes• Figure 9 – 2032 Build Peak-Hour Traffic Volumes• Appendix G – 2022 Build Traffic Conditions• Appendix H – 2032 Build Traffic Conditions• Appendix I – 2022 Build with Base Improvements Traffic Conditions• Appendix J – 2032 Build with Base Improvements Traffic Conditions



Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
Scientists

Traffic Impact and Access Study Distribution Warehouse

Friars Drive, Hudson NH

September 7, 2021

1. Introduction:

On behalf of developer GFI, TFMoran has prepared this Traffic Impact and Access Study to determine the traffic impacts associated with a proposed 504,000 sf High-Cube Transload and Short-Term Storage Warehouse (ITE Land Use Code 154) to be located on Friars Drive at the north end of the Sagamore Industrial Park in Hudson near Lowell Road (NH3A). The objectives of the study are:

- To estimate trip generation and distribution for the proposed development to perform capacity analysis for the project study area
- To determine potential traffic impacts of the proposed development
- To provide recommendations for operational improvements within the study area to accommodate the proposed development's traffic impacts

Proposal

GFI is proposing a 504,000 sf Distribution Warehouse on Friars Drive in Hudson. The building will contain two tenants of approximately equal size and equivalent operations. The site layout is such that each tenant will function independently with separate access to loading docks on opposite sides of the building. Separate access is provided to each tenant's loading and parking areas without having to drive through the other tenant's space. Vehicular parking and truck trailer parking are provided on three sides of the building. Tenant 'A' is provided 191 passenger vehicle parking spaces, with 41 truck slips and 60 loading docks. Tenant 'B' will have 171 parking spaces with 30 truck slips and 44 loading docks. Access to the site is provided by a single driveway onto Friars Drive.

A high-cube warehouse of Land Use Code 154 type (HCW – TSTS) is a building that is typically over 200,000 sf gross square feet of floor area and has a ceiling height of 24 feet or greater. It is primarily used for the storage and /or consolidation of manufactured goods prior to their distribution to retail locations or other warehouses. A typical HCW has a high level of on-site automation and logistics management which enable highly-efficient processing of goods through the HCW so there is very little storage duration and high throughput. This type of warehouse will typically see large trucks in and large trucks out, with relatively low levels of small truck activity. Overall trip generation rates are therefore much lower than other warehouse Land Use Codes, such as "Fulfillment Centers" (LUC 155) and "Parcel Hub Centers" (LUC 156).

Description of the Site

The existing site (Map 209 Lot 001) is an undeveloped lot located on Friars Drive about one mile north of the Sagamore Bridge. The lot is bounded by single-family residential development to the northwest, townhouses and multi-family developments to the east, and industrial development (Sagamore Park) across Fuller Brook (Third Brook) to the southwest. The

TFMoran, Inc.

48 Constitution Drive, Bedford, NH 03110
T(603) 472-4488 F(603) 472-9747 www.tfmoran.com

MSC a division of TFMoran, Inc.

170 Commerce Way – Suite 102, Portsmouth, NH 03801
T(603) 431-2222 F(603) 431-0910 www.msceingineers.com

proposed warehouse will occupy the last remaining large undeveloped lot within the Sagamore Industrial Park at its northern end.

Friars Drive formerly dead-ended in the east near Lowell Road, with access via Executive Drive in the west. A connection of Friars Drive to Lowell Road is currently under construction in connection with a new residential development at the northwest corner of Friars Drive and Lowell Road. The new Friars Drive connection to Lowell Road will be restricted to right-in and right-out movements.

Scoping Meeting

At a Traffic Scoping Meeting held on July 20, 2021 with Town Staff, it was agreed that this study would take into account the approved Hudson Logistics Center (HLC) further south along Lowell Road, and an ongoing CMAQ project being designed by VHB for the Town. In order to ensure consistency with these prior traffic studies, the TIAS for this project will be structured as follows:

Study Area:

- Includes the following intersections
 - Lowell Road at Pelham Road
 - Lowell Road at Fox Hollow Drive
 - Lowell Road at Friars Drive (Site Access)
 - Lowell Road at Executive Drive/Private Drive
 - Lowell Road at Hampshire Drive/Oblate Drive
 - Lowell Road at Flagstone Drive/Wason Road
 - Lowell Road at Sagamore Bridge

Volumes:

- Assume HLC project is fully constructed and open prior to opening year of this Friars Drive project (2022)
- Use 2022 Build & 2032 Build Volumes from the HLC study as No-Build volumes for Friars Drive warehouse
- HLC volumes have been adjusted to represent peak month conditions
- Background growth factor taken as 1% per year
- Counts from above referenced HLC study were taken in 2019 (no Covid adjustment needed)

Time Periods for Analysis:

- Opening Year – 2022
- Future Year – 2032
- Weekday AM roadway peak hour (7-9 am)
- Weekday PM roadway peak hour (4-6 pm)
- Saturday Midday peak hour: not studied consistent with HLC study (Saturday warehouse operations do not differ significantly from weekday operations)

Other Developments to Consider:

- BAE warehouse addition (recently completed)
- Friars Drive Apartments (under construction)

Corridor Improvements to be included as complete for No-Build:

- CMAQ project (VHB) – Phase 1&2, 2022 in place by 2022 opening year
 - Add extra lane from Flagstone to Sagamore Bridge, move mast arm
- HLC (per Langan Study - Base Improvements north of Sagamore Bridge)
 - Signal timing in corridor
 - Geometric improvements at Lowell Road and Flagstone/Wason
 - Restriping at Lowell Road and Fox Hollow Drive



2. Existing Conditions

Descriptions of Roadways and Intersections:

Roadways

Lowell Road (NH3A)

- **Classification.** Lowell Road (NH3A) is a Town-maintained north-south arterial roadway. The north end of Lowell Road terminates at Central Street and to the south the roadway ends at the junction of Dracut Road and River Road.
- **Lane widths and usage.** In the study area, the roadway provides a 3-lane section with an 11-foot wide two-way left turn lane (TWLTL) in the center from Executive Drive up to Fox Hollow Drive. A five lane section develops from Executive Drive down to Flagstone Drive. Typical lane width is 12 feet with 4-foot wide shoulders.
- **Pedestrian facilities.** There are sidewalks on both sides of the road from Flagstone Drive to Hampshire Drive. From Hampshire Drive north, there is only a sidewalk on the west side of Lowell Road which terminates about 400' south of Friars Drive at a residential driveway.
- **Signage.** The speed limit is posted at 30 mph within the study area. Other traffic signage includes lane use, directional signs, street name signs and stop signs at major driveways. Pavement markings consist of a center TWLTL and shoulder markings in fair to good condition.
- **Lighting.** Roadway lighting is present at the signalized intersections.

Pelham Road

- **Classification.** Pelham Road is a Town-maintained east-west local roadway that begins at Lowell Road and heads east into residential areas.

- Lane widths and usage. In the study area, the roadway provides two 11-foot wide travel lanes in each direction with 4-foot shoulders.
- Pedestrian facilities. There are sidewalks on both sides of the road from Lowell Road extending about 500' eastward.
- Signage. The speed limit is posted at 30 mph within the study area. Other traffic signage includes directional signs, street name signs and stop signs at major driveways.
- Lighting. No roadway lighting.

Fox Hollow Drive

- Classification. Fox Hollow Drive is a private east-west looped roadway that connects to Lowell Road at both ends, with the southern end being part of this study area. The southern connection has an 8-foot wide landscape median separating the entering and exiting traffic from Lowell Road.
- Lane widths and usage. The roadway provides a 12-foot wide lane in each direction with no shoulders.
- Pedestrian facilities. There are no sidewalks along the roadway.
- Signage. The speed limit is posted is 10 mph. Other traffic signage includes private property signs and stop signs.
- Lighting. No roadway lighting.

Nottingham Square Driveway

- Classification. Nottingham Square Driveway is a private drive providing access to the Nottingham Square plaza with a 6-foot wide concrete median at the signalized intersection.
- Lane widths and usage. The driveway provides a 14-foot wide travel lane entering the plaza and a 14-foot wide lane exiting.
- Pedestrian facilities. There are no sidewalks along the driveway.
- Signage. There is no posted speed limit.
- Lighting. Parking lot and driveway lighting is present.

Executive Drive

- Classification. Executive Drive is a Town-maintained east west local roadway. The road heads west into the Sagamore Industrial Park and bends north and terminates at a cul-de-sac.
- Lane widths and usage. The roadway provides one 11-foot wide travel lane in each direction with no shoulders.
- Pedestrian facilities. There are no sidewalks along the road.
- Signage. There is no posted speed limit. Other traffic signage includes lane use, directional signs, street name signs and stop signs at major driveways.
- Lighting. No roadway lighting.

Hampshire Drive

- Classification. Hampshire Drive is a Town-maintained east-west local roadway that connects from Lowell Road to Flagstone Drive.
- Lane widths and usage. The roadway generally provides one 14-foot wide travel lane in each direction with no shoulders.
- Pedestrian facilities. There are no sidewalks along the road.

- **Signage.** The speed limit is posted at 30 mph. Other traffic signage includes lane use, directional signs, street name signs and stop signs at major driveways.
- **Lighting.** No roadway lighting.

Oblate Drive

- **Classification.** Oblate Drive is a private east-west roadway that provides access to a residential development. The roadway entrance has a 5-foot wide median that extends about 100 feet beyond Lowell road, with a fence that separates the roadway lanes extending 100 feet beyond the median.
- **Lane widths and usage.** The roadway provides a 12-foot wide lane in each direction with 5-foot shoulders on both sides.
- **Pedestrian facilities.** There are no sidewalks along the roadway.
- **Signage.** The speed limit is posted is 10 mph. Other traffic signage includes private property signs and stop signs.
- **Lighting.** There is decorative lighting along the roadway.

Flagstone Drive

- **Classification.** Flagstone is a Town-maintained east-west local roadway that connects from Lowell Road to Sagamore Park Road.
- **Lane widths and usage.** The roadway generally provides one 18-foot wide travel lane in each direction with no shoulders.
- **Pedestrian facilities.** There are no sidewalks along the road.
- **Signage.** The speed limit is posted at 30 mph. Other traffic signage includes lane use, directional signs, street name signs and stop signs at major driveways.
- **Lighting.** No roadway lighting.

Wason Road

- **Classification.** Wason Road is a Town-maintained east-west collector roadway extending from Lowell Road into residential areas.
- **Lane widths and usage.** The roadway provides 11-foot wide travel lanes in both direction with 2-foot shoulders on each side.
- **Pedestrian facilities.** There are sidewalks on the south side of the roadway for the length of the Goodwill plaza.
- **Signage.** The speed limit is posted at 30 mph within the study area. Other traffic signage includes lane use, directional signs, street name signs and stop signs at major driveways.
- **Lighting.** Lighting is present at roadway intersections.

Intersections

Lowell Road at Pelham Road

Traffic Control.

- Existing 3-way signalized "T" intersection.
- Pedestrian crosswalk and pushbutton-actuated ped signals are provided at the westbound approach, with an exclusive all-red pedestrian phase.

Approaches.

- Lowell Road (Route 3A) Southbound – one thru lane with approximately 1,310 feet of storage and one left-turn lane with approximately 150 feet of storage.

- Pelham Road Westbound – one right-turn lane with approximately 75 feet of storage and one left-turn lane with approximately 510 feet of storage.
- Lowell Road (Route 3A) Northbound – one shared right-turn/thru lane with approximately 550 feet of storage.

Lowell Road at Fox Hollow Drive

Traffic Control.

- Existing 4-way signalized intersection.
- Pedestrian crosswalks and pushbutton-actuated ped signals are provided at the westbound and southbound approaches, with an exclusive all-red pedestrian phase.

Approaches.

- Lowell Road (Route 3A) Southbound – one shared right-turn/thru lane with approximately 550 feet of storage and one left-turn lane with approximately 125 feet of storage.
- Nottingham Square Driveway – one right-turn lane with approximately 100 feet of storage and one left-turn/thru lane with approximately 260 feet of storage.
- Lowell Road (Route 3A) Northbound – one right-turn lane with approximately 325 feet of storage, one thru lane with approximately 1,410 feet of storage, and one left-turn lane with approximately 210 feet of storage.
- Fox Hollow Drive – one right-turn lane with approximately 50 feet of storage and one left-turn/thru lane with approximately 600 feet of storage.

Lowell Road at Friars Drive (under construction)

Traffic Control.

- 3-way unsignalized intersection currently under construction.
- No pedestrian facilities proposed.

Approaches.

- Lowell Road (Route 3A) Southbound – one thru lane, TWLTL.
- Friars Road Westbound – right-turn lane out only.
- Lowell Road (Route 3A) Northbound – one thru lane, TWLTL.

Lowell Road at Executive Drive/Private Drive

Traffic Control.

- Existing 4-way signalized intersection.
- Pedestrian crosswalks and pushbutton-actuated ped signals are provided at the eastbound approach.

Approaches.

- Lowell Road (Route 3A) Southbound – one right-turn/thru lane with approximately 1,170 feet of storage, one thru lane with approximately 1,170 feet of storage, and one left-turn lane with approximately 150 feet of storage.
- Executive Drive Westbound – one right-turn lane with approximately 80 feet of storage and one left-turn/thru lane with approximately 580 feet of storage.
- Lowell Road (Route 3A) Northbound – one right-turn/thru lane with approximately 1,790 feet of storage, one thru lane with approximately 1,790 feet of storage, and one left-turn lane with approximately 350 feet of storage.

- Executive Drive Eastbound – one right-turn lane with approximately 225 feet of storage and one left-turn/thru lane with approximately 490 feet of storage.

Lowell Road at Hampshire Drive/Oblate Drive

Traffic Control.

- Existing 4-way signalized intersection.
- Pedestrian crosswalks and pushbutton-actuated ped signals are provided at the eastbound and northbound approaches.

Approaches.

- Lowell Road (Route 3A) Southbound – right-turn/thru lane with approximately 1,790 feet of storage, one thru lane with approximately 1,790 feet of storage, and one left-turn lane with approximately 225 feet of storage.
- Oblate Drive – one right-turn lane with approximately 100 feet of storage and one left-turn/thru lane with approximately 380 feet of storage.
- Lowell Road (Route 3A) Northbound – one right-turn/thru lane with approximately 1,520 feet of storage, one thru lane with approximately 1,520 feet of storage, and one left-turn lane with approximately 225 feet of storage.
- Hampshire Drive – one right-turn lane with approximately 100 feet of storage and one left-turn/thru lane with approximately 500 feet of storage.

Lowell Road at Flagstone Drive/Wason Road

Traffic Control.

- Existing 4-way signalized intersection.
- Pedestrian crosswalks and pushbutton-actuated ped signals are provided at all four approaches. .

Approaches.

- Lowell Road (Route 3A) Southbound – one right-turn/thru lane with approximately 1,520 feet of storage, one thru lane with approximately 1,520 feet of storage, and one left-turn lane with approximately 175 feet of storage.
- Wason Road – one right-turn lane with approximately 75 feet of storage, one left-turn/thru lane with approximately 590 feet of storage, and one left-turn lane with approximately 200 feet of storage.
- Lowell Road (Route 3A) Northbound – one right-turn lane with approximately 275 feet of storage, two thru lanes with approximately 1,000 feet of storage, and one left-turn lane with approximately 575 feet of storage.
- Flagstone Drive – one right-turn lane with approximately 250 feet of storage and one left-turn/thru lane with approximately 810 feet of storage.

Lowell Road at Sagamore Bridge

Traffic Control.

- Existing 4-way signalized intersection.
- There are no pedestrian facilities at the intersection.

Approaches.

- Lowell Road (Route 3A) Southbound – two thru lanes with approximately 1,000 feet of storage and a channelized free-right-turn lane that diverges from the thru lanes approximately 330 feet from the intersection with minimal storage upstream prior to the exit ramp.

- Lowell Road (Route 3A) Northbound – two thru lanes with approximately 1,200 feet of storage and two left-turn lanes with approximately 525 feet of storage.
- Sagamore Bridge Road Eastbound – two left-turn lanes and a channelized free- right-turn lane.

Proposed traffic improvements from CMAQ and HLC projects

Proposed traffic mitigation improvements from CMAQ and HLC projects and included in the baseline conditions for this study:

- Signal timing optimization at the following intersections
 - Lowell Road (3A) & Executive Drive during the 2032 weekday morning peak periods
 - Lowell Road (3A) & Fox Hollow Drive
- Construct a third northbound left turn lane at the intersection of Lowell Road and Sagamore Bridge Road.
- Construction of the following geometric improvements at the intersection of Lowell Road and Flagstone Road/Wason Road
 - Construct an additional receiving lane on Wason Road eastbound to accept the two right-turning lanes from Lowell Road northbound
 - Remove exclusive left turn lanes into the Goodwill shopping center and the Market Basket shopping center to accommodate the additional travel lane
 - Provide a lane drop approximately 850 feet east of Lowell Road to meet existing Wason Road eastbound geometry
- Restripe at the intersection of Lowell Road and Fox Hollow Drive of the northbound right-turn -only lane to a shared thru/right-turn lane. Two northbound thru receiving lanes currently exist.

3. Background Volumes:

Background volumes for this study are taken directly from the Langan Traffic Impact Study that was performed in 2020 for the proposed Hudson Logistics Center that is proposed just south of the Sagamore Bridge at the site of the former Green Meadow Golf Club with access onto Lowell Road. The traffic study and proposed mitigation improvements have been approved and will be incorporated into the traffic network; therefore, the Town has asked that we prepare our study with the proposed Logistics Center project and roadway improvements in place.

The traffic volumes for 2022 are taken directly from Figure 8 for both AM and PM peak hours. Volumes for 2032 are based on Figure 9 for both AM and PM peak hours.

4. No-Build Volumes:

To establish No-Build volumes for this study, the following adjustments were made to the Langan HLC study 2022/2032 Build volumes.

Other Developments

Two projects in the vicinity of the proposed warehouse have been included as “Other Developments” to create the No-Build case for this study.

- Friars Drive Apartments: 81-unit apartment development within two 3-story buildings at the corner of Lowell Road and Friars Drive.
 - 30 trips AM Peak Hour (8 in/ 22 out)
 - 36 trips PM Peak Hour (22 in/ 14 out)
 - Directional Distribution of predominant traffic flow on Lowell Road (3A)
 - AM 68% NB
 - PM 62% SB
- 36 Executive Drive: 100,000 sf building addition at the north end of the existing building.
 - CASE C (Hypothetical Buildout Scenario)
 - 3 shifts, 30 employees (max) per shift, 22 active loading docks
 - 36 trips AM Peak Hour (3 in/ 33 out)
 - 8 trips PM Peak Hour (4 in/ 4 out)
 - Distribution: 35% use Executive Drive for access, 65% use Flagstone Drive to/from site
 - Peak hour for warehouse traffic does not coincide with the peak hour for NH3A traffic

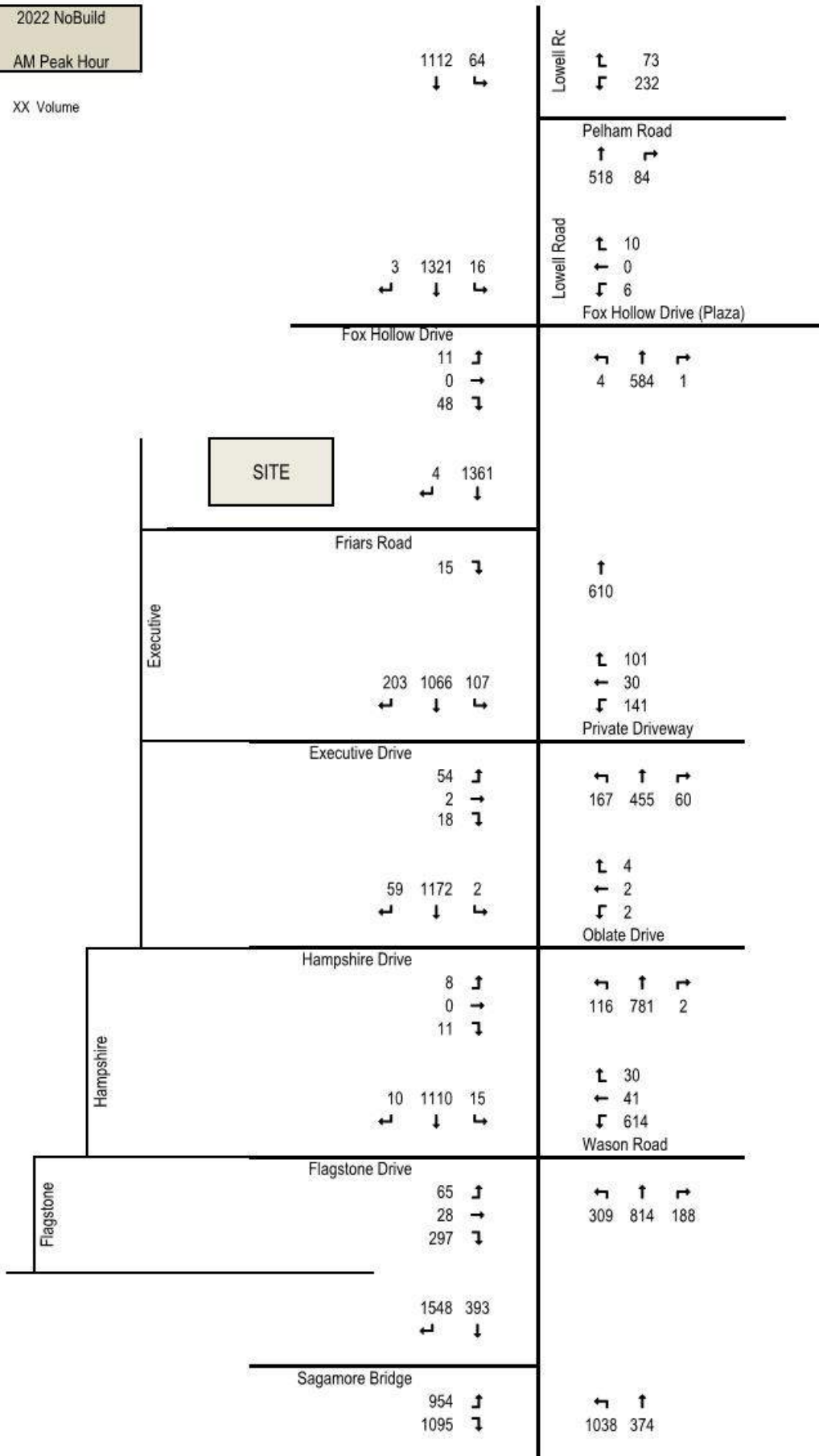
Because separate traffic analyses were not required by the Town for the two development projects listed above, the following assumptions were made for distribution of those trips along the corridor.

- Friars Drive Apartments:
 - AM: 68% NB, 32% SB
 - NB ENTER: 35% use Exec. Dr, 65% use Flagstone Dr
 - SB ENTER: All at Friars Dr
 - SB EXIT: All at Friars, NB EXIT: All at Executive Dr
 - PM: 38% NB, 62% SB
 - NB ENTER: 35% use Exec. Dr, 65% use Flagstone Dr
 - SB ENTER: All at Friars Dr
 - SB EXIT: All at Friars, NB EXIT: All at Executive Dr
- 36 Executive Drive:
 - AM: 68% NB, 32% SB
 - ENTER/EXIT: 35% use Executive Dr, 65% use Flagstone Dr
 - PM: 38% NB, 62% SB
 - ENTER/EXIT: 35% use Executive Dr, 65% use Flagstone Dr

A summary of total no-build volumes for the opening and future years are presented in the following figures.

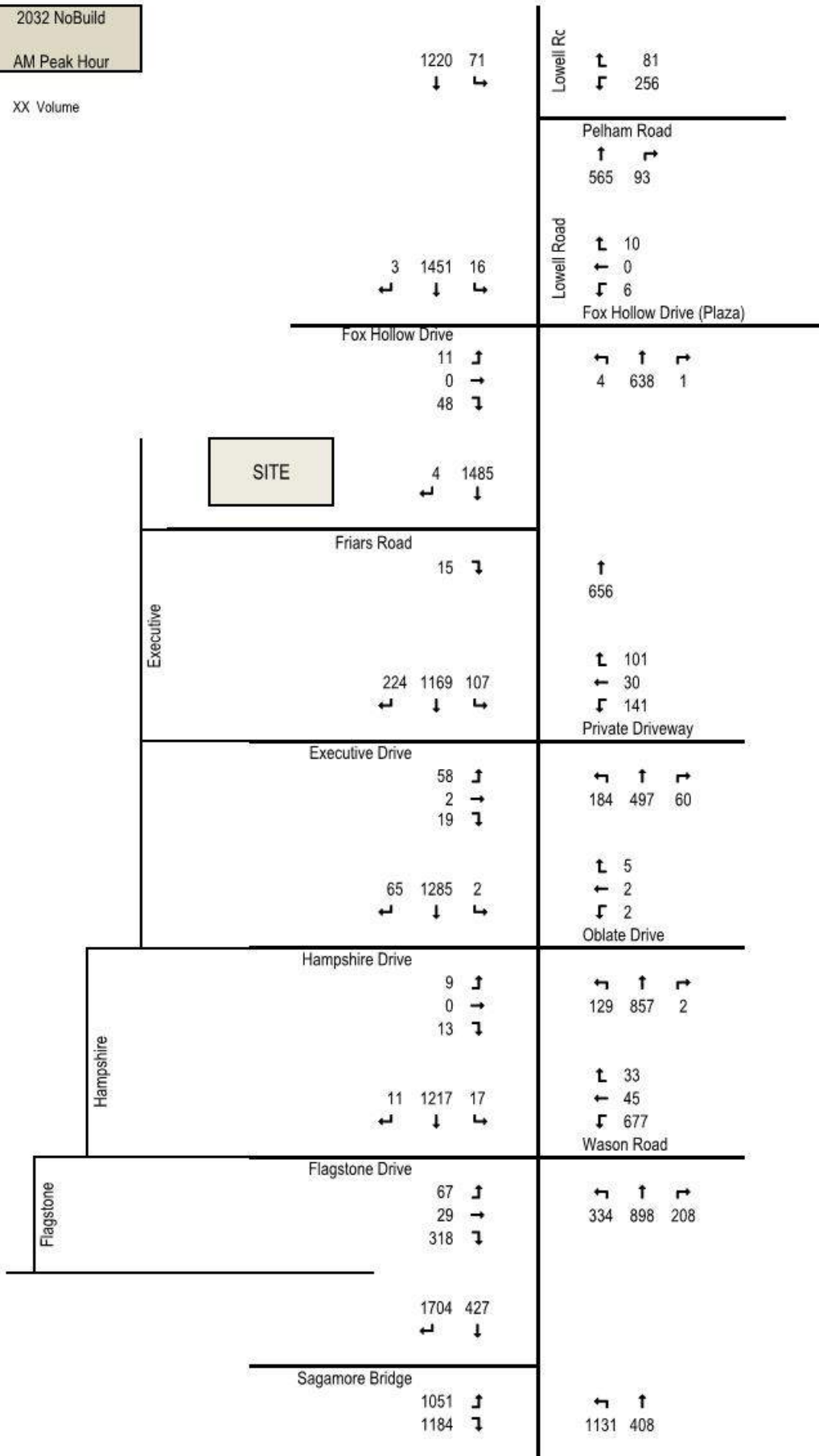
2022 NoBuild
 AM Peak Hour

XX Volume



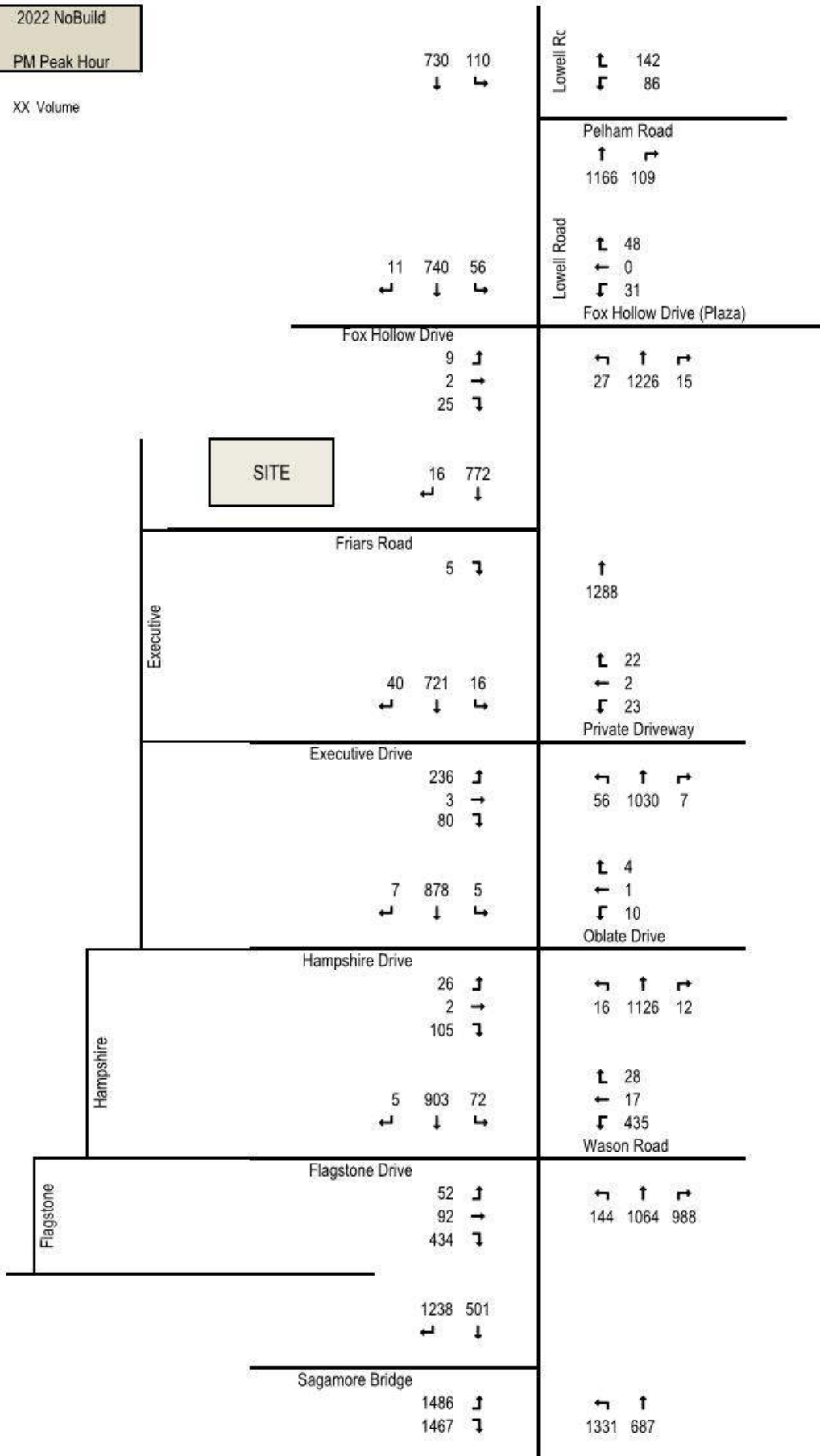
2032 NoBuild
 AM Peak Hour

XX Volume



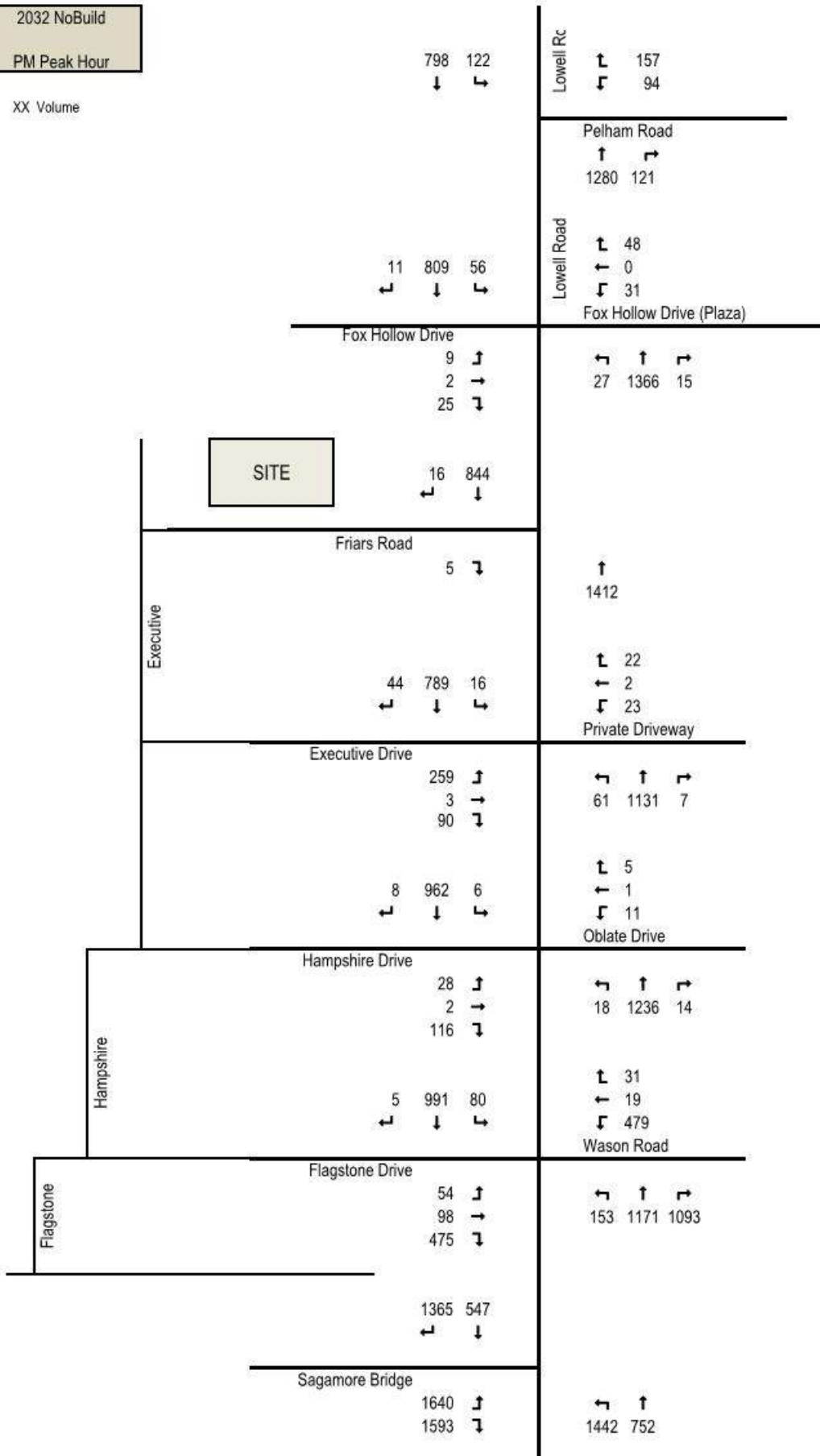
2022 NoBuild
 PM Peak Hour

XX Volume



2032 NoBuild
 PM Peak Hour

XX Volume



5. Trip Generation:

The facility that is proposed in this report conforms to the classification known as “High-Cube Transload/Short-Term Storage Warehouse” Land Use Code (LUC) 154. ITE has issued an updated 2020 supplement to the 10th Edition Trip Generation Manual¹ that includes a separate calculation of car and truck trips for this warehouse use. Calculations from the supplement are included in Appendix A and tabulated in the table below.

A typical LUC 154 HCW operates on a 24-hour/three shift schedule with office and warehouse employees and truck arrivals and departures distributed throughout the day, generally outside of roadway peak hours. Common shift changes occur at 7am, 4pm, and 1230am. Using this shift pattern places arrivals and departures of most employees outside of adjacent roadway peak hours. A generally even distribution of trucking arrivals and departures is commonly anticipated.

Table 1 below presents total trip generation (cars and trucks) from the ITE supplement:

Table 1
Trip Generation – per ITE Supplement

Land Use	In	Out	Total
Proposed 504,000 sf Distribution Warehouse (LUC 154)			
Weekday AM Peak Hour Adjacent Street	36	14	50
Weekday PM Peak Hour Adjacent Street	16	39	55

Although, trucking schedules tend to avoid peak hour traffic, we have carried the distribution of trucks per ITE shown below. Table 2 shows a breakdown of car and truck volume calculations:

Table 2
Trip Generation – Cars vs Trucks

	Cars		Trucks	
	In	Out	In	Out
Weekday AM Peak Hour Adjacent Street	31	9	5	5
Weekday PM Peak Hour Adjacent Street	14	36	2	3

6. Trip Generation vs Parking – Distribution Center:

A typical shift schedule base on the High-Cube Transload and Short-Term Storage Warehouse use shows the need for at least 265 parking spaces. The sample shift schedule is outlined in Appendix B. The current plan shows 362 parking spaces.

7. Holiday Trip Generation:

Although some types of warehouses (e.g. “fulfillment centers” and “parcel hub distribution centers”) show substantially increased holiday traffic, the proposed facility does not show this marked seasonal increase, and the increase of truck traffic during the holiday season is modest.

¹ *Trip Generation Manual*, Institute of Transportation Engineers (ITE), 10th Edition Supplement, February 2020.

8. Trip Composition and Distribution:

Composition

Based on the proposed use, all trips to the development will be considered Primary, that is, a trip made for the specific purpose of visiting the generator.

Distribution

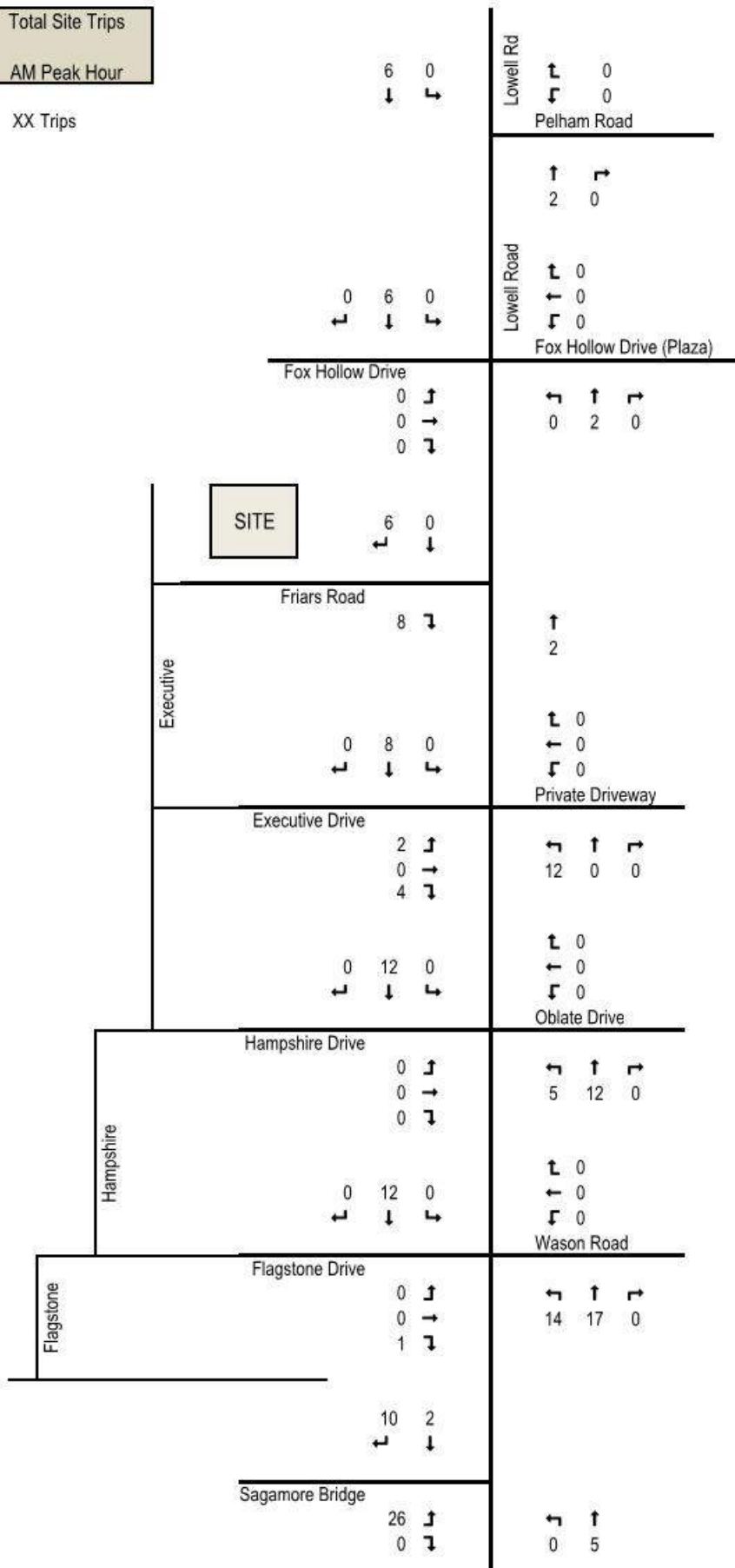
Trip distribution for passenger cars (employees) will be based on Journey to Work Data as calculated in the HLC study. That report shows that 15% of employees would be expected to arrive via Lowell Road (NH3A) from the north and the remaining 85% would arrive to the site from the south via US3, Daniel Webster Highway, and NH3A/Dracut Road.

Traffic inbound to Sagamore Park, will be distributed pro-rata based on left turns at Flagstone, Hampshire, and Executive drives. Passenger cars heading south will leave via Friars Drive. However, since left turns out of Friars Drive are not permitted, cars will generally use Executive Drive to access Lowell Road north. At the Sagamore Bridge, most of these site trips will be headed over the bridge, however, some passenger vehicles will have destinations further south and continue on NH3A.

For truck traffic distribution, the appeal of Sagamore Industrial Park to a HCW is its proximity to the Everett Turnpike. Getting into the interstate highway system quickly is a major benefit for distribution operations. We therefore carried an assumption that 80% of truck trips will arrive and depart using the Sagamore Bridge within this study area. Since there is a possibility of deliveries locally as well, 10% of truck trips are assigned to NH3A north of the site and 10% to NH3A south of the bridge.

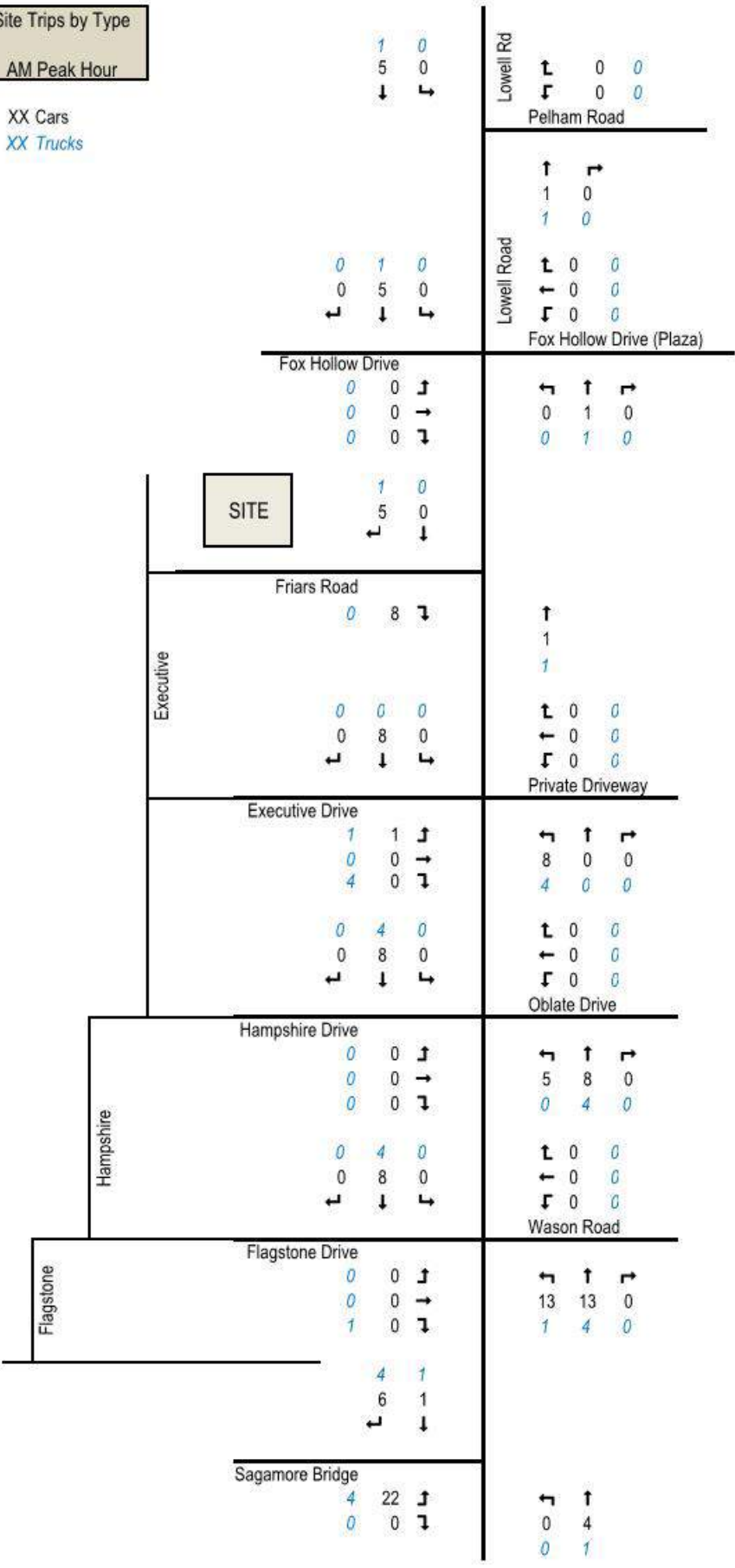
Total Site Trips
 AM Peak Hour

XX Trips



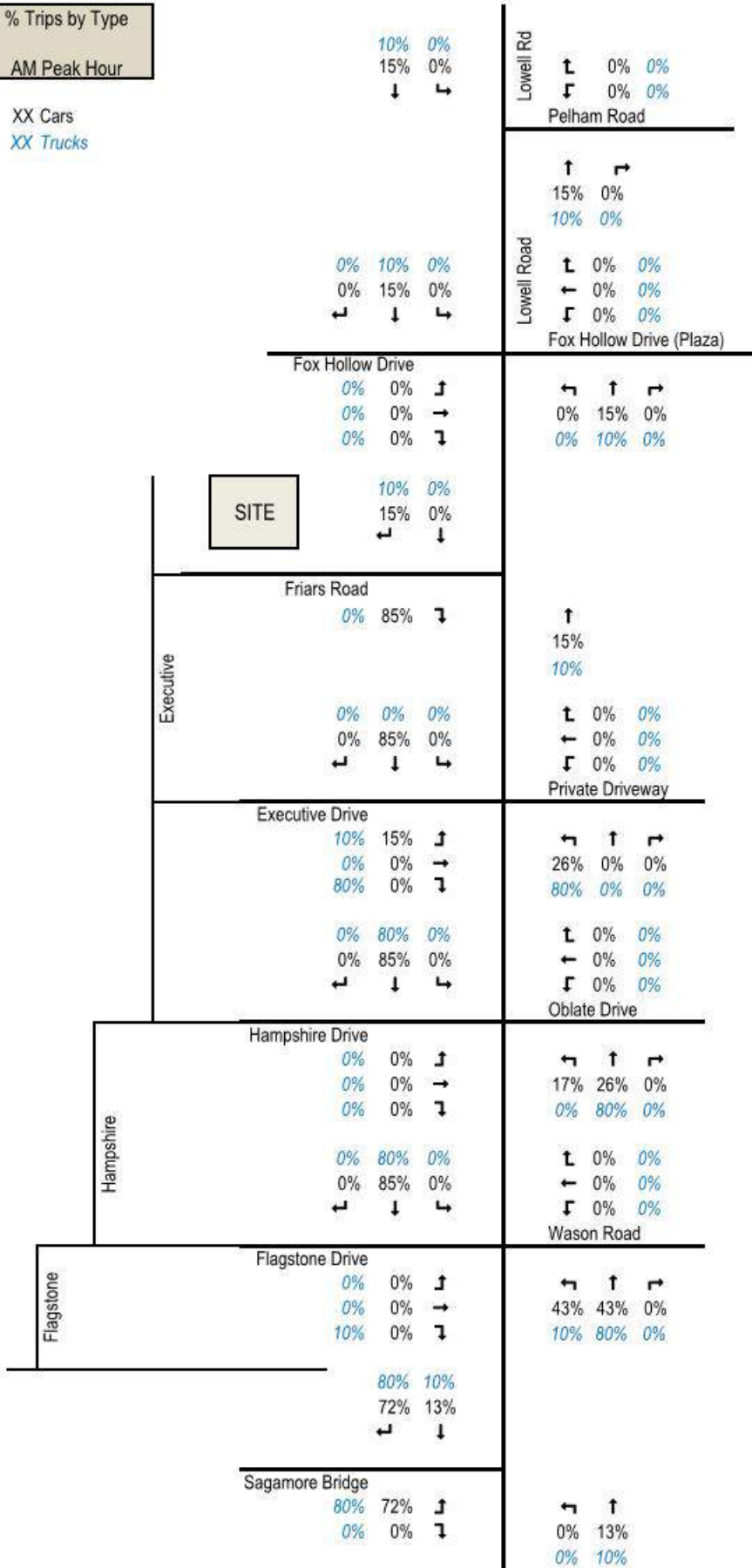
Site Trips by Type
AM Peak Hour

XX Cars
 XX Trucks



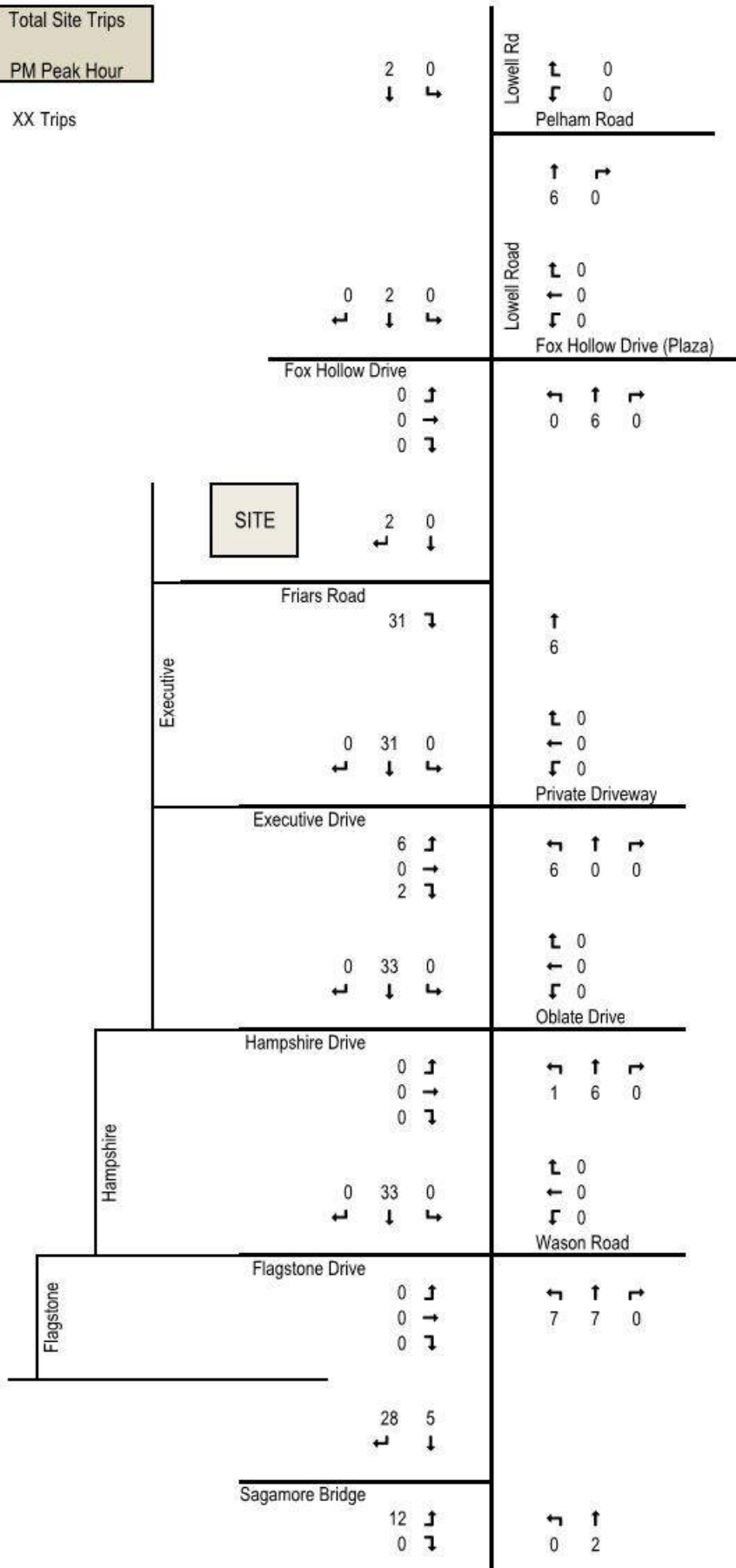
% Trips by Type
AM Peak Hour

XX Cars
 XX Trucks



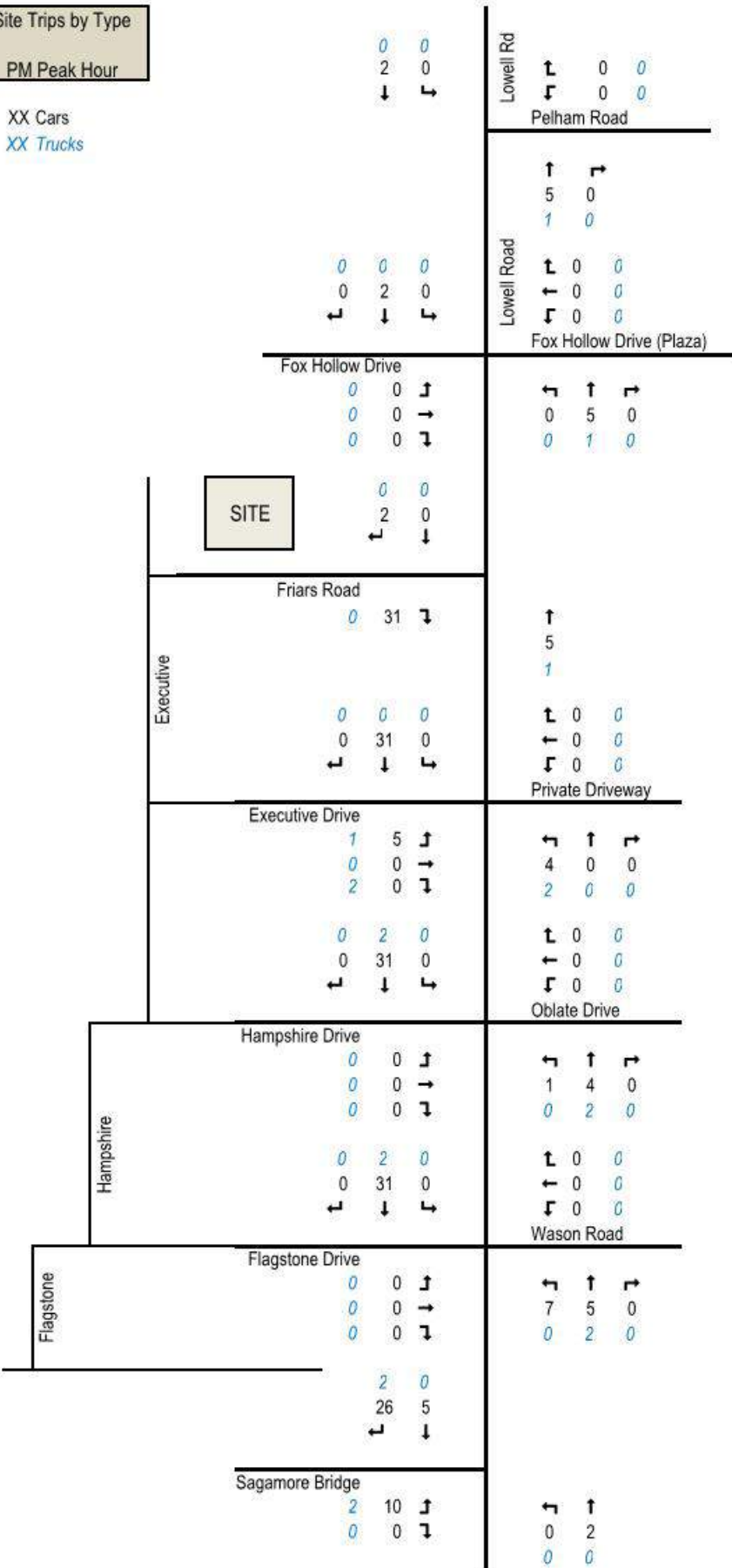
Total Site Trips
 PM Peak Hour

XX Trips



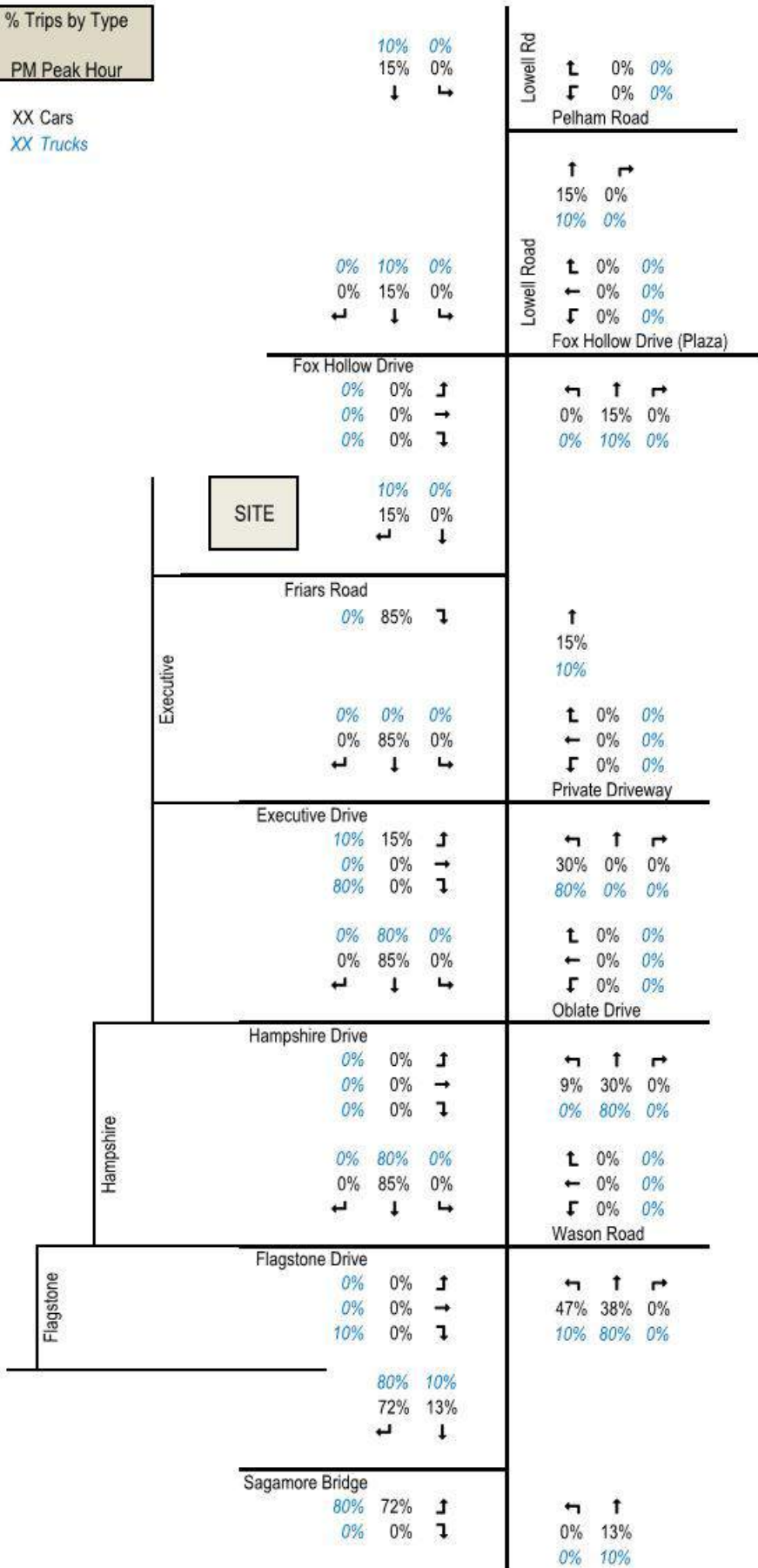
Site Trips by Type
PM Peak Hour

XX Cars
 XX Trucks



% Trips by Type
PM Peak Hour

XX Cars
 XX Trucks

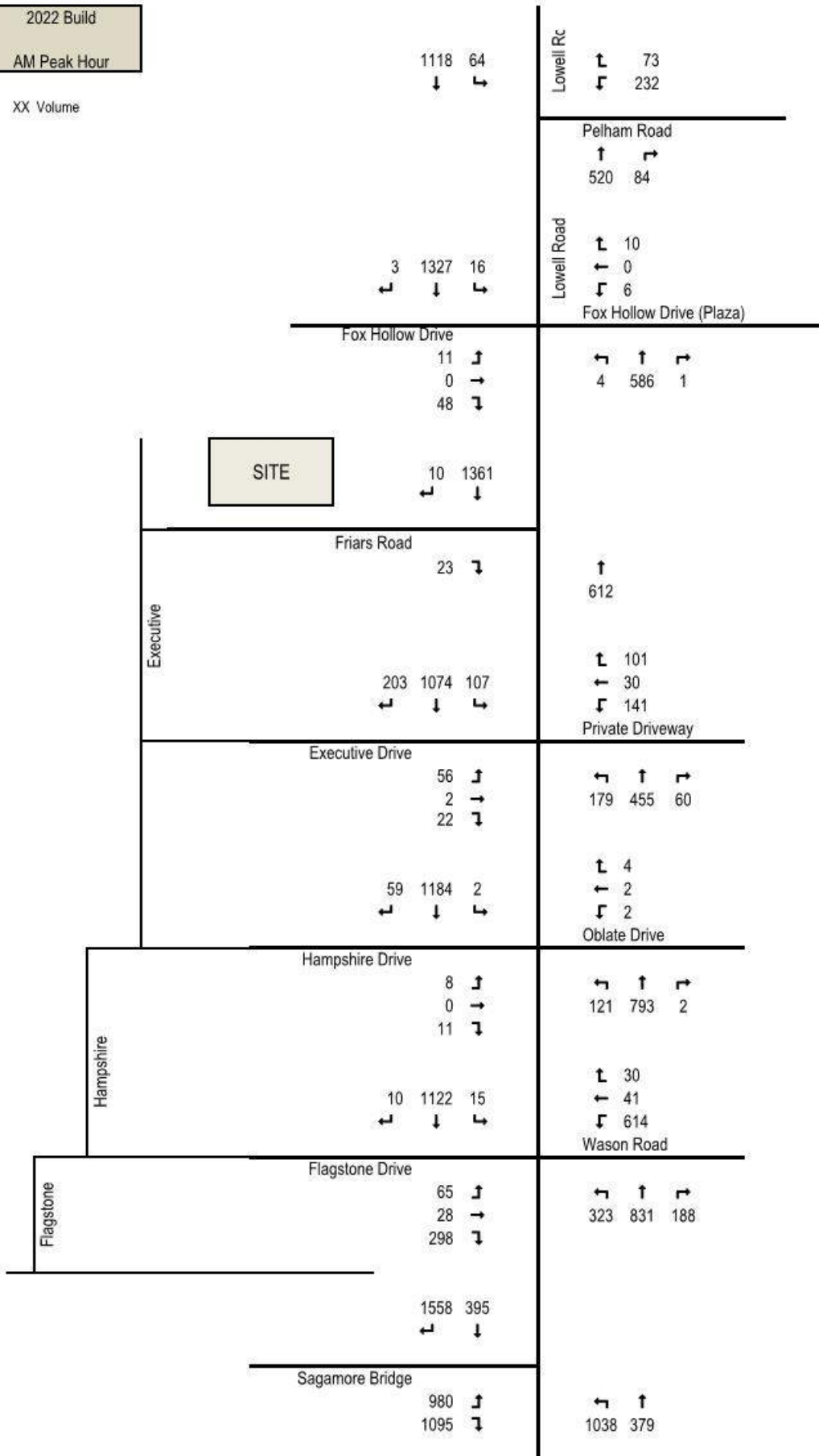


9. Build Volumes:

The trips generated by the proposed development were added to the No-Build volumes through the study area to produce the Build volume diagrams shown on following pages:

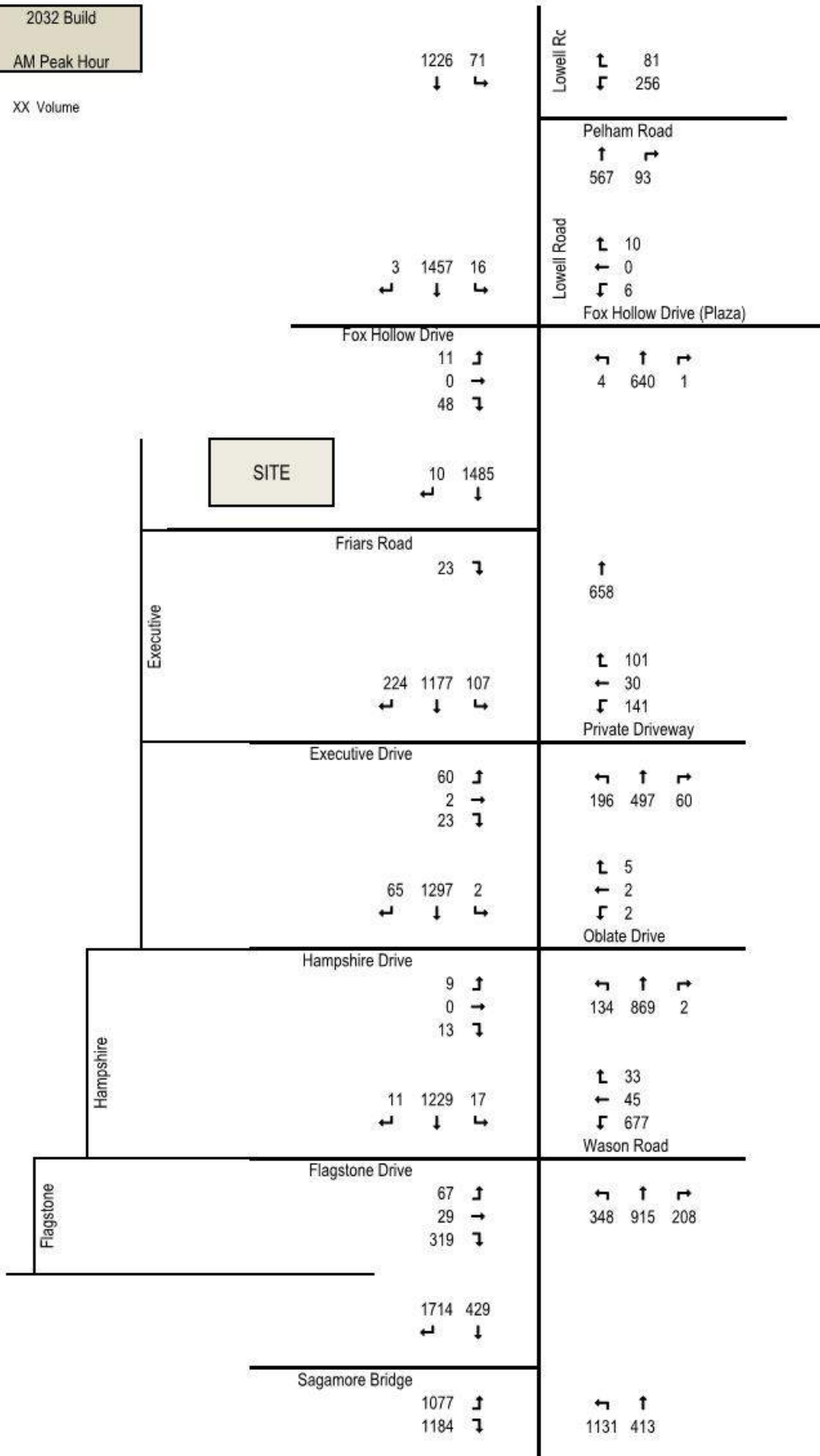
2022 Build
 AM Peak Hour

XX Volume



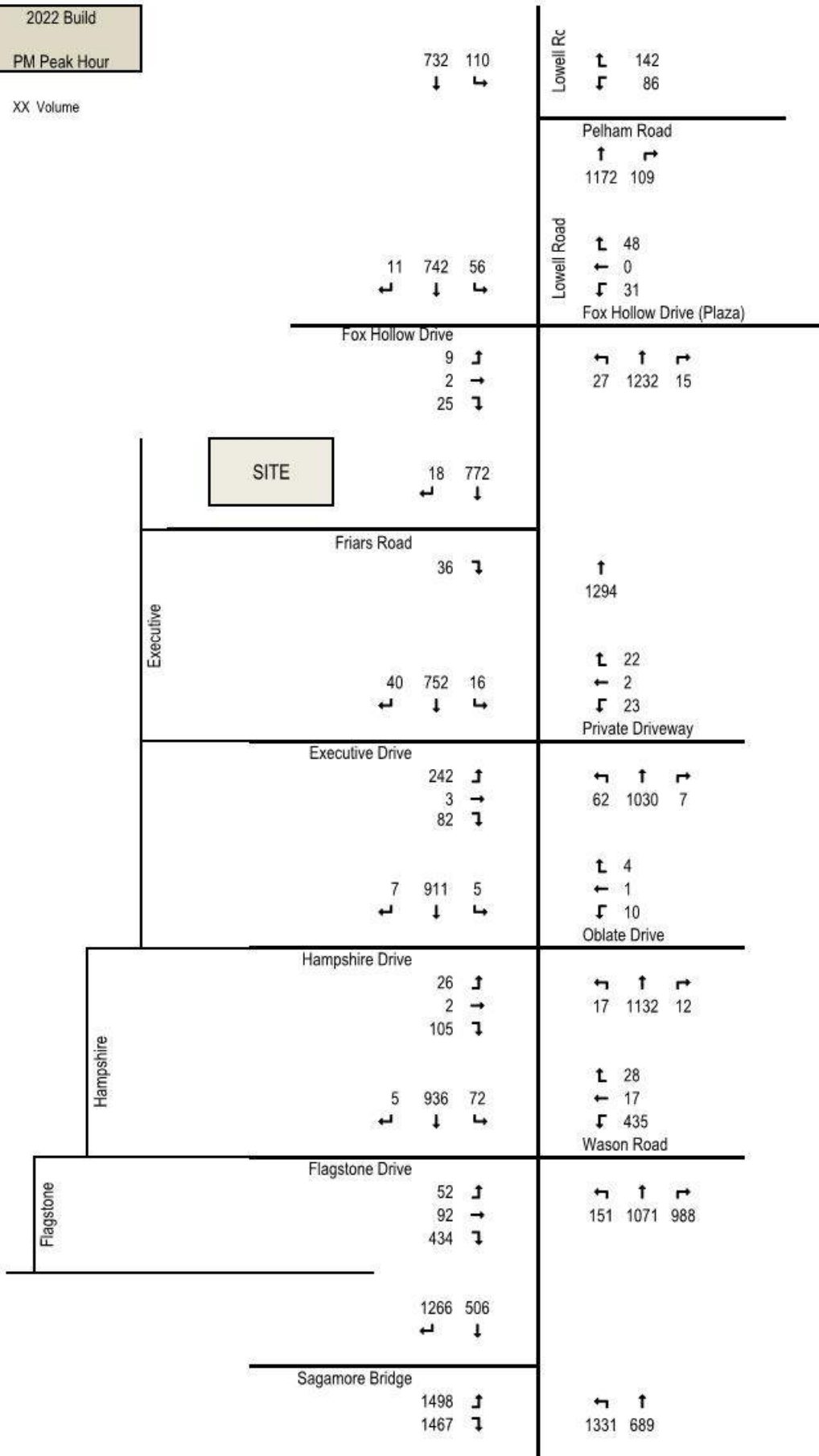
2032 Build
 AM Peak Hour

XX Volume



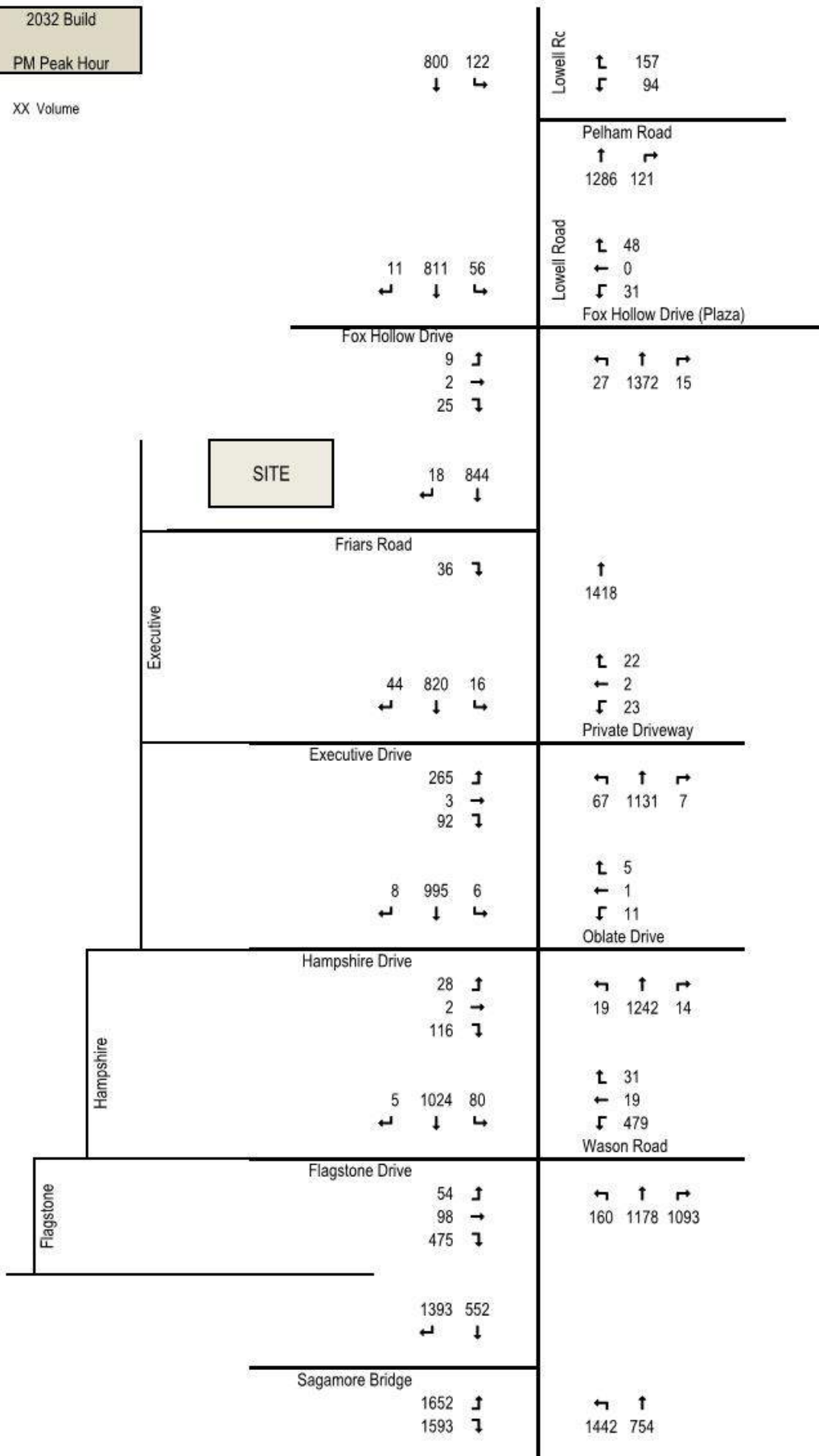
2022 Build
 PM Peak Hour

XX Volume



2032 Build
 PM Peak Hour

XX Volume



10. Level of Service/Queue Analysis:

Level of Service Analysis:

Level of service (LOS) is a qualitative description of operational conditions within a traffic stream measured in terms of control delay, a function of capacity, degree of saturation, and delay associated with traffic signals and “STOP” signs. Control delay includes initial deceleration, delay approaching a control device, stopped delay, queue move-up time, and acceleration delay from a stopped condition. The relationship between control delay and LOS is shown in the following table.

Level of Service (LOS)	Signalized Control Delay (sec)	Unsignalized Control Delay (sec)
A	≤10.0	≤10.0
B	10.1 to 20.0	10.1 to 15.0
C	20.1 to 35.0	15.1 to 25.0
D	35.1 to 55.0	25.1 to 35.0
E	55.1 to 80.0	35.1 to 50.0
F	Over 80.0	Over 50.0

Study Area.

Analyses were performed for the study area intersections previously described, that is:

- Lowell Road at Pelham Road
- Lowell Road at Fox Hollow Drive
- Lowell Road at Friars Drive (Site Access)
- Lowell Road at Executive Drive/Private Drive
- Lowell Road at Hampshire Drive/Oblate Drive
- Lowell Road at Flagstone Drive/Wason Road
- Lowell Road at Sagamore Bridge

Queue Analysis.

Vehicle queue lengths are determined by the capacity of the movement under study and the volume of traffic processed by the intersection during the analysis period. It is standard practice to report the 95th percentile queue, that is, the queue that will be exceeded no more than 5% of the time during the peak periods.

Methodology.

Trafficware “Synchro” v10.0 software was used to analyze stop controlled intersections (based on HCM 6th) and signalized intersections (based on HCM 2000) within the study area intersections during the weekday AM and PM peak hours.

Volume to capacity (v/c) ratios, Level of Service (LOS), delays and queue results are summarized in the following tables. The tables compare the following conditions:

- *No-Build*, representing conditions HLC build volumes and mitigation improvements adjusted as described above.
- *Build*, calculated by adding the trips from this development to the HLC build volumes
- *Build Mit*, showing proposed mitigation improvements as described in Section 11 of this report.

**Table 3a 2022 AM Peak Hour
 Level of Service Analysis Summary**

Location/ Peak Hour	2022 No-Build				2022 Build				2022 Build Mit			
	v/c ^a	Del. ^b	LOS ^c	Q ^d	v/c ^a	Del. ^b	LOS ^c	Q ^d	v/c ^a	Del. ^b	LOS ^c	Q ^d

9: Lowell Road (3A) at Pelham Road

AM OVERALL –	0.88	48.5	D	---	0.88	49.2	D	---	0.88	49.2	D	---
WB L	0.64	68.7	E	529	0.64	68.7	E	529	No Timing Mitigation Recommended			
WB R	0.13	45.7	D	109	0.13	45.7	D	109				
NB TR	0.64	32.4	C	715	0.64	32.4	C	718				
SB L	0.66	98.5	F	210	0.66	98.5	F	210				
SB T	0.96	50.4	D	1798	0.97	51.7	D	1813				

8: Lowell Road (3A) at Fox Hollow Drive/Plaza

AM OVERALL –	0.89	24.1	C	---	0.89	24.5	C	---	0.89	24.5	C	---
EB LT	0.30	86.0	F	40	0.30	86.0	F	40	No Timing Mitigation Recommended			
EB R	0.04	84.0	F	3	0.04	84.0	F	3				
WB LT	0.16	84.8	F	27	0.16	84.8	F	27				
WB R	0.01	74.5	E	0	0.01	74.5	E	0				
NB L	0.44	101.4	F	20	0.44	101.4	F	20				
NB TTR	0.25	5.6	A	212	0.25	5.6	A	213				
SB L	0.42	89.5	F	50	0.42	89.5	F	50				
SB TR	0.94	27.5	C	2198	0.94	28.2	C	2213				

10: Lowell Road (3A) at Friars Drive

AM OVERALL –	0.2	A	---	---	0.4	A	---	---	0.4	A	---
EB R	0.11	32.2	D	10	0.17	34.1	D	15			

7: Lowell Road (3A) at Executive Drive/PMA Drive

AM OVERALL –	0.83	29.5	C	---	0.84	32.0	C	---	0.83	29.8	C	---
EB LT	0.52	35.4	D	82	0.53	35.6	D	84	0.56	39.1	D	84
EB R	0.01	18.8	B	12	0.02	19.0	B	15	0.02	18.6	B	14
WB LT	0.86	59.8	E	227	0.86	60.9	E	227	0.89	69.2	E	227
WB R	0.15	31.4	C	51	0.15	31.5	C	51	0.15	33.5	C	51
NB L	0.97	95.8	F	293	1.06	125.4	F	317	0.83	61.2	E	272
NB TTR	0.31	12.8	B	133	0.31	12.8	B	133	0.30	12.4	B	133
SB L	0.68	48.4	D	172	0.69	48.8	D	172	0.71	53.5	D	172
SB TTR	0.79	20.9	C	433	0.79	21.0	C	438	0.81	23.8	C	481

^a Volume-to-capacity ratio - ^b Average control delay (sec/veh) - ^c Level of service - ^d 95th percentile queue in feet

**Table 3b 2022 AM Peak Hour
 Level of Service Analysis Summary**

Location/ Peak Hour	2022 No-Build				2022 Build				2022 Build Mit			
	v/c ^a	Del. ^b	LOS ^c	Q ^d	v/c ^a	Del. ^b	LOS ^c	Q ^d	v/c ^a	Del. ^b	LOS ^c	Q ^d

6: Lowell Road (3A) at Hampshire Drive/Oblate Drive

AM OVERALL –	0.67	13.3	B	---	0.68	13.5	B	---	0.68	13.5	B	---
EB LT	0.19	44.7	D	22	0.20	44.9	D	22	No Timing Mitigation Recommended			
EB R	0.01	32.9	C	0	0.01	32.8	C	0				
WB LT	0.15	45.1	D	16	0.15	45.2	D	16				
WB R	0.00	37.0	D	0	0.00	37.1	D	0				
NB L	0.62	41.6	D	174	0.63	42.3	D	183				
NB TTR	0.36	5.5	A	204	0.36	5.5	A	207				
SB L	0.15	46.6	D	8	0.15	46.7	D	8				
SB TTR	0.72	14.7	B	447	0.73	15.0	B	454				

5: Lowell Road (3A) at Flagstone Drive/Wason Road

AM OVERALL –	0.97	48.7	D	---	0.98	50.7	D	---	0.98	50.7	D	---
EB LT	0.94	105.2	F	147	0.94	105.2	F	147	No Timing Mitigation Recommended			
EB R	0.56	30.3	C	181	0.56	30.3	C	183				
WB L	0.95	68.9	E	382	0.95	68.9	E	382				
WB LT	0.95	69.3	E	386	0.95	69.3	E	386				
WB R	0.02	25.1	C	0	0.02	25.1	C	0				
NB L	0.96	82.8	F	327	1.01	94.2	F	339				
NB TT	0.59	20.2	C	200	0.60	20.8	C	206				
NB RR	0.06	0.0	A	0	0.06	0.0	A	0				
SB L	0.29	44.5	D	29	0.29	44.5	D	29				
SB TTR	0.99	56.5	E	349	1.00	59.1	E	355				

4: Lowell Road (3A) at Sagamore Bridge

AM OVERALL –	0.92	13.5	B	---	0.92	13.7	B	---	0.92	13.7	B	---
EB LL	0.83	32.4	C	337	0.84	32.7	C	349	No Timing Mitigation Recommended			
EB R	0.70	2.5	A	0	0.70	2.5	A	0				
NB LLL	0.83	24.1	C	231	0.83	24.2	C	231				
NB TT	0.22	4.2	A	12	0.23	4.4	A	12				
SB TT	0.79	31.4	C	134	0.82	32.4	C	134				
SB RR	0.61	0.4	A	101	0.61	0.4	A	102				

^a Volume-to-capacity ratio - ^b Average control delay (sec/veh) - ^c Level of service - ^d 95th percentile queue in feet

**Table 4a 2022 PM Peak Hour
 Level of Service Analysis Summary**

Location/ Peak Hour	2022 No-Build				2022 Build				2022 Build Mit			
	v/c ^a	Del. ^b	LOS ^c	Q ^d	v/c ^a	Del. ^b	LOS ^c	Q ^d	v/c ^a	Del. ^b	LOS ^c	Q ^d

9: Lowell Road (3A) at Pelham Road

PM OVERALL	0.93	54.2	D	---	0.93	55.1	E	---	---	---
WB L	0.73	102.1	F	184	0.73	102.1	F	184	No Timing Mitigation Recommended	
WB R	0.13	57.2	E	78	0.13	57.2	E	78		
NB TR	1.06	76.9	E	2191	1.06	78.6	E	2205		
SB L	0.53	78.6	E	384	0.53	78.6	E	384		
SB T	0.55	8.2	A	750	0.55	8.2	A	754		

8: Lowell Road (3A) at Fox Hollow Drive/Plaza

PM OVERALL	0.56	18.0	B	---	0.56	18.0	B	---	---	---
EB LT	0.20	82.8	F	39	0.20	82.8	F	39	No Timing Mitigation Recommended	
EB R	0.02	81.5	F	0	0.02	81.5	F	0		
WB LT	0.55	88.3	F	80	0.55	88.3	F	80		
WB R	0.04	67.3	E	34	0.04	67.3	E	34		
NB L	0.50	88.5	F	70	0.50	88.5	F	70		
NB TTR	0.50	10.7	B	586	0.50	10.8	B	590		
SB L	0.60	89.4	F	124	0.60	89.4	F	124		
SB TR	0.56	10.8	B	807	0.56	10.8	B	810		

10: Lowell Road (3A) at Friars Drive

PM OVERALL	---	0.0	A	---	---	0.2	A	---	---	---
EB R	0.02	15.2	C	0	0.11	16.3	C	8		

7: Lowell Road (3A) at Executive Drive/PMA Drive

PM OVERALL	0.74	20.5	C	---	0.75	21.1	C	---	---	---
EB LT	0.83	38.4	D	277	0.86	42.6	D	286	No Timing Mitigation Recommended	
EB R	0.06	11.7	B	21	0.06	11.9	B	21		
WB LT	0.09	19.4	B	33	0.09	19.7	B	33		
WB R	0.02	19.0	B	0	0.02	19.3	B	0		
NB L	0.45	33.1	C	66	0.49	33.6	C	72		
NB TTR	0.66	16.3	B	282	0.65	16.1	B	282		
SB L	0.71	92.0	F	29	0.71	92.3	F	29		
SB TTR	0.59	18.1	B	217	0.61	18.4	B	228		

^a Volume-to-capacity ratio - ^b Average control delay (sec/veh) - ^c Level of service - ^d 95th percentile queue in feet

**Table 4b 2022 PM Peak Hour
 Level of Service Analysis Summary**

Location/ Peak Hour	2022 No-Build				2022 Build				2022 Build Mit			
	v/c ^a	Del. ^b	LOS ^c	Q ^d	v/c ^a	Del. ^b	LOS ^c	Q ^d	v/c ^a	Del. ^b	LOS ^c	Q ^d

6: Lowell Road (3A) at Hampshire Drive/Oblate Drive

PM OVERALL –	0.56	14.7	B	---	0.56	14.8	B	---	---	---
EB LT	0.37	32.3	C	47	0.37	32.7	C	47	No Timing Mitigation Recommended	
EB R	0.08	24.5	C	26	0.08	24.8	C	26		
WB LT	0.22	36.6	D	24	0.22	36.9	D	24		
WB R	0.00	28.3	C	0	0.00	28.6	C	0		
NB L	0.13	32.0	C	31	0.14	32.4	C	33		
NB TTR	0.62	12.4	B	334	0.62	12.3	B	337		
SB L	0.33	40.2	D	16	0.33	40.5	D	16		
SB TTR	0.60	14.8	B	261	0.62	15.0	B	275		

5: Lowell Road (3A) at Flagstone Drive/Wason Road

PM OVERALL –	0.86	34.8	C	---	0.86	35.1	D	---	---	---
EB LT	0.79	67.8	E	188	0.79	67.8	E	188	No Timing Mitigation Recommended	
EB R	0.82	45.5	D	366	0.81	45.3	D	366		
WB L	0.82	63.0	E	344	0.83	64.4	E	344		
WB LT	0.82	62.1	E	343	0.83	63.4	E	343		
WB R	0.02	34.5	C	0	0.02	34.6	C	0		
NB L	0.42	57.7	E	139	0.44	57.9	E	145		
NB TT	0.73	28.2	C	254	0.73	28.0	C	253		
NB RR	0.44	5.2	A	25	0.44	5.2	A	25		
SB L	0.76	80.4	F	123	0.76	80.4	F	123		
SB TTR	0.69	40.3	D	320	0.71	40.8	D	334		

4: Lowell Road (3A) at Sagamore Bridge

PM OVERALL –	1.12	40.4	D	---	1.12	41.0	D	---	---	---
EB LL	1.07	81.0	F	820	1.08	84.0	F	830	No Timing Mitigation Recommended	
EB R	0.90	8.4	A	5	0.90	8.4	A	5		
NB LLL	1.05	73.8	E	523	1.05	73.8	E	523		
NB TT	0.40	14.9	B	227	0.41	14.9	B	227		
SB TT	0.94	63.4	E	343	0.95	64.5	E	348		
SB RR	0.49	0.4	A	39	0.51	0.4	A	48		

^a Volume-to-capacity ratio - ^b Average control delay (sec/veh) - ^c Level of service - ^d 95th percentile queue in feet

**Table 5a 2032 AM Peak Hour
 Level of Service Analysis Summary**

Location/ Peak Hour	2032 No-Build				2032 Build			
	v/c ^a	Del. ^b	LOS ^c	Q ^d	v/c ^a	Del. ^b	LOS ^c	Q ^d

9: Lowell Road (3A) at Pelham Road

AM OVERALL –	0.97	69.2	E	---	0.97	70.3	E	---
WB L	0.67	67.7	E	616	0.67	67.7	E	616
WB R	0.14	43.4	D	124	0.14	43.4	D	124
NB TR	0.72	38.3	D	811	0.73	38.4	D	816
SB L	0.67	99.0	F	233	0.67	99.0	F	233
SB T	1.08	87.1	F	2072	1.09	89.0	F	2090

8: Lowell Road (3A) at Fox Hollow Drive/Plaza

AM OVERALL –	0.97	38.4	D	---	0.98	39.4	D	---
EB LT	0.30	86.0	F	40	0.30	86.0	F	40
EB R	0.04	84.0	F	3	0.04	84.0	F	3
WB LT	0.16	84.8	F	27	0.16	84.8	F	27
WB R	0.01	74.5	E	0	0.01	74.5	E	0
NB L	0.44	101.4	F	20	0.44	101.4	F	20
NB TTR	0.27	5.7	A	234	0.27	5.7	A	235
SB L	0.42	89.5	F	50	0.42	89.5	F	50
SB TR	1.03	50.0	D	2526	1.04	51.4	D	2543

10: Lowell Road (3A) at Friars Drive

AM OVERALL –	0.3	A	---	---	0.4	A	---	
EB R	0.14	38.8	E	13	0.21	41.8	E	18

7: Lowell Road (3A) at Executive Drive/PMA Drive

AM OVERALL –	0.87	33.2	C	---	0.89	35.6	D	---
EB LT	0.66	49.4	D	107	0.67	50.6	D	110
EB R	0.02	21.2	C	13	0.02	21.5	C	16
WB LT	0.94	83.0	F	255	0.94	84.8	F	255
WB R	0.16	35.6	D	55	0.16	35.8	D	55
NB L	0.98	100.7	F	301	1.07	127.5	F	326
NB TTR	0.32	12.0	B	135	0.32	12.0	B	135
SB L	0.74	58.4	E	172	0.74	59.6	E	172
SB TTR	0.83	23.0	C	498	0.83	23.0	C	503

^a Volume-to-capacity ratio - ^b Average control delay (sec/veh) - ^c Level of service percentile queue in feet

**Table 5b 2032 AM Peak Hour
 Level of Service Analysis Summary**

Location/ Peak Hour	2032 No-Build				2032 Build			
	v/c ^a	Del. ^b	LOS ^c	Q ^d	v/c ^a	Del. ^b	LOS ^c	Q ^d

6: Lowell Road (3A) at Hampshire Drive/Oblate Drive

AM OVERALL –	0.73	14.6	B	---	0.73	14.9	B	---
EB LT	0.21	46.9	D	23	0.21	47.1	D	23
EB R	0.01	34.4	C	0	0.01	34.4	C	0
WB LT	0.15	47.2	D	16	0.15	47.4	D	16
WB R	0.00	39.0	D	0	0.00	39.2	D	0
NB L	0.69	47.4	D	201	0.70	48.0	D	212
NB TTR	0.38	5.6	A	229	0.39	5.6	A	233
SB L	0.14	48.4	D	8	0.14	48.6	D	8
SB TTR	0.78	16.3	B	521	0.79	16.7	B	530

5: Lowell Road (3A) at Flagstone Drive/Wason Road

AM OVERALL –	1.06	59.1	E	---	1.08	61.9	E	---
EB LT	0.98	115.1	F	152	0.98	115.1	F	152
EB R	0.67	35.6	D	212	0.68	35.6	D	214
WB L	1.00	80.5	F	422	1.00	80.5	F	422
WB LT	1.00	80.3	F	425	1.00	80.3	F	425
WB R	0.02	24.4	C	0	0.02	24.4	C	0
NB L	1.27	164.3	F	300	1.32	184.8	F	308
NB TT	0.67	17.0	B	294	0.68	17.1	B	295
NB RR	0.07	31.4	C	26	0.07	31.2	C	25
SB L	0.34	45.1	D	33	0.34	45.1	D	33
SB TTR	1.00	56.7	E	379	1.01	59.2	E	385

4: Lowell Road (3A) at Sagamore Bridge

AM OVERALL –	1.01	18.4	B	---	1.02	19.5	B	---
EB LL	0.97	51.2	D	461	1.00	57.1	E	479
EB R	0.76	3.4	A	0	0.76	3.4	A	0
NB LLL	0.87	24.6	C	256	0.87	24.6	C	256
NB TT	0.23	4.4	A	17	0.23	4.4	A	17
SB TT	0.80	48.8	D	134	0.80	48.8	D	133
SB RR	0.67	1.4	A	273	0.68	0.4	A	275

^a Volume-to-capacity ratio - ^b Average control delay (sec/veh) - ^c Level of service percentile queue in feet

**Table 6a 2032 PM Peak Hour
 Level of Service Analysis Summary**

Location/ Peak Hour	2032 No-Build				2032 Build			
	v/c ^a	Del. ^b	LOS ^c	Q ^d	v/c ^a	Del. ^b	LOS ^c	Q ^d

9: Lowell Road (3A) at Pelham Road

PM OVERALL	1.03	84.1	F	---	1.03	85.2	F	---
WB L	0.76	104.9	F	197	0.76	104.9	F	197
WB R	0.16	55.0	E	100	0.16	55.0	E	100
NB TR	1.20	133.8	F	2523	1.20	136.0	F	2536
SB L	0.52	76.1	E	423	0.52	76.1	E	423
SB T	0.60	9.4	A	884	0.60	9.4	A	888

8: Lowell Road (3A) at Fox Hollow Drive/Plaza

PM OVERALL	0.61	18.0	B	---	0.61	18.0	B	---
EB LT	0.22	83.4	F	40	0.22	83.4	F	40
EB R	0.02	82.1	F	0	0.02	82.1	F	0
WB LT	0.59	93.3	F	81	0.59	93.3	F	81
WB R	0.04	68.6	E	36	0.04	68.6	E	36
NB L	0.50	88.5	F	70	0.50	88.5	F	70
NB TTR	0.55	10.9	B	623	0.55	11.0	B	626
SB L	0.66	96.3	F	134	0.66	96.3	F	134
SB TR	0.61	11.6	B	903	0.61	11.6	B	908

10: Lowell Road (3A) at Friars Drive

PM OVERALL	---	0.0	A	---	---	0.3	A	---
EB R	0.02	16.3	C	3	0.12	17.7	C	10

7: Lowell Road (3A) at Executive Drive/PMA Drive

PM OVERALL	0.80	23.7	C	---	0.80	26.3	C	---
EB LT	0.95	62.9	E	339	1.02	84.8	F	349
EB R	0.06	13.1	B	24	0.07	13.5	B	24
WB LT	0.10	21.1	C	36	0.12	22.7	C	36
WB R	0.02	20.6	C	0	0.02	22.1	C	0
NB L	0.49	35.1	D	76	0.46	34.9	C	82
NB TTR	0.68	16.5	B	318	0.65	15.6	B	318
SB L	0.74	107.3	F	31	0.71	95.1	F	31
SB TTR	0.61	18.1	B	240	0.62	18.7	B	251

^a Volume-to-capacity ratio - ^b Average control delay (sec/veh) - ^c Level of service percentile queue in feet

**Table 6b 2032 PM Peak Hour
 Level of Service Analysis Summary**

Location/ Peak Hour	2032 No-Build				2032 Build			
	v/c ^a	Del. ^b	LOS ^c	Q ^d	v/c ^a	Del. ^b	LOS ^c	Q ^d

6: Lowell Road (3A) at Hampshire Drive/Oblate Drive

PM OVERALL –	0.60	15.4	B	---	0.60	15.4	B	---
EB LT	0.41	35.3	D	55	0.42	35.9	D	56
EB R	0.09	26.5	C	29	0.09	26.9	C	29
WB LT	0.26	39.8	D	27	0.27	40.4	D	27
WB R	0.00	30.0	C	0	0.00	30.4	C	0
NB L	0.15	34.3	C	36	0.16	34.8	C	38
NB TTR	0.67	13.3	B	383	0.66	13.1	B	386
SB L	0.19	38.7	D	18	0.19	39.2	D	19
SB TTR	0.62	14.9	B	295	0.64	15.0	B	310

5: Lowell Road (3A) at Flagstone Drive/Wason Road

PM OVERALL –	0.93	34.5	C	---	0.94	34.8	C	---
EB LT	0.89	86.2	F	232	0.89	86.2	F	232
EB R	0.89	52.5	D	441	0.89	52.5	D	441
WB L	0.87	67.6	E	382	0.87	67.6	E	382
WB LT	0.86	66.1	E	378	0.86	66.1	E	378
WB R	0.02	33.1	C	0	0.02	33.1	C	0
NB L	0.42	57.5	E	123	0.44	57.6	E	126
NB TT	0.82	19.3	B	162	0.82	19.0	B	161
NB RR	0.53	0.6	A	1	0.53	0.7	A	1
SB L	0.77	80.4	F	155	0.77	80.4	F	155
SB TTR	0.80	45.2	D	349	0.83	46.4	D	363

4: Lowell Road (3A) at Sagamore Bridge

PM OVERALL –	1.25	58.1	E	---	1.26	58.8	E	---
EB LL	1.26	161.3	F	992	1.27	165.5	F	1003
EB R	0.98	18.1	B	216	0.98	18.1	B	216
NB LLL	1.04	64.1	E	550	1.04	63.3	E	549
NB TT	0.42	8.8	A	181	0.42	7.6	A	166
SB TT	1.02	72.6	E	358	1.03	74.1	E	365
SB RR	0.55	0.4	A	47	0.56	0.4	A	61

^a Volume-to-capacity ratio - ^b Average control delay (sec/veh) - ^c Level of service percentile queue in feet

11. Mitigation:

In addition to the roadway improvements proposed in the HLC study and the VHB CMAQ project described above, preliminary mitigation improvements relative to the impacts of the Friars Drive warehouse have been discussed with Town staff. These include the following:

- Applicant will install a right turn pocket from Lowell Road into Friars Drive. One utility pole will need to be moved to provide as long a taper and deceleration length as practicable.
- An extra inch (1in) of pavement will be applied on top of the current Friars Drive improvements.
- Right turning movements for WB-67 vehicles from Flagstone onto Lowell Road are to be reviewed, taking into account the new (CMAQ) lane on Lowell Road.

For the opening year AM peak hour, a small timing modification is also recommended as it shows improvements to the following intersection and helps return operating conditions to no-build conditions or better.

- Lowell Road at Executive Drive:
 - Add 2 seconds to the NBL (Phase 1), reducing Phase 2 by 2 seconds.

At the Sagamore Bridge interchange, the build conditions of the HLC and CMAQ improvements for the eastbound left turn still show an over-capacity condition ($v/c = 1.26$). However, analysis shows that the effects of this development on this approach are negligible ($v/c = 1.27$), and therefore no further mitigation is required.

12. Conclusion:

This study shows that traffic from this development adds between 50 and 55 trips to the roadway network during weekday am and pm peak hours, respectively.

Background traffic along Lowell Road is between 2000-3000 vehicles per hour during these peak hours. This new traffic (approximately 2% of background volume) falls within the normal day-to-day range of traffic variation, and represents little more than expected background growth for the corridor.

Traffic entering and exiting the Sagamore Park have several intersections to choose from, and thus reduce impacts at any single intersection. As the tables above show for all cases, delays and level of service are not significantly affected, and 95th percentile queues are extended by less than one car length even in worst-case pm conditions.

The intersection that carries most project-related traffic is the Sagamore Bridge intersection, where 47 new trips (4 trucks and 43 cars) are added during the pm peak hour. However, 28 of these trips are southbound right turns not subject to signal control, leaving only 19 vehicles added to the signal (throughs and left turns) during the peak hour. In the am peak hour, 43 trips (10 trucks and 33 cars) are added, but only 33 of these trips are added to the signal.

These volumes amount to less than one new vehicle per cycle at the interchange, and multiple lanes are provided for each movement. The results above show that the effect of this development even at the Sagamore Bridge interchange are negligible.

This level of traffic is not expected to materially affect the "Build" traffic conditions associated with the HLC project, and can be accommodated by the mitigation improvements proposed therein. The additional mitigation improvements of this project at the Friars Drive and Flagstone Drive intersections will further improve traffic movements at both ends of the corridor.

Please let me know if you have any questions in regard to these items.

TFMORAN, INC.



Robert Duval, PE
Chief Engineer

Appendix

APPENDIX A	Trip Generation Calculations <ul style="list-style-type: none">• ITE 10th Edition Supplement for Cars & Trucks
APPENDIX B	Daily Shift Schedule Summary
APPENDIX C	Trip Distribution Calculations (AM/PM)
APPENDIX D	Truck Volume Calculations (AM/PM)
APPENDIX E	Other Development Site Trips (AM/PM)
APPENDIX F	Volume Calculations (AM/PM)
APPENDIX G	<u>AM Networks (Synchro)</u> 2022 NoBuild & Build 2032 NoBuild & Build
APPENDIX H	<u>PM Networks (Synchro)</u> 2022 NoBuild & Build 2032 NoBuild & Build
APPENDIX I	<u>Mitigation Networks (Synchro)</u> 2022 Build Mit (AM)
APPENDIX J	Report Resource – Langan Traffic Impact Study for Hudson Logistics Center <ul style="list-style-type: none">• Journey to Work calculations• Figure 8 – 2022 Build Peak-Hour Traffic Volumes• Figure 9 – 2032 Build Peak-Hour Traffic Volumes• Appendix G – 2022 Build Traffic Conditions• Appendix H – 2032 Build Traffic Conditions• Appendix I – 2022 Build with Base Improvements Traffic Conditions• Appendix J – 2032 Build with Base Improvements Traffic Conditions

APPENDIX A

Proposed Trip Generation - Warehouse

ITE Trip Generation Manual, 10th Edition Supplement Setting/Location: General Urban/Suburban

ITE LUC 154 - High-Cube Transload and Short-Term Storage Warehouse: 504,000 sf Gross Floor Area

Time Period	Rate/Equ		Rate/ Eq Used	Trip Ends	Directional Split		Directional Distribution	
	X	Rate			In	Out	In	Out
Weekday AM Peak Hour Adjacent Street - CARS	504	0.08	Rate	40	77%	23%	31	9
Weekday AM Peak Hour Adjacent Street - TRUCKS	504	0.02	Rate	10	49%	51%	5	5
Weekday AM Peak Hour Adjacent Street - TOTAL				50			36	14
Weekday PM Peak Hour Adjacent Street - CARS	504	0.1	Rate	50	28%	72%	14	36
Weekday PM Peak Hour Adjacent Street - TRUCKS	504	0.01	Rate	5	47%	53%	2	3
Weekday AM Peak Hour Adjacent Street - TOTAL				55			16	39
Weekday Daily - CARS	504	1.4	Rate	706	50%	50%	353	353
Weekday Daily - TRUCKS	504	0.22	Rate	111	50%	50%	56	55
Weekday Daily - TOTAL				817			409	408

Proposed Trip Composition

100% Primary Trips

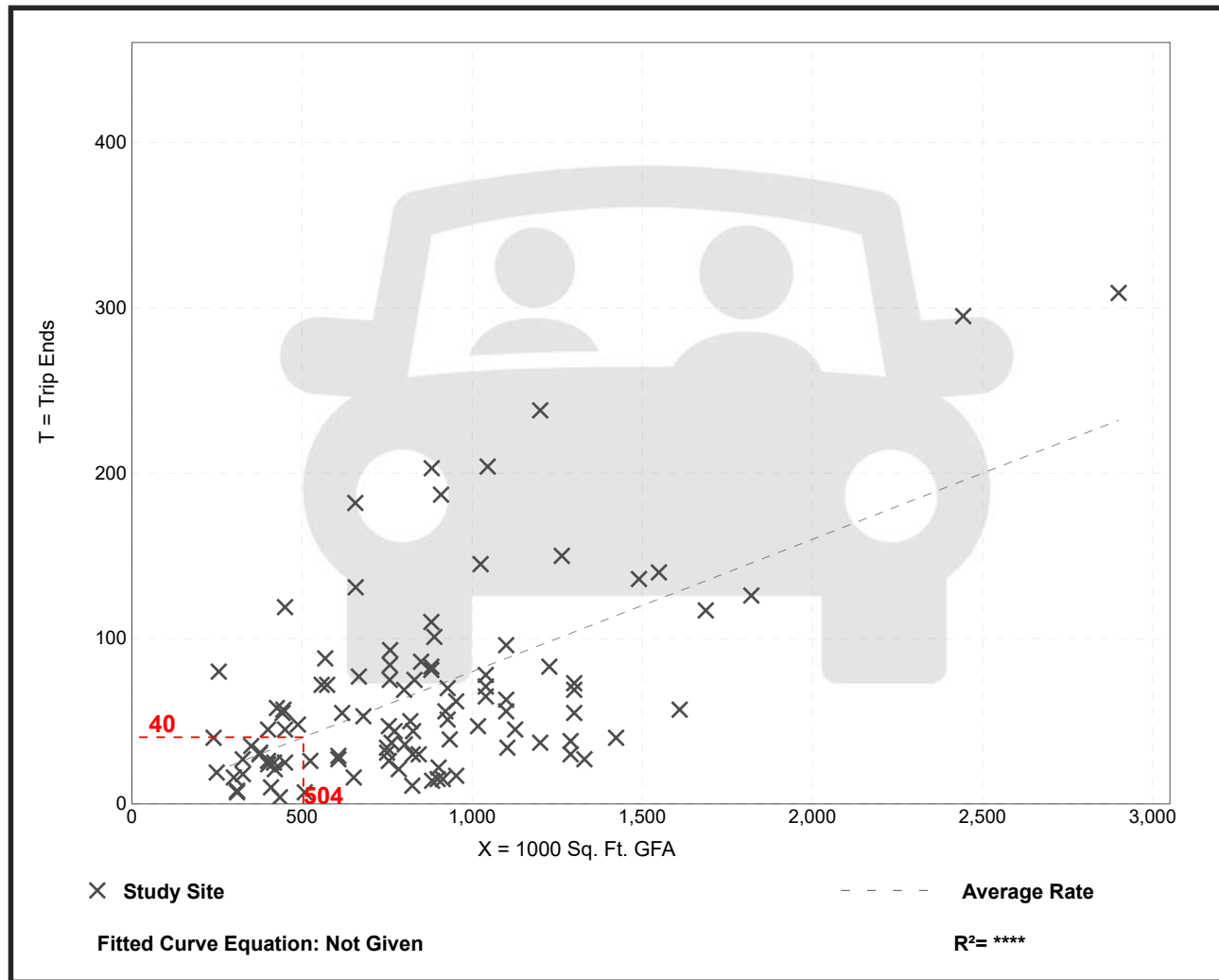
High-Cube Transload and Short-Term Storage Warehouse (154)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 102
 Avg. 1000 Sq. Ft. GFA: 846
 Directional Distribution: 77% entering, 23% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.08	0.01 - 0.31	0.05

Data Plot and Equation



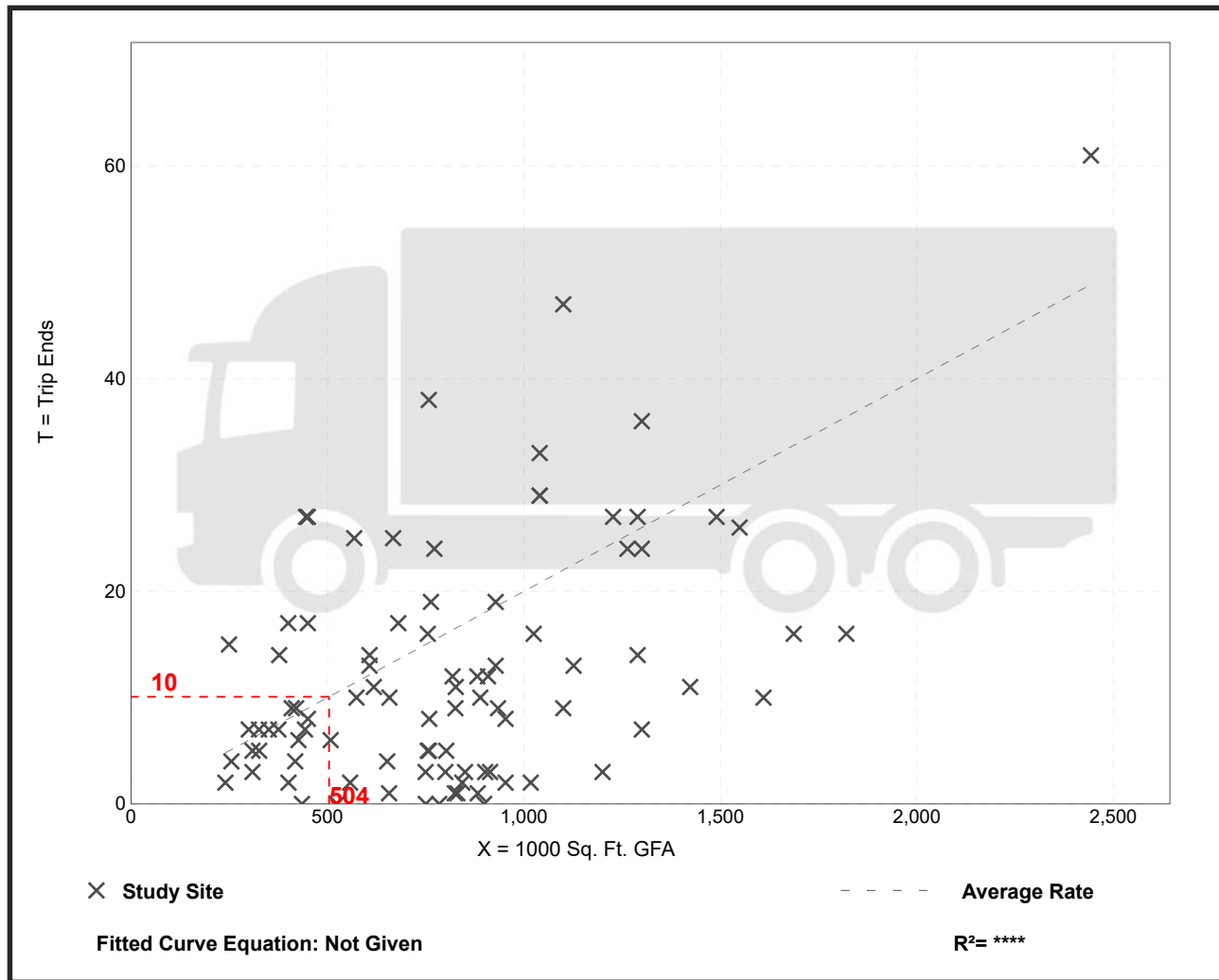
High-Cube Transload and Short-Term Storage Warehouse (154)

Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 90
 Avg. 1000 Sq. Ft. GFA: 812
 Directional Distribution: 49% entering, 51% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.02	0.00 - 0.06	0.01

Data Plot and Equation



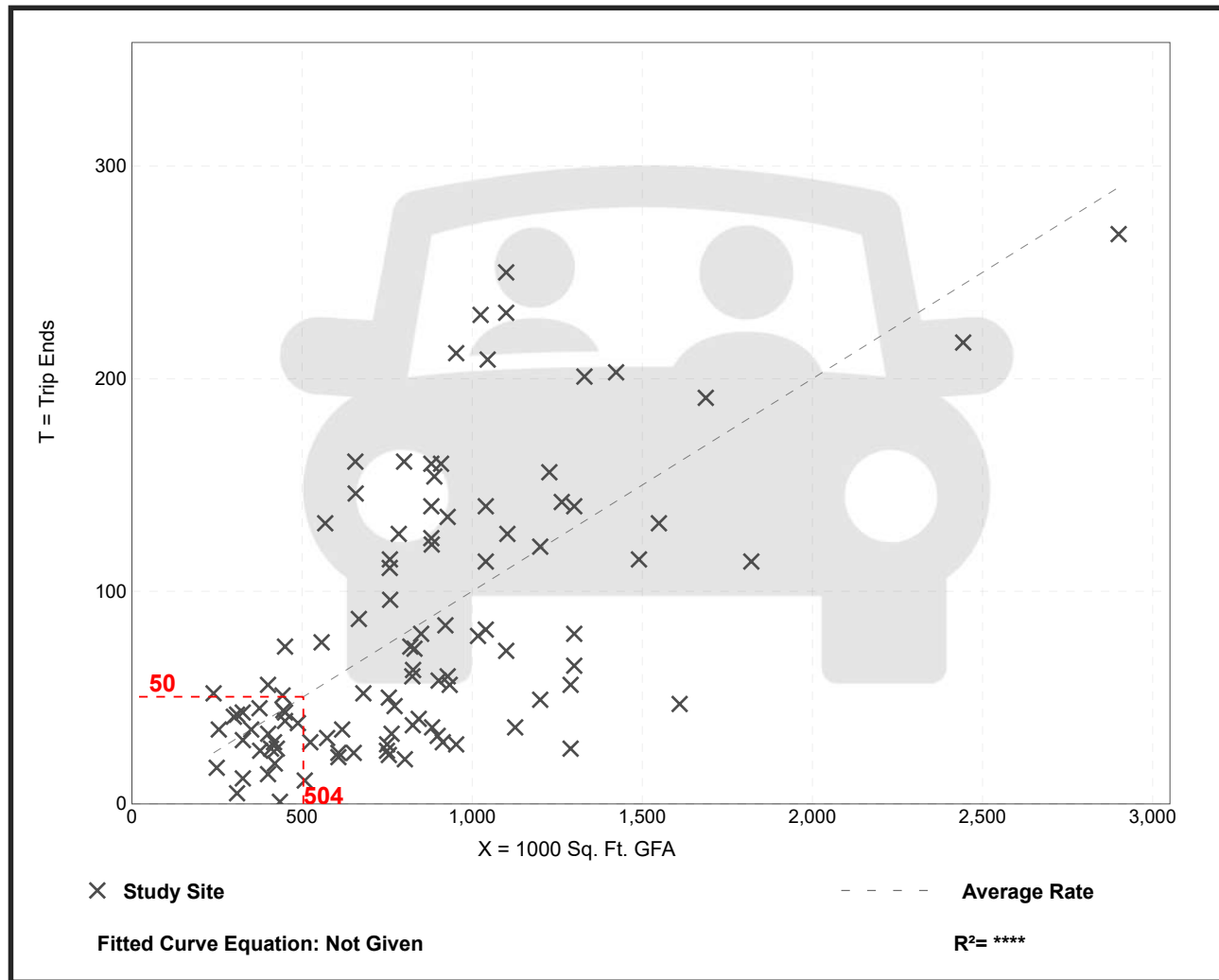
High-Cube Transload and Short-Term Storage Warehouse (154)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 103
 Avg. 1000 Sq. Ft. GFA: 840
 Directional Distribution: 28% entering, 72% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.10	0.00 - 0.25	0.06

Data Plot and Equation



Trip Gen Manual, 10th Ed + Supplement • Institute of Transportation Engineers

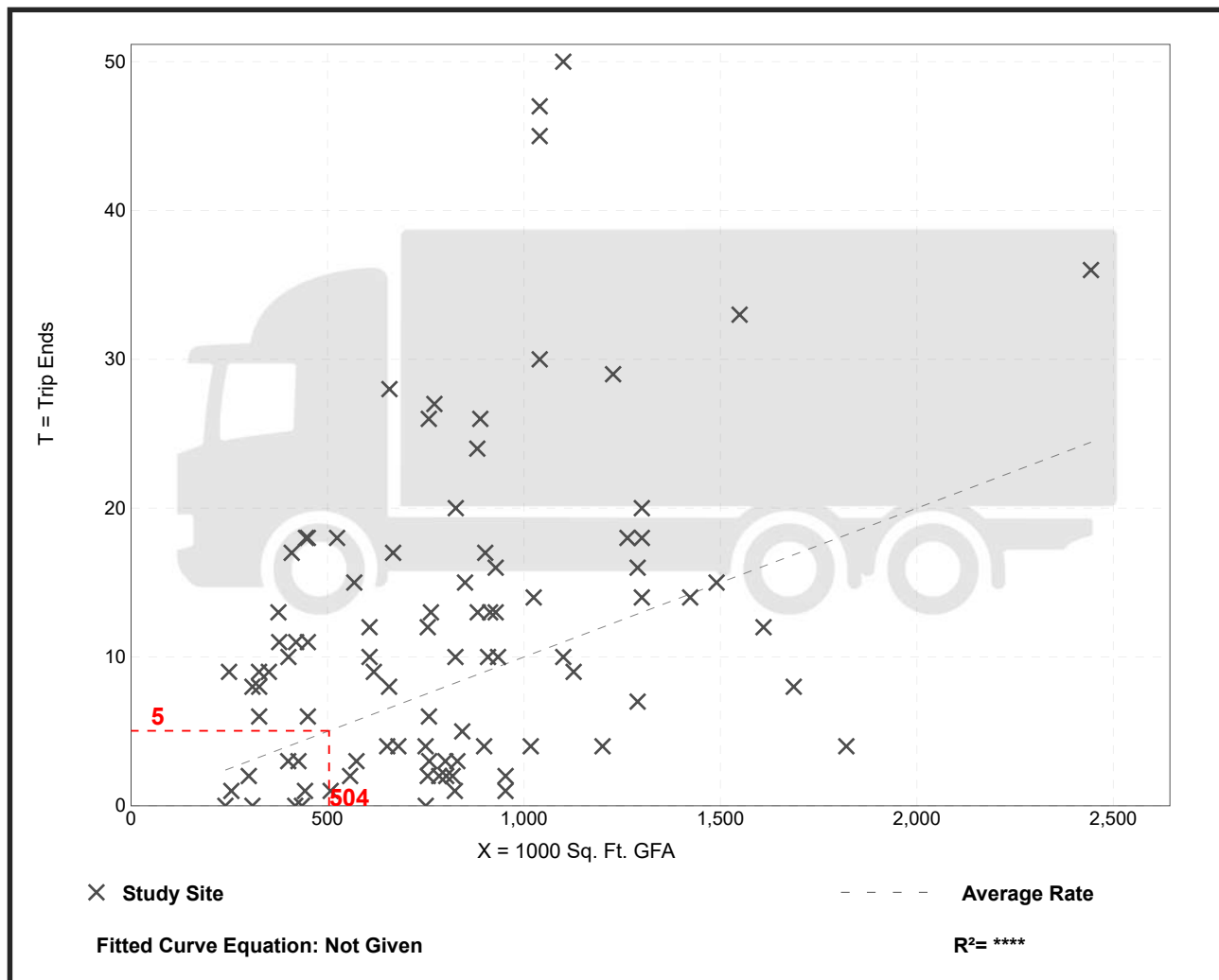
High-Cube Transload and Short-Term Storage Warehouse (154)

Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 91
 Avg. 1000 Sq. Ft. GFA: 807
 Directional Distribution: 47% entering, 53% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.01	0.00 - 0.05	0.01

Data Plot and Equation



High-Cube Transload and Short-Term Storage Warehouse (154)

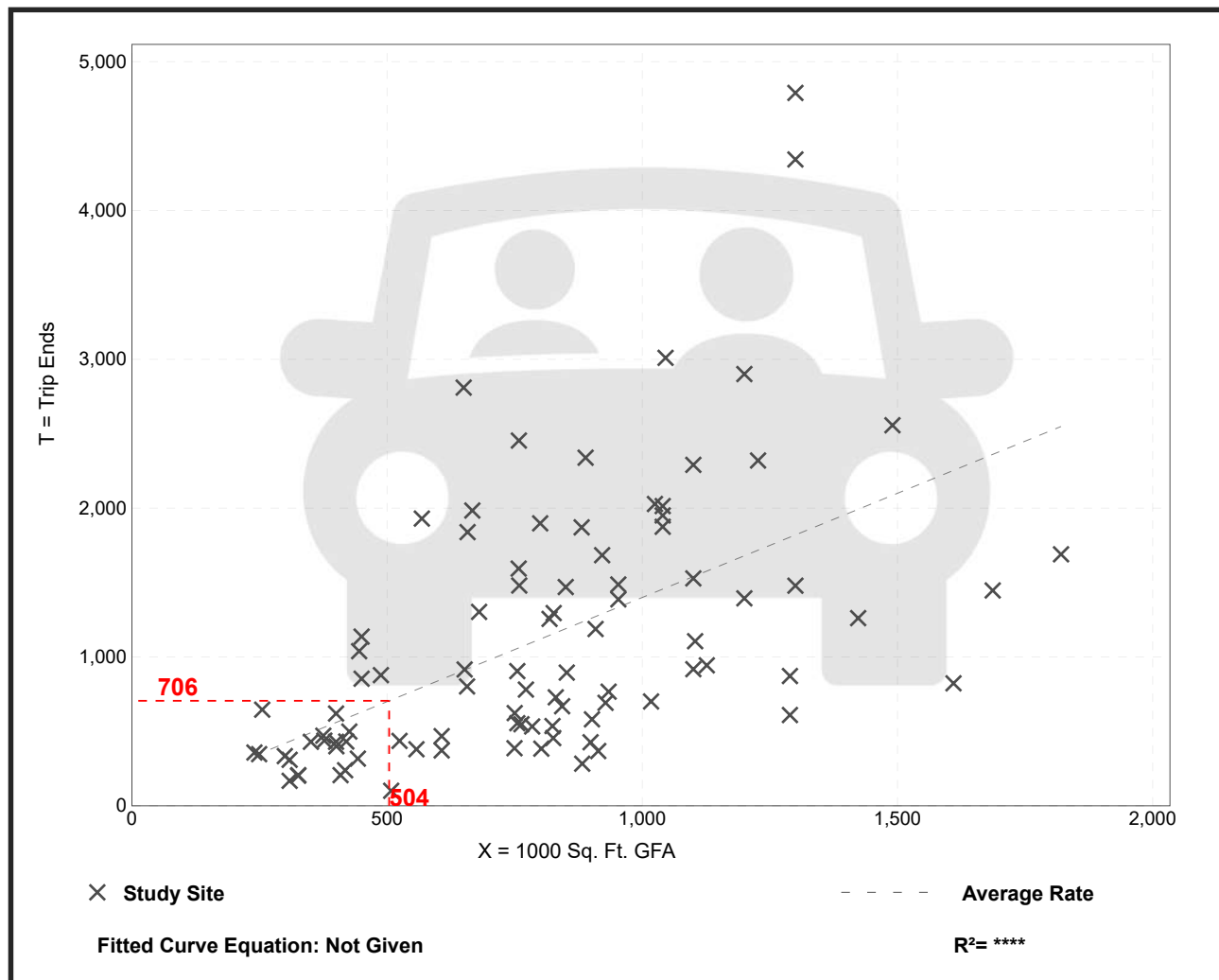
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
 Number of Studies: 91
 Avg. 1000 Sq. Ft. GFA: 798
 Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.40	0.20 - 4.32	0.86

Data Plot and Equation



High-Cube Transload and Short-Term Storage Warehouse (154)

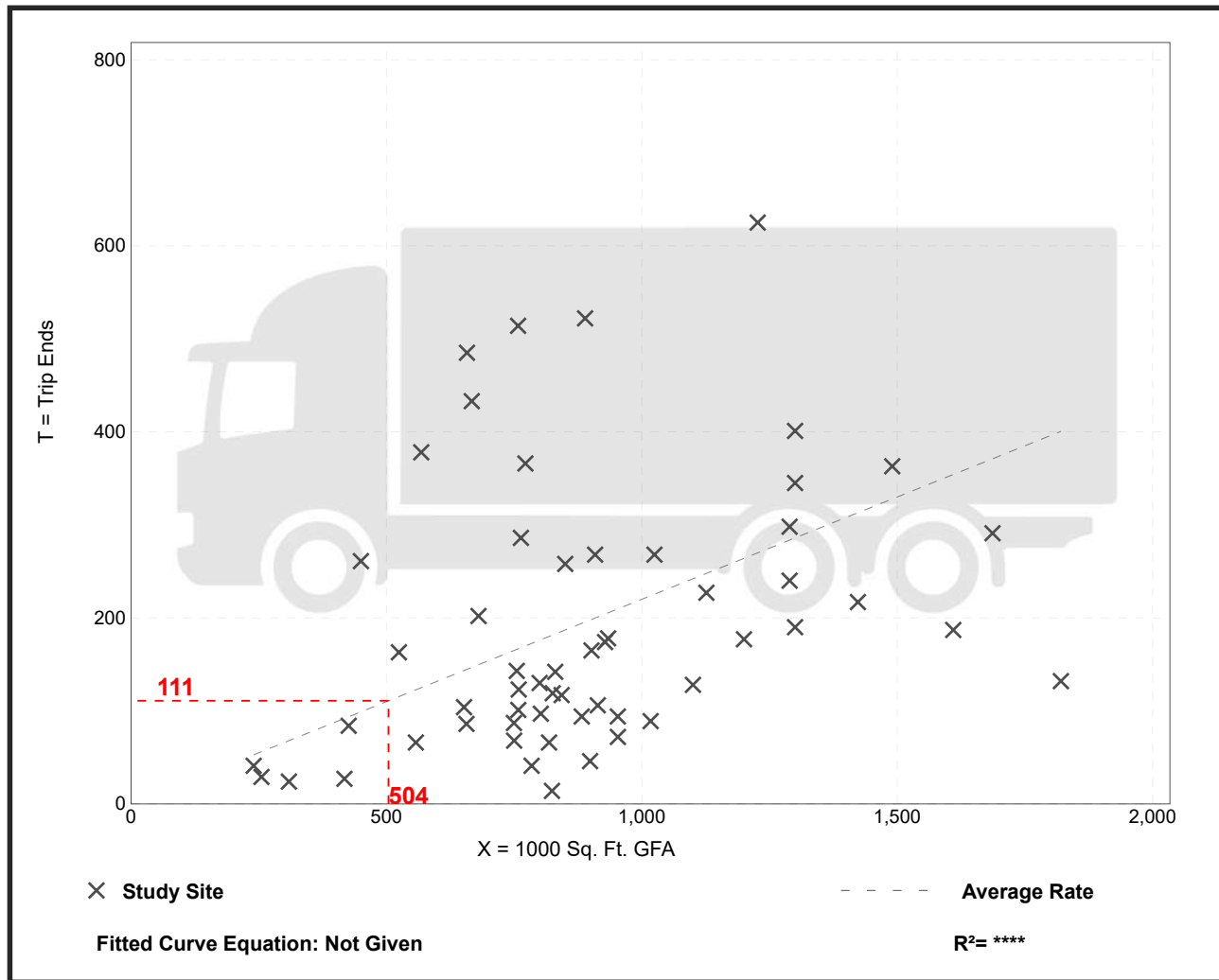
Truck Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
 Number of Studies: 57
 Avg. 1000 Sq. Ft. GFA: 892
 Directional Distribution: 50% entering, 50% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.22	0.02 - 0.74	0.16

Data Plot and Equation



Trip Gen Manual, 10th Ed + Supplement • Institute of Transportation Engineers

APPENDIX B

TRIP GENERATION SUMMARY: HUDSON FRIARS ROAD DISTRIBUTION BUILDING
(500,000 SF High-Cube Transload and Short-Term Storage Warehouse)

DAILY SHIFT SCHEDULE	353 ----- Total Employees ----->						56 <-- Total Trucks -->		Totals	Trips/hr							
	Office Emp		Office Emp		Office Emp		Warehouse Emp					Warehouse Emp		Warehouse Emp		Trucks	
	1st Shift 7a - 4p/8a - 5p		2nd Shift 4p - 12:30a		3rd Shift 12:30a - 7a		1st Shift 6a - 2:30p					2nd Shift 2:30p - 11p		3rd Shift 11p - 6a		All Shifts 6a - 9p	
	In	Out	In	Out	In	Out	In	Out				In	Out	In	Out	In	Out
12:00M - 1:00AM			8	4									4	8	12		
1:00AM - 2:00AM													0	0	0		
2:00AM - 3:00AM													0	0	0		
3:00AM - 4:00AM													0	0	0		
4:00AM - 5:00AM													0	0	0		
5:00AM - 6:00AM							140						140	0	140	<- AM Peak of Generator	
6:00AM - 7:00AM	10									60		5	15	60	75		
7:00AM - 8:00AM	6			4								5	11	9	20	<- Roadway Peak*	
8:00AM - 9:00AM												5	5	5	10		
9:00AM - 10:00AM												5	5	5	10		
10:00AM - 11:00AM												5	5	5	10		
11:00AM - 12:00N												4	4	2	6		
12:00N - 1:00PM												5	5	5	10		
1:00PM - 2:00PM												5	5	5	10		
2:00PM - 3:00PM							140	125				5	130	145	275	<- PM Peak of Generator	
3:00PM - 4:00PM		8										5	13	5	18		
4:00PM - 5:00PM		10										2	2	13	15	<- Roadway Peak*	
5:00PM - 6:00PM		6										5	5	11	16		
6:00PM - 7:00PM												5	0	5	5		
7:00PM - 8:00PM													0	0	0		
8:00PM - 9:00PM													0	0	0		
9:00PM - 10:00PM													0	0	0		
10:00PM - 11:00PM										60			60	0	60		
11:00PM - 12:00M								125					0	125	125		
	16	16	8	8	4	4	140	140	125	125	60	60	56	55	409	408	817 = Daily Trips

NOTES:

- Assume Two (2) Tenants
- All trucks originate from offsite.
- Truck trailer storage at the site, no fleet parking
- Largest Shift Change overlap is Warehouse 1st to 2nd shift between 2pm-3pm: 125 (in) + 140 (out) = 265
- Lower Truck percentage is typ. due to truck operations scheduled to avoid peak periods.

Hudson Article II Traffic Regulations: Section 317-13 Trucks, commercial vehicles and heavy vehicles

No commercial truck traffic shall be permitted, except by special permit issued by the Town of Hudson, on any road in the Town of Hudson before 6:00 a.m. and after 7:00 p.m., unless otherwise specified under Subsection F, except on Route 111, Route 102, Route 3A and West Road.

APPENDIX C

**Distribution Warehouse
Site Trips Distribution - CARS**

*Distribution based on Langan Report Journey to Work:
15% to/fr 3A north; 72% to/fr Sagamore Bridge; 13% to/fr 3A south
Left turns into Sagamore Industrial Park prorata per TMCs, All southbound cars leave via Friars Dr.*

AM Distribution

PM Distribution

	In	Out
AM Totals	31	9

	In	Out
PM Totals	14	36

9: Lowell Road at Pelham Road

Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
WBL			0	0
WBR			0	0
NBT		15%	0	1
NBR			0	0
SBL			0	0
SBT	15%		5	0

9: Lowell Road at Pelham Road

Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
WBL			0	0
WBR			0	0
NBT		15%	0	5
NBR			0	0
SBL			0	0
SBT	15%		2	0

8: Lowell Road at Fox Hollow Drive/Plaza

Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL			0	0
EBT			0	0
EBR			0	0
WBL			0	0
WBT			0	0
WBR			0	0
NBL			0	0
NBT		15%	0	1
NBR			0	0
SBL			0	0
SBT	15%		5	0
SBR			0	0

8: Lowell Road at Fox Hollow Drive/Plaza

Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL			0	0
EBT			0	0
EBR			0	0
WBL			0	0
WBT			0	0
WBR			0	0
NBL			0	0
NBT		15%	0	5
NBR			0	0
SBL			0	0
SBT	15%		2	0
SBR			0	0

10: Lowell Road at Friars Road

Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBR		85%	0	8
NBT		15%	0	1
SBT			0	0
SBR	15%		5	0

10: Lowell Road at Friars Road

Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBR		85%	0	31
NBT		15%	0	5
SBT			0	0
SBR	15%		2	0

7: Lowell Road at Executive Drive/PMA Driveway

Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL		15%	0	1
EBT			0	0
EBR			0	0
WBL			0	0
WBT			0	0
WBR			0	0
NBL	26%		8	0
NBT			0	0
NBR			0	0
SBL			0	0
SBT		85%	0	8
SBR			0	0

7: Lowell Road at Executive Drive/PMA Driveway

Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL		15%	0	5
EBT			0	0
EBR			0	0
WBL			0	0
WBT			0	0
WBR			0	0
NBL	30%		4	0
NBT			0	0
NBR			0	0
SBL			0	0
SBT		85%	0	31
SBR			0	0

**Distribution Warehouse
Site Trips Distribution - CARS**

*Distribution based on Langan Report Journey to Work:
15% to/fr 3A north; 72% to/fr Sagamore Bridge; 13% to/fr 3A south
Left turns into Sagamore Industrial Park prorata per TMCs, All southbound cars leave via Friars Dr.*

AM Distribution

PM Distribution

	In	Out
AM Totals	31	9

	In	Out
PM Totals	14	36

6: Lowell Road at Hampshire Drive/Oblate Drive

Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL			0	0
EBT			0	0
EBR			0	0
WBL			0	0
WBT			0	0
WBR			0	0
NBL	17%		5	0
NBT	26%		8	0
NBR			0	0
SBL			0	0
SBT		85%	0	8
SBR			0	0

6: Lowell Road at Hampshire Drive/Oblate Drive

Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL			0	0
EBT			0	0
EBR			0	0
WBL			0	0
WBT			0	0
WBR			0	0
NBL	9%		1	0
NBT	30%		4	0
NBR			0	0
SBL			0	0
SBT		85%	0	31
SBR			0	0

5: Lowell Road at Flagstone Drive/Wason Road

Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL			0	0
EBT			0	0
EBR			0	0
WBL			0	0
WBT			0	0
WBR			0	0
NBL	43%		13	0
NBT	43%		13	0
NBR			0	0
SBL			0	0
SBT		85%	0	8
SBR			0	0

5: Lowell Road at Flagstone Drive/Wason Road

Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL			0	0
EBT			0	0
EBR			0	0
WBL			0	0
WBT			0	0
WBR			0	0
NBL	47%		7	0
NBT	38%		5	0
NBR			0	0
SBL			0	0
SBT		85%	0	31
SBR			0	0

4: Lowell Road at Sagamore Bridge

Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL	72%		22	0
EBR			0	0
NBL			0	0
NBT	13%		4	0
SBT		13%	0	1
SBR		72%	0	6

4: Lowell Road at Sagamore Bridge

Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL	72%		10	0
EBR			0	0
NBL			0	0
NBT	13%		2	0
SBT		13%	0	5
SBR		72%	0	26

Distribution Warehouse	
Site Trips Distribution - TRUCKS	
80% trucks to/fr Sagamore Bridge; 10% to/fr 3A north; 10% to/fr 3A south	
ENTER: 10% southbound via Friars; northbound 80% at Executive, 10% at Flagstone	
EXIT: 10% northbound & 80% southbound at Executive, 10% southbound at Flagstone	

AM Distribution

PM Distribution

	In	Out
AM Totals	5	5

	In	Out
PM Totals	2	3

9: Lowell Road at Pelham Road				
	PERCENTAGES		TRIPS	
<u>Movement</u>	<u>In</u>	<u>Out</u>	<u>In</u>	<u>Out</u>
WBL			0	0
WBR			0	0
NBT		10%	0	1
NBR			0	0
SBL			0	0
SBT	10%		1	0

9: Lowell Road at Pelham Road				
	PERCENTAGES		TRIPS	
<u>Movement</u>	<u>In</u>	<u>Out</u>	<u>In</u>	<u>Out</u>
WBL			0	0
WBR			0	0
NBT		10%	0	1
NBR			0	0
SBL			0	0
SBT	10%		0	0

8: Lowell Road at Fox Hollow Drive/Plaza				
	PERCENTAGES		TRIPS	
<u>Movement</u>	<u>In</u>	<u>Out</u>	<u>In</u>	<u>Out</u>
EBL			0	0
EBT			0	0
EBR			0	0
WBL			0	0
WBT			0	0
WBR			0	0
NBL			0	0
NBT		10%	0	1
NBR			0	0
SBL			0	0
SBT	10%		1	0
SBR			0	0

8: Lowell Road at Fox Hollow Drive/Plaza				
	PERCENTAGES		TRIPS	
<u>Movement</u>	<u>In</u>	<u>Out</u>	<u>In</u>	<u>Out</u>
EBL			0	0
EBT			0	0
EBR			0	0
WBL			0	0
WBT			0	0
WBR			0	0
NBL			0	0
NBT		10%	0	1
NBR			0	0
SBL			0	0
SBT	10%		0	0
SBR			0	0

10: Lowell Road at Friars Road				
	PERCENTAGES		TRIPS	
<u>Movement</u>	<u>In</u>	<u>Out</u>	<u>In</u>	<u>Out</u>
EBR			0	0
NBT		10%	0	1
SBT			0	0
SBR	10%		1	0

10: Lowell Road at Friars Road				
	PERCENTAGES		TRIPS	
<u>Movement</u>	<u>In</u>	<u>Out</u>	<u>In</u>	<u>Out</u>
EBR			0	0
NBT		10%	0	1
SBT			0	0
SBR	10%		0	0

7: Lowell Road at Executive Drive/PMA Driveway				
	PERCENTAGES		TRIPS	
<u>Movement</u>	<u>In</u>	<u>Out</u>	<u>In</u>	<u>Out</u>
EBL		10%	0	1
EBT			0	0
EBR		80%	0	4
WBL			0	0
WBT			0	0
WBR			0	0
NBL	80%		4	0
NBT			0	0
NBR			0	0
SBL			0	0
SBT			0	0
SBR			0	0

7: Lowell Road at Executive Drive/PMA Driveway				
	PERCENTAGES		TRIPS	
<u>Movement</u>	<u>In</u>	<u>Out</u>	<u>In</u>	<u>Out</u>
EBL		10%	0	1
EBT			0	0
EBR		80%	0	2
WBL			0	0
WBT			0	0
WBR			0	0
NBL	80%		2	0
NBT			0	0
NBR			0	0
SBL			0	0
SBT			0	0
SBR			0	0

Distribution Warehouse	
Site Trips Distribution - TRUCKS	
80% trucks to/fr Sagamore Bridge; 10% to/fr 3A north; 10% to/fr 3A south	
ENTER: 10% southbound via Friars; northbound 80% at Executive, 10% at Flagstone	
EXIT: 10% northbound & 80% southbound at Executive, 10% southbound at Flagstone	

AM Distribution

PM Distribution

	In	Out
AM Totals	5	5

	In	Out
PM Totals	2	3

6: Lowell Road at Hampshire Drive/Oblate Drive				
Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL			0	0
EBT			0	0
EBR			0	0
WBL			0	0
WBT			0	0
WBR			0	0
NBL			0	0
NBT	80%		4	0
NBR			0	0
SBL			0	0
SBT		80%	0	4
SBR			0	0

6: Lowell Road at Hampshire Drive/Oblate Drive				
Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL			0	0
EBT			0	0
EBR			0	0
WBL			0	0
WBT			0	0
WBR			0	0
NBL			0	0
NBT	80%		2	0
NBR			0	0
SBL			0	0
SBT		80%	0	2
SBR			0	0

5: Lowell Road at Flagstone Drive/Wason Road				
Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL			0	0
EBT			0	0
EBR		10%	0	1
WBL			0	0
WBT			0	0
WBR			0	0
NBL	10%		1	0
NBT	80%		4	0
NBR			0	0
SBL			0	0
SBT		80%	0	4
SBR			0	0

5: Lowell Road at Flagstone Drive/Wason Road				
Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL			0	0
EBT			0	0
EBR		10%	0	0
WBL			0	0
WBT			0	0
WBR			0	0
NBL	10%		0	0
NBT	80%		2	0
NBR			0	0
SBL			0	0
SBT		80%	0	2
SBR			0	0

4: Lowell Road at Sagamore Bridge				
Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL	80%		4	0
EBR			0	0
NBL			0	0
NBT	10%		1	0
SBT		10%	0	1
SBR		80%	0	4

4: Lowell Road at Sagamore Bridge				
Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL	80%		2	0
EBR			0	0
NBL			0	0
NBT	10%		0	0
SBT		10%	0	0
SBR		80%	0	2

**Distribution Warehouse
Total Site Trips**

AM Total Site Trips

PM Total Site Trips

AM TOTAL: 50	
9: Lowell Road at Pelham Road	
<u>Movement</u>	<u>TRIPS</u>
WBL	0
WBR	0
NBT	2
NBR	0
SBL	0
SBT	6
8: Lowell Road at Fox Hollow Drive/Plaza	
<u>Movement</u>	<u>TRIPS</u>
EBL	0
EBT	0
EBR	0
WBL	0
WBT	0
WBR	0
NBL	0
NBT	2
NBR	0
SBL	0
SBT	6
SBR	0
10: Lowell Road at Friars Road	
<u>Movement</u>	<u>TRIPS</u>
EBR	8
NBT	2
SBT	0
SBR	6
7: Lowell Road at Executive Drive/PMA Driveway	
<u>Movement</u>	<u>TRIPS</u>
EBL	2
EBT	0
EBR	4
WBL	0
WBT	0
WBR	0
NBL	12
NBT	0
NBR	0
SBL	0
SBT	8
SBR	0

PM TOTAL: 55	
9: Lowell Road at Pelham Road	
<u>Movement</u>	<u>TRIPS</u>
WBL	0
WBR	0
NBT	6
NBR	0
SBL	0
SBT	2
8: Lowell Road at Fox Hollow Drive/Plaza	
<u>Movement</u>	<u>TRIPS</u>
EBL	0
EBT	0
EBR	0
WBL	0
WBT	0
WBR	0
NBL	0
NBT	6
NBR	0
SBL	0
SBT	2
SBR	0
10: Lowell Road at Friars Road	
<u>Movement</u>	<u>TRIPS</u>
EBR	31
NBT	6
SBT	0
SBR	2
7: Lowell Road at Executive Drive/PMA Driveway	
<u>Movement</u>	<u>TRIPS</u>
EBL	6
EBT	0
EBR	2
WBL	0
WBT	0
WBR	0
NBL	6
NBT	0
NBR	0
SBL	0
SBT	31
SBR	0

**Distribution Warehouse
Total Site Trips**

AM Total Site Trips

PM Total Site Trips

AM TOTAL: 50	
6: Lowell Road at Hampshire Drive/Oblate Drive	
Movement	TRIPS
EBL	0
EBT	0
EBR	0
WBL	0
WBT	0
WBR	0
NBL	5
NBT	12
NBR	0
SBL	0
SBT	12
SBR	0
5: Lowell Road at Flagstone Drive/Wason Road	
Movement	TRIPS
EBL	0
EBT	0
EBR	1
WBL	0
WBT	0
WBR	0
NBL	14
NBT	17
NBR	0
SBL	0
SBT	12
SBR	0
4: Lowell Road at Sagamore Bridge	
Movement	TRIPS
EBL	26
EBR	0
NBL	0
NBT	5
SBT	2
SBR	10

PM TOTAL: 55	
6: Lowell Road at Hampshire Drive/Oblate Drive	
Movement	TRIPS
EBL	0
EBT	0
EBR	0
WBL	0
WBT	0
WBR	0
NBL	1
NBT	6
NBR	0
SBL	0
SBT	33
SBR	0
5: Lowell Road at Flagstone Drive/Wason Road	
Movement	TRIPS
EBL	0
EBT	0
EBR	0
WBL	0
WBT	0
WBR	0
NBL	7
NBT	7
NBR	0
SBL	0
SBT	33
SBR	0
4: Lowell Road at Sagamore Bridge	
Movement	TRIPS
EBL	12
EBR	0
NBL	0
NBT	2
SBT	5
SBR	28

APPENDIX D

Heavy Vehicle Volumes
AM Peak data

AM Peak Hour	Counted			Proposed		
	AM %Heavy	2022 Build Langan	AM Heavy	AM Heavy Vehicles	2022 Build	AM % Heavy
				<i>Proposed</i>		
9: Lowell Road at Pelham Road						
<u>Movement</u>						
WBL	1%	232	2.3	0	232	1%
WBR	6%	73	4.4	0	73	6%
NBT	5%	500	25.0	1	520	5%
NBR	3%	84	2.5	0	84	3%
SBL	5%	64	3.2	0	64	5%
SBT	2%	1108	22.2	1	1118	2%
8: Lowell Road at Fox Hollow Drive						
<u>Movement</u>						
EBL	5%	11	0.6	0	11	5%
EBT	0%	0	0.0	0	0	-
EBR	2%	48	1.0	0	48	2%
WBL	0%	6	0.0	0	6	0%
WBT	0%	0	0.0	0	0	-
WBR	0%	10	0.0	0	10	0%
NBL	0%	4	0.0	0	4	0%
NBT	4%	566	22.6	1	586	4%
NBR	0%	1	0.0	0	1	0%
SBL	0%	16	0.0	0	16	0%
SBT	2%	1317	26.3	1	1327	2%
SBR	0%	3	0.0	0	3	0%
10: Lowell Road at Friars Road (Site Access)						
<u>Movement</u>						
EBR	0%	0	0.0	0	23	0%
NBT	4%	592	23.7	1	612	4%
SBT	2%	1361	27.2	0	1361	2%
SBR	0%	0	0.0	1	10	10%
7: Lowell Road at Executive Drive/Private Driveway						
<u>Movement</u>						
EBL	12%	36	4.3	1	56	9%
EBT	0%	2	0.0	0	2	0%
EBR	14%	10	1.4	4	22	25%
WBL	1%	141	1.4	0	141	1%
WBT	0%	30	0.0	0	30	0%
WBR	3%	101	3.0	0	101	3%
NBL	2%	164	3.3	4	179	4%
NBT	4%	455	18.2	0	455	4%
NBR	3%	60	1.8	0	60	3%
SBL	1%	107	1.1	0	107	1%
SBT	2%	1051	21.0	0	1074	2%
SBR	2%	203	4.1	0	203	2%

Heavy Vehicle Volumes
AM Peak data

AM Peak Hour	Counted			Proposed		
	AM %Heavy	2022 Build Langan	AM Heavy	AM Heavy Vehicles	2022 Build	AM % Heavy
6: Lowell Road at Hampshire Drive/Oblate Drive						
<u>Movement</u>						
EBL	5%	8	0.4	0	8	5%
EBT	0%	0	0.0	0	0	-
EBR	11%	11	1.2	0	11	11%
WBL	0%	2	0.0	0	2	0%
WBT	0%	2	0.0	0	2	0%
WBR	0%	4	0.0	0	4	0%
NBL	3%	116	3.5	0	121	3%
NBT	3%	778	23.3	4	793	3%
NBR	0%	2	0.0	0	2	0%
SBL	0%	2	0.0	0	2	0%
SBT	3%	1149	34.5	4	1184	3%
SBR	3%	59	1.8	0	59	3%
5: Lowell Road at Flagstone Drive/Wason Road						
<u>Movement</u>						
EBL	0%	65	0.0	0	65	0%
EBT	0%	28	0.0	0	28	0%
EBR	2%	282	5.6	1	298	2%
WBL	1%	614	6.1	0	614	1%
WBT	0%	41	0.0	0	41	0%
WBR	4%	30	1.2	0	30	4%
NBL	1%	303	3.0	1	323	1%
NBT	2%	811	16.2	4	831	2%
NBR	2%	188	3.8	0	188	2%
SBL	3%	15	0.5	0	15	3%
SBT	2%	1087	21.7	4	1122	2%
SBR	6%	10	0.6	0	10	6%
4: Lowell Road at Sagamore Bridge						
<u>Movement</u>						
EBL	2%	948	19.0	4	980	2%
EBR	4%	1095	43.8	0	1095	4%
NBL	4%	1038	41.5	0	1038	4%
NBT	2%	371	7.4	1	379	2%
SBT	2%	386	7.7	1	395	2%
SBR	3%	1517	45.5	4	1558	3%

Heavy Vehicle Volumes
PM Peak data

PM Peak Hour	Counted			Proposed		
	PM %Heavy	2022 Build Langan	PM Heavy	PM Heavy Vehicles	2022 Build	PM % Heavy
				<i>Proposed</i>		
9: Lowell Road at Pelham Road						
<u>Movement</u>						
WBL	0%	86	0.0	0	86	0%
WBR	0%	142	0.0	0	142	0%
NBT	1%	1155	11.6	0	1171	1%
NBR	0%	109	0.0	0	109	0%
SBL	0%	110	0.0	0	110	0%
SBT	1%	714	7.1	0	732	1%
8: Lowell Road at Fox Hollow Drive						
<u>Movement</u>						
EBL	0%	9	0.0	0	9	0%
EBT	0%	2	0.0	0	2	0%
EBR	2%	25	0.5	0	25	2%
WBL	0%	31	0.0	0	31	0%
WBT	0%	0	0.0	0	0	-
WBR	0%	48	0.0	0	48	0%
NBL	0%	27	0.0	0	27	0%
NBT	1%	1215	12.2	0	1231	1%
NBR	0%	15	0.0	0	15	0%
SBL	0%	56	0.0	0	56	0%
SBT	1%	724	7.2	0	742	1%
SBR	0%	11	0.0	0	11	0%
10: Lowell Road at Friars Road (Site Access)						
<u>Movement</u>						
EBR	0%	0	0.0	0	36	0%
NBT	1%	1277	12.8	0	1293	1%
SBT	1%	772	7.7	0	772	1%
SBR	0%	0	0.0	0	18	0%
7: Lowell Road at Executive Drive/Private Driveway						
<u>Movement</u>						
EBL	1%	225	2.3	0	241	1%
EBT	0%	3	0.0	0	3	0%
EBR	2%	79	1.6	2	82	4%
WBL	0%	23	0.0	0	23	0%
WBT	0%	2	0.0	0	2	0%
WBR	3%	22	0.7	0	22	3%
NBL	4%	52	2.1	2	62	7%
NBT	1%	1030	10.3	0	1030	1%
NBR	0%	7	0.0	0	7	0%
SBL	6%	16	1.0	0	16	6%
SBT	1%	716	7.2	0	752	1%
SBR	4%	40	1.6	0	40	4%

Heavy Vehicle Volumes
PM Peak data

PM Peak Hour	Counted			Proposed		
	PM %Heavy	2022 Build Langan	PM Heavy	PM Heavy Vehicles	2022 Build	PM % Heavy
6: Lowell Road at Hampshire Drive/Oblate Drive						
<u>Movement</u>						
EBL	0%	26	0.0	0	26	0%
EBT	0%	2	0.0	0	2	0%
EBR	2%	105	2.1	0	105	2%
WBL	0%	10	0.0	0	10	0%
WBT	0%	1	0.0	0	1	0%
WBR	0%	4	0.0	0	4	0%
NBL	4%	16	0.6	0	17	4%
NBT	1%	1122	11.2	2	1132	1%
NBR	0%	12	0.0	0	12	0%
SBL	0%	5	0.0	0	5	0%
SBT	1%	872	8.7	2	911	1%
SBR	0%	7	0.0	0	7	0%
5: Lowell Road at Flagstone Drive/Wason Road						
<u>Movement</u>						
EBL	0%	52	0.0	0	52	0%
EBT	0%	92	0.0	0	92	0%
EBR	1%	433	4.3	0	434	1%
WBL	0%	435	0.0	0	435	0%
WBT	0%	17	0.0	0	17	0%
WBR	1%	28	0.3	0	28	1%
NBL	1%	137	1.4	0	151	1%
NBT	1%	1060	10.6	2	1071	1%
NBR	0%	988	0.0	0	988	0%
SBL	0%	72	0.0	0	72	0%
SBT	1%	897	9.0	2	936	1%
SBR	0%	5	0.0	0	5	0%
4: Lowell Road at Sagamore Bridge						
<u>Movement</u>						
EBL	1%	1479	14.8	2	1498	1%
EBR	2%	1467	29.3	0	1467	2%
NBL	1%	1331	13.3	0	1331	1%
NBT	0%	684	0.0	0	689	0%
SBT	0%	500	0.0	0	506	0%
SBR	1%	1233	12.3	2	1266	1%

APPENDIX E

Proposed Trip Generation - Other Developments: 81 Residential Units at Friars Drive

ITE Trip Generation Manual, 10th Edition

Setting/Location: General Urban/Suburban

ITE LUC 221 - Multifamily (Mid-Rise): 81 units (2-buildings) per VHB Memo 4/23/2019

Time Period	Trip Ends	Directional	
		In	Out
Weekday AM Peak Hour Adjacent Street	30	8	22
Weekday PM Peak Hour Adjacent Street	36	22	14

Distribution - Other Development: Residential 81 Units

AM: 68% NB, 32% SB
NB ENTER: 35% use Exec. Dr, 65% use Flagstone Dr
SB ENTER: All at Friars Dr
SB EXIT: All at Friars, NB EXIT: All at Executive Dr

PM: 38% NB, 62% SB
NB ENTER: 35% use Exec. Dr, 65% use Flagstone Dr
SB ENTER: All at Friars Dr
SB EXIT: All at Friars, NB EXIT: All at Executive Dr

AM Distribution

PM Distribution

	In	Out
AM Totals	8	22

	In	Out
PM Totals	22	14

Lowell Road at Pelham Road				
Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
WBL			0	0
WBR			0	0
NBT		32%	0	7
NBR			0	0
SBL			0	0
SBT	32%		3	0

Lowell Road at Pelham Road				
Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
WBL			0	0
WBR			0	0
NBT		62%	0	9
NBR			0	0
SBL			0	0
SBT	62%		14	0

Lowell Road at Fox Hollow Drive				
Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL			0	0
EBT			0	0
EBR			0	0
WBL			0	0
WBT			0	0
WBR			0	0
NBL			0	0
NBT		32%	0	7
NBR			0	0
SBL			0	0
SBT	32%		3	0
SBR			0	0

Lowell Road at Fox Hollow Drive				
Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL			0	0
EBT			0	0
EBR			0	0
WBL			0	0
WBT			0	0
WBR			0	0
NBL			0	0
NBT		62%	0	9
NBR			0	0
SBL			0	0
SBT	62%		14	0
SBR			0	0

Lowell Road at Friars Road (Site Access)				
Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBR		68%	0	15
NBT		32%	0	7
SBT			0	0
SBR	32%		3	0

Lowell Road at Friars Road (Site Access)				
Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBR		38%	0	5
NBT		62%	0	9
SBT			0	0
SBR	62%		14	0

Distribution - Other Development: Residential 81 Units						
AM: 68% NB, 32% SB NB ENTER: 35% use Exec. Dr, 65% use Flagstone Dr SB ENTER: All at Friars Dr SB EXIT: All at Friars, NB EXIT: All at Executive Dr			PM: 38% NB, 62% SB NB ENTER: 35% use Exec. Dr, 65% use Flagstone Dr SB ENTER: All at Friars Dr SB EXIT: All at Friars, NB EXIT: All at Executive Dr			
AM Distribution			PM Distribution			
		In	Out			
AM Totals		8	22	PM Totals 22 14		
Lowell Road at Executive Drive/Private Driveway						
PERCENTAGES TRIPS						
Movement	In	Out	In	Out		
EBL		32%	0	7		
EBT			0	0		
EBR			0	0		
WBL			0	0		
WBT			0	0		
WBR			0	0		
NBL	24%		2	0		
NBT			0	0		
NBR			0	0		
SBL			0	0		
SBT		68%	0	15		
SBR			0	0		
Lowell Road at Hampshire Drive/Oblate Drive						
PERCENTAGES TRIPS						
Movement	In	Out	In	Out		
EBL			0	0		
EBT			0	0		
EBR			0	0		
WBL			0	0		
WBT			0	0		
WBR			0	0		
NBL			0	0		
NBT	24%		2	0		
NBR			0	0		
SBL			0	0		
SBT		68%	0	15		
SBR			0	0		
Lowell Road at Flagstone Drive/Wason Road						
PERCENTAGES TRIPS						
Movement	In	Out	In	Out		
EBL			0	0		
EBT			0	0		
EBR			0	0		
WBL			0	0		
WBT			0	0		
WBR			0	0		
NBL	44%		4	0		
NBT	24%		2	0		
NBR			0	0		
SBL			0	0		
SBT		68%	0	15		
SBR			0	0		
Lowell Road at Sagamore Bridge						
PERCENTAGES TRIPS						
Movement	In	Out	In	Out		
EBL	50%		4	0		
EBR			0	0		
NBL			0	0		
NBT	18%		2	0		
SBT		12%	0	3		
Lowell Road at Executive Drive/Private Driveway						
PERCENTAGES TRIPS						
Movement	In	Out	In	Out		
EBL		62%	0	9		
EBT			0	0		
EBR			0	0		
WBL			0	0		
WBT			0	0		
WBR			0	0		
NBL	13%		3	0		
NBT			0	0		
NBR			0	0		
SBL			0	0		
SBT		38%	0	5		
SBR			0	0		
Lowell Road at Hampshire Drive/Oblate Drive						
PERCENTAGES TRIPS						
Movement	In	Out	In	Out		
EBL			0	0		
EBT			0	0		
EBR			0	0		
WBL			0	0		
WBT			0	0		
WBR			0	0		
NBL			0	0		
NBT	13%		3	0		
NBR			0	0		
SBL			0	0		
SBT		38%	0	5		
SBR			0	0		
Lowell Road at Flagstone Drive/Wason Road						
PERCENTAGES TRIPS						
Movement	In	Out	In	Out		
EBL			0	0		
EBT			0	0		
EBR			0	0		
WBL			0	0		
WBT			0	0		
WBR			0	0		
NBL	25%		6	0		
NBT	13%		3	0		
NBR			0	0		
SBL			0	0		
SBT		38%	0	5		
SBR			0	0		
Lowell Road at Sagamore Bridge						
PERCENTAGES TRIPS						
Movement	In	Out	In	Out		
EBL	27%		6	0		
EBR			0	0		
NBL			0	0		
NBT	11%		3	0		
SBT		7%	0	1		

Distribution - Other Development: Residential 81 Units	
AM: 68% NB, 32% SB NB ENTER: 35% use Exec. Dr, 65% use Flagstone Dr SB ENTER: All at Friars Dr SB EXIT: All at Friars, NB EXIT: All at Executive Dr	PM: 38% NB, 62% SB NB ENTER: 35% use Exec. Dr, 65% use Flagstone Dr SB ENTER: All at Friars Dr SB EXIT: All at Friars, NB EXIT: All at Executive Dr

AM Distribution			
		In	Out
AM Totals		8	22
SBR	56%	0	12

**ProRata per Langan*

PM Distribution			
		In	Out
PM Totals		22	14
SBR	31%	0	4

**ProRata per Langan*

Proposed Trip Generation - Other Developments: 36 Executive Drive Expansion

ITE Trip Generation Manual, 10th Edition

Setting/Location: General Urban/Suburban

100,000 sf Warehouse per Pernaw Memo 9/29/2020:

Manual derivation based on 3 work shifts, 30 employees per shift, 22 active loading docks (Case C)

Time Period	Trip Ends	Directional	
		In	Out
Weekday AM Peak Hour Adjacent Street	36	3	33
Weekday PM Peak Hour Adjacent Street	8	4	4

Distribution - Other Developments: 36 Executive Drive Expansion

AM: 68% NB, 32% SB
ENTER/EXIT: 35% use Executive Dr, 65% use Flagstone Dr

PM: 38% NB, 62% SB
ENTER/EXIT: 35% use Executive Dr, 65% use Flagstone Dr

AM Distribution

PM Distribution

	In	Out
AM Totals	3	33

	In	Out
PM Totals	4	4

Lowell Road at Pelham Road				
Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
WBL			0	0
WBR			0	0
NBT		32%	0	11
NBR			0	0
SBL			0	0
SBT	32%		1	0

Lowell Road at Pelham Road				
Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
WBL			0	0
WBR			0	0
NBT		62%	0	2
NBR			0	0
SBL			0	0
SBT	62%		2	0

Lowell Road at Fox Hollow Drive				
Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL			0	0
EBT			0	0
EBR			0	0
WBL			0	0
WBT			0	0
WBR			0	0
NBL			0	0
NBT		32%	0	11
NBR			0	0
SBL			0	0
SBT	32%		1	0
SBR			0	0

Lowell Road at Fox Hollow Drive				
Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBL			0	0
EBT			0	0
EBR			0	0
WBL			0	0
WBT			0	0
WBR			0	0
NBL			0	0
NBT		62%	0	2
NBR			0	0
SBL			0	0
SBT	62%		2	0
SBR			0	0

Lowell Road at Friars Road (Site Access)				
Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBR			0	0
NBT		32%	0	11
SBT			0	0
SBR	32%		1	0

Lowell Road at Friars Road (Site Access)				
Movement	PERCENTAGES		TRIPS	
	In	Out	In	Out
EBR			0	0
NBT		62%	0	2
SBT			0	0
SBR	62%		2	0

Distribution - Other Developments: 36 Executive Drive Expansion													
AM: 68% NB, 32% SB ENTER/EXIT: 35% use Executive Dr, 65% use Flagstone Dr			PM: 38% NB, 62% SB ENTER/EXIT: 35% use Executive Dr, 65% use Flagstone Dr										
AM Distribution			PM Distribution										
<table border="1" style="width:100%; border-collapse: collapse;"> <tr><td style="text-align: right;">In</td><td style="text-align: center;">Out</td></tr> <tr><td style="text-align: right;">AM Totals</td><td style="text-align: center;">3 33</td></tr> </table>			In	Out	AM Totals	3 33	<table border="1" style="width:100%; border-collapse: collapse;"> <tr><td style="text-align: right;">In</td><td style="text-align: center;">Out</td></tr> <tr><td style="text-align: right;">PM Totals</td><td style="text-align: center;">4 4</td></tr> </table>			In	Out	PM Totals	4 4
In	Out												
AM Totals	3 33												
In	Out												
PM Totals	4 4												
Lowell Road at Executive Drive/Private Driveway													
		PERCENTAGES		TRIPS									
Movement	In	Out	In	Out									
EBL		32%	0	11									
EBT			0	0									
EBR		24%	0	8									
WBL			0	0									
WBT			0	0									
WBR			0	0									
NBL	24%		1	0									
NBT			0	0									
NBR			0	0									
SBL			0	0									
SBT			0	0									
SBR			0	0									
Lowell Road at Hampshire Drive/Oblate Drive													
		PERCENTAGES		TRIPS									
Movement	In	Out	In	Out									
EBL			0	0									
EBT			0	0									
EBR			0	0									
WBL			0	0									
WBT			0	0									
WBR			0	0									
NBL			0	0									
NBT	24%		1	0									
NBR			0	0									
SBL			0	0									
SBT		24%	0	8									
SBR			0	0									
Lowell Road at Flagstone Drive/Wason Road													
		PERCENTAGES		TRIPS									
Movement	In	Out	In	Out									
EBL			0	0									
EBT			0	0									
EBR		44%	0	15									
WBL			0	0									
WBT			0	0									
WBR			0	0									
NBL	44%		2	0									
NBT	24%		1	0									
NBR			0	0									
SBL			0	0									
SBT		24%	0	8									
SBR			0	0									
Lowell Road at Sagamore Bridge													
		PERCENTAGES		TRIPS									
Movement	In	Out	In	Out									
EBL	50%		2	0									
EBR			0	0									
NBL			0	0									
NBT	18%		1	0									
SBT		12%	0	4									
Lowell Road at Hampshire Drive/Oblate Drive													
		PERCENTAGES		TRIPS									
Movement	In	Out	In	Out									
EBL			0	0									
EBT			0	0									
EBR			0	0									
WBL			0	0									
WBT			0	0									
WBR			0	0									
NBL			0	0									
NBT	13%		1	0									
NBR			0	0									
SBL			0	0									
SBT		13%	0	1									
SBR			0	0									
Lowell Road at Flagstone Drive/Wason Road													
		PERCENTAGES		TRIPS									
Movement	In	Out	In	Out									
EBL			0	0									
EBT			0	0									
EBR		25%	0	1									
WBL			0	0									
WBT			0	0									
WBR			0	0									
NBL	25%		1	0									
NBT	13%		1	0									
NBR			0	0									
SBL			0	0									
SBT		13%	0	1									
SBR			0	0									
Lowell Road at Sagamore Bridge													
		PERCENTAGES		TRIPS									
Movement	In	Out	In	Out									
EBL	27%		1	0									
EBR			0	0									
NBL			0	0									
NBT	11%		0	0									
SBT		7%	0	0									

Distribution - Other Developments: 36 Executive Drive Expansion

AM: 68% NB, 32% SB
 ENTER/EXIT: 35% use Executive Dr, 65% use Flagstone Dr

PM: 38% NB, 62% SB
 ENTER/EXIT: 35% use Executive Dr, 65% use Flagstone Dr

AM Distribution

PM Distribution

	In	Out
AM Totals	3	33
SBR	56%	0 19

	In	Out
PM Totals	4	4
SBR	31%	0 1

**ProRata per Langan*

**ProRata per Langan*

SP #10-21 - Friars Drive Industrial Facility - Attachment C

Other Development
Trips
AM Peak Hour

XX Friars Rd Residential
XX 36 Executive Warehouse

1 0
3 0
↓ ↘

0 1 0
0 3 0
↙ ↓ ↘

Lowell Rd
↑ 0 0
↓ 0 0

Pelham Road
↑ ↘
7 0
11 0

Lowell Road
↑ 0 0
← 0 0
↓ 0 0

Fox Hollow Drive
0 0 ↑
0 0 →
0 0 ↓

Fox Hollow Drive (Plaza)
← ↑ ↘
0 7 0
0 11 0

Residential
1 0
3 0
↙ ↓

Warehouse

Executive
Friars Road
0 15 ↓
0 0 0
0 15 0
↙ ↓ ↘

↑
7
11

↙ 0 0
← 0 0
↓ 0 0

Executive Drive
11 7 ↑
0 0 →
8 0 ↓
0 8 0
0 15 0
↙ ↓ ↘

Private Driveway

↙ ↑ ↘
2 0 0
1 0 0

↙ 0 0
← 0 0
↓ 0 0

Hampshire
Hampshire Drive
0 0 ↑
0 0 →
0 0 ↓
0 8 0
0 15 0
↙ ↓ ↘

Oblate Drive

↙ ↑ ↘
0 2 0
0 1 0

↙ 0 0
← 0 0
↓ 0 0

Flagstone
Flagstone Drive
0 0 ↑
0 0 →
15 0 ↓
19 4
12 3
↙ ↓

Wason Road

↙ ↑ ↘
4 2 0
2 1 0

Lowell Road

Sagamore Bridge
2 4 ↑
0 0 ↓

↙ ↑
0 2
0 1

APPENDIX F

Background Traffic Volumes

AM Peak data

AM Peak Hour	Figure 8	Figure 9	Langan Report:	
	Langan Report: 2022 Build Peak-Hour Traffic Volumes	Langan Report: 2032 Build Peak-Hour Traffic Volumes	AM PHF	% HV
9: Lowell Road at Pelham Road				
<u>Movement</u>				
WBL	232	256		
WBR	73	81	0.88	6%
NBT	500	547		5%
NBR	84	93	0.92	3%
SBL	64	71		5%
SBT	1108	1216	0.96	2%
8: Lowell Road at Fox Hollow Drive				
<u>Movement</u>				
EBL	11	11		5%
EBT	0	0	0.80	0%
EBR	48	48		2%
WBL	6	6		0%
WBT	0	0	0.80	0%
WBR	10	10		0%
NBL	4	4		0%
NBT	566	620	0.91	4%
NBR	1	1		0%
SBL	16	16		0%
SBT	1317	1447	0.95	2%
SBR	3	3		0%
10: Lowell Road at Friars Road (Site Access)				
<i>Calculated from Executive Drive Int.</i>				
<u>Movement</u>				
EBR	0	0	0.90	0%
NBT	592	638	0.90	4%
SBT	1361	1485	0.90	2%
SBR	0	0		0%
7: Lowell Road at Executive Drive/Private Driveway				
<u>Movement</u>				
EBL	36	40		12%
EBT	2	2	0.80	0%
EBR	10	11		14%
WBL	141	141		1%
WBT	30	30	0.80	0%
WBR	101	101		3%
NBL	164	181		2%
NBT	455	497	0.91	4%
NBR	60	60		3%
SBL	107	107		1%
SBT	1051	1154	0.91	2%
SBR	203	224		2%

Background Traffic Volumes

AM Peak data

AM Peak Hour	Figure 8	Figure 9	Langan Report:	
	Langan Report: 2022 Build Peak-Hour Traffic Volumes	Langan Report: 2032 Build Peak-Hour Traffic Volumes	AM PHF	% HV
6: Lowell Road at Hampshire Drive/Oblate Drive				
<u>Movement</u>				
EBL	8	9		5%
EBT	0	0	0.80	0%
EBR	11	13		11%
WBL	2	2		0%
WBT	2	2	0.80	0%
WBR	4	5		0%
NBL	116	129		3%
NBT	778	854	0.90	3%
NBR	2	2		0%
SBL	2	2		0%
SBT	1149	1262	0.83	3%
SBR	59	65		3%
5: Lowell Road at Flagstone Drive/Wason Road				
<u>Movement</u>				
EBL	65	67		0%
EBT	28	29	0.81	0%
EBR	282	303		2%
WBL	614	677		1%
WBT	41	45	0.94	0%
WBR	30	33		4%
NBL	303	328		1%
NBT	811	895	0.95	2%
NBR	188	208		2%
SBL	15	17		3%
SBT	1087	1194	0.87	2%
SBR	10	11		6%
4: Lowell Road at Sagamore Bridge				
<u>Movement</u>				
EBL	948	1045	0.94	2%
EBR	1095	1184		4%
NBL	1038	1131		4%
NBT	371	405	0.92	2%
SBT	386	420		2%
SBR	1517	1673	0.92	3%

AM Peak Hour	2022 (Langan Build)	Other Developments (Friars Rd Res. and 36 Exec. Dr Wrhs)	2022 No-Build	Site Trip Distribution	2022 Build	AM BUILD % HV
9: Lowell Road at Pelham Road						
<u>Movement</u>						
WBL	232	0	232	0	232	1%
WBR	73	0	73	0	73	6%
NBT	500	18	518	2	520	5%
NBR	84	0	84	0	84	3%
SBL	64	0	64	0	64	5%
SBT	1108	4	1112	6	1118	2%
8: Lowell Road at Fox Hollow Drive						
<u>Movement</u>						
EBL	11	0	11	0	11	5%
EBT	0	0	0	0	0	-
EBR	48	0	48	0	48	2%
WBL	6	0	6	0	6	0%
WBT	0	0	0	0	0	-
WBR	10	0	10	0	10	0%
NBL	4	0	4	0	4	0%
NBT	566	18	584	2	586	4%
NBR	1	0	1	0	1	0%
SBL	16	0	16	0	16	0%
SBT	1317	4	1321	6	1327	2%
SBR	3	0	3	0	3	0%
10: Lowell Road at Friars Road (Site Access)						
<u>Movement</u>						
EBR	0	15	15	8	23	0%
NBT	592	18	610	2	612	4%
SBT	1361	0	1361	0	1361	2%
SBR	0	4	4	6	10	10%
7: Lowell Road at Executive Drive/Private Driveway						
<u>Movement</u>						
EBL	36	18	54	2	56	9%
EBT	2	0	2	0	2	0%
EBR	10	8	18	4	22	25%
WBL	141	0	141	0	141	1%
WBT	30	0	30	0	30	0%
WBR	101	0	101	0	101	3%
NBL	164	3	167	12	179	4%
NBT	455	0	455	0	455	4%
NBR	60	0	60	0	60	3%
SBL	107	0	107	0	107	1%
SBT	1051	15	1066	8	1074	2%
SBR	203	0	203	0	203	2%

AM Peak Hour	2022 (Langan Build)	Other Developments (Friars Rd Res. and 36 Exec. Dr Wrhs)	2022 No-Build	Site Trip Distribution	2022 Build	AM BUILD % HV
6: Lowell Road at Hampshire Drive/Oblate Drive						
<u>Movement</u>						
EBL	8	0	8	0	8	5%
EBT	0	0	0	0	0	-
EBR	11	0	11	0	11	11%
WBL	2	0	2	0	2	0%
WBT	2	0	2	0	2	0%
WBR	4	0	4	0	4	0%
NBL	116	0	116	5	121	3%
NBT	778	3	781	12	793	3%
NBR	2	0	2	0	2	0%
SBL	2	0	2	0	2	0%
SBT	1149	23	1172	12	1184	3%
SBR	59	0	59	0	59	3%
5: Lowell Road at Flagstone Drive/Wason Road						
<u>Movement</u>						
EBL	65	0	65	0	65	0%
EBT	28	0	28	0	28	0%
EBR	282	15	297	1	298	2%
WBL	614	0	614	0	614	1%
WBT	41	0	41	0	41	0%
WBR	30	0	30	0	30	4%
NBL	303	6	309	14	323	1%
NBT	811	3	814	17	831	2%
NBR	188	0	188	0	188	2%
SBL	15	0	15	0	15	3%
SBT	1087	23	1110	12	1122	2%
SBR	10	0	10	0	10	6%
4: Lowell Road at Sagamore Bridge						
<u>Movement</u>						
EBL	948	6	954	26	980	2%
EBR	1095	0	1095	0	1095	4%
NBL	1038	0	1038	0	1038	4%
NBT	371	3	374	5	379	2%
SBT	386	7	393	2	395	2%
SBR	1517	31	1548	10	1558	3%

AM Peak Hour	2032 (Langan Build)	Other Developments (Friars Rd Res. and 36 Exec. Dr Wrhs)	2032 No-Build	Site Trip Distribution	2032 Build	AM BUILD % HV
9: Lowell Road at Pelham Road						
<u>Movement</u>						
WBL	256	0	256	0	256	1%
WBR	81	0	81	0	81	6%
NBT	547	18	565	2	567	5%
NBR	93	0	93	0	93	3%
SBL	71	0	71	0	71	5%
SBT	1216	4	1220	6	1226	2%
8: Lowell Road at Fox Hollow Drive						
<u>Movement</u>						
EBL	11	0	11	0	11	5%
EBT	0	0	0	0	0	-
EBR	48	0	48	0	48	2%
WBL	6	0	6	0	6	0%
WBT	0	0	0	0	0	-
WBR	10	0	10	0	10	0%
NBL	4	0	4	0	4	0%
NBT	620	18	638	2	640	4%
NBR	1	0	1	0	1	0%
SBL	16	0	16	0	16	0%
SBT	1447	4	1451	6	1457	2%
SBR	3	0	3	0	3	0%
10: Lowell Road at Friars Road (Site Access)						
<u>Movement</u>						
EBR	0	15	15	8	23	0%
NBT	638	18	656	2	658	4%
SBT	1485	0	1485	0	1485	2%
SBR	0	4	4	6	10	10%
7: Lowell Road at Executive Drive/Private Driveway						
<u>Movement</u>						
EBL	40	18	58	2	60	9%
EBT	2	0	2	0	2	0%
EBR	11	8	19	4	23	25%
WBL	141	0	141	0	141	1%
WBT	30	0	30	0	30	0%
WBR	101	0	101	0	101	3%
NBL	181	3	184	12	196	4%
NBT	497	0	497	0	497	4%
NBR	60	0	60	0	60	3%
SBL	107	0	107	0	107	1%
SBT	1154	15	1169	8	1177	2%
SBR	224	0	224	0	224	2%

AM Peak Hour	2032 (Langan Build)	Other Developments (Friars Rd Res. and 36 Exec. Dr Wrhs)	2032 No-Build	Site Trip Distribution	2032 Build	AM BUILD % HV
6: Lowell Road at Hampshire Drive/Oblate Drive						
<u>Movement</u>						
EBL	9	0	9	0	9	5%
EBT	0	0	0	0	0	-
EBR	13	0	13	0	13	11%
WBL	2	0	2	0	2	0%
WBT	2	0	2	0	2	0%
WBR	5	0	5	0	5	0%
NBL	129	0	129	5	134	3%
NBT	854	3	857	12	869	3%
NBR	2	0	2	0	2	0%
SBL	2	0	2	0	2	0%
SBT	1262	23	1285	12	1297	3%
SBR	65	0	65	0	65	3%
5: Lowell Road at Flagstone Drive/Wason Road						
<u>Movement</u>						
EBL	67	0	67	0	67	0%
EBT	29	0	29	0	29	0%
EBR	303	15	318	1	319	2%
WBL	677	0	677	0	677	1%
WBT	45	0	45	0	45	0%
WBR	33	0	33	0	33	4%
NBL	328	6	334	14	348	1%
NBT	895	3	898	17	915	2%
NBR	208	0	208	0	208	2%
SBL	17	0	17	0	17	3%
SBT	1194	23	1217	12	1229	2%
SBR	11	0	11	0	11	6%
4: Lowell Road at Sagamore Bridge						
<u>Movement</u>						
EBL	1045	6	1051	26	1077	2%
EBR	1184	0	1184	0	1184	4%
NBL	1131	0	1131	0	1131	4%
NBT	405	3	408	5	413	2%
SBT	420	7	427	2	429	2%
SBR	1673	31	1704	10	1714	3%

Background Traffic Volumes

PM Peak data

PM Peak Hour	Figure 8	Figure 9	Langan Report:	
	Langan Report: 2022 Build Peak-Hour Traffic Volumes	Langan Report: 2032 Build Peak-Hour Traffic Volumes	PM PHF	PM % HV
9: Lowell Road at Pelham Road				
<u>Movement</u>				
WBL	86	94	0.87	0%
WBR	142	157		0%
NBT	1155	1269	0.98	1%
NBR	109	121		0%
SBL	110	122	0.89	0%
SBT	714	782		1%
8: Lowell Road at Fox Hollow Drive				
<u>Movement</u>				
EBL	9	9	0.80	0%
EBT	2	2		0%
EBR	25	25	0.80	2%
WBL	31	31		0%
WBT	0	0	0.80	0%
WBR	48	48		0%
NBL	27	27	0.99	0%
NBT	1215	1355		1%
NBR	15	15	0.94	0%
SBL	56	56		0%
SBT	724	793	0.94	1%
SBR	11	11		0%
10: Lowell Road at Friars Road (Site Access)				
<i>Calculated from Executive Drive Int.</i>				
<u>Movement</u>				
EBR	0	0	0.90	0%
NBT	1277	1401		1%
SBT	772	844	0.90	1%
SBR	0	0		0%
7: Lowell Road at Executive Drive/Private Driveway				
<u>Movement</u>				
EBL	225	248	0.80	1%
EBT	3	3		0%
EBR	79	89	0.80	2%
WBL	23	23		0%
WBT	2	2	0.80	0%
WBR	22	22		3%
NBL	52	57	0.97	4%
NBT	1030	1131		1%
NBR	7	7	0.92	0%
SBL	16	16		6%
SBT	716	784	0.92	1%
SBR	40	44		4%

Background Traffic Volumes

PM Peak data

PM Peak Hour	Figure 8	Figure 9	Langan Report:	
	Langan Report: 2022 Build Peak-Hour Traffic Volumes	Langan Report: 2032 Build Peak-Hour Traffic Volumes	PM PHF	PM % HV
6: Lowell Road at Hampshire Drive/Oblate Drive				
<u>Movement</u>				
EBL	26	28		0%
EBT	2	2	0.80	0%
EBR	105	116		2%
WBL	10	11		0%
WBT	1	1	0.80	0%
WBR	4	5		0%
NBL	16	18		4%
NBT	1122	1232	0.95	1%
NBR	12	14		0%
SBL	5	6		0%
SBT	872	956	0.87	1%
SBR	7	8		0%
5: Lowell Road at Flagstone Drive/Wason Road				
<u>Movement</u>				
EBL	52	54		0%
EBT	92	98	0.80	0%
EBR	433	474		1%
WBL	435	479		0%
WBT	17	19	0.9	0%
WBR	28	31		1%
NBL	137	146		1%
NBT	1060	1167	0.94	1%
NBR	988	1093		0%
SBL	72	80		0%
SBT	897	985	0.88	1%
SBR	5	5		0%
4: Lowell Road at Sagamore Bridge				
<u>Movement</u>				
EBL	1479	1633	0.96	1%
EBR	1467	1593		2%
NBL	1331	1442	0.94	1%
NBT	684	749		0%
SBT	500	546	0.89	0%
SBR	1233	1360		1%

PM Peak Hour	2022 (Langan Build)	Other Developments (Friars Rd Res. and 36 Exec. Dr Wrhs)	2022 No-Build	Site Trip Distribution	2022 Build	PM BUILD % HV
9: Lowell Road at Pelham Road						
<u>Movement</u>						
WBL	86	0	86	0	86	0%
WBR	142	0	142	0	142	0%
NBT	1155	11	1166	6	1172	1%
NBR	109	0	109	0	109	0%
SBL	110	0	110	0	110	0%
SBT	714	16	730	2	732	1%
8: Lowell Road at Fox Hollow Drive						
<u>Movement</u>						
EBL	9	0	9	0	9	0%
EBT	2	0	2	0	2	0%
EBR	25	0	25	0	25	2%
WBL	31	0	31	0	31	0%
WBT	0	0	0	0	0	-
WBR	48	0	48	0	48	0%
NBL	27	0	27	0	27	0%
NBT	1215	11	1226	6	1232	1%
NBR	15	0	15	0	15	0%
SBL	56	0	56	0	56	0%
SBT	724	16	740	2	742	1%
SBR	11	0	11	0	11	0%
10: Lowell Road at Friars Road (Site Access)						
<u>Movement</u>						
EBR	0	5	5	31	36	0%
NBT	1277	11	1288	6	1294	1%
SBT	772	0	772	0	772	1%
SBR	0	16	16	2	18	0%
7: Lowell Road at Executive Drive/Private Driveway						
<u>Movement</u>						
EBL	225	11	236	6	242	1%
EBT	3	0	3	0	3	0%
EBR	79	1	80	2	82	4%
WBL	23	0	23	0	23	0%
WBT	2	0	2	0	2	0%
WBR	22	0	22	0	22	3%
NBL	52	4	56	6	62	7%
NBT	1030	0	1030	0	1030	1%
NBR	7	0	7	0	7	0%
SBL	16	0	16	0	16	6%
SBT	716	5	721	31	752	1%
SBR	40	0	40	0	40	4%

PM Peak Hour	2022 (Langan Build)	Other Developments (Friars Rd Res. and 36 Exec. Dr Wrhs)	2022 No-Build	Site Trip Distribution	2022 Build	PM BUILD % HV
6: Lowell Road at Hampshire Drive/Oblate Drive						
<u>Movement</u>						
EBL	26	0	26	0	26	0%
EBT	2	0	2	0	2	0%
EBR	105	0	105	0	105	2%
WBL	10	0	10	0	10	0%
WBT	1	0	1	0	1	0%
WBR	4	0	4	0	4	0%
NBL	16	0	16	1	17	4%
NBT	1122	4	1126	6	1132	1%
NBR	12	0	12	0	12	0%
SBL	5	0	5	0	5	0%
SBT	872	6	878	33	911	1%
SBR	7	0	7	0	7	0%
5: Lowell Road at Flagstone Drive/Wason Road						
<u>Movement</u>						
EBL	52	0	52	0	52	0%
EBT	92	0	92	0	92	0%
EBR	433	1	434	0	434	1%
WBL	435	0	435	0	435	0%
WBT	17	0	17	0	17	0%
WBR	28	0	28	0	28	1%
NBL	137	7	144	7	151	1%
NBT	1060	4	1064	7	1071	1%
NBR	988	0	988	0	988	0%
SBL	72	0	72	0	72	0%
SBT	897	6	903	33	936	1%
SBR	5	0	5	0	5	0%
4: Lowell Road at Sagamore Bridge						
<u>Movement</u>						
EBL	1479	7	1486	12	1498	1%
EBR	1467	0	1467	0	1467	2%
NBL	1331	0	1331	0	1331	1%
NBT	684	3	687	2	689	0%
SBT	500	1	501	5	506	0%
SBR	1233	5	1238	28	1266	1%

PM Peak Hour	2032 (Langan Build)	Other Developments (Friars Rd Res. and 36 Exec. Dr Wrhs)	2032 No-Build	Site Trip Distribution	2032 Build	PM BUILD % HV
9: Lowell Road at Pelham Road						
<u>Movement</u>						
WBL	94	0	94	0	94	0%
WBR	157	0	157	0	157	0%
NBT	1269	11	1280	6	1286	1%
NBR	121	0	121	0	121	0%
SBL	122	0	122	0	122	0%
SBT	782	16	798	2	800	1%
8: Lowell Road at Fox Hollow Drive						
<u>Movement</u>						
EBL	9	0	9	0	9	0%
EBT	2	0	2	0	2	0%
EBR	25	0	25	0	25	2%
WBL	31	0	31	0	31	0%
WBT	0	0	0	0	0	-
WBR	48	0	48	0	48	0%
NBL	27	0	27	0	27	0%
NBT	1355	11	1366	6	1372	1%
NBR	15	0	15	0	15	0%
SBL	56	0	56	0	56	0%
SBT	793	16	809	2	811	1%
SBR	11	0	11	0	11	0%
10: Lowell Road at Friars Road (Site Access)						
<u>Movement</u>						
EBR	0	5	5	31	36	0%
NBT	1401	11	1412	6	1418	1%
SBT	844	0	844	0	844	1%
SBR	0	16	16	2	18	0%
7: Lowell Road at Executive Drive/Private Driveway						
<u>Movement</u>						
EBL	248	11	259	6	265	1%
EBT	3	0	3	0	3	0%
EBR	89	1	90	2	92	4%
WBL	23	0	23	0	23	0%
WBT	2	0	2	0	2	0%
WBR	22	0	22	0	22	3%
NBL	57	4	61	6	67	7%
NBT	1131	0	1131	0	1131	1%
NBR	7	0	7	0	7	0%
SBL	16	0	16	0	16	6%
SBT	784	5	789	31	820	1%
SBR	44	0	44	0	44	4%

PM Peak Hour	2032 (Langan Build)	Other Developments (Friars Rd Res. and 36 Exec. Dr Wrhs)	2032 No-Build	Site Trip Distribution	2032 Build	PM BUILD % HV
6: Lowell Road at Hampshire Drive/Oblate Drive						
<u>Movement</u>						
EBL	28	0	28	0	28	0%
EBT	2	0	2	0	2	0%
EBR	116	0	116	0	116	2%
WBL	11	0	11	0	11	0%
WBT	1	0	1	0	1	0%
WBR	5	0	5	0	5	0%
NBL	18	0	18	1	19	4%
NBT	1232	4	1236	6	1242	1%
NBR	14	0	14	0	14	0%
SBL	6	0	6	0	6	0%
SBT	956	6	962	33	995	1%
SBR	8	0	8	0	8	0%
5: Lowell Road at Flagstone Drive/Wason Road						
<u>Movement</u>						
EBL	54	0	54	0	54	0%
EBT	98	0	98	0	98	0%
EBR	474	1	475	0	475	1%
WBL	479	0	479	0	479	0%
WBT	19	0	19	0	19	0%
WBR	31	0	31	0	31	1%
NBL	146	7	153	7	160	1%
NBT	1167	4	1171	7	1178	1%
NBR	1093	0	1093	0	1093	0%
SBL	80	0	80	0	80	0%
SBT	985	6	991	33	1024	1%
SBR	5	0	5	0	5	0%
4: Lowell Road at Sagamore Bridge						
<u>Movement</u>						
EBL	1633	7	1640	12	1652	1%
EBR	1593	0	1593	0	1593	2%
NBL	1442	0	1442	0	1442	1%
NBT	749	3	752	2	754	0%
SBT	546	1	547	5	552	0%
SBR	1360	5	1365	28	1393	1%

APPENDIX G

4: 14/Lowell Road (3A) & Sagamore Bridge

2022 AM NoBuild.syn

Lanes, Volumes, Timings

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	954	1095	1038	374	393	1548
Future Volume (vph)	954	1095	1038	374	393	1548
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	12	12	12	12
Storage Length (ft)	0	0	525			200
Storage Lanes	2	1	2			1
Taper Length (ft)	25		100			
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Fr't		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3662	1656	4894	3539	3539	2760
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3662	1656	4894	3539	3539	2760
Right Turn on Red		No				Yes
Satd. Flow (RTOR)						1227
Link Speed (mph)	35			30	30	
Link Distance (ft)	929			1189	999	
Travel Time (s)	18.1			27.0	22.7	
Peak Hour Factor	0.94	0.94	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	4%	2%	2%	3%
Adj. Flow (vph)	1015	1165	1128	407	427	1683
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1015	1165	1128	407	427	1683
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Detector Phase	3		1	6	2	
Switch Phase						
Minimum Initial (s)	10.0		7.0	10.0	10.0	
Minimum Split (s)	16.0		15.0	17.0	17.0	
Total Split (s)	38.0		33.0	52.0	19.0	
Total Split (%)	42.2%		36.7%	57.8%	21.1%	
Maximum Green (s)	32.0		25.0	45.0	12.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		4.0	3.0	3.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		8.0	7.0	7.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Recall Mode	None		None	C-Min	C-Min	
Act Effct Green (s)	30.2	90.0	25.0	46.8	13.8	90.0
Actuated g/C Ratio	0.34	1.00	0.28	0.52	0.15	1.00
v/c Ratio	0.83	0.70	0.83	0.22	0.79	0.61
Control Delay	33.9	2.5	25.7	4.4	34.1	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.9	2.5	25.7	4.4	34.1	4.1
LOS	C	A	C	A	C	A

4: 14/Lowell Road (3A) & Sagamore Bridge

2022 AM NoBuild.syn

Lanes, Volumes, Timings

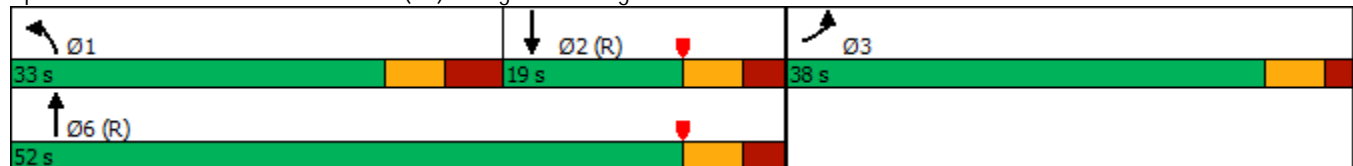


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	17.1			20.0	10.2	
Approach LOS	B			C	B	
Queue Length 50th (ft)	261	0	221	16	121	92
Queue Length 95th (ft)	337	0	231	12	m134	m101
Internal Link Dist (ft)	849			1109	919	
Turn Bay Length (ft)			525			200
Base Capacity (vph)	1302	1656	1377	1839	540	2760
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	0.78	0.70	0.82	0.22	0.79	0.61

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Offset:	0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
Natural Cycle:	70
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.83
Intersection Signal Delay:	15.4
Intersection LOS:	B
Intersection Capacity Utilization	74.5%
ICU Level of Service	D
Analysis Period (min)	15
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: 14/Lowell Road (3A) & Sagamore Bridge



4: 14/Lowell Road (3A) & Sagamore Bridge

2022 AM NoBuild.syn

HCM Signalized Intersection Capacity Analysis



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↖	↖↗↘	↕	↕	↖↗
Traffic Volume (vph)	954	1095	1038	374	393	1548
Future Volume (vph)	954	1095	1038	374	393	1548
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	14	14	12	12	12	12
Total Lost time (s)	6.0	4.0	8.0	7.0	7.0	4.0
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3662	1656	4894	3539	3539	2760
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3662	1656	4894	3539	3539	2760
Peak-hour factor, PHF	0.94	0.94	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1015	1165	1128	407	427	1683
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1015	1165	1128	407	427	1683
Heavy Vehicles (%)	2%	4%	4%	2%	2%	3%
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Actuated Green, G (s)	30.2	90.0	25.0	46.8	13.8	90.0
Effective Green, g (s)	30.2	90.0	25.0	46.8	13.8	90.0
Actuated g/C Ratio	0.34	1.00	0.28	0.52	0.15	1.00
Clearance Time (s)	6.0		8.0	7.0	7.0	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Lane Grp Cap (vph)	1228	1656	1359	1840	542	2760
v/s Ratio Prot	0.28		0.23	0.11	0.12	
v/s Ratio Perm		c0.70				0.61
v/c Ratio	0.83	0.70	0.83	0.22	0.79	0.61
Uniform Delay, d1	27.5	0.0	30.5	11.7	36.7	0.0
Progression Factor	1.00	1.00	0.66	0.34	0.73	1.00
Incremental Delay, d2	4.9	2.5	4.1	0.2	4.4	0.4
Delay (s)	32.4	2.5	24.1	4.2	31.4	0.4
Level of Service	C	A	C	A	C	A
Approach Delay (s)	16.4			18.9	6.7	
Approach LOS	B			B	A	
























Intersection Summary			
HCM 2000 Control Delay	13.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

5: Lowell Road (3A) & Flagstone Drive/Wason Road

2022 AM NoBuild.syn

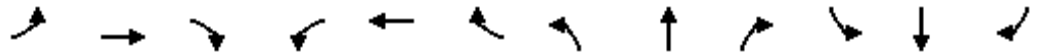
Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	28	297	614	41	30	309	814	188	15	1110	10
Future Volume (vph)	65	28	297	614	41	30	309	814	188	15	1110	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		250	200		75	575		275	175		300
Storage Lanes	0		1	1		1	1		2	1		1
Taper Length (ft)	25			50			175			75		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91	0.91
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.966		0.950	0.958		0.950			0.950		
Satd. Flow (prot)	0	1835	1583	1641	1657	1501	1787	3539	2787	1752	5079	0
Flt Permitted		0.966		0.950	0.958		0.950			0.950		
Satd. Flow (perm)	0	1835	1583	1641	1657	1501	1787	3539	2787	1752	5079	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109			182			198			1
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		805			586			999			1515	
Travel Time (s)		18.3			13.3			22.7			34.4	
Peak Hour Factor	0.81	0.81	0.81	0.94	0.94	0.94	0.95	0.95	0.95	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	2%	1%	0%	4%	1%	2%	2%	3%	2%	6%
Adj. Flow (vph)	80	35	367	653	44	32	325	857	198	17	1276	11
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	115	367	346	351	32	325	857	198	17	1287	0
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Detector Phase	8	8	1	7	7	5	1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	11.0	16.0	
Total Split (s)	12.0	12.0	23.0	26.0	26.0	11.0	23.0	41.0	26.0	11.0	29.0	
Total Split (%)	13.3%	13.3%	25.6%	28.9%	28.9%	12.2%	25.6%	45.6%	28.9%	12.2%	32.2%	
Maximum Green (s)	6.0	6.0	17.0	20.0	20.0	5.0	17.0	35.0	20.0	5.0	23.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Min	None	None	C-Min	
Act Effct Green (s)		6.0	29.0	20.0	20.0	25.0	17.0	39.4	65.4	5.0	23.0	
Actuated g/C Ratio		0.07	0.32	0.22	0.22	0.28	0.19	0.44	0.73	0.06	0.26	
v/c Ratio		0.94	0.63	0.95	0.95	0.06	0.96	0.55	0.10	0.18	0.99	
Control Delay		112.3	23.5	72.8	73.2	0.2	84.8	19.4	0.1	44.9	57.5	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		112.3	23.5	72.8	73.2	0.2	84.8	19.4	0.1	44.9	57.5	
LOS		F	C	E	E	A	F	B	A	D	E	

5: Lowell Road (3A) & Flagstone Drive/Wason Road

2022 AM NoBuild.syn

Lanes, Volumes, Timings

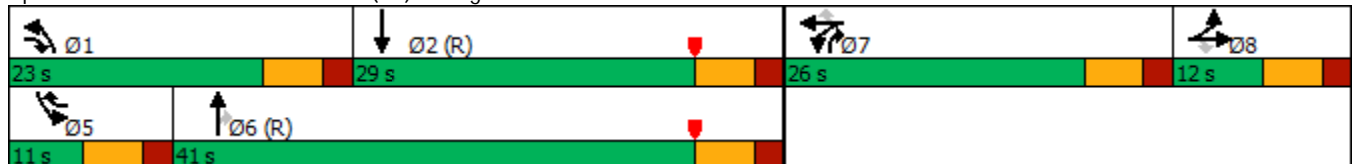


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		44.7			69.8			32.0				57.3
Approach LOS		D			E			C				E
Queue Length 50th (ft)		66	122	205	208	0	203	127	0	9	267	
Queue Length 95th (ft)		#147	181	#382	#386	0	m#327	200	m0	29	#349	
Internal Link Dist (ft)		725			506			919			1435	
Turn Bay Length (ft)			250	200		75	575		275	175		
Base Capacity (vph)		122	583	364	368	548	337	1549	2079	97	1298	
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.94	0.63	0.95	0.95	0.06	0.96	0.55	0.10	0.18	0.99	

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 48 (53%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.99
 Intersection Signal Delay: 49.1
 Intersection LOS: D
 Intersection Capacity Utilization 78.5%
 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.
 m Volume for 95th percentile queue is metered by upstream signal.
























Splits and Phases: 5: Lowell Road (3A) & Flagstone Drive/Wason Road



5: Lowell Road (3A) & Flagstone Drive/Wason Road























2022 AM NoBuild.syn

HCM Signalized Intersection Capacity Analysis

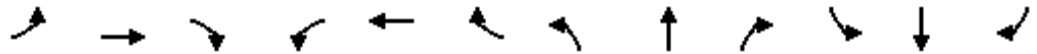
													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	65	28	297	614	41	30	309	814	188	15	1110	10	
Future Volume (vph)	65	28	297	614	41	30	309	814	188	15	1110	10	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	11	11	11	12	12	12	12	12	12	
Total Lost time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91		
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		
Flt Protected		0.97	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1836	1583	1641	1657	1501	1787	3539	2787	1752	5077		
Flt Permitted		0.97	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (perm)		1836	1583	1641	1657	1501	1787	3539	2787	1752	5077		
Peak-hour factor, PHF	0.81	0.81	0.81	0.94	0.94	0.94	0.95	0.95	0.95	0.87	0.87	0.87	
Adj. Flow (vph)	80	35	367	653	44	32	325	857	198	17	1276	11	
RTOR Reduction (vph)	0	0	81	0	0	24	0	0	73	0	1	0	
Lane Group Flow (vph)	0	115	286	346	351	8	325	857	125	17	1286	0	
Heavy Vehicles (%)	0%	0%	2%	1%	0%	4%	1%	2%	2%	3%	2%	6%	
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA		
Protected Phases	8	8	1	7	7	5	1	6	7	5	2		
Permitted Phases			8			7			6				
Actuated Green, G (s)		6.0	23.0	20.0	20.0	23.0	17.0	37.0	57.0	3.0	23.0		
Effective Green, g (s)		6.0	23.0	20.0	20.0	23.0	17.0	37.0	57.0	3.0	23.0		
Actuated g/C Ratio		0.07	0.26	0.22	0.22	0.26	0.19	0.41	0.63	0.03	0.26		
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)		2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0		
Lane Grp Cap (vph)		122	510	364	368	383	337	1454	1950	58	1297		
v/s Ratio Prot		c0.06	0.11	0.21	c0.21	0.00	c0.18	0.24	0.01	0.01	c0.25		
v/s Ratio Perm			0.07			0.00			0.03				
v/c Ratio		0.94	0.56	0.95	0.95	0.02	0.96	0.59	0.06	0.29	0.99		
Uniform Delay, d1		41.8	29.1	34.5	34.5	25.1	36.2	20.6	6.3	42.5	33.4		
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.35	0.91	0.01	1.00	1.00		
Incremental Delay, d2		63.4	1.1	34.4	34.8	0.0	34.0	1.4	0.0	2.0	23.1		
Delay (s)		105.2	30.3	68.9	69.3	25.1	82.8	20.2	0.0	44.5	56.5		
Level of Service		F	C	E	E	C	F	C	A	D	E		
Approach Delay (s)		48.1			67.2			32.0			56.3		
Approach LOS		D			E			C			E		
Intersection Summary													
HCM 2000 Control Delay			48.7									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.97										
Actuated Cycle Length (s)			90.0									Sum of lost time (s)	24.0
Intersection Capacity Utilization			78.5%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group

Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	0	11	2	2	4	116	781	2	2	1172	59
Future Volume (vph)	8	0	11	2	2	4	116	781	2	2	1172	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	13	13	13	12	12	12	11	12	12
Storage Length (ft)	0		100	0		100	225		0	225		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850						0.993
Flt Protected		0.950			0.976		0.950			0.950		
Satd. Flow (prot)	0	1719	1455	0	1916	1669	1752	3505	0	1745	3480	0
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1810	1455	0	1963	1669	1752	3505	0	1745	3480	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			86			86						7
Link Speed (mph)		30			10			30				30
Link Distance (ft)		495			382			1515				1791
Travel Time (s)		11.3			26.0			34.4				40.7
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.90	0.90	0.90	0.83	0.83	0.83
Heavy Vehicles (%)	5%	0%	11%	0%	0%	0%	3%	3%	0%	0%	3%	3%
Adj. Flow (vph)	10	0	14	3	3	5	129	868	2	2	1412	71
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	10	14	0	6	5	129	870	0	2	1483	0
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		4	4 1		8	8 5	1	6		5	2	
Permitted Phases	4			8								
Detector Phase	4	4	4 1	8	8	8 5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		2.0	15.0		2.0	15.0	
Minimum Split (s)	9.0	9.0		9.0	9.0		8.0	21.0		8.0	21.0	
Total Split (s)	16.0	16.0		16.0	16.0		16.0	66.0		16.0	66.0	
Total Split (%)	14.0%	14.0%		14.0%	14.0%		14.0%	57.9%		14.0%	57.9%	
Maximum Green (s)	10.0	10.0		10.0	10.0		12.0	60.0		12.0	60.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)		7.4	11.4		6.5	9.1	10.8	68.1		5.1	49.4	
Actuated g/C Ratio		0.09	0.14		0.08	0.11	0.14	0.86		0.06	0.62	
v/c Ratio		0.06	0.05		0.04	0.02	0.54	0.29		0.02	0.68	
Control Delay		44.4	0.4		46.4	0.2	48.0	5.0		48.5	14.6	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		44.4	0.4		46.4	0.2	48.0	5.0		48.5	14.6	
LOS		D	A		D	A	D	A		D	B	

Lanes, Volumes, Timings

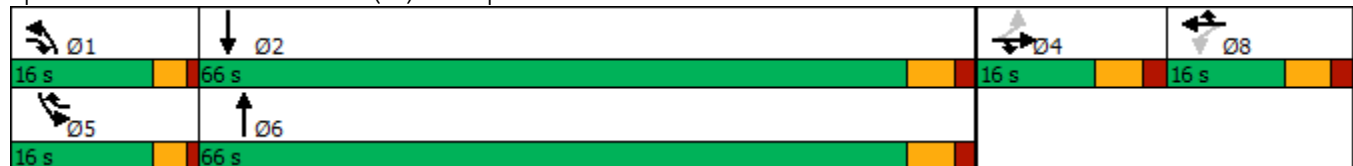


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		18.7			25.4			10.6				14.7
Approach LOS		B			C			B				B
Queue Length 50th (ft)		4	0		2	0	47	0		1		146
Queue Length 95th (ft)		22	0		16	0	#174	204		8		447
Internal Link Dist (ft)		415			302			1435				1711
Turn Bay Length (ft)			100			100	225			225		
Base Capacity (vph)		252	326		273	364	293	3016		291		2780
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		0.04	0.04		0.02	0.01	0.44	0.29		0.01		0.53























Intersection Summary

Area Type:	Other
Cycle Length:	114
Actuated Cycle Length:	79.2
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.68
Intersection Signal Delay:	13.1
Intersection LOS:	B
Intersection Capacity Utilization:	60.7%
ICU Level of Service:	B
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 6: Lowell Road (3A) & Hampshire Drive/Oblate Drive



HCM Signalized Intersection Capacity Analysis























													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	8	0	11	2	2	4	116	781	2	2	1172	59	
Future Volume (vph)	8	0	11	2	2	4	116	781	2	2	1172	59	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	13	13	13	12	12	12	11	12	12	
Total Lost time (s)		6.0	6.0		6.0	6.0	4.0	6.0		4.0	6.0		
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95		
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99		
Flt Protected		0.95	1.00		0.98	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)		1719	1455		1915	1669	1752	3504		1745	3480		
Flt Permitted		1.00	1.00		1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (perm)		1810	1455		1963	1669	1752	3504		1745	3480		
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.90	0.90	0.90	0.83	0.83	0.83	
Adj. Flow (vph)	10	0	14	2	2	5	129	868	2	2	1412	71	
RTOR Reduction (vph)	0	0	12	0	0	5	0	0	0	0	3	0	
Lane Group Flow (vph)	0	10	2	0	6	0	129	870	0	2	1480	0	
Heavy Vehicles (%)	5%	0%	11%	0%	0%	0%	3%	3%	0%	0%	3%	3%	
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA		
Protected Phases		4	4	1	8	8	5	1	6		5	2	
Permitted Phases	4			8									
Actuated Green, G (s)		2.6	13.4		1.9	8.6	10.8	63.2		0.7	53.1		
Effective Green, g (s)		2.6	13.4		1.9	8.6	10.8	63.2		0.7	53.1		
Actuated g/C Ratio		0.03	0.15		0.02	0.10	0.12	0.70		0.01	0.59		
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0		
Vehicle Extension (s)		3.0			3.0		2.0	3.0		2.0	3.0		
Lane Grp Cap (vph)		52	215		41	158	209	2449		13	2044		
v/s Ratio Prot			0.00			0.00	c0.07	0.25		0.00	c0.43		
v/s Ratio Perm		c0.01			c0.00								
v/c Ratio		0.19	0.01		0.15	0.00	0.62	0.36		0.15	0.72		
Uniform Delay, d1		42.9	32.8		43.5	37.0	37.8	5.4		44.6	13.4		
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2		1.8	0.0		1.6	0.0	3.8	0.1		2.0	1.3		
Delay (s)		44.7	32.9		45.1	37.0	41.6	5.5		46.6	14.7		
Level of Service		D	C		D	D	D	A		D	B		
Approach Delay (s)		37.8			41.4			10.2			14.7		
Approach LOS		D			D			B			B		
Intersection Summary													
HCM 2000 Control Delay			13.3									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.67										
Actuated Cycle Length (s)			90.4									Sum of lost time (s)	22.0
Intersection Capacity Utilization			60.7%									ICU Level of Service	B
Analysis Period (min)			15										

c Critical Lane Group

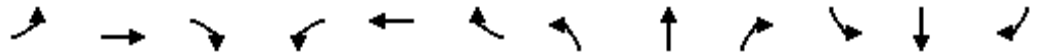
7: Lowell Road (3A) & Executive Drive/PMA Drive

2022 AM NoBuild.syn

Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	2	18	141	30	101	167	455	60	107	1066	203
Future Volume (vph)	54	2	18	141	30	101	167	455	60	107	1066	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	15	12	12	13	11	12	12	11	12	12
Storage Length (ft)	0		225	0		80	350		0	150		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.983			0.976	
Flt Protected		0.954			0.961		0.950			0.950		
Satd. Flow (prot)	0	1572	1558	0	1811	1620	1711	3416	0	1728	3454	0
Flt Permitted		0.449			0.715		0.950			0.950		
Satd. Flow (perm)	0	740	1558	0	1347	1620	1711	3416	0	1728	3454	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			30			101		21			33	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		492			577			1791			1168	
Travel Time (s)		11.2			13.1			40.7			26.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	12%	0%	14%	1%	0%	3%	2%	4%	3%	1%	2%	2%
Adj. Flow (vph)	68	3	23	176	38	126	184	500	66	118	1171	223
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	71	23	0	214	126	184	566	0	118	1394	0
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA	
Protected Phases		8	8 1		4	4	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8 1	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		5.0	5.0	5.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	9.0	9.0		11.0	11.0	11.0	9.0	14.0		9.0	14.0	
Total Split (s)	26.0	26.0		23.0	23.0	23.0	16.0	66.0		16.0	66.0	
Total Split (%)	24.1%	24.1%		21.3%	21.3%	21.3%	14.8%	61.1%		14.8%	61.1%	
Maximum Green (s)	20.0	20.0		17.0	17.0	17.0	10.0	60.0		10.0	60.0	
Yellow Time (s)	4.0	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	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None	None	None	Min		None	Min	
Act Effct Green (s)		17.0	33.3		17.0	17.0	10.2	47.6		9.2	46.6	
Actuated g/C Ratio		0.18	0.36		0.18	0.18	0.11	0.52		0.10	0.51	
v/c Ratio		0.52	0.04		0.86	0.33	0.97	0.32		0.69	0.79	
Control Delay		52.1	6.9		70.1	13.9	104.8	12.9		64.4	21.9	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		52.1	6.9		70.1	13.9	104.8	12.9		64.4	21.9	
LOS		D	A		E	B	F	B		E	C	

Lanes, Volumes, Timings



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		41.0			49.3			35.5				25.2
Approach LOS		D			D			D				C
Queue Length 50th (ft)		38	0		122	12	109	92		67		324
Queue Length 95th (ft)		82	12		#227	51	#293	133		#172		433
Internal Link Dist (ft)		412			497			1711				1088
Turn Bay Length (ft)			225			80	350			150		
Base Capacity (vph)		163	547		298	436	189	2274		191		2303
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		0.44	0.04		0.72	0.29	0.97	0.25		0.62		0.61

Intersection Summary

Area Type:	Other
Cycle Length:	108
Actuated Cycle Length:	92.1
Natural Cycle:	80
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.97
Intersection Signal Delay:	31.7
Intersection LOS:	C
Intersection Capacity Utilization	76.2%
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.	























Splits and Phases: 7: Lowell Road (3A) & Executive Drive/PMA Drive



7: Lowell Road (3A) & Executive Drive/PMA Drive






















2022 AM NoBuild.syn

HCM Signalized Intersection Capacity Analysis

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	54	2	18	141	30	101	167	455	60	107	1066	203		
Future Volume (vph)	54	2	18	141	30	101	167	455	60	107	1066	203		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width	11	11	15	12	12	13	11	12	12	11	12	12		
Total Lost time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0			
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95			
Frt		1.00	0.85		1.00	0.85	1.00	0.98		1.00	0.98			
Flt Protected		0.95	1.00		0.96	1.00	0.95	1.00		0.95	1.00			
Satd. Flow (prot)		1572	1558		1810	1620	1711	3414		1728	3454			
Flt Permitted		0.45	1.00		0.72	1.00	0.95	1.00		0.95	1.00			
Satd. Flow (perm)		739	1558		1348	1620	1711	3414		1728	3454			
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.91	0.91	0.91		
Adj. Flow (vph)	68	2	22	176	38	126	184	500	66	118	1171	223		
RTOR Reduction (vph)	0	0	15	0	0	82	0	10	0	0	16	0		
Lane Group Flow (vph)	0	71	8	0	214	44	184	556	0	118	1378	0		
Heavy Vehicles (%)	12%	0%	14%	1%	0%	3%	2%	4%	3%	1%	2%	2%		
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA			
Protected Phases		8	8 1		4	4	1	6		5	2			
Permitted Phases	8			4										
Actuated Green, G (s)		17.0	33.2		17.0	17.0	10.2	47.6		9.2	46.6			
Effective Green, g (s)		17.0	33.2		17.0	17.0	10.2	47.6		9.2	46.6			
Actuated g/C Ratio		0.19	0.36		0.19	0.19	0.11	0.52		0.10	0.51			
Clearance Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0			
Vehicle Extension (s)		2.0			2.0	2.0	2.0	3.0		2.0	3.0			
Lane Grp Cap (vph)		136	563		249	300	190	1770		173	1753			
v/s Ratio Prot			0.01			0.03	c0.11	0.16		0.07	c0.40			
v/s Ratio Perm		0.10			c0.16									
v/c Ratio		0.52	0.01		0.86	0.15	0.97	0.31		0.68	0.79			
Uniform Delay, d1		33.7	18.8		36.2	31.3	40.6	12.7		39.9	18.5			
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00			
Incremental Delay, d2		1.7	0.0		23.5	0.1	55.2	0.1		8.5	2.4			
Delay (s)		35.4	18.8		59.8	31.4	95.8	12.8		48.4	20.9			
Level of Service		D	B		E	C	F	B		D	C			
Approach Delay (s)		31.3			49.3			33.2			23.1			
Approach LOS		C			D			C			C			
Intersection Summary														
HCM 2000 Control Delay			29.5									HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio			0.83											
Actuated Cycle Length (s)			91.8								18.0		Sum of lost time (s)	
Intersection Capacity Utilization			76.2%										ICU Level of Service	D
Analysis Period (min)			15											

c Critical Lane Group

Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	0	48	6	0	10	4	584	1	16	1321	3
Future Volume (vph)	11	0	48	6	0	10	4	584	1	16	1321	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	13	13	11	11	12	12	12	12
Storage Length (ft)	0		50	0		100	210		325	125		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			50			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850			0.850						
Flt Protected		0.950			0.950		0.950			0.950		
Satd. Flow (prot)	0	1719	1583	0	1865	1669	1745	3356	0	1805	1863	0
Flt Permitted		0.752			0.748		0.950			0.950		
Satd. Flow (perm)	0	1361	1583	0	1469	1669	1745	3356	0	1805	1863	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			91			55						
Link Speed (mph)		10			30			30			30	
Link Distance (ft)		598			262			1405			549	
Travel Time (s)		40.8			6.0			31.9			12.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.95	0.95	0.95
Heavy Vehicles (%)	5%	0%	2%	0%	0%	0%	0%	4%	0%	0%	2%	0%
Adj. Flow (vph)	14	0	60	8	0	13	4	642	1	17	1391	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	60	0	8	13	4	643	0	17	1394	0
Turn Type	Perm	NA	Prot	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		8	8		4	4.5	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8	4	4	4.5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0		11.0	16.0		11.0	16.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0		16.0	116.0		16.0	116.0	
Total Split (%)	8.9%	8.9%	8.9%	8.9%	8.9%		8.9%	64.4%		8.9%	64.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0		10.0	110.0		10.0	110.0	
Yellow Time (s)	4.0	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	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5		1.0	1.5		1.5	1.5	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effect Green (s)		6.3	6.3		6.3	18.3	5.0	147.7		6.0	153.1	
Actuated g/C Ratio		0.04	0.04		0.04	0.10	0.03	0.82		0.03	0.85	
v/c Ratio		0.30	0.42		0.16	0.06	0.08	0.23		0.28	0.88	
Control Delay		100.2	12.4		90.2	0.5	89.0	5.8		95.9	18.9	

Lanes, Volumes, Timings

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr _t	
Fl _t Protected	
Satd. Flow (prot)	
Fl _t 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 (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	32.0
Total Split (s)	32.0
Total Split (%)	18%
Maximum Green (s)	26.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	1.5
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	5
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	

Lanes, Volumes, Timings

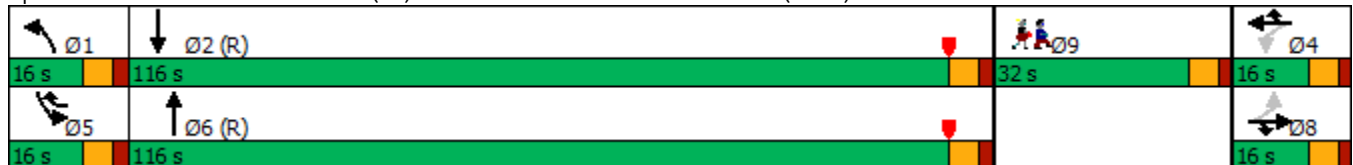


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	16.9	
Total Delay		100.2	12.4		90.2	0.5	89.0	5.8		95.9	35.8	
LOS		F	B		F	A	F	A		F	D	
Approach Delay		29.0			34.7			6.3			36.5	
Approach LOS		C			C			A			D	
Queue Length 50th (ft)		17	0		9	0	5	67		20	456	
Queue Length 95th (ft)		40	3		27	0	20	212		50	#2198	
Internal Link Dist (ft)		518			182			1325			469	
Turn Bay Length (ft)			50			100	210			125		
Base Capacity (vph)		75	173		81	234	96	2753		100	1585	
Starvation Cap Reductn		0	0		0	0	0	0		0	221	
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		0.19	0.35		0.10	0.06	0.04	0.23		0.17	1.02	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow, Master Intersection
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 27.2
 Intersection LOS: C
 Intersection Capacity Utilization 93.0%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.






















Splits and Phases: 8: Lowell Road (3A) & Fox Hollow Drive/Fox Hollow Drive (Plaza)



Lanes, Volumes, Timings












Lane Group	Ø9
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	

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	0	48	6	0	10	4	584	1	16	1321	3
Future Volume (vph)	11	0	48	6	0	10	4	584	1	16	1321	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	14	13	13	11	11	12	12	12	12
Total Lost time (s)		6.0	6.0		6.0	6.0		6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00	1.00		0.95		1.00	1.00	
Frt		1.00	0.85		1.00	0.85		1.00		1.00	1.00	
Flt Protected		0.95	1.00		0.95	1.00		0.95		0.95	1.00	
Satd. Flow (prot)		1719	1583		1865	1669		1745		3355	1805	1862
Flt Permitted		0.75	1.00		0.75	1.00		0.95		0.95	1.00	
Satd. Flow (perm)		1362	1583		1469	1669		1745		3355	1805	1862
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.95	0.95	0.95
Adj. Flow (vph)	14	0	60	8	0	12	4	642	1	17	1391	3
RTOR Reduction (vph)	0	0	58	0	0	12	0	0	0	0	0	0
Lane Group Flow (vph)	0	14	2	0	8	1	4	643	0	17	1394	0
Heavy Vehicles (%)	5%	0%	2%	0%	0%	0%	0%	4%	0%	0%	2%	0%
Turn Type	Perm	NA	Prot	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		8	8		4	4 5	1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		6.3	6.3		6.3	16.3	1.0	140.5		4.0	143.5	
Effective Green, g (s)		6.3	6.3		6.3	16.3	1.0	140.5		4.0	143.5	
Actuated g/C Ratio		0.03	0.03		0.03	0.09	0.01	0.78		0.02	0.80	
Clearance Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)		1.5	1.5		1.5		1.0	1.5		1.5	1.5	
Lane Grp Cap (vph)		47	55		51	151	9	2618		40	1484	
v/s Ratio Prot			0.00			0.00	0.00	0.19		c0.01	c0.75	
v/s Ratio Perm		c0.01			0.01							
v/c Ratio		0.30	0.04		0.16	0.01	0.44	0.25		0.42	0.94	
Uniform Delay, d1		84.7	83.9		84.3	74.5	89.2	5.4		86.9	14.7	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.3	0.1		0.5	0.0	12.2	0.2		2.6	12.8	
Delay (s)		86.0	84.0		84.8	74.5	101.4	5.6		89.5	27.5	
Level of Service		F	F		F	E	F	A		F	C	
Approach Delay (s)		84.4			78.4			6.2			28.3	
Approach LOS		F			E			A			C	
Intersection Summary												
HCM 2000 Control Delay			24.1									C
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			180.0								24.0	
Intersection Capacity Utilization			93.0%									F
Analysis Period (min)			15									

c Critical Lane Group

9: Lowell Road (3A) & Pelham Road
Lanes, Volumes, Timings

							
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø9
Lane Configurations							
Traffic Volume (vph)	232	73	518	84	64	1112	
Future Volume (vph)	232	73	518	84	64	1112	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	13	13	12	12	
Storage Length (ft)	0	75		0	150		
Storage Lanes	1	1		0	1		
Taper Length (ft)	25				50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.850	0.981				
Flt Protected	0.950				0.950		
Satd. Flow (prot)	1787	1524	1839	0	1719	1863	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1787	1524	1839	0	1719	1863	
Right Turn on Red		Yes		Yes			
Satd. Flow (RTOR)		29	7				
Link Speed (mph)	20		30			30	
Link Distance (ft)	512		549			1309	
Travel Time (s)	17.5		12.5			29.8	
Peak Hour Factor	0.88	0.88	0.92	0.92	0.96	0.96	
Heavy Vehicles (%)	1%	6%	5%	3%	5%	2%	
Adj. Flow (vph)	264	83	563	91	67	1158	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	264	83	654	0	67	1158	
Turn Type	Prot	pt+ov	NA		Prot	NA	
Protected Phases	4	4 5	6		5	2	9
Permitted Phases							
Detector Phase	4	4 5	6		5	2	
Switch Phase							
Minimum Initial (s)	5.0		10.0		3.0	10.0	5.0
Minimum Split (s)	11.0		16.0		9.0	16.0	35.0
Total Split (s)	26.0		116.0		13.0	116.0	35.0
Total Split (%)	13.7%		61.1%		6.8%	61.1%	18%
Maximum Green (s)	20.0		110.0		7.0	110.0	29.0
Yellow Time (s)	4.0		4.0		4.0	4.0	4.0
All-Red Time (s)	2.0		2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.0		6.0		6.0	6.0	
Lead/Lag			Lag		Lead		
Lead-Lag Optimize?			Yes		Yes		
Vehicle Extension (s)	1.5		1.5		1.5	1.5	3.0
Recall Mode	None		C-Min		None	C-Min	None
Walk Time (s)							5.0
Flash Dont Walk (s)							24.0
Pedestrian Calls (#/hr)							5
Act Effct Green (s)	43.7	61.0	110.0		11.3	127.3	
Actuated g/C Ratio	0.23	0.32	0.58		0.06	0.67	
v/c Ratio	0.64	0.16	0.61		0.66	0.93	
Control Delay	74.7	34.6	29.0		111.3	40.3	

9: Lowell Road (3A) & Pelham Road
Lanes, Volumes, Timings

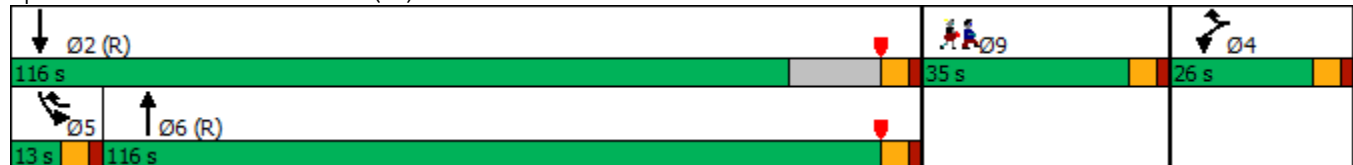


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø9
Queue Delay	0.0	0.0	2.4		0.0	0.0	
Total Delay	74.7	34.6	31.4		111.3	40.3	
LOS	E	C	C		F	D	
Approach Delay	65.1		31.4			44.2	
Approach LOS	E		C			D	
Queue Length 50th (ft)	308	48	468		82	1002	
Queue Length 95th (ft)	#529	109	715		#210	#1798	
Internal Link Dist (ft)	432		469			1229	
Turn Bay Length (ft)		75			150		
Base Capacity (vph)	410	508	1100		102	1281	
Starvation Cap Reductn	0	0	309		0	0	
Spillback Cap Reductn	0	0	0		0	0	
Storage Cap Reductn	0	0	0		0	0	
Reduced v/c Ratio	0.64	0.16	0.83		0.66	0.90	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 30 (16%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 43.7
 Intersection LOS: D
 Intersection Capacity Utilization 81.4%
 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.












Splits and Phases: 9: Lowell Road (3A) & Pelham Road



9: Lowell Road (3A) & Pelham Road

2022 AM NoBuild.syn

HCM Signalized Intersection Capacity Analysis

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	232	73	518	84	64	1112
Future Volume (vph)	232	73	518	84	64	1112
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	13	13	12	12
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	1524	1840		1719	1863
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1787	1524	1840		1719	1863
Peak-hour factor, PHF	0.88	0.88	0.92	0.92	0.96	0.96
Adj. Flow (vph)	264	83	563	91	67	1158
RTOR Reduction (vph)	0	20	3	0	0	0
Lane Group Flow (vph)	264	63	651	0	67	1158
Heavy Vehicles (%)	1%	6%	5%	3%	5%	2%
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	4	4 5	6		5	2
Permitted Phases						
Actuated Green, G (s)	43.7	61.0	105.2		11.3	122.5
Effective Green, g (s)	43.7	61.0	105.2		11.3	122.5
Actuated g/C Ratio	0.23	0.32	0.55		0.06	0.64
Clearance Time (s)	6.0		6.0		6.0	6.0
Vehicle Extension (s)	1.5		1.5		1.5	1.5
Lane Grp Cap (vph)	411	489	1018		102	1201
v/s Ratio Prot	c0.15	0.04	0.35		0.04	c0.62
v/s Ratio Perm						
v/c Ratio	0.64	0.13	0.64		0.66	0.96
Uniform Delay, d1	66.1	45.7	29.3		87.5	31.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.6	0.0	3.1		11.0	18.7
Delay (s)	68.7	45.7	32.4		98.5	50.4
Level of Service	E	D	C		F	D
Approach Delay (s)	63.2		32.4			53.0
Approach LOS	E		C			D
Intersection Summary						
HCM 2000 Control Delay			48.5		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.88			
Actuated Cycle Length (s)			190.0		Sum of lost time (s)	24.0
Intersection Capacity Utilization			81.4%		ICU Level of Service	D
Analysis Period (min)			15			

c Critical Lane Group

10: Lowell Road (3A) & Friars Drive (Site Access)

2022 AM NoBuild.syn

Lanes, Volumes, Timings



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	15	0	610	1361	4
Future Volume (vph)	0	15	0	610	1361	4
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	200			200
Storage Lanes	0	1	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				0.850
Flt Protected						
Satd. Flow (prot)	0	1644	0	1827	1863	1615
Flt Permitted						
Satd. Flow (perm)	0	1644	0	1827	1863	1615
Link Speed (mph)	30			30	30	
Link Distance (ft)	704			770	1145	
Travel Time (s)	16.0			17.5	26.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	4%	2%	0%
Adj. Flow (vph)	0	17	0	678	1512	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	17	0	678	1512	4
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	81.6%
Analysis Period (min)	15
	ICU Level of Service D

HCM 6th TWSC

Intersection

Int Delay, s/veh 0.2

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations		↗		↖	↖	↗
Traffic Vol, veh/h	0	15	0	610	1361	4
Future Vol, veh/h	0	15	0	610	1361	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	200
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	4	2	0
Mvmt Flow	0	17	0	678	1512	4

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	-	1512	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.2	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	149	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	149	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s	32.2	0	0
HCM LOS	D		



















Minor Lane/Major Mvmt NBT EBLn1 SBT SBR

Capacity (veh/h)	-	149	-	-
HCM Lane V/C Ratio	-	0.112	-	-
HCM Control Delay (s)	-	32.2	-	-
HCM Lane LOS	-	D	-	-
HCM 95th %tile Q(veh)	-	0.4	-	-

4: 14/Lowell Road (3A) & Sagamore Bridge

2022 AM Build.syn

Lanes, Volumes, Timings

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 		  	 	 	 
Traffic Volume (vph)	980	1095	1038	379	395	1558
Future Volume (vph)	980	1095	1038	379	395	1558
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	12	12	12	12
Storage Length (ft)	0	0	525			200
Storage Lanes	2	1	2			1
Taper Length (ft)	25		100			
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Fr't		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3662	1656	4894	3539	3539	2760
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3662	1656	4894	3539	3539	2760
Right Turn on Red		No				Yes
Satd. Flow (RTOR)						1227
Link Speed (mph)	35			30	30	
Link Distance (ft)	929			1189	999	
Travel Time (s)	18.1			27.0	22.7	
Peak Hour Factor	0.94	0.94	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	4%	2%	2%	3%
Adj. Flow (vph)	1043	1165	1128	412	429	1693
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1043	1165	1128	412	429	1693
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Detector Phase	3		1	6	2	
Switch Phase						
Minimum Initial (s)	10.0		7.0	10.0	10.0	
Minimum Split (s)	16.0		15.0	17.0	17.0	
Total Split (s)	38.0		33.0	52.0	19.0	
Total Split (%)	42.2%		36.7%	57.8%	21.1%	
Maximum Green (s)	32.0		25.0	45.0	12.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		4.0	3.0	3.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		8.0	7.0	7.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Recall Mode	None		None	C-Min	C-Min	
Act Effect Green (s)	30.6	90.0	25.0	46.4	13.4	90.0
Actuated g/C Ratio	0.34	1.00	0.28	0.52	0.15	1.00
v/c Ratio	0.84	0.70	0.83	0.23	0.82	0.61
Control Delay	34.3	2.5	25.7	4.6	35.0	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.3	2.5	25.7	4.6	35.0	4.2
LOS	C	A	C	A	D	A

4: 14/Lowell Road (3A) & Sagamore Bridge

2022 AM Build.syn

Lanes, Volumes, Timings

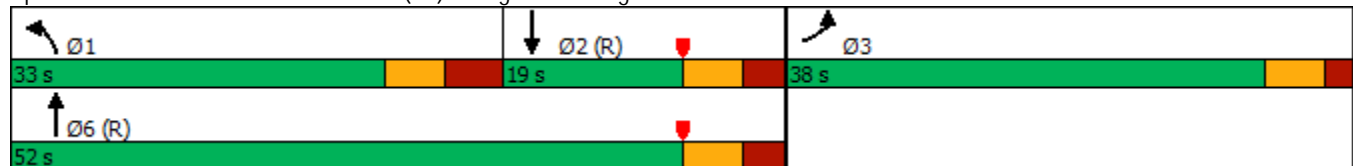


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	17.6			20.1	10.5	
Approach LOS	B			C	B	
Queue Length 50th (ft)	271	0	221	17	122	93
Queue Length 95th (ft)	349	0	231	12	m134	m102
Internal Link Dist (ft)	849			1109	919	
Turn Bay Length (ft)			525			200
Base Capacity (vph)	1302	1656	1377	1824	525	2760
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	0.80	0.70	0.82	0.23	0.82	0.61

Intersection Summary













Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Offset:	0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
Natural Cycle:	70
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.84
Intersection Signal Delay:	15.6
Intersection LOS:	B
Intersection Capacity Utilization:	75.3%
ICU Level of Service:	D
Analysis Period (min):	15
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: 14/Lowell Road (3A) & Sagamore Bridge



4: 14/Lowell Road (3A) & Sagamore Bridge

HCM Signalized Intersection Capacity Analysis

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	980	1095	1038	379	395	1558
Future Volume (vph)	980	1095	1038	379	395	1558
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	14	14	12	12	12	12
Total Lost time (s)	6.0	4.0	8.0	7.0	7.0	4.0
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3662	1656	4894	3539	3539	2760
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3662	1656	4894	3539	3539	2760
Peak-hour factor, PHF	0.94	0.94	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1043	1165	1128	412	429	1693
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1043	1165	1128	412	429	1693
Heavy Vehicles (%)	2%	4%	4%	2%	2%	3%
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Actuated Green, G (s)	30.6	90.0	25.0	46.4	13.4	90.0
Effective Green, g (s)	30.6	90.0	25.0	46.4	13.4	90.0
Actuated g/C Ratio	0.34	1.00	0.28	0.52	0.15	1.00
Clearance Time (s)	6.0		8.0	7.0	7.0	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Lane Grp Cap (vph)	1245	1656	1359	1824	526	2760
v/s Ratio Prot	0.28		0.23	0.12	0.12	
v/s Ratio Perm		c0.70				0.61
v/c Ratio	0.84	0.70	0.83	0.23	0.82	0.61
Uniform Delay, d1	27.4	0.0	30.5	12.0	37.1	0.0
Progression Factor	1.00	1.00	0.66	0.35	0.73	1.00
Incremental Delay, d2	5.3	2.5	4.1	0.2	5.2	0.4
Delay (s)	32.7	2.5	24.2	4.4	32.4	0.4
Level of Service	C	A	C	A	C	A
Approach Delay (s)	16.8			18.9	6.9	
Approach LOS	B			B	A	
Intersection Summary						
HCM 2000 Control Delay			13.7	HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio			0.92			
Actuated Cycle Length (s)			90.0	Sum of lost time (s)		21.0
Intersection Capacity Utilization			75.3%	ICU Level of Service		D
Analysis Period (min)			15			

c Critical Lane Group

5: Lowell Road (3A) & Flagstone Drive/Wason Road

2022 AM Build.syn

Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	28	298	614	41	30	323	831	188	15	1122	10
Future Volume (vph)	65	28	298	614	41	30	323	831	188	15	1122	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		250	200		75	575		275	175		300
Storage Lanes	0		1	1		1	1		2	1		1
Taper Length (ft)	25			50			175			75		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91	0.91
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.966		0.950	0.958		0.950			0.950		
Satd. Flow (prot)	0	1835	1583	1641	1657	1501	1787	3539	2787	1752	5079	0
Flt Permitted		0.966		0.950	0.958		0.950			0.950		
Satd. Flow (perm)	0	1835	1583	1641	1657	1501	1787	3539	2787	1752	5079	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109			182			198			1
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		805			586			999			1515	
Travel Time (s)		18.3			13.3			22.7			34.4	
Peak Hour Factor	0.81	0.81	0.81	0.94	0.94	0.94	0.95	0.95	0.95	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	2%	1%	0%	4%	1%	2%	2%	3%	2%	6%
Adj. Flow (vph)	80	35	368	653	44	32	340	875	198	17	1290	11
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	115	368	346	351	32	340	875	198	17	1301	0
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Detector Phase	8	8	1	7	7	5	1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	11.0	16.0	
Total Split (s)	12.0	12.0	23.0	26.0	26.0	11.0	23.0	41.0	26.0	11.0	29.0	
Total Split (%)	13.3%	13.3%	25.6%	28.9%	28.9%	12.2%	25.6%	45.6%	28.9%	12.2%	32.2%	
Maximum Green (s)	6.0	6.0	17.0	20.0	20.0	5.0	17.0	35.0	20.0	5.0	23.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Min	None	None	C-Min	
Act Effect Green (s)		6.0	29.0	20.0	20.0	25.0	17.0	39.4	65.4	5.0	23.0	
Actuated g/C Ratio		0.07	0.32	0.22	0.22	0.28	0.19	0.44	0.73	0.06	0.26	
v/c Ratio		0.94	0.63	0.95	0.95	0.06	1.01	0.56	0.10	0.18	1.00	
Control Delay		112.3	23.6	72.8	73.2	0.2	94.3	20.0	0.1	44.9	60.1	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		112.3	23.6	72.8	73.2	0.2	94.3	20.0	0.1	44.9	60.1	
LOS		F	C	E	E	A	F	C	A	D	E	

5: Lowell Road (3A) & Flagstone Drive/Wason Road

2022 AM Build.syn

Lanes, Volumes, Timings

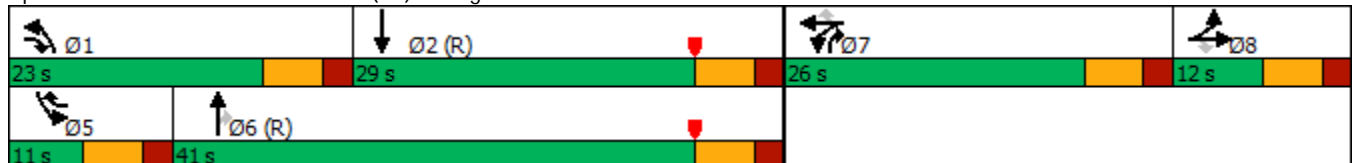


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		44.7			69.8			35.1				59.9
Approach LOS		D			E			D				E
Queue Length 50th (ft)		66	123	205	208	0	~214	133	0	9	~272	
Queue Length 95th (ft)		#147	183	#382	#386	0	m#339	206	m0	29	#355	
Internal Link Dist (ft)		725			506			919				1435
Turn Bay Length (ft)			250	200		75	575		275	175		
Base Capacity (vph)		122	583	364	368	548	337	1549	2079	97	1298	
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.94	0.63	0.95	0.95	0.06	1.01	0.56	0.10	0.18	1.00	

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 48 (53%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.01
 Intersection Signal Delay: 51.0 Intersection LOS: D
 Intersection Capacity Utilization 79.5% ICU Level of Service D
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Lowell Road (3A) & Flagstone Drive/Wason Road

























HCM Signalized Intersection Capacity Analysis

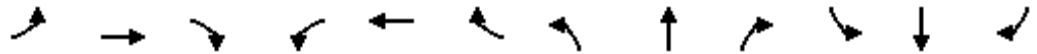
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	65	28	298	614	41	30	323	831	188	15	1122	10	
Future Volume (vph)	65	28	298	614	41	30	323	831	188	15	1122	10	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	11	11	11	12	12	12	12	12	12	
Total Lost time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91		
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		
Flt Protected		0.97	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1836	1583	1641	1657	1501	1787	3539	2787	1752	5077		
Flt Permitted		0.97	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (perm)		1836	1583	1641	1657	1501	1787	3539	2787	1752	5077		
Peak-hour factor, PHF	0.81	0.81	0.81	0.94	0.94	0.94	0.95	0.95	0.95	0.87	0.87	0.87	
Adj. Flow (vph)	80	35	368	653	44	32	340	875	198	17	1290	11	
RTOR Reduction (vph)	0	0	81	0	0	24	0	0	73	0	1	0	
Lane Group Flow (vph)	0	115	287	346	351	8	340	875	125	17	1300	0	
Heavy Vehicles (%)	0%	0%	2%	1%	0%	4%	1%	2%	2%	3%	2%	6%	
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA		
Protected Phases	8	8	1	7	7	5	1	6	7	5	2		
Permitted Phases			8			7			6				
Actuated Green, G (s)		6.0	23.0	20.0	20.0	23.0	17.0	37.0	57.0	3.0	23.0		
Effective Green, g (s)		6.0	23.0	20.0	20.0	23.0	17.0	37.0	57.0	3.0	23.0		
Actuated g/C Ratio		0.07	0.26	0.22	0.22	0.26	0.19	0.41	0.63	0.03	0.26		
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)		2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0		
Lane Grp Cap (vph)		122	510	364	368	383	337	1454	1950	58	1297		
v/s Ratio Prot		c0.06	0.11	0.21	c0.21	0.00	c0.19	0.25	0.01	0.01	c0.26		
v/s Ratio Perm			0.07			0.00			0.03				
v/c Ratio		0.94	0.56	0.95	0.95	0.02	1.01	0.60	0.06	0.29	1.00		
Uniform Delay, d1		41.8	29.1	34.5	34.5	25.1	36.5	20.7	6.3	42.5	33.5		
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.34	0.94	0.00	1.00	1.00		
Incremental Delay, d2		63.4	1.2	34.4	34.8	0.0	45.2	1.4	0.0	2.0	25.6		
Delay (s)		105.2	30.3	68.9	69.3	25.1	94.2	20.8	0.0	44.5	59.1		
Level of Service		F	C	E	E	C	F	C	A	D	E		
Approach Delay (s)		48.1			67.2			35.6			58.9		
Approach LOS		D			E			D			E		
Intersection Summary													
HCM 2000 Control Delay			50.7									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.98										
Actuated Cycle Length (s)			90.0									Sum of lost time (s)	24.0
Intersection Capacity Utilization			79.5%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group

Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	0	11	2	2	4	121	793	2	2	1184	59
Future Volume (vph)	8	0	11	2	2	4	121	793	2	2	1184	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	13	13	13	12	12	12	11	12	12
Storage Length (ft)	0		100	0		100	225		0	225		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850						0.993
Flt Protected		0.950			0.976		0.950			0.950		
Satd. Flow (prot)	0	1719	1455	0	1916	1669	1752	3505	0	1745	3480	0
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1810	1455	0	1963	1669	1752	3505	0	1745	3480	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			86			86						7
Link Speed (mph)		30			10			30				30
Link Distance (ft)		495			382			1515				1791
Travel Time (s)		11.3			26.0			34.4				40.7
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.90	0.90	0.90	0.83	0.83	0.83
Heavy Vehicles (%)	5%	0%	11%	0%	0%	0%	3%	3%	0%	0%	3%	3%
Adj. Flow (vph)	10	0	14	3	3	5	134	881	2	2	1427	71
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	10	14	0	6	5	134	883	0	2	1498	0
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		4	4 1		8	8 5	1	6		5	2	
Permitted Phases	4			8								
Detector Phase	4	4	4 1	8	8	8 5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		2.0	15.0		2.0	15.0	
Minimum Split (s)	9.0	9.0		9.0	9.0		8.0	21.0		8.0	21.0	
Total Split (s)	16.0	16.0		16.0	16.0		16.0	66.0		16.0	66.0	
Total Split (%)	14.0%	14.0%		14.0%	14.0%		14.0%	57.9%		14.0%	57.9%	
Maximum Green (s)	10.0	10.0		10.0	10.0		12.0	60.0		12.0	60.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)		7.4	11.6		6.5	9.1	11.0	68.3		5.1	49.3	
Actuated g/C Ratio		0.09	0.15		0.08	0.11	0.14	0.86		0.06	0.62	
v/c Ratio		0.06	0.05		0.04	0.02	0.55	0.29		0.02	0.69	
Control Delay		44.4	0.4		46.6	0.2	48.1	5.1		48.5	14.9	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		44.4	0.4		46.6	0.2	48.1	5.1		48.5	14.9	
LOS		D	A		D	A	D	A		D	B	

Lanes, Volumes, Timings

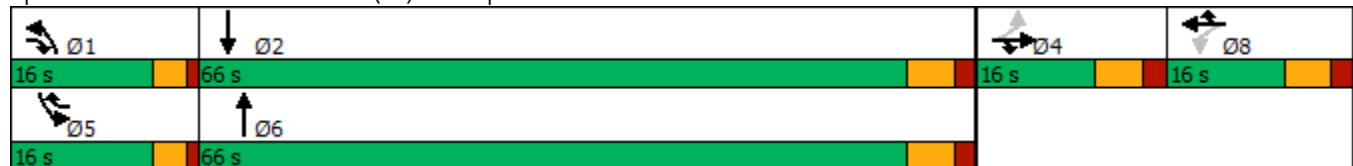


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		18.7			25.5			10.7				15.0
Approach LOS		B			C			B				B
Queue Length 50th (ft)		4	0		2	0	50	0		1		153
Queue Length 95th (ft)		22	0		16	0	#183	207		8		454
Internal Link Dist (ft)		415			302			1435				1711
Turn Bay Length (ft)			100			100	225			225		
Base Capacity (vph)		251	326		272	363	292	3016		290		2772
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		0.04	0.04		0.02	0.01	0.46	0.29		0.01		0.54























Intersection Summary

Area Type:	Other
Cycle Length:	114
Actuated Cycle Length:	79.4
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.69
Intersection Signal Delay:	13.4
Intersection LOS:	B
Intersection Capacity Utilization:	61.3%
ICU Level of Service:	B
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 6: Lowell Road (3A) & Hampshire Drive/Oblate Drive



HCM Signalized Intersection Capacity Analysis

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	8	0	11	2	2	4	121	793	2	2	1184	59	
Future Volume (vph)	8	0	11	2	2	4	121	793	2	2	1184	59	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	13	13	13	12	12	12	11	12	12	
Total Lost time (s)		6.0	6.0		6.0	6.0	4.0	6.0		4.0	6.0		
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95		
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99		
Flt Protected		0.95	1.00		0.98	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)		1719	1455		1915	1669	1752	3504		1745	3480		
Flt Permitted		1.00	1.00		1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (perm)		1810	1455		1963	1669	1752	3504		1745	3480		
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.90	0.90	0.90	0.83	0.83	0.83	
Adj. Flow (vph)	10	0	14	2	2	5	134	881	2	2	1427	71	
RTOR Reduction (vph)	0	0	12	0	0	5	0	0	0	0	3	0	
Lane Group Flow (vph)	0	10	2	0	6	0	134	883	0	2	1495	0	
Heavy Vehicles (%)	5%	0%	11%	0%	0%	0%	3%	3%	0%	0%	3%	3%	
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA		
Protected Phases		4	4 1		8	8 5	1	6		5	2		
Permitted Phases	4			8									
Actuated Green, G (s)		2.6	13.6		1.9	8.6	11.0	63.4		0.7	53.1		
Effective Green, g (s)		2.6	13.6		1.9	8.6	11.0	63.4		0.7	53.1		
Actuated g/C Ratio		0.03	0.15		0.02	0.09	0.12	0.70		0.01	0.59		
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0		
Vehicle Extension (s)		3.0			3.0		2.0	3.0		2.0	3.0		
Lane Grp Cap (vph)		51	218		41	158	212	2452		13	2039		
v/s Ratio Prot			0.00			0.00	c0.08	0.25		0.00	c0.43		
v/s Ratio Perm		c0.01			c0.00								
v/c Ratio		0.20	0.01		0.15	0.00	0.63	0.36		0.15	0.73		
Uniform Delay, d1		43.0	32.8		43.6	37.1	37.9	5.5		44.7	13.6		
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2		1.9	0.0		1.6	0.0	4.5	0.1		2.0	1.4		
Delay (s)		44.9	32.8		45.2	37.1	42.3	5.5		46.7	15.0		
Level of Service		D	C		D	D	D	A		D	B		
Approach Delay (s)		37.8			41.5			10.4			15.0		
Approach LOS		D			D			B			B		
Intersection Summary													
HCM 2000 Control Delay			13.5									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.68										
Actuated Cycle Length (s)			90.6									Sum of lost time (s)	22.0
Intersection Capacity Utilization			61.3%									ICU Level of Service	B
Analysis Period (min)			15										

c Critical Lane Group

7: Lowell Road (3A) & Executive Drive/PMA Drive

2022 AM Build.syn

Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	2	22	141	30	101	179	455	60	107	1074	203
Future Volume (vph)	56	2	22	141	30	101	179	455	60	107	1074	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	15	12	12	13	11	12	12	11	12	12
Storage Length (ft)	0		225	0		80	350		0	150		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.983			0.976	
Flt Protected		0.954			0.961		0.950			0.950		
Satd. Flow (prot)	0	1613	1421	0	1811	1620	1678	3416	0	1728	3454	0
Flt Permitted		0.447			0.714		0.950			0.950		
Satd. Flow (perm)	0	756	1421	0	1346	1620	1678	3416	0	1728	3454	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			30			101		21			32	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		492			577			1791			1168	
Travel Time (s)		11.2			13.1			40.7			26.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	9%	0%	25%	1%	0%	3%	4%	4%	3%	1%	2%	2%
Adj. Flow (vph)	70	3	28	176	38	126	197	500	66	118	1180	223
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	73	28	0	214	126	197	566	0	118	1403	0
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA	
Protected Phases		8	8 1		4	4	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8 1	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		5.0	5.0	5.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	9.0	9.0		11.0	11.0	11.0	9.0	14.0		9.0	14.0	
Total Split (s)	26.0	26.0		23.0	23.0	23.0	16.0	66.0		16.0	66.0	
Total Split (%)	24.1%	24.1%		21.3%	21.3%	21.3%	14.8%	61.1%		14.8%	61.1%	
Maximum Green (s)	20.0	20.0		17.0	17.0	17.0	10.0	60.0		10.0	60.0	
Yellow Time (s)	4.0	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	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None	None	None	Min		None	Min	
Act Effct Green (s)		17.0	33.3		17.0	17.0	10.2	47.9		9.2	46.8	
Actuated g/C Ratio		0.18	0.36		0.18	0.18	0.11	0.52		0.10	0.51	
v/c Ratio		0.53	0.05		0.86	0.33	1.06	0.32		0.69	0.79	
Control Delay		52.1	8.4		70.7	14.0	128.6	12.9		64.6	22.0	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		52.1	8.4		70.7	14.0	128.6	12.9		64.6	22.0	
LOS		D	A		E	B	F	B		E	C	

7: Lowell Road (3A) & Executive Drive/PMA Drive

2022 AM Build.syn

Lanes, Volumes, Timings

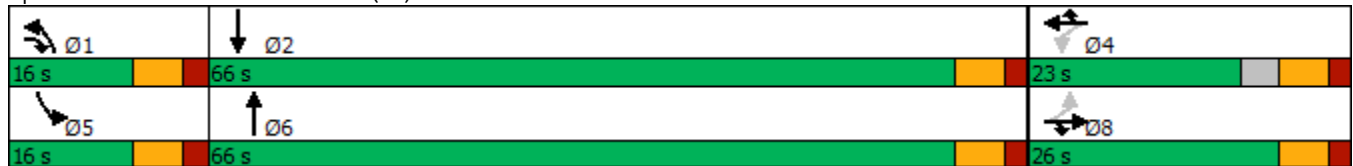


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		40.0			49.7			42.8				25.3
Approach LOS		D			D			D				C
Queue Length 50th (ft)		39	0		122	12	~130	92		67		328
Queue Length 95th (ft)		84	15		#227	51	#317	133		#172		438
Internal Link Dist (ft)		412			497			1711				1088
Turn Bay Length (ft)			225			80	350			150		
Base Capacity (vph)		166	499		297	436	185	2267		190		2296
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		0.44	0.06		0.72	0.29	1.06	0.25		0.62		0.61























Intersection Summary

Area Type:	Other
Cycle Length:	108
Actuated Cycle Length:	92.4
Natural Cycle:	80
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.06
Intersection Signal Delay:	33.8
Intersection LOS:	C
Intersection Capacity Utilization	77.1%
ICU Level of Service	D
Analysis Period (min)	15
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 7: Lowell Road (3A) & Executive Drive/PMA Drive
























HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	2	22	141	30	101	179	455	60	107	1074	203
Future Volume (vph)	56	2	22	141	30	101	179	455	60	107	1074	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	15	12	12	13	11	12	12	11	12	12
Total Lost time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	0.98		1.00	0.98	
Flt Protected		0.95	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1613	1421		1810	1620	1678	3414		1728	3455	
Flt Permitted		0.45	1.00		0.71	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		756	1421		1346	1620	1678	3414		1728	3455	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	70	2	28	176	38	126	197	500	66	118	1180	223
RTOR Reduction (vph)	0	0	18	0	0	82	0	10	0	0	16	0
Lane Group Flow (vph)	0	73	10	0	214	44	197	556	0	118	1387	0
Heavy Vehicles (%)	9%	0%	25%	1%	0%	3%	4%	4%	3%	1%	2%	2%
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA	
Protected Phases		8	8 1		4	4	1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		17.0	33.2		17.0	17.0	10.2	47.9		9.2	46.9	
Effective Green, g (s)		17.0	33.2		17.0	17.0	10.2	47.9		9.2	46.9	
Actuated g/C Ratio		0.18	0.36		0.18	0.18	0.11	0.52		0.10	0.51	
Clearance Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)		2.0			2.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		139	512		248	299	185	1775		172	1759	
v/s Ratio Prot			0.01			0.03	c0.12	0.16		0.07	c0.40	
v/s Ratio Perm		0.10			c0.16							
v/c Ratio		0.53	0.02		0.86	0.15	1.06	0.31		0.69	0.79	
Uniform Delay, d1		33.9	19.0		36.4	31.5	40.9	12.7		40.1	18.5	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.6	0.0		24.5	0.1	84.4	0.1		8.7	2.4	
Delay (s)		35.6	19.0		60.9	31.5	125.4	12.8		48.8	21.0	
Level of Service		D	B		E	C	F	B		D	C	
Approach Delay (s)		31.0			50.0			41.8			23.1	
Approach LOS		C			D			D			C	
Intersection Summary												
HCM 2000 Control Delay			32.0									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			0.84									
Actuated Cycle Length (s)			92.1								18.0	Sum of lost time (s)
Intersection Capacity Utilization			77.1%									ICU Level of Service D
Analysis Period (min)			15									

c Critical Lane Group

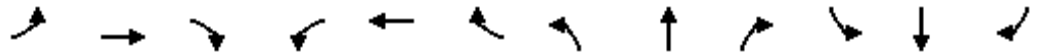
Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	0	48	6	0	10	4	586	1	16	1327	3
Future Volume (vph)	11	0	48	6	0	10	4	586	1	16	1327	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	13	13	11	11	12	12	12	12
Storage Length (ft)	0		50	0		100	210		325	125		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			50			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850			0.850						
Flt Protected		0.950			0.950		0.950			0.950		
Satd. Flow (prot)	0	1719	1583	0	1865	1669	1745	3356	0	1805	1863	0
Flt Permitted		0.752			0.748		0.950			0.950		
Satd. Flow (perm)	0	1361	1583	0	1469	1669	1745	3356	0	1805	1863	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			91			55						
Link Speed (mph)		10			30			30			30	
Link Distance (ft)		598			262			1405			549	
Travel Time (s)		40.8			6.0			31.9			12.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.95	0.95	0.95
Heavy Vehicles (%)	5%	0%	2%	0%	0%	0%	0%	4%	0%	0%	2%	0%
Adj. Flow (vph)	14	0	60	8	0	13	4	644	1	17	1397	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	60	0	8	13	4	645	0	17	1400	0
Turn Type	Perm	NA	Prot	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		8	8		4	4.5	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8	4	4	4.5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0		11.0	16.0		11.0	16.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0		16.0	116.0		16.0	116.0	
Total Split (%)	8.9%	8.9%	8.9%	8.9%	8.9%		8.9%	64.4%		8.9%	64.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0		10.0	110.0		10.0	110.0	
Yellow Time (s)	4.0	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	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5		1.0	1.5		1.5	1.5	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		6.3	6.3		6.3	18.3	5.0	147.7		6.0	153.1	
Actuated g/C Ratio		0.04	0.04		0.04	0.10	0.03	0.82		0.03	0.85	
v/c Ratio		0.30	0.42		0.16	0.06	0.08	0.23		0.28	0.88	
Control Delay		100.2	12.4		90.2	0.5	89.0	5.8		95.9	19.2	

Lanes, Volumes, Timings

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr _t	
Fl _t Protected	
Satd. Flow (prot)	
Fl _t 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 (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	32.0
Total Split (s)	32.0
Total Split (%)	18%
Maximum Green (s)	26.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	1.5
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	5
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	

Lanes, Volumes, Timings

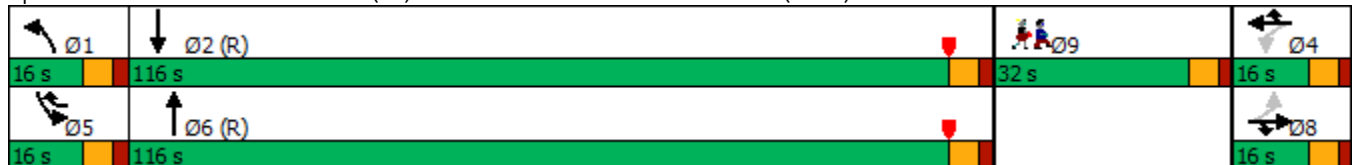


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	17.5	
Total Delay		100.2	12.4		90.2	0.5	89.0	5.8		95.9	36.7	
LOS		F	B		F	A	F	A		F	D	
Approach Delay		29.0			34.7			6.3			37.4	
Approach LOS		C			C			A			D	
Queue Length 50th (ft)		17	0		9	0	5	68		20	464	
Queue Length 95th (ft)		40	3		27	0	20	213		50	#2213	
Internal Link Dist (ft)		518			182			1325			469	
Turn Bay Length (ft)			50			100	210			125		
Base Capacity (vph)		75	173		81	234	96	2753		100	1585	
Starvation Cap Reductn		0	0		0	0	0	0		0	218	
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		0.19	0.35		0.10	0.06	0.04	0.23		0.17	1.02	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow, Master Intersection
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 27.7
 Intersection LOS: C
 Intersection Capacity Utilization 93.4%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.























Splits and Phases: 8: Lowell Road (3A) & Fox Hollow Drive/Fox Hollow Drive (Plaza)



Lanes, Volumes, Timings

Lane Group	Ø9
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	












HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	0	48	6	0	10	4	586	1	16	1327	3
Future Volume (vph)	11	0	48	6	0	10	4	586	1	16	1327	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	14	13	13	11	11	12	12	12	12
Total Lost time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected		0.95	1.00		0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1719	1583		1865	1669	1745	3355		1805	1862	
Flt Permitted		0.75	1.00		0.75	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1362	1583		1469	1669	1745	3355		1805	1862	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.95	0.95	0.95
Adj. Flow (vph)	14	0	60	8	0	12	4	644	1	17	1397	3
RTOR Reduction (vph)	0	0	58	0	0	12	0	0	0	0	0	0
Lane Group Flow (vph)	0	14	2	0	8	1	4	645	0	17	1400	0
Heavy Vehicles (%)	5%	0%	2%	0%	0%	0%	0%	4%	0%	0%	2%	0%
Turn Type	Perm	NA	Prot	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		8	8		4	4 5	1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		6.3	6.3		6.3	16.3	1.0	140.5		4.0	143.5	
Effective Green, g (s)		6.3	6.3		6.3	16.3	1.0	140.5		4.0	143.5	
Actuated g/C Ratio		0.03	0.03		0.03	0.09	0.01	0.78		0.02	0.80	
Clearance Time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)		1.5	1.5		1.5		1.0	1.5		1.5	1.5	
Lane Grp Cap (vph)		47	55		51	151	9	2618		40	1484	
v/s Ratio Prot			0.00			0.00	0.00	0.19		c0.01	c0.75	
v/s Ratio Perm		c0.01		0.01								
v/c Ratio		0.30	0.04		0.16	0.01	0.44	0.25		0.42	0.94	
Uniform Delay, d1		84.7	83.9		84.3	74.5	89.2	5.4		86.9	14.9	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.3	0.1		0.5	0.0	12.2	0.2		2.6	13.3	
Delay (s)		86.0	84.0		84.8	74.5	101.4	5.6		89.5	28.2	
Level of Service		F	F		F	E	F	A		F	C	
Approach Delay (s)		84.4			78.4			6.2			28.9	
Approach LOS		F			E			A			C	
Intersection Summary												
HCM 2000 Control Delay			24.5									C
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			180.0							24.0		
Intersection Capacity Utilization			93.4%									F
Analysis Period (min)			15									

c Critical Lane Group

9: Lowell Road (3A) & Pelham Road
Lanes, Volumes, Timings

2022 AM Build.syn

							Ø9
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (vph)	232	73	520	84	64	1118	
Future Volume (vph)	232	73	520	84	64	1118	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	13	13	12	12	
Storage Length (ft)	0	75		0	150		
Storage Lanes	1	1		0	1		
Taper Length (ft)	25				50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.850	0.981				
Flt Protected	0.950				0.950		
Satd. Flow (prot)	1787	1524	1839	0	1719	1863	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1787	1524	1839	0	1719	1863	
Right Turn on Red		Yes		Yes			
Satd. Flow (RTOR)		29	7				
Link Speed (mph)	20		30			30	
Link Distance (ft)	512		549			1309	
Travel Time (s)	17.5		12.5			29.8	
Peak Hour Factor	0.88	0.88	0.92	0.92	0.96	0.96	
Heavy Vehicles (%)	1%	6%	5%	3%	5%	2%	
Adj. Flow (vph)	264	83	565	91	67	1165	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	264	83	656	0	67	1165	
Turn Type	Prot	pt+ov	NA		Prot	NA	
Protected Phases	4	4 5	6		5	2	9
Permitted Phases							
Detector Phase	4	4 5	6		5	2	
Switch Phase							
Minimum Initial (s)	5.0		10.0		3.0	10.0	5.0
Minimum Split (s)	11.0		16.0		9.0	16.0	35.0
Total Split (s)	26.0		116.0		13.0	116.0	35.0
Total Split (%)	13.7%		61.1%		6.8%	61.1%	18%
Maximum Green (s)	20.0		110.0		7.0	110.0	29.0
Yellow Time (s)	4.0		4.0		4.0	4.0	4.0
All-Red Time (s)	2.0		2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.0		6.0		6.0	6.0	
Lead/Lag			Lag		Lead		
Lead-Lag Optimize?			Yes		Yes		
Vehicle Extension (s)	1.5		1.5		1.5	1.5	3.0
Recall Mode	None		C-Min		None	C-Min	None
Walk Time (s)							5.0
Flash Dont Walk (s)							24.0
Pedestrian Calls (#/hr)							5
Act Effct Green (s)	43.7	61.0	110.0		11.3	127.3	
Actuated g/C Ratio	0.23	0.32	0.58		0.06	0.67	
v/c Ratio	0.64	0.16	0.61		0.66	0.93	
Control Delay	74.7	34.6	29.0		111.3	41.2	

9: Lowell Road (3A) & Pelham Road
Lanes, Volumes, Timings

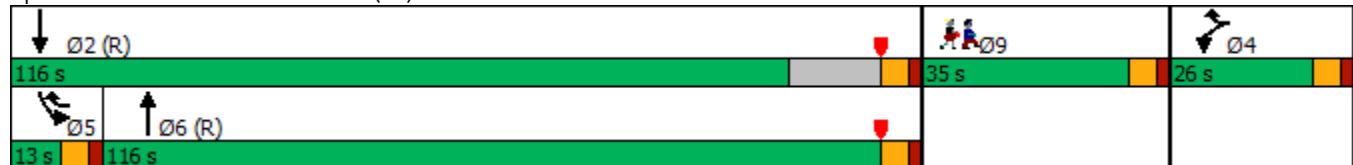


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø9
Queue Delay	0.0	0.0	2.5		0.0	0.0	
Total Delay	74.7	34.6	31.5		111.3	41.2	
LOS	E	C	C		F	D	
Approach Delay	65.1		31.5			45.0	
Approach LOS	E		C			D	
Queue Length 50th (ft)	308	48	470		82	1018	
Queue Length 95th (ft)	#529	109	718		#210	#1813	
Internal Link Dist (ft)	432		469			1229	
Turn Bay Length (ft)		75			150		
Base Capacity (vph)	410	508	1100		102	1281	
Starvation Cap Reductn	0	0	309		0	0	
Spillback Cap Reductn	0	0	0		0	0	
Storage Cap Reductn	0	0	0		0	0	
Reduced v/c Ratio	0.64	0.16	0.83		0.66	0.91	












Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 30 (16%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 44.1
 Intersection LOS: D
 Intersection Capacity Utilization 81.7%
 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.

Splits and Phases: 9: Lowell Road (3A) & Pelham Road



HCM Signalized Intersection Capacity Analysis

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	232	73	520	84	64	1118
Future Volume (vph)	232	73	520	84	64	1118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	13	13	12	12
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	1524	1840		1719	1863
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1787	1524	1840		1719	1863
Peak-hour factor, PHF	0.88	0.88	0.92	0.92	0.96	0.96
Adj. Flow (vph)	264	83	565	91	67	1165
RTOR Reduction (vph)	0	20	3	0	0	0
Lane Group Flow (vph)	264	63	653	0	67	1165
Heavy Vehicles (%)	1%	6%	5%	3%	5%	2%
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	4	4 5	6		5	2
Permitted Phases						
Actuated Green, G (s)	43.7	61.0	105.2		11.3	122.5
Effective Green, g (s)	43.7	61.0	105.2		11.3	122.5
Actuated g/C Ratio	0.23	0.32	0.55		0.06	0.64
Clearance Time (s)	6.0		6.0		6.0	6.0
Vehicle Extension (s)	1.5		1.5		1.5	1.5
Lane Grp Cap (vph)	411	489	1018		102	1201
v/s Ratio Prot	c0.15	0.04	0.35		0.04	c0.63
v/s Ratio Perm						
v/c Ratio	0.64	0.13	0.64		0.66	0.97
Uniform Delay, d1	66.1	45.7	29.3		87.5	32.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.6	0.0	3.1		11.0	19.7
Delay (s)	68.7	45.7	32.4		98.5	51.7
Level of Service	E	D	C		F	D
Approach Delay (s)	63.2		32.4			54.3
Approach LOS	E		C			D
Intersection Summary						
HCM 2000 Control Delay			49.2		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.88			
Actuated Cycle Length (s)			190.0		Sum of lost time (s)	24.0
Intersection Capacity Utilization			81.7%		ICU Level of Service	D
Analysis Period (min)			15			

c Critical Lane Group

10: Lowell Road (3A) & Friars Drive (Site Access)

2022 AM Build.syn

Lanes, Volumes, Timings



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↕	↕	↘
Traffic Volume (vph)	0	23	0	612	1361	10
Future Volume (vph)	0	23	0	612	1361	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	200			200
Storage Lanes	0	1	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				0.850
Flt Protected						
Satd. Flow (prot)	0	1644	0	1827	1863	1468
Flt Permitted						
Satd. Flow (perm)	0	1644	0	1827	1863	1468
Link Speed (mph)	30			30	30	
Link Distance (ft)	704			770	1145	
Travel Time (s)	16.0			17.5	26.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	4%	2%	10%
Adj. Flow (vph)	0	26	0	680	1512	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	26	0	680	1512	11
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	81.6%
Analysis Period (min)	15
	ICU Level of Service D

HCM 6th TWSC

Intersection

Int Delay, s/veh 0.4

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations		↗		↖	↖	↗
Traffic Vol, veh/h	0	23	0	612	1361	10
Future Vol, veh/h	0	23	0	612	1361	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	200
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	4	2	10
Mvmt Flow	0	26	0	680	1512	11

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	-	1512	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.2	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	149	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	149	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s	34.1	0	0
HCM LOS	D		



















Minor Lane/Major Mvmt NBT EBLn1 SBT SBR

Capacity (veh/h)	-	149	-	-
HCM Lane V/C Ratio	-	0.172	-	-
HCM Control Delay (s)	-	34.1	-	-
HCM Lane LOS	-	D	-	-
HCM 95th %tile Q(veh)	-	0.6	-	-

4: 14/Lowell Road (3A) & Sagamore Bridge

2032 AM NoBuild.syn

Lanes, Volumes, Timings

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 		  	 	 	 
Traffic Volume (vph)	1051	1184	1131	408	427	1704
Future Volume (vph)	1051	1184	1131	408	427	1704
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	12	12	12	12
Storage Length (ft)	0	0	525			200
Storage Lanes	2	1	2			1
Taper Length (ft)	25		100			
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Fr _t		0.850				0.850
Fl _t Protected	0.950		0.950			
Satd. Flow (prot)	3662	1656	4894	3539	3539	2760
Fl _t Permitted	0.950		0.950			
Satd. Flow (perm)	3662	1656	4894	3539	3539	2760
Right Turn on Red		No				Yes
Satd. Flow (RTOR)						1198
Link Speed (mph)	35			30	30	
Link Distance (ft)	929			1189	999	
Travel Time (s)	18.1			27.0	22.7	
Peak Hour Factor	0.94	0.94	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	4%	2%	2%	3%
Adj. Flow (vph)	1118	1260	1229	443	464	1852
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1118	1260	1229	443	464	1852
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Detector Phase	3		1	6	2	
Switch Phase						
Minimum Initial (s)	10.0		7.0	10.0	10.0	
Minimum Split (s)	16.0		15.0	17.0	17.0	
Total Split (s)	34.0		34.0	56.0	22.0	
Total Split (%)	37.8%		37.8%	62.2%	24.4%	
Maximum Green (s)	28.0		26.0	49.0	15.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		4.0	3.0	3.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		8.0	7.0	7.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Recall Mode	None		None	C-Min	C-Min	
Act Effct Green (s)	28.2	90.0	26.0	48.8	14.8	90.0
Actuated g/C Ratio	0.31	1.00	0.29	0.54	0.16	1.00
v/c Ratio	0.97	0.76	0.87	0.23	0.80	0.67
Control Delay	52.6	3.4	26.4	4.4	49.3	4.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.6	3.4	26.4	4.4	49.3	4.8
LOS	D	A	C	A	D	A

4: 14/Lowell Road (3A) & Sagamore Bridge
Lanes, Volumes, Timings

2032 AM NoBuild.syn

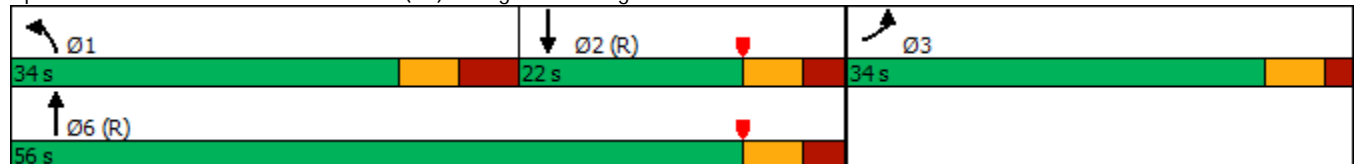


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	26.5			20.6	13.7	
Approach LOS	C			C	B	
Queue Length 50th (ft)	322	0	79	11	126	268
Queue Length 95th (ft)	#461	0	#256	17	m134	m273
Internal Link Dist (ft)	849			1109	919	
Turn Bay Length (ft)			525			200
Base Capacity (vph)	1149	1656	1413	1926	589	2760
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	0.97	0.76	0.87	0.23	0.79	0.67

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 85 (94%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 20.3
 Intersection LOS: C
 Intersection Capacity Utilization 80.0%
 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.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: 14/Lowell Road (3A) & Sagamore Bridge



HCM Signalized Intersection Capacity Analysis



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖↗↘	↕	↕	↖↗
Traffic Volume (vph)	1051	1184	1131	408	427	1704
Future Volume (vph)	1051	1184	1131	408	427	1704
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	14	14	12	12	12	12
Total Lost time (s)	6.0	4.0	8.0	7.0	7.0	4.0
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3662	1656	4894	3539	3539	2760
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3662	1656	4894	3539	3539	2760
Peak-hour factor, PHF	0.94	0.94	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1118	1260	1229	443	464	1852
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1118	1260	1229	443	464	1852
Heavy Vehicles (%)	2%	4%	4%	2%	2%	3%
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Actuated Green, G (s)	28.2	90.0	26.0	48.8	14.8	90.0
Effective Green, g (s)	28.2	90.0	26.0	48.8	14.8	90.0
Actuated g/C Ratio	0.31	1.00	0.29	0.54	0.16	1.00
Clearance Time (s)	6.0		8.0	7.0	7.0	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Lane Grp Cap (vph)	1147	1656	1413	1918	581	2760
v/s Ratio Prot	c0.31		0.25	0.13	0.13	
v/s Ratio Perm		c0.76				0.67
v/c Ratio	0.97	0.76	0.87	0.23	0.80	0.67
Uniform Delay, d1	30.5	0.0	30.4	10.8	36.2	0.0
Progression Factor	1.00	1.00	0.64	0.38	1.25	1.00
Incremental Delay, d2	20.6	3.4	5.3	0.2	3.6	0.4
Delay (s)	51.2	3.4	24.6	4.4	48.8	0.4
Level of Service	D	A	C	A	D	A
Approach Delay (s)	25.8			19.2	10.1	
Approach LOS	C			B	B	
























Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

5: Lowell Road (3A) & Flagstone Drive/Wason Road

2032 AM NoBuild.syn

Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	29	318	677	45	33	334	898	208	17	1217	11
Future Volume (vph)	67	29	318	677	45	33	334	898	208	17	1217	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		250	200		75	575		275	175		300
Storage Lanes	0		1	1		1	1		2	1		1
Taper Length (ft)	25			50			175			75		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91	0.91
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.966		0.950	0.958		0.950			0.950		
Satd. Flow (prot)	0	1835	1583	1641	1657	1501	1787	3539	2787	1752	5078	0
Flt Permitted		0.966		0.950	0.958		0.950			0.950		
Satd. Flow (perm)	0	1835	1583	1641	1657	1501	1787	3539	2787	1752	5078	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109			182			219			1
Link Speed (mph)		30			30			30				30
Link Distance (ft)		805			586			999				1515
Travel Time (s)		18.3			13.3			22.7				34.4
Peak Hour Factor	0.81	0.81	0.81	0.94	0.94	0.94	0.95	0.95	0.95	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	2%	1%	0%	4%	1%	2%	2%	3%	2%	6%
Adj. Flow (vph)	83	36	393	720	48	35	352	945	219	20	1399	13
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	119	393	382	386	35	352	945	219	20	1412	0
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Detector Phase	8	8	1	7	7	5	1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	11.0	16.0	
Total Split (s)	12.0	12.0	20.0	27.0	27.0	11.0	20.0	40.0	27.0	11.0	31.0	
Total Split (%)	13.3%	13.3%	22.2%	30.0%	30.0%	12.2%	22.2%	44.4%	30.0%	12.2%	34.4%	
Maximum Green (s)	6.0	6.0	14.0	21.0	21.0	5.0	14.0	34.0	21.0	5.0	25.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Min	None	None	C-Min	
Act Effct Green (s)		6.0	26.0	21.0	21.0	26.0	14.0	38.4	65.4	5.0	25.0	
Actuated g/C Ratio		0.07	0.29	0.23	0.23	0.29	0.16	0.43	0.73	0.06	0.28	
v/c Ratio		0.98	0.74	1.00	1.00	0.06	1.27	0.63	0.11	0.21	1.00	
Control Delay		120.4	30.2	82.8	82.5	0.2	165.6	16.3	3.8	45.8	57.7	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		120.4	30.2	82.8	82.5	0.2	165.6	16.3	3.8	45.8	57.7	
LOS		F	C	F	F	A	F	B	A	D	E	

5: Lowell Road (3A) & Flagstone Drive/Wason Road

2032 AM NoBuild.syn

Lanes, Volumes, Timings

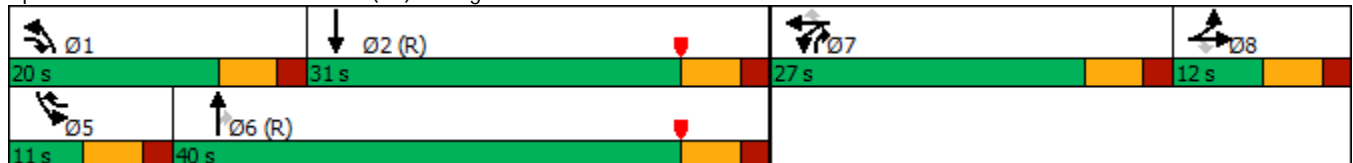


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		51.1			79.0			49.2				57.5
Approach LOS		D			E			D				E
Queue Length 50th (ft)		69	146	229	231	0	~244	243	19	11	~293	
Queue Length 95th (ft)		#152	212	#422	#425	0	m#300	m294	m26	33	#379	
Internal Link Dist (ft)		725			506			919				1435
Turn Bay Length (ft)			250	200		75	575		275	175		
Base Capacity (vph)		122	534	382	386	563	277	1509	2085	97	1411	
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.98	0.74	1.00	1.00	0.06	1.27	0.63	0.11	0.21	1.00	
























Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 80 (89%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.27
 Intersection Signal Delay: 57.8
 Intersection LOS: E
 Intersection Capacity Utilization 83.9%
 ICU Level of Service E
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Lowell Road (3A) & Flagstone Drive/Wason Road



HCM Signalized Intersection Capacity Analysis

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	67	29	318	677	45	33	334	898	208	17	1217	11	
Future Volume (vph)	67	29	318	677	45	33	334	898	208	17	1217	11	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	11	11	11	12	12	12	12	12	12	
Total Lost time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91		
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		
Flt Protected		0.97	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1836	1583	1641	1657	1501	1787	3539	2787	1752	5076		
Flt Permitted		0.97	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (perm)		1836	1583	1641	1657	1501	1787	3539	2787	1752	5076		
Peak-hour factor, PHF	0.81	0.81	0.81	0.94	0.94	0.94	0.95	0.95	0.95	0.87	0.87	0.87	
Adj. Flow (vph)	83	36	393	720	48	35	352	945	219	20	1399	13	
RTOR Reduction (vph)	0	0	85	0	0	26	0	0	80	0	1	0	
Lane Group Flow (vph)	0	119	308	382	386	9	352	945	139	20	1411	0	
Heavy Vehicles (%)	0%	0%	2%	1%	0%	4%	1%	2%	2%	3%	2%	6%	
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA		
Protected Phases	8	8	1	7	7	5	1	6	7	5	2		
Permitted Phases			8			7			6				
Actuated Green, G (s)		6.0	20.0	21.0	21.0	24.0	14.0	36.0	57.0	3.0	25.0		
Effective Green, g (s)		6.0	20.0	21.0	21.0	24.0	14.0	36.0	57.0	3.0	25.0		
Actuated g/C Ratio		0.07	0.22	0.23	0.23	0.27	0.16	0.40	0.63	0.03	0.28		
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)		2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0		
Lane Grp Cap (vph)		122	457	382	386	400	277	1415	1950	58	1410		
v/s Ratio Prot		0.06	c0.10	0.23	c0.23	0.00	c0.20	0.27	0.02	0.01	c0.28		
v/s Ratio Perm			0.09			0.01			0.03				
v/c Ratio		0.98	0.67	1.00	1.00	0.02	1.27	0.67	0.07	0.34	1.00		
Uniform Delay, d1		41.9	32.0	34.5	34.5	24.4	38.0	22.1	6.3	42.5	32.5		
Progression Factor		1.00	1.00	1.00	1.00	1.00	0.68	0.70	4.95	1.00	1.00		
Incremental Delay, d2		73.2	3.6	46.0	45.8	0.0	138.6	1.6	0.0	2.6	24.2		
Delay (s)		115.1	35.6	80.5	80.3	24.4	164.3	17.0	31.4	45.1	56.7		
Level of Service		F	D	F	F	C	F	B	C	D	E		
Approach Delay (s)		54.1			78.0			53.3			56.5		
Approach LOS		D			E			D			E		
Intersection Summary													
HCM 2000 Control Delay			59.1		HCM 2000 Level of Service					E			
HCM 2000 Volume to Capacity ratio			1.06										
Actuated Cycle Length (s)			90.0		Sum of lost time (s)					24.0			
Intersection Capacity Utilization			83.9%		ICU Level of Service					E			
Analysis Period (min)			15										

c Critical Lane Group

6: Lowell Road (3A) & Hampshire Drive/Oblate Drive

2032 AM NoBuild.syn

Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	0	13	2	2	5	129	857	2	2	1285	65
Future Volume (vph)	9	0	13	2	2	5	129	857	2	2	1285	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	13	13	13	12	12	12	11	12	12
Storage Length (ft)	0		100	0		100	225		0	225		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850						0.993
Flt Protected		0.950			0.976		0.950			0.950		
Satd. Flow (prot)	0	1719	1455	0	1916	1669	1752	3505	0	1745	3480	0
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1810	1455	0	1963	1669	1752	3505	0	1745	3480	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			86			86						7
Link Speed (mph)		30			10			30				30
Link Distance (ft)		495			382			1515				1791
Travel Time (s)		11.3			26.0			34.4				40.7
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.90	0.90	0.90	0.83	0.83	0.83
Heavy Vehicles (%)	5%	0%	11%	0%	0%	0%	3%	3%	0%	0%	3%	3%
Adj. Flow (vph)	11	0	16	3	3	6	143	952	2	2	1548	78
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	11	16	0	6	6	143	954	0	2	1626	0
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		4	4 1		8	8 5	1	6		5	2	
Permitted Phases	4			8								
Detector Phase	4	4	4 1	8	8	8 5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		2.0	15.0		2.0	15.0	
Minimum Split (s)	9.0	9.0		9.0	9.0		8.0	21.0		8.0	21.0	
Total Split (s)	16.0	16.0		16.0	16.0		16.0	66.0		16.0	66.0	
Total Split (%)	14.0%	14.0%		14.0%	14.0%		14.0%	57.9%		14.0%	57.9%	
Maximum Green (s)	10.0	10.0		10.0	10.0		12.0	60.0		12.0	60.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)		7.4	11.9		6.3	9.1	11.3	71.8		5.0	53.0	
Actuated g/C Ratio		0.09	0.14		0.08	0.11	0.14	0.86		0.06	0.63	
v/c Ratio		0.07	0.06		0.04	0.02	0.61	0.32		0.02	0.74	
Control Delay		45.2	0.4		47.2	0.2	51.6	5.2		49.0	16.1	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		45.2	0.4		47.2	0.2	51.6	5.2		49.0	16.1	
LOS		D	A		D	A	D	A		D	B	

Lanes, Volumes, Timings



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		18.7			23.7			11.3				16.2
Approach LOS		B			C			B				B
Queue Length 50th (ft)		5	0		3	0	63	0		1		177
Queue Length 95th (ft)		23	0		16	0	#201	229		8		521
Internal Link Dist (ft)		415			302			1435				1711
Turn Bay Length (ft)			100			100	225			225		
Base Capacity (vph)		232	311		252	347	270	2996		269		2680
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		0.05	0.05		0.02	0.02	0.53	0.32		0.01		0.61























Intersection Summary

Area Type:	Other
Cycle Length:	114
Actuated Cycle Length:	83.5
Natural Cycle:	70
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.74
Intersection Signal Delay:	14.3
Intersection LOS:	B
Intersection Capacity Utilization:	65.2%
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.	

Splits and Phases: 6: Lowell Road (3A) & Hampshire Drive/Oblate Drive



HCM Signalized Intersection Capacity Analysis

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	9	0	13	2	2	5	129	857	2	2	1285	65	
Future Volume (vph)	9	0	13	2	2	5	129	857	2	2	1285	65	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	13	13	13	12	12	12	11	12	12	
Total Lost time (s)		6.0	6.0		6.0	6.0	4.0	6.0		4.0	6.0		
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95		
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99		
Flt Protected		0.95	1.00		0.98	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)		1719	1455		1915	1669	1752	3504		1745	3480		
Flt Permitted		1.00	1.00		1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (perm)		1810	1455		1963	1669	1752	3504		1745	3480		
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.90	0.90	0.90	0.83	0.83	0.83	
Adj. Flow (vph)	11	0	16	2	2	6	143	952	2	2	1548	78	
RTOR Reduction (vph)	0	0	14	0	0	5	0	0	0	0	3	0	
Lane Group Flow (vph)	0	11	2	0	6	1	143	954	0	2	1623	0	
Heavy Vehicles (%)	5%	0%	11%	0%	0%	0%	3%	3%	0%	0%	3%	3%	
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA		
Protected Phases		4	4	1	8	8	5	1	6		5	2	
Permitted Phases	4			8									
Actuated Green, G (s)		2.8	14.1		2.0	8.8	11.3	67.2		0.8	56.7		
Effective Green, g (s)		2.8	14.1		2.0	8.8	11.3	67.2		0.8	56.7		
Actuated g/C Ratio		0.03	0.15		0.02	0.09	0.12	0.71		0.01	0.60		
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0		
Vehicle Extension (s)		3.0			3.0		2.0	3.0		2.0	3.0		
Lane Grp Cap (vph)		53	216		41	154	208	2483		14	2081		
v/s Ratio Prot			0.00			0.00	c0.08	0.27		0.00	c0.47		
v/s Ratio Perm		c0.01			c0.00								
v/c Ratio		0.21	0.01		0.15	0.00	0.69	0.38		0.14	0.78		
Uniform Delay, d1		44.9	34.4		45.6	39.0	40.1	5.5		46.7	14.4		
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2		1.9	0.0		1.6	0.0	7.3	0.1		1.7	2.0		
Delay (s)		46.9	34.4		47.2	39.0	47.4	5.6		48.4	16.3		
Level of Service		D	C		D	D	D	A		D	B		
Approach Delay (s)		39.5			43.1			11.1			16.4		
Approach LOS		D			D			B			B		
Intersection Summary													
HCM 2000 Control Delay			14.6									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.73										
Actuated Cycle Length (s)			94.8									Sum of lost time (s)	22.0
Intersection Capacity Utilization			65.2%									ICU Level of Service	C
Analysis Period (min)			15										

c Critical Lane Group

7: Lowell Road (3A) & Executive Drive/PMA Drive

2032 AM NoBuild.syn

Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	2	19	141	30	101	184	497	60	107	1169	224
Future Volume (vph)	58	2	19	141	30	101	184	497	60	107	1169	224
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	15	12	12	13	11	12	12	11	12	12
Storage Length (ft)	0		225	0		80	350		0	150		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.984			0.976	
Flt Protected		0.954			0.961		0.950			0.950		
Satd. Flow (prot)	0	1571	1558	0	1811	1620	1711	3419	0	1728	3454	0
Flt Permitted		0.410			0.712		0.950			0.950		
Satd. Flow (perm)	0	675	1558	0	1342	1620	1711	3419	0	1728	3454	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			30			98		21			34	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		492			577			1791			1168	
Travel Time (s)		11.2			13.1			40.7			26.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	12%	0%	14%	1%	0%	3%	2%	4%	3%	1%	2%	2%
Adj. Flow (vph)	73	3	24	176	38	126	202	546	66	118	1285	246
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	76	24	0	214	126	202	612	0	118	1531	0
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA	
Protected Phases		8	8 1		4	4	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8 1	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		5.0	5.0	5.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	9.0	9.0		11.0	11.0	11.0	9.0	14.0		9.0	14.0	
Total Split (s)	23.0	23.0		23.0	23.0	23.0	18.0	69.0		16.0	67.0	
Total Split (%)	21.3%	21.3%		21.3%	21.3%	21.3%	16.7%	63.9%		14.8%	62.0%	
Maximum Green (s)	17.0	17.0		17.0	17.0	17.0	12.0	63.0		10.0	61.0	
Yellow Time (s)	4.0	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	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None	None	None	Min		None	Min	
Act Effct Green (s)		17.1	35.3		17.1	17.1	12.1	55.9		9.3	53.1	
Actuated g/C Ratio		0.17	0.35		0.17	0.17	0.12	0.56		0.09	0.53	
v/c Ratio		0.66	0.04		0.94	0.35	0.98	0.32		0.74	0.83	
Control Delay		70.6	7.6		89.7	15.8	105.7	11.9		73.3	23.9	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		70.6	7.6		89.7	15.8	105.7	11.9		73.3	23.9	
LOS		E	A		F	B	F	B		E	C	

7: Lowell Road (3A) & Executive Drive/PMA Drive

2032 AM NoBuild.syn

Lanes, Volumes, Timings



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		55.5			62.3			35.2				27.4
Approach LOS		E			E			D				C
Queue Length 50th (ft)		48	0		143	16	~140	102		77		401
Queue Length 95th (ft)		#107	13		#255	55	#301	135		#172		498
Internal Link Dist (ft)		412			497			1711				1088
Turn Bay Length (ft)			225			80	350			150		
Base Capacity (vph)		115	566		228	357	206	2167		173		2125
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		0.66	0.04		0.94	0.35	0.98	0.28		0.68		0.72

Intersection Summary

Area Type:	Other
Cycle Length:	108
Actuated Cycle Length:	100.5
Natural Cycle:	90
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.98
Intersection Signal Delay:	34.6
Intersection LOS:	C
Intersection Capacity Utilization:	80.7%
ICU Level of Service:	D
Analysis Period (min):	15
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	























Splits and Phases: 7: Lowell Road (3A) & Executive Drive/PMA Drive



7: Lowell Road (3A) & Executive Drive/PMA Drive






















2032 AM NoBuild.syn

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	2	19	141	30	101	184	497	60	107	1169	224
Future Volume (vph)	58	2	19	141	30	101	184	497	60	107	1169	224
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	15	12	12	13	11	12	12	11	12	12
Total Lost time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	0.98		1.00	0.98	
Flt Protected		0.95	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1571	1558		1810	1620	1711	3419		1728	3454	
Flt Permitted		0.41	1.00		0.71	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		675	1558		1342	1620	1711	3419		1728	3454	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	72	2	24	176	38	126	202	546	66	118	1285	246
RTOR Reduction (vph)	0	0	16	0	0	81	0	9	0	0	16	0
Lane Group Flow (vph)	0	76	8	0	214	45	202	603	0	118	1515	0
Heavy Vehicles (%)	12%	0%	14%	1%	0%	3%	2%	4%	3%	1%	2%	2%
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA	
Protected Phases		8	8 1		4	4	1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		17.1	35.2		17.1	17.1	12.1	55.9		9.3	53.1	
Effective Green, g (s)		17.1	35.2		17.1	17.1	12.1	55.9		9.3	53.1	
Actuated g/C Ratio		0.17	0.35		0.17	0.17	0.12	0.56		0.09	0.53	
Clearance Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)		2.0			2.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		115	546		228	276	206	1905		160	1828	
v/s Ratio Prot			0.01			0.03	c0.12	c0.18		0.07	c0.44	
v/s Ratio Perm		0.11			c0.16							
v/c Ratio		0.66	0.02		0.94	0.16	0.98	0.32		0.74	0.83	
Uniform Delay, d1		38.9	21.2		41.1	35.5	44.0	11.9		44.3	19.8	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		10.5	0.0		41.9	0.1	56.8	0.1		14.1	3.3	
Delay (s)		49.4	21.2		83.0	35.6	100.7	12.0		58.4	23.0	
Level of Service		D	C		F	D	F	B		E	C	
Approach Delay (s)		42.6			65.4			34.0			25.6	
Approach LOS		D			E			C			C	
Intersection Summary												
HCM 2000 Control Delay			33.2								HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			100.3								Sum of lost time (s)	18.0
Intersection Capacity Utilization			80.7%								ICU Level of Service	D
Analysis Period (min)			15									

c Critical Lane Group

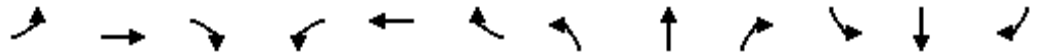
Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	0	48	6	0	10	4	638	1	16	1451	3
Future Volume (vph)	11	0	48	6	0	10	4	638	1	16	1451	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	13	13	11	11	12	12	12	12
Storage Length (ft)	0		50	0		100	210		325	125		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			50			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850			0.850						
Flt Protected		0.950			0.950		0.950			0.950		
Satd. Flow (prot)	0	1719	1583	0	1865	1669	1745	3356	0	1805	1863	0
Flt Permitted		0.752			0.748		0.950			0.950		
Satd. Flow (perm)	0	1361	1583	0	1469	1669	1745	3356	0	1805	1863	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			91			55						
Link Speed (mph)		10			30			30			30	
Link Distance (ft)		598			262			1405			549	
Travel Time (s)		40.8			6.0			31.9			12.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.95	0.95	0.95
Heavy Vehicles (%)	5%	0%	2%	0%	0%	0%	0%	4%	0%	0%	2%	0%
Adj. Flow (vph)	14	0	60	8	0	13	4	701	1	17	1527	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	60	0	8	13	4	702	0	17	1530	0
Turn Type	Perm	NA	Prot	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		8	8		4	4.5	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8	4	4	4.5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0		11.0	16.0		11.0	16.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0		16.0	116.0		16.0	116.0	
Total Split (%)	8.9%	8.9%	8.9%	8.9%	8.9%		8.9%	64.4%		8.9%	64.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0		10.0	110.0		10.0	110.0	
Yellow Time (s)	4.0	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	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5		1.0	1.5		1.5	1.5	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effect Green (s)		6.3	6.3		6.3	18.3	5.0	147.7		6.0	153.1	
Actuated g/C Ratio		0.04	0.04		0.04	0.10	0.03	0.82		0.03	0.85	
v/c Ratio		0.30	0.42		0.16	0.06	0.08	0.25		0.28	0.97	
Control Delay		100.2	12.4		90.2	0.5	89.0	5.9		95.9	28.8	

Lanes, Volumes, Timings

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr _t	
Fl _t Protected	
Satd. Flow (prot)	
Fl _t 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 (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	32.0
Total Split (s)	32.0
Total Split (%)	18%
Maximum Green (s)	26.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	1.5
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	5
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	

Lanes, Volumes, Timings

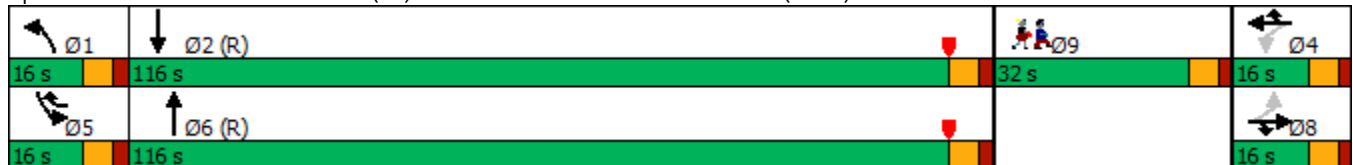


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	27.7	
Total Delay		100.2	12.4		90.2	0.5	89.0	5.9		95.9	56.5	
LOS		F	B		F	A	F	A		F	E	
Approach Delay		29.0			34.7			6.4			57.0	
Approach LOS		C			C			A			E	
Queue Length 50th (ft)		17	0		9	0	5	75		20	703	
Queue Length 95th (ft)		40	3		27	0	20	234		50	#2526	
Internal Link Dist (ft)		518			182			1325			469	
Turn Bay Length (ft)			50			100	210			125		
Base Capacity (vph)		75	173		81	234	96	2753		100	1585	
Starvation Cap Reductn		0	0		0	0	0	0		0	148	
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		0.19	0.35		0.10	0.06	0.04	0.25		0.17	1.06	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow, Master Intersection
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 40.7
 Intersection LOS: D
 Intersection Capacity Utilization 99.9%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.






















Splits and Phases: 8: Lowell Road (3A) & Fox Hollow Drive/Fox Hollow Drive (Plaza)



Lanes, Volumes, Timings

Lane Group	Ø9
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	












HCM Signalized Intersection Capacity Analysis

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	11	0	48	6	0	10	4	638	1	16	1451	3		
Future Volume (vph)	11	0	48	6	0	10	4	638	1	16	1451	3		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width	12	12	12	14	13	13	11	11	12	12	12	12		
Total Lost time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0			
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	1.00			
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00			
Flt Protected		0.95	1.00		0.95	1.00	0.95	1.00		0.95	1.00			
Satd. Flow (prot)		1719	1583		1865	1669	1745	3355		1805	1862			
Flt Permitted		0.75	1.00		0.75	1.00	0.95	1.00		0.95	1.00			
Satd. Flow (perm)		1362	1583		1469	1669	1745	3355		1805	1862			
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.95	0.95	0.95		
Adj. Flow (vph)	14	0	60	8	0	12	4	701	1	17	1527	3		
RTOR Reduction (vph)	0	0	58	0	0	12	0	0	0	0	0	0		
Lane Group Flow (vph)	0	14	2	0	8	1	4	702	0	17	1530	0		
Heavy Vehicles (%)	5%	0%	2%	0%	0%	0%	0%	4%	0%	0%	2%	0%		
Turn Type	Perm	NA	Prot	Perm	NA	pt+ov	Prot	NA		Prot	NA			
Protected Phases		8	8		4	4 5	1	6		5	2			
Permitted Phases	8			4										
Actuated Green, G (s)		6.3	6.3		6.3	16.3	1.0	140.5		4.0	143.5			
Effective Green, g (s)		6.3	6.3		6.3	16.3	1.0	140.5		4.0	143.5			
Actuated g/C Ratio		0.03	0.03		0.03	0.09	0.01	0.78		0.02	0.80			
Clearance Time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0			
Vehicle Extension (s)		1.5	1.5		1.5		1.0	1.5		1.5	1.5			
Lane Grp Cap (vph)		47	55		51	151	9	2618		40	1484			
v/s Ratio Prot			0.00			0.00	0.00	0.21		c0.01	c0.82			
v/s Ratio Perm		c0.01			0.01									
v/c Ratio		0.30	0.04		0.16	0.01	0.44	0.27		0.42	1.03			
Uniform Delay, d1		84.7	83.9		84.3	74.5	89.2	5.5		86.9	18.2			
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00			
Incremental Delay, d2		1.3	0.1		0.5	0.0	12.2	0.3		2.6	31.7			
Delay (s)		86.0	84.0		84.8	74.5	101.4	5.7		89.5	50.0			
Level of Service		F	F		F	E	F	A		F	D			
Approach Delay (s)		84.4			78.4			6.3			50.4			
Approach LOS		F			E			A			D			
Intersection Summary														
HCM 2000 Control Delay			38.4									HCM 2000 Level of Service	D	
HCM 2000 Volume to Capacity ratio			0.97											
Actuated Cycle Length (s)			180.0								24.0		Sum of lost time (s)	
Intersection Capacity Utilization			99.9%										ICU Level of Service	F
Analysis Period (min)			15											

c Critical Lane Group

9: Lowell Road (3A) & Pelham Road
Lanes, Volumes, Timings

2032 AM NoBuild.syn

							Ø9
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (vph)	256	81	565	93	71	1220	
Future Volume (vph)	256	81	565	93	71	1220	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	13	13	12	12	
Storage Length (ft)	0	75		0	150		
Storage Lanes	1	1		0	1		
Taper Length (ft)	25				50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.850	0.981				
Flt Protected	0.950				0.950		
Satd. Flow (prot)	1787	1524	1839	0	1719	1863	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1787	1524	1839	0	1719	1863	
Right Turn on Red		Yes		Yes			
Satd. Flow (RTOR)		29	7				
Link Speed (mph)	20		30			30	
Link Distance (ft)	512		549			1309	
Travel Time (s)	17.5		12.5			29.8	
Peak Hour Factor	0.88	0.88	0.92	0.92	0.96	0.96	
Heavy Vehicles (%)	1%	6%	5%	3%	5%	2%	
Adj. Flow (vph)	291	92	614	101	74	1271	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	291	92	715	0	74	1271	
Turn Type	Prot	pt+ov	NA		Prot	NA	
Protected Phases	4	4 5	6		5	2	9
Permitted Phases							
Detector Phase	4	4 5	6		5	2	
Switch Phase							
Minimum Initial (s)	5.0		10.0		3.0	10.0	5.0
Minimum Split (s)	11.0		16.0		9.0	16.0	35.0
Total Split (s)	26.0		116.0		13.0	116.0	35.0
Total Split (%)	13.7%		61.1%		6.8%	61.1%	18%
Maximum Green (s)	20.0		110.0		7.0	110.0	29.0
Yellow Time (s)	4.0		4.0		4.0	4.0	4.0
All-Red Time (s)	2.0		2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.0		6.0		6.0	6.0	
Lead/Lag			Lag		Lead		
Lead-Lag Optimize?			Yes		Yes		
Vehicle Extension (s)	1.5		1.5		1.5	1.5	3.0
Recall Mode	None		C-Min		None	C-Min	None
Walk Time (s)							5.0
Flash Dont Walk (s)							24.0
Pedestrian Calls (#/hr)							5
Act Effct Green (s)	46.5	64.7	106.3		12.2	124.5	
Actuated g/C Ratio	0.24	0.34	0.56		0.06	0.66	
v/c Ratio	0.67	0.17	0.69		0.67	1.04	
Control Delay	72.6	34.8	34.0		110.1	69.1	

9: Lowell Road (3A) & Pelham Road
Lanes, Volumes, Timings

2032 AM NoBuild.syn

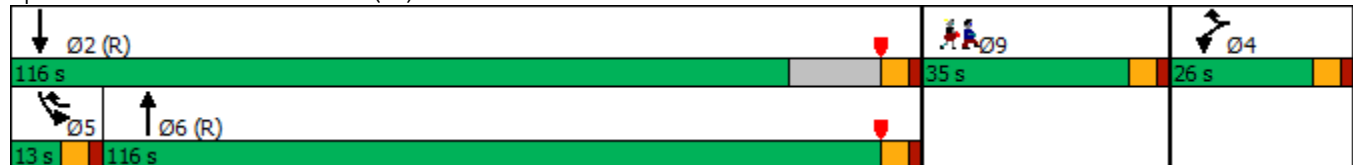


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø9
Queue Delay	0.0	0.0	3.9		0.0	0.0	
Total Delay	72.6	34.8	38.0		110.1	69.1	
LOS	E	C	D		F	E	
Approach Delay	63.5		38.0			71.4	
Approach LOS	E		D			E	
Queue Length 50th (ft)	334	53	588		91	1436	
Queue Length 95th (ft)	#616	124	811		#233	#2072	
Internal Link Dist (ft)	432		469			1229	
Turn Bay Length (ft)		75			150		
Base Capacity (vph)	437	538	1075		110	1251	
Starvation Cap Reductn	0	0	271		0	0	
Spillback Cap Reductn	0	0	0		0	0	
Storage Cap Reductn	0	0	0		0	0	
Reduced v/c Ratio	0.67	0.17	0.89		0.67	1.02	

Intersection Summary












Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 30 (16%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.04
 Intersection Signal Delay: 60.4
 Intersection LOS: E
 Intersection Capacity Utilization 88.4%
 ICU Level of Service E
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 9: Lowell Road (3A) & Pelham Road



9: Lowell Road (3A) & Pelham Road

HCM Signalized Intersection Capacity Analysis

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	256	81	565	93	71	1220
Future Volume (vph)	256	81	565	93	71	1220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	13	13	12	12
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	1524	1839		1719	1863
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1787	1524	1839		1719	1863
Peak-hour factor, PHF	0.88	0.88	0.92	0.92	0.96	0.96
Adj. Flow (vph)	291	92	614	101	74	1271
RTOR Reduction (vph)	0	19	3	0	0	0
Lane Group Flow (vph)	291	73	712	0	74	1271
Heavy Vehicles (%)	1%	6%	5%	3%	5%	2%
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	4	4 5	6		5	2
Permitted Phases						
Actuated Green, G (s)	46.5	64.7	101.5		12.2	119.7
Effective Green, g (s)	46.5	64.7	101.5		12.2	119.7
Actuated g/C Ratio	0.24	0.34	0.53		0.06	0.63
Clearance Time (s)	6.0		6.0		6.0	6.0
Vehicle Extension (s)	1.5		1.5		1.5	1.5
Lane Grp Cap (vph)	437	518	982		110	1173
v/s Ratio Prot	c0.16	0.05	0.39		0.04	c0.68
v/s Ratio Perm						
v/c Ratio	0.67	0.14	0.72		0.67	1.08
Uniform Delay, d1	64.7	43.4	33.6		86.9	35.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.0	0.0	4.7		12.0	52.0
Delay (s)	67.7	43.4	38.3		99.0	87.1
Level of Service	E	D	D		F	F
Approach Delay (s)	61.9		38.3			87.8
Approach LOS	E		D			F
Intersection Summary						
HCM 2000 Control Delay			69.2		HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			0.97			
Actuated Cycle Length (s)			190.0		Sum of lost time (s)	24.0
Intersection Capacity Utilization			88.4%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

10: Lowell Road (3A) & Friars Drive (Site Access)

2032 AM NoBuild.syn

Lanes, Volumes, Timings



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	15	0	656	1485	4
Future Volume (vph)	0	15	0	656	1485	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	200			200
Storage Lanes	0	1	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				0.850
Flt Protected						
Satd. Flow (prot)	0	1644	0	1827	1863	1615
Flt Permitted						
Satd. Flow (perm)	0	1644	0	1827	1863	1615
Link Speed (mph)	30			30	30	
Link Distance (ft)	704			770	1145	
Travel Time (s)	16.0			17.5	26.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	4%	2%	0%
Adj. Flow (vph)	0	17	0	729	1650	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	17	0	729	1650	4
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	88.2%
Analysis Period (min)	15
	ICU Level of Service E

HCM 6th TWSC

Intersection

Int Delay, s/veh 0.3

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations		↗		↖	↖	↗
Traffic Vol, veh/h	0	15	0	656	1485	4
Future Vol, veh/h	0	15	0	656	1485	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	200
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	4	2	0
Mvmt Flow	0	17	0	729	1650	4

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	-	1650	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.2	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	123	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	123	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s	38.8	0	0
HCM LOS	E		



















Minor Lane/Major Mvmt NBT EBLn1 SBT SBR

Capacity (veh/h)	-	123	-	-
HCM Lane V/C Ratio	-	0.136	-	-
HCM Control Delay (s)	-	38.8	-	-
HCM Lane LOS	-	E	-	-
HCM 95th %tile Q(veh)	-	0.5	-	-

4: 14/Lowell Road (3A) & Sagamore Bridge

2032 AM Build.syn

Lanes, Volumes, Timings

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 		  	 	 	 
Traffic Volume (vph)	1077	1184	1131	413	429	1714
Future Volume (vph)	1077	1184	1131	413	429	1714
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	12	12	12	12
Storage Length (ft)	0	0	525			200
Storage Lanes	2	1	2			1
Taper Length (ft)	25		100			
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Fr _t		0.850				0.850
Fl _t Protected	0.950		0.950			
Satd. Flow (prot)	3662	1656	4894	3539	3539	2760
Fl _t Permitted	0.950		0.950			
Satd. Flow (perm)	3662	1656	4894	3539	3539	2760
Right Turn on Red		No				Yes
Satd. Flow (RTOR)						1198
Link Speed (mph)	35			30	30	
Link Distance (ft)	929			1189	999	
Travel Time (s)	18.1			27.0	22.7	
Peak Hour Factor	0.94	0.94	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	4%	2%	2%	3%
Adj. Flow (vph)	1146	1260	1229	449	466	1863
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1146	1260	1229	449	466	1863
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Detector Phase	3		1	6	2	
Switch Phase						
Minimum Initial (s)	10.0		7.0	10.0	10.0	
Minimum Split (s)	16.0		15.0	17.0	17.0	
Total Split (s)	34.0		34.0	56.0	22.0	
Total Split (%)	37.8%		37.8%	62.2%	24.4%	
Maximum Green (s)	28.0		26.0	49.0	15.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		4.0	3.0	3.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		8.0	7.0	7.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Recall Mode	None		None	C-Min	C-Min	
Act Effct Green (s)	28.2	90.0	26.0	48.8	14.8	90.0
Actuated g/C Ratio	0.31	1.00	0.29	0.54	0.16	1.00
v/c Ratio	1.00	0.76	0.87	0.23	0.80	0.68
Control Delay	58.4	3.4	26.4	4.4	49.3	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.4	3.4	26.4	4.4	49.3	5.0
LOS	E	A	C	A	D	A

4: 14/Lowell Road (3A) & Sagamore Bridge
Lanes, Volumes, Timings

2032 AM Build.syn

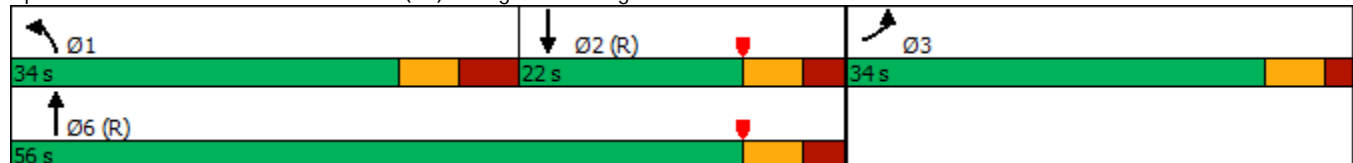


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	29.6			20.5	13.9	
Approach LOS	C			C	B	
Queue Length 50th (ft)	~337	0	79	11	127	272
Queue Length 95th (ft)	#479	0	#256	17	m133	m275
Internal Link Dist (ft)	849			1109	919	
Turn Bay Length (ft)			525			200
Base Capacity (vph)	1148	1656	1413	1926	589	2760
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	1.00	0.76	0.87	0.23	0.79	0.68

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Offset:	85 (94%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.00
Intersection Signal Delay:	21.5
Intersection LOS:	C
Intersection Capacity Utilization:	80.8%
ICU Level of Service:	D
Analysis Period (min):	15
~	Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.
#	95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m	Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: 14/Lowell Road (3A) & Sagamore Bridge



HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	1077	1184	1131	413	429	1714
Future Volume (vph)	1077	1184	1131	413	429	1714
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	14	14	12	12	12	12
Total Lost time (s)	6.0	4.0	8.0	7.0	7.0	4.0
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3662	1656	4894	3539	3539	2760
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3662	1656	4894	3539	3539	2760
Peak-hour factor, PHF	0.94	0.94	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1146	1260	1229	449	466	1863
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1146	1260	1229	449	466	1863
Heavy Vehicles (%)	2%	4%	4%	2%	2%	3%
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Actuated Green, G (s)	28.2	90.0	26.0	48.8	14.8	90.0
Effective Green, g (s)	28.2	90.0	26.0	48.8	14.8	90.0
Actuated g/C Ratio	0.31	1.00	0.29	0.54	0.16	1.00
Clearance Time (s)	6.0		8.0	7.0	7.0	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Lane Grp Cap (vph)	1147	1656	1413	1918	581	2760
v/s Ratio Prot	c0.31		0.25	0.13	0.13	
v/s Ratio Perm		c0.76				0.68
v/c Ratio	1.00	0.76	0.87	0.23	0.80	0.68
Uniform Delay, d1	30.9	0.0	30.4	10.8	36.2	0.0
Progression Factor	1.00	1.00	0.64	0.38	1.25	1.00
Incremental Delay, d2	26.2	3.4	5.3	0.2	3.6	0.4
Delay (s)	57.1	3.4	24.6	4.4	48.8	0.4
Level of Service	E	A	C	A	D	A
Approach Delay (s)	28.9			19.2	10.1	
Approach LOS	C			B	B	
Intersection Summary						
HCM 2000 Control Delay			19.5		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			1.02			
Actuated Cycle Length (s)			90.0		Sum of lost time (s)	21.0
Intersection Capacity Utilization			80.8%		ICU Level of Service	D
Analysis Period (min)			15			

c Critical Lane Group

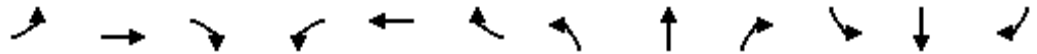
5: Lowell Road (3A) & Flagstone Drive/Wason Road

2032 AM Build.syn

Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗	↖	↕	↗	↖	↕	↗	↖	↕	↗
Traffic Volume (vph)	67	29	319	677	45	33	348	915	208	17	1229	11
Future Volume (vph)	67	29	319	677	45	33	348	915	208	17	1229	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		250	200		75	575		275	175		300
Storage Lanes	0		1	1		1	1		2	1		1
Taper Length (ft)	25			50			175			75		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91	0.91
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.966		0.950	0.958		0.950			0.950		
Satd. Flow (prot)	0	1835	1583	1641	1657	1501	1787	3539	2787	1752	5078	0
Flt Permitted		0.966		0.950	0.958		0.950			0.950		
Satd. Flow (perm)	0	1835	1583	1641	1657	1501	1787	3539	2787	1752	5078	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109			182			219			1
Link Speed (mph)		30			30			30				30
Link Distance (ft)		805			586			999				1515
Travel Time (s)		18.3			13.3			22.7				34.4
Peak Hour Factor	0.81	0.81	0.81	0.94	0.94	0.94	0.95	0.95	0.95	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	2%	1%	0%	4%	1%	2%	2%	3%	2%	6%
Adj. Flow (vph)	83	36	394	720	48	35	366	963	219	20	1413	13
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	119	394	382	386	35	366	963	219	20	1426	0
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Detector Phase	8	8	1	7	7	5	1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	11.0	16.0	
Total Split (s)	12.0	12.0	20.0	27.0	27.0	11.0	20.0	40.0	27.0	11.0	31.0	
Total Split (%)	13.3%	13.3%	22.2%	30.0%	30.0%	12.2%	22.2%	44.4%	30.0%	12.2%	34.4%	
Maximum Green (s)	6.0	6.0	14.0	21.0	21.0	5.0	14.0	34.0	21.0	5.0	25.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Min	None	None	C-Min	
Act Effect Green (s)		6.0	26.0	21.0	21.0	26.0	14.0	38.4	65.4	5.0	25.0	
Actuated g/C Ratio		0.07	0.29	0.23	0.23	0.29	0.16	0.43	0.73	0.06	0.28	
v/c Ratio		0.98	0.74	1.00	1.00	0.06	1.32	0.64	0.11	0.21	1.01	
Control Delay		120.4	30.3	82.8	82.5	0.2	185.7	16.4	3.8	45.8	60.0	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		120.4	30.3	82.8	82.5	0.2	185.7	16.4	3.8	45.8	60.0	
LOS		F	C	F	F	A	F	B	A	D	E	

Lanes, Volumes, Timings

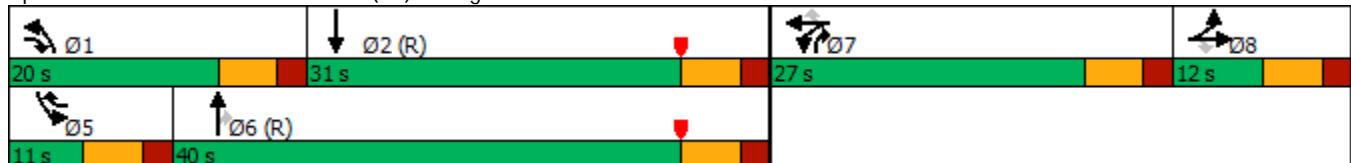


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		51.2			79.0			54.6				59.8
Approach LOS		D			E			D				E
Queue Length 50th (ft)		69	147	229	231	0	-261	256	19	11		-302
Queue Length 95th (ft)		#152	214	#422	#425	0	m#308	m295	m25	33		#385
Internal Link Dist (ft)		725			506			919				1435
Turn Bay Length (ft)			250	200		75	575		275	175		
Base Capacity (vph)		122	534	382	386	563	277	1509	2085	97		1411
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		0.98	0.74	1.00	1.00	0.06	1.32	0.64	0.11	0.21		1.01
























Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 80 (89%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.32
 Intersection Signal Delay: 60.5
 Intersection LOS: E
 Intersection Capacity Utilization 84.9%
 ICU Level of Service E
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Lowell Road (3A) & Flagstone Drive/Wason Road



HCM Signalized Intersection Capacity Analysis

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	67	29	319	677	45	33	348	915	208	17	1229	11	
Future Volume (vph)	67	29	319	677	45	33	348	915	208	17	1229	11	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	11	11	11	12	12	12	12	12	12	
Total Lost time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91		
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		
Flt Protected		0.97	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1836	1583	1641	1657	1501	1787	3539	2787	1752	5077		
Flt Permitted		0.97	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (perm)		1836	1583	1641	1657	1501	1787	3539	2787	1752	5077		
Peak-hour factor, PHF	0.81	0.81	0.81	0.94	0.94	0.94	0.95	0.95	0.95	0.87	0.87	0.87	
Adj. Flow (vph)	83	36	394	720	48	35	366	963	219	20	1413	13	
RTOR Reduction (vph)	0	0	85	0	0	26	0	0	80	0	1	0	
Lane Group Flow (vph)	0	119	309	382	386	9	366	963	139	20	1425	0	
Heavy Vehicles (%)	0%	0%	2%	1%	0%	4%	1%	2%	2%	3%	2%	6%	
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA		
Protected Phases	8	8	1	7	7	5	1	6	7	5	2		
Permitted Phases			8			7			6				
Actuated Green, G (s)		6.0	20.0	21.0	21.0	24.0	14.0	36.0	57.0	3.0	25.0		
Effective Green, g (s)		6.0	20.0	21.0	21.0	24.0	14.0	36.0	57.0	3.0	25.0		
Actuated g/C Ratio		0.07	0.22	0.23	0.23	0.27	0.16	0.40	0.63	0.03	0.28		
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)		2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0		
Lane Grp Cap (vph)		122	457	382	386	400	277	1415	1950	58	1410		
v/s Ratio Prot		0.06	c0.11	0.23	c0.23	0.00	c0.20	0.27	0.02	0.01	c0.28		
v/s Ratio Perm			0.09			0.01			0.03				
v/c Ratio		0.98	0.68	1.00	1.00	0.02	1.32	0.68	0.07	0.34	1.01		
Uniform Delay, d1		41.9	32.0	34.5	34.5	24.4	38.0	22.3	6.3	42.5	32.5		
Progression Factor		1.00	1.00	1.00	1.00	1.00	0.68	0.70	4.92	1.00	1.00		
Incremental Delay, d2		73.2	3.6	46.0	45.8	0.0	159.1	1.6	0.0	2.6	26.7		
Delay (s)		115.1	35.6	80.5	80.3	24.4	184.8	17.1	31.2	45.1	59.2		
Level of Service		F	D	F	F	C	F	B	C	D	E		
Approach Delay (s)		54.1			78.0			58.8			59.0		
Approach LOS		D			E			E			E		
Intersection Summary													
HCM 2000 Control Delay			61.9		HCM 2000 Level of Service					E			
HCM 2000 Volume to Capacity ratio			1.08										
Actuated Cycle Length (s)			90.0		Sum of lost time (s)					24.0			
Intersection Capacity Utilization			84.9%		ICU Level of Service					E			
Analysis Period (min)			15										

c Critical Lane Group

6: Lowell Road (3A) & Hampshire Drive/Oblate Drive

2032 AM Build.syn

Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	0	13	2	2	5	134	869	2	2	1297	65
Future Volume (vph)	9	0	13	2	2	5	134	869	2	2	1297	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	13	13	13	12	12	12	11	12	12
Storage Length (ft)	0		100	0		100	225		0	225		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850						0.993
Flt Protected		0.950			0.976		0.950			0.950		
Satd. Flow (prot)	0	1719	1455	0	1916	1669	1752	3505	0	1745	3480	0
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1810	1455	0	1963	1669	1752	3505	0	1745	3480	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			86			86						7
Link Speed (mph)		30			10			30				30
Link Distance (ft)		495			382			1515				1791
Travel Time (s)		11.3			26.0			34.4				40.7
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.90	0.90	0.90	0.83	0.83	0.83
Heavy Vehicles (%)	5%	0%	11%	0%	0%	0%	3%	3%	0%	0%	3%	3%
Adj. Flow (vph)	11	0	16	3	3	6	149	966	2	2	1563	78
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	11	16	0	6	6	149	968	0	2	1641	0
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		4	4 1		8	8 5	1	6		5	2	
Permitted Phases	4			8								
Detector Phase	4	4	4 1	8	8	8 5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		2.0	15.0		2.0	15.0	
Minimum Split (s)	9.0	9.0		9.0	9.0		8.0	21.0		8.0	21.0	
Total Split (s)	16.0	16.0		16.0	16.0		16.0	66.0		16.0	66.0	
Total Split (%)	14.0%	14.0%		14.0%	14.0%		14.0%	57.9%		14.0%	57.9%	
Maximum Green (s)	10.0	10.0		10.0	10.0		12.0	60.0		12.0	60.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effect Green (s)		7.3	12.3		6.3	9.1	11.6	72.2		5.0	53.2	
Actuated g/C Ratio		0.09	0.15		0.08	0.11	0.14	0.86		0.06	0.63	
v/c Ratio		0.07	0.06		0.04	0.02	0.62	0.32		0.02	0.74	
Control Delay		45.3	0.4		47.4	0.2	52.0	5.2		49.0	16.5	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		45.3	0.4		47.4	0.2	52.0	5.2		49.0	16.5	
LOS		D	A		D	A	D	A		D	B	

Lanes, Volumes, Timings

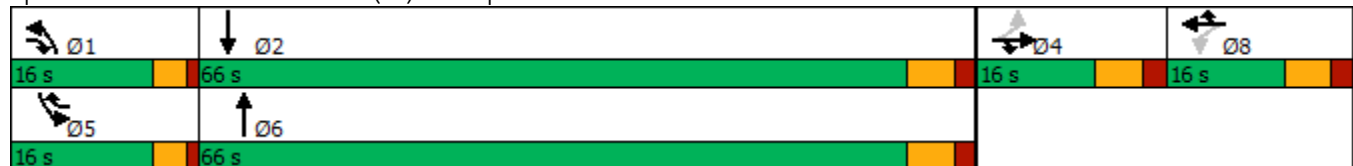


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		18.7			23.8			11.5				16.5
Approach LOS		B			C			B				B
Queue Length 50th (ft)		5	0		3	0	67	0		1		181
Queue Length 95th (ft)		23	0		16	0	#212	233		8		530
Internal Link Dist (ft)		415			302			1435				1711
Turn Bay Length (ft)			100			100	225			225		
Base Capacity (vph)		230	310		250	345	268	2980		266		2659
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		0.05	0.05		0.02	0.02	0.56	0.32		0.01		0.62























Intersection Summary

Area Type:	Other
Cycle Length:	114
Actuated Cycle Length:	84
Natural Cycle:	75
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.74
Intersection Signal Delay:	14.5
Intersection LOS:	B
Intersection Capacity Utilization	65.8%
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.	

Splits and Phases: 6: Lowell Road (3A) & Hampshire Drive/Oblate Drive



HCM Signalized Intersection Capacity Analysis

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	9	0	13	2	2	5	134	869	2	2	1297	65		
Future Volume (vph)	9	0	13	2	2	5	134	869	2	2	1297	65		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width	12	12	12	13	13	13	12	12	12	11	12	12		
Total Lost time (s)		6.0	6.0		6.0	6.0	4.0	6.0		4.0	6.0			
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95			
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99			
Flt Protected		0.95	1.00		0.98	1.00	0.95	1.00		0.95	1.00			
Satd. Flow (prot)		1719	1455		1915	1669	1752	3504		1745	3480			
Flt Permitted		1.00	1.00		1.00	1.00	0.95	1.00		0.95	1.00			
Satd. Flow (perm)		1810	1455		1963	1669	1752	3504		1745	3480			
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.90	0.90	0.90	0.83	0.83	0.83		
Adj. Flow (vph)	11	0	16	2	2	6	149	966	2	2	1563	78		
RTOR Reduction (vph)	0	0	14	0	0	5	0	0	0	0	3	0		
Lane Group Flow (vph)	0	11	2	0	6	1	149	968	0	2	1638	0		
Heavy Vehicles (%)	5%	0%	11%	0%	0%	0%	3%	3%	0%	0%	3%	3%		
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA			
Protected Phases		4	4	1	8	8	5	1	6		5	2		
Permitted Phases	4			8										
Actuated Green, G (s)		2.8	14.4		2.0	8.8	11.6	67.6		0.8	56.8			
Effective Green, g (s)		2.8	14.4		2.0	8.8	11.6	67.6		0.8	56.8			
Actuated g/C Ratio		0.03	0.15		0.02	0.09	0.12	0.71		0.01	0.60			
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0			
Vehicle Extension (s)		3.0			3.0		2.0	3.0		2.0	3.0			
Lane Grp Cap (vph)		53	220		41	154	213	2488		14	2076			
v/s Ratio Prot			0.00			0.00	c0.09	0.28		0.00	c0.47			
v/s Ratio Perm		c0.01			c0.00									
v/c Ratio		0.21	0.01		0.15	0.00	0.70	0.39		0.14	0.79			
Uniform Delay, d1		45.1	34.3		45.8	39.2	40.1	5.5		46.9	14.6			
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00			
Incremental Delay, d2		1.9	0.0		1.6	0.0	7.8	0.1		1.7	2.1			
Delay (s)		47.1	34.4		47.4	39.2	48.0	5.6		48.6	16.7			
Level of Service		D	C		D	D	D	A		D	B			
Approach Delay (s)		39.5			43.3			11.3			16.7			
Approach LOS		D			D			B			B			
Intersection Summary														
HCM 2000 Control Delay			14.9									HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio			0.73											
Actuated Cycle Length (s)			95.2								22.0		Sum of lost time (s)	
Intersection Capacity Utilization			65.8%										ICU Level of Service	C
Analysis Period (min)			15											

c Critical Lane Group

7: Lowell Road (3A) & Executive Drive/PMA Drive

2032 AM Build.syn

Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	2	23	141	30	101	196	497	60	107	1177	224
Future Volume (vph)	60	2	23	141	30	101	196	497	60	107	1177	224
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	15	12	12	13	11	12	12	11	12	12
Storage Length (ft)	0		225	0		80	350		0	150		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.984			0.976	
Flt Protected		0.954			0.961		0.950			0.950		
Satd. Flow (prot)	0	1613	1421	0	1811	1620	1678	3419	0	1728	3454	0
Flt Permitted		0.407			0.711		0.950			0.950		
Satd. Flow (perm)	0	688	1421	0	1340	1620	1678	3419	0	1728	3454	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			30			98		21			33	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		492			577			1791			1168	
Travel Time (s)		11.2			13.1			40.7			26.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	9%	0%	25%	1%	0%	3%	4%	4%	3%	1%	2%	2%
Adj. Flow (vph)	75	3	29	176	38	126	215	546	66	118	1293	246
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	78	29	0	214	126	215	612	0	118	1539	0
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA	
Protected Phases		8	8 1		4	4	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8 1	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		5.0	5.0	5.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	9.0	9.0		11.0	11.0	11.0	9.0	14.0		9.0	14.0	
Total Split (s)	23.0	23.0		23.0	23.0	23.0	18.0	69.0		16.0	67.0	
Total Split (%)	21.3%	21.3%		21.3%	21.3%	21.3%	16.7%	63.9%		14.8%	62.0%	
Maximum Green (s)	17.0	17.0		17.0	17.0	17.0	12.0	63.0		10.0	61.0	
Yellow Time (s)	4.0	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	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None	None	None	Min		None	Min	
Act Effct Green (s)		17.1	35.2		17.1	17.1	12.1	56.4		9.3	53.6	
Actuated g/C Ratio		0.17	0.35		0.17	0.17	0.12	0.56		0.09	0.53	
v/c Ratio		0.67	0.06		0.94	0.35	1.07	0.32		0.74	0.83	
Control Delay		70.9	9.0		91.6	15.9	129.0	11.9		73.9	23.9	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		70.9	9.0		91.6	15.9	129.0	11.9		73.9	23.9	
LOS		E	A		F	B	F	B		E	C	

Lanes, Volumes, Timings



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		54.1			63.5			42.3				27.5
Approach LOS		D			E			D				C
Queue Length 50th (ft)		50	0		144	16	~165	102		78		406
Queue Length 95th (ft)		#110	16		#255	55	#326	135		#172		503
Internal Link Dist (ft)		412			497			1711				1088
Turn Bay Length (ft)			225			80	350			150		
Base Capacity (vph)		116	515		227	356	200	2157		172		2115
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		0.67	0.06		0.94	0.35	1.07	0.28		0.69		0.73























Intersection Summary

Area Type:	Other
Cycle Length:	108
Actuated Cycle Length:	100.9
Natural Cycle:	80
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.07
Intersection Signal Delay:	36.8
Intersection LOS:	D
Intersection Capacity Utilization	81.6%
ICU Level of Service	D
Analysis Period (min)	15
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 7: Lowell Road (3A) & Executive Drive/PMA Drive



HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	2	23	141	30	101	196	497	60	107	1177	224
Future Volume (vph)	60	2	23	141	30	101	196	497	60	107	1177	224
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	15	12	12	13	11	12	12	11	12	12
Total Lost time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	0.98		1.00	0.98	
Flt Protected		0.95	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1613	1421		1810	1620	1678	3419		1728	3454	
Flt Permitted		0.41	1.00		0.71	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		688	1421		1340	1620	1678	3419		1728	3454	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	75	2	29	176	38	126	215	546	66	118	1293	246
RTOR Reduction (vph)	0	0	19	0	0	81	0	9	0	0	15	0
Lane Group Flow (vph)	0	78	10	0	214	45	215	603	0	118	1524	0
Heavy Vehicles (%)	9%	0%	25%	1%	0%	3%	4%	4%	3%	1%	2%	2%
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA	
Protected Phases		8	8 1		4	4	1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		17.1	35.2		17.1	17.1	12.1	56.4		9.3	53.6	
Effective Green, g (s)		17.1	35.2		17.1	17.1	12.1	56.4		9.3	53.6	
Actuated g/C Ratio		0.17	0.35		0.17	0.17	0.12	0.56		0.09	0.53	
Clearance Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)		2.0			2.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		116	496		227	274	201	1913		159	1836	
v/s Ratio Prot			0.01			0.03	c0.13	c0.18		0.07	c0.44	
v/s Ratio Perm		0.11			c0.16							
v/c Ratio		0.67	0.02		0.94	0.16	1.07	0.32		0.74	0.83	
Uniform Delay, d1		39.2	21.5		41.4	35.7	44.4	11.9		44.6	19.8	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		11.4	0.0		43.4	0.1	83.2	0.1		15.0	3.3	
Delay (s)		50.6	21.5		84.8	35.8	127.5	12.0		59.6	23.0	
Level of Service		D	C		F	D	F	B		E	C	
Approach Delay (s)		42.7			66.6			42.0			25.6	
Approach LOS		D			E			D			C	
Intersection Summary												
HCM 2000 Control Delay			35.6								HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			100.8								Sum of lost time (s)	18.0
Intersection Capacity Utilization			81.6%								ICU Level of Service	D
Analysis Period (min)			15									

c Critical Lane Group

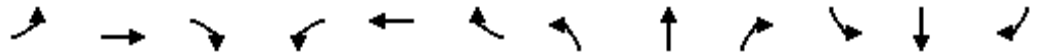
Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	0	48	6	0	10	4	640	1	16	1457	3
Future Volume (vph)	11	0	48	6	0	10	4	640	1	16	1457	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	13	13	11	11	12	12	12	12
Storage Length (ft)	0		50	0		100	210		325	125		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			50			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850			0.850						
Flt Protected		0.950			0.950		0.950			0.950		
Satd. Flow (prot)	0	1719	1583	0	1865	1669	1745	3356	0	1805	1863	0
Flt Permitted		0.752			0.748		0.950			0.950		
Satd. Flow (perm)	0	1361	1583	0	1469	1669	1745	3356	0	1805	1863	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			91			55						
Link Speed (mph)		10			30			30				30
Link Distance (ft)		598			262			1405				549
Travel Time (s)		40.8			6.0			31.9				12.5
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.95	0.95	0.95
Heavy Vehicles (%)	5%	0%	2%	0%	0%	0%	0%	4%	0%	0%	2%	0%
Adj. Flow (vph)	14	0	60	8	0	13	4	703	1	17	1534	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	60	0	8	13	4	704	0	17	1537	0
Turn Type	Perm	NA	Prot	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		8	8		4	4.5	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8	4	4	4.5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0		11.0	16.0		11.0	16.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0		16.0	116.0		16.0	116.0	
Total Split (%)	8.9%	8.9%	8.9%	8.9%	8.9%		8.9%	64.4%		8.9%	64.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0		10.0	110.0		10.0	110.0	
Yellow Time (s)	4.0	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	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5		1.0	1.5		1.5	1.5	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effect Green (s)		6.3	6.3		6.3	18.3	5.0	147.7		6.0	153.1	
Actuated g/C Ratio		0.04	0.04		0.04	0.10	0.03	0.82		0.03	0.85	
v/c Ratio		0.30	0.42		0.16	0.06	0.08	0.26		0.28	0.97	
Control Delay		100.2	12.4		90.2	0.5	89.0	6.0		95.9	29.7	

Lanes, Volumes, Timings

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr _t	
Fl _t Protected	
Satd. Flow (prot)	
Fl _t 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 (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	32.0
Total Split (s)	32.0
Total Split (%)	18%
Maximum Green (s)	26.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	1.5
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	5
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	

Lanes, Volumes, Timings

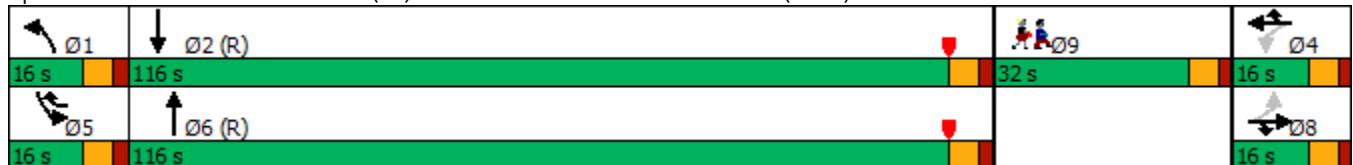


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	27.9	
Total Delay		100.2	12.4		90.2	0.5	89.0	6.0		95.9	57.6	
LOS		F	B		F	A	F	A		F	E	
Approach Delay		29.0			34.7			6.4			58.0	
Approach LOS		C			C			A			E	
Queue Length 50th (ft)		17	0		9	0	5	76		20	724	
Queue Length 95th (ft)		40	3		27	0	20	235		50	#2543	
Internal Link Dist (ft)		518			182			1325			469	
Turn Bay Length (ft)			50			100	210			125		
Base Capacity (vph)		75	173		81	234	96	2753		100	1585	
Starvation Cap Reductn		0	0		0	0	0	0		0	144	
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		0.19	0.35		0.10	0.06	0.04	0.26		0.17	1.07	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow, Master Intersection
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 41.4
 Intersection LOS: D
 Intersection Capacity Utilization 100.2%
 ICU Level of Service G
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.






















Splits and Phases: 8: Lowell Road (3A) & Fox Hollow Drive/Fox Hollow Drive (Plaza)



Lanes, Volumes, Timings












Lane Group	Ø9
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	

HCM Signalized Intersection Capacity Analysis

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	11	0	48	6	0	10	4	640	1	16	1457	3	
Future Volume (vph)	11	0	48	6	0	10	4	640	1	16	1457	3	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	14	13	13	11	11	12	12	12	12	
Total Lost time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0		
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	1.00		
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00		
Flt Protected		0.95	1.00		0.95	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)		1719	1583		1865	1669	1745	3355		1805	1862		
Flt Permitted		0.75	1.00		0.75	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (perm)		1362	1583		1469	1669	1745	3355		1805	1862		
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.95	0.95	0.95	
Adj. Flow (vph)	14	0	60	8	0	12	4	703	1	17	1534	3	
RTOR Reduction (vph)	0	0	58	0	0	12	0	0	0	0	0	0	
Lane Group Flow (vph)	0	14	2	0	8	1	4	704	0	17	1537	0	
Heavy Vehicles (%)	5%	0%	2%	0%	0%	0%	0%	4%	0%	0%	2%	0%	
Turn Type	Perm	NA	Prot	Perm	NA	pt+ov	Prot	NA		Prot	NA		
Protected Phases		8	8		4	4 5	1	6		5	2		
Permitted Phases	8			4									
Actuated Green, G (s)		6.3	6.3		6.3	16.3	1.0	140.5		4.0	143.5		
Effective Green, g (s)		6.3	6.3		6.3	16.3	1.0	140.5		4.0	143.5		
Actuated g/C Ratio		0.03	0.03		0.03	0.09	0.01	0.78		0.02	0.80		
Clearance Time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0		
Vehicle Extension (s)		1.5	1.5		1.5		1.0	1.5		1.5	1.5		
Lane Grp Cap (vph)		47	55		51	151	9	2618		40	1484		
v/s Ratio Prot			0.00			0.00	0.00	0.21		c0.01	c0.83		
v/s Ratio Perm		c0.01		0.01									
v/c Ratio		0.30	0.04		0.16	0.01	0.44	0.27		0.42	1.04		
Uniform Delay, d1		84.7	83.9		84.3	74.5	89.2	5.5		86.9	18.2		
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2		1.3	0.1		0.5	0.0	12.2	0.3		2.6	33.1		
Delay (s)		86.0	84.0		84.8	74.5	101.4	5.7		89.5	51.4		
Level of Service		F	F		F	E	F	A		F	D		
Approach Delay (s)		84.4			78.4			6.3			51.8		
Approach LOS		F			E			A			D		
Intersection Summary													
HCM 2000 Control Delay			39.4									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.98										
Actuated Cycle Length (s)			180.0									Sum of lost time (s)	24.0
Intersection Capacity Utilization			100.2%									ICU Level of Service	G
Analysis Period (min)			15										

c Critical Lane Group

9: Lowell Road (3A) & Pelham Road
Lanes, Volumes, Timings

							Ø9
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (vph)	256	81	567	93	71	1226	
Future Volume (vph)	256	81	567	93	71	1226	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	13	13	12	12	
Storage Length (ft)	0	75		0	150		
Storage Lanes	1	1		0	1		
Taper Length (ft)	25				50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.850	0.981				
Flt Protected	0.950				0.950		
Satd. Flow (prot)	1787	1524	1839	0	1719	1863	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1787	1524	1839	0	1719	1863	
Right Turn on Red		Yes		Yes			
Satd. Flow (RTOR)		29	7				
Link Speed (mph)	20		30			30	
Link Distance (ft)	512		549			1309	
Travel Time (s)	17.5		12.5			29.8	
Peak Hour Factor	0.88	0.88	0.92	0.92	0.96	0.96	
Heavy Vehicles (%)	1%	6%	5%	3%	5%	2%	
Adj. Flow (vph)	291	92	616	101	74	1277	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	291	92	717	0	74	1277	
Turn Type	Prot	pt+ov	NA		Prot	NA	
Protected Phases	4	4 5	6		5	2	9
Permitted Phases							
Detector Phase	4	4 5	6		5	2	
Switch Phase							
Minimum Initial (s)	5.0		10.0		3.0	10.0	5.0
Minimum Split (s)	11.0		16.0		9.0	16.0	35.0
Total Split (s)	26.0		116.0		13.0	116.0	35.0
Total Split (%)	13.7%		61.1%		6.8%	61.1%	18%
Maximum Green (s)	20.0		110.0		7.0	110.0	29.0
Yellow Time (s)	4.0		4.0		4.0	4.0	4.0
All-Red Time (s)	2.0		2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.0		6.0		6.0	6.0	
Lead/Lag			Lag		Lead		
Lead-Lag Optimize?			Yes		Yes		
Vehicle Extension (s)	1.5		1.5		1.5	1.5	3.0
Recall Mode	None		C-Min		None	C-Min	None
Walk Time (s)							5.0
Flash Dont Walk (s)							24.0
Pedestrian Calls (#/hr)							5
Act Effct Green (s)	46.5	64.7	106.3		12.2	124.5	
Actuated g/C Ratio	0.24	0.34	0.56		0.06	0.66	
v/c Ratio	0.67	0.17	0.70		0.67	1.05	
Control Delay	72.6	34.8	34.1		110.1	70.7	

9: Lowell Road (3A) & Pelham Road
Lanes, Volumes, Timings

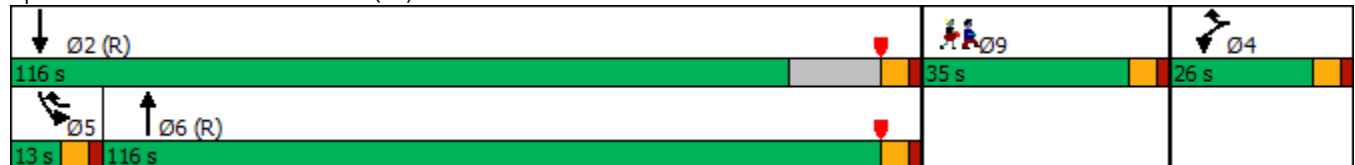


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø9
Queue Delay	0.0	0.0	4.0		0.0	0.0	
Total Delay	72.6	34.8	38.1		110.1	70.7	
LOS	E	C	D		F	E	
Approach Delay	63.5		38.1			72.9	
Approach LOS	E		D			E	
Queue Length 50th (ft)	334	53	590		91	1459	
Queue Length 95th (ft)	#616	124	816		#233	#2090	
Internal Link Dist (ft)	432		469			1229	
Turn Bay Length (ft)		75			150		
Base Capacity (vph)	437	538	1075		110	1251	
Starvation Cap Reductn	0	0	270		0	0	
Spillback Cap Reductn	0	0	0		0	0	
Storage Cap Reductn	0	0	0		0	0	
Reduced v/c Ratio	0.67	0.17	0.89		0.67	1.02	












Intersection Summary

Area Type:	Other
Cycle Length:	190
Actuated Cycle Length:	190
Offset:	30 (16%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
Natural Cycle:	150
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.05
Intersection Signal Delay:	61.2
Intersection LOS:	E
Intersection Capacity Utilization	88.7%
ICU Level of Service	E
Analysis Period (min)	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 9: Lowell Road (3A) & Pelham Road



HCM Signalized Intersection Capacity Analysis

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	256	81	567	93	71	1226
Future Volume (vph)	256	81	567	93	71	1226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	13	13	12	12
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	1524	1839		1719	1863
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1787	1524	1839		1719	1863
Peak-hour factor, PHF	0.88	0.88	0.92	0.92	0.96	0.96
Adj. Flow (vph)	291	92	616	101	74	1277
RTOR Reduction (vph)	0	19	3	0	0	0
Lane Group Flow (vph)	291	73	714	0	74	1277
Heavy Vehicles (%)	1%	6%	5%	3%	5%	2%
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	4	4 5	6		5	2
Permitted Phases						
Actuated Green, G (s)	46.5	64.7	101.5		12.2	119.7
Effective Green, g (s)	46.5	64.7	101.5		12.2	119.7
Actuated g/C Ratio	0.24	0.34	0.53		0.06	0.63
Clearance Time (s)	6.0		6.0		6.0	6.0
Vehicle Extension (s)	1.5		1.5		1.5	1.5
Lane Grp Cap (vph)	437	518	982		110	1173
v/s Ratio Prot	c0.16	0.05	0.39		0.04	c0.69
v/s Ratio Perm						
v/c Ratio	0.67	0.14	0.73		0.67	1.09
Uniform Delay, d1	64.7	43.4	33.7		86.9	35.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.0	0.0	4.7		12.0	53.9
Delay (s)	67.7	43.4	38.4		99.0	89.0
Level of Service	E	D	D		F	F
Approach Delay (s)	61.9		38.4			89.6
Approach LOS	E		D			F
Intersection Summary						
HCM 2000 Control Delay			70.3		HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			0.97			
Actuated Cycle Length (s)			190.0		Sum of lost time (s)	24.0
Intersection Capacity Utilization			88.7%		ICU Level of Service	E
Analysis Period (min)			15			

c Critical Lane Group

10: Lowell Road (3A) & Friars Drive (Site Access)

2032 AM Build.syn

Lanes, Volumes, Timings



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	23	0	658	1485	10
Future Volume (vph)	0	23	0	658	1485	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	200			200
Storage Lanes	0	1	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				0.850
Flt Protected						
Satd. Flow (prot)	0	1644	0	1827	1863	1468
Flt Permitted						
Satd. Flow (perm)	0	1644	0	1827	1863	1468
Link Speed (mph)	30			30	30	
Link Distance (ft)	704			770	1145	
Travel Time (s)	16.0			17.5	26.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	4%	2%	10%
Adj. Flow (vph)	0	26	0	731	1650	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	26	0	731	1650	11
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	88.2%
Analysis Period (min)	15
	ICU Level of Service E

HCM 6th TWSC

Intersection

Int Delay, s/veh 0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↖	↖	↗
Traffic Vol, veh/h	0	23	0	658	1485	10
Future Vol, veh/h	0	23	0	658	1485	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	200
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	4	2	10
Mvmt Flow	0	26	0	731	1650	11

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	- 1650	-	0 - 0
Stage 1	-	-	- - -
Stage 2	-	-	- - -
Critical Hdwy	- 6.2	-	- - -
Critical Hdwy Stg 1	-	-	- - -
Critical Hdwy Stg 2	-	-	- - -
Follow-up Hdwy	- 3.3	-	- - -
Pot Cap-1 Maneuver	0 123	0	- - -
Stage 1	0 -	0	- - -
Stage 2	0 -	0	- - -
Platoon blocked, %			- - -
Mov Cap-1 Maneuver	- 123	-	- - -
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	NB	SB
HCM Control Delay, s	41.8	0	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBT EBLn1	SBT	SBR
Capacity (veh/h)	- 123	-	-
HCM Lane V/C Ratio	- 0.208	-	-
HCM Control Delay (s)	- 41.8	-	-
HCM Lane LOS	- E	-	-
HCM 95th %tile Q(veh)	- 0.7	-	-

APPENDIX H

4: Lowell Road (3A) & Sagamore Bridge
Lanes, Volumes, Timings

2022 PM NoBuild.syn



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	1486	1467	1331	687	501	1238
Future Volume (vph)	1486	1467	1331	687	501	1238
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	12	12	12	12
Storage Length (ft)	0	0	525			200
Storage Lanes	2	1	2			1
Taper Length (ft)	25		100			
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Fr _t		0.850				0.850
Fl _t Protected	0.950		0.950			
Satd. Flow (prot)	3698	1689	5040	3610	3610	2814
Fl _t Permitted	0.950		0.950			
Satd. Flow (perm)	3698	1689	5040	3610	3610	2814
Right Turn on Red		No				Yes
Satd. Flow (RTOR)						1300
Link Speed (mph)	35			30	30	
Link Distance (ft)	929			1189	999	
Travel Time (s)	18.1			27.0	22.7	
Peak Hour Factor	0.96	0.96	0.94	0.94	0.89	0.89
Heavy Vehicles (%)	1%	2%	1%	0%	0%	1%
Adj. Flow (vph)	1548	1528	1416	731	563	1391
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1548	1528	1416	731	563	1391
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Detector Phase	3		1	6	2	
Switch Phase						
Minimum Initial (s)	10.0		7.0	10.0	10.0	
Minimum Split (s)	16.0		15.0	17.0	17.0	
Total Split (s)	53.0		40.0	67.0	27.0	
Total Split (%)	44.2%		33.3%	55.8%	22.5%	
Maximum Green (s)	47.0		32.0	60.0	20.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		4.0	3.0	3.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		8.0	7.0	7.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Recall Mode	None		None	C-Min	C-Min	
Act Effct Green (s)	47.0	120.0	32.0	60.0	20.0	120.0
Actuated g/C Ratio	0.39	1.00	0.27	0.50	0.17	1.00
v/c Ratio	1.07	0.90	1.05	0.40	0.94	0.49
Control Delay	80.1	9.3	73.4	15.0	64.0	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	80.1	9.3	73.4	15.0	64.0	1.8
LOS	F	A	E	B	E	A

4: Lowell Road (3A) & Sagamore Bridge
Lanes, Volumes, Timings

2022 PM NoBuild.syn

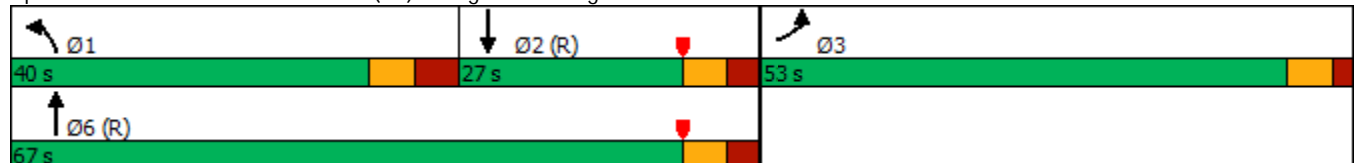


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	45.0			53.5	19.7	
Approach LOS	D			D	B	
Queue Length 50th (ft)	~684	0	~433	222	245	59
Queue Length 95th (ft)	#820	#5	#523	m227	#343	39
Internal Link Dist (ft)	849			1109	919	
Turn Bay Length (ft)			525			200
Base Capacity (vph)	1448	1689	1344	1805	601	2814
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	1.07	0.90	1.05	0.40	0.94	0.49

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.07
 Intersection Signal Delay: 40.6
 Intersection LOS: D
 Intersection Capacity Utilization 98.2%
 ICU Level of Service F
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Lowell Road (3A) & Sagamore Bridge



4: Lowell Road (3A) & Sagamore Bridge

2022 PM NoBuild.syn

HCM Signalized Intersection Capacity Analysis



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰↰	↱	↰↰↰	↕↕	↕↕	↱↱
Traffic Volume (vph)	1486	1467	1331	687	501	1238
Future Volume (vph)	1486	1467	1331	687	501	1238
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	14	14	12	12	12	12
Total Lost time (s)	6.0	4.0	8.0	7.0	7.0	4.0
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3698	1689	5040	3610	3610	2814
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3698	1689	5040	3610	3610	2814
Peak-hour factor, PHF	0.96	0.96	0.94	0.94	0.89	0.89
Adj. Flow (vph)	1548	1528	1416	731	563	1391
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1548	1528	1416	731	563	1391
Heavy Vehicles (%)	1%	2%	1%	0%	0%	1%
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Actuated Green, G (s)	47.0	120.0	32.0	60.0	20.0	120.0
Effective Green, g (s)	47.0	120.0	32.0	60.0	20.0	120.0
Actuated g/C Ratio	0.39	1.00	0.27	0.50	0.17	1.00
Clearance Time (s)	6.0		8.0	7.0	7.0	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Lane Grp Cap (vph)	1448	1689	1344	1805	601	2814
v/s Ratio Prot	c0.42		0.28	0.20	0.16	
v/s Ratio Perm		c0.90				0.49
v/c Ratio	1.07	0.90	1.05	0.40	0.94	0.49
Uniform Delay, d1	36.5	0.0	44.0	18.8	49.4	0.0
Progression Factor	1.00	1.00	0.85	0.77	0.92	1.00
Incremental Delay, d2	44.5	8.4	36.4	0.5	17.8	0.4
Delay (s)	81.0	8.4	73.8	14.9	63.4	0.4
Level of Service	F	A	E	B	E	A
Approach Delay (s)	45.0			53.8	18.6	
Approach LOS	D			D	B	
























Intersection Summary			
HCM 2000 Control Delay	40.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	98.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

5: Lowell Road (3A) & Flagstone Drive/Wason Road

2022 PM NoBuild.syn

Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	92	434	435	17	28	144	1064	988	72	903	5
Future Volume (vph)	52	92	434	435	17	28	144	1064	988	72	903	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		250	200		75	575		275	175		300
Storage Lanes	0		1	1		1	1		2	1		1
Taper Length (ft)	25			50			175			75		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91	0.91
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.982		0.950	0.956		0.950			0.950		
Satd. Flow (prot)	0	1866	1599	1658	1668	1546	1787	3574	2842	1805	5131	0
Flt Permitted		0.982		0.950	0.956		0.950			0.950		
Satd. Flow (perm)	0	1866	1599	1658	1668	1546	1787	3574	2842	1805	5131	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			82			136			567			1
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		805			586			999			1515	
Travel Time (s)		18.3			13.3			22.7			34.4	
Peak Hour Factor	0.80	0.80	0.80	0.90	0.90	0.90	0.94	0.94	0.94	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%	1%	1%	0%	0%	1%	0%
Adj. Flow (vph)	65	115	543	483	19	31	153	1132	1051	82	1026	6
Shared Lane Traffic (%)				48%								
Lane Group Flow (vph)	0	180	543	251	251	31	153	1132	1051	82	1032	0
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Detector Phase	8	8	1	7	7	5	1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	11.0	16.0	
Total Split (s)	22.0	22.0	34.0	28.0	28.0	15.0	34.0	55.0	28.0	15.0	36.0	
Total Split (%)	18.3%	18.3%	28.3%	23.3%	23.3%	12.5%	28.3%	45.8%	23.3%	12.5%	30.0%	
Maximum Green (s)	16.0	16.0	28.0	22.0	22.0	9.0	28.0	49.0	22.0	9.0	30.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Min	None	None	C-Min	
Act Effct Green (s)		14.6	44.9	22.1	22.1	30.5	24.3	53.3	81.4	8.4	34.9	
Actuated g/C Ratio		0.12	0.37	0.18	0.18	0.25	0.20	0.44	0.68	0.07	0.29	
v/c Ratio		0.79	0.84	0.82	0.82	0.06	0.42	0.71	0.50	0.65	0.69	
Control Delay		75.6	40.6	69.4	68.7	0.2	58.4	28.8	2.3	77.7	41.7	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		75.6	40.6	69.4	68.7	0.2	58.4	28.8	2.3	77.7	41.7	
LOS		E	D	E	E	A	E	C	A	E	D	

5: Lowell Road (3A) & Flagstone Drive/Wason Road

2022 PM NoBuild.syn

Lanes, Volumes, Timings

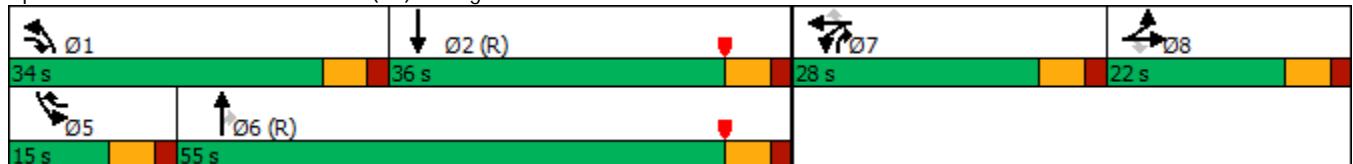


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		49.3			65.0			18.8				44.4
Approach LOS		D			E			B				D
Queue Length 50th (ft)		136	318	198	198	0	121	252	17	63	267	
Queue Length 95th (ft)		188	366	#344	#343	0	m139	m254	m25	#123	320	
Internal Link Dist (ft)		725			506			919			1435	
Turn Bay Length (ft)			250	200		75	575		275	175		
Base Capacity (vph)		248	696	311	313	501	416	1592	2118	135	1494	
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.73	0.78	0.81	0.80	0.06	0.37	0.71	0.50	0.61	0.69	

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 64 (53%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 34.8
 Intersection LOS: C
 Intersection Capacity Utilization 71.9%
 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.
 m Volume for 95th percentile queue is metered by upstream signal.
























Splits and Phases: 5: Lowell Road (3A) & Flagstone Drive/Wason Road



5: Lowell Road (3A) & Flagstone Drive/Wason Road

2022 PM NoBuild.syn

HCM Signalized Intersection Capacity Analysis

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	52	92	434	435	17	28	144	1064	988	72	903	5	
Future Volume (vph)	52	92	434	435	17	28	144	1064	988	72	903	5	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	11	11	11	12	12	12	12	12	12	
Total Lost time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91		
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		
Flt Protected		0.98	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1866	1599	1658	1668	1546	1787	3574	2842	1805	5131		
Flt Permitted		0.98	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (perm)		1866	1599	1658	1668	1546	1787	3574	2842	1805	5131		
Peak-hour factor, PHF	0.80	0.80	0.80	0.90	0.90	0.90	0.94	0.94	0.94	0.88	0.88	0.88	
Adj. Flow (vph)	65	115	542	483	19	31	153	1132	1051	82	1026	6	
RTOR Reduction (vph)	0	0	55	0	0	23	0	0	216	0	1	0	
Lane Group Flow (vph)	0	180	488	251	251	8	153	1132	835	82	1031	0	
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%	1%	1%	0%	0%	1%	0%	
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA		
Protected Phases	8	8	1	7	7	5	1	6	7	5	2		
Permitted Phases			8			7			6				
Actuated Green, G (s)		14.6	38.9	22.1	22.1	29.3	24.3	52.1	74.2	7.2	35.0		
Effective Green, g (s)		14.6	38.9	22.1	22.1	29.3	24.3	52.1	74.2	7.2	35.0		
Actuated g/C Ratio		0.12	0.32	0.18	0.18	0.24	0.20	0.43	0.62	0.06	0.29		
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)		2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0		
Lane Grp Cap (vph)		227	598	305	307	377	361	1551	1899	108	1496		
v/s Ratio Prot		0.10	c0.17	c0.15	0.15	0.00	0.09	c0.32	0.08	0.05	0.20		
v/s Ratio Perm			0.14			0.00			0.21				
v/c Ratio		0.79	0.82	0.82	0.82	0.02	0.42	0.73	0.44	0.76	0.69		
Uniform Delay, d1		51.2	37.3	47.1	47.0	34.4	41.7	28.1	12.0	55.5	37.7		
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.38	0.94	0.43	1.00	1.00		
Incremental Delay, d2		16.6	8.2	15.9	15.1	0.0	0.3	1.6	0.1	24.8	2.6		
Delay (s)		67.8	45.5	63.0	62.1	34.5	57.7	28.2	5.2	80.4	40.3		
Level of Service		E	D	E	E	C	E	C	A	F	D		
Approach Delay (s)		51.0			60.9			19.8			43.2		
Approach LOS		D			E			B			D		
Intersection Summary													
HCM 2000 Control Delay			34.8									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.86										
Actuated Cycle Length (s)			120.0									Sum of lost time (s)	24.0
Intersection Capacity Utilization			71.9%									ICU Level of Service	C
Analysis Period (min)			15										

c Critical Lane Group

6: Lowell Road (3A) & Hampshire Drive/Oblate Drive

2022 PM NoBuild.syn

Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	2	105	10	1	4	16	1126	12	5	878	7
Future Volume (vph)	26	2	105	10	1	4	16	1126	12	5	878	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	13	13	13	12	12	12	11	12	12
Storage Length (ft)	0		100	0		100	225		0	225		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.998			0.999	
Flt Protected		0.956			0.956		0.950			0.950		
Satd. Flow (prot)	0	1816	1583	0	1877	1669	1736	3567	0	1745	3571	0
Flt Permitted		0.436					0.950			0.950		
Satd. Flow (perm)	0	828	1583	0	1963	1669	1736	3567	0	1745	3571	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			131			86		1				1
Link Speed (mph)		30			10			30				30
Link Distance (ft)		495			382			1515				1791
Travel Time (s)		11.3			26.0			34.4				40.7
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.95	0.95	0.95	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	4%	1%	0%	0%	1%	0%
Adj. Flow (vph)	33	3	131	13	1	5	17	1185	13	6	1009	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	36	131	0	14	5	17	1198	0	6	1017	0
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		4	4 1		8	8 5	1	6		5	2	
Permitted Phases	4			8								
Detector Phase	4	4	4 1	8	8	8 5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		2.0	15.0		2.0	15.0	
Minimum Split (s)	9.0	9.0		9.0	9.0		8.0	21.0		8.0	21.0	
Total Split (s)	16.0	16.0		16.0	16.0		16.0	66.0		16.0	66.0	
Total Split (%)	14.0%	14.0%		14.0%	14.0%		14.0%	57.9%		14.0%	57.9%	
Maximum Green (s)	10.0	10.0		10.0	10.0		12.0	60.0		12.0	60.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)		8.8	16.8		6.7	9.6	5.6	39.8		5.1	31.4	
Actuated g/C Ratio		0.13	0.25		0.10	0.14	0.08	0.59		0.08	0.47	
v/c Ratio		0.33	0.27		0.07	0.02	0.12	0.57		0.05	0.61	
Control Delay		41.7	5.7		35.8	0.0	37.8	11.3		38.2	15.8	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		41.7	5.7		35.8	0.0	37.8	11.3		38.2	15.8	
LOS		D	A		D	A	D	B		D	B	

Lanes, Volumes, Timings

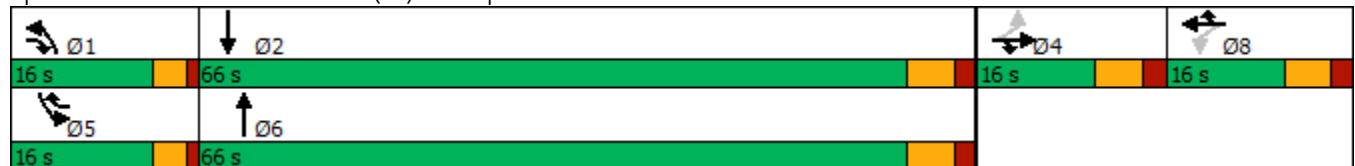


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		13.4			26.4			11.7				16.0
Approach LOS		B			C			B				B
Queue Length 50th (ft)		10	0		4	0	5	99		2		125
Queue Length 95th (ft)		47	26		24	0	31	334		16		261
Internal Link Dist (ft)		415			302			1435				1711
Turn Bay Length (ft)			100			100	225			225		
Base Capacity (vph)		131	592		311	410	330	3134		332		3138
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		0.27	0.22		0.05	0.01	0.05	0.38		0.02		0.32

Intersection Summary

Area Type:	Other
Cycle Length:	114
Actuated Cycle Length:	67
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.61
Intersection Signal Delay:	13.7
Intersection LOS:	B
Intersection Capacity Utilization	53.2%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 6: Lowell Road (3A) & Hampshire Drive/Oblate Drive



HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗	↗	↕↗		↗	↕↗	
Traffic Volume (vph)	26	2	105	10	1	4	16	1126	12	5	878	7
Future Volume (vph)	26	2	105	10	1	4	16	1126	12	5	878	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	13	13	13	12	12	12	11	12	12
Total Lost time (s)		6.0	6.0		6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected		0.96	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1817	1583		1876	1669	1736	3569		1745	3570	
Flt Permitted		0.44	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		828	1583		1963	1669	1736	3569		1745	3570	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.95	0.95	0.95	0.87	0.87	0.87
Adj. Flow (vph)	32	2	131	12	1	5	17	1185	13	6	1009	8
RTOR Reduction (vph)	0	0	105	0	0	4	0	0	0	0	1	0
Lane Group Flow (vph)	0	36	26	0	14	1	17	1198	0	6	1016	0
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	4%	1%	0%	0%	1%	0%
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		4	4	1	8	8	5	6		5	2	
Permitted Phases	4			8								
Actuated Green, G (s)		8.8	14.4		2.4	9.2	5.6	39.9		0.8	35.1	
Effective Green, g (s)		8.8	14.4		2.4	9.2	5.6	39.9		0.8	35.1	
Actuated g/C Ratio		0.12	0.19		0.03	0.12	0.08	0.54		0.01	0.47	
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		98	308		63	207	131	1926		18	1695	
v/s Ratio Prot			0.02			0.00	c0.01	c0.34		0.00	0.28	
v/s Ratio Perm		c0.04			c0.01							
v/c Ratio		0.37	0.08		0.22	0.00	0.13	0.62		0.33	0.60	
Uniform Delay, d1		30.0	24.3		34.8	28.3	31.9	11.8		36.3	14.2	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.3	0.1		1.8	0.0	0.2	0.6		3.9	0.6	
Delay (s)		32.3	24.5		36.6	28.3	32.0	12.4		40.2	14.8	
Level of Service		C	C		D	C	C	B		D	B	
Approach Delay (s)		26.2			34.4			12.7			15.0	
Approach LOS		C			C			B			B	
Intersection Summary												
HCM 2000 Control Delay			14.7			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			73.9	Sum of lost time (s)				22.0				
Intersection Capacity Utilization			53.2%	ICU Level of Service				A				
Analysis Period (min)			15									

c Critical Lane Group

7: Lowell Road (3A) & Executive Drive/PMA Drive

2022 PM NoBuild.syn

Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	236	3	80	23	2	22	56	1030	7	16	721	40
Future Volume (vph)	236	3	80	23	2	22	56	1030	7	16	721	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	15	12	12	13	11	12	12	11	12	12
Storage Length (ft)	0		225	0		80	350		0	150		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.999			0.992	
Flt Protected		0.953			0.957		0.950			0.950		
Satd. Flow (prot)	0	1733	1742	0	1818	1620	1678	3571	0	1646	3540	0
Flt Permitted		0.705			0.667		0.950			0.950		
Satd. Flow (perm)	0	1282	1742	0	1267	1620	1678	3571	0	1646	3540	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			100			91		1			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		492			577			1791			1168	
Travel Time (s)		11.2			13.1			40.7			26.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.97	0.97	0.97	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	2%	0%	0%	3%	4%	1%	0%	6%	1%	4%
Adj. Flow (vph)	295	4	100	29	3	28	58	1062	7	17	784	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	299	100	0	32	28	58	1069	0	17	827	0
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA	
Protected Phases		8	8 1		4	4	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8 1	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		5.0	5.0	5.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	9.0	9.0		11.0	11.0	11.0	9.0	14.0		9.0	14.0	
Total Split (s)	26.0	26.0		23.0	23.0	23.0	16.0	66.0		16.0	66.0	
Total Split (%)	24.1%	24.1%		21.3%	21.3%	21.3%	14.8%	61.1%		14.8%	61.1%	
Maximum Green (s)	20.0	20.0		17.0	17.0	17.0	10.0	60.0		10.0	60.0	
Yellow Time (s)	4.0	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	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None	None	None	Min		None	Min	
Act Effect Green (s)		20.6	33.8		20.6	20.6	6.9	33.4		5.4	25.2	
Actuated g/C Ratio		0.30	0.49		0.30	0.30	0.10	0.49		0.08	0.37	
v/c Ratio		0.77	0.11		0.08	0.05	0.34	0.61		0.13	0.63	
Control Delay		42.2	3.8		23.1	0.2	37.7	14.6		36.5	20.4	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		42.2	3.8		23.1	0.2	37.7	14.6		36.5	20.4	
LOS		D	A		C	A	D	B		D	C	

Lanes, Volumes, Timings

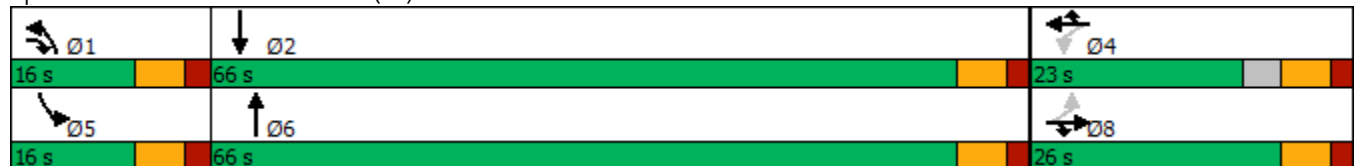


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		32.6			12.4			15.8				20.7
Approach LOS		C			B			B				C
Queue Length 50th (ft)		113	0		10	0	23	145		7		151
Queue Length 95th (ft)		#277	21		33	0	66	282		29		217
Internal Link Dist (ft)		412			497			1711				1088
Turn Bay Length (ft)			225			80	350			150		
Base Capacity (vph)		386	990		381	551	252	3098		247		3072
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		0.77	0.10		0.08	0.05	0.23	0.35		0.07		0.27

Intersection Summary

Area Type:	Other
Cycle Length:	108
Actuated Cycle Length:	68.5
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.77
Intersection Signal Delay:	20.2
Intersection LOS:	C
Intersection Capacity Utilization:	66.9%
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.	

Splits and Phases: 7: Lowell Road (3A) & Executive Drive/PMA Drive
























HCM Signalized Intersection Capacity Analysis

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	236	3	80	23	2	22	56	1030	7	16	721	40
Future Volume (vph)	236	3	80	23	2	22	56	1030	7	16	721	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	15	12	12	13	11	12	12	11	12	12
Total Lost time (s)		6.0	6.0		6.0	6.0		6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00	1.00		0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85		1.00		1.00	0.99	
Flt Protected		0.95	1.00		0.96	1.00		0.95		0.95	1.00	
Satd. Flow (prot)		1733	1742		1818	1620		1678		3571	1646	3541
Flt Permitted		0.71	1.00		0.67	1.00		0.95		0.95	1.00	
Satd. Flow (perm)		1283	1742		1267	1620		1678		3571	1646	3541
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.97	0.97	0.97	0.92	0.92	0.92
Adj. Flow (vph)	295	4	100	29	2	28	58	1062	7	17	784	43
RTOR Reduction (vph)	0	0	56	0	0	20	0	1	0	0	5	0
Lane Group Flow (vph)	0	299	44	0	32	8	58	1068	0	17	822	0
Heavy Vehicles (%)	1%	0%	2%	0%	0%	3%	4%	1%	0%	6%	1%	4%
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA	
Protected Phases		8	8 1		4	4	1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		20.6	32.3		20.6	20.6	5.7	33.4		1.1	28.8	
Effective Green, g (s)		20.6	32.3		20.6	20.6	5.7	33.4		1.1	28.8	
Actuated g/C Ratio		0.28	0.44		0.28	0.28	0.08	0.46		0.02	0.39	
Clearance Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)		2.0			2.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		361	769		357	456	130	1631		24	1395	
v/s Ratio Prot			0.03			0.00	c0.03	c0.30		0.01	0.23	
v/s Ratio Perm		c0.23			0.03							
v/c Ratio		0.83	0.06		0.09	0.02	0.45	0.66		0.71	0.59	
Uniform Delay, d1		24.6	11.7		19.3	18.9	32.2	15.4		35.8	17.5	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		13.8	0.0		0.0	0.0	0.9	1.0		56.1	0.6	
Delay (s)		38.4	11.7		19.4	19.0	33.1	16.3		92.0	18.1	
Level of Service		D	B		B	B	C	B		F	B	
Approach Delay (s)		31.7			19.2			17.2			19.6	
Approach LOS		C			B			B			B	
Intersection Summary												
HCM 2000 Control Delay			20.5				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			73.1				Sum of lost time (s)				18.0	
Intersection Capacity Utilization			66.9%				ICU Level of Service				C	
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	2	25	31	0	48	27	1226	15	56	740	11
Future Volume (vph)	9	2	25	31	0	48	27	1226	15	56	740	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	13	13	11	11	12	12	12	12
Storage Length (ft)	0		50	0		100	210		325	125		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			50			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850			0.850		0.998			0.998	
Flt Protected		0.962			0.950		0.950			0.950		
Satd. Flow (prot)	0	1828	1583	0	1865	1669	1745	3449	0	1805	1878	0
Flt Permitted		0.746			0.748		0.950			0.950		
Satd. Flow (perm)	0	1417	1583	0	1469	1669	1745	3449	0	1805	1878	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			91			60		1				1
Link Speed (mph)		10			30			30				30
Link Distance (ft)		598			262			1405				549
Travel Time (s)		40.8			6.0			31.9				12.5
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.99	0.99	0.99	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	11	3	31	39	0	60	27	1238	15	60	787	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	31	0	39	60	27	1253	0	60	799	0
Turn Type	Perm	NA	Prot	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		8	8		4	4.5	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8	4	4	4.5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0		11.0	16.0		11.0	16.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0		16.0	116.0		16.0	116.0	
Total Split (%)	8.9%	8.9%	8.9%	8.9%	8.9%		8.9%	64.4%		8.9%	64.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0		10.0	110.0		10.0	110.0	
Yellow Time (s)	4.0	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	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5		1.0	1.5		1.5	1.5	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effect Green (s)		8.8	8.8		8.8	24.8	6.6	136.8		10.0	142.4	
Actuated g/C Ratio		0.05	0.05		0.05	0.14	0.04	0.76		0.06	0.79	
v/c Ratio		0.20	0.19		0.54	0.21	0.42	0.48		0.60	0.54	
Control Delay		87.2	2.6		109.4	14.6	103.9	11.4		106.4	12.0	

Lanes, Volumes, Timings

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr _t	
Fl _t Protected	
Satd. Flow (prot)	
Fl _t 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 (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	32.0
Total Split (s)	32.0
Total Split (%)	18%
Maximum Green (s)	26.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	1.5
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	5
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	

Lanes, Volumes, Timings

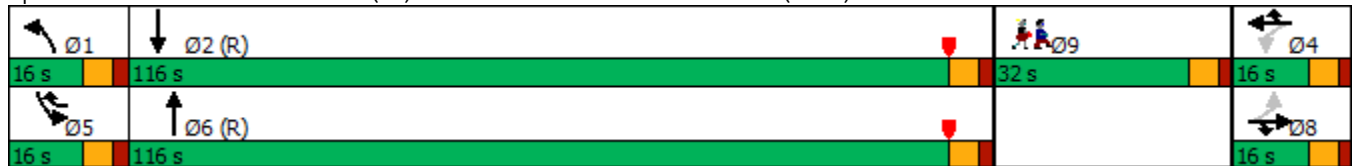


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	1.5	
Total Delay		87.2	2.6		109.4	14.6	103.9	11.4		106.4	13.5	
LOS		F	A		F	B	F	B		F	B	
Approach Delay		28.9			51.9			13.4			20.0	
Approach LOS		C			D			B			B	
Queue Length 50th (ft)		16	0		46	0	32	221		71	260	
Queue Length 95th (ft)		39	0		80	34	70	586		124	807	
Internal Link Dist (ft)		518			182			1325			469	
Turn Bay Length (ft)			50			100	210			125		
Base Capacity (vph)		84	179		87	277	96	2649		112	1490	
Starvation Cap Reductn		0	0		0	0	0	0		0	475	
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		0.17	0.17		0.45	0.22	0.28	0.47		0.54	0.79	

Intersection Summary

Area Type:	Other
Cycle Length:	180
Actuated Cycle Length:	180
Offset:	0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow, Master Intersection
Natural Cycle:	100
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.60
Intersection Signal Delay:	17.9
Intersection LOS:	B
Intersection Capacity Utilization	64.9%
ICU Level of Service	C
Analysis Period (min)	15






















Splits and Phases: 8: Lowell Road (3A) & Fox Hollow Drive/Fox Hollow Drive (Plaza)



Lanes, Volumes, Timings












Lane Group	Ø9
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	

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	2	25	31	0	48	27	1226	15	56	740	11
Future Volume (vph)	9	2	25	31	0	48	27	1226	15	56	740	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	14	13	13	11	11	12	12	12	12
Total Lost time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1828	1583		1865	1669	1745	3449		1805	1877	
Flt Permitted		0.75	1.00		0.75	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1417	1583		1469	1669	1745	3449		1805	1877	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.99	0.99	0.99	0.94	0.94	0.94
Adj. Flow (vph)	11	2	31	39	0	60	27	1238	15	60	787	12
RTOR Reduction (vph)	0	0	29	0	0	52	0	0	0	0	0	0
Lane Group Flow (vph)	0	14	2	0	39	8	27	1253	0	60	799	0
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Perm	NA	Prot	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		8	8		4	4 5	1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		8.8	8.8		8.8	24.8	5.6	132.0		10.0	136.4	
Effective Green, g (s)		8.8	8.8		8.8	24.8	5.6	132.0		10.0	136.4	
Actuated g/C Ratio		0.05	0.05		0.05	0.14	0.03	0.73		0.06	0.76	
Clearance Time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)		1.5	1.5		1.5		1.0	1.5		1.5	1.5	
Lane Grp Cap (vph)		69	77		71	229	54	2529		100	1422	
v/s Ratio Prot			0.00			0.00	0.02	0.36		c0.03	c0.43	
v/s Ratio Perm		0.01			c0.03							
v/c Ratio		0.20	0.02		0.55	0.04	0.50	0.50		0.60	0.56	
Uniform Delay, d1		82.2	81.5		83.7	67.2	85.8	10.1		83.0	9.2	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5	0.0		4.6	0.0	2.6	0.7		6.3	1.6	
Delay (s)		82.8	81.5		88.3	67.3	88.5	10.7		89.4	10.8	
Level of Service		F	F		F	E	F	B		F	B	
Approach Delay (s)		81.9			75.5			12.4			16.3	
Approach LOS		F			E			B			B	
Intersection Summary												
HCM 2000 Control Delay			18.0									B
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			180.0							24.0		
Intersection Capacity Utilization			64.9%									C
Analysis Period (min)			15									

c Critical Lane Group

9: Lowell Road (3A) & Pelham Road
Lanes, Volumes, Timings

							Ø9
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (vph)	86	142	1166	109	110	730	
Future Volume (vph)	86	142	1166	109	110	730	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	13	13	12	12	
Storage Length (ft)	0	75		0	150		
Storage Lanes	1	1		0	1		
Taper Length (ft)	25				50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.850	0.988				
Flt Protected	0.950				0.950		
Satd. Flow (prot)	1805	1615	1922	0	1805	1881	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1805	1615	1922	0	1805	1881	
Right Turn on Red		Yes		Yes			
Satd. Flow (RTOR)		151	4				
Link Speed (mph)	20		30			30	
Link Distance (ft)	512		549			1309	
Travel Time (s)	17.5		12.5			29.8	
Peak Hour Factor	0.87	0.87	0.98	0.98	0.89	0.89	
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%	
Adj. Flow (vph)	99	163	1190	111	124	820	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	99	163	1301	0	124	820	
Turn Type	Prot	pt+ov	NA		Prot	NA	
Protected Phases	4	4 5	6		5	2	9
Permitted Phases							
Detector Phase	4	4 5	6		5	2	
Switch Phase							
Minimum Initial (s)	5.0		10.0		3.0	10.0	5.0
Minimum Split (s)	11.0		16.0		9.0	16.0	35.0
Total Split (s)	26.0		116.0		13.0	116.0	35.0
Total Split (%)	13.7%		61.1%		6.8%	61.1%	18%
Maximum Green (s)	20.0		110.0		7.0	110.0	29.0
Yellow Time (s)	4.0		4.0		4.0	4.0	4.0
All-Red Time (s)	2.0		2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.0		6.0		6.0	6.0	
Lead/Lag			Lag		Lead		
Lead-Lag Optimize?			Yes		Yes		
Vehicle Extension (s)	1.5		1.5		1.5	1.5	3.0
Recall Mode	None		C-Min		None	C-Min	None
Walk Time (s)							5.0
Flash Dont Walk (s)							24.0
Pedestrian Calls (#/hr)							5
Act Effct Green (s)	14.3	44.8	126.2		24.5	156.7	
Actuated g/C Ratio	0.08	0.24	0.66		0.13	0.82	
v/c Ratio	0.73	0.33	1.02		0.53	0.53	
Control Delay	114.7	12.5	60.3		82.4	9.4	

9: Lowell Road (3A) & Pelham Road
Lanes, Volumes, Timings

2022 PM NoBuild.syn



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø9
Queue Delay	0.0	0.0	31.2		0.0	0.0	
Total Delay	114.7	12.5	91.5		82.4	9.4	
LOS	F	B	F		F	A	
Approach Delay	51.1		91.5			19.0	
Approach LOS	D		F			B	
Queue Length 50th (ft)	123	12	1399		148	205	
Queue Length 95th (ft)	184	78	#2191		#384	750	
Internal Link Dist (ft)	432		469			1229	
Turn Bay Length (ft)		75			150		
Base Capacity (vph)	190	491	1277		233	1551	
Starvation Cap Reductn	0	0	203		0	0	
Spillback Cap Reductn	0	0	0		0	0	
Storage Cap Reductn	0	0	0		0	0	
Reduced v/c Ratio	0.52	0.33	1.21		0.53	0.53	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 30 (16%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.02
 Intersection Signal Delay: 60.0
 Intersection LOS: E
 Intersection Capacity Utilization 93.8%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.












Splits and Phases: 9: Lowell Road (3A) & Pelham Road



9: Lowell Road (3A) & Pelham Road

2022 PM NoBuild.syn

HCM Signalized Intersection Capacity Analysis

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	86	142	1166	109	110	730
Future Volume (vph)	86	142	1166	109	110	730
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	13	13	12	12
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	1615	1923		1805	1881
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1805	1615	1923		1805	1881
Peak-hour factor, PHF	0.87	0.87	0.98	0.98	0.89	0.89
Adj. Flow (vph)	99	163	1190	111	124	820
RTOR Reduction (vph)	0	115	1	0	0	0
Lane Group Flow (vph)	99	48	1300	0	124	820
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	4	4 5	6		5	2
Permitted Phases						
Actuated Green, G (s)	14.3	44.8	121.4		24.5	151.9
Effective Green, g (s)	14.3	44.8	121.4		24.5	151.9
Actuated g/C Ratio	0.08	0.24	0.64		0.13	0.80
Clearance Time (s)	6.0		6.0		6.0	6.0
Vehicle Extension (s)	1.5		1.5		1.5	1.5
Lane Grp Cap (vph)	135	380	1228		232	1503
v/s Ratio Prot	c0.05	0.03	c0.68		0.07	c0.44
v/s Ratio Perm						
v/c Ratio	0.73	0.13	1.06		0.53	0.55
Uniform Delay, d1	86.0	57.2	34.3		77.4	6.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	16.2	0.1	42.6		1.2	1.4
Delay (s)	102.1	57.2	76.9		78.6	8.2
Level of Service	F	E	E		E	A
Approach Delay (s)	74.2		76.9			17.5
Approach LOS	E		E			B
Intersection Summary						
HCM 2000 Control Delay			54.2		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.93			
Actuated Cycle Length (s)			190.0		Sum of lost time (s)	24.0
Intersection Capacity Utilization			93.8%		ICU Level of Service	F
Analysis Period (min)			15			

c Critical Lane Group

10: Lowell Road (3A) & Friars Drive (Site Access)

2022 PM NoBuild.syn

Lanes, Volumes, Timings



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	5	0	1288	772	16
Future Volume (vph)	0	5	0	1288	772	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	200			200
Storage Lanes	0	1	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				0.850
Flt Protected						
Satd. Flow (prot)	0	1644	0	1881	1881	1615
Flt Permitted						
Satd. Flow (perm)	0	1644	0	1881	1881	1615
Link Speed (mph)	30			30	30	
Link Distance (ft)	704			770	1145	
Travel Time (s)	16.0			17.5	26.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	0	6	0	1431	858	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	6	0	1431	858	18
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	71.1%
Analysis Period (min)	15
	ICU Level of Service C

HCM 6th TWSC

Intersection

Int Delay, s/veh 0

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations		↗		↖	↖	↗
Traffic Vol, veh/h	0	5	0	1288	772	16
Future Vol, veh/h	0	5	0	1288	772	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	200
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	0	6	0	1431	858	18

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	-	858	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.2	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	359	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	359	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-



















Approach EB NB SB

HCM Control Delay, s	15.2	0	0
HCM LOS	C		

Minor Lane/Major Mvmt NBT EBLn1 SBT SBR

Capacity (veh/h)	-	359	-	-
HCM Lane V/C Ratio	-	0.015	-	-
HCM Control Delay (s)	-	15.2	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0	-	-

4: Lowell Road (3A) & Sagamore Bridge
Lanes, Volumes, Timings

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 		  	 	 	 
Traffic Volume (vph)	1498	1467	1331	689	506	1266
Future Volume (vph)	1498	1467	1331	689	506	1266
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	12	12	12	12
Storage Length (ft)	0	0	525			200
Storage Lanes	2	1	2			1
Taper Length (ft)	25		100			
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3698	1689	5040	3610	3610	2814
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3698	1689	5040	3610	3610	2814
Right Turn on Red		No				Yes
Satd. Flow (RTOR)						1300
Link Speed (mph)	35			30	30	
Link Distance (ft)	929			1189	999	
Travel Time (s)	18.1			27.0	22.7	
Peak Hour Factor	0.96	0.96	0.94	0.94	0.89	0.89
Heavy Vehicles (%)	1%	2%	1%	0%	0%	1%
Adj. Flow (vph)	1560	1528	1416	733	569	1422
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1560	1528	1416	733	569	1422
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Detector Phase	3		1	6	2	
Switch Phase						
Minimum Initial (s)	10.0		7.0	10.0	10.0	
Minimum Split (s)	16.0		15.0	17.0	17.0	
Total Split (s)	53.0		40.0	67.0	27.0	
Total Split (%)	44.2%		33.3%	55.8%	22.5%	
Maximum Green (s)	47.0		32.0	60.0	20.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		4.0	3.0	3.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		8.0	7.0	7.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Recall Mode	None		None	C-Min	C-Min	
Act Effct Green (s)	47.0	120.0	32.0	60.0	20.0	120.0
Actuated g/C Ratio	0.39	1.00	0.27	0.50	0.17	1.00
v/c Ratio	1.08	0.90	1.05	0.41	0.95	0.51
Control Delay	83.0	9.3	73.4	15.0	65.0	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.0	9.3	73.4	15.0	65.0	1.9
LOS	F	A	E	B	E	A

4: Lowell Road (3A) & Sagamore Bridge
Lanes, Volumes, Timings

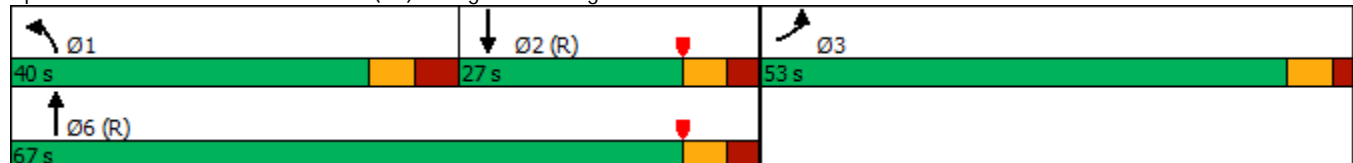


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	46.5			53.5	20.0	
Approach LOS	D			D	B	
Queue Length 50th (ft)	~694	0	~433	222	248	65
Queue Length 95th (ft)	#830	#5	#523	m227	#348	48
Internal Link Dist (ft)	849			1109	919	
Turn Bay Length (ft)			525			200
Base Capacity (vph)	1448	1689	1344	1805	601	2814
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	1.08	0.90	1.05	0.41	0.95	0.51

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
Natural Cycle:	140
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.08
Intersection Signal Delay:	41.3
Intersection LOS:	D
Intersection Capacity Utilization	98.7%
ICU Level of Service	F
Analysis Period (min)	15
~	Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.
#	95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m	Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Lowell Road (3A) & Sagamore Bridge



4: Lowell Road (3A) & Sagamore Bridge
 HCM Signalized Intersection Capacity Analysis

2022 PM Build.syn



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↶↶	↷	↶↶↶	↶↶	↶↶	↷↷
Traffic Volume (vph)	1498	1467	1331	689	506	1266
Future Volume (vph)	1498	1467	1331	689	506	1266
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	14	14	12	12	12	12
Total Lost time (s)	6.0	4.0	8.0	7.0	7.0	4.0
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3698	1689	5040	3610	3610	2814
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3698	1689	5040	3610	3610	2814
Peak-hour factor, PHF	0.96	0.96	0.94	0.94	0.89	0.89
Adj. Flow (vph)	1560	1528	1416	733	569	1422
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1560	1528	1416	733	569	1422
Heavy Vehicles (%)	1%	2%	1%	0%	0%	1%
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Actuated Green, G (s)	47.0	120.0	32.0	60.0	20.0	120.0
Effective Green, g (s)	47.0	120.0	32.0	60.0	20.0	120.0
Actuated g/C Ratio	0.39	1.00	0.27	0.50	0.17	1.00
Clearance Time (s)	6.0		8.0	7.0	7.0	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Lane Grp Cap (vph)	1448	1689	1344	1805	601	2814
v/s Ratio Prot	c0.42		0.28	0.20	0.16	
v/s Ratio Perm		c0.90				0.51
v/c Ratio	1.08	0.90	1.05	0.41	0.95	0.51
Uniform Delay, d1	36.5	0.0	44.0	18.8	49.5	0.0
Progression Factor	1.00	1.00	0.85	0.77	0.92	1.00
Incremental Delay, d2	47.5	8.4	36.4	0.5	18.9	0.4
Delay (s)	84.0	8.4	73.8	14.9	64.5	0.4
Level of Service	F	A	E	B	E	A
Approach Delay (s)	46.6			53.7	18.7	
Approach LOS	D			D	B	
























Intersection Summary			
HCM 2000 Control Delay	41.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	98.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

5: Lowell Road (3A) & Flagstone Drive/Wason Road

2022 PM Build.syn

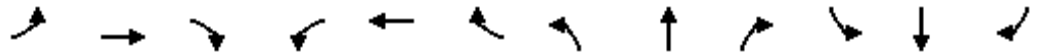
Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	92	434	435	17	28	151	1071	988	72	936	5
Future Volume (vph)	52	92	434	435	17	28	151	1071	988	72	936	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		250	200		75	575		275	175		300
Storage Lanes	0		1	1		1	1		2	1		1
Taper Length (ft)	25			50			175			75		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91	0.91
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.982		0.950	0.956		0.950			0.950		
Satd. Flow (prot)	0	1866	1599	1658	1668	1546	1787	3574	2842	1805	5131	0
Flt Permitted		0.982		0.950	0.956		0.950			0.950		
Satd. Flow (perm)	0	1866	1599	1658	1668	1546	1787	3574	2842	1805	5131	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			82			136			567			1
Link Speed (mph)		30			30			30				30
Link Distance (ft)		805			586			999				1515
Travel Time (s)		18.3			13.3			22.7				34.4
Peak Hour Factor	0.80	0.80	0.80	0.90	0.90	0.90	0.94	0.94	0.94	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%	1%	1%	0%	0%	1%	0%
Adj. Flow (vph)	65	115	543	483	19	31	161	1139	1051	82	1064	6
Shared Lane Traffic (%)				48%								
Lane Group Flow (vph)	0	180	543	251	251	31	161	1139	1051	82	1070	0
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Detector Phase	8	8	1	7	7	5	1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	11.0	16.0	
Total Split (s)	22.0	22.0	34.0	28.0	28.0	15.0	34.0	55.0	28.0	15.0	36.0	
Total Split (%)	18.3%	18.3%	28.3%	23.3%	23.3%	12.5%	28.3%	45.8%	23.3%	12.5%	30.0%	
Maximum Green (s)	16.0	16.0	28.0	22.0	22.0	9.0	28.0	49.0	22.0	9.0	30.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Min	None	None	C-Min	
Act Effct Green (s)		14.6	45.0	21.9	21.9	30.4	24.4	53.5	81.4	8.4	35.1	
Actuated g/C Ratio		0.12	0.38	0.18	0.18	0.25	0.20	0.45	0.68	0.07	0.29	
v/c Ratio		0.79	0.84	0.83	0.83	0.06	0.44	0.72	0.50	0.65	0.71	
Control Delay		75.6	40.4	70.3	69.6	0.2	58.8	28.6	2.3	77.7	42.2	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		75.6	40.4	70.3	69.6	0.2	58.8	28.6	2.3	77.7	42.2	
LOS		E	D	E	E	A	E	C	A	E	D	

5: Lowell Road (3A) & Flagstone Drive/Wason Road

2022 PM Build.syn

Lanes, Volumes, Timings

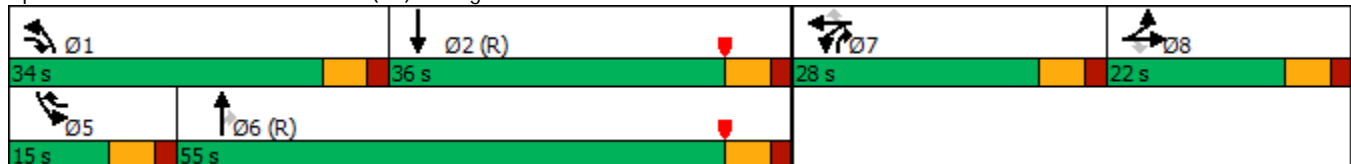


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		49.2			65.9			18.9				44.8
Approach LOS		D			E			B				D
Queue Length 50th (ft)		136	318	198	198	0	128	253	17	63		279
Queue Length 95th (ft)		188	366	#344	#343	0	m145	m253	m25	#123		334
Internal Link Dist (ft)		725			506			919				1435
Turn Bay Length (ft)			250	200		75	575		275	175		
Base Capacity (vph)		248	696	308	310	499	416	1592	2118	135		1499
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.73	0.78	0.81	0.81	0.06	0.39	0.72	0.50	0.61		0.71

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 64 (53%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 35.0 Intersection LOS: D
 Intersection Capacity Utilization 72.6% 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.
 m Volume for 95th percentile queue is metered by upstream signal.
























Splits and Phases: 5: Lowell Road (3A) & Flagstone Drive/Wason Road



5: Lowell Road (3A) & Flagstone Drive/Wason Road

2022 PM Build.syn

HCM Signalized Intersection Capacity Analysis























													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	52	92	434	435	17	28	151	1071	988	72	936	5	
Future Volume (vph)	52	92	434	435	17	28	151	1071	988	72	936	5	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	11	11	11	12	12	12	12	12	12	
Total Lost time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91		
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		
Flt Protected		0.98	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1866	1599	1658	1668	1546	1787	3574	2842	1805	5132		
Flt Permitted		0.98	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (perm)		1866	1599	1658	1668	1546	1787	3574	2842	1805	5132		
Peak-hour factor, PHF	0.80	0.80	0.80	0.90	0.90	0.90	0.94	0.94	0.94	0.88	0.88	0.88	
Adj. Flow (vph)	65	115	542	483	19	31	161	1139	1051	82	1064	6	
RTOR Reduction (vph)	0	0	55	0	0	23	0	0	216	0	1	0	
Lane Group Flow (vph)	0	180	488	251	251	8	161	1139	835	82	1069	0	
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%	1%	1%	0%	0%	1%	0%	
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA		
Protected Phases	8	8	1	7	7	5	1	6	7	5	2		
Permitted Phases			8			7			6				
Actuated Green, G (s)		14.6	39.0	21.9	21.9	29.1	24.4	52.3	74.2	7.2	35.1		
Effective Green, g (s)		14.6	39.0	21.9	21.9	29.1	24.4	52.3	74.2	7.2	35.1		
Actuated g/C Ratio		0.12	0.32	0.18	0.18	0.24	0.20	0.44	0.62	0.06	0.29		
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)		2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0		
Lane Grp Cap (vph)		227	599	302	304	374	363	1557	1899	108	1501		
v/s Ratio Prot		0.10	c0.17	c0.15	0.15	0.00	0.09	c0.32	0.08	0.05	0.21		
v/s Ratio Perm			0.14			0.00			0.21				
v/c Ratio		0.79	0.81	0.83	0.83	0.02	0.44	0.73	0.44	0.76	0.71		
Uniform Delay, d1		51.2	37.2	47.3	47.2	34.6	41.9	28.0	12.0	55.5	37.9		
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.38	0.94	0.43	1.00	1.00		
Incremental Delay, d2		16.6	8.1	17.1	16.2	0.0	0.3	1.6	0.1	24.8	2.9		
Delay (s)		67.8	45.3	64.4	63.4	34.6	57.9	28.0	5.2	80.4	40.8		
Level of Service		E	D	E	E	C	E	C	A	F	D		
Approach Delay (s)		50.9			62.2			19.8			43.7		
Approach LOS		D			E			B			D		
Intersection Summary													
HCM 2000 Control Delay			35.1									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.86										
Actuated Cycle Length (s)			120.0									Sum of lost time (s)	24.0
Intersection Capacity Utilization			72.6%									ICU Level of Service	C
Analysis Period (min)			15										

c Critical Lane Group

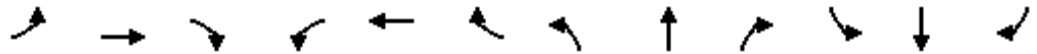
6: Lowell Road (3A) & Hampshire Drive/Oblate Drive

2022 PM Build.syn

Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	2	105	10	1	4	17	1132	12	5	911	7
Future Volume (vph)	26	2	105	10	1	4	17	1132	12	5	911	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	13	13	13	12	12	12	11	12	12
Storage Length (ft)	0		100	0		100	225		0	225		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.998			0.999	
Flt Protected		0.956			0.956		0.950			0.950		
Satd. Flow (prot)	0	1816	1583	0	1877	1669	1736	3567	0	1745	3571	0
Flt Permitted		0.436					0.950			0.950		
Satd. Flow (perm)	0	828	1583	0	1963	1669	1736	3567	0	1745	3571	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			131			86		1			1	
Link Speed (mph)		30			10			30			30	
Link Distance (ft)		495			382			1515			1791	
Travel Time (s)		11.3			26.0			34.4			40.7	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.95	0.95	0.95	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	4%	1%	0%	0%	1%	0%
Adj. Flow (vph)	33	3	131	13	1	5	18	1192	13	6	1047	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	36	131	0	14	5	18	1205	0	6	1055	0
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		4	4 1		8	8 5	1	6		5	2	
Permitted Phases	4			8								
Detector Phase	4	4	4 1	8	8	8 5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		2.0	15.0		2.0	15.0	
Minimum Split (s)	9.0	9.0		9.0	9.0		8.0	21.0		8.0	21.0	
Total Split (s)	16.0	16.0		16.0	16.0		16.0	66.0		16.0	66.0	
Total Split (%)	14.0%	14.0%		14.0%	14.0%		14.0%	57.9%		14.0%	57.9%	
Maximum Green (s)	10.0	10.0		10.0	10.0		12.0	60.0		12.0	60.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effect Green (s)		8.8	16.8		6.7	9.6	5.6	40.5		5.1	32.0	
Actuated g/C Ratio		0.13	0.25		0.10	0.14	0.08	0.60		0.08	0.47	
v/c Ratio		0.34	0.27		0.07	0.02	0.12	0.56		0.05	0.62	
Control Delay		42.3	5.7		36.2	0.0	38.2	11.3		38.6	16.1	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		42.3	5.7		36.2	0.0	38.2	11.3		38.6	16.1	
LOS		D	A		D	A	D	B		D	B	

Lanes, Volumes, Timings



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		13.6			26.7			11.7				16.2
Approach LOS		B			C			B				B
Queue Length 50th (ft)		10	0		4	0	6	100		2		132
Queue Length 95th (ft)		47	26		24	0	33	337		16		275
Internal Link Dist (ft)		415			302			1435				1711
Turn Bay Length (ft)			100			100	225			225		
Base Capacity (vph)		130	587		308	407	327	3124		328		3127
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	0.22		0.05	0.01	0.06	0.39		0.02		0.34























Intersection Summary

Area Type:	Other
Cycle Length:	114
Actuated Cycle Length:	67.7
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.62
Intersection Signal Delay:	13.9
Intersection LOS:	B
Intersection Capacity Utilization	53.3%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 6: Lowell Road (3A) & Hampshire Drive/Oblate Drive

Ø1	Ø2	Ø4	Ø8
16 s	66 s	16 s	16 s
Ø5	Ø6		
16 s	66 s		

HCM Signalized Intersection Capacity Analysis

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	26	2	105	10	1	4	17	1132	12	5	911	7		
Future Volume (vph)	26	2	105	10	1	4	17	1132	12	5	911	7		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width	12	12	12	13	13	13	12	12	12	11	12	12		
Total Lost time (s)		6.0	6.0		6.0	6.0	4.0	6.0		4.0	6.0			
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95			
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00			
Flt Protected		0.96	1.00		0.96	1.00	0.95	1.00		0.95	1.00			
Satd. Flow (prot)		1817	1583		1876	1669	1736	3569		1745	3570			
Flt Permitted		0.44	1.00		1.00	1.00	0.95	1.00		0.95	1.00			
Satd. Flow (perm)		828	1583		1963	1669	1736	3569		1745	3570			
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.95	0.95	0.95	0.87	0.87	0.87		
Adj. Flow (vph)	32	2	131	12	1	5	18	1192	13	6	1047	8		
RTOR Reduction (vph)	0	0	106	0	0	4	0	0	0	0	1	0		
Lane Group Flow (vph)	0	36	25	0	14	1	18	1205	0	6	1054	0		
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	4%	1%	0%	0%	1%	0%		
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA			
Protected Phases		4	4	1	8	8	5	6		5	2			
Permitted Phases	4			8										
Actuated Green, G (s)		8.8	14.4		2.4	9.2	5.6	40.5		0.8	35.7			
Effective Green, g (s)		8.8	14.4		2.4	9.2	5.6	40.5		0.8	35.7			
Actuated g/C Ratio		0.12	0.19		0.03	0.12	0.08	0.54		0.01	0.48			
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0			
Vehicle Extension (s)		3.0			3.0		2.0	3.0		2.0	3.0			
Lane Grp Cap (vph)		97	305		63	206	130	1940		18	1710			
v/s Ratio Prot			0.02			0.00	c0.01	c0.34		0.00	0.30			
v/s Ratio Perm		c0.04			c0.01									
v/c Ratio		0.37	0.08		0.22	0.00	0.14	0.62		0.33	0.62			
Uniform Delay, d1		30.3	24.6		35.1	28.6	32.2	11.7		36.6	14.3			
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00			
Incremental Delay, d2		2.4	0.1		1.8	0.0	0.2	0.6		3.9	0.7			
Delay (s)		32.7	24.8		36.9	28.6	32.4	12.3		40.5	15.0			
Level of Service		C	C		D	C	C	B		D	B			
Approach Delay (s)		26.5			34.7			12.6			15.2			
Approach LOS		C			C			B			B			
Intersection Summary														
HCM 2000 Control Delay			14.8									HCM 2000 Level of Service	B	
HCM 2000 Volume to Capacity ratio			0.56											
Actuated Cycle Length (s)			74.5								22.0			
Intersection Capacity Utilization			53.3%										ICU Level of Service	A
Analysis Period (min)			15											

c Critical Lane Group

7: Lowell Road (3A) & Executive Drive/PMA Drive

2022 PM Build.syn

Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	242	3	82	23	2	22	62	1030	7	16	752	40
Future Volume (vph)	242	3	82	23	2	22	62	1030	7	16	752	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	15	12	12	13	11	12	12	11	12	12
Storage Length (ft)	0		225	0		80	350		0	150		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.999			0.992	
Flt Protected		0.953			0.957		0.950			0.950		
Satd. Flow (prot)	0	1733	1708	0	1818	1620	1631	3571	0	1646	3540	0
Flt Permitted		0.705			0.663		0.950			0.950		
Satd. Flow (perm)	0	1282	1708	0	1260	1620	1631	3571	0	1646	3540	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			103			91		1			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		492			577			1791			1168	
Travel Time (s)		11.2			13.1			40.7			26.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.97	0.97	0.97	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	4%	0%	0%	3%	7%	1%	0%	6%	1%	4%
Adj. Flow (vph)	303	4	103	29	3	28	64	1062	7	17	817	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	307	103	0	32	28	64	1069	0	17	860	0
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA	
Protected Phases		8	8 1		4	4	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8 1	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		5.0	5.0	5.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	9.0	9.0		11.0	11.0	11.0	9.0	14.0		9.0	14.0	
Total Split (s)	26.0	26.0		23.0	23.0	23.0	16.0	66.0		16.0	66.0	
Total Split (%)	24.1%	24.1%		21.3%	21.3%	21.3%	14.8%	61.1%		14.8%	61.1%	
Maximum Green (s)	20.0	20.0		17.0	17.0	17.0	10.0	60.0		10.0	60.0	
Yellow Time (s)	4.0	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	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None	None	None	Min		None	Min	
Act Effct Green (s)		20.6	34.0		20.6	20.6	7.1	34.1		5.4	25.7	
Actuated g/C Ratio		0.30	0.49		0.30	0.30	0.10	0.49		0.08	0.37	
v/c Ratio		0.80	0.12		0.09	0.05	0.38	0.61		0.13	0.65	
Control Delay		45.3	3.8		23.5	0.2	39.1	14.4		36.9	20.7	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		45.3	3.8		23.5	0.2	39.1	14.4		36.9	20.7	
LOS		D	A		C	A	D	B		D	C	

7: Lowell Road (3A) & Executive Drive/PMA Drive

2022 PM Build.syn

Lanes, Volumes, Timings



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		34.9			12.6			15.8				21.0
Approach LOS		C			B			B				C
Queue Length 50th (ft)		121	0		10	0	26	145		7		160
Queue Length 95th (ft)		#286	21		33	0	72	282		29		228
Internal Link Dist (ft)		412			497			1711				1088
Turn Bay Length (ft)			225			80	350			150		
Base Capacity (vph)		382	964		375	546	243	3064		245		3039
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		0.80	0.11		0.09	0.05	0.26	0.35		0.07		0.28























Intersection Summary

Area Type:	Other
Cycle Length:	108
Actuated Cycle Length:	69.2
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.80
Intersection Signal Delay:	20.7
Intersection LOS:	C
Intersection Capacity Utilization	67.3%
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.	

Splits and Phases: 7: Lowell Road (3A) & Executive Drive/PMA Drive
























HCM Signalized Intersection Capacity Analysis

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	242	3	82	23	2	22	62	1030	7	16	752	40	
Future Volume (vph)	242	3	82	23	2	22	62	1030	7	16	752	40	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	11	11	15	12	12	13	11	12	12	11	12	12	
Total Lost time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0		
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95		
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99		
Flt Protected		0.95	1.00		0.96	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)		1733	1708		1818	1620	1631	3571		1646	3542		
Flt Permitted		0.71	1.00		0.66	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (perm)		1283	1708		1259	1620	1631	3571		1646	3542		
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.97	0.97	0.97	0.92	0.92	0.92	
Adj. Flow (vph)	302	4	102	29	2	28	64	1062	7	17	817	43	
RTOR Reduction (vph)	0	0	58	0	0	20	0	1	0	0	5	0	
Lane Group Flow (vph)	0	307	45	0	32	8	64	1068	0	17	855	0	
Heavy Vehicles (%)	1%	0%	4%	0%	0%	3%	7%	1%	0%	6%	1%	4%	
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA		
Protected Phases		8	8 1		4	4	1	6		5	2		
Permitted Phases	8			4									
Actuated Green, G (s)		20.6	32.5		20.6	20.6	5.9	34.1		1.1	29.3		
Effective Green, g (s)		20.6	32.5		20.6	20.6	5.9	34.1		1.1	29.3		
Actuated g/C Ratio		0.28	0.44		0.28	0.28	0.08	0.46		0.01	0.40		
Clearance Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0		
Vehicle Extension (s)		2.0			2.0	2.0	2.0	3.0		2.0	3.0		
Lane Grp Cap (vph)		358	752		351	452	130	1650		24	1406		
v/s Ratio Prot			0.03			0.00	c0.04	c0.30		0.01	0.24		
v/s Ratio Perm		c0.24		0.03									
v/c Ratio		0.86	0.06	0.09	0.02	0.49	0.65			0.71	0.61		
Uniform Delay, d1		25.2	11.9	19.7	19.3	32.5	15.2			36.2	17.7		
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00		
Incremental Delay, d2		17.4	0.0	0.0	0.0	1.1	0.9			56.1	0.8		
Delay (s)		42.6	11.9	19.7	19.3	33.6	16.1			92.3	18.4		
Level of Service		D	B		B	B	C	B		F	B		
Approach Delay (s)		34.9		19.5			17.1			19.9			
Approach LOS		C		B			B			B			
Intersection Summary													
HCM 2000 Control Delay			21.1		HCM 2000 Level of Service						C		
HCM 2000 Volume to Capacity ratio			0.75										
Actuated Cycle Length (s)			73.8		Sum of lost time (s)					18.0			
Intersection Capacity Utilization			67.3%		ICU Level of Service					C			
Analysis Period (min)			15										

c Critical Lane Group

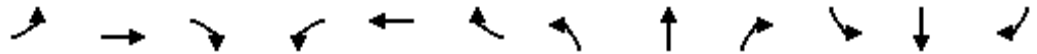
Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	2	25	31	0	48	27	1232	15	56	742	11
Future Volume (vph)	9	2	25	31	0	48	27	1232	15	56	742	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	13	13	11	11	12	12	12	12
Storage Length (ft)	0		50	0		100	210		325	125		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			50			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850			0.850		0.998			0.998	
Flt Protected		0.962			0.950		0.950			0.950		
Satd. Flow (prot)	0	1828	1583	0	1865	1669	1745	3449	0	1805	1878	0
Flt Permitted		0.746			0.748		0.950			0.950		
Satd. Flow (perm)	0	1417	1583	0	1469	1669	1745	3449	0	1805	1878	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			91			60		1			1	
Link Speed (mph)		10			30			30			30	
Link Distance (ft)		598			262			1405			549	
Travel Time (s)		40.8			6.0			31.9			12.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.99	0.99	0.99	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	11	3	31	39	0	60	27	1244	15	60	789	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	31	0	39	60	27	1259	0	60	801	0
Turn Type	Perm	NA	Prot	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		8	8		4	4.5	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8	4	4	4.5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0		11.0	16.0		11.0	16.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0		16.0	116.0		16.0	116.0	
Total Split (%)	8.9%	8.9%	8.9%	8.9%	8.9%		8.9%	64.4%		8.9%	64.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0		10.0	110.0		10.0	110.0	
Yellow Time (s)	4.0	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	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5		1.0	1.5		1.5	1.5	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effect Green (s)		8.8	8.8		8.8	24.8	6.6	136.8		10.0	142.4	
Actuated g/C Ratio		0.05	0.05		0.05	0.14	0.04	0.76		0.06	0.79	
v/c Ratio		0.20	0.19		0.54	0.21	0.42	0.48		0.60	0.54	
Control Delay		87.2	2.6		109.4	14.6	103.9	11.5		106.4	12.0	

Lanes, Volumes, Timings

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr _t	
Fl _t Protected	
Satd. Flow (prot)	
Fl _t 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 (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	32.0
Total Split (s)	32.0
Total Split (%)	18%
Maximum Green (s)	26.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	1.5
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	5
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	

Lanes, Volumes, Timings



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	1.5	
Total Delay		87.2	2.6		109.4	14.6	103.9	11.5		106.4	13.5	
LOS		F	A		F	B	F	B		F	B	
Approach Delay		28.9			51.9			13.4			20.0	
Approach LOS		C			D			B			C	
Queue Length 50th (ft)		16	0		46	0	32	222		71	261	
Queue Length 95th (ft)		39	0		80	34	70	590		124	810	
Internal Link Dist (ft)		518			182			1325			469	
Turn Bay Length (ft)			50			100	210			125		
Base Capacity (vph)		84	179		87	277	96	2649		112	1490	
Starvation Cap Reductn		0	0		0	0	0	0		0	474	
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		0.17	0.17		0.45	0.22	0.28	0.48		0.54	0.79	

Intersection Summary

Area Type:	Other
Cycle Length:	180
Actuated Cycle Length:	180
Offset:	0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow, Master Intersection
Natural Cycle:	100
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.60
Intersection Signal Delay:	17.9
Intersection LOS:	B
Intersection Capacity Utilization	64.9%
ICU Level of Service	C
Analysis Period (min)	15






















Splits and Phases: 8: Lowell Road (3A) & Fox Hollow Drive/Fox Hollow Drive (Plaza)



Lanes, Volumes, Timings












Lane Group	Ø9
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	

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	2	25	31	0	48	27	1232	15	56	742	11
Future Volume (vph)	9	2	25	31	0	48	27	1232	15	56	742	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	14	13	13	11	11	12	12	12	12
Total Lost time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1828	1583		1865	1669	1745	3449		1805	1877	
Flt Permitted		0.75	1.00		0.75	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1417	1583		1469	1669	1745	3449		1805	1877	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.99	0.99	0.99	0.94	0.94	0.94
Adj. Flow (vph)	11	2	31	39	0	60	27	1244	15	60	789	12
RTOR Reduction (vph)	0	0	29	0	0	52	0	0	0	0	0	0
Lane Group Flow (vph)	0	14	2	0	39	8	27	1259	0	60	801	0
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Perm	NA	Prot	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		8	8		4	4 5	1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		8.8	8.8		8.8	24.8	5.6	132.0		10.0	136.4	
Effective Green, g (s)		8.8	8.8		8.8	24.8	5.6	132.0		10.0	136.4	
Actuated g/C Ratio		0.05	0.05		0.05	0.14	0.03	0.73		0.06	0.76	
Clearance Time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)		1.5	1.5		1.5		1.0	1.5		1.5	1.5	
Lane Grp Cap (vph)		69	77		71	229	54	2529		100	1422	
v/s Ratio Prot			0.00			0.00	0.02	0.36		c0.03	c0.43	
v/s Ratio Perm		0.01			c0.03							
v/c Ratio		0.20	0.02		0.55	0.04	0.50	0.50		0.60	0.56	
Uniform Delay, d1		82.2	81.5		83.7	67.2	85.8	10.1		83.0	9.2	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5	0.0		4.6	0.0	2.6	0.7		6.3	1.6	
Delay (s)		82.8	81.5		88.3	67.3	88.5	10.8		89.4	10.8	
Level of Service		F	F		F	E	F	B		F	B	
Approach Delay (s)		81.9			75.5			12.4			16.3	
Approach LOS		F			E			B			B	
Intersection Summary												
HCM 2000 Control Delay			18.0									B
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			180.0							24.0		
Intersection Capacity Utilization			64.9%									C
Analysis Period (min)			15									

c Critical Lane Group

9: Lowell Road (3A) & Pelham Road
Lanes, Volumes, Timings

							Ø9
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (vph)	86	142	1172	109	110	732	
Future Volume (vph)	86	142	1172	109	110	732	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	13	13	12	12	
Storage Length (ft)	0	75		0	150		
Storage Lanes	1	1		0	1		
Taper Length (ft)	25				50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.850	0.989				
Flt Protected	0.950				0.950		
Satd. Flow (prot)	1805	1615	1924	0	1805	1881	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1805	1615	1924	0	1805	1881	
Right Turn on Red		Yes		Yes			
Satd. Flow (RTOR)		151	4				
Link Speed (mph)	20		30			30	
Link Distance (ft)	512		549			1309	
Travel Time (s)	17.5		12.5			29.8	
Peak Hour Factor	0.87	0.87	0.98	0.98	0.89	0.89	
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%	
Adj. Flow (vph)	99	163	1196	111	124	822	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	99	163	1307	0	124	822	
Turn Type	Prot	pt+ov	NA		Prot	NA	
Protected Phases	4	4 5	6		5	2	9
Permitted Phases							
Detector Phase	4	4 5	6		5	2	
Switch Phase							
Minimum Initial (s)	5.0		10.0		3.0	10.0	5.0
Minimum Split (s)	11.0		16.0		9.0	16.0	35.0
Total Split (s)	26.0		116.0		13.0	116.0	35.0
Total Split (%)	13.7%		61.1%		6.8%	61.1%	18%
Maximum Green (s)	20.0		110.0		7.0	110.0	29.0
Yellow Time (s)	4.0		4.0		4.0	4.0	4.0
All-Red Time (s)	2.0		2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.0		6.0		6.0	6.0	
Lead/Lag			Lag		Lead		
Lead-Lag Optimize?			Yes		Yes		
Vehicle Extension (s)	1.5		1.5		1.5	1.5	3.0
Recall Mode	None		C-Min		None	C-Min	None
Walk Time (s)							5.0
Flash Dont Walk (s)							24.0
Pedestrian Calls (#/hr)							5
Act Effct Green (s)	14.3	44.8	126.2		24.5	156.7	
Actuated g/C Ratio	0.08	0.24	0.66		0.13	0.82	
v/c Ratio	0.73	0.33	1.02		0.53	0.53	
Control Delay	114.7	12.5	61.4		82.4	9.5	

9: Lowell Road (3A) & Pelham Road
Lanes, Volumes, Timings



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø9
Queue Delay	0.0	0.0	30.3		0.0	0.0	
Total Delay	114.7	12.5	91.6		82.4	9.5	
LOS	F	B	F		F	A	
Approach Delay	51.1		91.6			19.0	
Approach LOS	D		F			B	
Queue Length 50th (ft)	123	12	1417		148	206	
Queue Length 95th (ft)	184	78	#2205		#384	754	
Internal Link Dist (ft)	432		469			1229	
Turn Bay Length (ft)		75			150		
Base Capacity (vph)	190	491	1279		233	1551	
Starvation Cap Reductn	0	0	202		0	0	
Spillback Cap Reductn	0	0	0		0	0	
Storage Cap Reductn	0	0	0		0	0	
Reduced v/c Ratio	0.52	0.33	1.21		0.53	0.53	












Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 30 (16%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.02
 Intersection Signal Delay: 60.1
 Intersection LOS: E
 Intersection Capacity Utilization 94.2%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 9: Lowell Road (3A) & Pelham Road



HCM Signalized Intersection Capacity Analysis

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	86	142	1172	109	110	732
Future Volume (vph)	86	142	1172	109	110	732
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	13	13	12	12
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	1615	1923		1805	1881
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1805	1615	1923		1805	1881
Peak-hour factor, PHF	0.87	0.87	0.98	0.98	0.89	0.89
Adj. Flow (vph)	99	163	1196	111	124	822
RTOR Reduction (vph)	0	115	1	0	0	0
Lane Group Flow (vph)	99	48	1306	0	124	822
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	4	4 5	6		5	2
Permitted Phases						
Actuated Green, G (s)	14.3	44.8	121.4		24.5	151.9
Effective Green, g (s)	14.3	44.8	121.4		24.5	151.9
Actuated g/C Ratio	0.08	0.24	0.64		0.13	0.80
Clearance Time (s)	6.0		6.0		6.0	6.0
Vehicle Extension (s)	1.5		1.5		1.5	1.5
Lane Grp Cap (vph)	135	380	1228		232	1503
v/s Ratio Prot	c0.05	0.03	c0.68		0.07	c0.44
v/s Ratio Perm						
v/c Ratio	0.73	0.13	1.06		0.53	0.55
Uniform Delay, d1	86.0	57.2	34.3		77.4	6.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	16.2	0.1	44.3		1.2	1.4
Delay (s)	102.1	57.2	78.6		78.6	8.2
Level of Service	F	E	E		E	A
Approach Delay (s)	74.2		78.6			17.4
Approach LOS	E		E			B
Intersection Summary						
HCM 2000 Control Delay			55.1		HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			0.93			
Actuated Cycle Length (s)			190.0		Sum of lost time (s)	24.0
Intersection Capacity Utilization			94.2%		ICU Level of Service	F
Analysis Period (min)			15			

c Critical Lane Group

10: Lowell Road (3A) & Friars Drive (Site Access)

2022 PM Build.syn

Lanes, Volumes, Timings



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑	↓	↙
Traffic Volume (vph)	0	36	0	1294	772	18
Future Volume (vph)	0	36	0	1294	772	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	200			200
Storage Lanes	0	1	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				0.850
Flt Protected						
Satd. Flow (prot)	0	1644	0	1881	1881	1615
Flt Permitted						
Satd. Flow (perm)	0	1644	0	1881	1881	1615
Link Speed (mph)	30			30	30	
Link Distance (ft)	704			770	1145	
Travel Time (s)	16.0			17.5	26.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	0	40	0	1438	858	20
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	40	0	1438	858	20
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	71.4%
Analysis Period (min)	15
	ICU Level of Service C

HCM 6th TWSC

Intersection

Int Delay, s/veh 0.3

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations		↗		↖	↖	↗
Traffic Vol, veh/h	0	36	0	1294	772	18
Future Vol, veh/h	0	36	0	1294	772	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	200
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	0	40	0	1438	858	20

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	-	858	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.2	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	359	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	359	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s	16.3	0	0
HCM LOS	C		

Minor Lane/Major Mvmt NBT EBLn1 SBT SBR

Capacity (veh/h)	-	359	-	-
HCM Lane V/C Ratio	-	0.111	-	-
HCM Control Delay (s)	-	16.3	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.4	-	-

4: Lowell Road (3A) & Sagamore Bridge
Lanes, Volumes, Timings

2032 PM NoBuild.syn



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	1640	1593	1442	752	547	1365
Future Volume (vph)	1640	1593	1442	752	547	1365
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	12	12	12	12
Storage Length (ft)	0	0	525			200
Storage Lanes	2	1	2			1
Taper Length (ft)	25		100			
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Fr _t		0.850				0.850
Fl _t Protected	0.950		0.950			
Satd. Flow (prot)	3698	1689	5040	3610	3610	2814
Fl _t Permitted	0.950		0.950			
Satd. Flow (perm)	3698	1689	5040	3610	3610	2814
Right Turn on Red		No				Yes
Satd. Flow (RTOR)						1242
Link Speed (mph)	35			30	30	
Link Distance (ft)	929			1189	999	
Travel Time (s)	18.1			27.0	22.7	
Peak Hour Factor	0.96	0.96	0.94	0.94	0.89	0.89
Heavy Vehicles (%)	1%	2%	1%	0%	0%	1%
Adj. Flow (vph)	1708	1659	1534	800	615	1534
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1708	1659	1534	800	615	1534
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Detector Phase	3		1	6	2	
Switch Phase						
Minimum Initial (s)	10.0		7.0	10.0	10.0	
Minimum Split (s)	16.0		15.0	17.0	17.0	
Total Split (s)	50.0		43.0	70.0	27.0	
Total Split (%)	41.7%		35.8%	58.3%	22.5%	
Maximum Green (s)	44.0		35.0	63.0	20.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		4.0	3.0	3.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		8.0	7.0	7.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Recall Mode	None		None	C-Min	C-Min	
Act Effct Green (s)	44.0	120.0	35.0	63.0	20.0	120.0
Actuated g/C Ratio	0.37	1.00	0.29	0.52	0.17	1.00
v/c Ratio	1.26	0.98	1.04	0.42	1.02	0.55
Control Delay	157.1	20.6	64.4	8.9	73.0	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	157.1	20.6	64.4	8.9	73.0	2.1
LOS	F	C	E	A	E	A

4: Lowell Road (3A) & Sagamore Bridge
Lanes, Volumes, Timings

2032 PM NoBuild.syn

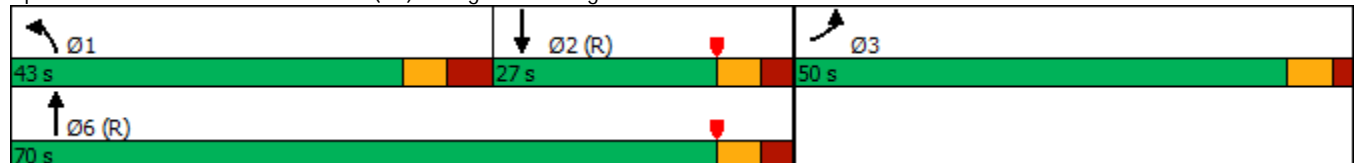


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	89.8			45.4	22.4	
Approach LOS	F			D	C	
Queue Length 50th (ft)	~855	0	~451	145	~253	73
Queue Length 95th (ft)	#992	#216	#550	m181	m#358	47
Internal Link Dist (ft)	849			1109	919	
Turn Bay Length (ft)			525			200
Base Capacity (vph)	1355	1689	1470	1895	601	2814
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	1.26	0.98	1.04	0.42	1.02	0.55

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
Natural Cycle:	150
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.26
Intersection Signal Delay:	58.1
Intersection LOS:	E
Intersection Capacity Utilization:	106.0%
ICU Level of Service:	G
Analysis Period (min):	15
~	Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.
#	95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m	Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Lowell Road (3A) & Sagamore Bridge



4: Lowell Road (3A) & Sagamore Bridge

2032 PM NoBuild.syn

HCM Signalized Intersection Capacity Analysis



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↗	↖↗↘	↕	↕	↖↗
Traffic Volume (vph)	1640	1593	1442	752	547	1365
Future Volume (vph)	1640	1593	1442	752	547	1365
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	14	14	12	12	12	12
Total Lost time (s)	6.0	4.0	8.0	7.0	7.0	4.0
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3698	1689	5040	3610	3610	2814
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3698	1689	5040	3610	3610	2814
Peak-hour factor, PHF	0.96	0.96	0.94	0.94	0.89	0.89
Adj. Flow (vph)	1708	1659	1534	800	615	1534
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1708	1659	1534	800	615	1534
Heavy Vehicles (%)	1%	2%	1%	0%	0%	1%
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Actuated Green, G (s)	44.0	120.0	35.0	63.0	20.0	120.0
Effective Green, g (s)	44.0	120.0	35.0	63.0	20.0	120.0
Actuated g/C Ratio	0.37	1.00	0.29	0.52	0.17	1.00
Clearance Time (s)	6.0		8.0	7.0	7.0	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Lane Grp Cap (vph)	1355	1689	1470	1895	601	2814
v/s Ratio Prot	c0.46		0.30	0.22	0.17	
v/s Ratio Perm		c0.98				0.55
v/c Ratio	1.26	0.98	1.04	0.42	1.02	0.55
Uniform Delay, d1	38.0	0.0	42.5	17.4	50.0	0.0
Progression Factor	1.00	1.00	0.77	0.48	0.80	1.00
Incremental Delay, d2	123.3	18.1	31.6	0.5	32.5	0.4
Delay (s)	161.3	18.1	64.1	8.8	72.6	0.4
Level of Service	F	B	E	A	E	A
Approach Delay (s)	90.7			45.2	21.1	
Approach LOS	F			D	C	

Intersection Summary			
HCM 2000 Control Delay	58.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.25		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	106.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

5: Lowell Road (3A) & Flagstone Drive/Wason Road

2032 PM NoBuild.syn

Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	98	475	479	19	31	153	1171	1093	80	991	5
Future Volume (vph)	54	98	475	479	19	31	153	1171	1093	80	991	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		250	200		75	575		275	175		300
Storage Lanes	0		1	1		1	1		2	1		1
Taper Length (ft)	25			50			175			75		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91	0.91
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.983		0.950	0.956		0.950			0.950		
Satd. Flow (prot)	0	1868	1599	1658	1668	1546	1787	3574	2842	1805	5131	0
Flt Permitted		0.983		0.950	0.956		0.950			0.950		
Satd. Flow (perm)	0	1868	1599	1658	1668	1546	1787	3574	2842	1805	5131	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			82			136			424			1
Link Speed (mph)		30			30			30				30
Link Distance (ft)		805			586			999				1515
Travel Time (s)		18.3			13.3			22.7				34.4
Peak Hour Factor	0.80	0.80	0.80	0.90	0.90	0.90	0.94	0.94	0.94	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%	1%	1%	0%	0%	1%	0%
Adj. Flow (vph)	68	123	594	532	21	34	163	1246	1163	91	1126	6
Shared Lane Traffic (%)				48%								
Lane Group Flow (vph)	0	191	594	277	276	34	163	1246	1163	91	1132	0
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Detector Phase	8	8	1	7	7	5	1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	11.0	16.0	
Total Split (s)	20.0	20.0	33.0	29.0	29.0	14.0	33.0	57.0	29.0	14.0	38.0	
Total Split (%)	16.7%	16.7%	27.5%	24.2%	24.2%	11.7%	27.5%	47.5%	24.2%	11.7%	31.7%	
Maximum Green (s)	14.0	14.0	27.0	23.0	23.0	8.0	27.0	51.0	23.0	8.0	32.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Min	None	None	C-Min	
Act Effct Green (s)		13.8	45.7	23.2	23.2	31.0	25.9	51.2	80.4	7.9	33.2	
Actuated g/C Ratio		0.12	0.38	0.19	0.19	0.26	0.22	0.43	0.67	0.07	0.28	
v/c Ratio		0.90	0.90	0.87	0.86	0.07	0.42	0.82	0.57	0.77	0.80	
Control Delay		92.1	48.3	73.5	72.3	0.3	58.4	19.5	0.6	93.6	45.6	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		92.1	48.3	73.5	72.3	0.3	58.4	19.5	0.6	93.6	45.6	
LOS		F	D	E	E	A	E	B	A	F	D	

5: Lowell Road (3A) & Flagstone Drive/Wason Road

2032 PM NoBuild.syn

Lanes, Volumes, Timings

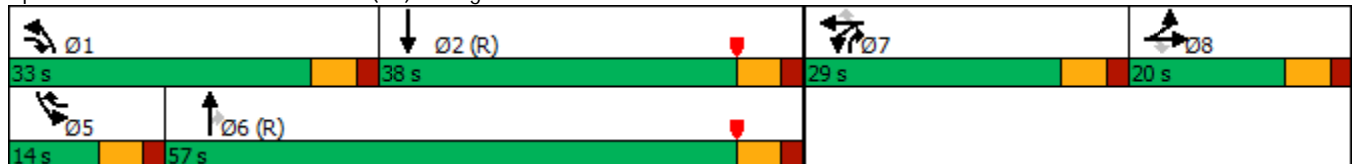


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		58.9			68.7			13.4				49.2
Approach LOS		E			E			B				D
Queue Length 50th (ft)		148	374	221	220	0	117	202	4	71		302
Queue Length 95th (ft)		#232	441	#382	#378	0	m123	m162	m1	#155		349
Internal Link Dist (ft)		725			506			919				1435
Turn Bay Length (ft)			250	200		75	575		275	175		
Base Capacity (vph)		217	673	319	321	502	402	1525	2044	120		1418
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		0.88	0.88	0.87	0.86	0.07	0.41	0.82	0.57	0.76		0.80
























Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	74 (62%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.90
Intersection Signal Delay:	35.1
Intersection LOS:	D
Intersection Capacity Utilization:	77.4%
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.
m	Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Lowell Road (3A) & Flagstone Drive/Wason Road

























HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	98	475	479	19	31	153	1171	1093	80	991	5
Future Volume (vph)	54	98	475	479	19	31	153	1171	1093	80	991	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	11	11	11	12	12	12	12	12	12
Total Lost time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.98	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1867	1599	1658	1668	1546	1787	3574	2842	1805	5132	
Flt Permitted		0.98	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1867	1599	1658	1668	1546	1787	3574	2842	1805	5132	
Peak-hour factor, PHF	0.80	0.80	0.80	0.90	0.90	0.90	0.94	0.94	0.94	0.88	0.88	0.88
Adj. Flow (vph)	68	122	594	532	21	34	163	1246	1163	91	1126	6
RTOR Reduction (vph)	0	0	55	0	0	25	0	0	161	0	1	0
Lane Group Flow (vph)	0	191	539	277	276	9	163	1246	1002	91	1131	0
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%	1%	1%	0%	0%	1%	0%
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Actuated Green, G (s)		13.8	39.7	23.2	23.2	31.1	25.9	51.1	74.3	7.9	33.1	
Effective Green, g (s)		13.8	39.7	23.2	23.2	31.1	25.9	51.1	74.3	7.9	33.1	
Actuated g/C Ratio		0.12	0.33	0.19	0.19	0.26	0.22	0.43	0.62	0.07	0.28	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)		2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	
Lane Grp Cap (vph)		214	608	320	322	400	385	1521	1901	118	1415	
v/s Ratio Prot		0.10	c0.19	c0.17	0.17	0.00	0.09	c0.35	0.10	0.05	0.22	
v/s Ratio Perm			0.15			0.00			0.25			
v/c Ratio		0.89	0.89	0.87	0.86	0.02	0.42	0.82	0.53	0.77	0.80	
Uniform Delay, d1		52.4	38.0	46.9	46.8	33.1	40.6	30.4	12.9	55.2	40.4	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.41	0.58	0.04	1.00	1.00	
Incremental Delay, d2		33.8	14.5	20.7	19.3	0.0	0.2	1.5	0.1	25.3	4.8	
Delay (s)		86.2	52.5	67.6	66.1	33.1	57.5	19.3	0.6	80.4	45.2	
Level of Service		F	D	E	E	C	E	B	A	F	D	
Approach Delay (s)		60.7			64.9			13.2			47.8	
Approach LOS		E			E			B			D	
Intersection Summary												
HCM 2000 Control Delay			34.5									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			120.0									Sum of lost time (s) 24.0
Intersection Capacity Utilization			77.4%									ICU Level of Service D
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	2	116	11	1	5	18	1236	14	6	962	8
Future Volume (vph)	28	2	116	11	1	5	18	1236	14	6	962	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	13	13	13	12	12	12	11	12	12
Storage Length (ft)	0		100	0		100	225		0	225	0	
Storage Lanes	0		1	0		1	1		0	1	0	
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.998			0.999	
Flt Protected		0.956			0.955		0.950			0.950		
Satd. Flow (prot)	0	1816	1583	0	1875	1669	1736	3568	0	1745	3571	0
Flt Permitted		0.422					0.950			0.950		
Satd. Flow (perm)	0	802	1583	0	1963	1669	1736	3568	0	1745	3571	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			145			86		1			1	
Link Speed (mph)		30			10			30			30	
Link Distance (ft)		495			382			1515			1791	
Travel Time (s)		11.3			26.0			34.4			40.7	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.95	0.95	0.95	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	4%	1%	0%	0%	1%	0%
Adj. Flow (vph)	35	3	145	14	1	6	19	1301	15	7	1106	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	38	145	0	15	6	19	1316	0	7	1115	0
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		4	4 1		8	8 5	1	6		5	2	
Permitted Phases	4			8								
Detector Phase	4	4	4 1	8	8	8 5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		2.0	15.0		2.0	15.0	
Minimum Split (s)	9.0	9.0		9.0	9.0		8.0	21.0		8.0	21.0	
Total Split (s)	16.0	16.0		16.0	16.0		16.0	66.0		16.0	66.0	
Total Split (%)	14.0%	14.0%		14.0%	14.0%		14.0%	57.9%		14.0%	57.9%	
Maximum Green (s)	10.0	10.0		10.0	10.0		12.0	60.0		12.0	60.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)		9.1	17.5		6.9	9.7	5.8	43.6		5.3	36.3	
Actuated g/C Ratio		0.13	0.24		0.09	0.13	0.08	0.60		0.07	0.50	
v/c Ratio		0.38	0.30		0.08	0.02	0.14	0.62		0.06	0.62	
Control Delay		49.1	6.2		40.4	0.2	42.7	12.8		43.0	15.4	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		49.1	6.2		40.4	0.2	42.7	12.8		43.0	15.4	
LOS		D	A		D	A	D	B		D	B	

Lanes, Volumes, Timings



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		15.1			28.9			13.3				15.6
Approach LOS		B			C			B				B
Queue Length 50th (ft)		12	0		5	0	6	118		2		146
Queue Length 95th (ft)		#55	29		27	0	36	383		18		295
Internal Link Dist (ft)		415			302			1435				1711
Turn Bay Length (ft)			100			100	225			225		
Base Capacity (vph)		119	573		292	386	310	3017		311		3019
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		0.32	0.25		0.05	0.02	0.06	0.44		0.02		0.37























Intersection Summary

Area Type:	Other
Cycle Length:	114
Actuated Cycle Length:	72.7
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.63
Intersection Signal Delay:	14.5
Intersection LOS:	B
Intersection Capacity Utilization:	56.3%
ICU Level of Service:	B
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 6: Lowell Road (3A) & Hampshire Drive/Oblate Drive



HCM Signalized Intersection Capacity Analysis

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	28	2	116	11	1	5	18	1236	14	6	962	8	
Future Volume (vph)	28	2	116	11	1	5	18	1236	14	6	962	8	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	13	13	13	12	12	12	11	12	12	
Total Lost time (s)		6.0	6.0		6.0	6.0	4.0	6.0		4.0	6.0		
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95		
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00		
Flt Protected		0.96	1.00		0.96	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)		1816	1583		1876	1669	1736	3569		1745	3570		
Flt Permitted		0.42	1.00		1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (perm)		802	1583		1963	1669	1736	3569		1745	3570		
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.95	0.95	0.95	0.87	0.87	0.87	
Adj. Flow (vph)	35	2	145	14	1	6	19	1301	15	7	1106	9	
RTOR Reduction (vph)	0	0	118	0	0	5	0	0	0	0	0	0	
Lane Group Flow (vph)	0	38	27	0	15	1	19	1316	0	7	1115	0	
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	4%	1%	0%	0%	1%	0%	
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA		
Protected Phases		4	4	1	8	8	5	6		5	2		
Permitted Phases	4			8									
Actuated Green, G (s)		9.1	14.9		2.3	10.0	5.8	43.6		1.7	39.5		
Effective Green, g (s)		9.1	14.9		2.3	10.0	5.8	43.6		1.7	39.5		
Actuated g/C Ratio		0.12	0.19		0.03	0.13	0.07	0.55		0.02	0.50		
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0		
Vehicle Extension (s)		3.0			3.0		2.0	3.0		2.0	3.0		
Lane Grp Cap (vph)		92	299		57	212	127	1977		37	1791		
v/s Ratio Prot			0.02			0.00	c0.01	c0.37		0.00	0.31		
v/s Ratio Perm		c0.05			c0.01								
v/c Ratio		0.41	0.09		0.26	0.00	0.15	0.67		0.19	0.62		
Uniform Delay, d1		32.3	26.3		37.4	30.0	34.1	12.4		37.8	14.2		
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2		3.0	0.1		2.5	0.0	0.2	0.9		0.9	0.7		
Delay (s)		35.3	26.5		39.8	30.0	34.3	13.3		38.7	14.9		
Level of Service		D	C		D	C	C	B		D	B		
Approach Delay (s)		28.3			37.0			13.6			15.0		
Approach LOS		C			D			B			B		
Intersection Summary													
HCM 2000 Control Delay			15.4									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.60										
Actuated Cycle Length (s)			78.7									Sum of lost time (s)	22.0
Intersection Capacity Utilization			56.3%									ICU Level of Service	B
Analysis Period (min)			15										

c Critical Lane Group

7: Lowell Road (3A) & Executive Drive/PMA Drive

2032 PM NoBuild.syn

Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	259	3	90	23	2	22	61	1131	7	16	789	44
Future Volume (vph)	259	3	90	23	2	22	61	1131	7	16	789	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	15	12	12	13	11	12	12	11	12	12
Storage Length (ft)	0		225	0		80	350		0	150		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.999			0.992	
Flt Protected		0.953			0.957		0.950			0.950		
Satd. Flow (prot)	0	1733	1742	0	1818	1620	1678	3571	0	1646	3540	0
Flt Permitted		0.705			0.611		0.950			0.950		
Satd. Flow (perm)	0	1282	1742	0	1161	1620	1678	3571	0	1646	3540	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			113			91		1				8
Link Speed (mph)		30			30			30				30
Link Distance (ft)		492			577			1791				1168
Travel Time (s)		11.2			13.1			40.7				26.5
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.97	0.97	0.97	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	2%	0%	0%	3%	4%	1%	0%	6%	1%	4%
Adj. Flow (vph)	324	4	113	29	3	28	63	1166	7	17	858	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	328	113	0	32	28	63	1173	0	17	906	0
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA	
Protected Phases		8	8 1		4	4	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8 1	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		5.0	5.0	5.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	9.0	9.0		11.0	11.0	11.0	9.0	14.0		9.0	14.0	
Total Split (s)	26.0	26.0		23.0	23.0	23.0	16.0	66.0		16.0	66.0	
Total Split (%)	24.1%	24.1%		21.3%	21.3%	21.3%	14.8%	61.1%		14.8%	61.1%	
Maximum Green (s)	20.0	20.0		17.0	17.0	17.0	10.0	60.0		10.0	60.0	
Yellow Time (s)	4.0	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	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None	None	None	Min		None	Min	
Act Effct Green (s)		20.7	34.1		20.7	20.7	7.2	37.0		5.5	28.5	
Actuated g/C Ratio		0.29	0.47		0.29	0.29	0.10	0.51		0.08	0.40	
v/c Ratio		0.89	0.13		0.10	0.05	0.38	0.64		0.13	0.65	
Control Delay		57.6	4.1		25.5	0.2	40.8	14.6		38.8	20.2	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		57.6	4.1		25.5	0.2	40.8	14.6		38.8	20.2	
LOS		E	A		C	A	D	B		D	C	

Lanes, Volumes, Timings

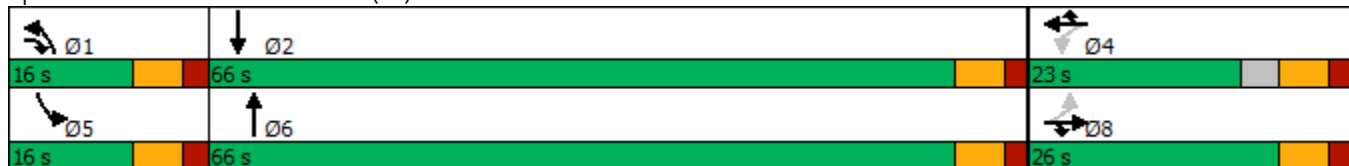


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		43.9			13.7			15.9				20.5
Approach LOS		D			B			B				C
Queue Length 50th (ft)		139	0		10	0	26	165		7		172
Queue Length 95th (ft)		#339	24		36	0	76	318		31		240
Internal Link Dist (ft)		412			497			1711				1088
Turn Bay Length (ft)			225			80	350			150		
Base Capacity (vph)		367	953		333	529	240	2984		236		2959
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		0.89	0.12		0.10	0.05	0.26	0.39		0.07		0.31























Intersection Summary

Area Type:	Other
Cycle Length:	108
Actuated Cycle Length:	72.1
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.89
Intersection Signal Delay:	22.1
Intersection LOS:	C
Intersection Capacity Utilization	71.0%
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.	

Splits and Phases: 7: Lowell Road (3A) & Executive Drive/PMA Drive



HCM Signalized Intersection Capacity Analysis

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	259	3	90	23	2	22	61	1131	7	16	789	44		
Future Volume (vph)	259	3	90	23	2	22	61	1131	7	16	789	44		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Lane Width	11	11	15	12	12	13	11	12	12	11	12	12		
Total Lost time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0			
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95			
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99			
Flt Protected		0.95	1.00		0.96	1.00	0.95	1.00		0.95	1.00			
Satd. Flow (prot)		1733	1742		1818	1620	1678	3571		1646	3540			
Flt Permitted		0.71	1.00		0.61	1.00	0.95	1.00		0.95	1.00			
Satd. Flow (perm)		1283	1742		1161	1620	1678	3571		1646	3540			
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.97	0.97	0.97	0.92	0.92	0.92		
Adj. Flow (vph)	324	4	112	29	2	28	63	1166	7	17	858	48		
RTOR Reduction (vph)	0	0	65	0	0	20	0	1	0	0	5	0		
Lane Group Flow (vph)	0	328	48	0	32	8	63	1172	0	17	901	0		
Heavy Vehicles (%)	1%	0%	2%	0%	0%	3%	4%	1%	0%	6%	1%	4%		
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA			
Protected Phases		8	8 1		4	4	1	6		5	2			
Permitted Phases	8			4										
Actuated Green, G (s)		20.7	32.6		20.7	20.7	5.9	37.0		1.1	32.2			
Effective Green, g (s)		20.7	32.6		20.7	20.7	5.9	37.0		1.1	32.2			
Actuated g/C Ratio		0.27	0.42		0.27	0.27	0.08	0.48		0.01	0.42			
Clearance Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0			
Vehicle Extension (s)		2.0			2.0	2.0	2.0	3.0		2.0	3.0			
Lane Grp Cap (vph)		345	739		312	436	128	1720		23	1484			
v/s Ratio Prot			0.03			0.00	c0.04	c0.33		0.01	0.25			
v/s Ratio Perm		c0.26		0.03										
v/c Ratio		0.95	0.06	0.10	0.02	0.49	0.68			0.74	0.61			
Uniform Delay, d1		27.5	13.1	21.1	20.6	34.0	15.4			37.7	17.4			
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00			
Incremental Delay, d2		35.3	0.0	0.1	0.0	1.1	1.1			69.6	0.7			
Delay (s)		62.9	13.1	21.1	20.6	35.1	16.5			107.3	18.1			
Level of Service		E	B	C	C	D	B			F	B			
Approach Delay (s)		50.1		20.9			17.4				19.7			
Approach LOS		D		C			B				B			
Intersection Summary														
HCM 2000 Control Delay			23.7									HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio			0.80											
Actuated Cycle Length (s)			76.8								18.0		Sum of lost time (s)	
Intersection Capacity Utilization			71.0%										ICU Level of Service	C
Analysis Period (min)			15											

c Critical Lane Group

Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	2	25	31	0	48	27	1366	15	56	809	11
Future Volume (vph)	9	2	25	31	0	48	27	1366	15	56	809	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	13	13	11	11	12	12	12	12
Storage Length (ft)	0		50	0		100	210		325	125		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			50			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850			0.850		0.998			0.998	
Flt Protected		0.962			0.950		0.950			0.950		
Satd. Flow (prot)	0	1828	1583	0	1865	1669	1745	3449	0	1805	1878	0
Flt Permitted		0.746			0.748		0.950			0.950		
Satd. Flow (perm)	0	1417	1583	0	1469	1669	1745	3449	0	1805	1878	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			91			60		1				1
Link Speed (mph)		10			30			30				30
Link Distance (ft)		598			262			1405				549
Travel Time (s)		40.8			6.0			31.9				12.5
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.99	0.99	0.99	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	11	3	31	39	0	60	27	1380	15	60	861	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	31	0	39	60	27	1395	0	60	873	0
Turn Type	Perm	NA	Prot	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		8	8		4	4.5	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8	4	4	4.5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0		11.0	16.0		11.0	16.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0		16.0	116.0		16.0	116.0	
Total Split (%)	8.9%	8.9%	8.9%	8.9%	8.9%		8.9%	64.4%		8.9%	64.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0		10.0	110.0		10.0	110.0	
Yellow Time (s)	4.0	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	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5		1.0	1.5		1.5	1.5	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		8.2	8.2		8.2	23.3	6.6	138.3		9.1	143.0	
Actuated g/C Ratio		0.05	0.05		0.05	0.13	0.04	0.77		0.05	0.79	
v/c Ratio		0.22	0.19		0.58	0.22	0.42	0.53		0.66	0.59	
Control Delay		89.6	2.7		116.5	15.8	103.9	11.1		114.9	12.5	

Lanes, Volumes, Timings

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr _t	
Fl _t Protected	
Satd. Flow (prot)	
Fl _t 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 (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	32.0
Total Split (s)	32.0
Total Split (%)	18%
Maximum Green (s)	26.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	1.5
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	5
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	

Lanes, Volumes, Timings



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	2.0	
Total Delay		89.6	2.7		116.5	15.8	103.9	11.1		114.9	14.5	
LOS		F	A		F	B	F	B		F	B	
Approach Delay		29.8			55.4			12.8			21.0	
Approach LOS		C			E			B			C	
Queue Length 50th (ft)		16	0		46	0	32	262		71	305	
Queue Length 95th (ft)		40	0		81	36	70	623		#134	903	
Internal Link Dist (ft)		518			182			1325			469	
Turn Bay Length (ft)			50			100	210			125		
Base Capacity (vph)		79	174		82	264	96	2649		104	1491	
Starvation Cap Reductn		0	0		0	0	0	0		0	445	
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		0.18	0.18		0.48	0.23	0.28	0.53		0.58	0.83	

Intersection Summary

Area Type: Other

Cycle Length: 180

Actuated Cycle Length: 180

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow, Master Intersection

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.66

Intersection Signal Delay: 17.9

Intersection LOS: B

Intersection Capacity Utilization 66.6%

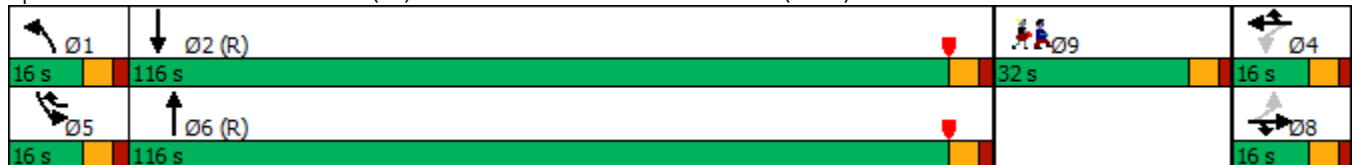
ICU Level of Service C

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.






















Splits and Phases: 8: Lowell Road (3A) & Fox Hollow Drive/Fox Hollow Drive (Plaza)



Lanes, Volumes, Timings

Lane Group	Ø9
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	












HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	2	25	31	0	48	27	1366	15	56	809	11
Future Volume (vph)	9	2	25	31	0	48	27	1366	15	56	809	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	14	13	13	11	11	12	12	12	12
Total Lost time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1828	1583		1865	1669	1745	3450		1805	1878	
Flt Permitted		0.75	1.00		0.75	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1417	1583		1469	1669	1745	3450		1805	1878	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.99	0.99	0.99	0.94	0.94	0.94
Adj. Flow (vph)	11	2	31	39	0	60	27	1380	15	60	861	12
RTOR Reduction (vph)	0	0	30	0	0	52	0	0	0	0	0	0
Lane Group Flow (vph)	0	14	1	0	39	8	27	1395	0	60	873	0
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Perm	NA	Prot	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		8	8		4	4 5	1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		8.2	8.2		8.2	23.3	5.6	133.5		9.1	137.0	
Effective Green, g (s)		8.2	8.2		8.2	23.3	5.6	133.5		9.1	137.0	
Actuated g/C Ratio		0.05	0.05		0.05	0.13	0.03	0.74		0.05	0.76	
Clearance Time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)		1.5	1.5		1.5		1.0	1.5		1.5	1.5	
Lane Grp Cap (vph)		64	72		66	216	54	2558		91	1429	
v/s Ratio Prot			0.00			0.00	0.02	0.40		c0.03	c0.46	
v/s Ratio Perm		0.01			c0.03							
v/c Ratio		0.22	0.02		0.59	0.04	0.50	0.55		0.66	0.61	
Uniform Delay, d1		82.8	82.1		84.3	68.5	85.8	10.1		83.9	9.6	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.6	0.0		9.1	0.0	2.6	0.8		12.4	2.0	
Delay (s)		83.4	82.1		93.3	68.6	88.5	10.9		96.3	11.6	
Level of Service		F	F		F	E	F	B		F	B	
Approach Delay (s)		82.5			78.3			12.4			17.0	
Approach LOS		F			E			B			B	
Intersection Summary												
HCM 2000 Control Delay			18.0									B
HCM 2000 Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			180.0							24.0		
Intersection Capacity Utilization			66.6%									C
Analysis Period (min)			15									

c Critical Lane Group

9: Lowell Road (3A) & Pelham Road
Lanes, Volumes, Timings

2032 PM NoBuild.syn

							Ø9
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (vph)	94	157	1280	121	122	798	
Future Volume (vph)	94	157	1280	121	122	798	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	13	13	12	12	
Storage Length (ft)	0	75		0	150		
Storage Lanes	1	1		0	1		
Taper Length (ft)	25				50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.850	0.988				
Flt Protected	0.950				0.950		
Satd. Flow (prot)	1805	1615	1922	0	1805	1881	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1805	1615	1922	0	1805	1881	
Right Turn on Red		Yes		Yes			
Satd. Flow (RTOR)		153	4				
Link Speed (mph)	20		30			30	
Link Distance (ft)	512		549			1309	
Travel Time (s)	17.5		12.5			29.8	
Peak Hour Factor	0.87	0.87	0.98	0.98	0.89	0.89	
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%	
Adj. Flow (vph)	108	180	1306	123	137	897	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	108	180	1429	0	137	897	
Turn Type	Prot	pt+ov	NA		Prot	NA	
Protected Phases	4	4 5	6		5	2	9
Permitted Phases							
Detector Phase	4	4 5	6		5	2	
Switch Phase							
Minimum Initial (s)	5.0		10.0		3.0	10.0	5.0
Minimum Split (s)	11.0		16.0		9.0	16.0	35.0
Total Split (s)	26.0		116.0		13.0	116.0	35.0
Total Split (%)	13.7%		61.1%		6.8%	61.1%	18%
Maximum Green (s)	20.0		110.0		7.0	110.0	29.0
Yellow Time (s)	4.0		4.0		4.0	4.0	4.0
All-Red Time (s)	2.0		2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.0		6.0		6.0	6.0	
Lead/Lag			Lag		Lead		
Lead-Lag Optimize?			Yes		Yes		
Vehicle Extension (s)	1.5		1.5		1.5	1.5	3.0
Recall Mode	None		C-Min		None	C-Min	None
Walk Time (s)							5.0
Flash Dont Walk (s)							24.0
Pedestrian Calls (#/hr)							5
Act Effct Green (s)	15.0	48.4	122.6		27.5	156.0	
Actuated g/C Ratio	0.08	0.25	0.65		0.14	0.82	
v/c Ratio	0.76	0.34	1.15		0.53	0.58	
Control Delay	116.3	14.9	109.9		79.5	10.7	

9: Lowell Road (3A) & Pelham Road
Lanes, Volumes, Timings

2032 PM NoBuild.syn



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø9
Queue Delay	0.0	0.0	0.5		0.0	0.0	
Total Delay	116.3	14.9	110.4		79.5	10.7	
LOS	F	B	F		E	B	
Approach Delay	52.9		110.4			19.8	
Approach LOS	D		F			B	
Queue Length 50th (ft)	135	26	~1988		162	254	
Queue Length 95th (ft)	197	100	#2523		#423	884	
Internal Link Dist (ft)	432		469			1229	
Turn Bay Length (ft)		75			150		
Base Capacity (vph)	190	518	1241		260	1544	
Starvation Cap Reductn	0	0	150		0	0	
Spillback Cap Reductn	0	0	0		0	0	
Storage Cap Reductn	0	0	0		0	0	
Reduced v/c Ratio	0.57	0.35	1.31		0.53	0.58	












Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 30 (16%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.15
 Intersection Signal Delay: 70.3
 Intersection LOS: E
 Intersection Capacity Utilization 101.7%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 9: Lowell Road (3A) & Pelham Road



HCM Signalized Intersection Capacity Analysis

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	94	157	1280	121	122	798
Future Volume (vph)	94	157	1280	121	122	798
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	13	13	12	12
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	1615	1923		1805	1881
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1805	1615	1923		1805	1881
Peak-hour factor, PHF	0.87	0.87	0.98	0.98	0.89	0.89
Adj. Flow (vph)	108	180	1306	123	137	897
RTOR Reduction (vph)	0	114	2	0	0	0
Lane Group Flow (vph)	108	66	1427	0	137	897
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	4	4 5	6		5	2
Permitted Phases						
Actuated Green, G (s)	15.0	48.5	117.7		27.5	151.2
Effective Green, g (s)	15.0	48.5	117.7		27.5	151.2
Actuated g/C Ratio	0.08	0.26	0.62		0.14	0.80
Clearance Time (s)	6.0		6.0		6.0	6.0
Vehicle Extension (s)	1.5		1.5		1.5	1.5
Lane Grp Cap (vph)	142	412	1191		261	1496
v/s Ratio Prot	c0.06	0.04	c0.74		0.08	c0.48
v/s Ratio Perm						
v/c Ratio	0.76	0.16	1.20		0.52	0.60
Uniform Delay, d1	85.7	54.9	36.1		75.2	7.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	19.1	0.1	97.7		0.9	1.8
Delay (s)	104.9	55.0	133.8		76.1	9.4
Level of Service	F	E	F		E	A
Approach Delay (s)	73.7		133.8			18.2
Approach LOS	E		F			B
Intersection Summary						
HCM 2000 Control Delay			84.1		HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.03			
Actuated Cycle Length (s)			190.0		Sum of lost time (s)	24.0
Intersection Capacity Utilization			101.7%		ICU Level of Service	G
Analysis Period (min)			15			

c Critical Lane Group

10: Lowell Road (3A) & Friars Drive (Site Access)

2032 PM NoBuild.syn

Lanes, Volumes, Timings



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑	↑	↘
Traffic Volume (vph)	0	5	0	1412	844	16
Future Volume (vph)	0	5	0	1412	844	16
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	200			200
Storage Lanes	0	1	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				0.850
Flt Protected						
Satd. Flow (prot)	0	1644	0	1881	1881	1615
Flt Permitted						
Satd. Flow (perm)	0	1644	0	1881	1881	1615
Link Speed (mph)	30			30	30	
Link Distance (ft)	704			770	1145	
Travel Time (s)	16.0			17.5	26.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	0	6	0	1569	938	18
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	6	0	1569	938	18
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	77.6% ICU Level of Service D
Analysis Period (min)	15

HCM 6th TWSC

Intersection

Int Delay, s/veh 0

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations		↗		↖	↖	↗
Traffic Vol, veh/h	0	5	0	1412	844	16
Future Vol, veh/h	0	5	0	1412	844	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	200
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	0	6	0	1569	938	18

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	-	938	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.2	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	323	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	323	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s	16.3	0	0
HCM LOS	C		

Minor Lane/Major Mvmt NBT EBLn1 SBT SBR

Capacity (veh/h)	-	323	-	-
HCM Lane V/C Ratio	-	0.017	-	-
HCM Control Delay (s)	-	16.3	-	-
HCM Lane LOS	-	C	-	-
HCM 95th %tile Q(veh)	-	0.1	-	-

4: Lowell Road (3A) & Sagamore Bridge
Lanes, Volumes, Timings

2032 PM Build.syn



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	1652	1593	1442	754	552	1393
Future Volume (vph)	1652	1593	1442	754	552	1393
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	12	12	12	12
Storage Length (ft)	0	0	525			200
Storage Lanes	2	1	2			1
Taper Length (ft)	25		100			
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Friction		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3698	1689	5040	3610	3610	2814
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3698	1689	5040	3610	3610	2814
Right Turn on Red		No				Yes
Satd. Flow (RTOR)						1242
Link Speed (mph)	35			30	30	
Link Distance (ft)	929			1189	999	
Travel Time (s)	18.1			27.0	22.7	
Peak Hour Factor	0.96	0.96	0.94	0.94	0.89	0.89
Heavy Vehicles (%)	1%	2%	1%	0%	0%	1%
Adj. Flow (vph)	1721	1659	1534	802	620	1565
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1721	1659	1534	802	620	1565
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Detector Phase	3		1	6	2	
Switch Phase						
Minimum Initial (s)	10.0		7.0	10.0	10.0	
Minimum Split (s)	16.0		15.0	17.0	17.0	
Total Split (s)	50.0		43.0	70.0	27.0	
Total Split (%)	41.7%		35.8%	58.3%	22.5%	
Maximum Green (s)	44.0		35.0	63.0	20.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		4.0	3.0	3.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		8.0	7.0	7.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Recall Mode	None		None	C-Min	C-Min	
Act Effect Green (s)	44.0	120.0	35.0	63.0	20.0	120.0
Actuated g/C Ratio	0.37	1.00	0.29	0.52	0.17	1.00
v/c Ratio	1.27	0.98	1.04	0.42	1.03	0.56
Control Delay	161.1	20.6	63.7	7.7	74.4	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	161.1	20.6	63.7	7.7	74.4	2.3
LOS	F	C	E	A	E	A

4: Lowell Road (3A) & Sagamore Bridge
Lanes, Volumes, Timings

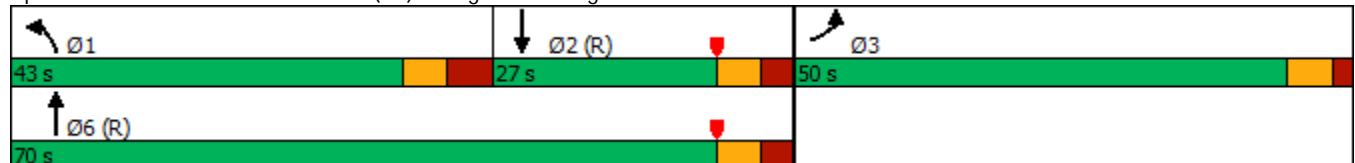


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	92.1			44.4	22.7	
Approach LOS	F			D	C	
Queue Length 50th (ft)	~866	0	~451	131	~267	80
Queue Length 95th (ft)	#1003	#216	#549	m166	m#365	61
Internal Link Dist (ft)	849			1109	919	
Turn Bay Length (ft)			525			200
Base Capacity (vph)	1355	1689	1470	1895	601	2814
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	1.27	0.98	1.04	0.42	1.03	0.56

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
Natural Cycle:	150
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.27
Intersection Signal Delay:	58.8
Intersection LOS:	E
Intersection Capacity Utilization:	106.5%
ICU Level of Service:	G
Analysis Period (min):	15
~	Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.
#	95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m	Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Lowell Road (3A) & Sagamore Bridge



4: Lowell Road (3A) & Sagamore Bridge
 HCM Signalized Intersection Capacity Analysis

2032 PM Build.syn



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	1652	1593	1442	754	552	1393
Future Volume (vph)	1652	1593	1442	754	552	1393
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	14	14	12	12	12	12
Total Lost time (s)	6.0	4.0	8.0	7.0	7.0	4.0
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3698	1689	5040	3610	3610	2814
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3698	1689	5040	3610	3610	2814
Peak-hour factor, PHF	0.96	0.96	0.94	0.94	0.89	0.89
Adj. Flow (vph)	1721	1659	1534	802	620	1565
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1721	1659	1534	802	620	1565
Heavy Vehicles (%)	1%	2%	1%	0%	0%	1%
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Actuated Green, G (s)	44.0	120.0	35.0	63.0	20.0	120.0
Effective Green, g (s)	44.0	120.0	35.0	63.0	20.0	120.0
Actuated g/C Ratio	0.37	1.00	0.29	0.52	0.17	1.00
Clearance Time (s)	6.0		8.0	7.0	7.0	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Lane Grp Cap (vph)	1355	1689	1470	1895	601	2814
v/s Ratio Prot	c0.47		0.30	0.22	0.17	
v/s Ratio Perm		c0.98				0.56
v/c Ratio	1.27	0.98	1.04	0.42	1.03	0.56
Uniform Delay, d1	38.0	0.0	42.5	17.4	50.0	0.0
Progression Factor	1.00	1.00	0.76	0.41	0.79	1.00
Incremental Delay, d2	127.5	18.1	31.2	0.4	34.4	0.4
Delay (s)	165.5	18.1	63.3	7.6	74.1	0.4
Level of Service	F	B	E	A	E	A
Approach Delay (s)	93.1			44.2	21.3	
Approach LOS	F			D	C	
























Intersection Summary			
HCM 2000 Control Delay	58.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	106.5%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

5: Lowell Road (3A) & Flagstone Drive/Wason Road

2032 PM Build.syn

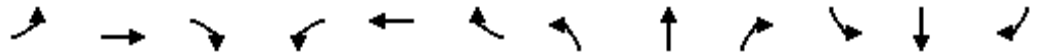
Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	98	475	479	19	31	160	1178	1093	80	1024	5
Future Volume (vph)	54	98	475	479	19	31	160	1178	1093	80	1024	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		250	200		75	575		275	175		300
Storage Lanes	0		1	1		1	1		2	1		1
Taper Length (ft)	25			50			175			75		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91	0.91
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.983		0.950	0.956		0.950			0.950		
Satd. Flow (prot)	0	1868	1599	1658	1668	1546	1787	3574	2842	1805	5131	0
Flt Permitted		0.983		0.950	0.956		0.950			0.950		
Satd. Flow (perm)	0	1868	1599	1658	1668	1546	1787	3574	2842	1805	5131	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			82			136			424			1
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		805			586			999			1515	
Travel Time (s)		18.3			13.3			22.7			34.4	
Peak Hour Factor	0.80	0.80	0.80	0.90	0.90	0.90	0.94	0.94	0.94	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%	1%	1%	0%	0%	1%	0%
Adj. Flow (vph)	68	123	594	532	21	34	170	1253	1163	91	1164	6
Shared Lane Traffic (%)				48%								
Lane Group Flow (vph)	0	191	594	277	276	34	170	1253	1163	91	1170	0
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Detector Phase	8	8	1	7	7	5	1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	11.0	16.0	
Total Split (s)	20.0	20.0	33.0	29.0	29.0	14.0	33.0	57.0	29.0	14.0	38.0	
Total Split (%)	16.7%	16.7%	27.5%	24.2%	24.2%	11.7%	27.5%	47.5%	24.2%	11.7%	31.7%	
Maximum Green (s)	14.0	14.0	27.0	23.0	23.0	8.0	27.0	51.0	23.0	8.0	32.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Min	None	None	C-Min	
Act Effct Green (s)		13.8	45.7	23.2	23.2	31.0	25.9	51.2	80.4	7.9	33.2	
Actuated g/C Ratio		0.12	0.38	0.19	0.19	0.26	0.22	0.43	0.67	0.07	0.28	
v/c Ratio		0.90	0.90	0.87	0.86	0.07	0.44	0.82	0.57	0.77	0.83	
Control Delay		92.1	48.3	73.5	72.3	0.3	58.6	19.2	0.6	93.6	46.8	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		92.1	48.3	73.5	72.3	0.3	58.6	19.2	0.6	93.6	46.8	
LOS		F	D	E	E	A	E	B	A	F	D	

5: Lowell Road (3A) & Flagstone Drive/Wason Road

2032 PM Build.syn

Lanes, Volumes, Timings

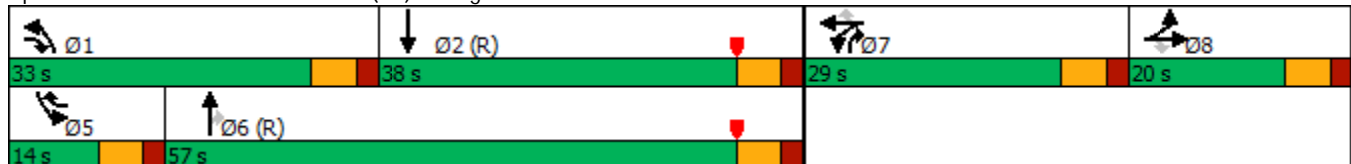


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		58.9			68.7			13.4				50.2
Approach LOS		E			E			B				D
Queue Length 50th (ft)		148	374	221	220	0	122	203	5	71		315
Queue Length 95th (ft)		#232	441	#382	#378	0	m126	m161	m1	#155		363
Internal Link Dist (ft)		725			506			919				1435
Turn Bay Length (ft)			250	200		75	575		275	175		
Base Capacity (vph)		217	673	319	321	502	402	1525	2044	120		1418
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		0.88	0.88	0.87	0.86	0.07	0.42	0.82	0.57	0.76		0.83
























Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 74 (62%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.90
 Intersection Signal Delay: 35.4 Intersection LOS: D
 Intersection Capacity Utilization 78.1% 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.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Lowell Road (3A) & Flagstone Drive/Wason Road

























HCM Signalized Intersection Capacity Analysis

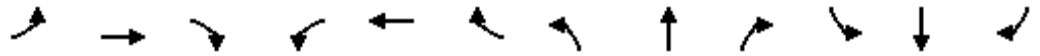
													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	54	98	475	479	19	31	160	1178	1093	80	1024	5	
Future Volume (vph)	54	98	475	479	19	31	160	1178	1093	80	1024	5	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	11	11	11	12	12	12	12	12	12	
Total Lost time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91		
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		
Flt Protected		0.98	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1867	1599	1658	1668	1546	1787	3574	2842	1805	5132		
Flt Permitted		0.98	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (perm)		1867	1599	1658	1668	1546	1787	3574	2842	1805	5132		
Peak-hour factor, PHF	0.80	0.80	0.80	0.90	0.90	0.90	0.94	0.94	0.94	0.88	0.88	0.88	
Adj. Flow (vph)	68	122	594	532	21	34	170	1253	1163	91	1164	6	
RTOR Reduction (vph)	0	0	55	0	0	25	0	0	161	0	1	0	
Lane Group Flow (vph)	0	191	539	277	276	9	170	1253	1002	91	1169	0	
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%	1%	1%	0%	0%	1%	0%	
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA		
Protected Phases	8	8	1	7	7	5	1	6	7	5	2		
Permitted Phases			8			7			6				
Actuated Green, G (s)		13.8	39.7	23.2	23.2	31.1	25.9	51.1	74.3	7.9	33.1		
Effective Green, g (s)		13.8	39.7	23.2	23.2	31.1	25.9	51.1	74.3	7.9	33.1		
Actuated g/C Ratio		0.12	0.33	0.19	0.19	0.26	0.22	0.43	0.62	0.07	0.28		
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)		2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0		
Lane Grp Cap (vph)		214	608	320	322	400	385	1521	1901	118	1415		
v/s Ratio Prot		0.10	c0.19	c0.17	0.17	0.00	0.10	c0.35	0.10	0.05	0.23		
v/s Ratio Perm			0.15			0.00			0.25				
v/c Ratio		0.89	0.89	0.87	0.86	0.02	0.44	0.82	0.53	0.77	0.83		
Uniform Delay, d1		52.4	38.0	46.9	46.8	33.1	40.8	30.5	12.9	55.2	40.8		
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.41	0.57	0.05	1.00	1.00		
Incremental Delay, d2		33.8	14.5	20.7	19.3	0.0	0.2	1.5	0.1	25.3	5.6		
Delay (s)		86.2	52.5	67.6	66.1	33.1	57.6	19.0	0.7	80.4	46.4		
Level of Service		F	D	E	E	C	E	B	A	F	D		
Approach Delay (s)		60.7			64.9			13.3			48.9		
Approach LOS		E			E			B			D		
Intersection Summary													
HCM 2000 Control Delay			34.8									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.94										
Actuated Cycle Length (s)			120.0									Sum of lost time (s)	24.0
Intersection Capacity Utilization			78.1%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group

Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	2	116	11	1	5	19	1242	14	6	995	8
Future Volume (vph)	28	2	116	11	1	5	19	1242	14	6	995	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	13	13	13	12	12	12	11	12	12
Storage Length (ft)	0		100	0		100	225		0	225		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.998			0.999	
Flt Protected		0.956			0.955		0.950			0.950		
Satd. Flow (prot)	0	1816	1583	0	1875	1669	1736	3568	0	1745	3571	0
Flt Permitted		0.422					0.950			0.950		
Satd. Flow (perm)	0	802	1583	0	1963	1669	1736	3568	0	1745	3571	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			145			86		1				1
Link Speed (mph)		30			10			30				30
Link Distance (ft)		495			382			1515				1791
Travel Time (s)		11.3			26.0			34.4				40.7
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.95	0.95	0.95	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	4%	1%	0%	0%	1%	0%
Adj. Flow (vph)	35	3	145	14	1	6	20	1307	15	7	1144	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	38	145	0	15	6	20	1322	0	7	1153	0
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		4	4 1		8	8 5	1	6		5	2	
Permitted Phases	4			8								
Detector Phase	4	4	4 1	8	8	8 5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		2.0	15.0		2.0	15.0	
Minimum Split (s)	9.0	9.0		9.0	9.0		8.0	21.0		8.0	21.0	
Total Split (s)	16.0	16.0		16.0	16.0		16.0	66.0		16.0	66.0	
Total Split (%)	14.0%	14.0%		14.0%	14.0%		14.0%	57.9%		14.0%	57.9%	
Maximum Green (s)	10.0	10.0		10.0	10.0		12.0	60.0		12.0	60.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)		9.1	17.5		6.8	9.7	5.8	44.5		5.2	37.2	
Actuated g/C Ratio		0.12	0.24		0.09	0.13	0.08	0.60		0.07	0.51	
v/c Ratio		0.38	0.30		0.08	0.02	0.15	0.61		0.06	0.64	
Control Delay		49.8	6.3		40.8	0.2	42.9	12.7		43.3	15.6	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		49.8	6.3		40.8	0.2	42.9	12.7		43.3	15.6	
LOS		D	A		D	A	D	B		D	B	

Lanes, Volumes, Timings



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		15.3			29.2			13.2				15.8
Approach LOS		B			C			B				B
Queue Length 50th (ft)		12	0		5	0	7	120		2		154
Queue Length 95th (ft)		#56	29		27	0	38	386		19		310
Internal Link Dist (ft)		415			302			1435				1711
Turn Bay Length (ft)			100			100	225			225		
Base Capacity (vph)		117	566		288	382	305	3009		307		3012
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		0.32	0.26		0.05	0.02	0.07	0.44		0.02		0.38























Intersection Summary

Area Type:	Other
Cycle Length:	114
Actuated Cycle Length:	73.6
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.64
Intersection Signal Delay:	14.6
Intersection LOS:	B
Intersection Capacity Utilization:	56.4%
ICU Level of Service:	B
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 6: Lowell Road (3A) & Hampshire Drive/Oblate Drive



HCM Signalized Intersection Capacity Analysis

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	28	2	116	11	1	5	19	1242	14	6	995	8	
Future Volume (vph)	28	2	116	11	1	5	19	1242	14	6	995	8	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	13	13	13	12	12	12	11	12	12	
Total Lost time (s)		6.0	6.0		6.0	6.0	4.0	6.0		4.0	6.0		
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95		
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00		
Flt Protected		0.96	1.00		0.96	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)		1816	1583		1876	1669	1736	3569		1745	3570		
Flt Permitted		0.42	1.00		1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (perm)		802	1583		1963	1669	1736	3569		1745	3570		
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.95	0.95	0.95	0.87	0.87	0.87	
Adj. Flow (vph)	35	2	145	14	1	6	20	1307	15	7	1144	9	
RTOR Reduction (vph)	0	0	118	0	0	5	0	0	0	0	0	0	
Lane Group Flow (vph)	0	38	27	0	15	1	20	1322	0	7	1153	0	
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	4%	1%	0%	0%	1%	0%	
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA		
Protected Phases		4	4	1	8	8	5	6		5	2		
Permitted Phases	4			8									
Actuated Green, G (s)		9.1	14.9		2.3	10.0	5.8	44.5		1.7	40.4		
Effective Green, g (s)		9.1	14.9		2.3	10.0	5.8	44.5		1.7	40.4		
Actuated g/C Ratio		0.11	0.19		0.03	0.13	0.07	0.56		0.02	0.51		
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0		
Vehicle Extension (s)		3.0			3.0		2.0	3.0		2.0	3.0		
Lane Grp Cap (vph)		91	296		56	209	126	1995		37	1811		
v/s Ratio Prot			0.02			0.00	c0.01	c0.37		0.00	0.32		
v/s Ratio Perm		c0.05			c0.01								
v/c Ratio		0.42	0.09		0.27	0.00	0.16	0.66		0.19	0.64		
Uniform Delay, d1		32.8	26.8		37.8	30.4	34.6	12.3		38.3	14.3		
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2		3.1	0.1		2.6	0.0	0.2	0.8		0.9	0.7		
Delay (s)		35.9	26.9		40.4	30.4	34.8	13.1		39.2	15.0		
Level of Service		D	C		D	C	C	B		D	B		
Approach Delay (s)		28.8			37.6			13.5			15.1		
Approach LOS		C			D			B			B		
Intersection Summary													
HCM 2000 Control Delay			15.4									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.60										
Actuated Cycle Length (s)			79.6									Sum of lost time (s)	22.0
Intersection Capacity Utilization			56.4%									ICU Level of Service	B
Analysis Period (min)			15										

c Critical Lane Group

7: Lowell Road (3A) & Executive Drive/PMA Drive

2032 PM Build.syn

Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	265	3	92	23	2	22	67	1131	7	16	820	44
Future Volume (vph)	265	3	92	23	2	22	67	1131	7	16	820	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	15	12	12	13	11	12	12	11	12	12
Storage Length (ft)	0		225	0		80	350		0	150		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.999			0.992	
Flt Protected		0.953			0.957		0.950			0.950		
Satd. Flow (prot)	0	1733	1708	0	1818	1620	1631	3571	0	1646	3540	0
Flt Permitted		0.705			0.568		0.950			0.950		
Satd. Flow (perm)	0	1282	1708	0	1079	1620	1631	3571	0	1646	3540	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			115			91		1			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		492			577			1791			1168	
Travel Time (s)		11.2			13.1			40.7			26.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.97	0.97	0.97	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	4%	0%	0%	3%	7%	1%	0%	6%	1%	4%
Adj. Flow (vph)	331	4	115	29	3	28	69	1166	7	17	891	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	335	115	0	32	28	69	1173	0	17	939	0
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA	
Protected Phases		8	8 1		4	4	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8 1	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		5.0	5.0	5.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	9.0	9.0		11.0	11.0	11.0	9.0	14.0		9.0	14.0	
Total Split (s)	26.0	26.0		23.0	23.0	23.0	16.0	66.0		16.0	66.0	
Total Split (%)	24.1%	24.1%		21.3%	21.3%	21.3%	14.8%	61.1%		14.8%	61.1%	
Maximum Green (s)	20.0	20.0		17.0	17.0	17.0	10.0	60.0		10.0	60.0	
Yellow Time (s)	4.0	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	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None	None	None	Min		None	Min	
Act Effct Green (s)		20.4	33.9		20.4	20.4	7.4	39.9		5.5	28.5	
Actuated g/C Ratio		0.27	0.45		0.27	0.27	0.10	0.53		0.07	0.38	
v/c Ratio		0.96	0.14		0.11	0.06	0.43	0.61		0.14	0.69	
Control Delay		71.0	4.1		26.3	0.2	43.0	14.0		39.6	21.8	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		71.0	4.1		26.3	0.2	43.0	14.0		39.6	21.8	
LOS		E	A		C	A	D	B		D	C	

7: Lowell Road (3A) & Executive Drive/PMA Drive

2032 PM Build.syn

Lanes, Volumes, Timings

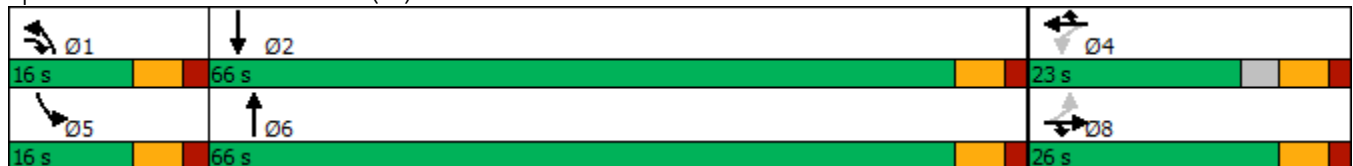


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		53.9			14.2			15.6				22.1
Approach LOS		D			B			B				C
Queue Length 50th (ft)		147	0		11	0	30	165		7		182
Queue Length 95th (ft)		#349	24		36	0	82	318		31		251
Internal Link Dist (ft)		412			497			1711				1088
Turn Bay Length (ft)			225			80	350			150		
Base Capacity (vph)		350	898		294	509	222	2927		224		2903
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		0.96	0.13		0.11	0.06	0.31	0.40		0.08		0.32























Intersection Summary

Area Type:	Other
Cycle Length:	108
Actuated Cycle Length:	74.7
Natural Cycle:	65
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.96
Intersection Signal Delay:	24.2
Intersection LOS:	C
Intersection Capacity Utilization:	71.3%
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.	

Splits and Phases: 7: Lowell Road (3A) & Executive Drive/PMA Drive
























HCM Signalized Intersection Capacity Analysis

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	265	3	92	23	2	22	67	1131	7	16	820	44	
Future Volume (vph)	265	3	92	23	2	22	67	1131	7	16	820	44	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	11	11	15	12	12	13	11	12	12	11	12	12	
Total Lost time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0		
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95		
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99		
Flt Protected		0.95	1.00		0.96	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)		1733	1708		1818	1620	1631	3571		1646	3541		
Flt Permitted		0.71	1.00		0.57	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (perm)		1282	1708		1078	1620	1631	3571		1646	3541		
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.97	0.97	0.97	0.92	0.92	0.92	
Adj. Flow (vph)	331	4	115	29	2	28	69	1166	7	17	891	48	
RTOR Reduction (vph)	0	0	66	0	0	21	0	0	0	0	5	0	
Lane Group Flow (vph)	0	335	49	0	32	7	69	1173	0	17	934	0	
Heavy Vehicles (%)	1%	0%	4%	0%	0%	3%	7%	1%	0%	6%	1%	4%	
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA		
Protected Phases		8	8 1		4	4	1	6		5	2		
Permitted Phases	8			4									
Actuated Green, G (s)		20.4	33.8		20.4	20.4	7.4	39.9		1.2	33.7		
Effective Green, g (s)		20.4	33.8		20.4	20.4	7.4	39.9		1.2	33.7		
Actuated g/C Ratio		0.26	0.43		0.26	0.26	0.09	0.50		0.02	0.42		
Clearance Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0		
Vehicle Extension (s)		2.0			2.0	2.0	2.0	3.0		2.0	3.0		
Lane Grp Cap (vph)		328	726		276	415	151	1792		24	1501		
v/s Ratio Prot			0.03			0.00	c0.04	c0.33		0.01	0.26		
v/s Ratio Perm		c0.26		0.03									
v/c Ratio		1.02	0.07		0.12	0.02	0.46	0.65		0.71	0.62		
Uniform Delay, d1		29.6	13.5		22.6	22.1	34.1	14.7		39.0	17.9		
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2		55.3	0.0		0.1	0.0	0.8	0.9		56.1	0.8		
Delay (s)		84.8	13.5		22.7	22.1	34.9	15.6		95.1	18.7		
Level of Service		F	B		C	C	C	B		F	B		
Approach Delay (s)		66.6			22.4			16.6			20.1		
Approach LOS		E			C			B			C		
Intersection Summary													
HCM 2000 Control Delay			26.3		HCM 2000 Level of Service						C		
HCM 2000 Volume to Capacity ratio			0.80										
Actuated Cycle Length (s)			79.5		Sum of lost time (s)					18.0			
Intersection Capacity Utilization			71.3%		ICU Level of Service					C			
Analysis Period (min)			15										

c Critical Lane Group

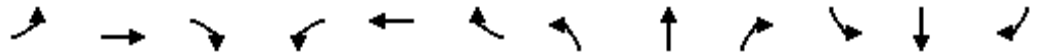
Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	2	25	31	0	48	27	1372	15	56	811	11
Future Volume (vph)	9	2	25	31	0	48	27	1372	15	56	811	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	13	13	11	11	12	12	12	12
Storage Length (ft)	0		50	0		100	210		325	125		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			50			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850			0.850		0.998			0.998	
Flt Protected		0.962			0.950		0.950			0.950		
Satd. Flow (prot)	0	1828	1583	0	1865	1669	1745	3449	0	1805	1878	0
Flt Permitted		0.746			0.748		0.950			0.950		
Satd. Flow (perm)	0	1417	1583	0	1469	1669	1745	3449	0	1805	1878	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			91			60		1			1	
Link Speed (mph)		10			30			30			30	
Link Distance (ft)		598			262			1405			549	
Travel Time (s)		40.8			6.0			31.9			12.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.99	0.99	0.99	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	11	3	31	39	0	60	27	1386	15	60	863	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	31	0	39	60	27	1401	0	60	875	0
Turn Type	Perm	NA	Prot	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		8	8		4	4.5	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8	4	4	4.5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0		11.0	16.0		11.0	16.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0		16.0	116.0		16.0	116.0	
Total Split (%)	8.9%	8.9%	8.9%	8.9%	8.9%		8.9%	64.4%		8.9%	64.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0		10.0	110.0		10.0	110.0	
Yellow Time (s)	4.0	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	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5		1.0	1.5		1.5	1.5	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effect Green (s)		8.2	8.2		8.2	23.3	6.6	138.3		9.1	143.0	
Actuated g/C Ratio		0.05	0.05		0.05	0.13	0.04	0.77		0.05	0.79	
v/c Ratio		0.22	0.19		0.58	0.22	0.42	0.53		0.66	0.59	
Control Delay		89.6	2.7		116.5	15.8	103.9	11.1		114.9	12.6	

Lanes, Volumes, Timings

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr _t	
Fl _t Protected	
Satd. Flow (prot)	
Fl _t 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 (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	32.0
Total Split (s)	32.0
Total Split (%)	18%
Maximum Green (s)	26.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	1.5
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	5
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	

Lanes, Volumes, Timings

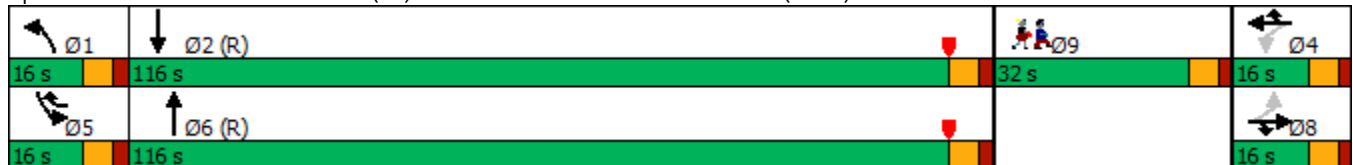


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	2.0	
Total Delay		89.6	2.7		116.5	15.8	103.9	11.1		114.9	14.6	
LOS		F	A		F	B	F	B		F	B	
Approach Delay		29.8			55.4			12.9			21.0	
Approach LOS		C			E			B			C	
Queue Length 50th (ft)		16	0		46	0	32	264		71	306	
Queue Length 95th (ft)		40	0		81	36	70	626		#134	908	
Internal Link Dist (ft)		518			182			1325			469	
Turn Bay Length (ft)			50			100	210			125		
Base Capacity (vph)		79	174		82	264	96	2649		104	1491	
Starvation Cap Reductn		0	0		0	0	0	0		0	444	
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		0.18	0.18		0.48	0.23	0.28	0.53		0.58	0.84	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow, Master Intersection
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.66
 Intersection Signal Delay: 17.9
 Intersection LOS: B
 Intersection Capacity Utilization 66.7%
 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.






















Splits and Phases: 8: Lowell Road (3A) & Fox Hollow Drive/Fox Hollow Drive (Plaza)



Lanes, Volumes, Timings












Lane Group	Ø9
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	

HCM Signalized Intersection Capacity Analysis

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	9	2	25	31	0	48	27	1372	15	56	811	11	
Future Volume (vph)	9	2	25	31	0	48	27	1372	15	56	811	11	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	14	13	13	11	11	12	12	12	12	
Total Lost time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0		
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	1.00		
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00		
Flt Protected		0.96	1.00		0.95	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)		1828	1583		1865	1669	1745	3450		1805	1878		
Flt Permitted		0.75	1.00		0.75	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (perm)		1417	1583		1469	1669	1745	3450		1805	1878		
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.99	0.99	0.99	0.94	0.94	0.94	
Adj. Flow (vph)	11	2	31	39	0	60	27	1386	15	60	863	12	
RTOR Reduction (vph)	0	0	30	0	0	52	0	0	0	0	0	0	
Lane Group Flow (vph)	0	14	1	0	39	8	27	1401	0	60	875	0	
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	0%	1%	0%	0%	1%	0%	
Turn Type	Perm	NA	Prot	Perm	NA	pt+ov	Prot	NA		Prot	NA		
Protected Phases		8	8		4	4 5	1	6		5	2		
Permitted Phases	8			4									
Actuated Green, G (s)		8.2	8.2		8.2	23.3	5.6	133.5		9.1	137.0		
Effective Green, g (s)		8.2	8.2		8.2	23.3	5.6	133.5		9.1	137.0		
Actuated g/C Ratio		0.05	0.05		0.05	0.13	0.03	0.74		0.05	0.76		
Clearance Time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0		
Vehicle Extension (s)		1.5	1.5		1.5		1.0	1.5		1.5	1.5		
Lane Grp Cap (vph)		64	72		66	216	54	2558		91	1429		
v/s Ratio Prot			0.00			0.00	0.02	0.41		c0.03	c0.47		
v/s Ratio Perm		0.01			c0.03								
v/c Ratio		0.22	0.02		0.59	0.04	0.50	0.55		0.66	0.61		
Uniform Delay, d1		82.8	82.1		84.3	68.5	85.8	10.1		83.9	9.6		
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2		0.6	0.0		9.1	0.0	2.6	0.8		12.4	2.0		
Delay (s)		83.4	82.1		93.3	68.6	88.5	11.0		96.3	11.6		
Level of Service		F	F		F	E	F	B		F	B		
Approach Delay (s)		82.5			78.3			12.4			17.0		
Approach LOS		F			E			B			B		
Intersection Summary													
HCM 2000 Control Delay			18.0									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.61										
Actuated Cycle Length (s)			180.0									Sum of lost time (s)	24.0
Intersection Capacity Utilization			66.7%									ICU Level of Service	C
Analysis Period (min)			15										

c Critical Lane Group

9: Lowell Road (3A) & Pelham Road
Lanes, Volumes, Timings

							Ø9
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (vph)	94	157	1286	121	122	800	
Future Volume (vph)	94	157	1286	121	122	800	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	13	13	12	12	
Storage Length (ft)	0	75		0	150		
Storage Lanes	1	1		0	1		
Taper Length (ft)	25				50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Fr _t		0.850	0.988				
Fl _t Protected	0.950				0.950		
Satd. Flow (prot)	1805	1615	1922	0	1805	1881	
Fl _t Permitted	0.950				0.950		
Satd. Flow (perm)	1805	1615	1922	0	1805	1881	
Right Turn on Red		Yes		Yes			
Satd. Flow (RTOR)		153	4				
Link Speed (mph)	20		30			30	
Link Distance (ft)	512		549			1309	
Travel Time (s)	17.5		12.5			29.8	
Peak Hour Factor	0.87	0.87	0.98	0.98	0.89	0.89	
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%	
Adj. Flow (vph)	108	180	1312	123	137	899	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	108	180	1435	0	137	899	
Turn Type	Prot	pt+ov	NA		Prot	NA	
Protected Phases	4	4 5	6		5	2	9
Permitted Phases							
Detector Phase	4	4 5	6		5	2	
Switch Phase							
Minimum Initial (s)	5.0		10.0		3.0	10.0	5.0
Minimum Split (s)	11.0		16.0		9.0	16.0	35.0
Total Split (s)	26.0		116.0		13.0	116.0	35.0
Total Split (%)	13.7%		61.1%		6.8%	61.1%	18%
Maximum Green (s)	20.0		110.0		7.0	110.0	29.0
Yellow Time (s)	4.0		4.0		4.0	4.0	4.0
All-Red Time (s)	2.0		2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.0		6.0		6.0	6.0	
Lead/Lag			Lag		Lead		
Lead-Lag Optimize?			Yes		Yes		
Vehicle Extension (s)	1.5		1.5		1.5	1.5	3.0
Recall Mode	None		C-Min		None	C-Min	None
Walk Time (s)							5.0
Flash Dont Walk (s)							24.0
Pedestrian Calls (#/hr)							5
Act Effct Green (s)	15.0	48.4	122.6		27.5	156.0	
Actuated g/C Ratio	0.08	0.25	0.65		0.14	0.82	
v/c Ratio	0.76	0.34	1.16		0.53	0.58	
Control Delay	116.3	14.9	111.8		79.5	10.7	

9: Lowell Road (3A) & Pelham Road
Lanes, Volumes, Timings

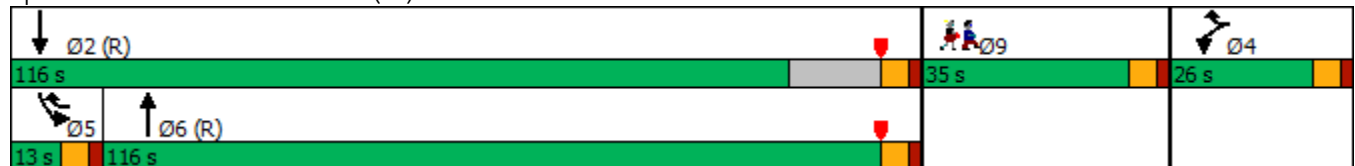


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø9
Queue Delay	0.0	0.0	0.5		0.0	0.0	
Total Delay	116.3	14.9	112.3		79.5	10.7	
LOS	F	B	F		E	B	
Approach Delay	52.9		112.3			19.8	
Approach LOS	D		F			B	
Queue Length 50th (ft)	135	26	~2004		162	255	
Queue Length 95th (ft)	197	100	#2536		#423	888	
Internal Link Dist (ft)	432		469			1229	
Turn Bay Length (ft)		75			150		
Base Capacity (vph)	190	518	1241		260	1544	
Starvation Cap Reductn	0	0	148		0	0	
Spillback Cap Reductn	0	0	0		0	0	
Storage Cap Reductn	0	0	0		0	0	
Reduced v/c Ratio	0.57	0.35	1.31		0.53	0.58	












Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 30 (16%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.16
 Intersection Signal Delay: 71.4
 Intersection LOS: E
 Intersection Capacity Utilization 102.0%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 9: Lowell Road (3A) & Pelham Road



HCM Signalized Intersection Capacity Analysis

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	94	157	1286	121	122	800
Future Volume (vph)	94	157	1286	121	122	800
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	13	13	12	12
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	1615	1923		1805	1881
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1805	1615	1923		1805	1881
Peak-hour factor, PHF	0.87	0.87	0.98	0.98	0.89	0.89
Adj. Flow (vph)	108	180	1312	123	137	899
RTOR Reduction (vph)	0	114	2	0	0	0
Lane Group Flow (vph)	108	66	1433	0	137	899
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	4	4 5	6		5	2
Permitted Phases						
Actuated Green, G (s)	15.0	48.5	117.7		27.5	151.2
Effective Green, g (s)	15.0	48.5	117.7		27.5	151.2
Actuated g/C Ratio	0.08	0.26	0.62		0.14	0.80
Clearance Time (s)	6.0		6.0		6.0	6.0
Vehicle Extension (s)	1.5		1.5		1.5	1.5
Lane Grp Cap (vph)	142	412	1191		261	1496
v/s Ratio Prot	c0.06	0.04	c0.75		0.08	c0.48
v/s Ratio Perm						
v/c Ratio	0.76	0.16	1.20		0.52	0.60
Uniform Delay, d1	85.7	54.9	36.1		75.2	7.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	19.1	0.1	99.8		0.9	1.8
Delay (s)	104.9	55.0	136.0		76.1	9.4
Level of Service	F	E	F		E	A
Approach Delay (s)	73.7		136.0			18.2
Approach LOS	E		F			B
Intersection Summary						
HCM 2000 Control Delay			85.2		HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			1.03			
Actuated Cycle Length (s)			190.0		Sum of lost time (s)	24.0
Intersection Capacity Utilization			102.0%		ICU Level of Service	G
Analysis Period (min)			15			
c Critical Lane Group						

10: Lowell Road (3A) & Friars Drive (Site Access)

2032 PM Build.syn

Lanes, Volumes, Timings



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑	↑	↘
Traffic Volume (vph)	0	36	0	1418	844	18
Future Volume (vph)	0	36	0	1418	844	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	200			200
Storage Lanes	0	1	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				0.850
Flt Protected						
Satd. Flow (prot)	0	1644	0	1881	1881	1615
Flt Permitted						
Satd. Flow (perm)	0	1644	0	1881	1881	1615
Link Speed (mph)	30			30	30	
Link Distance (ft)	704			770	1145	
Travel Time (s)	16.0			17.5	26.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	1%	1%	0%
Adj. Flow (vph)	0	40	0	1576	938	20
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	40	0	1576	938	20
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	78.0%
Analysis Period (min)	15
	ICU Level of Service D

HCM 6th TWSC

Intersection

Int Delay, s/veh 0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↖	↖	↗
Traffic Vol, veh/h	0	36	0	1418	844	18
Future Vol, veh/h	0	36	0	1418	844	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	200
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	0	40	0	1576	938	20

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	-	938	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	6.2	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.3	-
Pot Cap-1 Maneuver	0	323	0
Stage 1	0	-	0
Stage 2	0	-	0
Platoon blocked, %			-
Mov Cap-1 Maneuver	-	323	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.7	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT EBLn1	SBT	SBR
Capacity (veh/h)	-	323	-
HCM Lane V/C Ratio	-	0.124	-
HCM Control Delay (s)	-	17.7	-
HCM Lane LOS	-	C	-
HCM 95th %tile Q(veh)	-	0.4	-

APPENDIX I

4: 14/Lowell Road (3A) & Sagamore Bridge

2022 AM Build MIT.syn

Lanes, Volumes, Timings



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	980	1095	1038	379	395	1558
Future Volume (vph)	980	1095	1038	379	395	1558
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	12	12	12	12
Storage Length (ft)	0	0	525			200
Storage Lanes	2	1	2			1
Taper Length (ft)	25		100			
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3662	1656	4894	3539	3539	2760
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3662	1656	4894	3539	3539	2760
Right Turn on Red		No				Yes
Satd. Flow (RTOR)						1227
Link Speed (mph)	35			30	30	
Link Distance (ft)	929			1189	999	
Travel Time (s)	18.1			27.0	22.7	
Peak Hour Factor	0.94	0.94	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	4%	2%	2%	3%
Adj. Flow (vph)	1043	1165	1128	412	429	1693
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1043	1165	1128	412	429	1693
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Detector Phase	3		1	6	2	
Switch Phase						
Minimum Initial (s)	10.0		7.0	10.0	10.0	
Minimum Split (s)	16.0		15.0	17.0	17.0	
Total Split (s)	38.0		33.0	52.0	19.0	
Total Split (%)	42.2%		36.7%	57.8%	21.1%	
Maximum Green (s)	32.0		25.0	45.0	12.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		4.0	3.0	3.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		8.0	7.0	7.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Recall Mode	None		None	C-Min	C-Min	
Act Effect Green (s)	30.6	90.0	25.0	46.4	13.4	90.0
Actuated g/C Ratio	0.34	1.00	0.28	0.52	0.15	1.00
v/c Ratio	0.84	0.70	0.83	0.23	0.82	0.61
Control Delay	34.3	2.5	25.7	4.6	35.0	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.3	2.5	25.7	4.6	35.0	4.2
LOS	C	A	C	A	D	A

4: 14/Lowell Road (3A) & Sagamore Bridge
Lanes, Volumes, Timings

2022 AM Build MIT.syn

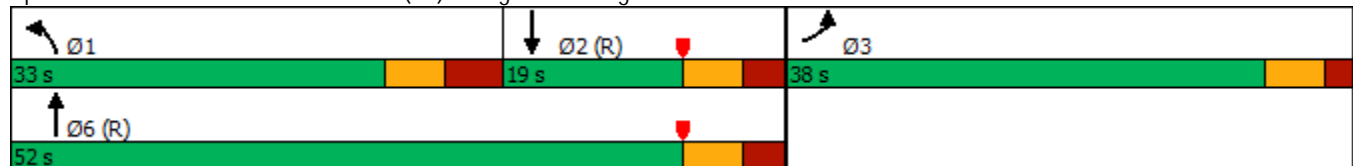


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	17.6			20.1	10.5	
Approach LOS	B			C	B	
Queue Length 50th (ft)	271	0	221	17	122	93
Queue Length 95th (ft)	349	0	231	12	m134	m102
Internal Link Dist (ft)	849			1109	919	
Turn Bay Length (ft)			525			200
Base Capacity (vph)	1302	1656	1377	1824	525	2760
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	0.80	0.70	0.82	0.23	0.82	0.61

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Offset:	0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
Natural Cycle:	70
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.84
Intersection Signal Delay:	15.6
Intersection LOS:	B
Intersection Capacity Utilization:	75.3%
ICU Level of Service:	D
Analysis Period (min):	15
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 4: 14/Lowell Road (3A) & Sagamore Bridge



4: 14/Lowell Road (3A) & Sagamore Bridge

HCM Signalized Intersection Capacity Analysis



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↶↶	↷	↶↶↶	↶↶	↶↶	↶↶
Traffic Volume (vph)	980	1095	1038	379	395	1558
Future Volume (vph)	980	1095	1038	379	395	1558
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	14	14	12	12	12	12
Total Lost time (s)	6.0	4.0	8.0	7.0	7.0	4.0
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	3662	1656	4894	3539	3539	2760
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	3662	1656	4894	3539	3539	2760
Peak-hour factor, PHF	0.94	0.94	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1043	1165	1128	412	429	1693
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1043	1165	1128	412	429	1693
Heavy Vehicles (%)	2%	4%	4%	2%	2%	3%
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Actuated Green, G (s)	30.6	90.0	25.0	46.4	13.4	90.0
Effective Green, g (s)	30.6	90.0	25.0	46.4	13.4	90.0
Actuated g/C Ratio	0.34	1.00	0.28	0.52	0.15	1.00
Clearance Time (s)	6.0		8.0	7.0	7.0	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Lane Grp Cap (vph)	1245	1656	1359	1824	526	2760
v/s Ratio Prot	0.28		0.23	0.12	0.12	
v/s Ratio Perm		c0.70				0.61
v/c Ratio	0.84	0.70	0.83	0.23	0.82	0.61
Uniform Delay, d1	27.4	0.0	30.5	12.0	37.1	0.0
Progression Factor	1.00	1.00	0.66	0.35	0.73	1.00
Incremental Delay, d2	5.3	2.5	4.1	0.2	5.2	0.4
Delay (s)	32.7	2.5	24.2	4.4	32.4	0.4
Level of Service	C	A	C	A	C	A
Approach Delay (s)	16.8			18.9	6.9	
Approach LOS	B			B	A	

Intersection Summary			
HCM 2000 Control Delay	13.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

5: Lowell Road (3A) & Flagstone Drive/Wason Road

2022 AM Build MIT.syn

Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	28	298	614	41	30	323	831	188	15	1122	10
Future Volume (vph)	65	28	298	614	41	30	323	831	188	15	1122	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		250	200		75	575		275	175		300
Storage Lanes	0		1	1		1	1		2	1		1
Taper Length (ft)	25			50			175			75		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91	0.91
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.966		0.950	0.958		0.950			0.950		
Satd. Flow (prot)	0	1835	1583	1641	1657	1501	1787	3539	2787	1752	5079	0
Flt Permitted		0.966		0.950	0.958		0.950			0.950		
Satd. Flow (perm)	0	1835	1583	1641	1657	1501	1787	3539	2787	1752	5079	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109			182			198			1
Link Speed (mph)		30			30			30				30
Link Distance (ft)		805			586			999				1515
Travel Time (s)		18.3			13.3			22.7				34.4
Peak Hour Factor	0.81	0.81	0.81	0.94	0.94	0.94	0.95	0.95	0.95	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	2%	1%	0%	4%	1%	2%	2%	3%	2%	6%
Adj. Flow (vph)	80	35	368	653	44	32	340	875	198	17	1290	11
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	115	368	346	351	32	340	875	198	17	1301	0
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Detector Phase	8	8	1	7	7	5	1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	11.0	16.0	
Total Split (s)	12.0	12.0	23.0	26.0	26.0	11.0	23.0	41.0	26.0	11.0	29.0	
Total Split (%)	13.3%	13.3%	25.6%	28.9%	28.9%	12.2%	25.6%	45.6%	28.9%	12.2%	32.2%	
Maximum Green (s)	6.0	6.0	17.0	20.0	20.0	5.0	17.0	35.0	20.0	5.0	23.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Min	None	None	C-Min	
Act Effct Green (s)		6.0	29.0	20.0	20.0	25.0	17.0	39.4	65.4	5.0	23.0	
Actuated g/C Ratio		0.07	0.32	0.22	0.22	0.28	0.19	0.44	0.73	0.06	0.26	
v/c Ratio		0.94	0.63	0.95	0.95	0.06	1.01	0.56	0.10	0.18	1.00	
Control Delay		112.3	23.6	72.8	73.2	0.2	94.3	20.0	0.1	44.9	60.1	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		112.3	23.6	72.8	73.2	0.2	94.3	20.0	0.1	44.9	60.1	
LOS		F	C	E	E	A	F	C	A	D	E	

5: Lowell Road (3A) & Flagstone Drive/Wason Road

2022 AM Build MIT.syn

Lanes, Volumes, Timings

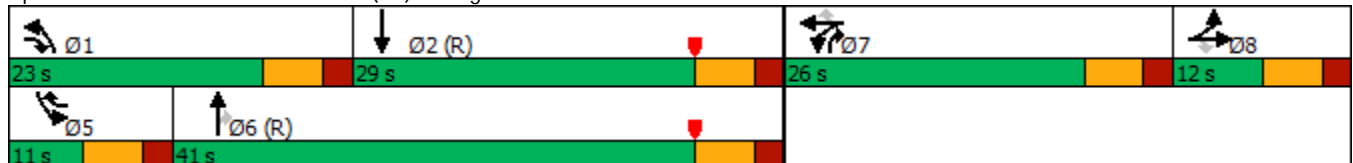


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		44.7			69.8			35.1				59.9
Approach LOS		D			E			D				E
Queue Length 50th (ft)		66	123	205	208	0	~214	133	0	9	~272	
Queue Length 95th (ft)		#147	183	#382	#386	0	m#339	206	m0	29	#355	
Internal Link Dist (ft)		725			506			919				1435
Turn Bay Length (ft)			250	200		75	575		275	175		
Base Capacity (vph)		122	583	364	368	548	337	1549	2079	97	1298	
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.94	0.63	0.95	0.95	0.06	1.01	0.56	0.10	0.18	1.00	
























Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 48 (53%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.01
 Intersection Signal Delay: 51.0 Intersection LOS: D
 Intersection Capacity Utilization 79.5% ICU Level of Service D
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Lowell Road (3A) & Flagstone Drive/Wason Road



HCM Signalized Intersection Capacity Analysis























													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	65	28	298	614	41	30	323	831	188	15	1122	10	
Future Volume (vph)	65	28	298	614	41	30	323	831	188	15	1122	10	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	12	12	11	11	11	12	12	12	12	12	12	
Total Lost time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91		
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		
Flt Protected		0.97	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1836	1583	1641	1657	1501	1787	3539	2787	1752	5077		
Flt Permitted		0.97	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (perm)		1836	1583	1641	1657	1501	1787	3539	2787	1752	5077		
Peak-hour factor, PHF	0.81	0.81	0.81	0.94	0.94	0.94	0.95	0.95	0.95	0.87	0.87	0.87	
Adj. Flow (vph)	80	35	368	653	44	32	340	875	198	17	1290	11	
RTOR Reduction (vph)	0	0	81	0	0	24	0	0	73	0	1	0	
Lane Group Flow (vph)	0	115	287	346	351	8	340	875	125	17	1300	0	
Heavy Vehicles (%)	0%	0%	2%	1%	0%	4%	1%	2%	2%	3%	2%	6%	
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA		
Protected Phases	8	8	1	7	7	5	1	6	7	5	2		
Permitted Phases			8			7			6				
Actuated Green, G (s)		6.0	23.0	20.0	20.0	23.0	17.0	37.0	57.0	3.0	23.0		
Effective Green, g (s)		6.0	23.0	20.0	20.0	23.0	17.0	37.0	57.0	3.0	23.0		
Actuated g/C Ratio		0.07	0.26	0.22	0.22	0.26	0.19	0.41	0.63	0.03	0.26		
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Vehicle Extension (s)		2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0		
Lane Grp Cap (vph)		122	510	364	368	383	337	1454	1950	58	1297		
v/s Ratio Prot		c0.06	0.11	0.21	c0.21	0.00	c0.19	0.25	0.01	0.01	c0.26		
v/s Ratio Perm			0.07			0.00			0.03				
v/c Ratio		0.94	0.56	0.95	0.95	0.02	1.01	0.60	0.06	0.29	1.00		
Uniform Delay, d1		41.8	29.1	34.5	34.5	25.1	36.5	20.7	6.3	42.5	33.5		
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.34	0.94	0.00	1.00	1.00		
Incremental Delay, d2		63.4	1.2	34.4	34.8	0.0	45.2	1.4	0.0	2.0	25.6		
Delay (s)		105.2	30.3	68.9	69.3	25.1	94.2	20.8	0.0	44.5	59.1		
Level of Service		F	C	E	E	C	F	C	A	D	E		
Approach Delay (s)		48.1			67.2			35.6			58.9		
Approach LOS		D			E			D			E		
Intersection Summary													
HCM 2000 Control Delay			50.7									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.98										
Actuated Cycle Length (s)			90.0									Sum of lost time (s)	24.0
Intersection Capacity Utilization			79.5%									ICU Level of Service	D
Analysis Period (min)			15										

c Critical Lane Group

6: Lowell Road (3A) & Hampshire Drive/Oblate Drive

2022 AM Build MIT.syn

Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	0	11	2	2	4	121	793	2	2	1184	59
Future Volume (vph)	8	0	11	2	2	4	121	793	2	2	1184	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	13	13	13	12	12	12	11	12	12
Storage Length (ft)	0		100	0		100	225		0	225		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850						0.993
Flt Protected		0.950			0.976		0.950			0.950		
Satd. Flow (prot)	0	1719	1455	0	1916	1669	1752	3505	0	1745	3480	0
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1810	1455	0	1963	1669	1752	3505	0	1745	3480	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			86			86						7
Link Speed (mph)		30			10			30				30
Link Distance (ft)		495			382			1515				1791
Travel Time (s)		11.3			26.0			34.4				40.7
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.90	0.90	0.90	0.83	0.83	0.83
Heavy Vehicles (%)	5%	0%	11%	0%	0%	0%	3%	3%	0%	0%	3%	3%
Adj. Flow (vph)	10	0	14	3	3	5	134	881	2	2	1427	71
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	10	14	0	6	5	134	883	0	2	1498	0
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		4	4 1		8	8 5	1	6		5	2	
Permitted Phases	4			8								
Detector Phase	4	4	4 1	8	8	8 5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		2.0	15.0		2.0	15.0	
Minimum Split (s)	9.0	9.0		9.0	9.0		8.0	21.0		8.0	21.0	
Total Split (s)	16.0	16.0		16.0	16.0		16.0	66.0		16.0	66.0	
Total Split (%)	14.0%	14.0%		14.0%	14.0%		14.0%	57.9%		14.0%	57.9%	
Maximum Green (s)	10.0	10.0		10.0	10.0		12.0	60.0		12.0	60.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effect Green (s)		7.4	11.6		6.5	9.1	11.0	68.3		5.1	49.3	
Actuated g/C Ratio		0.09	0.15		0.08	0.11	0.14	0.86		0.06	0.62	
v/c Ratio		0.06	0.05		0.04	0.02	0.55	0.29		0.02	0.69	
Control Delay		44.4	0.4		46.6	0.2	48.1	5.1		48.5	14.9	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		44.4	0.4		46.6	0.2	48.1	5.1		48.5	14.9	
LOS		D	A		D	A	D	A		D	B	

6: Lowell Road (3A) & Hampshire Drive/Oblate Drive
Lanes, Volumes, Timings

2022 AM Build MIT.syn

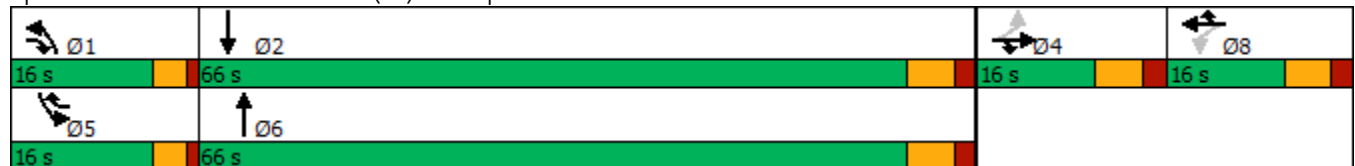


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		18.7			25.5			10.7				15.0
Approach LOS		B			C			B				B
Queue Length 50th (ft)		4	0		2	0	50	0		1		153
Queue Length 95th (ft)		22	0		16	0	#183	207		8		454
Internal Link Dist (ft)		415			302			1435				1711
Turn Bay Length (ft)			100			100	225			225		
Base Capacity (vph)		251	326		272	363	292	3016		290		2772
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		0.04	0.04		0.02	0.01	0.46	0.29		0.01		0.54























Intersection Summary

Area Type:	Other
Cycle Length:	114
Actuated Cycle Length:	79.4
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.69
Intersection Signal Delay:	13.4
Intersection LOS:	B
Intersection Capacity Utilization:	61.3%
ICU Level of Service:	B
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 6: Lowell Road (3A) & Hampshire Drive/Oblate Drive



HCM Signalized Intersection Capacity Analysis























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	0	11	2	2	4	121	793	2	2	1184	59
Future Volume (vph)	8	0	11	2	2	4	121	793	2	2	1184	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	13	13	13	12	12	12	11	12	12
Total Lost time (s)		6.0	6.0		6.0	6.0	4.0	6.0		4.0	6.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected		0.95	1.00		0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1719	1455		1915	1669	1752	3504		1745	3480	
Flt Permitted		1.00	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1810	1455		1963	1669	1752	3504		1745	3480	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.90	0.90	0.90	0.83	0.83	0.83
Adj. Flow (vph)	10	0	14	2	2	5	134	881	2	2	1427	71
RTOR Reduction (vph)	0	0	12	0	0	5	0	0	0	0	3	0
Lane Group Flow (vph)	0	10	2	0	6	0	134	883	0	2	1495	0
Heavy Vehicles (%)	5%	0%	11%	0%	0%	0%	3%	3%	0%	0%	3%	3%
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		4	4	1	8	8	5	1	6		5	2
Permitted Phases	4			8								
Actuated Green, G (s)		2.6	13.6		1.9	8.6	11.0	63.4		0.7	53.1	
Effective Green, g (s)		2.6	13.6		1.9	8.6	11.0	63.4		0.7	53.1	
Actuated g/C Ratio		0.03	0.15		0.02	0.09	0.12	0.70		0.01	0.59	
Clearance Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		3.0			3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		51	218		41	158	212	2452		13	2039	
v/s Ratio Prot			0.00			0.00	c0.08	0.25		0.00	c0.43	
v/s Ratio Perm		c0.01			c0.00							
v/c Ratio		0.20	0.01		0.15	0.00	0.63	0.36		0.15	0.73	
Uniform Delay, d1		43.0	32.8		43.6	37.1	37.9	5.5		44.7	13.6	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.9	0.0		1.6	0.0	4.5	0.1		2.0	1.4	
Delay (s)		44.9	32.8		45.2	37.1	42.3	5.5		46.7	15.0	
Level of Service		D	C		D	D	D	A		D	B	
Approach Delay (s)		37.8			41.5			10.4			15.0	
Approach LOS		D			D			B			B	
Intersection Summary												
HCM 2000 Control Delay			13.5				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			90.6				Sum of lost time (s)				22.0	
Intersection Capacity Utilization			61.3%				ICU Level of Service				B	
Analysis Period (min)			15									

c Critical Lane Group

7: Lowell Road (3A) & Executive Drive/PMA Drive

2022 AM Build MIT.syn

Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	2	22	141	30	101	179	455	60	107	1074	203
Future Volume (vph)	55	2	22	141	30	101	179	455	60	107	1074	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	15	12	12	13	11	12	12	11	12	12
Storage Length (ft)	0		225	0		80	350		0	150		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.983			0.976	
Flt Protected		0.954			0.961		0.950			0.950		
Satd. Flow (prot)	0	1613	1421	0	1811	1620	1678	3416	0	1728	3454	0
Flt Permitted		0.430			0.715		0.950			0.950		
Satd. Flow (perm)	0	727	1421	0	1347	1620	1678	3416	0	1728	3454	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			30			101		21			30	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		492			577			1791			1168	
Travel Time (s)		11.2			13.1			40.7			26.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	9%	0%	25%	1%	0%	3%	4%	4%	3%	1%	2%	2%
Adj. Flow (vph)	69	3	28	176	38	126	197	500	66	118	1180	223
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	72	28	0	214	126	197	566	0	118	1403	0
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA	
Protected Phases		8	8 1		4	4	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8 1	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		5.0	5.0	5.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	9.0	9.0		11.0	11.0	11.0	9.0	14.0		9.0	14.0	
Total Split (s)	26.0	26.0		23.0	23.0	23.0	20.0	66.0		16.0	62.0	
Total Split (%)	24.1%	24.1%		21.3%	21.3%	21.3%	18.5%	61.1%		14.8%	57.4%	
Maximum Green (s)	20.0	20.0		17.0	17.0	17.0	14.0	60.0		10.0	56.0	
Yellow Time (s)	4.0	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	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None	None	None	Min		None	Min	
Act Effct Green (s)		17.2	36.9		17.2	17.2	13.6	52.0		9.3	47.6	
Actuated g/C Ratio		0.18	0.38		0.18	0.18	0.14	0.54		0.10	0.49	
v/c Ratio		0.56	0.05		0.90	0.34	0.83	0.31		0.72	0.82	
Control Delay		57.1	7.6		78.2	14.3	72.0	12.4		69.2	25.1	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		57.1	7.6		78.2	14.3	72.0	12.4		69.2	25.1	
LOS		E	A		E	B	E	B		E	C	

Lanes, Volumes, Timings

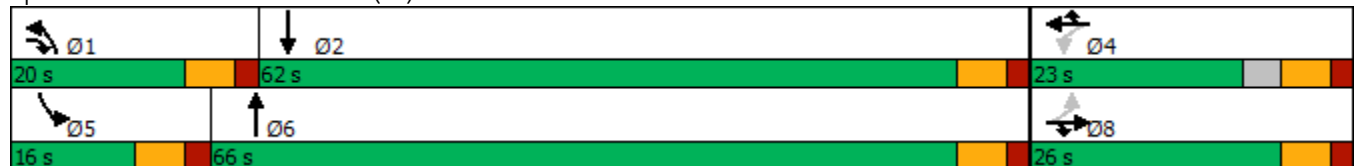


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		43.2			54.6			27.8				28.5
Approach LOS		D			D			C				C
Queue Length 50th (ft)		42	0		134	13	122	92		73		362
Queue Length 95th (ft)		84	14		#227	51	#272	133		#172		481
Internal Link Dist (ft)		412			497			1711				1088
Turn Bay Length (ft)			225			80	350			150		
Base Capacity (vph)		152	538		283	420	246	2161		181		2044
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		0.47	0.05		0.76	0.30	0.80	0.26		0.65		0.69























Intersection Summary

Area Type:	Other
Cycle Length:	108
Actuated Cycle Length:	96.7
Natural Cycle:	80
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.90
Intersection Signal Delay:	32.1
Intersection LOS:	C
Intersection Capacity Utilization	77.1%
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.	

Splits and Phases: 7: Lowell Road (3A) & Executive Drive/PMA Drive
























HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	2	22	141	30	101	179	455	60	107	1074	203
Future Volume (vph)	55	2	22	141	30	101	179	455	60	107	1074	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	11	15	12	12	13	11	12	12	11	12	12
Total Lost time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frt		1.00	0.85		1.00	0.85	1.00	0.98		1.00	0.98	
Flt Protected		0.95	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1614	1421		1810	1620	1678	3414		1728	3455	
Flt Permitted		0.43	1.00		0.71	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		727	1421		1347	1620	1678	3414		1728	3455	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	69	2	28	176	38	126	197	500	66	118	1180	223
RTOR Reduction (vph)	0	0	17	0	0	83	0	10	0	0	15	0
Lane Group Flow (vph)	0	72	11	0	214	43	197	556	0	118	1388	0
Heavy Vehicles (%)	9%	0%	25%	1%	0%	3%	4%	4%	3%	1%	2%	2%
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA	
Protected Phases		8	8 1		4	4	1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		17.2	36.8		17.2	17.2	13.6	51.9		9.3	47.6	
Effective Green, g (s)		17.2	36.8		17.2	17.2	13.6	51.9		9.3	47.6	
Actuated g/C Ratio		0.18	0.38		0.18	0.18	0.14	0.54		0.10	0.49	
Clearance Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)		2.0			2.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		129	542		240	289	236	1838		166	1705	
v/s Ratio Prot			0.01			0.03	c0.12	c0.16		0.07	c0.40	
v/s Ratio Perm		0.10			c0.16							
v/c Ratio		0.56	0.02		0.89	0.15	0.83	0.30		0.71	0.81	
Uniform Delay, d1		36.1	18.6		38.7	33.4	40.3	12.3		42.2	20.7	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.0	0.0		30.5	0.1	20.9	0.1		11.3	3.1	
Delay (s)		39.1	18.6		69.2	33.5	61.2	12.4		53.5	23.8	
Level of Service		D	B		E	C	E	B		D	C	
Approach Delay (s)		33.3			55.9			25.0			26.1	
Approach LOS		C			E			C			C	
Intersection Summary												
HCM 2000 Control Delay			29.8									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			96.4								18.0	Sum of lost time (s)
Intersection Capacity Utilization			77.1%									ICU Level of Service D
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	0	48	6	0	10	4	586	1	16	1327	3
Future Volume (vph)	11	0	48	6	0	10	4	586	1	16	1327	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	13	13	11	11	12	12	12	12
Storage Length (ft)	0		50	0		100	210		325	125		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			50			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850			0.850						
Flt Protected		0.950			0.950		0.950			0.950		
Satd. Flow (prot)	0	1719	1583	0	1865	1669	1745	3356	0	1805	1863	0
Flt Permitted		0.752			0.748		0.950			0.950		
Satd. Flow (perm)	0	1361	1583	0	1469	1669	1745	3356	0	1805	1863	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			91			55						
Link Speed (mph)		10			30			30			30	
Link Distance (ft)		598			262			1405			549	
Travel Time (s)		40.8			6.0			31.9			12.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.95	0.95	0.95
Heavy Vehicles (%)	5%	0%	2%	0%	0%	0%	0%	4%	0%	0%	2%	0%
Adj. Flow (vph)	14	0	60	8	0	13	4	644	1	17	1397	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	60	0	8	13	4	645	0	17	1400	0
Turn Type	Perm	NA	Prot	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		8	8		4	4.5	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8	4	4	4.5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0		11.0	16.0		11.0	16.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0		16.0	116.0		16.0	116.0	
Total Split (%)	8.9%	8.9%	8.9%	8.9%	8.9%		8.9%	64.4%		8.9%	64.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0		10.0	110.0		10.0	110.0	
Yellow Time (s)	4.0	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	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5		1.0	1.5		1.5	1.5	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effect Green (s)		6.3	6.3		6.3	18.3	5.0	147.7		6.0	153.1	
Actuated g/C Ratio		0.04	0.04		0.04	0.10	0.03	0.82		0.03	0.85	
v/c Ratio		0.30	0.42		0.16	0.06	0.08	0.23		0.28	0.88	
Control Delay		100.2	12.4		90.2	0.5	89.0	5.8		95.9	19.2	

Lanes, Volumes, Timings

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr	
Flt Protected	
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 (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	32.0
Total Split (s)	32.0
Total Split (%)	18%
Maximum Green (s)	26.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	1.5
Recall Mode	None
Walk Time (s)	5.0
Flash Dont Walk (s)	21.0
Pedestrian Calls (#/hr)	5
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	

Lanes, Volumes, Timings



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	17.5	
Total Delay		100.2	12.4		90.2	0.5	89.0	5.8		95.9	36.7	
LOS		F	B		F	A	F	A		F	D	
Approach Delay		29.0			34.7			6.3			37.4	
Approach LOS		C			C			A			D	
Queue Length 50th (ft)		17	0		9	0	5	68		20	464	
Queue Length 95th (ft)		40	3		27	0	20	213		50	#2213	
Internal Link Dist (ft)		518			182			1325			469	
Turn Bay Length (ft)			50			100	210			125		
Base Capacity (vph)		75	173		81	234	96	2753		100	1585	
Starvation Cap Reductn		0	0		0	0	0	0		0	218	
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		0.19	0.35		0.10	0.06	0.04	0.23		0.17	1.02	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow, Master Intersection
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 27.7
 Intersection LOS: C
 Intersection Capacity Utilization 93.4%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.






















Splits and Phases: 8: Lowell Road (3A) & Fox Hollow Drive/Fox Hollow Drive (Plaza)



Lanes, Volumes, Timings












Lane Group	Ø9
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	

HCM Signalized Intersection Capacity Analysis

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	0	48	6	0	10	4	586	1	16	1327	3
Future Volume (vph)	11	0	48	6	0	10	4	586	1	16	1327	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	14	13	13	11	11	12	12	12	12
Total Lost time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected		0.95	1.00		0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1719	1583		1865	1669	1745	3355		1805	1862	
Flt Permitted		0.75	1.00		0.75	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1362	1583		1469	1669	1745	3355		1805	1862	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.95	0.95	0.95
Adj. Flow (vph)	14	0	60	8	0	12	4	644	1	17	1397	3
RTOR Reduction (vph)	0	0	58	0	0	12	0	0	0	0	0	0
Lane Group Flow (vph)	0	14	2	0	8	1	4	645	0	17	1400	0
Heavy Vehicles (%)	5%	0%	2%	0%	0%	0%	0%	4%	0%	0%	2%	0%
Turn Type	Perm	NA	Prot	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		8	8		4	4 5	1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		6.3	6.3		6.3	16.3	1.0	140.5		4.0	143.5	
Effective Green, g (s)		6.3	6.3		6.3	16.3	1.0	140.5		4.0	143.5	
Actuated g/C Ratio		0.03	0.03		0.03	0.09	0.01	0.78		0.02	0.80	
Clearance Time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Vehicle Extension (s)		1.5	1.5		1.5		1.0	1.5		1.5	1.5	
Lane Grp Cap (vph)		47	55		51	151	9	2618		40	1484	
v/s Ratio Prot			0.00			0.00	0.00	0.19		c0.01	c0.75	
v/s Ratio Perm		c0.01		0.01								
v/c Ratio		0.30	0.04		0.16	0.01	0.44	0.25		0.42	0.94	
Uniform Delay, d1		84.7	83.9		84.3	74.5	89.2	5.4		86.9	14.9	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.3	0.1		0.5	0.0	12.2	0.2		2.6	13.3	
Delay (s)		86.0	84.0		84.8	74.5	101.4	5.6		89.5	28.2	
Level of Service		F	F		F	E	F	A		F	C	
Approach Delay (s)		84.4			78.4			6.2			28.9	
Approach LOS		F			E			A			C	
Intersection Summary												
HCM 2000 Control Delay			24.5									C
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			180.0							24.0		
Intersection Capacity Utilization			93.4%									F
Analysis Period (min)			15									

c Critical Lane Group

9: Lowell Road (3A) & Pelham Road
Lanes, Volumes, Timings

							Ø9
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (vph)	232	73	520	84	64	1118	
Future Volume (vph)	232	73	520	84	64	1118	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	12	13	13	12	12	
Storage Length (ft)	0	75		0	150		
Storage Lanes	1	1		0	1		
Taper Length (ft)	25				50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.850	0.981				
Flt Protected	0.950				0.950		
Satd. Flow (prot)	1787	1524	1839	0	1719	1863	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1787	1524	1839	0	1719	1863	
Right Turn on Red		Yes		Yes			
Satd. Flow (RTOR)		29	7				
Link Speed (mph)	20		30			30	
Link Distance (ft)	512		549			1309	
Travel Time (s)	17.5		12.5			29.8	
Peak Hour Factor	0.88	0.88	0.92	0.92	0.96	0.96	
Heavy Vehicles (%)	1%	6%	5%	3%	5%	2%	
Adj. Flow (vph)	264	83	565	91	67	1165	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	264	83	656	0	67	1165	
Turn Type	Prot	pt+ov	NA		Prot	NA	
Protected Phases	4	4 5	6		5	2	9
Permitted Phases							
Detector Phase	4	4 5	6		5	2	
Switch Phase							
Minimum Initial (s)	5.0		10.0		3.0	10.0	5.0
Minimum Split (s)	11.0		16.0		9.0	16.0	35.0
Total Split (s)	26.0		116.0		13.0	116.0	35.0
Total Split (%)	13.7%		61.1%		6.8%	61.1%	18%
Maximum Green (s)	20.0		110.0		7.0	110.0	29.0
Yellow Time (s)	4.0		4.0		4.0	4.0	4.0
All-Red Time (s)	2.0		2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.0		6.0		6.0	6.0	
Lead/Lag			Lag		Lead		
Lead-Lag Optimize?			Yes		Yes		
Vehicle Extension (s)	1.5		1.5		1.5	1.5	3.0
Recall Mode	None		C-Min		None	C-Min	None
Walk Time (s)							5.0
Flash Dont Walk (s)							24.0
Pedestrian Calls (#/hr)							5
Act Effct Green (s)	43.7	61.0	110.0		11.3	127.3	
Actuated g/C Ratio	0.23	0.32	0.58		0.06	0.67	
v/c Ratio	0.64	0.16	0.61		0.66	0.93	
Control Delay	74.7	34.6	29.0		111.3	41.2	

9: Lowell Road (3A) & Pelham Road
Lanes, Volumes, Timings

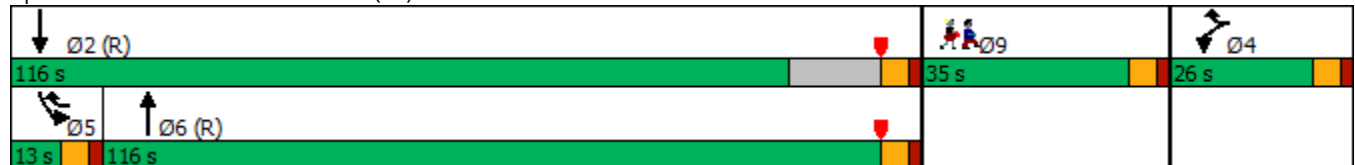


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø9
Queue Delay	0.0	0.0	2.5		0.0	0.0	
Total Delay	74.7	34.6	31.5		111.3	41.2	
LOS	E	C	C		F	D	
Approach Delay	65.1		31.5			45.0	
Approach LOS	E		C			D	
Queue Length 50th (ft)	308	48	470		82	1018	
Queue Length 95th (ft)	#529	109	718		#210	#1813	
Internal Link Dist (ft)	432		469			1229	
Turn Bay Length (ft)		75			150		
Base Capacity (vph)	410	508	1100		102	1281	
Starvation Cap Reductn	0	0	309		0	0	
Spillback Cap Reductn	0	0	0		0	0	
Storage Cap Reductn	0	0	0		0	0	
Reduced v/c Ratio	0.64	0.16	0.83		0.66	0.91	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 30 (16%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 44.1
 Intersection LOS: D
 Intersection Capacity Utilization 81.7%
 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.












Splits and Phases: 9: Lowell Road (3A) & Pelham Road



9: Lowell Road (3A) & Pelham Road

2022 AM Build MIT.syn

HCM Signalized Intersection Capacity Analysis

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	232	73	520	84	64	1118
Future Volume (vph)	232	73	520	84	64	1118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	13	13	12	12
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	1524	1840		1719	1863
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1787	1524	1840		1719	1863
Peak-hour factor, PHF	0.88	0.88	0.92	0.92	0.96	0.96
Adj. Flow (vph)	264	83	565	91	67	1165
RTOR Reduction (vph)	0	20	3	0	0	0
Lane Group Flow (vph)	264	63	653	0	67	1165
Heavy Vehicles (%)	1%	6%	5%	3%	5%	2%
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	4	4 5	6		5	2
Permitted Phases						
Actuated Green, G (s)	43.7	61.0	105.2		11.3	122.5
Effective Green, g (s)	43.7	61.0	105.2		11.3	122.5
Actuated g/C Ratio	0.23	0.32	0.55		0.06	0.64
Clearance Time (s)	6.0		6.0		6.0	6.0
Vehicle Extension (s)	1.5		1.5		1.5	1.5
Lane Grp Cap (vph)	411	489	1018		102	1201
v/s Ratio Prot	c0.15	0.04	0.35		0.04	c0.63
v/s Ratio Perm						
v/c Ratio	0.64	0.13	0.64		0.66	0.97
Uniform Delay, d1	66.1	45.7	29.3		87.5	32.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.6	0.0	3.1		11.0	19.7
Delay (s)	68.7	45.7	32.4		98.5	51.7
Level of Service	E	D	C		F	D
Approach Delay (s)	63.2		32.4			54.3
Approach LOS	E		C			D
Intersection Summary						
HCM 2000 Control Delay			49.2		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.88			
Actuated Cycle Length (s)			190.0		Sum of lost time (s)	24.0
Intersection Capacity Utilization			81.7%		ICU Level of Service	D
Analysis Period (min)			15			

c Critical Lane Group

10: Lowell Road (3A) & Friars Drive (Site Access)

2022 AM Build MIT.syn

Lanes, Volumes, Timings



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑	↑	↗
Traffic Volume (vph)	0	23	0	612	1361	10
Future Volume (vph)	0	23	0	612	1361	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	200			200
Storage Lanes	0	1	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				0.850
Flt Protected						
Satd. Flow (prot)	0	1644	0	1827	1863	1468
Flt Permitted						
Satd. Flow (perm)	0	1644	0	1827	1863	1468
Link Speed (mph)	30			30	30	
Link Distance (ft)	704			770	1145	
Travel Time (s)	16.0			17.5	26.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	4%	2%	10%
Adj. Flow (vph)	0	26	0	680	1512	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	26	0	680	1512	11
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	81.6%
Analysis Period (min)	15
	ICU Level of Service D

HCM 6th TWSC

Intersection

Int Delay, s/veh 0.4

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations		↗		↖	↖	↗
Traffic Vol, veh/h	0	23	0	612	1361	10
Future Vol, veh/h	0	23	0	612	1361	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	200
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	4	2	10
Mvmt Flow	0	26	0	680	1512	11

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	-	1512	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.2	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.3	-	-	-	-
Pot Cap-1 Maneuver	0	149	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	-	149	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s	34.1	0	0
HCM LOS	D		

Minor Lane/Major Mvmt NBT EBLn1 SBT SBR

Capacity (veh/h)	-	149	-	-
HCM Lane V/C Ratio	-	0.172	-	-
HCM Control Delay (s)	-	34.1	-	-
HCM Lane LOS	-	D	-	-
HCM 95th %tile Q(veh)	-	0.6	-	-

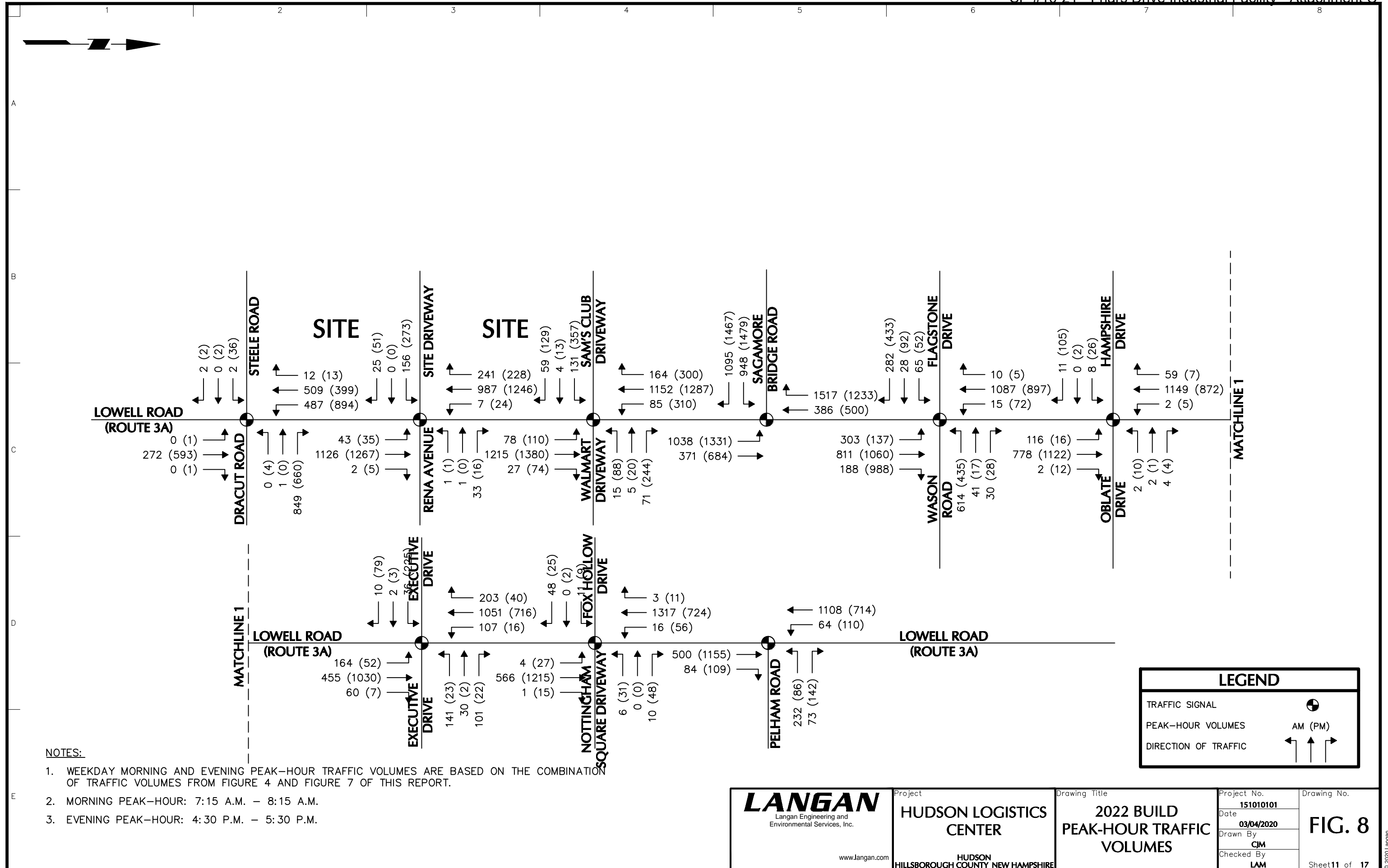
APPENDIX J

**Home Destination Report - Where Workers Live Who are Employed in the Selection Area
By ZIP Codes (ZCTA)**

Total Primary Jobs

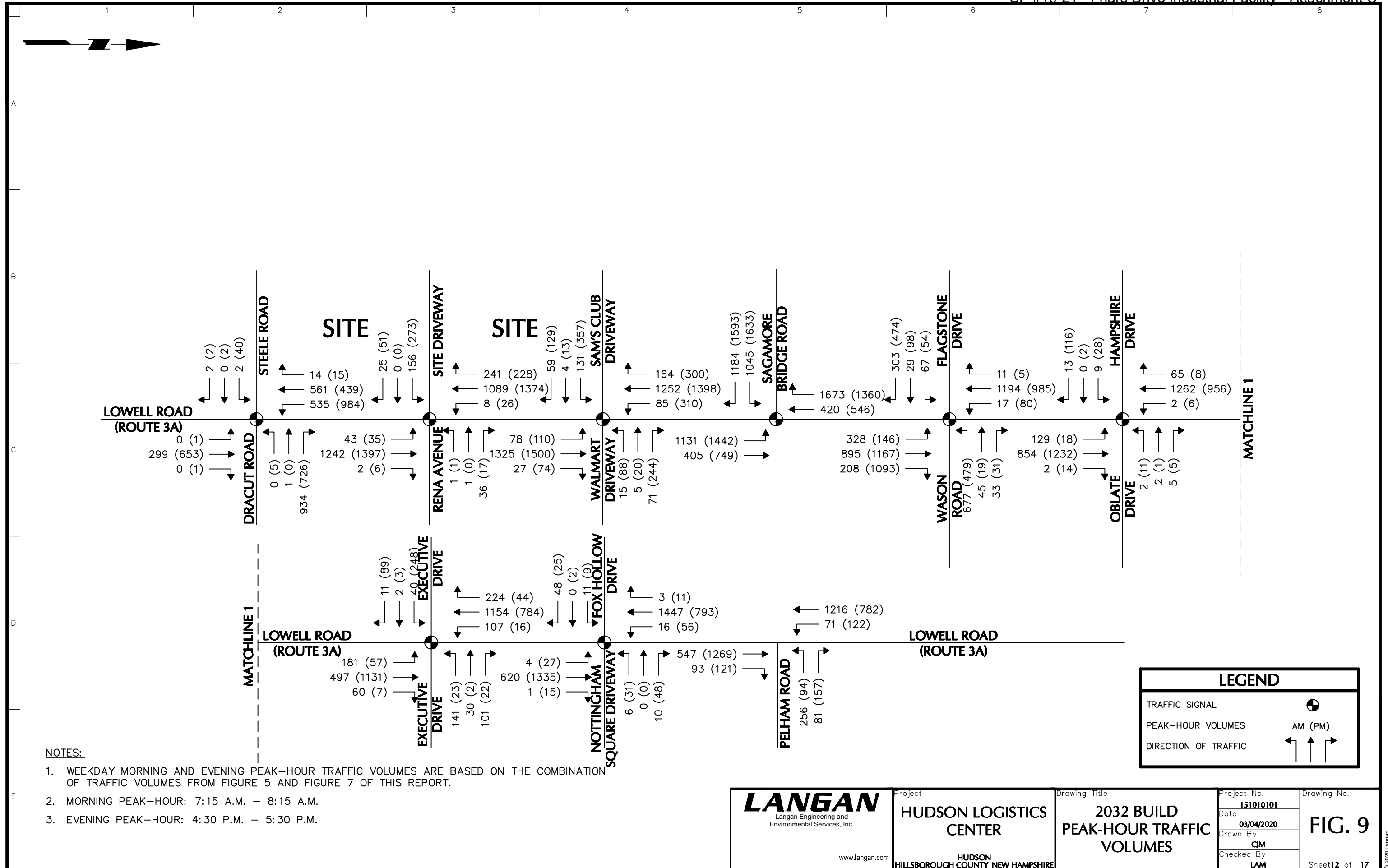
	2017	
	Count	Share
Total Primary Jobs	9,972	100.0%

Jobs Counts by ZIP Codes (ZCTA) Where Workers Live - Primary Jobs				Route 3A		U.S. Route 3		Daniel Webster Highway		Dracut Road	Total
				North	South	North	South	North	South	South	
		2017									
		Count	Share								
03051	Hudson, NH	1,568	15.7%	9.2%	3.0%					3.5%	15.7%
03060	Nashua, NH	651	6.5%			3.5%		3.0%			6.5%
03054	Merrimack, NH	447	4.5%			3.5%		1.0%			4.5%
03062	Nashua, NH	446	4.5%			4.5%					4.5%
03053	Londonderry, NH	341	3.4%	3.4%							3.4%
03038	Londonderry, NH	319	3.2%	2.7%					0.5%		3.2%
03063	Nashua, NH	294	2.9%			2.9%					2.9%
03064	Nashua, NH	279	2.8%			1.8%		1.0%			2.8%
03052	Litchfield, NH	258	2.6%	1.6%		1.0%					2.6%
03103	Manchester, NH	202	2.0%			2.0%					2.0%
03055	Milford, NH	196	2.0%			2.0%					2.0%
03104	Manchester, NH	192	1.9%			1.9%					1.9%
03079	Salem, NH	183	1.8%				0.8%		1.0%		1.8%
03102	Manchester, NH	179	1.8%			1.8%					1.8%
03076	Pelham, NH	175	1.8%						1.8%		1.8%
01851	Lowell, NH	144	1.4%				1.4%				1.4%
03110	Bedford, NH	140	1.4%			1.4%					1.4%
03087	Windham, NH	132	1.3%						1.3%		1.3%
01826	Dracut, MA	126	1.3%						1.3%		1.3%
03031	Amherst, NH	101	1.0%			1.0%					1.0%
01852	Lowell, MA	94	0.9%				0.9%				0.9%
01844	Methuen, NH	91	0.9%				0.5%		0.4%		0.9%
01879	Tyngsborough, MA	89	0.9%					0.9%			0.9%
03301	Concord, NH	88	0.9%			0.9%					0.9%
03049	Hollis, NH	84	0.8%			0.8%					0.8%
03045	Goffstown, NH	79	0.8%			0.8%					0.8%
01854	Lowell, MA	67	0.7%				0.7%				0.7%
03109	Manchester, NH	65	0.7%			0.7%					0.7%
03077	Raymond, NH	64	0.6%			0.6%					0.6%
01886	Westford, MA	61	0.6%				0.6%				0.6%
01841	Lawrence, MA	58	0.6%				0.6%				0.6%
03036	Chester, NH	51	0.5%			0.5%					0.5%
01824	South Chelmsford, MA	46	0.5%				0.5%				0.5%
03033	Brookline, NH	45	0.5%			0.5%					0.5%
03275	Allenstown, NH	45	0.5%			0.5%					0.5%
03820	Dover, NH	45	0.5%			0.5%					0.5%
03106	Hooksett, NH	42	0.4%			0.4%					0.4%
03281	Weare, NH	42	0.4%			0.4%					0.4%
01850	Lowell, MA	41	0.4%						0.4%		0.4%
03873	Sandown, NH	40	0.4%						0.4%		0.4%
01463	Pepperell, MA	39	0.4%			0.4%					0.4%
03841	Hampstead, NH	38	0.4%	0.2%					0.2%		0.4%
03032	Auburn, NH	37	0.4%			0.4%					0.4%
03070	New Boston, NH	34	0.3%			0.3%					0.3%
03811	Atkinson, NH	34	0.3%						0.3%		0.3%
01845	North Andover, MA	33	0.3%				0.3%				0.3%
03819	Danville, NH	33	0.3%						0.3%		0.3%
03071	New Ipswich, NH	32	0.3%			0.3%					0.3%
01830	Haverhill, MA	31	0.3%				0.3%				0.3%
03244	Hillsboro, NH	31	0.3%			0.3%					0.3%
Subtotal		7,952	79.7%	17.1%	3.0%	35.6%	6.7%	5.0%	0.9%	11.5%	79.7%
All Other Locations		2,020	20.3%			12.3%	7.0%	0.5%	0.5%		20.3%
TOTALS				17.1%	3.0%	47.8%	13.7%	5.5%	1.4%	11.5%	100.0%
USE				15.0%	3.0%	50.0%	15.0%	5.0%	2.0%	10.0%	100.0%



- NOTES:**
1. WEEKDAY MORNING AND EVENING PEAK-HOUR TRAFFIC VOLUMES ARE BASED ON THE COMBINATION OF TRAFFIC VOLUMES FROM FIGURE 4 AND FIGURE 7 OF THIS REPORT.
 2. MORNING PEAK-HOUR: 7:15 A.M. - 8:15 A.M.
 3. EVENING PEAK-HOUR: 4:30 P.M. - 5:30 P.M.

<p>LANGAN Langan Engineering and Environmental Services, Inc. www.langan.com</p>	<p>Project HUDSON LOGISTICS CENTER HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE</p>	<p>Drawing Title 2022 BUILD PEAK-HOUR TRAFFIC VOLUMES</p>	Project No. 151010101	Drawing No. FIG. 8
			Date 03/04/2020	
			Drawn By CJM	Sheet 11 of 17
			Checked By LAM	



NOTES:

1. WEEKDAY MORNING AND EVENING PEAK-HOUR TRAFFIC VOLUMES ARE BASED ON THE COMBINATION OF TRAFFIC VOLUMES FROM FIGURE 5 AND FIGURE 7 OF THIS REPORT.
2. MORNING PEAK-HOUR: 7:15 A.M. - 8:15 A.M.
3. EVENING PEAK-HOUR: 4:30 P.M. - 5:30 P.M.

<p>LANGAN Langan Engineering and Environmental Services, Inc. www.langan.com</p>	<p>Project HUDSON LOGISTICS CENTER</p>	<p>Drawing Title 2032 BUILD PEAK-HOUR TRAFFIC VOLUMES</p>	<p>Project No. 151010101</p>	<p>Drawing No. FIG. 9</p>
	<p>HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE</p>	<p>Date 03/04/2020</p>	<p>Checked By LAM</p>	<p>Sheet 12 of 17</p>

Appendix G

Capacity Analysis – 2022 Build Traffic Conditions

2022 Build Weekday A.M.

1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road

2022 Build AM

Lanes, Volumes, Timings

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	2	0	2	0	272	0	487	509	12	1	849
Future Volume (vph)	2	0	2	0	272	0	487	509	12	1	849
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	12	12	10	12	12	12	12
Storage Length (ft)	0	50		200		300	775		0	100	0
Storage Lanes	1	1		1		1	1		0	1	1
Taper Length (ft)	25			100			75			25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00
Frt		0.850						0.997			0.850
Flt Protected	0.950						0.950			0.950	
Satd. Flow (prot)	1685	1133	0	1773	3574	0	1652	3564	0	1805	1583
Flt Permitted	0.950						0.950			0.950	
Satd. Flow (perm)	1685	1133	0	1773	3574	0	1652	3564	0	1805	1583
Right Turn on Red			Yes			Yes			Yes		Yes
Satd. Flow (RTOR)		543						3			473
Link Speed (mph)	30				35			35		35	
Link Distance (ft)	591				758			1733		622	
Travel Time (s)	13.4				14.8			33.8		12.1	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.92	0.92	0.92	0.86	0.86
Heavy Vehicles (%)	0%	0%	33%	0%	1%	0%	2%	1%	0%	0%	2%
Adj. Flow (vph)	3	0	3	0	340	0	529	553	13	1	987
Shared Lane Traffic (%)											
Lane Group Flow (vph)	3	3	0	0	340	0	529	566	0	1	987
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Prot	pt+ov
Protected Phases	4	4		1	6		5	2		3	3 5
Permitted Phases											
Detector Phase	4	4		1	6		5	2		3	3 5
Switch Phase											
Minimum Initial (s)	5.0	5.0		5.0	8.0		8.0	8.0		5.0	
Minimum Split (s)	11.0	11.0		11.0	14.0		14.0	14.0		11.0	
Total Split (s)	16.0	16.0		16.0	20.0		38.0	42.0		16.0	
Total Split (%)	17.8%	17.8%		17.8%	22.2%		42.2%	46.7%		17.8%	
Maximum Green (s)	10.0	10.0		10.0	14.0		32.0	36.0		10.0	
Yellow Time (s)	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		2.0	2.0		2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	
Lead/Lag	Lag	Lag		Lead	Lag		Lead	Lag		Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0		3.0	4.0		4.0	4.0		4.0	
Recall Mode	None	None		None	C-Min		None	C-Min		None	
Act Effct Green (s)	5.8	5.8			16.3		42.4	64.7		10.8	58.0
Actuated g/C Ratio	0.06	0.06			0.18		0.47	0.72		0.12	0.64
v/c Ratio	0.03	0.01			0.53		0.68	0.22		0.00	0.83
Control Delay	40.0	0.0			37.6		23.6	0.7		36.0	14.2
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0
Total Delay	40.0	0.0			37.6		23.6	0.7		36.0	14.2
LOS	D	A			D		C	A		D	B

1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road
Lanes, Volumes, Timings

2022 Build AM

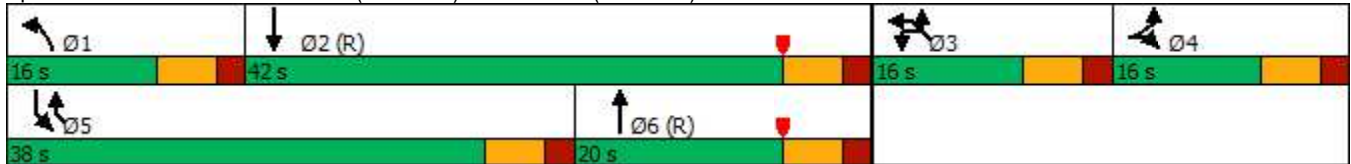


Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Approach Delay	20.0				37.6			11.8		14.3	
Approach LOS	B				D			B		B	
Queue Length 50th (ft)	2	0			96		149	2		1	138
Queue Length 95th (ft)	9	0			123		#427	5		5	#455
Internal Link Dist (ft)	511				678			1653		542	
Turn Bay Length (ft)		50					775			100	
Base Capacity (vph)	187	608			646		778	2562		217	1188
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	0.02	0.00			0.53		0.68	0.22		0.00	0.83

Intersection Summary






















Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Offset:	0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.83
Intersection Signal Delay:	16.4
Intersection LOS:	B
Intersection Capacity Utilization:	70.1%
ICU Level of Service:	C
Analysis Period (min):	15
Description:	NHDOT Int. No.: S-229-04
#	95th percentile volume exceeds capacity, queue may be longer.
	Queue shown is maximum after two cycles.

Splits and Phases: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road



2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue
Lanes, Volumes, Timings

2022 Build AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	156	0	25	1	1	33	43	1126	2	7	987	241
Future Volume (vph)	156	0	25	1	1	33	43	1126	2	7	987	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	13	13	13	10	12	12	12	12	12
Storage Length (ft)	0		50	0		0	300		0	350		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			75			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.872							0.971
Flt Protected		0.950			0.999		0.950			0.950		
Satd. Flow (prot)	0	1532	1133	0	1659	0	1685	3538	0	1570	3410	0
Flt Permitted		0.730			0.993		0.950			0.950		
Satd. Flow (perm)	0	1177	1133	0	1649	0	1685	3538	0	1570	3410	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109		39							45
Link Speed (mph)		15			30			35				35
Link Distance (ft)		510			557			1733				980
Travel Time (s)		23.2			12.7			33.8				19.1
Peak Hour Factor	0.80	0.80	0.80	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.95
Heavy Vehicles (%)	10%	0%	33%	9%	0%	3%	0%	2%	20%	15%	2%	6%
Adj. Flow (vph)	195	0	31	1	1	39	51	1325	2	7	1039	254
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	195	31	0	41	0	51	1327	0	7	1293	0
Turn Type	Perm	NA	Prot	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		7	7		3		1	6		5	2	
Permitted Phases	7			3								
Detector Phase	7	7	7	3	3		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0		11.0	16.0		11.0	16.0	
Total Split (s)	21.0	21.0	21.0	21.0	21.0		21.0	51.0		18.0	48.0	
Total Split (%)	23.3%	23.3%	23.3%	23.3%	23.3%		23.3%	56.7%		20.0%	53.3%	
Maximum Green (s)	15.0	15.0	15.0	15.0	15.0		15.0	45.0		12.0	42.0	
Yellow Time (s)	4.0	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	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Act Effct Green (s)		18.0	18.0		11.6		9.1	57.2		7.0	50.1	
Actuated g/C Ratio		0.20	0.20		0.13		0.10	0.64		0.08	0.56	
v/c Ratio		0.83	0.10		0.17		0.30	0.59		0.06	0.67	
Control Delay		66.1	0.6		13.2		42.1	10.1		29.9	19.6	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		66.1	0.6		13.2		42.1	10.1		29.9	19.6	
LOS		E	A		B		D	B		C	B	

2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue
Lanes, Volumes, Timings

2022 Build AM

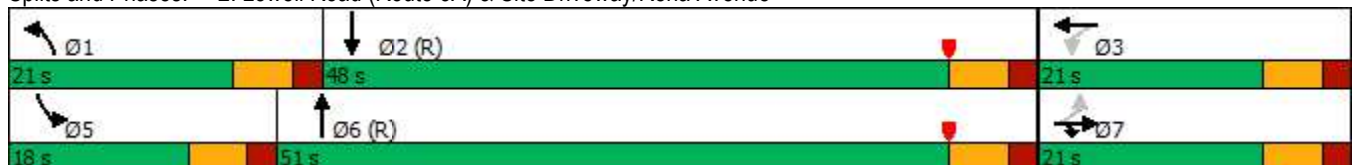


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		57.1			13.2			11.3				19.6
Approach LOS		E			B			B				B
Queue Length 50th (ft)		112	0		1		29	140		4		147
Queue Length 95th (ft)		#208	0		26		m37	250		m7		261
Internal Link Dist (ft)		430			477			1653				900
Turn Bay Length (ft)			50				300			350		
Base Capacity (vph)		235	313		307		280	2247		209		1918
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		0.83	0.10		0.13		0.18	0.59		0.03		0.67

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 51 (57%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.83
 Intersection Signal Delay: 18.5
 Intersection LOS: B
 Intersection Capacity Utilization 61.0%
 ICU Level of Service B
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-03
 # 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: Lowell Road (Route 3A) & Site Driveway/Rena Avenue



3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Lanes, Volumes, Timings

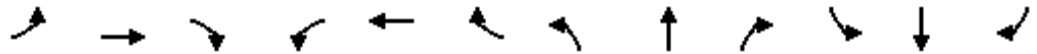
2022 Build AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 		 	  		 	  	 	 			
Traffic Volume (vph)	131	4	59	15	5	71	78	1215	27	85	1152	164
Future Volume (vph)	131	4	59	15	5	71	78	1215	27	85	1152	164
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	13	12	12	12	13	12	12	12	12	12	12
Storage Length (ft)	175		175	150		200	350		175	350		0
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			75			125			100		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Fr't			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3213	1852	1568	3502	1900	1589	3467	3505	1583	3433	3539	1482
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3213	1852	1568	3502	1900	1589	3467	3505	1583	3433	3539	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			182			182			182			182
Link Speed (mph)		30			30			35			30	
Link Distance (ft)		401			449			980			1189	
Travel Time (s)		9.1			10.2			19.1			27.0	
Peak Hour Factor	0.93	0.93	0.93	0.88	0.88	0.88	0.87	0.87	0.87	0.96	0.96	0.96
Heavy Vehicles (%)	9%	6%	3%	0%	0%	5%	1%	3%	2%	2%	2%	9%
Adj. Flow (vph)	141	4	63	17	6	81	90	1397	31	89	1200	171
Shared Lane Traffic (%)												
Lane Group Flow (vph)	141	4	63	17	6	81	90	1397	31	89	1200	171
Turn Type	Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot
Protected Phases	7	4	4	3	8	8	1	6	6	5	2	2
Permitted Phases												
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	16.0	11.0	16.0	16.0
Total Split (s)	17.0	16.0	16.0	17.0	16.0	16.0	16.0	41.0	41.0	16.0	41.0	41.0
Total Split (%)	18.9%	17.8%	17.8%	18.9%	17.8%	17.8%	17.8%	45.6%	45.6%	17.8%	45.6%	45.6%
Maximum Green (s)	11.0	10.0	10.0	11.0	10.0	10.0	10.0	35.0	35.0	10.0	35.0	35.0
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	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)	9.8	14.8	14.8	7.0	6.9	6.9	8.7	45.7	45.7	8.7	45.7	45.7
Actuated g/C Ratio	0.11	0.16	0.16	0.08	0.08	0.08	0.10	0.51	0.51	0.10	0.51	0.51
v/c Ratio	0.40	0.01	0.15	0.06	0.04	0.28	0.27	0.79	0.03	0.27	0.67	0.20
Control Delay	40.6	34.0	0.8	38.7	38.8	2.4	48.1	18.2	0.1	48.3	19.4	1.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	34.0	0.8	38.7	38.8	2.4	48.1	18.2	0.1	48.3	19.4	1.3
LOS	D	C	A	D	D	A	D	B	A	D	B	A

3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

2022 Build AM

Lanes, Volumes, Timings

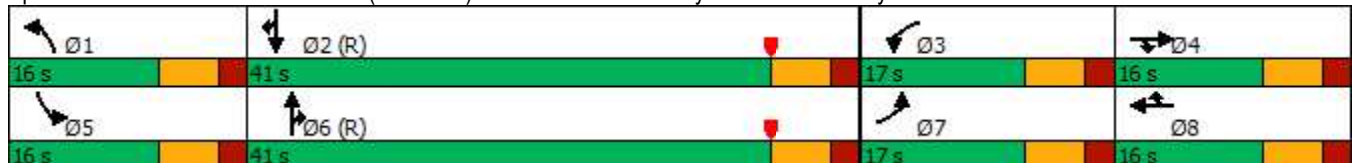


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		28.4			10.4			19.6			19.0	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	39	2	0	4	3	0	26	323	0	25	326	0
Queue Length 95th (ft)	67	12	0	14	15	0	m45	#509	m0	m38	424	m6
Internal Link Dist (ft)		321			369			900			1109	
Turn Bay Length (ft)	175		175	150		200	350		175	350		
Base Capacity (vph)	392	314	417	428	211	338	390	1778	892	386	1795	841
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.01	0.15	0.04	0.03	0.24	0.23	0.79	0.03	0.23	0.67	0.20

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 51 (57%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 19.6
 Intersection LOS: B
 Intersection Capacity Utilization 57.1%
 ICU Level of Service B
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-06
 # 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: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway



4: Lowell Road (Route 3A) & Sagamore Bridge Road
Lanes, Volumes, Timings

2022 Build AM



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↗	↖	↖↗	↑↑	↑↑	↖↗
Traffic Volume (vph)	948	1095	1038	371	386	1517
Future Volume (vph)	948	1095	1038	371	386	1517
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	12	12	12	12
Storage Length (ft)	0	0	525			200
Storage Lanes	2	1	2			1
Taper Length (ft)	25		100			
Lane Util. Factor	0.97	1.00	0.97	0.95	0.95	0.88
Fr _t		0.850				0.850
Fl _t Protected	0.950		0.950			
Satd. Flow (prot)	3662	1656	3367	3539	3539	2760
Fl _t Permitted	0.950		0.950			
Satd. Flow (perm)	3662	1656	3367	3539	3539	2760
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		800				1281
Link Speed (mph)	35			30	30	
Link Distance (ft)	929			1189	999	
Travel Time (s)	18.1			27.0	22.7	
Peak Hour Factor	0.94	0.94	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	4%	2%	2%	3%
Adj. Flow (vph)	1009	1165	1128	403	420	1649
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1009	1165	1128	403	420	1649
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Detector Phase	3		1	6	2	
Switch Phase						
Minimum Initial (s)	10.0		7.0	10.0	10.0	
Minimum Split (s)	16.0		15.0	17.0	17.0	
Total Split (s)	32.0		31.0	58.0	27.0	
Total Split (%)	35.6%		34.4%	64.4%	30.0%	
Maximum Green (s)	26.0		23.0	51.0	20.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		4.0	3.0	3.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		8.0	7.0	7.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Recall Mode	None		None	C-Min	C-Min	
Act Effct Green (s)	27.9	90.0	24.2	49.1	16.9	90.0
Actuated g/C Ratio	0.31	1.00	0.27	0.55	0.19	1.00
v/c Ratio	0.89	0.70	1.25	0.21	0.63	0.60
Control Delay	41.3	2.5	146.2	2.2	37.8	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.3	2.5	146.2	2.2	37.8	1.0
LOS	D	A	F	A	D	A

4: Lowell Road (Route 3A) & Sagamore Bridge Road
Lanes, Volumes, Timings

2022 Build AM

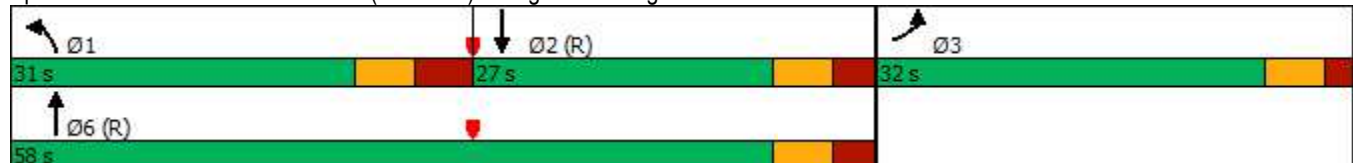


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	20.5			108.3	8.4	
Approach LOS	C			F	A	
Queue Length 50th (ft)	277	0	~414	3	115	0
Queue Length 95th (ft)	#416	0	#538	m4	158	0
Internal Link Dist (ft)	849			1109	919	
Turn Bay Length (ft)			525			200
Base Capacity (vph)	1135	1656	903	2005	786	2760
Starvation 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	0.89	0.70	1.25	0.20	0.53	0.60

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 70 (78%), Referenced to phase 2:SBT and 6:NBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.25
 Intersection Signal Delay: 39.5
 Intersection LOS: D
 Intersection Capacity Utilization 84.0%
 ICU Level of Service E
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-02
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Lowell Road (Route 3A) & Sagamore Bridge Road



5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Lanes, Volumes, Timings

2022 Build AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	28	282	614	41	30	303	811	188	15	1087	10
Future Volume (vph)	65	28	282	614	41	30	303	811	188	15	1087	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		250	200		75	575		275	175		300
Storage Lanes	0		1	1		1	1		1	1		1
Taper Length (ft)	25			50			175			75		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.966		0.950	0.958		0.950			0.950		
Satd. Flow (prot)	0	1835	1583	1641	1657	1501	1787	3539	1583	1752	5078	0
Flt Permitted		0.966		0.950	0.958		0.950			0.950		
Satd. Flow (perm)	0	1835	1583	1641	1657	1501	1787	3539	1583	1752	5078	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			53			89			198			1
Link Speed (mph)		30			30			30				30
Link Distance (ft)		805			586			999				1515
Travel Time (s)		18.3			13.3			22.7				34.4
Peak Hour Factor	0.81	0.81	0.81	0.94	0.94	0.94	0.95	0.95	0.95	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	2%	1%	0%	4%	1%	2%	2%	3%	2%	6%
Adj. Flow (vph)	80	35	348	653	44	32	319	854	198	17	1249	11
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	115	348	346	351	32	319	854	198	17	1260	0
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Detector Phase	8	8	1	7	7	5	1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	5.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	11.0	16.0	
Total Split (s)	26.0	26.0	31.0	56.0	56.0	21.0	31.0	71.0	56.0	21.0	71.0	
Total Split (%)	14.1%	14.1%	16.8%	30.4%	30.4%	11.4%	16.8%	38.6%	30.4%	11.4%	38.6%	
Maximum Green (s)	20.0	20.0	25.0	50.0	50.0	15.0	25.0	65.0	50.0	15.0	65.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	
Recall Mode	None	None	None	None	None	None	None	Min	None	None	Min	
Act Effct Green (s)		14.5	46.3	38.9	38.9	45.5	25.7	71.7	116.7	6.7	49.8	
Actuated g/C Ratio		0.09	0.30	0.25	0.25	0.30	0.17	0.47	0.76	0.04	0.32	
v/c Ratio		0.66	0.68	0.83	0.84	0.06	1.07	0.52	0.16	0.22	0.76	
Control Delay		89.9	50.2	73.5	73.7	0.2	130.4	32.6	1.0	86.6	50.6	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		89.9	50.2	73.5	73.7	0.2	130.4	32.6	1.0	86.6	50.6	
LOS		F	D	E	E	A	F	C	A	F	D	

5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road
Lanes, Volumes, Timings

2022 Build AM

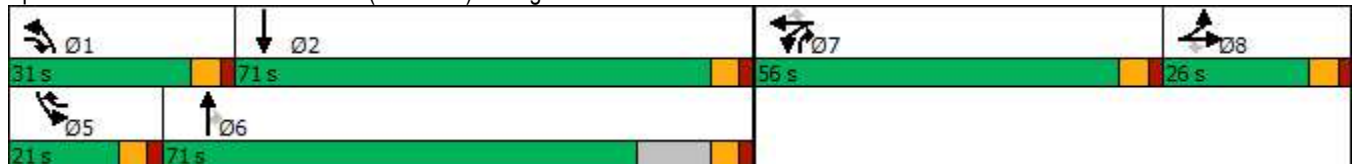


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		60.1			70.4			50.8				51.0
Approach LOS		E			E			D				D
Queue Length 50th (ft)		114	268	347	353	0	~368	330	0	17	420	
Queue Length 95th (ft)		187	394	550	556	0	#707	467	22	49	512	
Internal Link Dist (ft)		725			506			919			1435	
Turn Bay Length (ft)			250	200		75	575		275	175		
Base Capacity (vph)		245	514	549	554	588	298	1799	1352	175	2210	
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.47	0.68	0.63	0.63	0.05	1.07	0.47	0.15	0.10	0.57	

Intersection Summary

Area Type:	Other
Cycle Length:	184
Actuated Cycle Length:	153.5
Natural Cycle:	90
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.07
Intersection Signal Delay:	55.7
Intersection LOS:	E
Intersection Capacity Utilization	77.8%
ICU Level of Service	D
Analysis Period (min)	15
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	























Splits and Phases: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road



6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive

Lanes, Volumes, Timings

2022 Build AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	0	11	2	2	4	116	778	2	2	1149	59
Future Volume (vph)	8	0	11	2	2	4	116	778	2	2	1149	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	13	13	13	12	12	12	11	12	12
Storage Length (ft)	0		100	0		100	225		0	225		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850						0.993
Flt Protected		0.950			0.976		0.950			0.950		
Satd. Flow (prot)	0	1719	1455	0	1916	1669	1752	3505	0	1745	3480	0
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1810	1455	0	1963	1669	1752	3505	0	1745	3480	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			86			86						7
Link Speed (mph)		30			10			30				30
Link Distance (ft)		495			382			1515				1791
Travel Time (s)		11.3			26.0			34.4				40.7
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.90	0.90	0.90	0.83	0.83	0.83
Heavy Vehicles (%)	5%	0%	11%	0%	0%	0%	3%	3%	0%	0%	3%	3%
Adj. Flow (vph)	10	0	14	3	3	5	129	864	2	2	1384	71
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	10	14	0	6	5	129	866	0	2	1455	0
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		4	4 1		8	8 5	1	6		5	2	
Permitted Phases	4			8								
Detector Phase	4	4	4 1	8	8	8 5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		4.0	15.0		4.0	15.0	
Minimum Split (s)	9.0	9.0		9.0	9.0		8.0	21.0		8.0	21.0	
Total Split (s)	16.0	16.0		16.0	16.0		16.0	66.0		16.0	66.0	
Total Split (%)	14.0%	14.0%		14.0%	14.0%		14.0%	57.9%		14.0%	57.9%	
Maximum Green (s)	10.0	10.0		10.0	10.0		12.0	60.0		12.0	60.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)		7.5	11.3		6.5	9.1	10.8	67.5		5.2	48.6	
Actuated g/C Ratio		0.10	0.14		0.08	0.12	0.14	0.86		0.07	0.62	
v/c Ratio		0.06	0.05		0.04	0.02	0.54	0.29		0.02	0.67	
Control Delay		44.1	0.4		46.4	0.2	47.4	5.0		48.5	14.4	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		44.1	0.4		46.4	0.2	47.4	5.0		48.5	14.4	
LOS		D	A		D	A	D	A		D	B	

6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive
Lanes, Volumes, Timings

2022 Build AM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		18.6			25.4			10.5				14.5
Approach LOS		B			C			B				B
Queue Length 50th (ft)		4	0		2	0	46	0		1		141
Queue Length 95th (ft)		22	0		16	0	#174	203		8		433
Internal Link Dist (ft)		415			302			1435				1711
Turn Bay Length (ft)			100			100	225			225		
Base Capacity (vph)		256	329		277	367	297	2965		296		2800
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		0.04	0.04		0.02	0.01	0.43	0.29		0.01		0.52

Intersection Summary























Area Type:	Other
Cycle Length:	114
Actuated Cycle Length:	78.4
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.67
Intersection Signal Delay:	13.0
Intersection LOS:	B
Intersection Capacity Utilization:	60.0%
ICU Level of Service:	B
Analysis Period (min):	15
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive



7: Lowell Road (Route 3A) & Executive Drive
Lanes, Volumes, Timings

2022 Build AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	2	10	141	30	101	164	455	60	107	1051	203
Future Volume (vph)	36	2	10	141	30	101	164	455	60	107	1051	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	15	12	12	13	11	12	12	11	12	12
Storage Length (ft)	0		225	0		80	350		0	150		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Fr _t			0.850			0.850		0.983			0.976	
Fl _t Protected		0.955			0.961		0.950			0.950		
Satd. Flow (prot)	0	1577	1558	0	1811	1620	1711	3416	0	1728	3454	0
Fl _t Permitted		0.469			0.731		0.950			0.950		
Satd. Flow (perm)	0	774	1558	0	1378	1620	1711	3416	0	1728	3454	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			30			101		21			33	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		492			577			1791			1168	
Travel Time (s)		11.2			13.1			40.7			26.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	12%	0%	14%	1%	0%	3%	2%	4%	3%	1%	2%	2%
Adj. Flow (vph)	45	3	13	176	38	126	180	500	66	118	1155	223
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	13	0	214	126	180	566	0	118	1378	0
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA	
Protected Phases		8	8 1		4	4	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8 1	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		5.0	5.0	5.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	9.0	9.0		11.0	11.0	11.0	9.0	14.0		9.0	14.0	
Total Split (s)	26.0	26.0		23.0	23.0	23.0	16.0	66.0		16.0	66.0	
Total Split (%)	24.1%	24.1%		21.3%	21.3%	21.3%	14.8%	61.1%		14.8%	61.1%	
Maximum Green (s)	20.0	20.0		17.0	17.0	17.0	10.0	60.0		10.0	60.0	
Yellow Time (s)	4.0	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	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None	None	None	Min		None	Min	
Act Effct Green (s)		12.1	25.6		16.0	16.0	10.2	46.7		9.2	45.7	
Actuated g/C Ratio		0.13	0.28		0.18	0.18	0.11	0.52		0.10	0.51	
v/c Ratio		0.47	0.03		0.88	0.34	0.93	0.32		0.67	0.78	
Control Delay		52.3	3.3		72.7	14.3	94.3	12.5		61.9	21.0	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		52.3	3.3		72.7	14.3	94.3	12.5		61.9	21.0	
LOS		D	A		E	B	F	B		E	C	

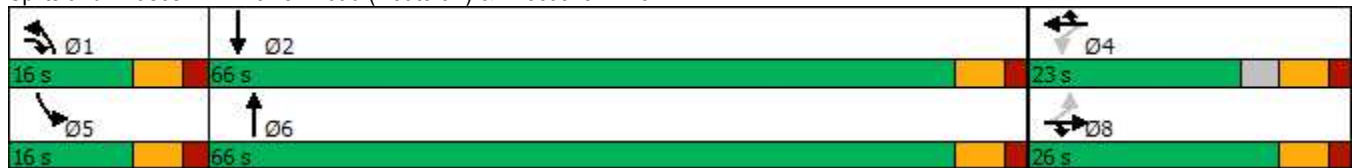
7: Lowell Road (Route 3A) & Executive Drive
Lanes, Volumes, Timings

2022 Build AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		41.8			51.1			32.2			24.2	
Approach LOS		D			D			C			C	
Queue Length 50th (ft)		24	0		120	12	105	92		66	318	
Queue Length 95th (ft)		59	4		#239	52	#278	126		#167	402	
Internal Link Dist (ft)		412			497			1711			1088	
Turn Bay Length (ft)			225			80	350			150		
Base Capacity (vph)		174	537		311	443	193	2319		194	2349	
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	0.02		0.69	0.28	0.93	0.24		0.61	0.59	

Intersection Summary	
Area Type:	Other
Cycle Length:	108
Actuated Cycle Length:	90.2
Natural Cycle:	80
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.93
Intersection Signal Delay:	30.3
Intersection LOS:	C
Intersection Capacity Utilization	75.7%
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.	























Splits and Phases: 7: Lowell Road (Route 3A) & Executive Drive



8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

2022 Build AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	0	48	6	0	10	4	566	1	16	1317	3
Future Volume (vph)	11	0	48	6	0	10	4	566	1	16	1317	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	13	13	11	11	12	12	12	12
Storage Length (ft)	0		50	0		100	210		325	125		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			50			100		
Lane Util. 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
Frt			0.850			0.850			0.850			
Flt Protected		0.950			0.950		0.950			0.950		
Satd. Flow (prot)	0	1719	1583	0	1865	1669	1745	1766	1615	1805	1863	0
Flt Permitted		0.752			0.748		0.950			0.950		
Satd. Flow (perm)	0	1361	1583	0	1469	1669	1745	1766	1615	1805	1863	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			91			55			91			
Link Speed (mph)		10			30			30			30	
Link Distance (ft)		598			262			1405			549	
Travel Time (s)		40.8			6.0			31.9			12.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.95	0.95	0.95
Heavy Vehicles (%)	5%	0%	2%	0%	0%	0%	0%	4%	0%	0%	2%	0%
Adj. Flow (vph)	14	0	60	8	0	13	4	622	1	17	1386	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	60	0	8	13	4	622	1	17	1389	0
Turn Type	Perm	NA	Prot	Perm	NA	pm+ov	Prot	NA	Prot	Prot	NA	
Protected Phases		8	8		4	5	1	6	6	5	2	
Permitted Phases	8			4		4						
Detector Phase	8	8	8	4	4	5	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	16.0	11.0	16.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	116.0	116.0	16.0	116.0	
Total Split (%)	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	64.4%	64.4%	8.9%	64.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	110.0	110.0	10.0	110.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag							Lead	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.5	1.5	1.5	1.5	
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		6.3	6.3		6.3	18.3	5.0	147.7	147.7	6.0	153.1	
Actuated g/C Ratio		0.04	0.04		0.04	0.10	0.03	0.82	0.82	0.03	0.85	
v/c Ratio		0.30	0.42		0.16	0.06	0.08	0.43	0.00	0.28	0.88	
Control Delay		100.2	12.4		90.2	0.5	89.0	8.4	0.0	95.9	18.7	

8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

2022 Build AM

Lanes, Volumes, Timings

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr _t	
Fl _t Protected	
Satd. Flow (prot)	
Fl _t 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 (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	32.0
Total Split (s)	32.0
Total Split (%)	18%
Maximum Green (s)	26.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
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)	21.0
Pedestrian Calls (#/hr)	5
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	

8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

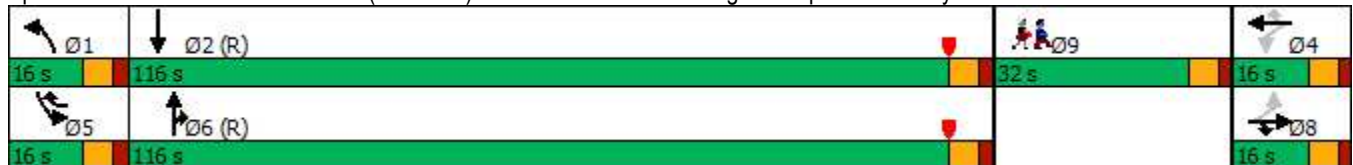
2022 Build AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	26.8	
Total Delay		100.2	12.4		90.2	0.5	89.0	8.4	0.0	95.9	45.4	
LOS		F	B		F	A	F	A	A	F	D	
Approach Delay		29.0			34.7			8.9			46.0	
Approach LOS		C			C			A			D	
Queue Length 50th (ft)		17	0		9	0	5	156	0	20	449	
Queue Length 95th (ft)		40	3		27	0	20	517	0	50	#2186	
Internal Link Dist (ft)		518			182			1325			469	
Turn Bay Length (ft)			50			100	210		325	125		
Base Capacity (vph)		75	173		81	254	96	1449	1341	100	1585	
Starvation Cap Reductn		0	0		0	0	0	0	0	0	262	
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		0.19	0.35		0.10	0.05	0.04	0.43	0.00	0.17	1.05	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow, Master Intersection
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 34.4
 Intersection LOS: C
 Intersection Capacity Utilization 92.8%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway














8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway
 Lanes, Volumes, Timings

2022 Build AM

Lane Group	Ø9
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	

9: Lowell Road (Route 3A) & Pelham Road
Lanes, Volumes, Timings

2022 Build AM

							Ø9
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (vph)	232	73	500	84	64	1108	
Future Volume (vph)	232	73	500	84	64	1108	
Ideal Flow (vphpl)	1900	1000	1900	1900	1900	1900	
Lane Width (ft)	12	12	13	13	12	12	
Storage Length (ft)	0	75		0	150		
Storage Lanes	1	1		0	1		
Taper Length (ft)	25				50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Fr _t		0.850	0.981				
Fl _t Protected	0.950				0.950		
Satd. Flow (prot)	1787	802	1839	0	1719	1863	
Fl _t Permitted	0.950				0.950		
Satd. Flow (perm)	1787	802	1839	0	1719	1863	
Right Turn on Red		Yes		Yes			
Satd. Flow (RTOR)		29	8				
Link Speed (mph)	20		30			30	
Link Distance (ft)	512		549			1309	
Travel Time (s)	17.5		12.5			29.8	
Peak Hour Factor	0.88	0.88	0.92	0.92	0.96	0.96	
Heavy Vehicles (%)	1%	6%	5%	3%	5%	2%	
Adj. Flow (vph)	264	83	543	91	67	1154	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	264	83	634	0	67	1154	
Turn Type	Prot	pt+ov	NA		Prot	NA	
Protected Phases	4	4 5	6		5	2	9
Permitted Phases							
Detector Phase	4	4 5	6		5	2	
Switch Phase							
Minimum Initial (s)	5.0		10.0		3.0	10.0	5.0
Minimum Split (s)	11.0		16.0		9.0	16.0	35.0
Total Split (s)	26.0		116.0		13.0	116.0	35.0
Total Split (%)	13.7%		61.1%		6.8%	61.1%	18%
Maximum Green (s)	20.0		110.0		7.0	110.0	29.0
Yellow Time (s)	4.0		4.0		4.0	4.0	4.0
All-Red Time (s)	2.0		2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.0		6.0		6.0	6.0	
Lead/Lag			Lag		Lead		
Lead-Lag Optimize?			Yes		Yes		
Vehicle Extension (s)	1.5		1.5		1.5	1.5	3.0
Recall Mode	None		C-Min		None	C-Min	None
Walk Time (s)							5.0
Flash Dont Walk (s)							24.0
Pedestrian Calls (#/hr)							5
Act Effct Green (s)	20.0	33.0	138.0		7.0	151.0	
Actuated g/C Ratio	0.11	0.17	0.73		0.04	0.79	
v/c Ratio	1.40	0.51	0.47		1.06	0.78	
Control Delay	265.8	57.8	14.1		211.0	17.8	

9: Lowell Road (Route 3A) & Pelham Road
Lanes, Volumes, Timings

2022 Build AM

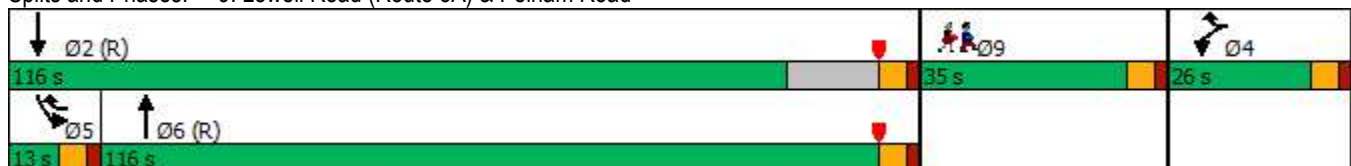


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø9
Queue Delay	0.0	0.0	3.9		0.0	0.0	
Total Delay	265.8	57.8	18.1		211.0	17.8	
LOS	F	E	B		F	B	
Approach Delay	216.0		18.1			28.4	
Approach LOS	F		B			C	
Queue Length 50th (ft)	~439	62	258		~91	548	
Queue Length 95th (ft)	#620	125	619		#210	#1690	
Internal Link Dist (ft)	432		469			1229	
Turn Bay Length (ft)		75			150		
Base Capacity (vph)	188	163	1338		63	1480	
Starvation Cap Reductn	0	0	603		0	0	
Spillback Cap Reductn	0	0	0		0	0	
Storage Cap Reductn	0	0	0		0	0	
Reduced v/c Ratio	1.40	0.51	0.86		1.06	0.78	

Intersection Summary

Area Type:	Other
Cycle Length:	190
Actuated Cycle Length:	190
Offset:	30 (16%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
Natural Cycle:	150
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.40
Intersection Signal Delay:	55.0
Intersection LOS:	D
Intersection Capacity Utilization	81.2%
ICU Level of Service	D
Analysis Period (min)	15
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 9: Lowell Road (Route 3A) & Pelham Road



2022 Build Weekday P.M.

1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road

Lanes, Volumes, Timings

2022 Build PM



Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Traffic Volume (vph)	36	2	2	1	593	1	894	399	13	4	0	660
Future Volume (vph)	36	2	2	1	593	1	894	399	13	4	0	660
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	12	12	10	12	12	12	12	12
Storage Length (ft)	0	50		200		300	775		0		100	0
Storage Lanes	1	1		1		1	1		0		1	1
Taper Length (ft)	25			100			75				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Frt		0.850						0.995				0.850
Flt Protected	0.950			0.950			0.950				0.950	
Satd. Flow (prot)	1668	1507	0	1685	3610	0	1685	3557	0	0	1805	1615
Flt Permitted	0.950			0.950			0.950				0.950	
Satd. Flow (perm)	1668	1507	0	1685	3610	0	1685	3557	0	0	1805	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		191						4				263
Link Speed (mph)	30			35			35				35	
Link Distance (ft)	591			758			1733				622	
Travel Time (s)	13.4			14.8			33.8				12.1	
Peak Hour Factor	0.80	0.80	0.80	0.91	0.91	0.91	0.90	0.90	0.90	0.91	0.91	0.91
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
Adj. Flow (vph)	45	3	3	1	652	1	993	443	14	4	0	725
Shared Lane Traffic (%)												
Lane Group Flow (vph)	45	6	0	1	653	0	993	457	0	0	4	725
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Prot	Prot	pt+ov
Protected Phases	4	4		1	6		5	2		3	3	3.5
Permitted Phases												
Detector Phase	4	4		1	6		5	2		3	3	3.5
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	8.0		8.0	8.0		5.0	5.0	
Minimum Split (s)	11.0	11.0		11.0	14.0		14.0	14.0		11.0	11.0	
Total Split (s)	21.0	21.0		16.0	32.0		51.0	67.0		16.0	16.0	
Total Split (%)	17.5%	17.5%		13.3%	26.7%		42.5%	55.8%		13.3%	13.3%	
Maximum Green (s)	15.0	15.0		10.0	26.0		45.0	61.0		10.0	10.0	
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		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0			6.0	
Lead/Lag	Lag	Lag		Lead	Lag		Lead	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	4.0		4.0	4.0		4.0	4.0	
Recall Mode	None	None		None	C-Min		None	C-Min		None	None	
Act Effct Green (s)	8.7	8.7		5.6	25.4		53.6	82.6			10.6	65.4
Actuated g/C Ratio	0.07	0.07		0.05	0.21		0.45	0.69			0.09	0.54
v/c Ratio	0.38	0.02		0.01	0.85		1.32	0.19			0.03	0.72
Control Delay	61.1	0.2		55.0	57.5		171.7	1.2			51.0	16.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	61.1	0.2		55.0	57.5		171.7	1.2			51.0	16.4
LOS	E	A		D	E		F	A			D	B

1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road
Lanes, Volumes, Timings

2022 Build PM

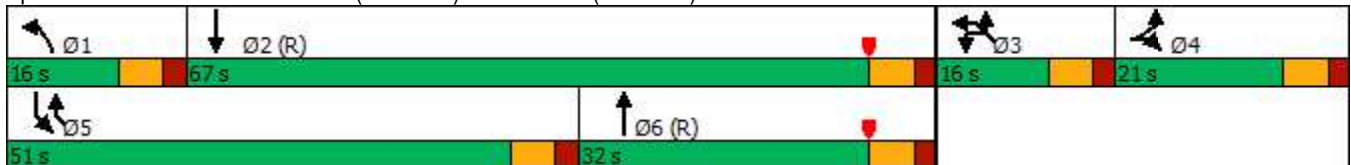


Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Approach Delay	53.9				57.5			118.0				16.6
Approach LOS	D				E			F				B
Queue Length 50th (ft)	34	0		1	256		~997	2			3	175
Queue Length 95th (ft)	63	0		7	#334		#1296	m44			15	377
Internal Link Dist (ft)	511				678			1653				542
Turn Bay Length (ft)		50		200			775				100	
Base Capacity (vph)	208	355		140	782		753	2450			159	1000
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	0.22	0.02		0.01	0.84		1.32	0.19			0.03	0.72

Intersection Summary






















Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 5 (4%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.32
 Intersection Signal Delay: 77.5
 Intersection LOS: E
 Intersection Capacity Utilization 94.3%
 ICU Level of Service F
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-04
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road



2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue
Lanes, Volumes, Timings

2022 Build PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	273	0	51	1	0	16	35	1267	5	24	1246	228
Future Volume (vph)	273	0	51	1	0	16	35	1267	5	24	1246	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	13	13	13	10	12	12	12	12	12
Storage Length (ft)	0		50	0		0	300		0	350		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			75			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.871			0.999				0.977
Flt Protected		0.950			0.998		0.950			0.950		
Satd. Flow (prot)	0	1620	1507	0	1707	0	1685	3606	0	1805	3463	0
Flt Permitted		0.744			0.986		0.950			0.950		
Satd. Flow (perm)	0	1269	1507	0	1686	0	1685	3606	0	1805	3463	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			82		82							23
Link Speed (mph)		15			30			35				35
Link Distance (ft)		510			557			1733				980
Travel Time (s)		23.2			12.7			33.8				19.1
Peak Hour Factor	0.84	0.84	0.84	0.80	0.80	0.80	0.93	0.93	0.93	0.90	0.90	0.90
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	12%
Adj. Flow (vph)	325	0	61	1	0	20	38	1362	5	27	1384	253
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	325	61	0	21	0	38	1367	0	27	1637	0
Turn Type	Perm	NA	Prot	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		7	7		3		1	6		5	2	
Permitted Phases	7			3								
Detector Phase	7	7	7	3	3		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0		11.0	16.0		11.0	16.0	
Total Split (s)	32.0	32.0	32.0	32.0	32.0		27.0	61.0		27.0	61.0	
Total Split (%)	26.7%	26.7%	26.7%	26.7%	26.7%		22.5%	50.8%		22.5%	50.8%	
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		21.0	55.0		21.0	55.0	
Yellow Time (s)	4.0	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	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Act Effct Green (s)		26.0	26.0		14.3		9.2	72.8		8.3	72.1	
Actuated g/C Ratio		0.22	0.22		0.12		0.08	0.61		0.07	0.60	
v/c Ratio		1.19	0.16		0.08		0.30	0.62		0.22	0.78	
Control Delay		155.9	5.2		0.5		66.0	15.7		57.3	14.8	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		155.9	5.2		0.5		66.0	15.7		57.3	14.8	
LOS		F	A		A		E	B		E	B	

2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue
Lanes, Volumes, Timings

2022 Build PM

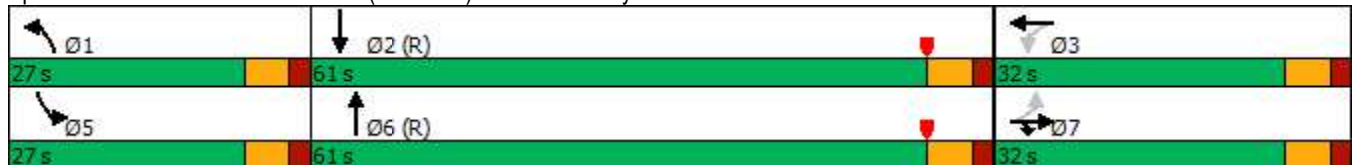


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		132.1			0.5			17.1				15.5
Approach LOS		F			A			B				B
Queue Length 50th (ft)		~302	0		0		30	498		22		137
Queue Length 95th (ft)		#438	18		0		m38	600		m30		280
Internal Link Dist (ft)		430			477			1653				900
Turn Bay Length (ft)			50				300			350		
Base Capacity (vph)		274	390		429		294	2188		315		2089
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		1.19	0.16		0.05		0.13	0.62		0.09		0.78

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 74 (62%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.19
 Intersection Signal Delay: 29.0
 Intersection LOS: C
 Intersection Capacity Utilization 73.5%
 ICU Level of Service D
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-03
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.
































Splits and Phases: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue



3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Lanes, Volumes, Timings

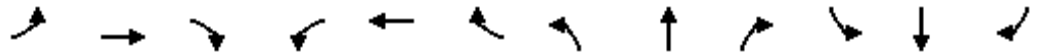
2022 Build PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 		 	 		 	 	 	 	 		
Traffic Volume (vph)	357	13	129	88	20	244	110	1380	74	310	1287	300
Future Volume (vph)	357	13	129	88	20	244	110	1380	74	310	1287	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	13	12	12	12	13	12	12	12	12	12	12
Storage Length (ft)	175		175	150		200	350		175	350		0
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			75			125			100		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frts			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1963	1615	3502	1900	1669	3467	3574	1615	3502	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1963	1615	3502	1900	1669	3467	3574	1615	3502	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			147			224			136			241
Link Speed (mph)		30			30			35				30
Link Distance (ft)		401			449			980				1189
Travel Time (s)		9.1			10.2			19.1				27.0
Peak Hour Factor	0.88	0.88	0.88	0.86	0.86	0.86	0.89	0.89	0.89	0.91	0.91	0.91
Heavy Vehicles (%)	2%	0%	0%	0%	0%	0%	1%	1%	0%	0%	2%	2%
Adj. Flow (vph)	406	15	147	102	23	284	124	1551	83	341	1414	330
Shared Lane Traffic (%)												
Lane Group Flow (vph)	406	15	147	102	23	284	124	1551	83	341	1414	330
Turn Type	Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot
Protected Phases	7	4	4	3	8	8	1	6	6	5	2	2
Permitted Phases												
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	16.0	11.0	16.0	16.0
Total Split (s)	26.0	20.0	20.0	26.0	20.0	20.0	21.0	48.0	48.0	26.0	53.0	53.0
Total Split (%)	21.7%	16.7%	16.7%	21.7%	16.7%	16.7%	17.5%	40.0%	40.0%	21.7%	44.2%	44.2%
Maximum Green (s)	20.0	14.0	14.0	20.0	14.0	14.0	15.0	42.0	42.0	20.0	47.0	47.0
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	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)	18.7	19.6	19.6	9.8	10.7	10.7	10.6	49.2	49.2	17.4	55.9	55.9
Actuated g/C Ratio	0.16	0.16	0.16	0.08	0.09	0.09	0.09	0.41	0.41	0.14	0.47	0.47
v/c Ratio	0.76	0.05	0.38	0.36	0.14	0.80	0.41	1.06	0.11	0.67	0.86	0.38
Control Delay	58.2	40.9	9.7	55.1	50.4	30.7	58.8	63.5	1.0	58.3	29.4	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.2	40.9	9.7	55.1	50.4	30.7	58.8	63.5	1.0	58.3	29.4	3.2
LOS	E	D	A	E	D	C	E	E	A	E	C	A

3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

2022 Build PM

Lanes, Volumes, Timings

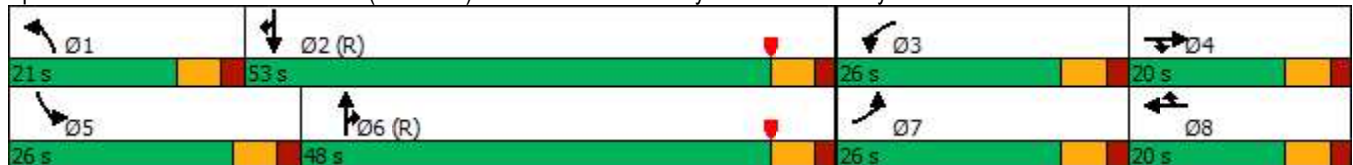


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		45.2			37.9			60.3			30.0	
Approach LOS		D			D			E			C	
Queue Length 50th (ft)	155	10	0	39	17	44	47	~708	0	124	557	0
Queue Length 95th (ft)	205	29	53	63	41	123	m72	m#836	m5	m134	m#727	m37
Internal Link Dist (ft)		321			369			900			1109	
Turn Bay Length (ft)	175		175	150		200	350		175	350		
Base Capacity (vph)	572	320	386	583	221	392	433	1464	742	583	1649	866
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.05	0.38	0.17	0.10	0.72	0.29	1.06	0.11	0.58	0.86	0.38

Intersection Summary


















Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 64 (53%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.06
 Intersection Signal Delay: 43.5
 Intersection LOS: D
 Intersection Capacity Utilization 78.8%
 ICU Level of Service D
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-06
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway



4: Lowell Road (Route 3A) & Sagamore Bridge Road
Lanes, Volumes, Timings

2022 Build PM

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 		 	 	 	 
Traffic Volume (vph)	1479	1467	1331	684	500	1233
Future Volume (vph)	1479	1467	1331	684	500	1233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	12	12	12	12
Storage Length (ft)	0	0	525			200
Storage Lanes	2	1	2			1
Taper Length (ft)	25		100			
Lane Util. Factor	0.97	1.00	0.97	0.95	0.95	0.88
Fr _t		0.850				0.850
Fl _t Protected	0.950		0.950			
Satd. Flow (prot)	3698	1689	3467	3610	3610	2814
Fl _t Permitted	0.950		0.950			
Satd. Flow (perm)	3698	1689	3467	3610	3610	2814
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		635				1300
Link Speed (mph)	35			30	30	
Link Distance (ft)	929			1189	999	
Travel Time (s)	18.1			27.0	22.7	
Peak Hour Factor	0.96	0.96	0.94	0.94	0.89	0.89
Heavy Vehicles (%)	1%	2%	1%	0%	0%	1%
Adj. Flow (vph)	1541	1528	1416	728	562	1385
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1541	1528	1416	728	562	1385
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Detector Phase	3		1	6	2	
Switch Phase						
Minimum Initial (s)	10.0		7.0	10.0	10.0	
Minimum Split (s)	16.0		15.0	17.0	17.0	
Total Split (s)	50.0		40.0	67.0	30.0	
Total Split (%)	41.7%		33.3%	55.8%	25.0%	
Maximum Green (s)	44.0		32.0	60.0	23.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		4.0	3.0	3.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		8.0	7.0	7.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Recall Mode	None		None	C-Min	C-Min	
Act Effct Green (s)	44.5	120.0	32.0	62.5	22.5	120.0
Actuated g/C Ratio	0.37	1.00	0.27	0.52	0.19	1.00
v/c Ratio	1.12	0.90	1.53	0.39	0.83	0.49
Control Delay	101.6	9.3	268.1	7.7	58.6	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	101.6	9.3	268.1	7.7	58.6	0.6
LOS	F	A	F	A	E	A

4: Lowell Road (Route 3A) & Sagamore Bridge Road
Lanes, Volumes, Timings

2022 Build PM

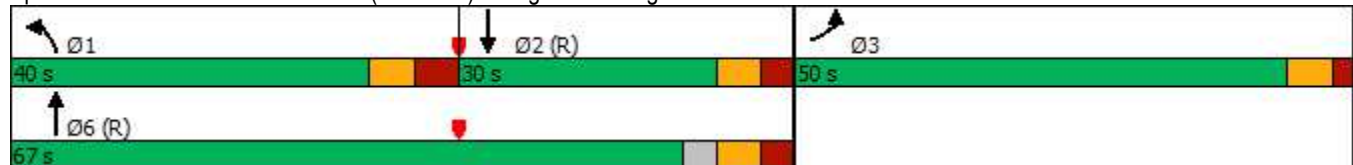


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	55.7			179.7	17.4	
Approach LOS	E			F	B	
Queue Length 50th (ft)	~717	0	~792	110	221	0
Queue Length 95th (ft)	#854	#5	m#785	m95	284	0
Internal Link Dist (ft)	849			1109	919	
Turn Bay Length (ft)			525			200
Base Capacity (vph)	1371	1689	924	1895	691	2814
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	1.12	0.90	1.53	0.38	0.81	0.49

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 100 (83%), Referenced to phase 2:SBT and 6:NBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.53
 Intersection Signal Delay: 82.4
 Intersection LOS: F
 Intersection Capacity Utilization 110.7%
 ICU Level of Service H
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-02
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.
























Splits and Phases: 4: Lowell Road (Route 3A) & Sagamore Bridge Road



5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Lanes, Volumes, Timings

2022 Build PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	92	433	435	17	28	137	1060	988	72	897	5
Future Volume (vph)	52	92	433	435	17	28	137	1060	988	72	897	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		250	200		75	575		275	175		300
Storage Lanes	0		1	1		1	1		1	1		1
Taper Length (ft)	25			50			175			75		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.982		0.950	0.956		0.950			0.950		
Satd. Flow (prot)	0	1866	1599	1658	1668	1546	1787	3574	1615	1805	5131	0
Flt Permitted		0.982		0.950	0.956		0.950			0.950		
Satd. Flow (perm)	0	1866	1599	1658	1668	1546	1787	3574	1615	1805	5131	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			57			89			283			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		805			586			999			1515	
Travel Time (s)		18.3			13.3			22.7			34.4	
Peak Hour Factor	0.80	0.80	0.80	0.90	0.90	0.90	0.94	0.94	0.94	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%	1%	1%	0%	0%	1%	0%
Adj. Flow (vph)	65	115	541	483	19	31	146	1128	1051	82	1019	6
Shared Lane Traffic (%)				48%								
Lane Group Flow (vph)	0	180	541	251	251	31	146	1128	1051	82	1025	0
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Detector Phase	8	8	1	7	7	5	1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	5.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	11.0	16.0	
Total Split (s)	26.0	26.0	31.0	56.0	56.0	21.0	31.0	71.0	56.0	21.0	71.0	
Total Split (%)	14.1%	14.1%	16.8%	30.4%	30.4%	11.4%	16.8%	38.6%	30.4%	11.4%	38.6%	
Maximum Green (s)	20.0	20.0	25.0	50.0	50.0	15.0	25.0	65.0	50.0	15.0	65.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	
Recall Mode	None	None	None	None	None	None	None	Min	None	None	Min	
Act Effct Green (s)		18.6	50.5	41.5	41.5	53.1	25.7	56.3	104.0	11.6	42.1	
Actuated g/C Ratio		0.12	0.33	0.27	0.27	0.35	0.17	0.37	0.68	0.08	0.28	
v/c Ratio		0.80	0.96	0.56	0.55	0.05	0.49	0.86	0.88	0.60	0.72	
Control Delay		92.7	74.4	53.8	53.7	0.2	69.2	53.7	24.2	91.8	53.5	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	
Total Delay		92.7	74.4	53.8	53.7	0.2	69.2	53.7	26.0	91.8	53.5	
LOS		F	E	D	D	A	E	D	C	F	D	

5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road
Lanes, Volumes, Timings

2022 Build PM

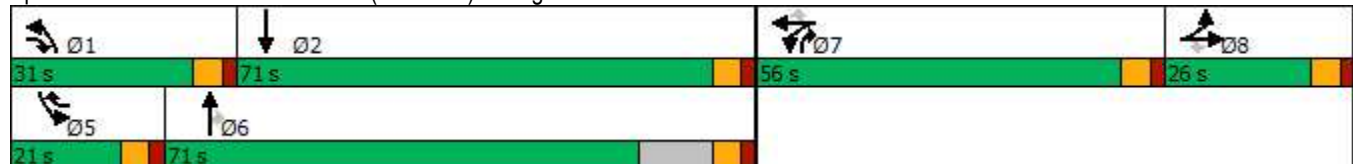


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		79.0			50.6			42.1				56.3
Approach LOS		E			D			D				E
Queue Length 50th (ft)		190	~540	231	231	0	146	603	641	87	368	
Queue Length 95th (ft)		#276	#703	358	358	0	239	715	992	151	408	
Internal Link Dist (ft)		725			506			919				1435
Turn Bay Length (ft)			250	200		75	575		275	175		
Base Capacity (vph)		251	566	559	562	632	301	1807	1277	182	2249	
Starvation Cap Reductn		0	0	0	0	0	0	0	105	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		0.72	0.96	0.45	0.45	0.05	0.49	0.62	0.90	0.45	0.46	

Intersection Summary

Area Type:	Other
Cycle Length:	184
Actuated Cycle Length:	152.7
Natural Cycle:	90
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.96
Intersection Signal Delay:	52.1
Intersection LOS:	D
Intersection Capacity Utilization	88.1%
ICU Level of Service	E
Analysis Period (min)	15
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	























Splits and Phases: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road



6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive

Lanes, Volumes, Timings

2022 Build PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	2	105	10	1	4	16	1122	12	5	872	7
Future Volume (vph)	26	2	105	10	1	4	16	1122	12	5	872	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	13	13	13	12	12	12	11	12	12
Storage Length (ft)	0		100	0		100	225		0	225		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.998			0.999	
Flt Protected		0.956			0.956		0.950			0.950		
Satd. Flow (prot)	0	1816	1583	0	1877	1669	1736	3567	0	1745	3571	0
Flt Permitted		0.436					0.950			0.950		
Satd. Flow (perm)	0	828	1583	0	1963	1669	1736	3567	0	1745	3571	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			131			86		1			1	
Link Speed (mph)		30			10			30			30	
Link Distance (ft)		495			382			1515			1791	
Travel Time (s)		11.3			26.0			34.4			40.7	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.95	0.95	0.95	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	4%	1%	0%	0%	1%	0%
Adj. Flow (vph)	33	3	131	13	1	5	17	1181	13	6	1002	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	36	131	0	14	5	17	1194	0	6	1010	0
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		4	4 1		8	8 5	1	6		5	2	
Permitted Phases	4			8								
Detector Phase	4	4	4 1	8	8	8 5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		4.0	15.0		4.0	15.0	
Minimum Split (s)	9.0	9.0		9.0	9.0		8.0	21.0		8.0	21.0	
Total Split (s)	16.0	16.0		16.0	16.0		16.0	66.0		16.0	66.0	
Total Split (%)	14.0%	14.0%		14.0%	14.0%		14.0%	57.9%		14.0%	57.9%	
Maximum Green (s)	10.0	10.0		10.0	10.0		12.0	60.0		12.0	60.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)		8.8	16.8		6.7	9.6	5.6	39.7		5.1	31.2	
Actuated g/C Ratio		0.13	0.25		0.10	0.14	0.08	0.59		0.08	0.47	
v/c Ratio		0.33	0.26		0.07	0.02	0.12	0.56		0.05	0.61	
Control Delay		41.6	5.6		35.6	0.0	37.7	11.3		38.0	15.8	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		41.6	5.6		35.6	0.0	37.7	11.3		38.0	15.8	
LOS		D	A		D	A	D	B		D	B	

6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive
Lanes, Volumes, Timings

2022 Build PM

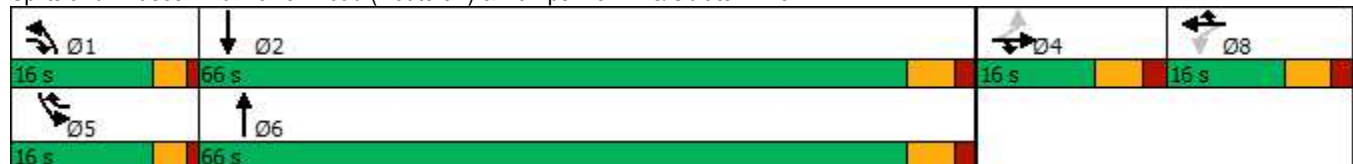


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		13.4			26.3			11.7				16.0
Approach LOS		B			C			B				B
Queue Length 50th (ft)		10	0		4	0	5	99		2		124
Queue Length 95th (ft)		48	26		24	0	31	332		16		258
Internal Link Dist (ft)		415			302			1435				1711
Turn Bay Length (ft)			100			100	225			225		
Base Capacity (vph)		131	593		312	411	331	3136		333		3140
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		0.27	0.22		0.04	0.01	0.05	0.38		0.02		0.32

Intersection Summary























Area Type:	Other
Cycle Length:	114
Actuated Cycle Length:	66.9
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.61
Intersection Signal Delay:	13.7
Intersection LOS:	B
Intersection Capacity Utilization	53.1%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive



7: Lowell Road (Route 3A) & Executive Drive
Lanes, Volumes, Timings

2022 Build PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	225	3	79	23	2	22	52	1030	7	16	716	40
Future Volume (vph)	225	3	79	23	2	22	52	1030	7	16	716	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	15	12	12	13	11	12	12	11	12	12
Storage Length (ft)	0		225	0		80	350		0	150		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.999			0.992	
Flt Protected		0.953			0.957		0.950			0.950		
Satd. Flow (prot)	0	1733	1742	0	1818	1620	1678	3571	0	1646	3540	0
Flt Permitted		0.706			0.673		0.950			0.950		
Satd. Flow (perm)	0	1284	1742	0	1279	1620	1678	3571	0	1646	3540	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			99			91		1			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		492			577			1791			1168	
Travel Time (s)		11.2			13.1			40.7			26.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.97	0.97	0.97	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	2%	0%	0%	3%	4%	1%	0%	6%	1%	4%
Adj. Flow (vph)	281	4	99	29	3	28	54	1062	7	17	778	43
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	285	99	0	32	28	54	1069	0	17	821	0
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA	
Protected Phases		8	8 1		4	4	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8 1	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		5.0	5.0	5.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	9.0	9.0		11.0	11.0	11.0	9.0	14.0		9.0	14.0	
Total Split (s)	26.0	26.0		23.0	23.0	23.0	16.0	66.0		16.0	66.0	
Total Split (%)	24.1%	24.1%		21.3%	21.3%	21.3%	14.8%	61.1%		14.8%	61.1%	
Maximum Green (s)	20.0	20.0		17.0	17.0	17.0	10.0	60.0		10.0	60.0	
Yellow Time (s)	4.0	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	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None	None	None	Min		None	Min	
Act Effct Green (s)		20.6	33.6		13.4	13.4	6.8	33.2		5.4	25.0	
Actuated g/C Ratio		0.30	0.49		0.20	0.20	0.10	0.49		0.08	0.37	
v/c Ratio		0.73	0.11		0.13	0.07	0.32	0.62		0.13	0.63	
Control Delay		39.1	3.8		24.3	0.4	37.2	14.6		36.3	20.3	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		39.1	3.8		24.3	0.4	37.2	14.6		36.3	20.3	
LOS		D	A		C	A	D	B		D	C	

7: Lowell Road (Route 3A) & Executive Drive
Lanes, Volumes, Timings

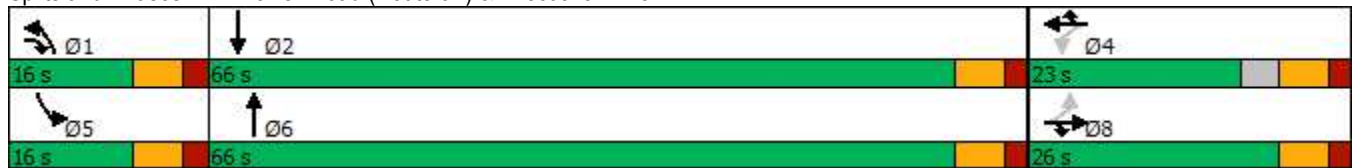
2022 Build PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		30.0			13.1			15.7				20.6
Approach LOS		C			B			B				C
Queue Length 50th (ft)		106	0		10	0	21	145		7	148	
Queue Length 95th (ft)		#258	21		33	0	63	282		29	215	
Internal Link Dist (ft)		412			497			1711			1088	
Turn Bay Length (ft)			225			80	350			150		
Base Capacity (vph)		388	993		386	553	253	3110		248	3084	
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	0.10		0.08	0.05	0.21	0.34		0.07	0.27	

Intersection Summary

Area Type:	Other
Cycle Length:	108
Actuated Cycle Length:	68.2
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.73
Intersection Signal Delay:	19.6
Intersection LOS:	B
Intersection Capacity Utilization	66.3%
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.	























Splits and Phases: 7: Lowell Road (Route 3A) & Executive Drive



8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

2022 Build PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	2	25	31	0	48	27	1215	15	56	724	11
Future Volume (vph)	9	2	25	31	0	48	27	1215	15	56	724	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	13	13	11	11	12	12	12	12
Storage Length (ft)	0		50	0		100	210		325	125		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			50			100		
Lane Util. 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
Frt			0.850			0.850			0.850		0.998	
Flt Protected		0.962			0.950		0.950			0.950		
Satd. Flow (prot)	0	1828	1583	0	1865	1669	1745	1818	1615	1805	1878	0
Flt Permitted		0.746			0.748		0.950			0.950		
Satd. Flow (perm)	0	1417	1583	0	1469	1669	1745	1818	1615	1805	1878	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			91			60			91			1
Link Speed (mph)		10			30			30				30
Link Distance (ft)		598			262			1405				549
Travel Time (s)		40.8			6.0			31.9				12.5
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.99	0.99	0.99	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	11	3	31	39	0	60	27	1227	15	60	770	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	31	0	39	60	27	1227	15	60	782	0
Turn Type	Perm	NA	Prot	Perm	NA	pm+ov	Prot	NA	Prot	Prot	NA	
Protected Phases		8	8		4	5	1	6	6	5	2	
Permitted Phases	8			4		4						
Detector Phase	8	8	8	4	4	5	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	16.0	11.0	16.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	116.0	116.0	16.0	116.0	
Total Split (%)	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	64.4%	64.4%	8.9%	64.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	110.0	110.0	10.0	110.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag						Lead	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.5	1.5	1.5	1.5	
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		8.1	8.1		8.1	20.7	6.6	140.9	140.9	8.8	146.5	
Actuated g/C Ratio		0.04	0.04		0.04	0.12	0.04	0.78	0.78	0.05	0.81	
v/c Ratio		0.22	0.20		0.59	0.25	0.42	0.86	0.01	0.68	0.51	
Control Delay		90.1	2.8		117.7	16.3	103.9	23.8	0.0	119.5	10.8	

8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway
Lanes, Volumes, Timings

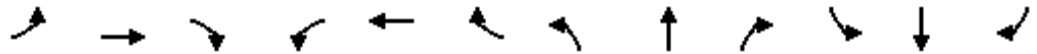
2022 Build PM

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
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 (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	32.0
Total Split (s)	32.0
Total Split (%)	18%
Maximum Green (s)	26.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
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)	21.0
Pedestrian Calls (#/hr)	5
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	

8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

2022 Build PM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4
Total Delay		90.1	2.8		117.7	16.3	103.9	23.8	0.0	119.5	13.2	
LOS		F	A		F	B	F	C	A	F	B	
Approach Delay		29.9			56.2			25.2				20.8
Approach LOS		C			E			C				C
Queue Length 50th (ft)		16	0		46	0	32	806	0	71	250	
Queue Length 95th (ft)		40	0		81	36	70	#1911	0	#134	741	
Internal Link Dist (ft)		518			182			1325				469
Turn Bay Length (ft)			50			100	210		325	125		
Base Capacity (vph)		78	173		81	255	96	1423	1284	100	1528	
Starvation Cap Reductn		0	0		0	0	0	0	0	0	588	
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		0.18	0.18		0.48	0.24	0.28	0.86	0.01	0.60	0.83	

Intersection Summary

Area Type: Other

Cycle Length: 180

Actuated Cycle Length: 180

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow, Master Intersection

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 25.0

Intersection LOS: C

Intersection Capacity Utilization 87.3%

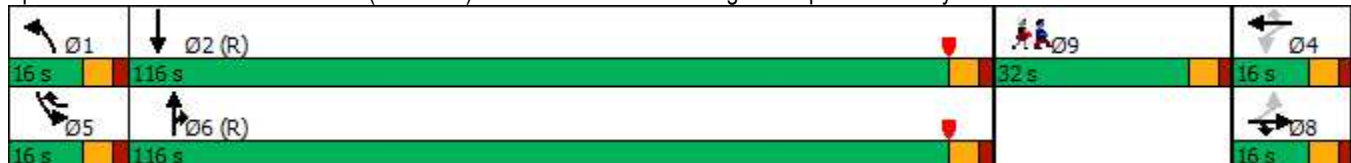
ICU Level of Service E

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway














8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway
 Lanes, Volumes, Timings

2022 Build PM

Lane Group	Ø9
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	

9: Lowell Road (Route 3A) & Pelham Road
Lanes, Volumes, Timings

2022 Build PM

							Ø9
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (vph)	86	142	1155	109	110	714	
Future Volume (vph)	86	142	1155	109	110	714	
Ideal Flow (vphpl)	1900	1000	1900	1900	1900	1900	
Lane Width (ft)	12	12	13	13	12	12	
Storage Length (ft)	0	75		0	150		
Storage Lanes	1	1		0	1		
Taper Length (ft)	25				50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Fr _t		0.850	0.988				
Fl _t Protected	0.950				0.950		
Satd. Flow (prot)	1805	850	1922	0	1805	1881	
Fl _t Permitted	0.950				0.950		
Satd. Flow (perm)	1805	850	1922	0	1805	1881	
Right Turn on Red		Yes		Yes			
Satd. Flow (RTOR)		151	4				
Link Speed (mph)	20		30			30	
Link Distance (ft)	512		549			1309	
Travel Time (s)	17.5		12.5			29.8	
Peak Hour Factor	0.87	0.87	0.98	0.98	0.89	0.89	
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%	
Adj. Flow (vph)	99	163	1179	111	124	802	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	99	163	1290	0	124	802	
Turn Type	Prot	pt+ov	NA		Prot	NA	
Protected Phases	4	4 5	6		5	2	9
Permitted Phases							
Detector Phase	4	4 5	6		5	2	
Switch Phase							
Minimum Initial (s)	5.0		10.0		3.0	10.0	5.0
Minimum Split (s)	11.0		16.0		9.0	16.0	35.0
Total Split (s)	26.0		116.0		13.0	116.0	35.0
Total Split (%)	13.7%		61.1%		6.8%	61.1%	18%
Maximum Green (s)	20.0		110.0		7.0	110.0	29.0
Yellow Time (s)	4.0		4.0		4.0	4.0	4.0
All-Red Time (s)	2.0		2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.0		6.0		6.0	6.0	
Lead/Lag			Lag		Lead		
Lead-Lag Optimize?			Yes		Yes		
Vehicle Extension (s)	1.5		1.5		1.5	1.5	3.0
Recall Mode	None		C-Min		None	C-Min	None
Walk Time (s)							5.0
Flash Dont Walk (s)							24.0
Pedestrian Calls (#/hr)							5
Act Effct Green (s)	14.3	27.3	143.7		7.0	156.7	
Actuated g/C Ratio	0.08	0.14	0.76		0.04	0.82	
v/c Ratio	0.73	0.65	0.89		1.88	0.52	
Control Delay	114.7	24.5	27.5		487.8	9.2	

9: Lowell Road (Route 3A) & Pelham Road
Lanes, Volumes, Timings

2022 Build PM

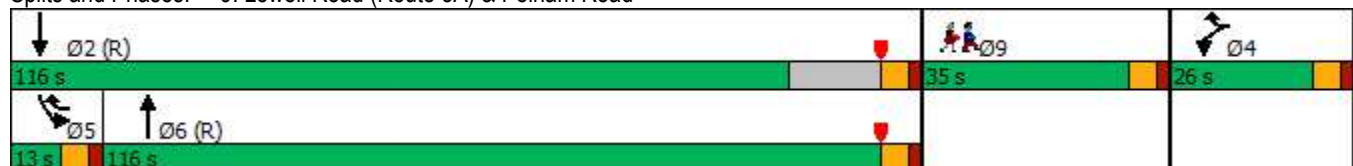


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø9
Queue Delay	0.0	0.0	47.0		0.0	0.0	
Total Delay	114.7	24.5	74.5		487.8	9.2	
LOS	F	C	E		F	A	
Approach Delay	58.6		74.5			73.3	
Approach LOS	E		E			E	
Queue Length 50th (ft)	123	13	904		~235	197	
Queue Length 95th (ft)	184	91	#2163		#384	722	
Internal Link Dist (ft)	432		469			1229	
Turn Bay Length (ft)		75			150		
Base Capacity (vph)	190	249	1455		66	1551	
Starvation Cap Reductn	0	0	317		0	0	
Spillback Cap Reductn	0	0	0		0	0	
Storage Cap Reductn	0	0	0		0	0	
Reduced v/c Ratio	0.52	0.65	1.13		1.88	0.52	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 30 (16%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.88
 Intersection Signal Delay: 72.4
 Intersection LOS: E
 Intersection Capacity Utilization 94.1%
 ICU Level of Service F
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 9: Lowell Road (Route 3A) & Pelham Road



Appendix H

Capacity Analysis – 2032 Build Traffic Conditions

2032 Build Weekday A.M.

1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road
Lanes, Volumes, Timings

2032 Build AM



Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	2	0	2	0	299	0	535	561	14	1	934
Future Volume (vph)	2	0	2	0	299	0	535	561	14	1	934
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	12	12	10	12	12	12	12
Storage Length (ft)	0	50		200		300	775		0	100	0
Storage Lanes	1	1		1		1	1		0	1	1
Taper Length (ft)	25			100			75			25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00
Frt		0.850						0.996			0.850
Flt Protected	0.950						0.950			0.950	
Satd. Flow (prot)	1685	1133	0	1773	3574	0	1652	3561	0	1805	1583
Flt Permitted	0.950						0.950			0.950	
Satd. Flow (perm)	1685	1133	0	1773	3574	0	1652	3561	0	1805	1583
Right Turn on Red			Yes			Yes			Yes		Yes
Satd. Flow (RTOR)		524						3			464
Link Speed (mph)	30				35			35		35	
Link Distance (ft)	591				758			1733		622	
Travel Time (s)	13.4				14.8			33.8		12.1	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.92	0.92	0.92	0.86	0.86
Heavy Vehicles (%)	0%	0%	33%	0%	1%	0%	2%	1%	0%	0%	2%
Adj. Flow (vph)	3	0	3	0	374	0	582	610	15	1	1086
Shared Lane Traffic (%)											
Lane Group Flow (vph)	3	3	0	0	374	0	582	625	0	1	1086
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Prot	pt+ov
Protected Phases	4	4		1	6		5	2		3	3 5
Permitted Phases											
Detector Phase	4	4		1	6		5	2		3	3 5
Switch Phase											
Minimum Initial (s)	5.0	5.0		5.0	8.0		8.0	8.0		5.0	
Minimum Split (s)	11.0	11.0		11.0	14.0		14.0	14.0		11.0	
Total Split (s)	16.0	16.0		16.0	20.0		38.0	42.0		16.0	
Total Split (%)	17.8%	17.8%		17.8%	22.2%		42.2%	46.7%		17.8%	
Maximum Green (s)	10.0	10.0		10.0	14.0		32.0	36.0		10.0	
Yellow Time (s)	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		2.0	2.0		2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	
Lead/Lag	Lag	Lag		Lead	Lag		Lead	Lag		Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	
Vehicle Extension (s)	3.0	3.0		3.0	4.0		4.0	4.0		4.0	
Recall Mode	None	None		None	C-Min		None	C-Min		None	
Act Effct Green (s)	5.8	5.8			13.5		45.5	65.1		10.5	60.8
Actuated g/C Ratio	0.06	0.06			0.15		0.51	0.72		0.12	0.68
v/c Ratio	0.03	0.01			0.70		0.70	0.24		0.00	0.89
Control Delay	40.0	0.0			43.8		20.1	0.6		36.0	18.8
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0
Total Delay	40.0	0.0			43.8		20.1	0.6		36.0	18.8
LOS	D	A			D		C	A		D	B

1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road
Lanes, Volumes, Timings

2032 Build AM

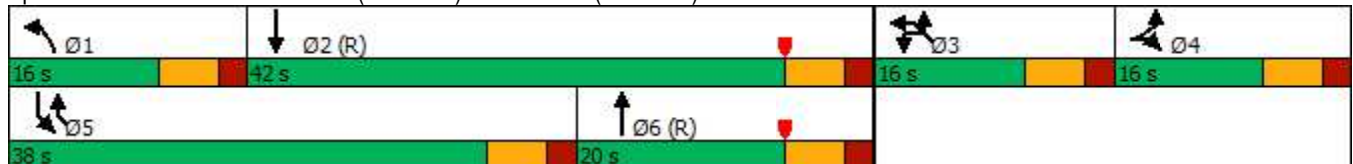


Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Approach Delay	20.0				43.8			10.0		18.8	
Approach LOS	B				D			B		B	
Queue Length 50th (ft)	2	0			106		152	2		1	215
Queue Length 95th (ft)	9	0			135		#495	5		5	#774
Internal Link Dist (ft)	511				678			1653		542	
Turn Bay Length (ft)		50					775			100	
Base Capacity (vph)	187	591			555		836	2575		210	1220
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	0.02	0.01			0.67		0.70	0.24		0.00	0.89

Intersection Summary






















Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Offset:	0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
Natural Cycle:	100
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.89
Intersection Signal Delay:	18.3
Intersection LOS:	B
Intersection Capacity Utilization:	76.1%
ICU Level of Service:	D
Analysis Period (min):	15
Description:	NHDOT Int. No.: S-229-04
#	95th percentile volume exceeds capacity, queue may be longer.
	Queue shown is maximum after two cycles.

Splits and Phases: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road



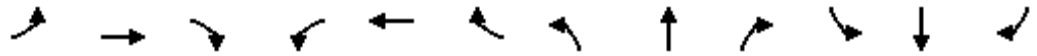
2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue
Lanes, Volumes, Timings

2032 Build AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	156	0	25	1	1	36	43	1242	2	8	1089	241
Future Volume (vph)	156	0	25	1	1	36	43	1242	2	8	1089	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	13	13	13	10	12	12	12	12	12
Storage Length (ft)	0		50	0		0	300		0	350		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			75			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.871							0.973
Flt Protected		0.950			0.999		0.950			0.950		
Satd. Flow (prot)	0	1532	1133	0	1657	0	1685	3538	0	1570	3419	0
Flt Permitted		0.728			0.993		0.950			0.950		
Satd. Flow (perm)	0	1174	1133	0	1648	0	1685	3538	0	1570	3419	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109		42							39
Link Speed (mph)		15			30			35				35
Link Distance (ft)		510			557			1733				980
Travel Time (s)		23.2			12.7			33.8				19.1
Peak Hour Factor	0.80	0.80	0.80	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.95
Heavy Vehicles (%)	10%	0%	33%	9%	0%	3%	0%	2%	20%	15%	2%	6%
Adj. Flow (vph)	195	0	31	1	1	42	51	1461	2	8	1146	254
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	195	31	0	44	0	51	1463	0	8	1400	0
Turn Type	Perm	NA	Prot	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		7	7		3		1	6		5	2	
Permitted Phases	7			3								
Detector Phase	7	7	7	3	3		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0		11.0	16.0		11.0	16.0	
Total Split (s)	21.0	21.0	21.0	21.0	21.0		21.0	51.0		18.0	48.0	
Total Split (%)	23.3%	23.3%	23.3%	23.3%	23.3%		23.3%	56.7%		20.0%	53.3%	
Maximum Green (s)	15.0	15.0	15.0	15.0	15.0		15.0	45.0		12.0	42.0	
Yellow Time (s)	4.0	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	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Act Effct Green (s)		17.6	17.6		11.6		9.1	57.6		7.1	50.6	
Actuated g/C Ratio		0.20	0.20		0.13		0.10	0.64		0.08	0.56	
v/c Ratio		0.86	0.10		0.18		0.30	0.65		0.06	0.72	
Control Delay		70.4	0.6		13.0		41.0	10.4		30.5	20.5	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		70.4	0.6		13.0		41.0	10.4		30.5	20.5	
LOS		E	A		B		D	B		C	C	

2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue
Lanes, Volumes, Timings

2032 Build AM

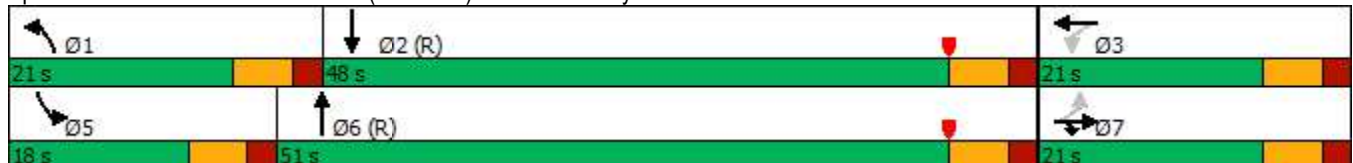


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		60.8			13.0			11.4			20.6	
Approach LOS		E			B			B			C	
Queue Length 50th (ft)		112	0		1		29	177		5	183	
Queue Length 95th (ft)		#208	0		27		m32	278		m7	298	
Internal Link Dist (ft)		430			477			1653			900	
Turn Bay Length (ft)			50				300			350		
Base Capacity (vph)		228	308		309		280	2264		209	1937	
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		0.86	0.10		0.14		0.18	0.65		0.04	0.72	

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 51 (57%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 19.0
 Intersection LOS: B
 Intersection Capacity Utilization 63.1%
 ICU Level of Service B
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-03
 # 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: Lowell Road (Route 3A) & Site Driveway/Rena Avenue



3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Lanes, Volumes, Timings

2032 Build AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 		 	  		 	  	 	 			
Traffic Volume (vph)	131	4	59	15	5	71	78	1325	27	85	1252	164
Future Volume (vph)	131	4	59	15	5	71	78	1325	27	85	1252	164
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	13	12	12	12	13	12	12	12	12	12	12
Storage Length (ft)	175		175	150		200	350		175	350		0
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			75			125			100		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frts			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3213	1852	1568	3502	1900	1589	3467	3505	1583	3433	3539	1482
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3213	1852	1568	3502	1900	1589	3467	3505	1583	3433	3539	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			182			182			182			182
Link Speed (mph)		30			30			35			30	
Link Distance (ft)		401			449			980			1189	
Travel Time (s)		9.1			10.2			19.1			27.0	
Peak Hour Factor	0.93	0.93	0.93	0.88	0.88	0.88	0.87	0.87	0.87	0.96	0.96	0.96
Heavy Vehicles (%)	9%	6%	3%	0%	0%	5%	1%	3%	2%	2%	2%	9%
Adj. Flow (vph)	141	4	63	17	6	81	90	1523	31	89	1304	171
Shared Lane Traffic (%)												
Lane Group Flow (vph)	141	4	63	17	6	81	90	1523	31	89	1304	171
Turn Type	Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot
Protected Phases	7	4	4	3	8	8	1	6	6	5	2	2
Permitted Phases												
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	16.0	11.0	16.0	16.0
Total Split (s)	17.0	16.0	16.0	17.0	16.0	16.0	16.0	41.0	41.0	16.0	41.0	41.0
Total Split (%)	18.9%	17.8%	17.8%	18.9%	17.8%	17.8%	17.8%	45.6%	45.6%	17.8%	45.6%	45.6%
Maximum Green (s)	11.0	10.0	10.0	11.0	10.0	10.0	10.0	35.0	35.0	10.0	35.0	35.0
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	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)	9.8	14.8	14.8	7.0	6.9	6.9	8.7	45.7	45.7	8.7	45.7	45.7
Actuated g/C Ratio	0.11	0.16	0.16	0.08	0.08	0.08	0.10	0.51	0.51	0.10	0.51	0.51
v/c Ratio	0.40	0.01	0.15	0.06	0.04	0.28	0.27	0.86	0.03	0.27	0.73	0.20
Control Delay	40.6	34.0	0.8	38.7	38.8	2.4	47.3	21.4	0.0	48.1	20.8	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	34.0	0.8	38.7	38.8	2.4	47.3	21.4	0.0	48.1	20.8	1.2
LOS	D	C	A	D	D	A	D	C	A	D	C	A

3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

2032 Build AM

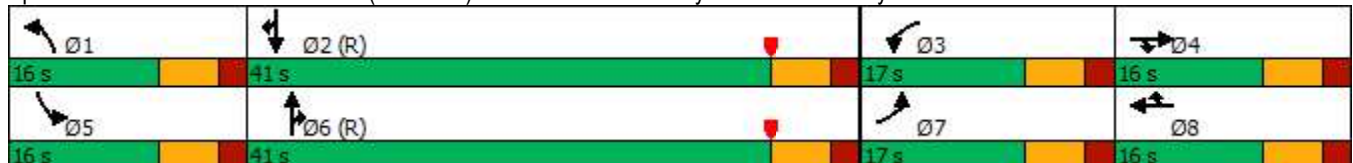
Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay	28.4			10.4			22.4			20.2		
Approach LOS	C			B			C			C		
Queue Length 50th (ft)	39	2	0	4	3	0	26	365	0	25	366	0
Queue Length 95th (ft)	67	12	0	14	15	0	m41	#591	m0	m35	#503	m4
Internal Link Dist (ft)	321			369			900			1109		
Turn Bay Length (ft)	175		175	150		200	350		175	350		
Base Capacity (vph)	392	314	417	428	211	338	390	1778	892	386	1795	841
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.01	0.15	0.04	0.03	0.24	0.23	0.86	0.03	0.23	0.73	0.20

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 51 (57%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 21.4
 Intersection LOS: C
 Intersection Capacity Utilization 60.2%
 ICU Level of Service B
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-06
 # 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: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway



4: Lowell Road (Route 3A) & Sagamore Bridge Road
Lanes, Volumes, Timings

2032 Build AM



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	1045	1184	1131	405	420	1673
Future Volume (vph)	1045	1184	1131	405	420	1673
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	12	12	12	12
Storage Length (ft)	0	0	525			200
Storage Lanes	2	1	2			1
Taper Length (ft)	25		100			
Lane Util. Factor	0.97	1.00	0.97	0.95	0.95	0.88
Fr _t		0.850				0.850
Fl _t Protected	0.950		0.950			
Satd. Flow (prot)	3662	1656	3400	3539	3539	2760
Fl _t Permitted	0.950		0.950			
Satd. Flow (perm)	3662	1656	3400	3539	3539	2760
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		795				1281
Link Speed (mph)	35			30	30	
Link Distance (ft)	929			1189	999	
Travel Time (s)	18.1			27.0	22.7	
Peak Hour Factor	0.94	0.94	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	3%
Adj. Flow (vph)	1112	1260	1229	440	457	1818
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1112	1260	1229	440	457	1818
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Detector Phase	3		1	6	2	
Switch Phase						
Minimum Initial (s)	10.0		7.0	10.0	10.0	
Minimum Split (s)	16.0		15.0	17.0	17.0	
Total Split (s)	32.0		31.0	58.0	27.0	
Total Split (%)	35.6%		34.4%	64.4%	30.0%	
Maximum Green (s)	26.0		23.0	51.0	20.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		4.0	3.0	3.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		8.0	7.0	7.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Recall Mode	None		None	C-Min	C-Min	
Act Effct Green (s)	28.4	90.0	23.0	48.6	17.6	90.0
Actuated g/C Ratio	0.32	1.00	0.26	0.54	0.20	1.00
v/c Ratio	0.96	0.76	1.42	0.23	0.66	0.66
Control Delay	50.9	3.4	218.8	2.3	38.2	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.9	3.4	218.8	2.3	38.2	1.2
LOS	D	A	F	A	D	A

4: Lowell Road (Route 3A) & Sagamore Bridge Road
Lanes, Volumes, Timings

2032 Build AM

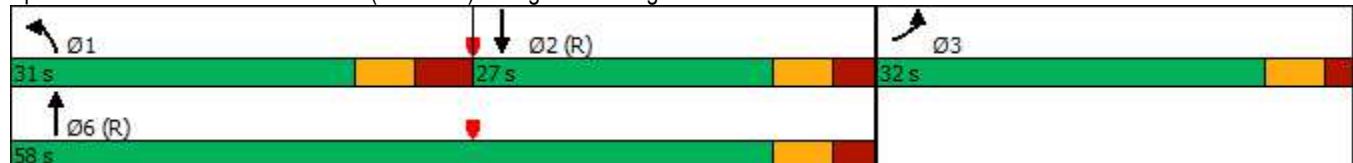


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	25.7			161.7	8.7	
Approach LOS	C			F	A	
Queue Length 50th (ft)	323	0	~476	3	125	0
Queue Length 95th (ft)	#482	0	#601	m4	173	0
Internal Link Dist (ft)	849			1109	919	
Turn Bay Length (ft)			525			200
Base Capacity (vph)	1156	1656	868	2005	786	2760
Starvation 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	0.96	0.76	1.42	0.22	0.58	0.66

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 70 (78%), Referenced to phase 2:SBT and 6:NBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.42
 Intersection Signal Delay: 55.5
 Intersection LOS: E
 Intersection Capacity Utilization 90.4%
 ICU Level of Service E
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-02
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.
























Splits and Phases: 4: Lowell Road (Route 3A) & Sagamore Bridge Road



5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Lanes, Volumes, Timings

2032 Build AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	29	303	677	45	33	328	895	208	17	1194	11
Future Volume (vph)	67	29	303	677	45	33	328	895	208	17	1194	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		250	200		75	575		275	175		300
Storage Lanes	0		1	1		1	1		1	1		1
Taper Length (ft)	25			50			175			75		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.966		0.950	0.958		0.950			0.950		
Satd. Flow (prot)	0	1835	1583	1641	1657	1501	1787	3539	1583	1752	5078	0
Flt Permitted		0.966		0.950	0.958		0.950			0.950		
Satd. Flow (perm)	0	1835	1583	1641	1657	1501	1787	3539	1583	1752	5078	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			53			89			219			1
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		805			586			999			1515	
Travel Time (s)		18.3			13.3			22.7			34.4	
Peak Hour Factor	0.81	0.81	0.81	0.94	0.94	0.94	0.95	0.95	0.95	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	2%	1%	0%	4%	1%	2%	2%	3%	2%	6%
Adj. Flow (vph)	83	36	374	720	48	35	345	942	219	20	1372	13
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	119	374	382	386	35	345	942	219	20	1385	0
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Detector Phase	8	8	1	7	7	5	1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	5.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	11.0	16.0	
Total Split (s)	26.0	26.0	31.0	56.0	56.0	21.0	31.0	71.0	56.0	21.0	71.0	
Total Split (%)	14.1%	14.1%	16.8%	30.4%	30.4%	11.4%	16.8%	38.6%	30.4%	11.4%	38.6%	
Maximum Green (s)	20.0	20.0	25.0	50.0	50.0	15.0	25.0	65.0	50.0	15.0	65.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	
Recall Mode	None	None	None	None	None	None	None	Min	None	None	Min	
Act Effct Green (s)		15.3	46.8	43.5	43.5	50.5	25.5	77.5	127.1	7.0	56.2	
Actuated g/C Ratio		0.09	0.28	0.26	0.26	0.31	0.15	0.47	0.77	0.04	0.34	
v/c Ratio		0.70	0.77	0.88	0.88	0.07	1.25	0.57	0.17	0.27	0.80	
Control Delay		97.4	59.9	81.4	81.3	0.2	193.7	35.4	1.0	91.8	53.8	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		97.4	59.9	81.4	81.3	0.2	193.7	35.4	1.0	91.8	53.8	
LOS		F	E	F	F	A	F	D	A	F	D	

5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road
Lanes, Volumes, Timings

2032 Build AM

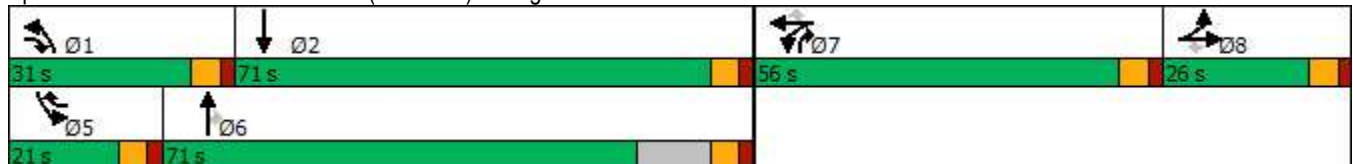


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		69.0			77.8			66.7				54.3
Approach LOS		E			E			E				D
Queue Length 50th (ft)		134	349	432	437	0	~510	422	0	23	523	
Queue Length 95th (ft)		192	433	#655	#660	0	#777	532	23	55	578	
Internal Link Dist (ft)		725			506			919			1435	
Turn Bay Length (ft)			250	200		75	575		275	175		
Base Capacity (vph)		226	487	506	511	592	275	1698	1331	162	2038	
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.53	0.77	0.75	0.76	0.06	1.25	0.55	0.16	0.12	0.68	

Intersection Summary

Area Type:	Other
Cycle Length:	184
Actuated Cycle Length:	164.9
Natural Cycle:	90
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.25
Intersection Signal Delay:	64.9
Intersection LOS:	E
Intersection Capacity Utilization:	83.1%
ICU Level of Service:	E
Analysis Period (min):	15
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	























Splits and Phases: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road



6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive

Lanes, Volumes, Timings

2032 Build AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	0	13	2	2	5	129	854	2	2	1262	65
Future Volume (vph)	9	0	13	2	2	5	129	854	2	2	1262	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	13	13	13	12	12	12	11	12	12
Storage Length (ft)	0		100	0		100	225		0	225	0	
Storage Lanes	0		1	0		1	1		0	1	0	
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850					0.993	
Flt Protected		0.950			0.976		0.950			0.950		
Satd. Flow (prot)	0	1719	1455	0	1916	1669	1752	3505	0	1745	3480	0
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1810	1455	0	1963	1669	1752	3505	0	1745	3480	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			86			86						7
Link Speed (mph)		30			10			30			30	
Link Distance (ft)		495			382			1515			1791	
Travel Time (s)		11.3			26.0			34.4			40.7	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.90	0.90	0.90	0.83	0.83	0.83
Heavy Vehicles (%)	5%	0%	11%	0%	0%	0%	3%	3%	0%	0%	3%	3%
Adj. Flow (vph)	11	0	16	3	3	6	143	949	2	2	1520	78
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	11	16	0	6	6	143	951	0	2	1598	0
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		4	4 1		8	8 5	1	6		5	2	
Permitted Phases	4			8								
Detector Phase	4	4	4 1	8	8	8 5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		4.0	15.0		4.0	15.0	
Minimum Split (s)	9.0	9.0		9.0	9.0		8.0	21.0		8.0	21.0	
Total Split (s)	16.0	16.0		16.0	16.0		16.0	66.0		16.0	66.0	
Total Split (%)	14.0%	14.0%		14.0%	14.0%		14.0%	57.9%		14.0%	57.9%	
Maximum Green (s)	10.0	10.0		10.0	10.0		12.0	60.0		12.0	60.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)		7.4	11.9		6.3	9.0	11.3	71.0		5.0	52.1	
Actuated g/C Ratio		0.09	0.14		0.08	0.11	0.14	0.86		0.06	0.63	
v/c Ratio		0.07	0.06		0.04	0.02	0.60	0.32		0.02	0.73	
Control Delay		45.0	0.4		47.0	0.2	50.7	5.2		49.0	15.9	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		45.0	0.4		47.0	0.2	50.7	5.2		49.0	15.9	
LOS		D	A		D	A	D	A		D	B	

6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive
Lanes, Volumes, Timings

2032 Build AM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		18.6			23.6			11.2				15.9
Approach LOS		B			C			B				B
Queue Length 50th (ft)		5	0		3	0	61	0		1		172
Queue Length 95th (ft)		23	0		16	0	#201	228		8		506
Internal Link Dist (ft)		415			302			1435				1711
Turn Bay Length (ft)			100			100	225			225		
Base Capacity (vph)		236	314		256	350	274	3005		273		2708
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		0.05	0.05		0.02	0.02	0.52	0.32		0.01		0.59

Intersection Summary























Area Type:	Other
Cycle Length:	114
Actuated Cycle Length:	82.6
Natural Cycle:	65
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.73
Intersection Signal Delay:	14.1
Intersection LOS:	B
Intersection Capacity Utilization:	64.6%
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.	

Splits and Phases: 6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive



7: Lowell Road (Route 3A) & Executive Drive
Lanes, Volumes, Timings

2032 Build AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	2	11	141	30	101	181	497	60	107	1154	224
Future Volume (vph)	40	2	11	141	30	101	181	497	60	107	1154	224
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	15	12	12	13	11	12	12	11	12	12
Storage Length (ft)	0		225	0		80	350		0	150		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.984			0.976	
Flt Protected		0.955			0.961		0.950			0.950		
Satd. Flow (prot)	0	1576	1558	0	1811	1620	1711	3419	0	1728	3454	0
Flt Permitted		0.427			0.728		0.950			0.950		
Satd. Flow (perm)	0	705	1558	0	1372	1620	1711	3419	0	1728	3454	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			30			101		19			33	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		492			577			1791			1168	
Travel Time (s)		11.2			13.1			40.7			26.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	12%	0%	14%	1%	0%	3%	2%	4%	3%	1%	2%	2%
Adj. Flow (vph)	50	3	14	176	38	126	199	546	66	118	1268	246
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	53	14	0	214	126	199	612	0	118	1514	0
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA	
Protected Phases		8	8 1		4	4	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8 1	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		5.0	5.0	5.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	9.0	9.0		11.0	11.0	11.0	9.0	14.0		9.0	14.0	
Total Split (s)	26.0	26.0		23.0	23.0	23.0	16.0	66.0		16.0	66.0	
Total Split (%)	24.1%	24.1%		21.3%	21.3%	21.3%	14.8%	61.1%		14.8%	61.1%	
Maximum Green (s)	20.0	20.0		17.0	17.0	17.0	10.0	60.0		10.0	60.0	
Yellow Time (s)	4.0	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	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None	None	None	Min		None	Min	
Act Effct Green (s)		14.6	29.3		16.6	16.6	10.1	51.9		9.3	51.0	
Actuated g/C Ratio		0.15	0.31		0.17	0.17	0.11	0.54		0.10	0.53	
v/c Ratio		0.50	0.03		0.91	0.35	1.11	0.33		0.71	0.82	
Control Delay		55.3	3.5		80.4	14.6	141.1	12.5		68.3	22.4	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		55.3	3.5		80.4	14.6	141.1	12.5		68.3	22.4	
LOS		E	A		F	B	F	B		E	C	

7: Lowell Road (Route 3A) & Executive Drive
Lanes, Volumes, Timings

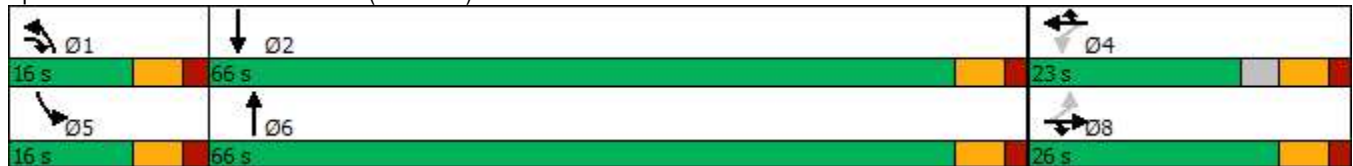
2032 Build AM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		44.5			56.0			44.1				25.8
Approach LOS		D			E			D				C
Queue Length 50th (ft)		30	0		133	13	~148	102		73		375
Queue Length 95th (ft)		65	5		#226	51	#318	145		#171		497
Internal Link Dist (ft)		412			497			1711				1088
Turn Bay Length (ft)			225			80	350			150		
Base Capacity (vph)		148	508		290	422	180	2174		182		2202
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		0.36	0.03		0.74	0.30	1.11	0.28		0.65		0.69

Intersection Summary	
Area Type:	Other
Cycle Length:	108
Actuated Cycle Length:	96
Natural Cycle:	90
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.11
Intersection Signal Delay:	35.0
Intersection LOS:	D
Intersection Capacity Utilization	80.1%
ICU Level of Service	D
Analysis Period (min)	15
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	






















Splits and Phases: 7: Lowell Road (Route 3A) & Executive Drive



8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

2032 Build AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	0	48	6	0	10	4	620	1	16	1447	3
Future Volume (vph)	11	0	48	6	0	10	4	620	1	16	1447	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	13	13	11	11	12	12	12	12
Storage Length (ft)	0		50	0		100	210		325	125		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			50			100		
Lane Util. 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
Frt			0.850			0.850			0.850			
Flt Protected		0.950			0.950		0.950			0.950		
Satd. Flow (prot)	0	1719	1583	0	1865	1669	1745	1766	1615	1805	1863	0
Flt Permitted		0.752			0.748		0.950			0.950		
Satd. Flow (perm)	0	1361	1583	0	1469	1669	1745	1766	1615	1805	1863	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			91			55			91			
Link Speed (mph)		10			30			30			30	
Link Distance (ft)		598			262			1405			549	
Travel Time (s)		40.8			6.0			31.9			12.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.95	0.95	0.95
Heavy Vehicles (%)	5%	0%	2%	0%	0%	0%	0%	4%	0%	0%	2%	0%
Adj. Flow (vph)	14	0	60	8	0	13	4	681	1	17	1523	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	60	0	8	13	4	681	1	17	1526	0
Turn Type	Perm	NA	Prot	Perm	NA	pm+ov	Prot	NA	Prot	Prot	NA	
Protected Phases		8	8		4	5	1	6	6	5	2	
Permitted Phases	8			4		4						
Detector Phase	8	8	8	4	4	5	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	16.0	11.0	16.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	116.0	116.0	16.0	116.0	
Total Split (%)	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	64.4%	64.4%	8.9%	64.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	110.0	110.0	10.0	110.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag							Lead	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.5	1.5	1.5	1.5	
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		6.3	6.3		6.3	18.3	5.0	147.7	147.7	6.0	153.1	
Actuated g/C Ratio		0.04	0.04		0.04	0.10	0.03	0.82	0.82	0.03	0.85	
v/c Ratio		0.30	0.42		0.16	0.06	0.08	0.47	0.00	0.28	0.96	
Control Delay		100.2	12.4		90.2	0.5	89.0	9.0	0.0	95.9	28.4	

8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway
Lanes, Volumes, Timings

2032 Build AM

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr _t	
Fl _t Protected	
Satd. Flow (prot)	
Fl _t 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 (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	32.0
Total Split (s)	32.0
Total Split (%)	18%
Maximum Green (s)	26.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
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)	21.0
Pedestrian Calls (#/hr)	5
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	

8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

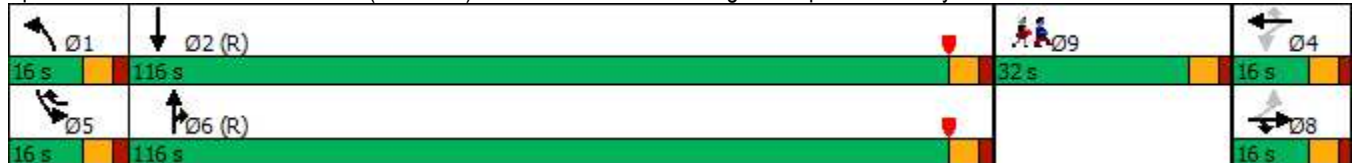
2032 Build AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	35.1	
Total Delay		100.2	12.4		90.2	0.5	89.0	9.0	0.0	95.9	63.5	
LOS		F	B		F	A	F	A	A	F	E	
Approach Delay		29.0			34.7			9.4			63.9	
Approach LOS		C			C			A			E	
Queue Length 50th (ft)		17	0		9	0	5	180	0	20	695	
Queue Length 95th (ft)		40	3		27	0	20	595	0	50	#2516	
Internal Link Dist (ft)		518			182			1325			469	
Turn Bay Length (ft)			50			100	210		325	125		
Base Capacity (vph)		75	173		81	254	96	1449	1341	100	1585	
Starvation Cap Reductn		0	0		0	0	0	0	0	0	175	
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		0.19	0.35		0.10	0.05	0.04	0.47	0.00	0.17	1.08	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow, Master Intersection
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.96
 Intersection Signal Delay: 46.4
 Intersection LOS: D
 Intersection Capacity Utilization 99.7%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway














8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway
 Lanes, Volumes, Timings

2032 Build AM

Lane Group	Ø9
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	

9: Lowell Road (Route 3A) & Pelham Road
Lanes, Volumes, Timings

2032 Build AM

							Ø9
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (vph)	256	81	547	93	71	1216	
Future Volume (vph)	256	81	547	93	71	1216	
Ideal Flow (vphpl)	1900	1000	1900	1900	1900	1900	
Lane Width (ft)	12	12	13	13	12	12	
Storage Length (ft)	0	75		0	150		
Storage Lanes	1	1		0	1		
Taper Length (ft)	25				50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Fr _t		0.850	0.980				
Fl _t Protected	0.950				0.950		
Satd. Flow (prot)	1787	802	1838	0	1719	1863	
Fl _t Permitted	0.950				0.950		
Satd. Flow (perm)	1787	802	1838	0	1719	1863	
Right Turn on Red		Yes		Yes			
Satd. Flow (RTOR)		29	8				
Link Speed (mph)	20		30			30	
Link Distance (ft)	512		549			1309	
Travel Time (s)	17.5		12.5			29.8	
Peak Hour Factor	0.88	0.88	0.92	0.92	0.96	0.96	
Heavy Vehicles (%)	1%	6%	5%	3%	5%	2%	
Adj. Flow (vph)	291	92	595	101	74	1267	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	291	92	696	0	74	1267	
Turn Type	Prot	pt+ov	NA		Prot	NA	
Protected Phases	4	4 5	6		5	2	9
Permitted Phases							
Detector Phase	4	4 5	6		5	2	
Switch Phase							
Minimum Initial (s)	5.0		10.0		3.0	10.0	5.0
Minimum Split (s)	11.0		16.0		9.0	16.0	35.0
Total Split (s)	26.0		116.0		13.0	116.0	35.0
Total Split (%)	13.7%		61.1%		6.8%	61.1%	18%
Maximum Green (s)	20.0		110.0		7.0	110.0	29.0
Yellow Time (s)	4.0		4.0		4.0	4.0	4.0
All-Red Time (s)	2.0		2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.0		6.0		6.0	6.0	
Lead/Lag			Lag		Lead		
Lead-Lag Optimize?			Yes		Yes		
Vehicle Extension (s)	1.5		1.5		1.5	1.5	3.0
Recall Mode	None		C-Min		None	C-Min	None
Walk Time (s)							5.0
Flash Dont Walk (s)							24.0
Pedestrian Calls (#/hr)							5
Act Effct Green (s)	20.0	33.0	138.0		7.0	151.0	
Actuated g/C Ratio	0.11	0.17	0.73		0.04	0.79	
v/c Ratio	1.55	0.56	0.52		1.17	0.86	
Control Delay	320.3	63.3	15.1		238.7	21.6	

9: Lowell Road (Route 3A) & Pelham Road
Lanes, Volumes, Timings

2032 Build AM



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø9
Queue Delay	0.0	0.0	5.6		0.0	0.0	
Total Delay	320.3	63.3	20.7		238.7	21.6	
LOS	F	E	C		F	C	
Approach Delay	258.6		20.7			33.6	
Approach LOS	F		C			C	
Queue Length 50th (ft)	~509	73	300		~109	716	
Queue Length 95th (ft)	#695	143	715		#233	#1982	
Internal Link Dist (ft)	432		469			1229	
Turn Bay Length (ft)		75			150		
Base Capacity (vph)	188	163	1337		63	1480	
Starvation Cap Reductn	0	0	570		0	0	
Spillback Cap Reductn	0	0	0		0	0	
Storage Cap Reductn	0	0	0		0	0	
Reduced v/c Ratio	1.55	0.56	0.91		1.17	0.86	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 30 (16%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.55
 Intersection Signal Delay: 65.5
 Intersection LOS: E
 Intersection Capacity Utilization 88.2%
 ICU Level of Service E
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 9: Lowell Road (Route 3A) & Pelham Road



2032 Build Weekday P.M.

1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road

Lanes, Volumes, Timings

2032 Build PM

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Traffic Volume (vph)	40	2	2	1	653	1	984	439	15	5	0	726
Future Volume (vph)	40	2	2	1	653	1	984	439	15	5	0	726
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	10	12	12	10	12	12	12	12	12
Storage Length (ft)	0	50		200		300	775		0		100	0
Storage Lanes	1	1		1		1	1		0		1	1
Taper Length (ft)	25			100			75				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Frt		0.850						0.995				0.850
Flt Protected	0.950			0.950			0.950				0.950	
Satd. Flow (prot)	1668	1507	0	1685	3610	0	1685	3558	0	0	1805	1615
Flt Permitted	0.950			0.950			0.950				0.950	
Satd. Flow (perm)	1668	1507	0	1685	3610	0	1685	3558	0	0	1805	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		191						4				246
Link Speed (mph)	30			35			35				35	
Link Distance (ft)	591			758			1733				622	
Travel Time (s)	13.4			14.8			33.8				12.1	
Peak Hour Factor	0.80	0.80	0.80	0.91	0.91	0.91	0.90	0.90	0.90	0.91	0.91	0.91
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
Adj. Flow (vph)	50	3	3	1	718	1	1093	488	17	5	0	798
Shared Lane Traffic (%)												
Lane Group Flow (vph)	50	6	0	1	719	0	1093	505	0	0	5	798
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Prot	Prot	pt+ov
Protected Phases	4	4		1	6		5	2		3	3	3.5
Permitted Phases												
Detector Phase	4	4		1	6		5	2		3	3	3.5
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	8.0		8.0	8.0		5.0	5.0	
Minimum Split (s)	11.0	11.0		11.0	14.0		14.0	14.0		11.0	11.0	
Total Split (s)	21.0	21.0		16.0	32.0		51.0	67.0		16.0	16.0	
Total Split (%)	17.5%	17.5%		13.3%	26.7%		42.5%	55.8%		13.3%	13.3%	
Maximum Green (s)	15.0	15.0		10.0	26.0		45.0	61.0		10.0	10.0	
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		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0			6.0	
Lead/Lag	Lag	Lag		Lead	Lag		Lead	Lag		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	4.0		4.0	4.0		4.0	4.0	
Recall Mode	None	None		None	C-Min		None	C-Min		None	None	
Act Effct Green (s)	9.0	9.0		5.6	26.0		53.3	82.9			10.0	64.5
Actuated g/C Ratio	0.08	0.08		0.05	0.22		0.44	0.69			0.08	0.54
v/c Ratio	0.40	0.02		0.01	0.92		1.46	0.21			0.03	0.81
Control Delay	61.5	0.2		55.0	64.1		234.0	1.3			51.2	22.4
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	61.5	0.2		55.0	64.1		234.0	1.3			51.2	22.4
LOS	E	A		D	E		F	A			D	C

1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road
Lanes, Volumes, Timings

2032 Build PM

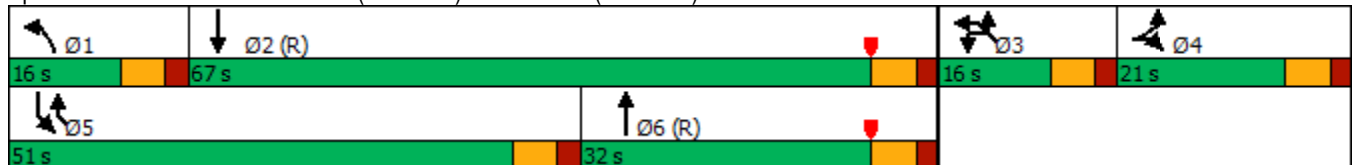


Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Approach Delay	54.9				64.1			160.4			22.6	
Approach LOS	D				E			F			C	
Queue Length 50th (ft)	38	0		1	288		~1169	2			4	270
Queue Length 95th (ft)	68	0		7	#402		#1470	m48			17	#446
Internal Link Dist (ft)	511				678			1653			542	
Turn Bay Length (ft)		50		200			775				100	
Base Capacity (vph)	208	355		140	782		748	2458			150	981
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	0.24	0.02		0.01	0.92		1.46	0.21			0.03	0.81

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 5 (4%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.46
 Intersection Signal Delay: 101.9 Intersection LOS: F
 Intersection Capacity Utilization 100.9% ICU Level of Service G
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-04
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road



2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue
Lanes, Volumes, Timings

2032 Build PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	273	0	51	1	0	17	35	1397	6	26	1374	228
Future Volume (vph)	273	0	51	1	0	17	35	1397	6	26	1374	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	13	13	13	10	12	12	12	12	12
Storage Length (ft)	0		50	0		0	300		0	350		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			75			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.871			0.999			0.979	
Flt Protected		0.950			0.998		0.950			0.950		
Satd. Flow (prot)	0	1620	1507	0	1707	0	1685	3606	0	1805	3475	0
Flt Permitted		0.743			0.987		0.950			0.950		
Satd. Flow (perm)	0	1267	1507	0	1688	0	1685	3606	0	1805	3475	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			82		82							20
Link Speed (mph)		15			30			35				35
Link Distance (ft)		510			557			1733				980
Travel Time (s)		23.2			12.7			33.8				19.1
Peak Hour Factor	0.84	0.84	0.84	0.80	0.80	0.80	0.93	0.93	0.93	0.90	0.90	0.90
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	12%
Adj. Flow (vph)	325	0	61	1	0	21	38	1502	6	29	1527	253
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	325	61	0	22	0	38	1508	0	29	1780	0
Turn Type	Perm	NA	Prot	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		7	7		3		1	6		5	2	
Permitted Phases	7			3								
Detector Phase	7	7	7	3	3		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0		11.0	16.0		11.0	16.0	
Total Split (s)	32.0	32.0	32.0	32.0	32.0		27.0	61.0		27.0	61.0	
Total Split (%)	26.7%	26.7%	26.7%	26.7%	26.7%		22.5%	50.8%		22.5%	50.8%	
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0		21.0	55.0		21.0	55.0	
Yellow Time (s)	4.0	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	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	
Act Effct Green (s)		26.0	26.0		18.2		9.2	72.7		8.5	72.1	
Actuated g/C Ratio		0.22	0.22		0.15		0.08	0.61		0.07	0.60	
v/c Ratio		1.19	0.16		0.07		0.30	0.69		0.23	0.85	
Control Delay		155.9	5.2		0.4		64.5	17.5		56.8	17.9	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		155.9	5.2		0.4		64.5	17.5		56.8	17.9	
LOS		F	A		A		E	B		E	B	

2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue
Lanes, Volumes, Timings

2032 Build PM

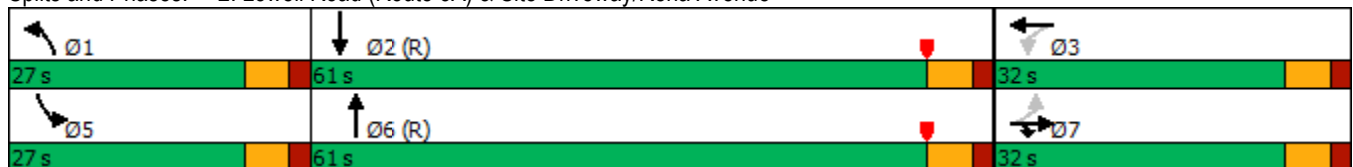


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		132.1			0.4			18.7				18.5
Approach LOS		F			A			B				B
Queue Length 50th (ft)		~303	0		0		30	565		23		201
Queue Length 95th (ft)		#438	18		0		m34	m688		m29		m#356
Internal Link Dist (ft)		430			477			1653				900
Turn Bay Length (ft)			50				300			350		
Base Capacity (vph)		274	390		429		294	2185		315		2095
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		1.19	0.16		0.05		0.13	0.69		0.09		0.85

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 74 (62%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.19
 Intersection Signal Delay: 30.1
 Intersection LOS: C
 Intersection Capacity Utilization 77.0%
 ICU Level of Service D
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-03
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue



3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Lanes, Volumes, Timings

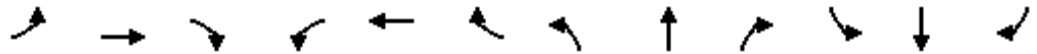
2032 Build PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	357	13	129	88	20	244	110	1500	74	310	1398	300
Future Volume (vph)	357	13	129	88	20	244	110	1500	74	310	1398	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	13	12	12	12	13	12	12	12	12	12	12
Storage Length (ft)	175		175	150		200	350		175	350		0
Storage Lanes	2		1	2		1	2		1	2		1
Taper Length (ft)	25			75			125			100		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frts			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1963	1615	3502	1900	1669	3467	3574	1615	3502	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1963	1615	3502	1900	1669	3467	3574	1615	3502	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			147			224			136			222
Link Speed (mph)		30			30			35			30	
Link Distance (ft)		401			449			980			1189	
Travel Time (s)		9.1			10.2			19.1			27.0	
Peak Hour Factor	0.88	0.88	0.88	0.86	0.86	0.86	0.89	0.89	0.89	0.91	0.91	0.91
Heavy Vehicles (%)	2%	0%	0%	0%	0%	0%	1%	1%	0%	0%	2%	2%
Adj. Flow (vph)	406	15	147	102	23	284	124	1685	83	341	1536	330
Shared Lane Traffic (%)												
Lane Group Flow (vph)	406	15	147	102	23	284	124	1685	83	341	1536	330
Turn Type	Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot
Protected Phases	7	4	4	3	8	8	1	6	6	5	2	2
Permitted Phases												
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	16.0	11.0	16.0	16.0
Total Split (s)	26.0	20.0	20.0	26.0	20.0	20.0	21.0	48.0	48.0	26.0	53.0	53.0
Total Split (%)	21.7%	16.7%	16.7%	21.7%	16.7%	16.7%	17.5%	40.0%	40.0%	21.7%	44.2%	44.2%
Maximum Green (s)	20.0	14.0	14.0	20.0	14.0	14.0	15.0	42.0	42.0	20.0	47.0	47.0
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	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)	18.7	19.6	19.6	9.8	10.7	10.7	10.6	49.2	49.2	17.4	55.9	55.9
Actuated g/C Ratio	0.16	0.16	0.16	0.08	0.09	0.09	0.09	0.41	0.41	0.14	0.47	0.47
v/c Ratio	0.76	0.05	0.38	0.36	0.14	0.80	0.41	1.15	0.11	0.67	0.93	0.39
Control Delay	58.2	40.9	9.7	55.1	50.4	30.7	57.9	100.7	1.8	57.6	32.2	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.2	40.9	9.7	55.1	50.4	30.7	57.9	100.7	1.8	57.6	32.2	3.9
LOS	E	D	A	E	D	C	E	F	A	E	C	A

3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

2032 Build PM

Lanes, Volumes, Timings

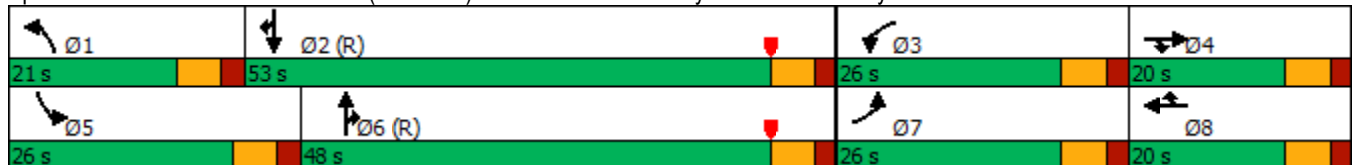


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		45.2			37.9			93.6			31.9	
Approach LOS		D			D			F			C	
Queue Length 50th (ft)	155	10	0	39	17	44	48	~821	0	125	627	8
Queue Length 95th (ft)	205	29	53	63	41	123	m67	m#954	m6	m122	m#756	m32
Internal Link Dist (ft)		321			369			900			1109	
Turn Bay Length (ft)	175		175	150		200	350		175	350		
Base Capacity (vph)	572	320	386	583	221	392	433	1464	742	583	1649	856
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.05	0.38	0.17	0.10	0.72	0.29	1.15	0.11	0.58	0.93	0.39

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 64 (53%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.15
 Intersection Signal Delay: 56.8
 Intersection LOS: E
 Intersection Capacity Utilization 82.2%
 ICU Level of Service E
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-06
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway



4: Lowell Road (Route 3A) & Sagamore Bridge Road
Lanes, Volumes, Timings

2032 Build PM



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	1633	1593	1442	749	546	1360
Future Volume (vph)	1633	1593	1442	749	546	1360
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	12	12	12	12
Storage Length (ft)	0	0	525			200
Storage Lanes	2	1	2			1
Taper Length (ft)	25		100			
Lane Util. Factor	0.97	1.00	0.97	0.95	0.95	0.88
Fr _t		0.850				0.850
Fl _t Protected	0.950		0.950			
Satd. Flow (prot)	3698	1689	3467	3610	3610	2814
Fl _t Permitted	0.950		0.950			
Satd. Flow (perm)	3698	1689	3467	3610	3610	2814
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		624				1300
Link Speed (mph)	35			30	30	
Link Distance (ft)	929			1189	999	
Travel Time (s)	18.1			27.0	22.7	
Peak Hour Factor	0.96	0.96	0.94	0.94	0.89	0.89
Heavy Vehicles (%)	1%	2%	1%	0%	0%	1%
Adj. Flow (vph)	1701	1659	1534	797	613	1528
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1701	1659	1534	797	613	1528
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Detector Phase	3		1	6	2	
Switch Phase						
Minimum Initial (s)	10.0		7.0	10.0	10.0	
Minimum Split (s)	16.0		15.0	17.0	17.0	
Total Split (s)	50.0		40.0	67.0	30.0	
Total Split (%)	41.7%		33.3%	55.8%	25.0%	
Maximum Green (s)	44.0		32.0	60.0	23.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		4.0	3.0	3.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		8.0	7.0	7.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Recall Mode	None		None	C-Min	C-Min	
Act Effct Green (s)	44.1	120.0	32.0	62.9	22.9	120.0
Actuated g/C Ratio	0.37	1.00	0.27	0.52	0.19	1.00
v/c Ratio	1.25	0.98	1.66	0.42	0.89	0.54
Control Delay	153.4	20.6	322.5	7.7	63.9	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	153.4	20.6	322.5	7.7	63.9	0.8
LOS	F	C	F	A	E	A

4: Lowell Road (Route 3A) & Sagamore Bridge Road
Lanes, Volumes, Timings

2032 Build PM

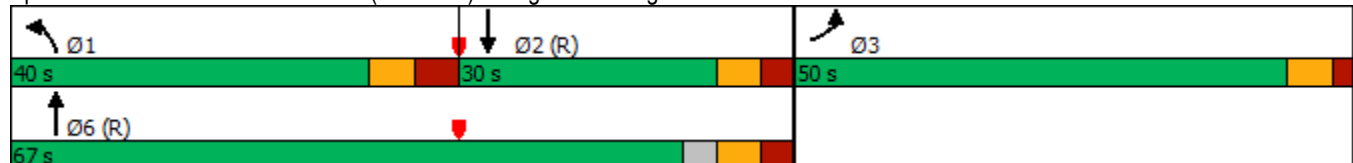


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	87.8			214.9	18.8	
Approach LOS	F			F	B	
Queue Length 50th (ft)	~850	0	~890	128	245	0
Queue Length 95th (ft)	#987	#216	m#807	m100	#337	0
Internal Link Dist (ft)	849			1109	919	
Turn Bay Length (ft)			525			200
Base Capacity (vph)	1359	1689	924	1895	691	2814
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	1.25	0.98	1.66	0.42	0.89	0.54

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 100 (83%), Referenced to phase 2:SBT and 6:NBT, Start of Green
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.66
 Intersection Signal Delay: 106.8
 Intersection LOS: F
 Intersection Capacity Utilization 119.5%
 ICU Level of Service H
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-02
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.
























Splits and Phases: 4: Lowell Road (Route 3A) & Sagamore Bridge Road



5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Lanes, Volumes, Timings

2032 Build PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	98	474	479	19	31	146	1167	1093	80	985	5
Future Volume (vph)	54	98	474	479	19	31	146	1167	1093	80	985	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		250	200		75	575		275	175		300
Storage Lanes	0		1	1		1	1		1	1		1
Taper Length (ft)	25			50			175			75		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.91	0.91
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.983		0.950	0.956		0.950			0.950		
Satd. Flow (prot)	0	1868	1599	1658	1668	1546	1787	3574	1615	1805	5131	0
Flt Permitted		0.983		0.950	0.956		0.950			0.950		
Satd. Flow (perm)	0	1868	1599	1658	1668	1546	1787	3574	1615	1805	5131	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			53			89			252			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		805			586			999			1515	
Travel Time (s)		18.3			13.3			22.7			34.4	
Peak Hour Factor	0.80	0.80	0.80	0.90	0.90	0.90	0.94	0.94	0.94	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%	1%	1%	0%	0%	1%	0%
Adj. Flow (vph)	68	123	593	532	21	34	155	1241	1163	91	1119	6
Shared Lane Traffic (%)				48%								
Lane Group Flow (vph)	0	191	593	277	276	34	155	1241	1163	91	1125	0
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Detector Phase	8	8	1	7	7	5	1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	5.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	11.0	16.0	
Total Split (s)	26.0	26.0	31.0	56.0	56.0	21.0	31.0	71.0	56.0	21.0	71.0	
Total Split (%)	14.1%	14.1%	16.8%	30.4%	30.4%	11.4%	16.8%	38.6%	30.4%	11.4%	38.6%	
Maximum Green (s)	20.0	20.0	25.0	50.0	50.0	15.0	25.0	65.0	50.0	15.0	65.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	
Recall Mode	None	None	None	None	None	None	None	Min	None	None	Min	
Act Effct Green (s)		19.7	50.8	48.3	48.3	60.8	25.1	62.6	116.9	12.5	50.0	
Actuated g/C Ratio		0.12	0.30	0.29	0.29	0.36	0.15	0.37	0.70	0.07	0.30	
v/c Ratio		0.87	1.13	0.58	0.57	0.05	0.58	0.93	0.97	0.68	0.73	
Control Delay		107.3	128.6	57.4	57.1	0.2	77.6	63.0	37.5	101.3	55.8	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.3	0.0	0.0	
Total Delay		107.3	128.6	57.4	57.1	0.2	77.6	63.0	53.8	101.3	55.8	
LOS		F	F	E	E	A	E	E	D	F	E	

5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road
Lanes, Volumes, Timings

2032 Build PM

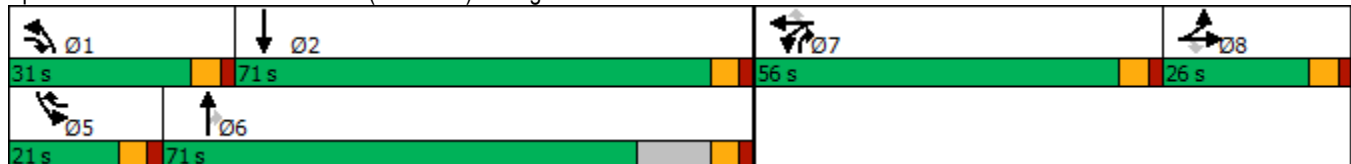


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		123.4			53.9			59.7				59.2
Approach LOS		F			D			E				E
Queue Length 50th (ft)		216	~749	283	281	0	167	705	993	102	414	
Queue Length 95th (ft)		#306	#835	402	400	0	255	#823	#1512	166	455	
Internal Link Dist (ft)		725			506			919				1435
Turn Bay Length (ft)			250	200		75	575		275	175		
Base Capacity (vph)		224	523	498	501	641	268	1610	1220	162	2004	
Starvation Cap Reductn		0	0	0	0	0	0	0	91	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		0.85	1.13	0.56	0.55	0.05	0.58	0.77	1.03	0.56	0.56	

Intersection Summary

Area Type:	Other
Cycle Length:	184
Actuated Cycle Length:	167.2
Natural Cycle:	110
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.13
Intersection Signal Delay:	68.7
Intersection LOS:	E
Intersection Capacity Utilization:	95.3%
ICU Level of Service:	F
Analysis Period (min):	15
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.	

Splits and Phases: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road



6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive

Lanes, Volumes, Timings

2032 Build PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	2	116	11	1	5	18	1232	14	6	956	8
Future Volume (vph)	28	2	116	11	1	5	18	1232	14	6	956	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	13	13	13	12	12	12	11	12	12
Storage Length (ft)	0		100	0		100	225		0	225		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.998			0.999	
Flt Protected		0.956			0.955		0.950			0.950		
Satd. Flow (prot)	0	1816	1583	0	1875	1669	1736	3568	0	1745	3571	0
Flt Permitted		0.422					0.950			0.950		
Satd. Flow (perm)	0	802	1583	0	1963	1669	1736	3568	0	1745	3571	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			145			86		1			1	
Link Speed (mph)		30			10			30			30	
Link Distance (ft)		495			382			1515			1791	
Travel Time (s)		11.3			26.0			34.4			40.7	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.95	0.95	0.95	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	4%	1%	0%	0%	1%	0%
Adj. Flow (vph)	35	3	145	14	1	6	19	1297	15	7	1099	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	38	145	0	15	6	19	1312	0	7	1108	0
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases		4	4 1		8	8 5	1	6		5	2	
Permitted Phases	4			8								
Detector Phase	4	4	4 1	8	8	8 5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		3.0	3.0		4.0	15.0		4.0	15.0	
Minimum Split (s)	9.0	9.0		9.0	9.0		8.0	21.0		8.0	21.0	
Total Split (s)	16.0	16.0		16.0	16.0		16.0	66.0		16.0	66.0	
Total Split (%)	14.0%	14.0%		14.0%	14.0%		14.0%	57.9%		14.0%	57.9%	
Maximum Green (s)	10.0	10.0		10.0	10.0		12.0	60.0		12.0	60.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)		9.2	17.5		6.9	9.7	5.8	43.5		5.3	36.2	
Actuated g/C Ratio		0.13	0.24		0.10	0.13	0.08	0.60		0.07	0.50	
v/c Ratio		0.38	0.30		0.08	0.02	0.14	0.61		0.06	0.62	
Control Delay		49.0	6.2		40.3	0.2	42.6	12.8		42.8	15.4	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		49.0	6.2		40.3	0.2	42.6	12.8		42.8	15.4	
LOS		D	A		D	A	D	B		D	B	

6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive
Lanes, Volumes, Timings

2032 Build PM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		15.1			28.9			13.2				15.6
Approach LOS		B			C			B				B
Queue Length 50th (ft)		12	0		5	0	6	118		2		145
Queue Length 95th (ft)		#55	29		27	0	36	381		18		293
Internal Link Dist (ft)		415			302			1435				1711
Turn Bay Length (ft)			100			100	225			225		
Base Capacity (vph)		119	574		292	387	310	3018		312		3021
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		0.32	0.25		0.05	0.02	0.06	0.43		0.02		0.37

Intersection Summary























Area Type:	Other
Cycle Length:	114
Actuated Cycle Length:	72.6
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.62
Intersection Signal Delay:	14.5
Intersection LOS:	B
Intersection Capacity Utilization	56.2%
ICU Level of Service	B
Analysis Period (min)	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive



7: Lowell Road (Route 3A) & Executive Drive
Lanes, Volumes, Timings

2032 Build PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	248	3	89	23	2	22	57	1131	7	16	784	44
Future Volume (vph)	248	3	89	23	2	22	57	1131	7	16	784	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	15	12	12	13	11	12	12	11	12	12
Storage Length (ft)	0		225	0		80	350		0	150		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Fr _t			0.850			0.850		0.999			0.992	
Fl _t Protected		0.953			0.957		0.950			0.950		
Satd. Flow (prot)	0	1733	1742	0	1818	1620	1678	3571	0	1646	3540	0
Fl _t Permitted		0.705			0.635		0.950			0.950		
Satd. Flow (perm)	0	1282	1742	0	1206	1620	1678	3571	0	1646	3540	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			111			91		1			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		492			577			1791			1168	
Travel Time (s)		11.2			13.1			40.7			26.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.97	0.97	0.97	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	2%	0%	0%	3%	4%	1%	0%	6%	1%	4%
Adj. Flow (vph)	310	4	111	29	3	28	59	1166	7	17	852	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	314	111	0	32	28	59	1173	0	17	900	0
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA	
Protected Phases		8	8 1		4	4	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8 1	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		5.0	5.0	5.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	9.0	9.0		11.0	11.0	11.0	9.0	14.0		9.0	14.0	
Total Split (s)	26.0	26.0		23.0	23.0	23.0	16.0	66.0		16.0	66.0	
Total Split (%)	24.1%	24.1%		21.3%	21.3%	21.3%	14.8%	61.1%		14.8%	61.1%	
Maximum Green (s)	20.0	20.0		17.0	17.0	17.0	10.0	60.0		10.0	60.0	
Yellow Time (s)	4.0	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	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None	None	None	Min		None	Min	
Act Effct Green (s)		20.7	33.9		13.5	13.5	7.0	36.7		5.5	28.3	
Actuated g/C Ratio		0.29	0.47		0.19	0.19	0.10	0.51		0.08	0.39	
v/c Ratio		0.85	0.13		0.14	0.07	0.36	0.64		0.13	0.64	
Control Delay		51.9	4.1		26.8	0.4	40.3	14.6		38.7	20.1	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		51.9	4.1		26.8	0.4	40.3	14.6		38.7	20.1	
LOS		D	A		C	A	D	B		D	C	

7: Lowell Road (Route 3A) & Executive Drive
Lanes, Volumes, Timings

2032 Build PM

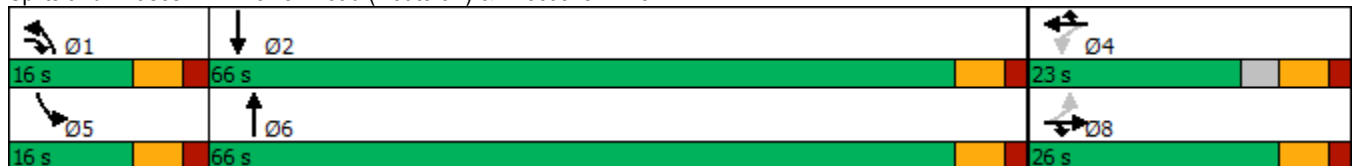


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		39.4			14.4			15.9				20.4
Approach LOS		D			B			B				C
Queue Length 50th (ft)		129	0		10	0	25	165		7		170
Queue Length 95th (ft)		#322	24		36	0	71	318		31		238
Internal Link Dist (ft)		412			497			1711				1088
Turn Bay Length (ft)			225			80	350			150		
Base Capacity (vph)		369	955		346	531	241	2995		237		2970
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		0.85	0.12		0.09	0.05	0.24	0.39		0.07		0.30

Intersection Summary

Area Type:	Other
Cycle Length:	108
Actuated Cycle Length:	71.8
Natural Cycle:	60
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.85
Intersection Signal Delay:	21.2
Intersection LOS:	C
Intersection Capacity Utilization:	70.4%
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.	























Splits and Phases: 7: Lowell Road (Route 3A) & Executive Drive



8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

2032 Build PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	2	25	31	0	48	27	1335	15	56	793	11
Future Volume (vph)	9	2	25	31	0	48	27	1335	15	56	793	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	13	13	11	11	12	12	12	12
Storage Length (ft)	0		50	0		100	210		325	125		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			50			100		
Lane Util. 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
Frt			0.850			0.850			0.850		0.998	
Flt Protected		0.962			0.950		0.950			0.950		
Satd. Flow (prot)	0	1828	1583	0	1865	1669	1745	1818	1615	1805	1878	0
Flt Permitted		0.746			0.748		0.950			0.950		
Satd. Flow (perm)	0	1417	1583	0	1469	1669	1745	1818	1615	1805	1878	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			91			60			91			1
Link Speed (mph)		10			30			30				30
Link Distance (ft)		598			262			1405				549
Travel Time (s)		40.8			6.0			31.9				12.5
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.99	0.99	0.99	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	11	3	31	39	0	60	27	1348	15	60	844	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	31	0	39	60	27	1348	15	60	856	0
Turn Type	Perm	NA	Prot	Perm	NA	pm+ov	Prot	NA	Prot	Prot	NA	
Protected Phases		8	8		4	5	1	6	6	5	2	
Permitted Phases	8			4		4						
Detector Phase	8	8	8	4	4	5	1	6	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	16.0	11.0	16.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	116.0	116.0	16.0	116.0	
Total Split (%)	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	64.4%	64.4%	8.9%	64.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	110.0	110.0	10.0	110.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag							Lead	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.5	1.5	1.5	1.5	
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		8.1	8.1		8.1	20.7	6.6	140.9	140.9	8.8	146.5	
Actuated g/C Ratio		0.04	0.04		0.04	0.12	0.04	0.78	0.78	0.05	0.81	
v/c Ratio		0.22	0.20		0.59	0.25	0.42	0.95	0.01	0.68	0.56	
Control Delay		90.1	2.8		117.7	16.3	103.9	33.1	0.0	119.5	11.9	

8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway
Lanes, Volumes, Timings

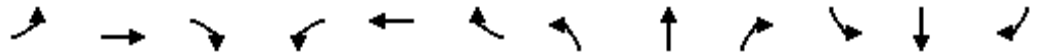
2032 Build PM

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr _t	
Fl _t Protected	
Satd. Flow (prot)	
Fl _t 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 (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	32.0
Total Split (s)	32.0
Total Split (%)	18%
Maximum Green (s)	26.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
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)	21.0
Pedestrian Calls (#/hr)	5
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	

8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

2032 Build PM

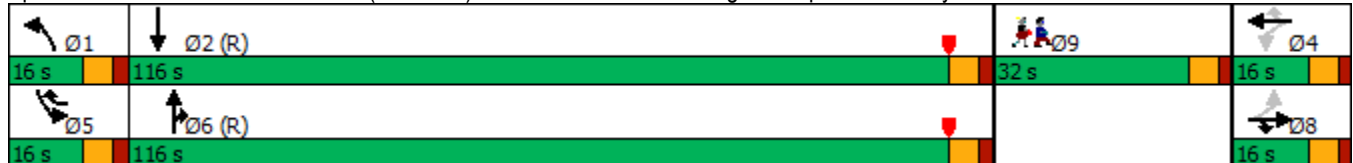


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1
Total Delay		90.1	2.8		117.7	16.3	103.9	33.1	0.0	119.5	14.9	
LOS		F	A		F	B	F	C	A	F	B	
Approach Delay		29.9			56.2			34.2				21.8
Approach LOS		C			E			C				C
Queue Length 50th (ft)		16	0		46	0	32	1114	0	71	294	
Queue Length 95th (ft)		40	0		81	36	70	#2202	0	#134	870	
Internal Link Dist (ft)		518			182			1325				469
Turn Bay Length (ft)			50			100	210		325	125		
Base Capacity (vph)		78	173		81	255	96	1423	1284	100	1528	
Starvation Cap Reductn		0	0		0	0	0	0	0	0	546	
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		0.18	0.18		0.48	0.24	0.28	0.95	0.01	0.60	0.87	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow, Master Intersection
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.95
 Intersection Signal Delay: 30.4
 Intersection LOS: C
 Intersection Capacity Utilization 93.6%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway














8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway
 Lanes, Volumes, Timings

2032 Build PM

Lane Group	Ø9
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	

9: Lowell Road (Route 3A) & Pelham Road
Lanes, Volumes, Timings

2032 Build PM

							Ø9
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Traffic Volume (vph)	94	157	1269	121	122	782	
Future Volume (vph)	94	157	1269	121	122	782	
Ideal Flow (vphpl)	1900	1000	1900	1900	1900	1900	
Lane Width (ft)	12	12	13	13	12	12	
Storage Length (ft)	0	75		0	150		
Storage Lanes	1	1		0	1		
Taper Length (ft)	25				50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.850	0.988				
Flt Protected	0.950				0.950		
Satd. Flow (prot)	1805	850	1922	0	1805	1881	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1805	850	1922	0	1805	1881	
Right Turn on Red		Yes		Yes			
Satd. Flow (RTOR)		153	4				
Link Speed (mph)	20		30			30	
Link Distance (ft)	512		549			1309	
Travel Time (s)	17.5		12.5			29.8	
Peak Hour Factor	0.87	0.87	0.98	0.98	0.89	0.89	
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%	
Adj. Flow (vph)	108	180	1295	123	137	879	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	108	180	1418	0	137	879	
Turn Type	Prot	pt+ov	NA		Prot	NA	
Protected Phases	4	4 5	6		5	2	9
Permitted Phases							
Detector Phase	4	4 5	6		5	2	
Switch Phase							
Minimum Initial (s)	5.0		10.0		3.0	10.0	5.0
Minimum Split (s)	11.0		16.0		9.0	16.0	35.0
Total Split (s)	26.0		116.0		13.0	116.0	35.0
Total Split (%)	13.7%		61.1%		6.8%	61.1%	18%
Maximum Green (s)	20.0		110.0		7.0	110.0	29.0
Yellow Time (s)	4.0		4.0		4.0	4.0	4.0
All-Red Time (s)	2.0		2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0	
Total Lost Time (s)	6.0		6.0		6.0	6.0	
Lead/Lag			Lag		Lead		
Lead-Lag Optimize?			Yes		Yes		
Vehicle Extension (s)	1.5		1.5		1.5	1.5	3.0
Recall Mode	None		C-Min		None	C-Min	None
Walk Time (s)							5.0
Flash Dont Walk (s)							24.0
Pedestrian Calls (#/hr)							5
Act Effct Green (s)	15.1	28.1	142.9		7.0	155.9	
Actuated g/C Ratio	0.08	0.15	0.75		0.04	0.82	
v/c Ratio	0.76	0.70	0.98		2.08	0.57	
Control Delay	115.2	30.4	41.7		568.2	10.5	

9: Lowell Road (Route 3A) & Pelham Road
Lanes, Volumes, Timings

2032 Build PM

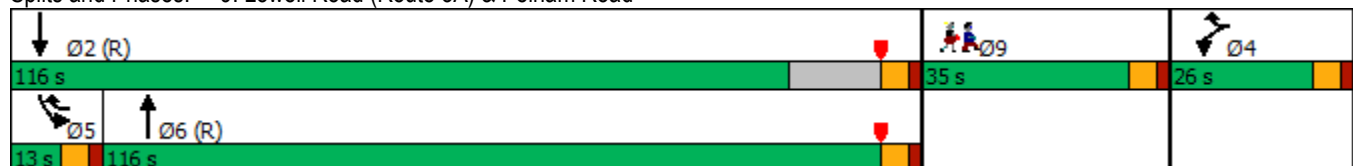


Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø9
Queue Delay	0.0	0.0	40.3		0.0	0.0	
Total Delay	115.2	30.4	82.0		568.2	10.5	
LOS	F	C	F		F	B	
Approach Delay	62.2		82.0			85.7	
Approach LOS	E		F			F	
Queue Length 50th (ft)	135	30	1286		~268	244	
Queue Length 95th (ft)	197	118	#2494		#423	851	
Internal Link Dist (ft)	432		469			1229	
Turn Bay Length (ft)		75			150		
Base Capacity (vph)	190	252	1446		66	1543	
Starvation Cap Reductn	0	0	244		0	0	
Spillback Cap Reductn	0	0	0		0	0	
Storage Cap Reductn	0	0	0		0	0	
Reduced v/c Ratio	0.57	0.71	1.18		2.08	0.57	

Intersection Summary

Area Type: Other
 Cycle Length: 190
 Actuated Cycle Length: 190
 Offset: 30 (16%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 2.08
 Intersection Signal Delay: 81.3
 Intersection LOS: F
 Intersection Capacity Utilization 102.6%
 ICU Level of Service G
 Analysis Period (min) 15
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 9: Lowell Road (Route 3A) & Pelham Road



Appendix I




















Capacity Analysis – 2022 Build with Base Improvements Traffic Conditions

2022 Build with Base Improvements Weekday A.M.

1: River Road (Route 3A)/Lowell Road (Route 3A) & Steele Road/Dracut Road

Lanes, Volumes, Timings

2022 Build with Improvements AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	0	2	0	1	849	0	272	0	487	509	12
Future Volume (vph)	2	0	2	0	1	849	0	272	0	487	509	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	10	12	12	10	12	12
Storage Length (ft)	0		50	100		0	200		300	775		0
Storage Lanes	0		0	0		1	0		1	0		0
Taper Length (ft)	25			25			100			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.932			0.850	0.850						0.998
Flt Protected		0.976										0.976
Satd. Flow (prot)	0	1385	0	0	1504	1504	0	3574	0	0	3465	0
Flt Permitted		0.976										0.976
Satd. Flow (perm)	0	1385	0	0	1504	1504	0	3574	0	0	3465	0
Link Speed (mph)		30			35			35			35	
Link Distance (ft)		591			645			758			1733	
Travel Time (s)		13.4			12.6			14.8			33.8	
Peak Hour Factor	0.80	0.80	0.80	0.86	0.86	0.86	0.80	0.80	0.80	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	33%	0%	0%	2%	0%	1%	0%	2%	1%	0%
Adj. Flow (vph)	3	0	3	0	1	987	0	340	0	529	553	13
Shared Lane Traffic (%)						50%						
Lane Group Flow (vph)	0	6	0	0	495	493	0	340	0	0	1095	0
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary

Area Type: Other

Control Type: Roundabout

Intersection Capacity Utilization 63.7%

ICU Level of Service B

Analysis Period (min) 15

1: River Road (Route 3A)/Lowell Road (Route 3A) & Steele Road/Dracut Road

HCM 6th Roundabout




























2022 Build with Improvements AM

Intersection								
Intersection Delay, s/veh	7.7							
Intersection LOS	A							
Approach	EB	WB		NB		SB		
Entry Lanes	1	2		2		2		
Conflicting Circle Lanes	2	2		2		2		
Adj Approach Flow, veh/h	6	988		340		1095		
Demand Flow Rate, veh/h	7	1008		343		1112		
Vehicles Circulating, veh/h	1099	346		543		1		
Vehicles Exiting, veh/h	14	540		563		1353		
Ped Vol Crossing Leg, #/h	0	0		0		0		
Ped Cap Adj	1.000	1.000		1.000		1.000		
Approach Delay, s/veh	7.7	9.5		6.3		6.4		
Approach LOS	A	A		A		A		
Lane	Left	Left	Right	Left	Right	Left	Right	
Designated Moves	LTR	LTR	R	LT	TR	LT	TR	
Assumed Moves	LTR	LTR	R	LT	TR	LT	TR	
RT Channelized								
Lane Util	1.000	0.470	0.530	0.469	0.531	0.470	0.530	
Follow-Up Headway, s	2.535	2.667	2.535	2.667	2.535	2.667	2.535	
Critical Headway, s	4.328	4.645	4.328	4.645	4.328	4.645	4.328	
Entry Flow, veh/h	7	474	534	161	182	523	589	
Cap Entry Lane, veh/h	558	982	1058	819	895	1349	1419	
Entry HV Adj Factor	0.857	0.980	0.981	0.991	0.989	0.984	0.986	
Flow Entry, veh/h	6	464	524	160	180	515	581	
Cap Entry, veh/h	478	962	1038	812	885	1328	1399	
V/C Ratio	0.013	0.483	0.505	0.197	0.203	0.388	0.415	
Control Delay, s/veh	7.7	9.6	9.5	6.5	6.1	6.4	6.5	
LOS	A	A	A	A	A	A	A	
95th %tile Queue, veh	0	3	3	1	1	2	2	

2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Lanes, Volumes, Timings

2022 Build with Improvements AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 				 		 	 		 	 	 
Traffic Volume (vph)	156	0	25	1	1	33	43	1126	2	7	987	241
Future Volume (vph)	156	0	25	1	1	33	43	1126	2	7	987	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	13	13	13	10	12	12	12	12	12
Storage Length (ft)	0		50	0		0	300		0	350		0
Storage Lanes	2		0	0		0	1		0	1		1
Taper Length (ft)	25			25			75			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Fr _t		0.850			0.872							0.850
Fl _t Protected	0.950				0.999		0.950			0.950		
Satd. Flow (prot)	2971	1133	0	0	1659	0	1685	3538	0	1570	3539	1524
Fl _t Permitted	0.529				0.990		0.950			0.950		
Satd. Flow (perm)	1654	1133	0	0	1644	0	1685	3538	0	1570	3539	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		316			39							254
Link Speed (mph)		15			30			35				35
Link Distance (ft)		510			557			1733				980
Travel Time (s)		23.2			12.7			33.8				19.1
Peak Hour Factor	0.80	0.80	0.80	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.95
Heavy Vehicles (%)	10%	0%	33%	9%	0%	3%	0%	2%	20%	15%	2%	6%
Adj. Flow (vph)	195	0	31	1	1	39	51	1325	2	7	1039	254
Shared Lane Traffic (%)												
Lane Group Flow (vph)	195	31	0	0	41	0	51	1327	0	7	1039	254
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	Prot
Protected Phases	3	7			4		1	6		5	2	2
Permitted Phases	7			4								
Detector Phase	3	7		4	4		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	10.0	11.0		11.0	11.0		11.0	16.0		11.0	16.0	16.0
Total Split (s)	10.0	21.0		11.0	11.0		22.0	49.0		20.0	47.0	47.0
Total Split (%)	11.1%	23.3%		12.2%	12.2%		24.4%	54.4%		22.2%	52.2%	52.2%
Maximum Green (s)	5.0	15.0		5.0	5.0		16.0	43.0		14.0	41.0	41.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	5.0	6.0			6.0		6.0	6.0		6.0	6.0	6.0
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)	14.6	12.6			5.6		9.1	61.6		7.0	54.5	54.5
Actuated g/C Ratio	0.16	0.14			0.06		0.10	0.68		0.08	0.61	0.61
v/c Ratio	0.51	0.07			0.30		0.30	0.55		0.06	0.48	0.25
Control Delay	38.2	0.3			20.5		41.3	9.7		37.6	12.1	1.5
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	38.2	0.3			20.5		41.3	9.7		37.6	12.1	1.5
LOS	D	A			C		D	A		D	B	A

2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue
Lanes, Volumes, Timings

2022 Build with Improvements AM

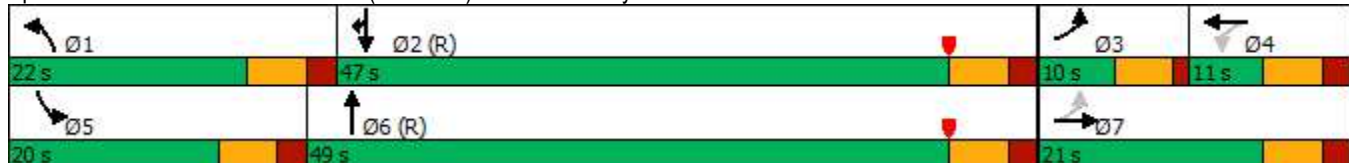


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		33.0			20.5			10.8			10.2	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)	46	0			1		27	202		4	98	0
Queue Length 95th (ft)	72	0			30		57	314		m10	131	12
Internal Link Dist (ft)		430			477			1653			900	
Turn Bay Length (ft)							300			350		
Base Capacity (vph)	384	461			138		299	2422		244	2144	1023
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	0.51	0.07			0.30		0.17	0.55		0.03	0.48	0.25

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Offset:	53 (59%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
Natural Cycle:	60
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.55
Intersection Signal Delay:	12.4
Intersection LOS:	B
Intersection Capacity Utilization:	56.9%
ICU Level of Service:	B
Analysis Period (min):	15
Description:	NHDOT Int. No.: S-229-03
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue



3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Lanes, Volumes, Timings

2022 Build with Improvements AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	131	4	59	15	5	71	78	1215	27	85	1152	164
Future Volume (vph)	131	4	59	15	5	71	78	1215	27	85	1152	164
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	13	12	12	12	13	12	12	12	12	12	12
Storage Length (ft)	175		175	150		200	350		175	350		400
Storage Lanes	2		1	2		1	2		0	2		1
Taper Length (ft)	25			75			125			100		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.91	0.91	0.97	0.91	1.00
Frt			0.850			0.850		0.997				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3213	1852	1568	3502	1900	1589	3467	5022	0	3433	5085	1482
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3213	1852	1568	3502	1900	1589	3467	5022	0	3433	5085	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109			109		5				171
Link Speed (mph)		30			30			35				30
Link Distance (ft)		401			449			980				1189
Travel Time (s)		9.1			10.2			19.1				27.0
Peak Hour Factor	0.93	0.93	0.93	0.88	0.88	0.88	0.87	0.87	0.87	0.96	0.96	0.96
Heavy Vehicles (%)	9%	6%	3%	0%	0%	5%	1%	3%	2%	2%	2%	9%
Adj. Flow (vph)	141	4	63	17	6	81	90	1397	31	89	1200	171
Shared Lane Traffic (%)												
Lane Group Flow (vph)	141	4	63	17	6	81	90	1428	0	89	1200	171
Turn Type	Prot	NA	pt+ov	Prot	NA	pt+ov	Prot	NA		Prot	NA	pt+ov
Protected Phases	7	4	4 1	3	8	8 5	1	6		5	2	2 7
Permitted Phases												
Detector Phase	7	4	4 1	3	8	8 5	1	6		5	2	2 7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0		11.0	11.0		11.0	16.0		11.0	16.0	
Total Split (s)	14.0	15.0		14.0	15.0		15.0	46.0		15.0	46.0	
Total Split (%)	15.6%	16.7%		15.6%	16.7%		16.7%	51.1%		16.7%	51.1%	
Maximum Green (s)	8.0	9.0		8.0	9.0		9.0	40.0		9.0	40.0	
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		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	6.0		4.0	6.0	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	7.9	13.1	27.6	7.0	7.1	19.0	8.5	47.6		8.5	47.6	62.7
Actuated g/C Ratio	0.09	0.15	0.31	0.08	0.08	0.21	0.09	0.53		0.09	0.53	0.70
v/c Ratio	0.50	0.01	0.11	0.06	0.04	0.19	0.28	0.54		0.28	0.45	0.16
Control Delay	45.6	36.2	1.8	38.7	38.4	3.9	44.9	13.2		47.2	11.9	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	45.6	36.2	1.8	38.7	38.4	3.9	44.9	13.2		47.2	11.9	0.5
LOS	D	D	A	D	D	A	D	B		D	B	A

3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Lanes, Volumes, Timings

2022 Build with Improvements AM

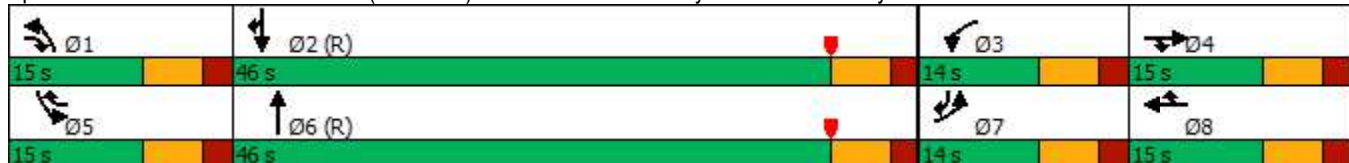


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		32.2			11.6			15.1			12.7	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	40	2	0	4	3	0	28	142		25	112	0
Queue Length 95th (ft)	70	12	9	14	14	19	50	137		m35	240	m1
Internal Link Dist (ft)		321			369			900			1109	
Turn Bay Length (ft)	175		175	150		200	350			350		400
Base Capacity (vph)	285	280	517	311	190	379	354	2657		351	2688	1067
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.49	0.01	0.12	0.05	0.03	0.21	0.25	0.54		0.25	0.45	0.16

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 53 (59%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.54
 Intersection Signal Delay: 15.0
 Intersection LOS: B
 Intersection Capacity Utilization 53.6%
 ICU Level of Service A
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-06
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway



4: Lowell Road (Route 3A) & Sagamore Bridge Road
Lanes, Volumes, Timings

2022 Build with Improvements AM



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	948	1095	1038	371	386	1517
Future Volume (vph)	948	1095	1038	371	386	1517
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	12	12	12	12
Storage Length (ft)	0	0	525			200
Storage Lanes	2	1	2			1
Taper Length (ft)	25		100			
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Fr _t		0.850				0.850
Fl _t Protected	0.950		0.950			
Satd. Flow (prot)	3662	1656	4894	3539	3539	2760
Fl _t Permitted	0.950		0.950			
Satd. Flow (perm)	3662	1656	4894	3539	3539	2760
Right Turn on Red		No				Yes
Satd. Flow (RTOR)						1227
Link Speed (mph)	35			30	30	
Link Distance (ft)	929			1189	999	
Travel Time (s)	18.1			27.0	22.7	
Peak Hour Factor	0.94	0.94	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	4%	2%	2%	3%
Adj. Flow (vph)	1009	1165	1128	403	420	1649
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1009	1165	1128	403	420	1649
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Detector Phase	3		1	6	2	
Switch Phase						
Minimum Initial (s)	10.0		7.0	10.0	10.0	
Minimum Split (s)	16.0		15.0	17.0	17.0	
Total Split (s)	38.0		33.0	52.0	19.0	
Total Split (%)	42.2%		36.7%	57.8%	21.1%	
Maximum Green (s)	32.0		25.0	45.0	12.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		4.0	3.0	3.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		8.0	7.0	7.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Recall Mode	None		None	C-Min	C-Min	
Act Effct Green (s)	30.2	90.0	25.0	46.8	13.8	90.0
Actuated g/C Ratio	0.34	1.00	0.28	0.52	0.15	1.00
v/c Ratio	0.82	0.70	0.83	0.22	0.77	0.60
Control Delay	33.7	2.5	25.7	4.4	33.6	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.7	2.5	25.7	4.4	33.6	3.9
LOS	C	A	C	A	C	A

4: Lowell Road (Route 3A) & Sagamore Bridge Road
Lanes, Volumes, Timings

2022 Build with Improvements AM

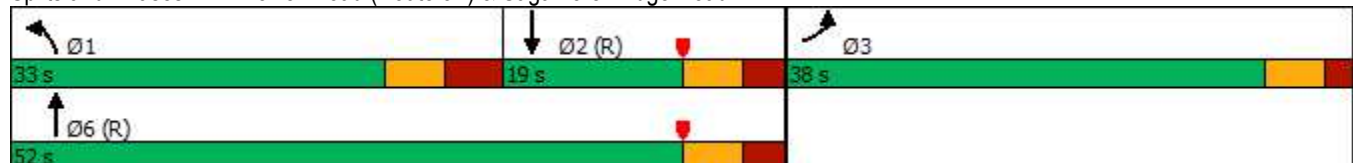


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	17.0			20.1	9.9	
Approach LOS	B			C	A	
Queue Length 50th (ft)	259	0	221	16	118	93
Queue Length 95th (ft)	334	0	231	12	m132	m98
Internal Link Dist (ft)	849			1109	919	
Turn Bay Length (ft)			525			200
Base Capacity (vph)	1302	1656	1377	1841	542	2760
Starvation 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	0.70	0.82	0.22	0.77	0.60

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow, Master Intersection
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.83
 Intersection Signal Delay: 15.3
 Intersection LOS: B
 Intersection Capacity Utilization 74.1%
 ICU Level of Service D
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-02
 m Volume for 95th percentile queue is metered by upstream signal.
























Splits and Phases: 4: Lowell Road (Route 3A) & Sagamore Bridge Road



5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Lanes, Volumes, Timings

2022 Build with Improvements AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	28	282	614	41	30	303	811	188	15	1087	10
Future Volume (vph)	65	28	282	614	41	30	303	811	188	15	1087	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		250	200		75	575		275	175		300
Storage Lanes	0		1	1		1	0		2	1		1
Taper Length (ft)	25			50			175			75		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91	0.91
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.966		0.950	0.958		0.950			0.950		
Satd. Flow (prot)	0	1835	1583	1641	1657	1501	1787	3539	2787	1752	5078	0
Flt Permitted		0.966		0.950	0.958		0.950			0.950		
Satd. Flow (perm)	0	1835	1583	1641	1657	1501	1787	3539	2787	1752	5078	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109			182			198			1
Link Speed (mph)		30			30			30				30
Link Distance (ft)		805			586			999				430
Travel Time (s)		18.3			13.3			22.7				9.8
Peak Hour Factor	0.81	0.81	0.81	0.94	0.94	0.94	0.95	0.95	0.95	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	2%	1%	0%	4%	1%	2%	2%	3%	2%	6%
Adj. Flow (vph)	80	35	348	653	44	32	319	854	198	17	1249	11
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	115	348	346	351	32	319	854	198	17	1260	0
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Detector Phase	8	8	1	7	7	5	1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	5.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	11.0	16.0	
Total Split (s)	12.0	12.0	23.0	26.0	26.0	11.0	23.0	41.0	26.0	11.0	29.0	
Total Split (%)	13.3%	13.3%	25.6%	28.9%	28.9%	12.2%	25.6%	45.6%	28.9%	12.2%	32.2%	
Maximum Green (s)	6.0	6.0	17.0	20.0	20.0	5.0	17.0	35.0	20.0	5.0	23.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Min	None	None	C-Min	
Act Effct Green (s)		6.0	29.0	20.0	20.0	25.0	17.0	39.4	65.4	5.0	23.0	
Actuated g/C Ratio		0.07	0.32	0.22	0.22	0.28	0.19	0.44	0.73	0.06	0.26	
v/c Ratio		0.94	0.60	0.95	0.95	0.06	0.95	0.55	0.10	0.18	0.97	
Control Delay		112.3	22.1	72.8	73.2	0.2	81.3	19.3	0.1	44.9	53.0	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		112.3	22.1	72.8	73.2	0.2	81.3	19.3	0.1	44.9	53.0	
LOS		F	C	E	E	A	F	B	A	D	D	

5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road
Lanes, Volumes, Timings

2022 Build with Improvements AM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		44.5			69.8			30.9				52.9
Approach LOS		D			E			C				D
Queue Length 50th (ft)		66	111	205	208	0	198	125	0	9		259
Queue Length 95th (ft)		#147	168	#382	#386	0	m#319	198	m0	29		#336
Internal Link Dist (ft)		725			506			919				350
Turn Bay Length (ft)			250	200		75	575		275	175		
Base Capacity (vph)		122	583	364	368	548	337	1549	2079	97		1298
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		0.94	0.60	0.95	0.95	0.06	0.95	0.55	0.10	0.18		0.97

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 48 (53%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 47.3
 Intersection LOS: D
 Intersection Capacity Utilization 77.8%
 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.
 m Volume for 95th percentile queue is metered by upstream signal.






















Splits and Phases: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road



8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

2022 Build with Improvements AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	0	48	6	0	10	4	566	1	16	1317	3
Future Volume (vph)	11	0	48	6	0	10	4	566	1	16	1317	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	13	13	11	11	12	12	12	12
Storage Length (ft)	0		50	0		100	210		325	125		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850			0.850						
Flt Protected		0.950			0.950		0.950			0.950		
Satd. Flow (prot)	0	1719	1583	0	1865	1669	1745	3356	0	1805	1863	0
Flt Permitted		0.752			0.748		0.950			0.950		
Satd. Flow (perm)	0	1361	1583	0	1469	1669	1745	3356	0	1805	1863	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			91			55						
Link Speed (mph)		10			30			30			30	
Link Distance (ft)		598			262			1405			549	
Travel Time (s)		40.8			6.0			31.9			12.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.95	0.95	0.95
Heavy Vehicles (%)	5%	0%	2%	0%	0%	0%	0%	4%	0%	0%	2%	0%
Adj. Flow (vph)	14	0	60	8	0	13	4	622	1	17	1386	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	60	0	8	13	4	623	0	17	1389	0
Turn Type	Perm	NA	Prot	Perm	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases		8	8		4	5	1	6		5	2	
Permitted Phases	8			4		4						
Detector Phase	8	8	8	4	4	5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0		11.0	16.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	116.0		16.0	116.0	
Total Split (%)	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	64.4%		8.9%	64.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	110.0		10.0	110.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lead	Lag		Lead	Lag
Lead-Lag Optimize?							Yes	Yes	Yes		Yes	Yes
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.5		1.5	1.5	
Recall Mode	None	None	None	None	None	None	None	C-Min		None	C-Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		6.3	6.3		6.3	18.3	5.0	147.7		6.0	153.1	
Actuated g/C Ratio		0.04	0.04		0.04	0.10	0.03	0.82		0.03	0.85	
v/c Ratio		0.30	0.42		0.16	0.06	0.08	0.23		0.28	0.88	
Control Delay		100.2	12.4		90.2	0.5	89.0	5.8		95.9	18.7	

8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

2022 Build with Improvements AM

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr _t	
Fl _t Protected	
Satd. Flow (prot)	
Fl _t 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 (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	32.0
Total Split (s)	32.0
Total Split (%)	18%
Maximum Green (s)	26.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
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)	21.0
Pedestrian Calls (#/hr)	5
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	

8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

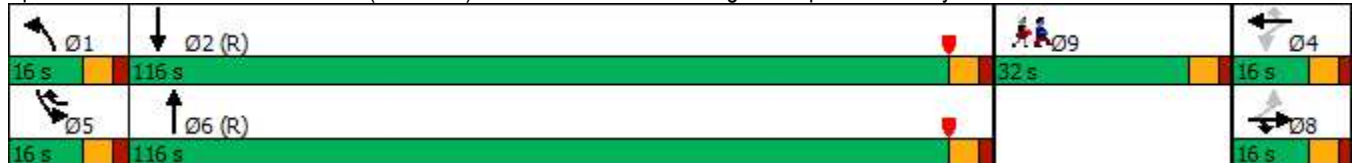
2022 Build with Improvements AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	26.8	
Total Delay		100.2	12.4		90.2	0.5	89.0	5.8		95.9	45.4	
LOS		F	B		F	A	F	A		F	D	
Approach Delay		29.0			34.7			6.3			46.0	
Approach LOS		C			C			A			D	
Queue Length 50th (ft)		17	0		9	0	5	65		20	449	
Queue Length 95th (ft)		40	3		27	0	20	204		50	#2186	
Internal Link Dist (ft)		518			182			1325			469	
Turn Bay Length (ft)			50			100	210			125		
Base Capacity (vph)		75	173		81	254	96	2753		100	1585	
Starvation Cap Reductn		0	0		0	0	0	0		0	262	
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		0.19	0.35		0.10	0.05	0.04	0.23		0.17	1.05	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow, Master Intersection
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 33.6
 Intersection LOS: C
 Intersection Capacity Utilization 92.8%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway



8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

2022 Build with Improvements AM




















Lane Group	Ø9
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	

2022 Build with Base Improvements Weekday P.M.

1: River Road (Route 3A)/Lowell Road (Route 3A) & Steele Road/Dracut Road

Lanes, Volumes, Timings

2022 Build with Improvements PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	2	2	4	0	660	1	593	1	894	399	13
Future Volume (vph)	36	2	2	4	0	660	1	593	1	894	399	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	10	12	12	10	12	12
Storage Length (ft)	0		50	100		0	200		300	775		0
Storage Lanes	0		0	0		1	0		1	0		0
Taper Length (ft)	25			25			100			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.992			0.852	0.850						0.999
Flt Protected		0.958			0.999							0.967
Satd. Flow (prot)	0	1671	0	0	1536	1534	0	3610	0	0	3477	0
Flt Permitted		0.958			0.999							0.967
Satd. Flow (perm)	0	1671	0	0	1536	1534	0	3610	0	0	3477	0
Link Speed (mph)		30			35			35				35
Link Distance (ft)		591			645			758				1733
Travel Time (s)		13.4			12.6			14.8				33.8
Peak Hour Factor	0.80	0.80	0.80	0.91	0.91	0.91	0.91	0.91	0.91	0.90	0.90	0.90
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Adj. Flow (vph)	45	3	3	4	0	725	1	652	1	993	443	14
Shared Lane Traffic (%)						50%						
Lane Group Flow (vph)	0	51	0	0	367	362	0	654	0	0	1450	0
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary

Area Type: Other

Control Type: Roundabout

Intersection Capacity Utilization 96.5% ICU Level of Service F

Analysis Period (min) 15

1: River Road (Route 3A)/Lowell Road (Route 3A) & Steele Road/Dracut Road

HCM 6th Roundabout






















2022 Build with Improvements PM

Intersection								
Intersection Delay, s/veh	12.9							
Intersection LOS	B							
Approach	EB	WB		NB		SB		
Entry Lanes	1	2		2		2		
Conflicting Circle Lanes	2	2		2		2		
Adj Approach Flow, veh/h	51	729		654		1450		
Demand Flow Rate, veh/h	51	729		654		1454		
Vehicles Circulating, veh/h	1444	698		1041		5		
Vehicles Exiting, veh/h	15	997		454		1422		
Ped Vol Crossing Leg, #/h	0	0		0		0		
Ped Cap Adj	1.000	1.000		1.000		1.000		
Approach Delay, s/veh	10.5	11.7		18.5		11.0		
Approach LOS	B	B		C		B		
Lane	Left	Left	Right	Left	Right	Left	Right	
Designated Moves	LTR	LTR	R	LT	TR	LT	TR	
Assumed Moves	LTR	LTR	R	LT	TR	L	TR	
RT Channelized								
Lane Util	1.000	0.471	0.529	0.469	0.531	0.683	0.317	
Follow-Up Headway, s	2.535	2.667	2.535	2.667	2.535	2.667	2.535	
Critical Headway, s	4.328	4.645	4.328	4.645	4.328	4.645	4.328	
Entry Flow, veh/h	51	343	386	307	347	993	461	
Cap Entry Lane, veh/h	416	710	785	518	586	1344	1414	
Entry HV Adj Factor	1.000	0.999	1.001	1.001	0.999	1.000	0.990	
Flow Entry, veh/h	51	343	386	307	347	993	457	
Cap Entry, veh/h	416	710	785	519	585	1344	1401	
V/C Ratio	0.123	0.483	0.492	0.593	0.592	0.739	0.326	
Control Delay, s/veh	10.5	12.1	11.4	19.5	17.6	13.5	5.4	
LOS	B	B	B	C	C	B	A	
95th %tile Queue, veh	0	3	3	4	4	7	1	

2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Lanes, Volumes, Timings

2022 Build with Improvements PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	273	0	51	1	0	16	35	1267	5	24	1246	228
Future Volume (vph)	273	0	51	1	0	16	35	1267	5	24	1246	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	13	13	13	10	12	12	12	12	12
Storage Length (ft)	0		50	0		0	300		0	350		0
Storage Lanes	2		0	0		0	1		0	1		1
Taper Length (ft)	25			25			75			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.850			0.871			0.999				0.850
Flt Protected	0.950				0.998		0.950			0.950		
Satd. Flow (prot)	3143	1507	0	0	1707	0	1685	3606	0	1805	3610	1482
Flt Permitted	0.500						0.950			0.950		
Satd. Flow (perm)	1654	1507	0	0	1710	0	1685	3606	0	1805	3610	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		314			136							212
Link Speed (mph)		15			30			35				35
Link Distance (ft)		510			557			1733				980
Travel Time (s)		23.2			12.7			33.8				19.1
Peak Hour Factor	0.84	0.84	0.84	0.80	0.80	0.80	0.93	0.93	0.93	0.90	0.90	0.90
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9%
Adj. Flow (vph)	325	0	61	1	0	20	38	1362	5	27	1384	253
Shared Lane Traffic (%)												
Lane Group Flow (vph)	325	61	0	0	21	0	38	1367	0	27	1384	253
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	Prot
Protected Phases	3	7			4		1	6		5	2	2
Permitted Phases	7			4								
Detector Phase	3	7		4	4		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	11.0	11.0		11.0	11.0		11.0	16.0		11.0	16.0	16.0
Total Split (s)	21.0	32.0		11.0	11.0		27.0	61.0		27.0	61.0	61.0
Total Split (%)	17.5%	26.7%		9.2%	9.2%		22.5%	50.8%		22.5%	50.8%	50.8%
Maximum Green (s)	15.0	26.0		5.0	5.0		21.0	55.0		21.0	55.0	55.0
Yellow Time (s)	4.0	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		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0			6.0		6.0	6.0		6.0	6.0	6.0
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)	19.2	17.7			5.6		9.2	79.7		8.3	78.9	78.9
Actuated g/C Ratio	0.16	0.15			0.05		0.08	0.66		0.07	0.66	0.66
v/c Ratio	0.73	0.12			0.10		0.30	0.57		0.22	0.58	0.24
Control Delay	56.4	0.5			0.9		57.5	14.4		68.0	7.8	0.7
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	56.4	0.5			0.9		57.5	14.4		68.0	7.8	0.7
LOS	E	A			A		E	B		E	A	A

2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue
Lanes, Volumes, Timings

2022 Build with Improvements PM

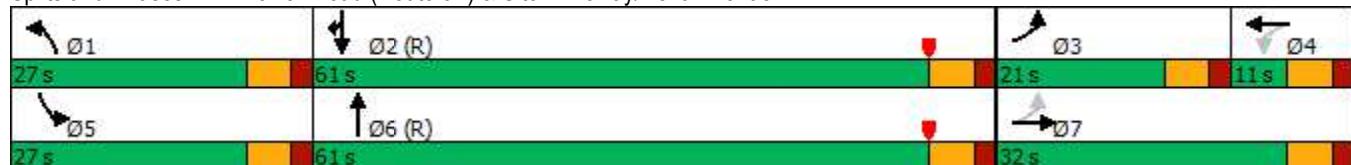


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		47.6			0.9			15.6			7.7	
Approach LOS		D			A			B			A	
Queue Length 50th (ft)	128	0			0		28	283		22	87	0
Queue Length 95th (ft)	147	0			0		63	471		m45	115	1
Internal Link Dist (ft)		430			477			1653			900	
Turn Bay Length (ft)							300			350		
Base Capacity (vph)	453	572			209		294	2393		315	2374	1047
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	0.72	0.11			0.10		0.13	0.57		0.09	0.58	0.24

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 74 (62%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.73
 Intersection Signal Delay: 15.3
 Intersection LOS: B
 Intersection Capacity Utilization 59.6%
 ICU Level of Service B
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-03
 m Volume for 95th percentile queue is metered by upstream signal.
































Splits and Phases: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue



3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Lanes, Volumes, Timings

2022 Build with Improvements PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 			 			 	  		 	  	
Traffic Volume (vph)	357	13	129	88	20	244	110	1380	74	310	1287	300
Future Volume (vph)	357	13	129	88	20	244	110	1380	74	310	1287	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	13	12	12	12	13	12	12	12	12	12	12
Storage Length (ft)	175		175	150		200	350		175	350		400
Storage Lanes	2		1	2		1	2		0	2		1
Taper Length (ft)	25			75			125			100		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.91	0.91	0.97	0.91	1.00
Frt			0.850			0.850		0.992				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1963	1615	3502	1900	1669	3467	5097	0	3502	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1963	1615	3502	1900	1669	3467	5097	0	3502	5085	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			136			136		9				330
Link Speed (mph)		30			30			35				30
Link Distance (ft)		401			449			980				1189
Travel Time (s)		9.1			10.2			19.1				27.0
Peak Hour Factor	0.88	0.88	0.88	0.86	0.86	0.86	0.89	0.89	0.89	0.91	0.91	0.91
Heavy Vehicles (%)	2%	0%	0%	0%	0%	0%	1%	1%	0%	0%	2%	2%
Adj. Flow (vph)	406	15	147	102	23	284	124	1551	83	341	1414	330
Shared Lane Traffic (%)												
Lane Group Flow (vph)	406	15	147	102	23	284	124	1634	0	341	1414	330
Turn Type	Prot	NA	pt+ov	Prot	NA	pt+ov	Prot	NA		Prot	NA	pt+ov
Protected Phases	7	4	4 1	3	8	8 5	1	6		5	2	2 7
Permitted Phases												
Detector Phase	7	4	4 1	3	8	8 5	1	6		5	2	2 7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0		11.0	11.0		11.0	16.0		11.0	16.0	
Total Split (s)	22.0	23.0		15.0	16.0		12.0	63.0		19.0	70.0	
Total Split (%)	18.3%	19.2%		12.5%	13.3%		10.0%	52.5%		15.8%	58.3%	
Maximum Green (s)	16.0	17.0		9.0	10.0		6.0	57.0		13.0	64.0	
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		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	6.0		4.0	6.0	
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	
Act Effct Green (s)	16.0	17.0	29.3	8.7	9.7	29.0	6.3	57.0		13.3	64.0	86.0
Actuated g/C Ratio	0.13	0.14	0.24	0.07	0.08	0.24	0.05	0.48		0.11	0.53	0.72
v/c Ratio	0.89	0.05	0.30	0.40	0.15	0.56	0.68	0.67		0.88	0.52	0.27
Control Delay	73.3	45.2	9.1	58.1	53.6	25.0	66.4	22.9		75.2	13.5	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	73.3	45.2	9.1	58.1	53.6	25.0	66.4	22.9		75.2	13.5	0.2
LOS	E	D	A	E	D	C	E	C		E	B	A

3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Lanes, Volumes, Timings

2022 Build with Improvements PM

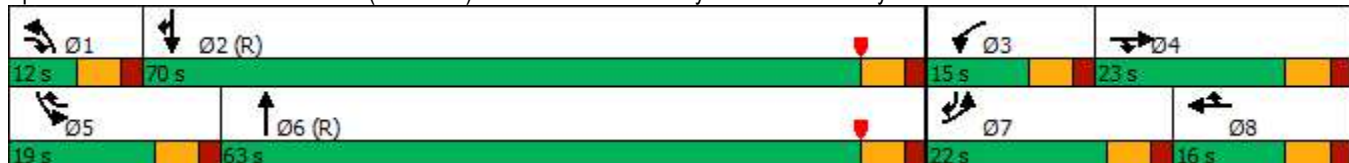


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		55.9			34.9			25.9			21.5	
Approach LOS		E			C			C			C	
Queue Length 50th (ft)	161	10	7	39	17	99	48	246		139	165	0
Queue Length 95th (ft)	#239	30	56	65	42	175	m#88	250		m154	m217	m0
Internal Link Dist (ft)		321			369			900			1109	
Turn Bay Length (ft)	175		175	150		200	350			350		400
Base Capacity (vph)	457	278	483	262	158	495	183	2425		389	2712	1227
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.89	0.05	0.30	0.39	0.15	0.57	0.68	0.67		0.88	0.52	0.27

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 64 (53%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.89
 Intersection Signal Delay: 28.3
 Intersection LOS: C
 Intersection Capacity Utilization 69.0%
 ICU Level of Service C
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-06
 # 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: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway



4: Lowell Road (Route 3A) & Sagamore Bridge Road
Lanes, Volumes, Timings

2022 Build with Improvements PM



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	1479	1467	1331	684	500	1233
Future Volume (vph)	1479	1467	1331	684	500	1233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	12	12	12	12
Storage Length (ft)	0	0	525			200
Storage Lanes	2	1	2			1
Taper Length (ft)	25		100			
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Fr _t		0.850				0.850
Fl _t Protected	0.950		0.950			
Satd. Flow (prot)	3698	1689	5040	3610	3610	2814
Fl _t Permitted	0.950		0.950			
Satd. Flow (perm)	3698	1689	5040	3610	3610	2814
Right Turn on Red		No				Yes
Satd. Flow (RTOR)						1300
Link Speed (mph)	35			30	30	
Link Distance (ft)	929			1189	999	
Travel Time (s)	18.1			27.0	22.7	
Peak Hour Factor	0.96	0.96	0.94	0.94	0.89	0.89
Heavy Vehicles (%)	1%	2%	1%	0%	0%	1%
Adj. Flow (vph)	1541	1528	1416	728	562	1385
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1541	1528	1416	728	562	1385
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Detector Phase	3		1	6	2	
Switch Phase						
Minimum Initial (s)	10.0		7.0	10.0	10.0	
Minimum Split (s)	16.0		15.0	17.0	17.0	
Total Split (s)	53.0		40.0	67.0	27.0	
Total Split (%)	44.2%		33.3%	55.8%	22.5%	
Maximum Green (s)	47.0		32.0	60.0	20.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		4.0	3.0	3.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		8.0	7.0	7.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Recall Mode	None		None	C-Min	C-Min	
Act Effct Green (s)	47.0	120.0	32.0	60.0	20.0	120.0
Actuated g/C Ratio	0.39	1.00	0.27	0.50	0.17	1.00
v/c Ratio	1.06	0.90	1.05	0.40	0.94	0.49
Control Delay	78.5	9.3	73.4	15.0	63.8	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.5	9.3	73.4	15.0	63.8	1.8
LOS	E	A	E	B	E	A

4: Lowell Road (Route 3A) & Sagamore Bridge Road
Lanes, Volumes, Timings

2022 Build with Improvements PM

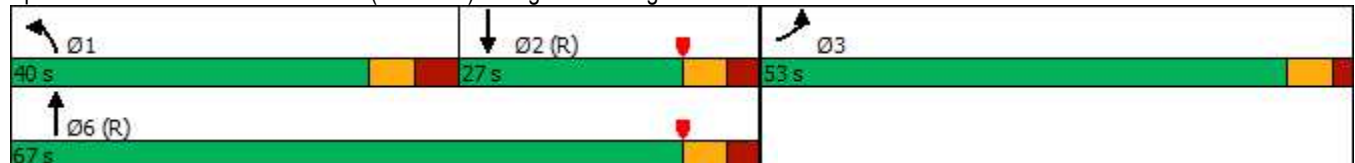


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	44.1			53.5	19.7	
Approach LOS	D			D	B	
Queue Length 50th (ft)	~678	0	~433	221	245	58
Queue Length 95th (ft)	#815	#5	#523	m225	#342	39
Internal Link Dist (ft)	849			1109	919	
Turn Bay Length (ft)			525			200
Base Capacity (vph)	1448	1689	1344	1805	601	2814
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	1.06	0.90	1.05	0.40	0.94	0.49

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
Natural Cycle:	120
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.06
Intersection Signal Delay:	40.3
Intersection LOS:	D
Intersection Capacity Utilization	98.0%
ICU Level of Service	F
Analysis Period (min)	15
Description:	NHDOT Int. No.: S-229-02
~	Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.
#	95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m	Volume for 95th percentile queue is metered by upstream signal.
























Splits and Phases: 4: Lowell Road (Route 3A) & Sagamore Bridge Road



5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Lanes, Volumes, Timings

2022 Build with Improvements PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	92	433	435	17	28	137	1060	988	72	897	5
Future Volume (vph)	52	92	433	435	17	28	137	1060	988	72	897	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		250	200		75	575		275	175		300
Storage Lanes	0		1	1		1	0		2	1		1
Taper Length (ft)	25			50			175			75		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91	0.91
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.982		0.950	0.956		0.950			0.950		
Satd. Flow (prot)	0	1866	1599	1658	1668	1546	1787	3574	2842	1805	5131	0
Flt Permitted		0.982		0.950	0.956		0.950			0.950		
Satd. Flow (perm)	0	1866	1599	1658	1668	1546	1787	3574	2842	1805	5131	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			82			136			567			1
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		805			586			999			427	
Travel Time (s)		18.3			13.3			22.7			9.7	
Peak Hour Factor	0.80	0.80	0.80	0.90	0.90	0.90	0.94	0.94	0.94	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%	1%	1%	0%	0%	1%	0%
Adj. Flow (vph)	65	115	541	483	19	31	146	1128	1051	82	1019	6
Shared Lane Traffic (%)				48%								
Lane Group Flow (vph)	0	180	541	251	251	31	146	1128	1051	82	1025	0
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Detector Phase	8	8	1	7	7	5	1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	5.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	11.0	16.0	
Total Split (s)	22.0	22.0	34.0	28.0	28.0	15.0	34.0	55.0	28.0	15.0	36.0	
Total Split (%)	18.3%	18.3%	28.3%	23.3%	23.3%	12.5%	28.3%	45.8%	23.3%	12.5%	30.0%	
Maximum Green (s)	16.0	16.0	28.0	22.0	22.0	9.0	28.0	49.0	22.0	9.0	30.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Min	None	None	C-Min	
Act Effct Green (s)		14.6	44.9	22.2	22.2	30.6	24.3	53.3	81.4	8.4	35.0	
Actuated g/C Ratio		0.12	0.37	0.18	0.18	0.26	0.20	0.44	0.68	0.07	0.29	
v/c Ratio		0.79	0.83	0.82	0.82	0.06	0.40	0.71	0.50	0.65	0.69	
Control Delay		75.6	40.4	69.2	68.5	0.2	58.2	28.8	2.3	77.7	41.6	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		75.6	40.4	69.2	68.5	0.2	58.2	28.8	2.3	77.7	41.6	
LOS		E	D	E	E	A	E	C	A	E	D	

5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road
Lanes, Volumes, Timings

2022 Build with Improvements PM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		49.2			64.8			18.7				44.2
Approach LOS		D			E			B				D
Queue Length 50th (ft)		136	317	198	198	0	116	251	15	63		264
Queue Length 95th (ft)		188	364	#344	#343	0	m134	m253	m25	#123		318
Internal Link Dist (ft)		725			506			919				347
Turn Bay Length (ft)			250	200		75	575		275	175		
Base Capacity (vph)		248	696	311	313	502	416	1592	2118	135		1495
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		0.73	0.78	0.81	0.80	0.06	0.35	0.71	0.50	0.61		0.69

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	64 (53%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
Natural Cycle:	80
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.83
Intersection Signal Delay:	34.6
Intersection LOS:	C
Intersection Capacity Utilization:	71.7%
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.
m	Volume for 95th percentile queue is metered by upstream signal.






















Splits and Phases: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road



8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

2022 Build with Improvements PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	2	25	31	0	48	27	1215	15	56	724	11
Future Volume (vph)	9	2	25	31	0	48	27	1215	15	56	724	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	13	13	11	11	12	12	12	12
Storage Length (ft)	0		50	0		100	210		325	125		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850			0.850		0.998			0.998	
Flt Protected		0.962			0.950		0.950			0.950		
Satd. Flow (prot)	0	1828	1583	0	1865	1669	1745	3449	0	1805	1878	0
Flt Permitted		0.746			0.748		0.950			0.950		
Satd. Flow (perm)	0	1417	1583	0	1469	1669	1745	3449	0	1805	1878	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			91			60		1			1	
Link Speed (mph)		10			30			30			30	
Link Distance (ft)		598			262			1405			549	
Travel Time (s)		40.8			6.0			31.9			12.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.99	0.99	0.99	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	11	3	31	39	0	60	27	1227	15	60	770	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	31	0	39	60	27	1242	0	60	782	0
Turn Type	Perm	NA	Prot	Perm	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases		8	8		4	5	1	6		5	2	
Permitted Phases	8			4		4						
Detector Phase	8	8	8	4	4	5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0		11.0	16.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	116.0		16.0	116.0	
Total Split (%)	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	64.4%		8.9%	64.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	110.0		10.0	110.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lead	Lag		Lead	Lag
Lead-Lag Optimize?							Yes	Yes	Yes		Yes	Yes
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.5		1.5	1.5	
Recall Mode	None	None	None	None	None	None	None	C-Min		None	C-Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		8.1	8.1		8.1	20.7	6.6	140.9		8.8	146.5	
Actuated g/C Ratio		0.04	0.04		0.04	0.12	0.04	0.78		0.05	0.81	
v/c Ratio		0.22	0.20		0.59	0.25	0.42	0.46		0.68	0.51	
Control Delay		90.1	2.8		117.7	16.3	103.9	9.6		119.5	10.8	

8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

2022 Build with Improvements PM

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr _t	
Fl _t Protected	
Satd. Flow (prot)	
Fl _t 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 (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	32.0
Total Split (s)	32.0
Total Split (%)	18%
Maximum Green (s)	26.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
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)	21.0
Pedestrian Calls (#/hr)	5
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	

8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

2022 Build with Improvements PM



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	2.4	
Total Delay		90.1	2.8		117.7	16.3	103.9	9.6		119.5	13.2	
LOS		F	A		F	B	F	A		F	B	
Approach Delay		29.9			56.2			11.6			20.8	
Approach LOS		C			E			B			C	
Queue Length 50th (ft)		16	0		46	0	32	217		71	250	
Queue Length 95th (ft)		40	0		81	36	70	519		#134	741	
Internal Link Dist (ft)		518			182			1325			469	
Turn Bay Length (ft)			50			100	210			125		
Base Capacity (vph)		78	173		81	255	96	2700		100	1528	
Starvation Cap Reductn		0	0		0	0	0	0		0	588	
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		0.18	0.18		0.48	0.24	0.28	0.46		0.60	0.83	

Intersection Summary

Area Type: Other

Cycle Length: 180

Actuated Cycle Length: 180

Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow, Master Intersection

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 17.4

Intersection LOS: B

Intersection Capacity Utilization 64.9%

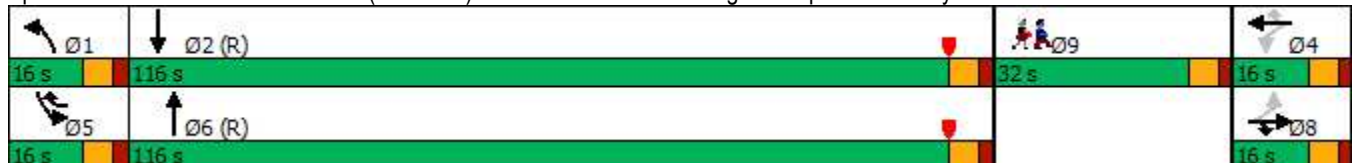
ICU Level of Service C

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway



8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

2022 Build with Improvements PM

Lane Group	Ø9
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	

Appendix J

Capacity Analysis – 2032 Build with Base Improvements Traffic Conditions


















2032 Build with Base Improvements Weekday A.M.

SP #10-21 - Friars Drive Industrial Facility - Attachment C

1: River Road (Route 3A)/Lowell Road (Route 3A) & Steele Road/Dracut Road

Lanes, Volumes, Timings

2032 Build with Improvements AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	0	2	0	1	934	0	299	0	535	561	14
Future Volume (vph)	2	0	2	0	1	934	0	299	0	535	561	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	10	12	12	10	12	12
Storage Length (ft)	0		50	100		0	200		300	775		0
Storage Lanes	0		0	0		1	0		1	0		0
Taper Length (ft)	25			25			100			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.932			0.850	0.850						0.998
Flt Protected		0.976										0.976
Satd. Flow (prot)	0	1385	0	0	1504	1504	0	3574	0	0	3465	0
Flt Permitted		0.976										0.976
Satd. Flow (perm)	0	1385	0	0	1504	1504	0	3574	0	0	3465	0
Link Speed (mph)		30			35			35			35	
Link Distance (ft)		591			638			758			1733	
Travel Time (s)		13.4			12.4			14.8			33.8	
Peak Hour Factor	0.80	0.80	0.80	0.86	0.86	0.86	0.80	0.80	0.80	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	33%	0%	0%	2%	0%	1%	0%	2%	1%	0%
Adj. Flow (vph)	3	0	3	0	1	1086	0	374	0	582	610	15
Shared Lane Traffic (%)						50%						
Lane Group Flow (vph)	0	6	0	0	544	543	0	374	0	0	1207	0
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary

Area Type: Other

Control Type: Roundabout

Intersection Capacity Utilization 69.1%

ICU Level of Service C

Analysis Period (min) 15

1: River Road (Route 3A)/Lowell Road (Route 3A) & Steele Road/Dracut Road

HCM 6th Roundabout

2032 Build with Improvements AM

Intersection								
Intersection Delay, s/veh	8.7							
Intersection LOS	A							
Approach	EB	WB		NB		SB		
Entry Lanes	1	2		2		2		
Conflicting Circle Lanes	2	2		2		2		
Adj Approach Flow, veh/h	6	1087		374		1207		
Demand Flow Rate, veh/h	7	1109		378		1225		
Vehicles Circulating, veh/h	1210	381		597		1		
Vehicles Exiting, veh/h	16	594		620		1489		
Ped Vol Crossing Leg, #/h	0	0		0		0		
Ped Cap Adj	1.000	1.000		1.000		1.000		
Approach Delay, s/veh	8.5	11.1		6.9		6.9		
Approach LOS	A	B		A		A		
Lane	Left	Left	Right	Left	Right	Left	Right	
Designated Moves	LTR	LTR	R	LT	TR	LT	TR	
Assumed Moves	LTR	LTR	R	LT	TR	LT	TR	
RT Channelized								
Lane Util	1.000	0.470	0.530	0.471	0.529	0.470	0.530	
Follow-Up Headway, s	2.535	2.667	2.535	2.667	2.535	2.667	2.535	
Critical Headway, s	4.328	4.645	4.328	4.645	4.328	4.645	4.328	
Entry Flow, veh/h	7	521	588	178	200	576	649	
Cap Entry Lane, veh/h	508	951	1027	779	855	1349	1419	
Entry HV Adj Factor	0.857	0.981	0.980	0.988	0.992	0.985	0.986	
Flow Entry, veh/h	6	511	576	176	198	567	640	
Cap Entry, veh/h	435	932	1006	770	848	1328	1398	
V/C Ratio	0.014	0.548	0.572	0.228	0.234	0.427	0.457	
Control Delay, s/veh	8.5	11.2	11.1	7.2	6.7	6.9	7.0	
LOS	A	B	B	A	A	A	A	
95th %tile Queue, veh	0	3	4	1	1	2	2	

2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Lanes, Volumes, Timings
























2032 Build with Improvements AM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	156	0	25	1	1	36	43	1242	2	8	1089	241
Future Volume (vph)	156	0	25	1	1	36	43	1242	2	8	1089	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	13	13	13	10	12	12	12	12	12
Storage Length (ft)	0		50	0		0	300		0	350		0
Storage Lanes	2		0	0		0	1		0	1		1
Taper Length (ft)	25			25			75			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Fr _t		0.850			0.871							0.850
Fl _t Protected	0.950				0.999		0.950			0.950		
Satd. Flow (prot)	2971	1133	0	0	1657	0	1685	3538	0	1570	3539	1524
Fl _t Permitted	0.728				0.995		0.950			0.950		
Satd. Flow (perm)	2277	1133	0	0	1651	0	1685	3538	0	1570	3539	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		273			42							254
Link Speed (mph)		15			30			35				35
Link Distance (ft)		510			557			1733				980
Travel Time (s)		23.2			12.7			33.8				19.1
Peak Hour Factor	0.80	0.80	0.80	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.95
Heavy Vehicles (%)	10%	0%	33%	9%	0%	3%	0%	2%	20%	15%	2%	6%
Adj. Flow (vph)	195	0	31	1	1	42	51	1461	2	8	1146	254
Shared Lane Traffic (%)												
Lane Group Flow (vph)	195	31	0	0	44	0	51	1463	0	8	1146	254
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	Prot
Protected Phases		7			3		1	6		5	2	2
Permitted Phases	7			3								
Detector Phase	7	7		3	3		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	11.0	11.0		11.0	11.0		11.0	16.0		11.0	16.0	16.0
Total Split (s)	21.0	21.0		21.0	21.0		21.0	51.0		18.0	48.0	48.0
Total Split (%)	23.3%	23.3%		23.3%	23.3%		23.3%	56.7%		20.0%	53.3%	53.3%
Maximum Green (s)	15.0	15.0		15.0	15.0		15.0	45.0		12.0	42.0	42.0
Yellow Time (s)	4.0	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		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0			6.0		6.0	6.0		6.0	6.0	6.0
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)	13.1	13.1			11.4		9.1	62.1		7.1	55.0	55.0
Actuated g/C Ratio	0.15	0.15			0.13		0.10	0.69		0.08	0.61	0.61
v/c Ratio	0.59	0.08			0.18		0.30	0.60		0.06	0.53	0.25
Control Delay	43.2	0.4			13.1		41.3	10.1		36.8	12.6	1.6
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	43.2	0.4			13.1		41.3	10.1		36.8	12.6	1.6
LOS	D	A			B		D	B		D	B	A

3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Lanes, Volumes, Timings

2032 Build with Improvements AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	131	4	59	15	5	71	78	1325	27	85	1252	164
Future Volume (vph)	131	4	59	15	5	71	78	1325	27	85	1252	164
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	13	12	12	12	13	12	12	12	12	12	12
Storage Length (ft)	175		175	150		200	350		175	350		400
Storage Lanes	2		1	2		1	2		0	2		1
Taper Length (ft)	25			75			125			100		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.91	0.91	0.97	0.91	1.00
Frts			0.850			0.850		0.997				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3213	1852	1568	3502	1900	1589	3467	5022	0	3433	5085	1482
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3213	1852	1568	3502	1900	1589	3467	5022	0	3433	5085	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			182			182		4				182
Link Speed (mph)		30			30			35				30
Link Distance (ft)		401			449			980				1189
Travel Time (s)		9.1			10.2			19.1				27.0
Peak Hour Factor	0.93	0.93	0.93	0.88	0.88	0.88	0.87	0.87	0.87	0.96	0.96	0.96
Heavy Vehicles (%)	9%	6%	3%	0%	0%	5%	1%	3%	2%	2%	2%	9%
Adj. Flow (vph)	141	4	63	17	6	81	90	1523	31	89	1304	171
Shared Lane Traffic (%)												
Lane Group Flow (vph)	141	4	63	17	6	81	90	1554	0	89	1304	171
Turn Type	Prot	NA	Prot	Prot	NA	Prot	Prot	NA		Prot	NA	Prot
Protected Phases	7	4	4	3	8	8	1	6		5	2	2
Permitted Phases												
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0		11.0	16.0	16.0
Total Split (s)	14.0	15.0	15.0	14.0	15.0	15.0	16.0	48.0		13.0	45.0	45.0
Total Split (%)	15.6%	16.7%	16.7%	15.6%	16.7%	16.7%	17.8%	53.3%		14.4%	50.0%	50.0%
Maximum Green (s)	8.0	9.0	9.0	8.0	9.0	9.0	10.0	42.0		7.0	39.0	39.0
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0		4.0	6.0	6.0
Recall Mode	None	None	None	None	None	None	None	C-Min		None	C-Min	C-Min
Act Effct Green (s)	7.9	12.9	12.9	7.0	6.9	6.9	8.7	48.1		8.1	47.5	47.5
Actuated g/C Ratio	0.09	0.14	0.14	0.08	0.08	0.08	0.10	0.53		0.09	0.53	0.53
v/c Ratio	0.50	0.02	0.17	0.06	0.04	0.28	0.27	0.58		0.29	0.49	0.20
Control Delay	45.6	36.5	0.9	38.7	38.8	2.4	44.9	13.9		48.7	13.5	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	45.6	36.5	0.9	38.7	38.8	2.4	44.9	13.9		48.7	13.5	0.8
LOS	D	D	A	D	D	A	D	B		D	B	A

3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Lanes, Volumes, Timings

2032 Build with Improvements AM

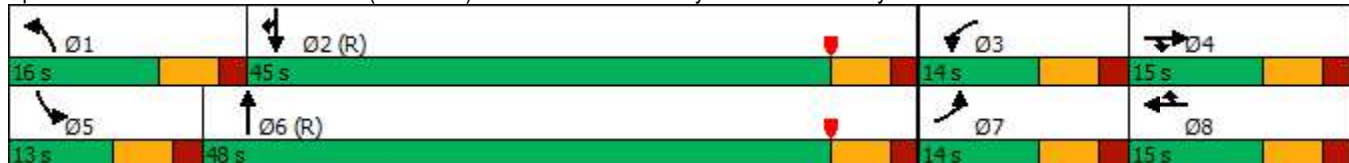


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		31.9			10.4			15.6			14.1	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	40	2	0	4	3	0	27	246		25	215	0
Queue Length 95th (ft)	70	12	0	14	15	0	m46	167		m34	278	m0
Internal Link Dist (ft)		321			369			900			1109	
Turn Bay Length (ft)	175		175	150		200	350			350		400
Base Capacity (vph)	285	280	391	311	190	322	390	2685		312	2685	868
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.49	0.01	0.16	0.05	0.03	0.25	0.23	0.58		0.29	0.49	0.20

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 51 (57%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.58
 Intersection Signal Delay: 15.8
 Intersection LOS: B
 Intersection Capacity Utilization 55.8%
 ICU Level of Service B
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-06
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway



4: Lowell Road (Route 3A) & Sagamore Bridge Road
Lanes, Volumes, Timings

2032 Build with Improvements AM



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	1045	1184	1131	405	420	1673
Future Volume (vph)	1045	1184	1131	405	420	1673
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	12	12	12	12
Storage Length (ft)	0	0	525			200
Storage Lanes	2	1	2			1
Taper Length (ft)	25		100			
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Fr _t		0.850				0.850
Fl _t Protected	0.950		0.950			
Satd. Flow (prot)	3662	1656	4942	3539	3539	2760
Fl _t Permitted	0.950		0.950			
Satd. Flow (perm)	3662	1656	4942	3539	3539	2760
Right Turn on Red		No				Yes
Satd. Flow (RTOR)						1198
Link Speed (mph)	35			30	30	
Link Distance (ft)	929			1189	999	
Travel Time (s)	18.1			27.0	22.7	
Peak Hour Factor	0.94	0.94	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	4%	3%	2%	2%	3%
Adj. Flow (vph)	1112	1260	1229	440	457	1818
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1112	1260	1229	440	457	1818
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Detector Phase	3		1	6	2	
Switch Phase						
Minimum Initial (s)	10.0		7.0	10.0	10.0	
Minimum Split (s)	16.0		15.0	17.0	17.0	
Total Split (s)	34.0		34.0	56.0	22.0	
Total Split (%)	37.8%		37.8%	62.2%	24.4%	
Maximum Green (s)	28.0		26.0	49.0	15.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		4.0	3.0	3.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		8.0	7.0	7.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Recall Mode	None		None	C-Min	C-Min	
Act Effct Green (s)	28.3	90.0	25.9	48.7	14.8	90.0
Actuated g/C Ratio	0.31	1.00	0.29	0.54	0.16	1.00
v/c Ratio	0.97	0.76	0.86	0.23	0.79	0.66
Control Delay	51.3	3.4	26.0	4.4	49.3	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.3	3.4	26.0	4.4	49.3	4.6
LOS	D	A	C	A	D	A

4: Lowell Road (Route 3A) & Sagamore Bridge Road
Lanes, Volumes, Timings

2032 Build with Improvements AM

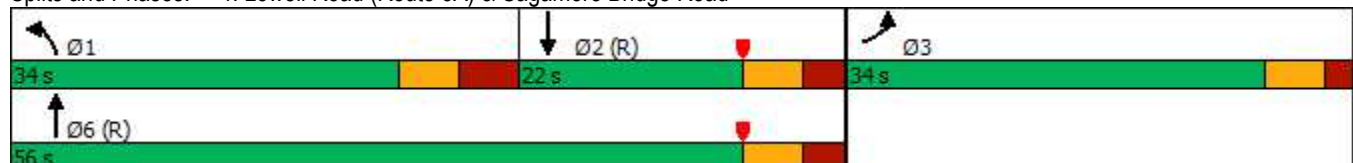


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	25.8			20.3	13.6	
Approach LOS	C			C	B	
Queue Length 50th (ft)	320	0	78	11	124	261
Queue Length 95th (ft)	#457	0	#240	16	m133	m269
Internal Link Dist (ft)	849			1109	919	
Turn Bay Length (ft)			525			200
Base Capacity (vph)	1150	1656	1427	1926	589	2760
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	0.97	0.76	0.86	0.23	0.78	0.66

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 85 (94%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 19.9
 Intersection LOS: B
 Intersection Capacity Utilization 79.6%
 ICU Level of Service D
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-02
 # 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: Lowell Road (Route 3A) & Sagamore Bridge Road



5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Lanes, Volumes, Timings

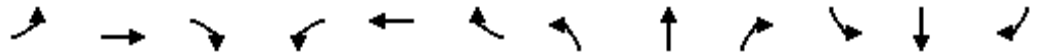
2032 Build with Improvements AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	29	303	677	45	33	328	895	208	17	1194	11
Future Volume (vph)	67	29	303	677	45	33	328	895	208	17	1194	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		250	200		75	575		275	175		300
Storage Lanes	0		1	1		1	1		2	1		1
Taper Length (ft)	25			50			175			75		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91	0.91
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.966		0.950	0.958		0.950			0.950		
Satd. Flow (prot)	0	1835	1583	1641	1657	1501	1787	3539	2787	1752	5078	0
Flt Permitted		0.966		0.950	0.958		0.950			0.950		
Satd. Flow (perm)	0	1835	1583	1641	1657	1501	1787	3539	2787	1752	5078	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109			182			219			1
Link Speed (mph)		30			30			30				30
Link Distance (ft)		805			586			999				405
Travel Time (s)		18.3			13.3			22.7				9.2
Peak Hour Factor	0.81	0.81	0.81	0.94	0.94	0.94	0.95	0.95	0.95	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	2%	1%	0%	4%	1%	2%	2%	3%	2%	6%
Adj. Flow (vph)	83	36	374	720	48	35	345	942	219	20	1372	13
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	119	374	382	386	35	345	942	219	20	1385	0
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Detector Phase	8	8	1	7	7	5	1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	5.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	11.0	16.0	
Total Split (s)	12.0	12.0	20.0	27.0	27.0	11.0	20.0	40.0	27.0	11.0	31.0	
Total Split (%)	13.3%	13.3%	22.2%	30.0%	30.0%	12.2%	22.2%	44.4%	30.0%	12.2%	34.4%	
Maximum Green (s)	6.0	6.0	14.0	21.0	21.0	5.0	14.0	34.0	21.0	5.0	25.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Min	None	None	C-Min	
Act Effct Green (s)		6.0	26.0	21.0	21.0	26.0	14.0	38.4	65.4	5.0	25.0	
Actuated g/C Ratio		0.07	0.29	0.23	0.23	0.29	0.16	0.43	0.73	0.06	0.28	
v/c Ratio		0.98	0.70	1.00	1.00	0.06	1.25	0.62	0.11	0.21	0.98	
Control Delay		120.4	28.0	82.8	82.5	0.2	155.6	16.3	3.8	45.8	53.2	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		120.4	28.0	82.8	82.5	0.2	155.6	16.3	3.8	45.8	53.2	
LOS		F	C	F	F	A	F	B	A	D	D	

5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

Lanes, Volumes, Timings

2032 Build with Improvements AM

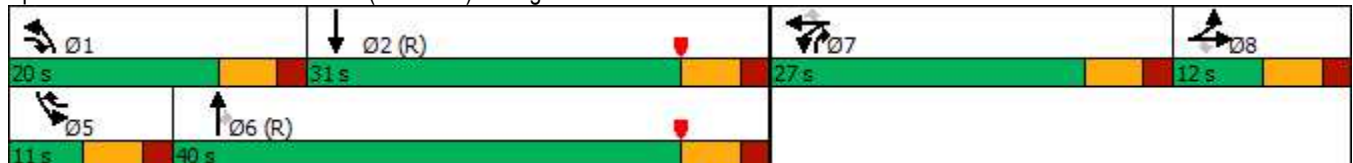


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		50.3			79.0			46.4				53.1
Approach LOS		D			E			D				D
Queue Length 50th (ft)		69	134	229	231	0	~236	241	20	11		285
Queue Length 95th (ft)		#152	197	#422	#425	0	m#293	m295	m26	33		#367
Internal Link Dist (ft)		725			506			919				325
Turn Bay Length (ft)			250	200		75	575		275	175		
Base Capacity (vph)		122	534	382	386	563	277	1509	2085	97		1411
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.98	0.70	1.00	1.00	0.06	1.25	0.62	0.11	0.21		0.98

Intersection Summary























Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	90
Offset:	80 (89%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.25
Intersection Signal Delay:	55.3
Intersection LOS:	E
Intersection Capacity Utilization:	83.1%
ICU Level of Service:	E
Analysis Period (min):	15
~	Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.
#	95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m	Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road



7: Lowell Road (Route 3A) & Executive Drive
Lanes, Volumes, Timings

2032 Build with Improvements AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	2	11	141	30	101	181	497	60	107	1154	224
Future Volume (vph)	40	2	11	141	30	101	181	497	60	107	1154	224
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	15	12	12	13	11	12	12	11	12	12
Storage Length (ft)	0		225	0		80	350		0	150		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			50		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.984			0.976	
Flt Protected		0.955			0.961		0.950			0.950		
Satd. Flow (prot)	0	1576	1558	0	1811	1620	1711	3419	0	1728	3454	0
Flt Permitted		0.416			0.728		0.950			0.950		
Satd. Flow (perm)	0	686	1558	0	1372	1620	1711	3419	0	1728	3454	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			30			98		21			34	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		492			577			1791			1168	
Travel Time (s)		11.2			13.1			40.7			26.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	12%	0%	14%	1%	0%	3%	2%	4%	3%	1%	2%	2%
Adj. Flow (vph)	50	3	14	176	38	126	199	546	66	118	1268	246
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	53	14	0	214	126	199	612	0	118	1514	0
Turn Type	Perm	NA	pt+ov	Perm	NA	Prot	Prot	NA		Prot	NA	
Protected Phases		8	8 1		4	4	1	6		5	2	
Permitted Phases	8			4								
Detector Phase	8	8	8 1	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0		5.0	5.0	5.0	3.0	8.0		3.0	8.0	
Minimum Split (s)	9.0	9.0		11.0	11.0	11.0	9.0	14.0		9.0	14.0	
Total Split (s)	23.0	23.0		23.0	23.0	23.0	18.0	69.0		16.0	67.0	
Total Split (%)	21.3%	21.3%		21.3%	21.3%	21.3%	16.7%	63.9%		14.8%	62.0%	
Maximum Green (s)	17.0	17.0		17.0	17.0	17.0	12.0	63.0		10.0	61.0	
Yellow Time (s)	4.0	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	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0		2.0	2.0	2.0	2.0	3.0		2.0	3.0	
Recall Mode	None	None		None	None	None	None	Min		None	Min	
Act Effct Green (s)		14.3	31.1		17.1	17.1	12.1	55.3		9.3	52.5	
Actuated g/C Ratio		0.14	0.31		0.17	0.17	0.12	0.55		0.09	0.53	
v/c Ratio		0.54	0.03		0.91	0.35	0.96	0.32		0.74	0.83	
Control Delay		61.9	3.7		83.6	15.8	100.4	12.0		72.7	23.7	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		61.9	3.7		83.6	15.8	100.4	12.0		72.7	23.7	
LOS		E	A		F	B	F	B		E	C	

7: Lowell Road (Route 3A) & Executive Drive
Lanes, Volumes, Timings

2032 Build with Improvements AM

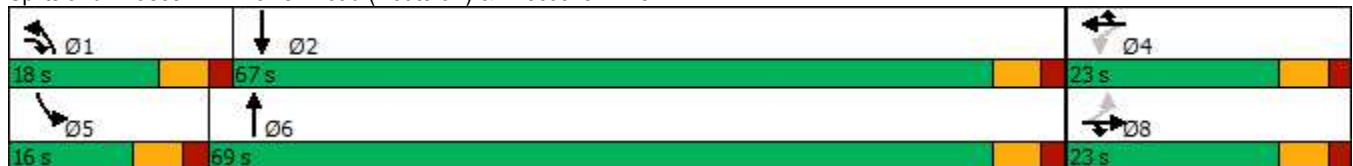


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		49.7			58.5			33.7				27.2
Approach LOS		D			E			C				C
Queue Length 50th (ft)		32	0		140	16	132	102		76		394
Queue Length 95th (ft)		67	5		#252	55	#296	135		#172		488
Internal Link Dist (ft)		412			497			1711				1088
Turn Bay Length (ft)			225			80	350			150		
Base Capacity (vph)		117	569		235	359	207	2181		174		2138
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		0.45	0.02		0.91	0.35	0.96	0.28		0.68		0.71

Intersection Summary

Area Type:	Other
Cycle Length:	108
Actuated Cycle Length:	99.9
Natural Cycle:	90
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.96
Intersection Signal Delay:	33.3
Intersection LOS:	C
Intersection Capacity Utilization:	80.1%
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.	






















Splits and Phases: 7: Lowell Road (Route 3A) & Executive Drive



8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

2032 Build with Improvements AM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	0	48	6	0	10	4	620	1	16	1447	3
Future Volume (vph)	11	0	48	6	0	10	4	620	1	16	1447	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	13	13	11	11	12	12	12	12
Storage Length (ft)	0		50	0		100	210		325	125		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850			0.850						
Flt Protected		0.950			0.950		0.950			0.950		
Satd. Flow (prot)	0	1719	1583	0	1865	1669	1745	3356	0	1805	1863	0
Flt Permitted		0.752			0.748		0.950			0.950		
Satd. Flow (perm)	0	1361	1583	0	1469	1669	1745	3356	0	1805	1863	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			91			55						
Link Speed (mph)		10			30			30			30	
Link Distance (ft)		598			262			1405			549	
Travel Time (s)		40.8			6.0			31.9			12.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.91	0.91	0.91	0.95	0.95	0.95
Heavy Vehicles (%)	5%	0%	2%	0%	0%	0%	0%	4%	0%	0%	2%	0%
Adj. Flow (vph)	14	0	60	8	0	13	4	681	1	17	1523	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	60	0	8	13	4	682	0	17	1526	0
Turn Type	Perm	NA	Prot	Perm	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases		8	8		4	5	1	6		5	2	
Permitted Phases	8			4		4						
Detector Phase	8	8	8	4	4	5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0		11.0	16.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	116.0		16.0	116.0	
Total Split (%)	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	64.4%		8.9%	64.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	110.0		10.0	110.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lead	Lag		Lead	Lag
Lead-Lag Optimize?							Yes	Yes	Yes		Yes	Yes
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.5		1.5	1.5	
Recall Mode	None	None	None	None	None	None	None	C-Min		None	C-Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		6.3	6.3		6.3	18.3	5.0	147.7		6.0	153.1	
Actuated g/C Ratio		0.04	0.04		0.04	0.10	0.03	0.82		0.03	0.85	
v/c Ratio		0.30	0.42		0.16	0.06	0.08	0.25		0.28	0.96	
Control Delay		100.2	12.4		90.2	0.5	89.0	5.9		95.9	28.4	

8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

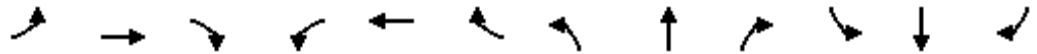
2032 Build with Improvements AM

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr _t	
Fl _t Protected	
Satd. Flow (prot)	
Fl _t 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 (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	32.0
Total Split (s)	32.0
Total Split (%)	18%
Maximum Green (s)	26.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
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)	21.0
Pedestrian Calls (#/hr)	5
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	

8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

2032 Build with Improvements AM

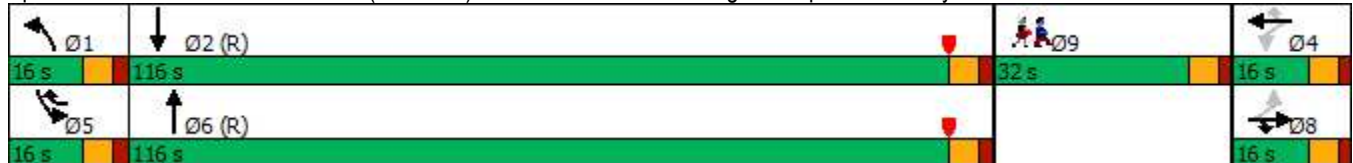


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	35.1	
Total Delay		100.2	12.4		90.2	0.5	89.0	5.9		95.9	63.5	
LOS		F	B		F	A	F	A		F	E	
Approach Delay		29.0			34.7			6.4			63.9	
Approach LOS		C			C			A			E	
Queue Length 50th (ft)		17	0		9	0	5	73		20	695	
Queue Length 95th (ft)		40	3		27	0	20	227		50	#2516	
Internal Link Dist (ft)		518			182			1325			469	
Turn Bay Length (ft)			50			100	210			125		
Base Capacity (vph)		75	173		81	254	96	2753		100	1585	
Starvation Cap Reductn		0	0		0	0	0	0		0	175	
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		0.19	0.35		0.10	0.05	0.04	0.25		0.17	1.08	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow, Master Intersection
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.96
 Intersection Signal Delay: 45.5
 Intersection LOS: D
 Intersection Capacity Utilization 99.7%
 ICU Level of Service F
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway



8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

2032 Build with Improvements AM


















Lane Group	Ø9
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	

2032 Build with Base Improvements Weekday P.M.

1: River Road (Route 3A)/Lowell Road (Route 3A) & Steele Road/Dracut Road

Lanes, Volumes, Timings

2032 Build with Improvements PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	2	2	5	0	726	1	653	1	984	439	15
Future Volume (vph)	40	2	2	5	0	726	1	653	1	984	439	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	12	12	12	10	12	12	10	12	12
Storage Length (ft)	0		50	100		0	200		300	775		0
Storage Lanes	0		0	0		1	0		1	0		0
Taper Length (ft)	25			25			100			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Frt		0.993			0.852	0.850						0.998
Flt Protected		0.957			0.999							0.967
Satd. Flow (prot)	0	1670	0	0	1536	1534	0	3610	0	0	3473	0
Flt Permitted		0.957			0.999							0.967
Satd. Flow (perm)	0	1670	0	0	1536	1534	0	3610	0	0	3473	0
Link Speed (mph)		30			35			35			35	
Link Distance (ft)		591			647			758			1733	
Travel Time (s)		13.4			12.6			14.8			33.8	
Peak Hour Factor	0.80	0.80	0.80	0.91	0.91	0.91	0.91	0.91	0.91	0.90	0.90	0.90
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
Adj. Flow (vph)	50	3	3	5	0	798	1	718	1	1093	488	17
Shared Lane Traffic (%)						50%						
Lane Group Flow (vph)	0	56	0	0	404	399	0	720	0	0	1598	0
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary

Area Type: Other

Control Type: Roundabout

Intersection Capacity Utilization 104.5% ICU Level of Service G

Analysis Period (min) 15

1: River Road (Route 3A)/Lowell Road (Route 3A) & Steele Road/Dracut Road

HCM 6th Roundabout

2032 Build with Improvements PM

Intersection							
Intersection Delay, s/veh	16.8						
Intersection LOS	C						
Approach	EB	WB		NB		SB	
Entry Lanes	1	2		2		2	
Conflicting Circle Lanes	2	2		2		2	
Adj Approach Flow, veh/h	56	803		720		1598	
Demand Flow Rate, veh/h	56	803		720		1603	
Vehicles Circulating, veh/h	1591	769		1146		6	
Vehicles Exiting, veh/h	18	1097		501		1566	
Ped Vol Crossing Leg, #/h	0	0		0		0	
Ped Cap Adj	1.000	1.000		1.000		1.000	
Approach Delay, s/veh	12.3	14.6		26.7		13.6	
Approach LOS	B	B		D		B	
Lane	Left	Left	Right	Left	Right	Left	Right
Designated Moves	LTR	LTR	R	LT	TR	LT	TR
Assumed Moves	LTR	LTR	R	LT	TR	L	TR
RT Channelized							
Lane Util	1.000	0.469	0.531	0.469	0.531	0.682	0.318
Follow-Up Headway, s	2.535	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.328	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	56	377	426	338	382	1093	510
Cap Entry Lane, veh/h	367	665	739	470	536	1342	1413
Entry HV Adj Factor	1.000	1.001	0.999	1.001	0.999	1.000	0.990
Flow Entry, veh/h	56	377	426	338	382	1093	505
Cap Entry, veh/h	367	666	738	471	535	1342	1399
V/C Ratio	0.153	0.567	0.577	0.719	0.713	0.814	0.361
Control Delay, s/veh	12.3	15.1	14.2	28.4	25.2	17.2	5.8
LOS	B	C	B	D	D	C	A
95th %tile Queue, veh	1	4	4	6	6	10	2

2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue

Lanes, Volumes, Timings

2032 Build with Improvements PM

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	273	0	51	1	0	17	35	1397	6	26	1374	228
Future Volume (vph)	273	0	51	1	0	17	35	1397	6	26	1374	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	10	10	13	13	13	10	12	12	12	12	12
Storage Length (ft)	0		50	0		0	300		0	350		0
Storage Lanes	2		0	0		0	1		0	1		1
Taper Length (ft)	25			25			75			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.850			0.871			0.999				0.850
Flt Protected	0.950				0.998		0.950			0.950		
Satd. Flow (prot)	3143	1507	0	0	1707	0	1685	3606	0	1805	3610	1442
Flt Permitted	0.743				0.992		0.950			0.950		
Satd. Flow (perm)	2458	1507	0	0	1696	0	1685	3606	0	1805	3610	1442
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		303			82							198
Link Speed (mph)		15			30			35				35
Link Distance (ft)		510			557			1733				980
Travel Time (s)		23.2			12.7			33.8				19.1
Peak Hour Factor	0.84	0.84	0.84	0.80	0.80	0.80	0.93	0.93	0.93	0.90	0.90	0.90
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	12%
Adj. Flow (vph)	325	0	61	1	0	21	38	1502	6	29	1527	253
Shared Lane Traffic (%)												
Lane Group Flow (vph)	325	61	0	0	22	0	38	1508	0	29	1527	253
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	Prot
Protected Phases		7			3		1	6		5	2	2
Permitted Phases	7			3								
Detector Phase	7	7		3	3		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	11.0	11.0		11.0	11.0		11.0	16.0		11.0	16.0	16.0
Total Split (s)	30.0	30.0		30.0	30.0		27.0	63.0		27.0	63.0	63.0
Total Split (%)	25.0%	25.0%		25.0%	25.0%		22.5%	52.5%		22.5%	52.5%	52.5%
Maximum Green (s)	24.0	24.0		24.0	24.0		21.0	57.0		21.0	57.0	57.0
Yellow Time (s)	4.0	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		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0			6.0		6.0	6.0		6.0	6.0	6.0
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Recall Mode	None	None		None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)	21.4	21.4			16.7		9.2	77.3		8.5	76.7	76.7
Actuated g/C Ratio	0.18	0.18			0.14		0.08	0.64		0.07	0.64	0.64
v/c Ratio	0.74	0.12			0.07		0.30	0.65		0.23	0.66	0.25
Control Delay	57.4	0.5			0.4		57.5	16.7		67.2	9.1	0.8
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	57.4	0.5			0.4		57.5	16.7		67.2	9.1	0.8
LOS	E	A			A		E	B		E	A	A

2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue
Lanes, Volumes, Timings

2032 Build with Improvements PM

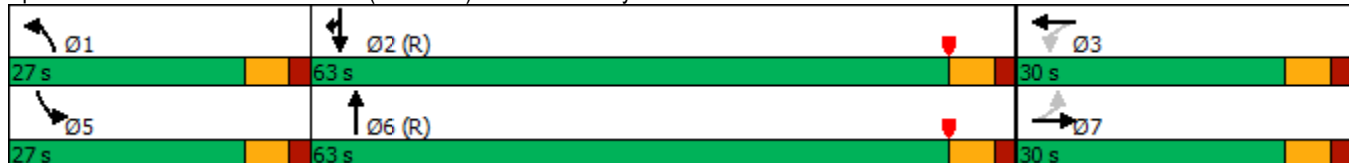


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		48.4			0.4			17.7			8.9	
Approach LOS		D			A			B			A	
Queue Length 50th (ft)	122	0			0		28	407		23	103	0
Queue Length 95th (ft)	158	0			0		63	533		m45	123	2
Internal Link Dist (ft)		430			477			1653			900	
Turn Bay Length (ft)							300			350		
Base Capacity (vph)	491	543			404		294	2324		315	2307	993
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	0.66	0.11			0.05		0.13	0.65		0.09	0.66	0.25

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 82 (68%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 16.5
 Intersection LOS: B
 Intersection Capacity Utilization 63.3%
 ICU Level of Service B
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-03
 m Volume for 95th percentile queue is metered by upstream signal.



































Splits and Phases: 2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue



3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

Lanes, Volumes, Timings

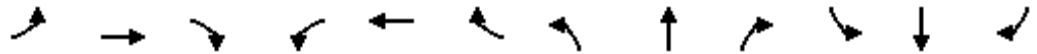
2032 Build with Improvements PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 		 	 		 	 	  		 	  	 
Traffic Volume (vph)	357	13	129	88	20	244	110	1500	74	310	1398	300
Future Volume (vph)	357	13	129	88	20	244	110	1500	74	310	1398	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	13	12	12	12	13	12	12	12	12	12	12
Storage Length (ft)	175		175	150		200	350		175	350		400
Storage Lanes	2		1	2		1	2		0	2		1
Taper Length (ft)	25			75			125			100		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.91	0.91	0.97	0.91	1.00
Frts			0.850			0.850		0.993				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3433	1963	1615	3502	1900	1669	3467	5102	0	3502	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3433	1963	1615	3502	1900	1669	3467	5102	0	3502	5085	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			191			245		8				330
Link Speed (mph)		30			30			35				30
Link Distance (ft)		401			449			980				1189
Travel Time (s)		9.1			10.2			19.1				27.0
Peak Hour Factor	0.88	0.88	0.88	0.86	0.86	0.86	0.89	0.89	0.89	0.91	0.91	0.91
Heavy Vehicles (%)	2%	0%	0%	0%	0%	0%	1%	1%	0%	0%	2%	2%
Adj. Flow (vph)	406	15	147	102	23	284	124	1685	83	341	1536	330
Shared Lane Traffic (%)												
Lane Group Flow (vph)	406	15	147	102	23	284	124	1768	0	341	1536	330
Turn Type	Prot	NA	Prot	Prot	NA	Prot	Prot	NA		Prot	NA	Prot
Protected Phases	7	4	4	3	8	8	1	6		5	2	2
Permitted Phases												
Detector Phase	7	4	4	3	8	8	1	6		5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0		11.0	16.0	16.0
Total Split (s)	22.0	23.0	23.0	15.0	16.0	16.0	12.0	63.0		19.0	70.0	70.0
Total Split (%)	18.3%	19.2%	19.2%	12.5%	13.3%	13.3%	10.0%	52.5%		15.8%	58.3%	58.3%
Maximum Green (s)	16.0	17.0	17.0	9.0	10.0	10.0	6.0	57.0		13.0	64.0	64.0
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0		4.0	6.0	6.0
Recall Mode	None	None	None	None	None	None	None	C-Min		None	C-Min	C-Min
Act Effct Green (s)	16.0	16.2	16.2	8.7	8.9	8.9	7.0	57.2		13.9	64.1	64.1
Actuated g/C Ratio	0.13	0.14	0.14	0.07	0.07	0.07	0.06	0.48		0.12	0.53	0.53
v/c Ratio	0.89	0.06	0.38	0.40	0.16	0.81	0.62	0.73		0.84	0.57	0.33
Control Delay	73.3	45.4	5.4	58.1	54.2	29.1	64.4	21.8		65.6	16.8	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	73.3	45.4	5.4	58.1	54.2	29.1	64.4	21.8		65.6	16.8	0.3
LOS	E	D	A	E	D	C	E	C		E	B	A

3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

2032 Build with Improvements PM

Lanes, Volumes, Timings



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		55.0			37.8			24.6			21.9	
Approach LOS		D			D			C			C	
Queue Length 50th (ft)	161	10	0	39	17	29	49	199		130	345	0
Queue Length 95th (ft)	#239	30	23	65	42	#125	m#86	261		m131	m349	m0
Internal Link Dist (ft)		321			369			900			1109	
Turn Bay Length (ft)	175		175	150		200	350			350		400
Base Capacity (vph)	457	278	392	262	158	363	201	2436		405	2717	999
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.89	0.05	0.38	0.39	0.15	0.78	0.62	0.73		0.84	0.57	0.33

Intersection Summary



















Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 74 (62%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.89
 Intersection Signal Delay: 27.9
 Intersection LOS: C
 Intersection Capacity Utilization 71.3%
 ICU Level of Service C
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-06
 # 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: 3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway



4: Lowell Road (Route 3A) & Sagamore Bridge Road
Lanes, Volumes, Timings

2032 Build with Improvements PM

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 		  	 	 	 
Traffic Volume (vph)	1633	1593	1442	749	546	1360
Future Volume (vph)	1633	1593	1442	749	546	1360
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	14	14	12	12	12	12
Storage Length (ft)	0	0	525			200
Storage Lanes	2	1	2			1
Taper Length (ft)	25		100			
Lane Util. Factor	0.97	1.00	0.94	0.95	0.95	0.88
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	3698	1689	5040	3610	3610	2814
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	3698	1689	5040	3610	3610	2814
Right Turn on Red		No				Yes
Satd. Flow (RTOR)						1242
Link Speed (mph)	35			30	30	
Link Distance (ft)	929			1189	999	
Travel Time (s)	18.1			27.0	22.7	
Peak Hour Factor	0.96	0.96	0.94	0.94	0.89	0.89
Heavy Vehicles (%)	1%	2%	1%	0%	0%	1%
Adj. Flow (vph)	1701	1659	1534	797	613	1528
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1701	1659	1534	797	613	1528
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	3		1	6	2	
Permitted Phases		Free				Free
Detector Phase	3		1	6	2	
Switch Phase						
Minimum Initial (s)	10.0		7.0	10.0	10.0	
Minimum Split (s)	16.0		15.0	17.0	17.0	
Total Split (s)	50.0		43.0	70.0	27.0	
Total Split (%)	41.7%		35.8%	58.3%	22.5%	
Maximum Green (s)	44.0		35.0	63.0	20.0	
Yellow Time (s)	4.0		4.0	4.0	4.0	
All-Red Time (s)	2.0		4.0	3.0	3.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	6.0		8.0	7.0	7.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	4.0		4.0	4.0	4.0	
Recall Mode	None		None	C-Min	C-Min	
Act Effct Green (s)	44.0	120.0	35.0	63.0	20.0	120.0
Actuated g/C Ratio	0.37	1.00	0.29	0.52	0.17	1.00
v/c Ratio	1.26	0.98	1.04	0.42	1.02	0.54
Control Delay	154.9	20.6	63.7	7.7	72.5	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	154.9	20.6	63.7	7.7	72.5	2.0
LOS	F	C	E	A	E	A

4: Lowell Road (Route 3A) & Sagamore Bridge Road
Lanes, Volumes, Timings

2032 Build with Improvements PM

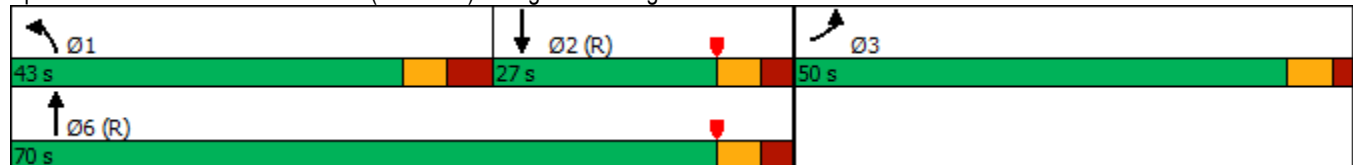


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach Delay	88.6			44.5	22.2	
Approach LOS	F			D	C	
Queue Length 50th (ft)	~850	0	~451	130	~251	72
Queue Length 95th (ft)	#987	#216	#549	m165	m#358	46
Internal Link Dist (ft)	849			1109	919	
Turn Bay Length (ft)			525			200
Base Capacity (vph)	1355	1689	1470	1895	601	2814
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	1.26	0.98	1.04	0.42	1.02	0.54

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow, Master Intersection
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.26
 Intersection Signal Delay: 57.3
 Intersection LOS: E
 Intersection Capacity Utilization 105.8%
 ICU Level of Service G
 Analysis Period (min) 15
 Description: NHDOT Int. No.: S-229-02
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 m Volume for 95th percentile queue is metered by upstream signal.
























Splits and Phases: 4: Lowell Road (Route 3A) & Sagamore Bridge Road



5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road

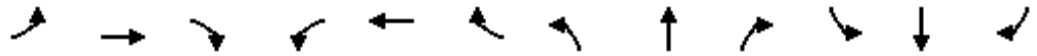
Lanes, Volumes, Timings

2032 Build with Improvements PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	98	474	479	19	31	146	1167	1093	80	985	5
Future Volume (vph)	54	98	474	479	19	31	146	1167	1093	80	985	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	11	11	11	12	12	12	12	12	12
Storage Length (ft)	0		250	200		75	575		275	175		300
Storage Lanes	0		1	1		1	1		2	1		1
Taper Length (ft)	25			50			175			75		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.91	0.91
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.983		0.950	0.956		0.950			0.950		
Satd. Flow (prot)	0	1868	1599	1658	1668	1546	1787	3574	2842	1805	5131	0
Flt Permitted		0.983		0.950	0.956		0.950			0.950		
Satd. Flow (perm)	0	1868	1599	1658	1668	1546	1787	3574	2842	1805	5131	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			82			136			424			1
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		805			586			999			414	
Travel Time (s)		18.3			13.3			22.7			9.4	
Peak Hour Factor	0.80	0.80	0.80	0.90	0.90	0.90	0.94	0.94	0.94	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	1%	0%	0%	1%	1%	1%	0%	0%	1%	0%
Adj. Flow (vph)	68	123	593	532	21	34	155	1241	1163	91	1119	6
Shared Lane Traffic (%)				48%								
Lane Group Flow (vph)	0	191	593	277	276	34	155	1241	1163	91	1125	0
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Detector Phase	8	8	1	7	7	5	1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	5.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	11.0	16.0	
Total Split (s)	20.0	20.0	33.0	29.0	29.0	14.0	33.0	57.0	29.0	14.0	38.0	
Total Split (%)	16.7%	16.7%	27.5%	24.2%	24.2%	11.7%	27.5%	47.5%	24.2%	11.7%	31.7%	
Maximum Green (s)	14.0	14.0	27.0	23.0	23.0	8.0	27.0	51.0	23.0	8.0	32.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	
Recall Mode	None	None	None	None	None	None	None	C-Min	None	None	C-Min	
Act Effct Green (s)		13.8	45.7	23.2	23.2	31.0	25.9	51.2	80.4	7.9	33.2	
Actuated g/C Ratio		0.12	0.38	0.19	0.19	0.26	0.22	0.43	0.67	0.07	0.28	
v/c Ratio		0.90	0.90	0.87	0.86	0.07	0.40	0.81	0.57	0.77	0.79	
Control Delay		92.1	48.1	73.5	72.3	0.3	57.8	19.5	0.6	93.6	45.4	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		92.1	48.1	73.5	72.3	0.3	57.8	19.5	0.6	93.6	45.4	
LOS		F	D	E	E	A	E	B	A	F	D	

5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road
Lanes, Volumes, Timings

2032 Build with Improvements PM

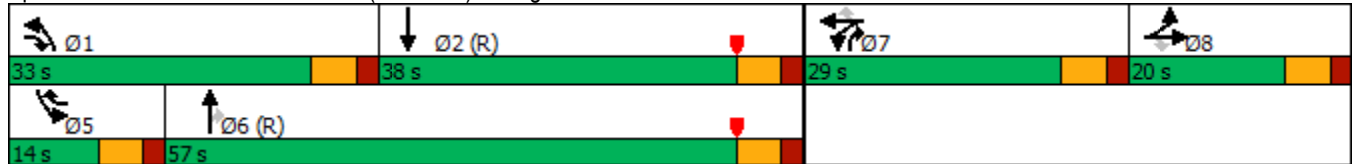


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		58.8			68.7			13.2				49.0
Approach LOS		E			E			B				D
Queue Length 50th (ft)		148	373	221	220	0	111	200	5	71	300	
Queue Length 95th (ft)		#232	439	#382	#378	0	m117	m161	m1	#155	346	
Internal Link Dist (ft)		725			506			919			334	
Turn Bay Length (ft)			250	200		75	575		275	175		
Base Capacity (vph)		217	673	319	321	502	402	1525	2044	120	1419	
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.88	0.88	0.87	0.86	0.07	0.39	0.81	0.57	0.76	0.79	

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	74 (62%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.90
Intersection Signal Delay:	35.0
Intersection LOS:	C
Intersection Capacity Utilization	77.3%
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.
m	Volume for 95th percentile queue is metered by upstream signal.






















Splits and Phases: 5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road



8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

2032 Build with Improvements PM

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	2	25	31	0	48	27	1335	15	56	793	11
Future Volume (vph)	9	2	25	31	0	48	27	1335	15	56	793	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	13	13	11	11	12	12	12	12
Storage Length (ft)	0		50	0		100	210		325	125		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			50			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.850			0.850		0.998			0.998	
Flt Protected		0.962			0.950		0.950			0.950		
Satd. Flow (prot)	0	1828	1583	0	1865	1669	1745	3449	0	1805	1878	0
Flt Permitted		0.746			0.748		0.950			0.950		
Satd. Flow (perm)	0	1417	1583	0	1469	1669	1745	3449	0	1805	1878	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			91			60		1			1	
Link Speed (mph)		10			30			30			30	
Link Distance (ft)		598			262			1405			549	
Travel Time (s)		40.8			6.0			31.9			12.5	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.99	0.99	0.99	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	2%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Adj. Flow (vph)	11	3	31	39	0	60	27	1348	15	60	844	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	14	31	0	39	60	27	1363	0	60	856	0
Turn Type	Perm	NA	Prot	Perm	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases		8	8		4	5	1	6		5	2	
Permitted Phases	8			4		4						
Detector Phase	8	8	8	4	4	5	1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0		11.0	16.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	116.0		16.0	116.0	
Total Split (%)	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	64.4%		8.9%	64.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	110.0		10.0	110.0	
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)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lead	Lag		Lead	Lag
Lead-Lag Optimize?							Yes	Yes	Yes		Yes	Yes
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.5	1.0	1.5		1.5	1.5	
Recall Mode	None	None	None	None	None	None	None	C-Min		None	C-Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		8.1	8.1		8.1	20.7	6.6	140.9		8.8	146.5	
Actuated g/C Ratio		0.04	0.04		0.04	0.12	0.04	0.78		0.05	0.81	
v/c Ratio		0.22	0.20		0.59	0.25	0.42	0.50		0.68	0.56	
Control Delay		90.1	2.8		117.7	16.3	103.9	10.3		119.5	11.9	

8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

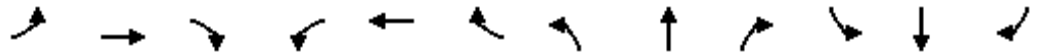
2032 Build with Improvements PM

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Fr _t	
Fl _t Protected	
Satd. Flow (prot)	
Fl _t 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 (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	32.0
Total Split (s)	32.0
Total Split (%)	18%
Maximum Green (s)	26.0
Yellow Time (s)	4.0
All-Red Time (s)	2.0
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)	21.0
Pedestrian Calls (#/hr)	5
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	

8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

2032 Build with Improvements PM

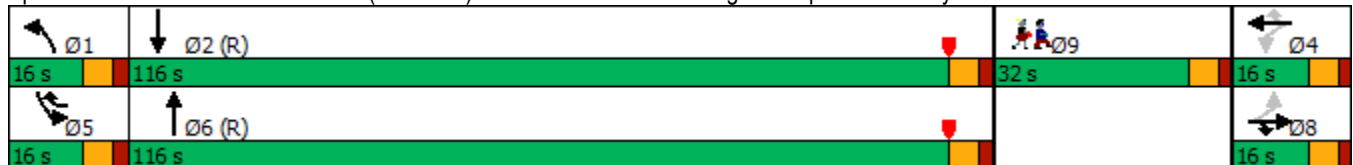


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	3.1	
Total Delay		90.1	2.8		117.7	16.3	103.9	10.3		119.5	14.9	
LOS		F	A		F	B	F	B		F	B	
Approach Delay		29.9			56.2			12.1			21.8	
Approach LOS		C			E			B			C	
Queue Length 50th (ft)		16	0		46	0	32	252		71	294	
Queue Length 95th (ft)		40	0		81	36	70	600		#134	870	
Internal Link Dist (ft)		518			182			1325			469	
Turn Bay Length (ft)			50			100	210			125		
Base Capacity (vph)		78	173		81	255	96	2700		100	1528	
Starvation Cap Reductn		0	0		0	0	0	0		0	546	
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		0.18	0.18		0.48	0.24	0.28	0.50		0.60	0.87	

Intersection Summary

Area Type: Other
 Cycle Length: 180
 Actuated Cycle Length: 180
 Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow, Master Intersection
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.68
 Intersection Signal Delay: 17.8
 Intersection Capacity Utilization 65.7%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway



8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway

Lanes, Volumes, Timings

2032 Build with Improvements PM

Lane Group	Ø9
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	
