RESTAURANT DEPOT SITE PLAN & CONDITIONAL USE PERMIT

SP# 01-26 & CUP# 01-26

STAFF REPORT

April 8, 2026

SITE: 273 Lowell Road, Map 234 /Lot 034-000

ZONING: General - 1 (G-1)

PURPOSE OF PLAN: to depict the construction of a new commercial building for a wholesale cash-and-carry foodservice supplier, along with associate site improvements. The project has been designed to avoid any direct impacts to on-site wetlands, with all proposed work located outside of the wetland boundary. However, certain construction activities and site improvements are proposed within the 75-foot wetland buffer.

PLAN UNDER REVIEW:

Proposed Restaurant Depot Site Development Plans, SP# 01-26 & CUP# 01-26, Map 234 Lot 034, 273 Lowell Road, Hudson, New Hampshire; prepared by: Bohler Engineering, 3 Executive Park Drive Floor 2, Bedford, NH 03110; prepared for: Restaurant Depot 17-10 Whitestone Expressway, Whitestone, NY 11357; consisting of 22 sheets and general notes 1-32 on Sheet C-102; dated January 23, 2026, last revised March 24, 2026.

ATTACHMENTS:
1) Site Plan & CUP Applications received January 27, 2026– Attachment "**A**".
2) Project Narrative – Attachment "**B**".
3) Department Review Comments & Bohler Response Comments– Attachment "**C**".
4) Stormwater Management Report, prepared by Bohler, dated January 23, 2026, last revised March 24, 2026 – Attachment "**D**". (Digital Only)
5) Traffic Impact Study, prepared by Chappell Engineering Associates, LLC, dated January 15, 2026 – Attachment "**E**". (Digital Only)
6) Peer Review Comments, prepared by Fuss & O'Neill, dated February 10, 2026 – Attachment "**F**".
7) Traffic Impact Response Comments, prepared by Chappell Engineering Associates, LLC, dated March 6, 2026 – Attachment "**G**".
8) CAP fee sheet – Attachment "**H**".
9) Site Plan dated January 23, 2026, last revised March 24, 2026.

APPLICATION TRACKING:
- January 27, 2026 – Site plan & CUP applications received.
- April 8, 2026 – Public Hearing scheduled.

WAIVERS REQUESTED:
- §275-8.C.(2) – Parking Calculations

- §275-8.C.(6).(b) – Loading Space Dimensions
- §276-11.1.B.(25) – Setbacks

COMMENTS & RECOMMENDATIONS:

BACKGROUND

The site is approximately 10.5 acres and is located in the General – One (G-1) zone, and is currently undeveloped. This site is proposed to be serviced by Town water and septic. The site does contain wetlands along the central, northwestern, and western portions of the property. The site currently has no curb cut, and is proposed to be serviced by shared access with Mercury Systems via an easement through the Target site. Utilities are proposed to be delivered via the same easement. The applicant is proposing a slight encroachment into the wetland buffer as part of the development, for which a Conditional Use Permit has been applied for and is before the Conservation Commission at this time.

WAIVER REQUESTS

The applicant has submitted three waivers at this time:

§275-8.C.(2) – Parking Calculations – To allow for 173 parking spaces where elsewise 250 would be required. The applicant states that based on their other locations they have a better measurement of how many spaces are needed for the site.

§275-8.C.(6).(b) – Loading Space Dimensions – To allow for reduced size loading docks. The applicant states that the proposed loading spaces meet the size and count requirements needed for their operation, without increasing the total non-permeable footprint.

§276-11.1.B.(25) – Setbacks – To allow for three parking spaces to encroach into the setback. The applicant states that to provide the interior landscaping required, three spaces had to be shifted to encroach the setback lines.

DEPARTMENT COMMENTS

Comments have been provided by the following departments:

Engineering provided the following comments:

1. Applicant shall provide snow storage area.
2. Applicant shall provide fire apparatus wheel movement on a separate plan.
3. Applicant shall increase the water line service to a minimum 10” to accommodate the 6” fire hydrant service, 8” fire suppression, and 2.5” domestic service.
4. The detention basin appears six feet deep; applicant shall consider a 4-foot safety fence.
5. Applicant shall review the need for a guiderail along the detention basin, currently showing a seven-foot drop from edge of pavement to bottom of basin.

Revised plans show all comments have been resolved at this time.

Fire provided the following comments:

1. Add one fire hydrant inside the site in the proposed landscaped island heading into the parking lot furthest away from the building. Show the hydrant on a revised site plan prior to Fire Department approval.

Revised plans do show one fire hydrant inside the site in the proposed landscaped island heading into the parking lot furthest away from the building.

Full Comments can be found in **Attachment "C"**.

STORMWATER MANAGEMENT REPORT

As part of the application, a Stormwater Management Report, revised March 24, 2026, has been supplied (Attachment "**D**"). This report concludes that there will be a decrease or no change in the peak rates of stormwater runoff leaving the property at the design point.

TRAFFIC IMPACT AND ACCESS STUDY

The applicant submitted a Traffic Impact and Access Study (Attachment "**E**") dated January 15, 2026, with the following conclusions:

1. *Based on empirical data collected at operational Restaurant Depot sites, the proposed parking= supply well exceeds the peak demand for the project.*

2. *In comparison to future No-Build conditions, project-related traffic results in only a minor= increase to area traffic of approximately 1 to 2 percent.*

This study was peer reviewed by Fuss & O'Neill on February 10, 2026 (Attachment "**F**"). The applicant has provided a response letter by Chappell Engineering Associates, LLC, dated March 6, 2026, addressing the traffic-related comments. The response indicates that project-related traffic impacts are anticipated to result in an increase of less than one second compared to the future No-Build condition. Full responses to the traffic may be found in Attachment "**G**".

PEER REVIEW

Fuss & O'Neill's review primarily focused on traffic and drainage. While revised materials have been submitted addressing portions of the review, staff notes that a formal response letter has only been provided for traffic-related comments. The applicant should submit a comprehensive response letter addressing the remaining peer review comments, including those related to drainage and other outstanding items.

The full review may be found in Attachment "**F**".

CONSERVATION COMMISSION

The Conditional Use Permit was submitted to the Conservation Commission, and a site walk was held on March 21, 2026. A follow-up hearing is scheduled for April 13, 2026.

STAFF COMMENTS

Staff notes that the peer review report prepared by Fuss & O'Neill identifies the need for staff and the Board to determine the appropriate use classification for the purpose of parking calculations and Impact Fees (CAP Fee).

For parking purposes, staff has classified the proposed use as Retail, which results in a parking requirement that necessitates a waiver. In support of this request, the applicant has indicated that, as of January 1, 2026, Restaurant Depot operates 164 locations across 35 states and has established operational experience to inform appropriate parking demand. Staff recommends that the Board discuss this with the applicant to confirm that the proposed parking count of 173 spaces is adequate.

For purposes of the Impact Fee (CAP Fee), staff finds that the designation of "Shopping Center" is the closest applicable category within the CAP Fee Matrix.

RECOMMENDATIONS

Staff recommends that the Board accept the application and hold public hearing. Following public testimony, staff further recommends that the Board discuss any outstanding questions and concerns with the applicant, including the request for waivers.

No approvals should be granted until written recommendation has been received from the Conservation Commission.

DRAFT MOTIONS:

TO DEFER:

I move to defer the Non-Residential **Site Plan** for Restaurant Depot Site Development Plan, SP# 01-26, Map 234 Lot 034, 273 Lowell Road, Hudson, NH.
Motion by: _______________Second: _________________Carried/Failed: ____________________

I move to defer the **Conditional Use Permit** for Restaurant Depot Site Development Plan, CUP# 01-26, Map 234 Lot 034, 273 Lowell Road, Hudson, NH.
Motion by: _______________Second: _________________Carried/Failed: __________________

TO ACCEPT:

I move to accept the Non-Residential **Site Plan** for Restaurant Depot Site Development Plan, SP# 01-26, Map 234 Lot 034, 273 Lowell Road, Hudson, NH.
Motion by: _______________Second: _________________Carried/Failed: ____________________

I move to accept the **Conditional Use Permit** for Restaurant Depot Site Development Plan, CUP# 01-26, Map 234 Lot 034, 273 Lowell Road, Hudson, NH.
Motion by: _______________Second: _________________Carried/Failed: __________________

TO CONTINUE:

I move to continue the Non-Residential **Site Plan** for Restaurant Depot Site Development Plan, SP# 01-26, Map 234 Lot 034, 273 Lowell Road, Hudson, NH, to date certain__________________, 2026.
Motion by: _______________Second: _________________Carried/Failed: ____________________

I move to continue the **Conditional Use Permit** for Restaurant Depot Site Development Plan, CUP# 01-26, Map 234 Lot 034, 273 Lowell Road, Hudson, NH, to date certain_________________, 2026.
Motion by: _______________Second: _________________Carried/Failed: _________________

Town of Hudson
12 School Street
Hudson, NH 03501

SITE PLAN APPLICATION

Revised September 2025

The following information must be filed with the Planning Department ***at the time of filing a site plan application***:

1. One (1) original completed application with original signatures.
2. One (1) full plan set *folded* (sheet size: 22" x 34").
3. One (1) original copy of the project narrative.
4. A list of direct abutters and a list of indirect abutters, and two (2) sets of mailing labels for abutter notifications.
5. Site Plan Review Checklist.
6. All of the above application materials, including plans, shall also be submitted in electronic form as a PDF.
7. ***All plans shall be folded*** and all pertinent data shall be attached to the plans with an elastic band or other enclosure.
8. ***Plans requiring third party consultant review*** – Complete submittal must be sent to:
   Fuss & O'Neill
   c/o Steve Reichert, PE
   50 Commercial Street Unit 2S
   Manchester, NH 03101

The following information is required to be filed with the Planning Department ***no later than 10:00 A.M., Tuesday ONE WEEK prior to the scheduled Planning meeting***. ***The purpose of these materials is hardcopy distribution to Planning Board members, not review.***

Any plan revisions that require staff review must be submitted no later than 10:00A.M., Tuesday TWO WEEKS prior to the scheduled Planning meeting. Depending on the complexity of changes, more time may be required for review. Please contact the Town Planner if you have any questions on this matter.

1. Submission of fifteen (15) 11" X 17" plan sets *folded*, revised if applicable.
2. Submission of one (1) full plan set *folded* (sheet size: 22" x 34"), if revised.
3. All of the above application materials, including plans, shall also be submitted in electronic form as a PDF.

Note: Prior to filing an application, it is recommended to schedule an appointment with the Town Planner.

SITE PLAN APPLICATION

Date of Application: 01/23/26 Tax Map #: 243 Lot #: 34

Site Address: 273 Lowell Road

Name of Project: Proposed Restaurant Depot

Zoning District: GENERAL ONE ZONE (G-1) & WETLAND CONSERVATION DISTRICT General SP#: ____________
(For Town Use Only)

Z.B.A. Action: ____________

PROPERTY OWNER:	DEVELOPER:
Name: IQ EQ Trustee, Thomas Friel Admin Trust c/u Thomas Friel 2021 Rev Trust	LARRY COHEN - RESTAURANT DEPOT, LLC
Address: 3 Executive Park Drive, Suite 302 Bedford, NH 03110 & Philip J Friel III	17-10 WHITESTONE EXPRESSWAY
Address: 94 Chritian Hill Rd Amherst NH 03031	WHITESTONE, NY 11357
Telephone # 617.897.5674	718-559-4290
Email: kburgener@sheehan.com	lcohen@jetrord.com

PROJECT ENGINEER:	SURVEYOR:
Name: KEITH CURRAN, P.E. - BOHLER, LLC	KEACH-NORDSTROM ASSOCIATES, LLC
Address: 3 EXECUTIVE PARK, SUITE 202	10 COMMERCE PARK NORTH, SUITE 3B
Address: BEDFORD, NH 03110	BEDFORD, NH 03110
Telephone # 603.441.2900	603.627.2881
Email: kcurran@bohlereng.com	chickey@keachnordstrom.com

PURPOSE OF PLAN:
Please refer to attached cover letter.

(For Town Use Only)

Routing Date: ____________ Deadline Date: ____________ Meeting Date: ____________

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

____________ Title: ______________________ Date: ____________
(Initials)

Department:

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

Attachment "A"

SITE DATA SHEET

PLAN NAME: Site Development Plans for Restaurant Depot, LLC

PLAN TYPE: SITE PLAN

LEGAL DESCRIPTION: MAP 243 LOT 34

DATE: ______________________

Location by Street:	273 Lowell Road		
Zoning:	G-1 & Wetland Conservation District		
Proposed Land Use:	Commercial		
Existing Use:	Vacant Land		
Surrounding Land Use(s):	Residential - East, Commercial - All other sides		
Number of Lots Occupied:	One (1) Lot		
Existing Area Covered by Building:	N/A Vacant Land		
Existing Buildings to be removed:	N/A Vacant Land		
Proposed Area Covered by Building:	50,000± SF		
Open Space Proposed:	(11.7% Interior Landscape)		
Open Space Required:	10% Interior Landscape		
Total Area:	S.F.: 457,281	Acres: 10.5	
Area in Wetland:	0.248 AC	Area Steep Slopes: 17,865 SF EXIST	
Required Lot Size:	87,120 SF		
Existing Frontage:	405.09 FT		
Required Frontage:	200.0 FT		

Building Setbacks:	Required*	Proposed
Front:	50 FT	168.8 FT
Side:	15 FT	64.8 FT
Rear:	15 FT	382.2 FT

SITE DATA SHEET
(Continued)

Flood Zone Reference: Zone X

Width of Driveways: 30 FT

Number of Curb Cuts: One (1)

Proposed Parking Spaces: 173

Required Parking Spaces: 84/250

Basis of Required Parking (Use): Will vary depending on how Zoning will classify the use, we are showing between retail and industrial warehouse required parking, please see site plan.

Dates/Case #/Description/Stipulations of ZBA, Conservation Commission, NH Wetlands Board Actions: N/A
(Attach stipulations on separate sheet)

Waiver Requests

Town Code Reference: *Regulation Description:*

Please see attached waiver request form.

(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: ______________________ Date: 1/20/26

Print Name of Owner: PHILIP J. FRIER, III

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

Signature of Developer: ______________________ Date: 1/15/26

Print Name of Developer: Larry Cohen

- 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.

SITE PLAN APPLICATION AUTHORIZATION

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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: ______________________ Date: 1/20/2026

Thomas Hart, Trust Officer IQ EQ - Ttee of Administrative Trust c/u Thomas

Print Name of Owner: Friel 2021 Revocable Trust

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

Signature of Developer: ______________________ Date: 1/15/26

Print Name of Developer: Larry Cohen

- ❖ 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.

SCHEDULE OF FEES

A. REVIEW FEES:

1. **Site Plan Use** | **Project Size/Fee**

Multi-Family	$105.00/unit for 3-50 units $78.50/unit for each additional unit over 50	$__________
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.	$ 7,850.00
Industrial	$150.00/1,000 sq.ft for first 100,000 sq.ft. (bldg. area); $78.50/1,000 sq.ft thereafter.	$__________
No Buildings	$30.00 per 1,000 sq.ft. of proposed developed area	$__________

CONSULTANT REVIEW FEE: (Separate Check)

Total 10.498 acres @ $600.00 per acre, or $1,250.00, whichever is greater. $ 6,298.80

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.

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.

B. POSTAGE:

11 Direct Abutters Applicant, Professionals, etc. as required by RSA 676:4.1.d @$6.08 **(or Current Certified Mail Rate)** $ 66.88

2 Indirect Abutters (property owners within 200 feet) @$0.78 **(or Current First Class Rate)** $ 1.56

C. TAX MAP UPDATING FEE: (FLAT FEE) $ 275.00

TOTAL $ 14,492.24

SCHEDULE OF FEES
(Continued)

(For Town Use)

AMOUNT RECEIVED:	$________________	DATE RECEIVED:	________________
RECEIPT NO.:	________________	RECEIVED BY:	________________

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

D. RECORDING:

*****The applicant shall be responsible for the recording of the approved plan, and all documents as required by an approval, at the Hillsborough County Registry of Deeds (HCRD), located at 19 Temple Street, Nashua, NH 03061. Additional fees associated with recording can be found at HCRD.*****

E. 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.*****

TOWN OF HUDSON
SITE PLAN REVIEW CHECKLIST

This checklist is intended to help the applicant and staff to ensure application completeness. Please refer to the regulations on the exact language of each requirement.

Key: Y=Yes   P =Pending   W=Waiver Request

Relevant Regulations:
§ 276-11.1 General Plan Requirements
§§ 275-8 – 275-9 Site Plan Requirements

	Y	P	W		Notes
1.	☑	☐	☐	- A list of the names and addresses of the owner(s) of the property, the applicant(s), and all abutters as indicated in the office of the Town Assessor records not more than five (5) days prior to the day of filing **[§ 276-11.1.A.]**	
2	☑	☐	☐	- Sets of plans and copies as indicated on application.	
3.	☑	☐	☐	- Scale no smaller than 50 feet to the inch (1" = 50') **[§ 276-11.1.B.(2)]**	
4.	☑	☐	☐	- Title block in the lower right-hand corner of the plan, containing: **[§ 276-11.1.B.(3)]**	
5.	☑	☐	☐	- Title, including the term "site plan" or "subdivision plan"	
6.	☑	☐	☐	- The name for whom the plan was prepared	
7.	☑	☐	☐	- Preparer of the plan	
8.	☑	☐	☐	- The scale(s) of the plan	
9.	☑	☐	☐	- Date of the plan	
10.	☑	☐	☐	- Appropriate revision block	
11.	☑	☐	☐	- Approval block (2"x6") located on the lower left corner of each sheet, with the required language and signature line **[§ 276-11.1.B.(4) & § 289-27.A]**	
12.	☑	☐	☐	- Owner's printed name and address and signature **[§ 276-11.1.B.(6)]**	
13.	☑	☐	☐	- Name and address of all abutting property owners **[§ 276-11.1.B.(7)]**	
14.	☑	☐	☐	- A locus plan at one inch equals 1,000 feet (1" = 1,000') **[§ 276-11.1.B.(8)]**	

(Continue next page)

15. ☑ ☐ ☐ - Boundary of the entire parcel held in single ownership with boundary dimensions and bearings **[§ 276-11.1.B.(9)]**
16. ☑ ☐ ☐ - Error of closure shown and certified by a licensed land surveyor
17. ☑ ☐ ☐ - North point arrow
18. ☑ ☐ ☐ - Zoning classification note of the tract and location of the zoning district boundaries if the property is located in two or more zoning district **[§ 276-11.1.B.(10)]**
19. ☑ ☐ ☐ - The location of all buildings within 50 feet of the tract **[§ 276-11.1.B.(15)]**
20. ☑ ☐ ☐ - The location of roadways, driveways, travel areas or parking areas within 200 feet of the tract, in accordance with **§ 276-11.1.B.(16)**
21. ☑ ☐ ☐ - Existing topography at two-foot contour intervals of that portion of the tract being proposed for development from a topographic survey and contours on the remainder of the tract from a reliable plan source **[§ 276-11.1.B.(17)]**
22. ☑ ☐ ☐ - Proposed topography at two-foot contour intervals **[§ 276-11.1.B.(18)]**
23. ☑ ☐ ☐ - A note identifying the Tax Map and Lot Number of the tract **[§ 276-11.1.B.(19)]**
24. ☑ ☐ ☐ - The location of all existing buildings (including size and height), driveways, sidewalks, parking spaces, loading area, open spaces, large trees, open drainage courses, signs, exterior lighting, service areas, easements landscaping and other pertinent items. **[§ 276-11.1.B.(20)]**
25. ☑ ☐ ☐ - The location of all proposed construction, buildings, structures, pavement, etc. **[§ 276-11.1.B.(21)]**
26. ☑ ☐ ☐ - A green area shown between the right-of-way line and any pavement, gravel or structure meeting the required minimum width **[§ 276-11.1.B.(22)]**
29. ☑ ☐ ☐ - Note any pertinent highway projects. **[§ 276-11.1.B.(23)]**

(Continue next page)

TOWN OF HUDSON
SITE PLAN REVIEW CHECKLIST

This checklist is intended to help the applicant and staff to ensure application completeness. Please refer to the regulations on the exact language of each requirement.

Key: Y=Yes P =Pending W=Waiver Request NA=Not Applicable (please explain)

No.	***Y***	***P***	***W***	***NA***	Item	***Notes***
30.	☑	☐	☐		- The location of all building setback lines as required by Chapter 334, Zoning, and setback lines as required by **§ 276-11.1.B.(12)**.	
31.	☑	☐	☐		- The location size and character of all signs or a note* stating "All signs are subject to approval by the Hudson Zoning Administrator prior to installation thereof." [**§ 276-11.1.B.(13)**] *The discrepancy on the note language is correct – reference to the Planning Board in the regulations is outdated.	
32.	☑	☐	☐		- The location, detail and character of all exterior lighting or a note stating: "There will be no exterior lighting." [**§ 276-11.1.B.(14)**]	
33.	☑	☐	☐	☐	- Required open space, including the calculation showing the requirement is met [**§ 276-11.1.B.(24)**]	
34.	☑	☐	☐	☐	- Parking space calculation showing and a statement stating the required parking spaces are provided [**§ 275-8.C.(2) & (3)**]	
35.	☑	☐	☐	☐	- Required dimensions for parking space [**§ 275-8.C.(4)]**	
36.	☑	☐	☐	☐	- Required dimensions for aisle/access drive [**§ 275-8.C.(5)]**	
37.	☑	☐	☐	☐	- Required off-street loading spaces [**§ 275-8.C.(6)]**	
38.	☑	☐	☐	☐	- Required landscaping for the parking lot, including calculation shown the planting requirement is met [**§ 275-8.C.(7)]**	
39.	☐	☐	☐	☑	- Required screening for visual separation of incompatible uses [**§ 275-8.C.(8)]**	
40.	☑	☐	☐	☐	- Handicap accessibility provided in accordance with the latest ADA Regulations [**§ 275-8.C.(11)]**	
41.	☑	☐	☐	☐	- Stormwater Management Plan [**§ 275-9.A]**	
42.	☑	☐	☐	☐	- Traffic Study, if required [**§ 275-9.B]**	
43.	☐	☐	☐	☑	- Noise Study, if required [**§ 275-9.C]**	

(Continue next page)

TOWN OF HUDSON
SITE PLAN REVIEW CHECKLIST

This checklist is intended to help the applicant and staff to ensure application completeness. Please refer to the regulations on the exact language of each requirement.

Key: Y=Yes P =Pending W=Waiver Request NA=Not Applicable (please explain)

	Y	P	W	NA		Notes
44.	☐	☐	☐	☑	- Fiscal Impact Study, if required [**§ 275-9.D]**	
45.	☐	☐	☐	☑	- Utility Study [**§ 275-9.E]**	
46.	☐	☐	☐	☑	- Copies of any proposed or existing easements, covenants, deed restrictions or any other similar document pertinent to the Site Plan [**§ 275-9.F]**	
47.	☐	☐	☐	☑	- A copy of all applicable Town, state, county or federal approvals or applications [**§ 275-9.G]**	
48.	☐	☐	☐	☑	- Environmental Impact Study, if required [**§ 275-9.I]**	

(End of checklist)

Attachment "A"

<u>SCHEDULE OF FEES</u>

(Fee covers both Conservation Commission & Planning Board)

A. <u>REVIEW FEES:</u>

1. Conditional Use Permit
   $100 Flat Fee $_ 100.00____

<u>LEGAL FEE:</u>

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

B. <u>POSTAGE:</u>

11____ Direct Abutters Applicant, Professionals, etc. as required by RSA 676:4.1.d @$6.08 **(or Current Certified Mail Rate)** $66.88_______

2____ Indirect Abutters (property owners within 200 feet) @$0.78 **(or Current First-Class Rate)** $1.56_______

TOTAL $168.44_______

(For Town Use)

AMOUNT RECEIVED:	$_________________	DATE RECEIVED:	__________________
RECEIPT NO.:	_________________	RECEIVED BY:	__________________

Attachment "A"

BOHLER

3 Executive Park Drive
Bedford, NH 03110
603.441.2900

Abutters List

Direct/Indirect	Parcel_ID	Address	Owner
Indirect	234-036-000	274 LOWELL RD	MACTHOMPSON REALTY, INC.
Indirect	228-054-000	272 LOWELL RD	NEW LIFE CHRISTIAN CHURCH
Indirect	228-052-000	268 LOWELL RD	DEXTER, KAREN
Direct	234-034-000	273 LOWELL RD	FRIEL, THOMAS P., TR.
Direct	234-033-000	277 LOWELL RD	277 LOWELL RD LLC
Indirect	234-032-000	279 LOWELL RD	KOMMA HOLDING, LLC
Indirect	234-017-000	9 LINDA ST	LIAKOS, ARTHUR
Direct	234-014-000	18 LINDA ST	WONG, DON R.
Direct	234-013-000	16 LINDA ST	CARROLL, ROY
Direct	234-012-000	12 LINDA ST	TEMPESTA, MARK
Direct	234-011-000	10 LINDA ST	STEVENS, SEAN P.
Indirect	234-031-000	281 LOWELL RD	ROBINSON, MICHELLE J.
Indirect	234-037-000	280 LOWELL RD	MACTHOMPSON REALTY INC.

Attachment "A"

SUBDIVISION/SITE PLAN WAIVER REQUEST FORM
Town of Hudson, New Hampshire

Name of Subdivision/Site Plan: Proposed Restaurant Depot

Street Address: 273 Lowell Road

I Keith Curran, P.E. hereby request that the Planning Board waive the requirements of item HR 275-8.C.(2) & Zoning Ordinance (ZO) 334-15.A of the Subdivision/Site Plan Checklist in reference to a plan presented by Keach-Nordstrom Associates, Inc & Bohler, LLC (name of surveyor and engineer) dated 01/23/26 rev 03/24/26 for property tax map(s) 234 and lot(s) 34 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. (For Subdivisions) and RSA 674:44, III (e) (For Site-Plans). 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 Subdivision/Site Plan 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 Subdivision/Site Plan regulations: (if additional space is needed please attach the appropriate documentation hereto):

See next page:

____

____

Signed: Keith Curran, P.E.

Applicant or Authorized Agent

<u>Planning Board Action:</u>

Waiver Granted ______________________________

Waiver Not Granted ___________________________

Attachment "A"

Restaurant Depot ("RD") does not readily fall into a type of use classified within Hudson's Zoning Ordinance, which the nearest being retail or industrial/warehouse. RD is a distributor/seller of approximately 6,000 different items. Their product range extends from dry groceries, perishables (produce, meat, fish), fresh and frozen foods, paper and plastics, to equipment and supplies but in much larger packages than a grocery store or club store. RD does not do any cooking, cutting, fabricating, processing, or preparation of food. All of their product is sold in its original form. This location will be open to the general public and will be open 7 days a week. As January 1st, 2026, RD operates 164 locations in 35 states and has understanding of the parking they need to fulfill their operations.

Attachment "A"

SUBDIVISION/SITE PLAN WAIVER REQUEST FORM
Town of Hudson, New Hampshire

Name of Subdivision/Site Plan: Proposed Restaurant Depot

Street Address: 273 Lowell Road

I Keith Curran, P.E. hereby request that the Planning Board waive the requirements of item HR 275-8.C.(6)(b) of the Subdivision/Site Plan Checklist in reference to a plan presented by Keach-Nordstrom Associates, Inc & Bohler, LLC (name of surveyor and engineer) dated 01/23/26 rev 03/24/26 for property tax map(s) 234 and lot(s) 34 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. (For Subdivisions) and RSA 674:44, III (e) (For Site-Plans). 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 Subdivision/Site Plan 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 Subdivision/Site Plan regulations: (if additional space is needed please attach the appropriate documentation hereto):

Restaurant Depot is providing the necessary amount of loading docks to support their operations.

____

Signed: [signature] Keith Curran, P.E.

Applicant or Authorized Agent

Planning Board Action:

Waiver Granted ______________________________

Waiver Not Granted ______________________________

Attachment "A"

SUBDIVISION/SITE PLAN WAIVER REQUEST FORM
Town of Hudson, New Hampshire

Name of Subdivision/Site Plan: Proposed Restaurant Depot

Street Address: 273 Lowell Road

I Keith Curran, P.E. hereby request that the Planning Board waive the requirements of item HR276-11.1.B.(25). of the Subdivision/Site Plan Checklist in reference to a plan presented by Keach-Nordstrom Associates, Inc & Bohler, LLC (name of surveyor and engineer) dated 01/23/26 rev 03/24/26 for property tax map(s) 234 and lot(s) 34 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. (For Subdivisions) and RSA 674:44, III (e) (For Site-Plans). 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 Subdivision/Site Plan regulations.

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

Restaurant Depot is seeking to provide enough parking to support their operations, however three (3) parking spaces will encroach within the property setback lines. We are providing the required interior landscaping that drives the need to extend the parking into the setback. The site is constrained by shallow bedrock to the east and wetlands to the south and west and no improvements can fit within 100 feet of the residential abutters.

Reason(s) for granting this waiver, relative to not being contrary to the Spirit and Intent of the Subdivision/Site Plan regulations: (if additional space is needed please attach the appropriate documentation hereto):

____

____

____

Signed: [signature] Keith Curran, P.E.

Applicant or Authorized Agent

Planning Board Action:

Waiver Granted ______________________________

Waiver Not Granted ___________________________

BOHLER //

Attachment "B"

3 Executive Park Drive
Bedford, NH 03110
603.441.2900

January 23, 2026 *Via Federal Express*

Planning Department
12 School Street
Hudson, NH 03051

Attn: Brooke Dubowik, Town Planner

Re: Site Plan Review Application
Proposed Restaurant Depot
273 Lowell Road
Hudson, NH

Dear Ms. Dubowik:

On behalf of the Applicant, Restaurant Depot, LLC, Bohler is submitting this package for a Site Plan Review Application and supporting materials for the proposed restaurant depot at the above referenced site.

Restaurant Depot, LLC ("Applicant") proposes to develop 273 Lowell Road (Map 234, Block 34, Lot 0) in Hudson, New Hampshire. Development efforts consist of constructing a new commercial use building, associated parking areas, drive aisles, pedestrian walkways, and landscaped zones. The development will be served by public water, private on-site septic, and incorporate a surface infiltration basin to manage runoff in compliance with local and state regulations.

In support of this application, please find the following enclosed:

- One (1) original completed application.
- One (1) Waiver Request Form.
- One (1) List of Direct and Indirect Abutters.
- Two (2) sets of mailing labels for the abutter notifications.
- One (1) Site Review Checklist.
- One (1) Copy of Cover Letter to Conservation Commission.
- One (1) Copy of Cover Letter to Peer Reviewer.
- One (1) full plan set folded (sheet size: 22" x 34") of Site Development Plans prepared by our office dated 01/23/2026.
- One (1) full size set of folded Architectural Plans (sheet size: 30"x42"); (including floor plan, elevations, and renderings) prepared by ADA Architects dated 01/23/2026.
- Fifteen (15) Copies of plan set folded (sheet size: 11"x17") of Site Development Plans prepared by our office dated 01/23/2026.
- Fifteen (15) Copies of plan set folded (sheet size: 11"x17") of Architectural Plans (including floor plan, elevations, and renderings) prepared by ADA Architects dated 01/23/2026.
- One (1) Traffic Study Report.
- One (1) Stormwater Management Report.
- Two (2) Schedule of Fees Forms (site plan and conservation commission conditional use).
- Three (3) Checks to cover review fees (site plan, conservation commission conditional use, and peer review).
- All of the above application materials, including plans, shall also be submitted in electronic form as a PDF.

Attachment "B"

We trust the above is sufficient for your review of the project. Should you have any questions or require additional information, please do not hesitate to contact us at (603) 441-2900.

Sincerely,

Bohler, LLC

Keith Curran, Senior Project Manager, P.E.

Attachment "C"

Planning Board Sign-off

Project Name	SP# 01-26 Restaurant Depot	Map/Lot:	234-034-000
Site Address:	273 Lowell Road	Zone:	General - 1
		Due by:	10/25/25

Project Status		**Ready for Approval**	**Awaiting Revisions**	**Approval with Stipulations**
DEPARTMENT	**INITIAL**			
FUSS & O'NEILL:	DK	✔		
ZONING:	CS	✔		
ASSESSING:	JM	✔		
ENGINEERING:	EZD	✔		
PUBLIC WORKS:	JT	✔		
FIRE:	DRH	✔		
POLICE:	PMM	✔		

Comments:

ZONING:

ASSESSING:

ENGINEERING:

PUBLIC WORKS:

FIRE:

POLICE:

Attachment "C"

Planning Board Sign-off

Project Name	SP# 01-26 Restaurant Depot	Map/Lot:	234-034-000
Site Address:	273 Lowell Road	Zone:	General - 1
		Due by:	10/25/25

Extended Comments:

Engineering comments have been addressed. Snow storage is not within wetland buffers; however, it is adjacent to one buffer area. The applicant should consider snow removal contractors with the Commercial Green SnowPro certification.

BOHLER

3 Executive Park Dr Floor 2
Bedford, NH 03110
603.441.2900

March 24, 2026 *Via Email and Federal Express*

Hudson Planning Board
12 School Street
Hudson, NH 03051

Attention: Brooke Dubowik – Town Planner

RE: Response to Comments
CSP# 03-25 Restaurant Depot
273 Lowell Road

Dear Members of the Board:

Bohler Engineering is in receipt of a comment letter from The Engineering Department from the town of Hudson. On behalf of Applicant Restaurant Depot, LLC, Bohler offers the following responses. For clarity, the original comments are in italics, while our responses are directly below in bold type.

Comment 1: Applicant shall provide snow storage area.

Response: Snow storage areas have been indicated on Sheet C-301.

Comment 2: Applicant shall provide fire apparatus wheel movement on a separate plan.

Response: A fire truck turn plan has been prepared. Please refer to sheet C-302.

Comment 3: Applicant shall increase the water line service to a minimum 10" to accommodate the 6" fire hydrant service, 8" fire suppression and 2.5" domestic service.

Response: The water line service has been revised to indicate a 10" line to accommodate the 6" fire hydrant service, 8" fire suppression, and 2.5" domestic service. Refer to Sheet C-501.

Comment 4: The detention basin appears six feet deep, applicant shall consider a 4 foot safety fence.

Response: A four (4) foot black vinyl coated chain link fence has been indicated on the site plan. Refer to Sheet C-301.

Comment 5: Applicant shall review the need for a guardrail along the detention basin, currently showing a seven foot drop from edge of pavement to bottom of basin.

Response: A wooden guide rail has been indicated on the site plan. Refer to sheet C-301.

Should you have any questions or require additional information please do not hesitate to contact me at 508-480-9900. We look forward to your continued review of the project and discussing it further with you.

Sincerely,

BOHLER, LLC

Keith Curran, Senior Project Manager, P.E.

3 Executive Park Dr Floor 2
Bedford, NH 03110
603.441.2900

March 24, 2026 *Via Email and Federal Express*

Hudson Planning Board
12 School Street
Hudson, NH 03051

Attention: Brooke Dubowik – Town Planner

RE: Response to Comments
P# 01-26/CUP# 01-26 Restaurant Depot
273 Lowell Road

Dear Members of the Board:

Bohler Engineering is in receipt of a comment letter from The Fire Department from the town of Hudson. On behalf of Applicant Restaurant Depot, LLC, Bohler offers the following responses. For clarity, the original comments are in italics, while our responses are directly below in bold type.

Comment 1: Add one fire hydrant inside the site in the proposed landscaped island heading into the parking lot furthest away from the building. Show the hydrant on a revised site plan prior to fire department approval.

Response: A fire hydrant has been added inside the site in the landscaped island. Please refer to sheet C-501.

Should you have any questions or require additional information please do not hesitate to contact me at 508-480-9900. We look forward to your continued review of the project and discussing it further with you.

Sincerely,

BOHLER, LLC

Keith Curran, Senior Project Manager, P.E.

Attachment "D"

DRAINAGE REPORT / DRAFT ALTERATION OF TERRAIN PERMIT APPLICATION

FOR

PROPOSED
RESTAURANT DEPOT
273 LOWELL ROAD
HUDSON, NEW HAMPSHIRE

PREPARED BY:
BOHLER ENGINEERING
3 EXECUTIVE PARK DRIVE, SUITE 202
BEDFORD, NH 03110
(603)-441-2900 TEL.

J.A. KUCICH
NEW HAMPSHIRE P.E. LIC. # 15476

BOHLER

JANUARY 23, 2026, revised March 24, 2026
#NHA250020.01

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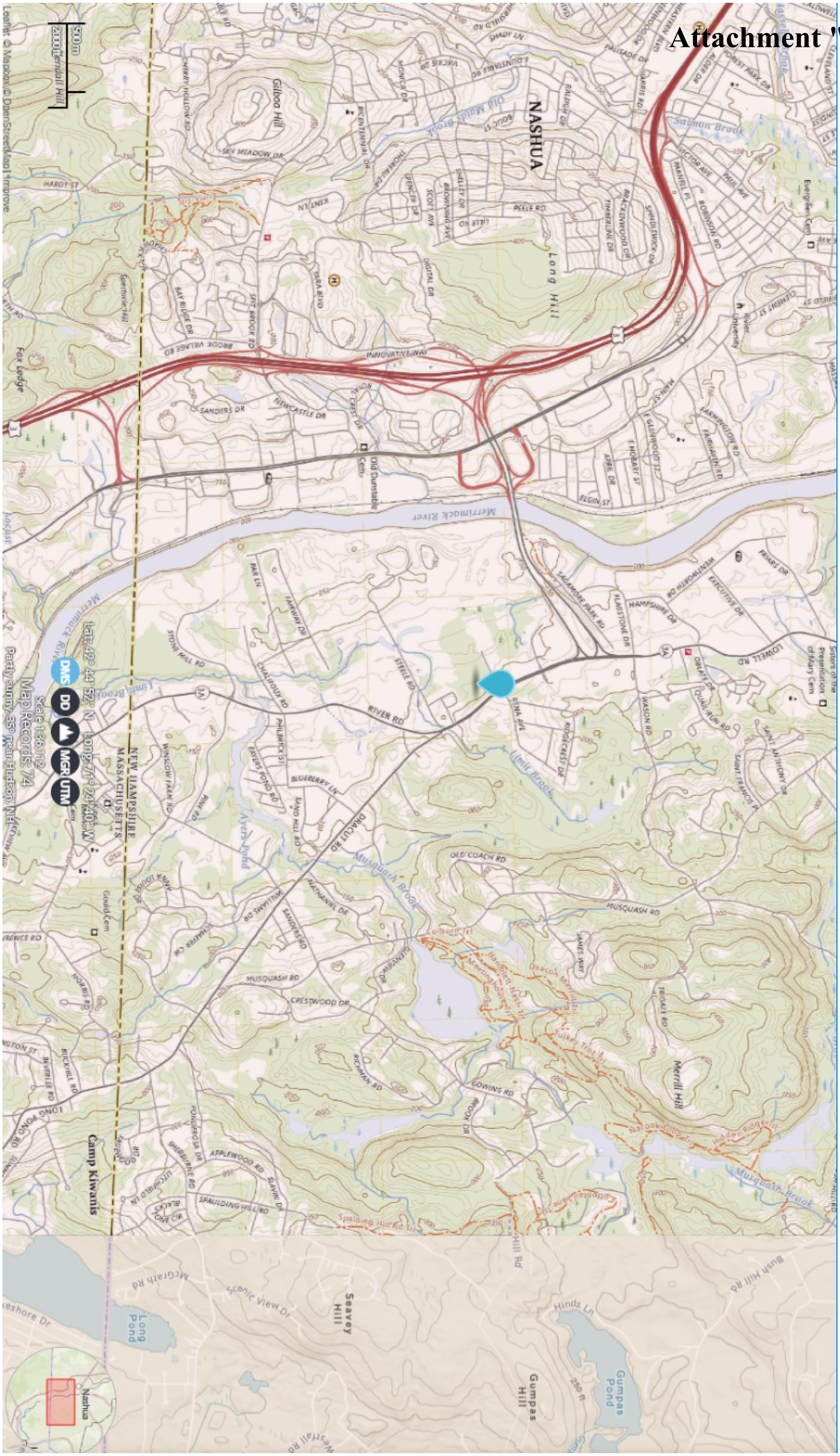
Attachment "D"

SECTION A: COPY OF SIGNED APPLICATION FORM & CHECKLIST – NOT USED (FOR AOT)

SECTION B: COPY OF CHECK (INCLUDED SEPARATELY) - NOT USED (FOR AOT)

SECTION C: USGS MAP (1” = 2000’ SCALE)

Attachment "D"



SECTION D: PROJECT NARRATIVE

PROJECT NARRATIVE

I. Description

Restaurant Depot, LLC ("Applicant") proposes to develop 273 Lowell Road (Map 234, Block 34, Lot 0) in Hudson, New Hampshire. Development efforts consist of constructing a new commercial-use building, associated parking areas, drive aisles, pedestrian walkways, and landscaped zones. The development will be served by public water, private on-site septic, and incorporate a surface infiltration basin to manage runoff in compliance with local and state regulations. A pre-application meeting with NHDES was held virtually on 02/25/2026 to discuss the project and the implementation of stormwater practices.

II. Pre-Development Conditions

The subject site is a 10.5± acre parcel of land, denoted as Lot 0 on Assessor's Map 234. The site is located at 273 Lowell Road within the General (G1) District and Wetland Conservation District. The site is primarily surrounded by wooded areas with Hudson Logistics Center (under construction AOT 221104-198) to the west, a church across Route 3A to the northeast, and residential uses to the south. The site consists of woods, limited cleared areas / paths, a tee box, and wetlands.

The site is not located in a FEMA floodplain.

According to Natural Resource Conservation Service (NRCS), most of the onsite soils are mapped as Agawam fine sandy loam, Deerfield loamy fine sand, and Windsor loamy sand. These soils are classified as Hydrologic groups "B", "A", and "A", respectively. A Site-Specific Soil Survey (SSS) prepared by TES Environmental Consultants, LLC, classified soils on-site as HSG "A", "B", and "C". Refer to section L for additional information. For the areas outside the SSS, NRCS soils are classified as HSG "A".

The site drains from northeast to southwest following the natural terrain to a wetland that drains to Limit Brook within the Merrimack River watershed.

A Natural Heritage Bureau (NHB) DataCheck was completed to determine if threatened or endangered species were mapped within the vicinity of the proposed improvements. No further consultation with the New Hampshire Fish and Game Department pursuant to Fis 1004 is required.

III. Post-Development Conditions

The project proposes the construction of a single 50,000± square foot (SF) building with associated paved parking areas, driveways, landscaping, utilities, and stormwater management systems. The site will be served by public water. The gas, electric, and communications services are proposed by connections to existing infrastructure brought to the site by Hudson Logistics Center. The site will utilize a proposed septic system.

There is a 3.7± acres net increase of impervious area and total disturbance of 5.5± acres.

The stormwater management system has been designed in accordance with the standards described in Env-Wq 1500 and the Town of Hudson Ch 290 Stormwater Management requirements.

The stormwater control measures (SCMs formerly best management practices (BMPs)) incorporated are deep sump catch basins, online proprietary water quality units, and a surface infiltration basin. The proposed development area has been designed to drain to the SCMs via a conventional closed-pipe drainage system with catch basins. Pretreatment of stormwater runoff is achieved by hydrodynamic separators, prior to discharge into the associated proposed stormwater management area. Please refer to the enclosed Site Plan Documents and HydroCAD for additional detail regarding the proposed stormwater management features included as part of the project.

IV. Drainage Analysis

The analysis was completed with HydroCAD, utilizing the SCS TR-20 Runoff Method, 24-hour duration NRCS Type III storm distribution, and rainfall depths from Northeast Regional Climate Center for the site location.

Pipes have been designed for the 25-year storm using the Hydraflow Storm Sewers Extension for Autodesk Civil 3D. The pipe that passes under the paved accessway has been designed for the 50-year storm. Outlet Protection in the form of riprap apron is provided at each outfall and designed for the 25-year storm for stormwater basin inflows and 50-year storm for stormwater basin outflows for the pipe under the access drive.

The table below summarizes the pre-development versus post-development peak discharge rates at the design points (DP), where DP1 is the wetlands and DP2 is the southern abutters.

Peak Flow Discharge in cubic feet per second (cfs)															
	1-year			**2-year**			**10-year**			**25-year**			**50-year**		
	Pre-	Post-	Delta	Pre-	Post-	Delta	Pre-	Post-	Delta	Pre-	Post-	Delta	Pre-	Post-	Delta
DP1	0.07	0.07	0.00	0.25	0.22	-0.03	1.57	1.34	-0.23	3.20	2.68	-0.52	5.08	5.05	-0.03
DP2	0.17	0.01	-0.16	0.29	0.01	-0.28	0.77	0.08	-0.69	1.22	0.16	-1.06	1.68	0.24	-1.44

Env-Wq 1507.03 - Pollutant Discharge Minimization

This criterion is met by providing WQV in the surface infiltration basin and pretreating the WQF via proprietary water quality units. Refer to the SCM worksheets enclosed for additional information.

Env-Wq 1507.04 - Groundwater Recharge

This criterion is met via the surface infiltration basin. Refer to the SCM worksheets and infiltration feasibility report enclosed for additional information.

Env-Wq 1507.05 - Channel Protection

This criterion is met as the site complies with 1507.05(b)(1)b.

1507.05(b)(1) The 2-year, 24-hour post-development peak flow rate generated from the proposed disturbance shall be equal to or less than the 2-year, 24-hour pre-development peak flow rate and:

- b. The 2-year, 24-hour post-development peak flow rate directed to a channel, downstream receiving water, or wetland is less than 2 cfs.

Env-Wq 1507.06 - Peak Runoff Control

The table above demonstrates the attenuation of peak rates of post-development runoff for the 10 and 50 yr events. The 25 yr is provided to comply with the Town of Hudson.

Env-Wq 1507.07 – Long-Term Maintenance

An Operation and Maintenance Plan is enclosed.

Specific Local Requirements

The Code Chapter 290 – Stormwater Management - §290-5.A Post-Construction Stormwater Management Standards for New and Redevelopment

(1) *Low-Impact Development (LID) to the maximum extent practical, to reduce the disturbance and impervious cover, minimize the volume of stormwater runoff discharged from the site, as well as preserve and protect existing vegetation. If LID measures are determined to be impractical or inappropriate, the Applicant shall document in writing why LID strategies or measures are not appropriate or practical for the particular site.*

The site was carefully planned with the following LID site planning techniques: minimize disturbed areas, maintain natural buffers, and fit to the terrain.

(2) *Stormwater runoff from developed portions of the site shall be treated on site to the maximum extent practicable and not discharged directly to municipal drainage systems, privately owned drainage systems or to surface water bodies and wetlands that will cause adverse water quality impacts or additional flooding.*

This standard is met by compliance with Env-Wq 1507.03 above.

(3) *Minimize the amount of effective impervious area through use of permeable pavement, capture/reuse measures or other methods designed to disconnect impervious area and retain/infiltrate water on site through vegetative islands, rain gardens, bioretention systems, tree box filters and/or filter strips.*

The site is best suited for conventional closed pipe drainage system to direct stormwater runoff to the area with soils suitable for infiltration. Disconnecting impervious areas is restricted by (1) Shallow bedrock on the East side prevents the use of stormwater measures to disconnect impervious area, (2) the 100’ zoning buffer to residential zones on the South side leaves little lot width to the North after incorporating the programmed parking spaces, and (3) the West is impractical as there is not enough land area to achieve the treatment and attenuation measures prior to the wetlands.

(4) *Maintain existing groundwater recharge volume GRv in accordance with the NHDES Alteration of Terrain regulations (Env-Wq 1504.04) while accounting for the existing Hydrologic Soil Group (HSG) types. For sites where infiltration is limited or not practicable, the applicant must demonstrate that the project will not create or contribute to water quality impairment. All groundwater recharge systems shall require on-site test pit and percolation test data to be submitted as part of the review.*

This standard is met by compliance with Env-Wq 1507.04 above.

(5) *Implement measures to control the post-development peak rate runoff so that it does not exceed pre-development runoff. Drainage analyses shall include calculations comparing pre- and post-development stormwater runoff rates (cubic feet/second) and volumes (cubic feet) for the two-, ten-, twenty-five-, and fifty-year twenty-four-hour storm events.*

This standard is met by compliance with Env-Wq 1507.06 above. Volumes are reported in the table below.

Volume Discharge in cubic feet (cf) from 72-hr Time Span															
	1-year			2-year			10-year			25-year			50-year		
	Pre-	Post-	Delta	Pre-	Post-	Delta	Pre-	Post-	Delta	Pre-	Post-	Delta	Pre-	Post-	Delta
DP1	1,166	1,024	-142	2,403	2,063	-340	8,557	7,119	**-1,438**	15,793	12,870	**-2,923**	24,791	24,717	-74
DP2	1,039	70	-969	1,628	138	-1,490	3,910	453	**-3,457**	6,715	945	**-5,770**	11,125	1,833	-9,292

(6) *Stormwater management BMP sizing and design shall be based on the extreme precipitation tables posted at the Northeast Region Climate Center (NRCC). See NRCC website at http://precip.eas.cornell.edu/.*

This standard is met as NRCC data is utilized for this design.

(7) *The proposed stormwater drainage system shall not result in flooding or functional impairment to streets, adjacent properties, downstream properties, soils, or vegetation while accounting for upstream and upgradient runoff that flows onto, over, or through the site to be developed or redeveloped and provide for this contribution of runoff.*

This standard is met as there are no anticipated impairment to any of the above locations with the incorporation of the proposed stormwater and erosion control measures.

(8) *Where practical, native site vegetation shall be retained, protected, or supplemented. Vegetation removal shall be done in a manner that minimizes soil erosion.*

This standard is met as vegetation is maintained to the maximum extent practicable disturbing only what's necessary to facilitate this development. The development was placed as far away from wetland buffers as feasible and limiting impervious within the buffer only for the required access drive to serve the site.

(9) *Seasonal high-water table elevations must be accounted for in all BMP designs as specified in the New Hampshire Stormwater Manual Volume 2 (as amended)*

This standard is met. Refer to the infiltration feasibility report for more information.

(10) *Locate stormwater management and erosion and sediment control practices outside any protected buffer zones unless otherwise approved by the Planning Board. Alternatives to stream and wetland crossings that eliminate or minimize environmental impacts shall be considered whenever possible.*

We are applying with the Conservation Commission for the conditional use for the access drive and surface basin within the wetland buffers.

(11) *Design in accordance with the NH Stormwater Manual.*

This standard is met through compliance with the applicable sections of Env-Wq 1500 for the Alteration of Terrain permit.

(12) *Develop a long-term maintenance plan and agreement that meets the requirements outlined in § 290-8.*

The applicant will comply with the above requirements.

(13) *Salt storage areas - N/A. Runoff from snow and salt storage areas shall be directed to treatment areas before discharging to receiving waters or allowed to infiltrate into the groundwater.*

Runoff from snow storage areas is pretreated by proprietary water quality units.

§290-5.B-Enhanced Stormwater Management Standards for New Development and Redevelopment Projects that will Disturb 40,000 square feet or more:

1.a. – Retain the WQV to maximum extent practicable

This standard is met by compliance with Env-Wq 1507.03 above.

1.b. – Removal of 80% TSS and 50% TP from impervious area to maximum extent practicable

Pretreatment is provided by the proprietary water quality units with TSS removal rates achieving a minimum of 80%. 50% minimum TP removal is met by treating at least 1 inch of runoff via the surface infiltration basin with an efficiency of 98%.

V. Erosion and Sediment Control Measures

The project proposes temporary and permanent erosion and sedimentation controls. A complete description of the controls can be found on the accompanying plans and detail sheets. The project is subject to the NPDES Stormwater Permit Program requirements. A SWPPP will be developed prior to the start of construction and modified as needed throughout the construction period.

SECTION E: ONESTOP MAPPER

- *"SURFACE WATER IMPAIRMENTS"*
- *"AOT SCREENING LAYERS"*

Map by NHDES OneStop Data Mapper

Attachment "D"

12/31/2025, 12:25:03 PM

EMD PFAS Groundwater Station Samples with 1000ft Buffer

PFAS > MCL (2020) Groundwater Stations

Remediation Sites

Other

Parcels

1:6,215

0 0.04 0.07 0.15 mi

0 0.05 0.1 0.2 km

Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community, NHDRA, Axiomatic, Inc.

Map by NH DES OneStop Data Mapper

Attachment "D"

12/31/2025, 12:28:52 PM

ArcGIS World Geocoding Service

Parcels

1:3,366

0 0.03 0.06 0.12 mi

0 0.05 0.1 0.2 km

Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community, NHDRA, Axiomatic, Inc.

SECTION F: NHB DATA CHECK TOOL LETTER AND CORRESPONDENCE

The State of New Hampshire

Attachment "D"

DEPARTMENT OF ENVIRONMENTAL SERVICES

Robert R. Scott, Commissioner

Date: 12/29/2025 (This letter is valid through 12/29/2026)

Permit Type(s): Hudson
Alteration of Terrain Permit

Project ID: DCT25-3501

Applicant: Restaurant Depot, LLC

Location: Hudson
Tax Map: 234, Tax Lot: 0
Address: 273 Lowell Road

Project Description: Constructing a new 50,000sf building.

Dear Restaurant Depot, LLC:

The provided mapped project area has been checked against available records of protected species occurrences and Exemplary Natural Community (ENC) locations. Based on the information submitted, there are currently no recorded occurrences (known records) of protected species or ENCs expected to be impacted by the proposed project.

DataCheck Tool results only reflect documented and verified occurrences of protected species and ENCs. A negative result does not guarantee that protected species and ENCs are not present at this location, only that their presence has not been documented and verified. As many areas have never been surveyed, or have only been surveyed for certain species, surveys are the best way to determine what species are present on site. Based on the information submitted, no further consultation with the New Hampshire Fish and Game Department pursuant to Fis 1004 is required.

Federal compliance: This letter does not constitute compliance with the federal Endangered Species Act (ESA) for the purposes of meeting federal permitting requirements. There may be occurrences of federally listed species in New Hampshire that are not included in this letter. For ESA compliance, please visit the US Fish and Wildlife Service (USFWS) Information for Planning and Consultation (iPaC) website for an official list of federally listed species that may be present in your project area. If a federal agency is involved in your project through funding, permit or other authorization, coordinate your IPaC results with your point of contact at the agency for further ESA review. If there is no federal agency nexus to your project, and you determine through IPaC, habitat evaluations etc. that a project may cause take of a federally listed species, we recommend coordinating with the USFWS New England Field Office (newengland@fws.gov or 603-223-2541).

Sincerely,

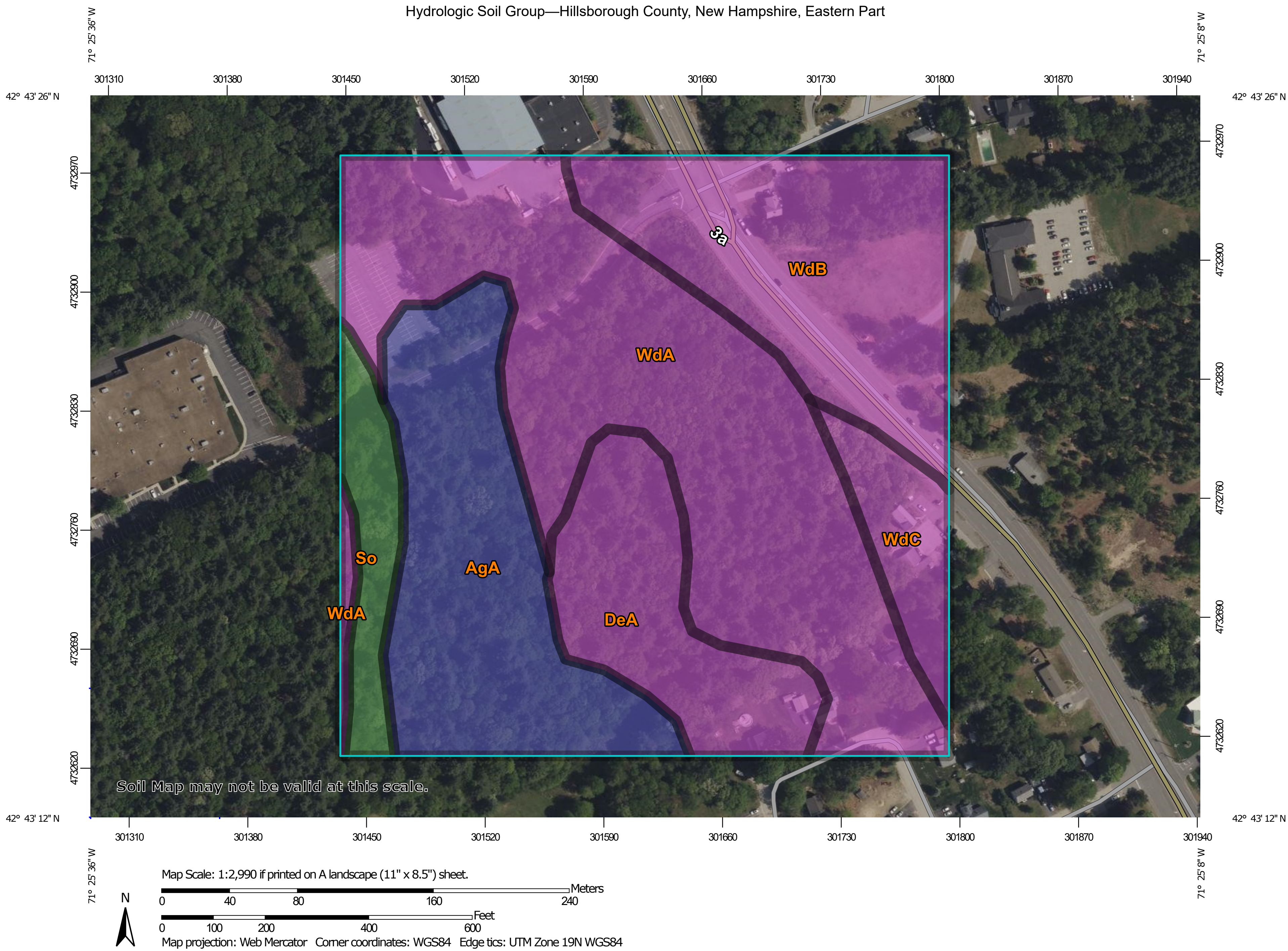
Ryan Esch
Ecological Program Specialist
Ecological Review Section
Land Resources Management Program
(603) 271-7972
ecologicalreviews@des.nh.gov

MAP OF PROJECT BOUNDARIES

SECTION G: NRCS WEB SOIL SURVEY

Attachment "D"

Hydrologic Soil Group—Hillsborough County, New Hampshire, Eastern Part



Attachment "D"

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hillsborough County, New Hampshire, Eastern Part
Survey Area Data: Version 27, Sep 3, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AgA	Agawam fine sandy loam, 0 to 3 percent slopes	B	6.4	20.2%
DeA	Deerfield loamy fine sand, 0 to 3 percent slopes	A	3.8	12.0%
So	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	A/D	1.6	5.0%
WdA	Windsor loamy sand, 0 to 3 percent slopes	A	12.0	38.2%
WdB	Windsor loamy sand, 3 to 8 percent slopes	A	6.2	19.6%
WdC	Windsor loamy sand, 8 to 15 percent slopes	A	1.6	5.0%
Totals for Area of Interest			**31.5**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

SECTION H: AERIAL PHOTOGRAPH (1” = 2000’ SCALE)

Attachment "D"

N

LOCATION MAP

SCALE: 1" = 1,000'
SOURCE: BING MAPS AERIAL IMAGERY

Attachment "D"

SECTION I: SITE PHOTOS

BOHLER
3 Executive Park Drive, Suite 202
Bedford, NH 03110
603.441.2900

Site Photographs:

Map/Lot 243-34
Hudson, NH
September 2025


ury
Matters

Attachment "D"

BOHLER

BOHLER//

SECTION J: GRV AND BMP (SCM) WORKSHEETS

- *BMP WORKSHEETS*
- *TR-55 EXHIBIT 4-III*
- *EPA BMP PERFORMANCE CURVES*

GROUNDWATER RECHARGE VOLUME (GRV)
(Env-Wq 1504.12)

3.72	ac	Area of HSG A soil that was replaced by impervious cover	0.40"
0.04	ac	Area of HSG B soil that was replaced by impervious cover	0.25"
	ac	Area of HSG C soil that was replaced by impervious cover	0.10"
	ac	Area of HSG D soil or impervious cover that was replaced by impervious cover	0.0"
0.40	inches	Rd = Weighted groundwater recharge depth	
1.4978	ac-in	GRV = AI * Rd	
5,437	cf	GRV conversion (ac-in x 43,560 sf/ac x 1ft/12”)	
Y	← Y/N	Is a stage-storage table attached showing that the GRV can be stored below the lowest invert of the outlet structure (if applicable)? Multiple stormwater control measures may be used to meet the GRV requirements.	

Provide calculations/discussion below showing that the project meets the groundwater recharge requirements (Env-Wq 1507.04):

GRV is provided in practice P-1.1.

Total Provided: 39,032 cf

Attachment "D"

GENERAL CALCULATIONS - WQV and WQF
(optional worksheet)

This worksheet may be useful when designing a BMP that does not fit into one of the specific worksheets already provided (such as for a technology which is not a stormwater wetland, infiltration practice, etc.)

Water Quality Volume (WQV)

3.62	ac	A = Area draining to the practice
1.63	ac	A_I = Impervious area draining to the practice
0.45	decimal	I = Percent impervious area draining to the practice, in decimal form
0.45	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)
1.64	ac-in	WQV= 1” x Rv x A
5,968	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12”)

Water Quality Flow (WQF)

1	inches	P = Amount of rainfall. For WQF in NH, P = 1".
0.45	inches	Q = Water quality depth. Q = WQV/A
93	unitless	CN = Unit peak discharge curve number. CN =1000/(10+5P+10Q–10*[Q^2 + 1.25*Q*P] $^{0.5}$)
0.7	inches	S = Potential maximum retention. S = (1000/CN) - 10
0.149	inches	Ia = Initial abstraction. Ia = 0.2S
6.0	minutes	T_c = Time of Concentration
635.0	cfs/mi^2/in	q_u is the unit peak discharge. Obtain this value from TR-55 exhibits 4-II and 4-III.
1.631	cfs	WQF = q_u x WQV. Conversion: to convert "cfs/mi^2/in * ac-in" to "cfs" multiply by 1mi^2/640ac.

Designer's Notes: For Pretreatment to P-1.1: WQU A-20A

Attachment "D"

GENERAL CALCULATIONS - WQV and WQF
(optional worksheet)

This worksheet may be useful when designing a BMP that does not fit into one of the specific worksheets already provided (such as for a technology which is not a stormwater wetland, infiltration practice, etc.)

Water Quality Volume (WQV)

2.42	ac	A = Area draining to the practice
1.63	ac	A_I = Impervious area draining to the practice
0.67	decimal	I = Percent impervious area draining to the practice, in decimal form
0.65	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)
1.58	ac-in	WQV= 1” x Rv x A
5,750	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12”)

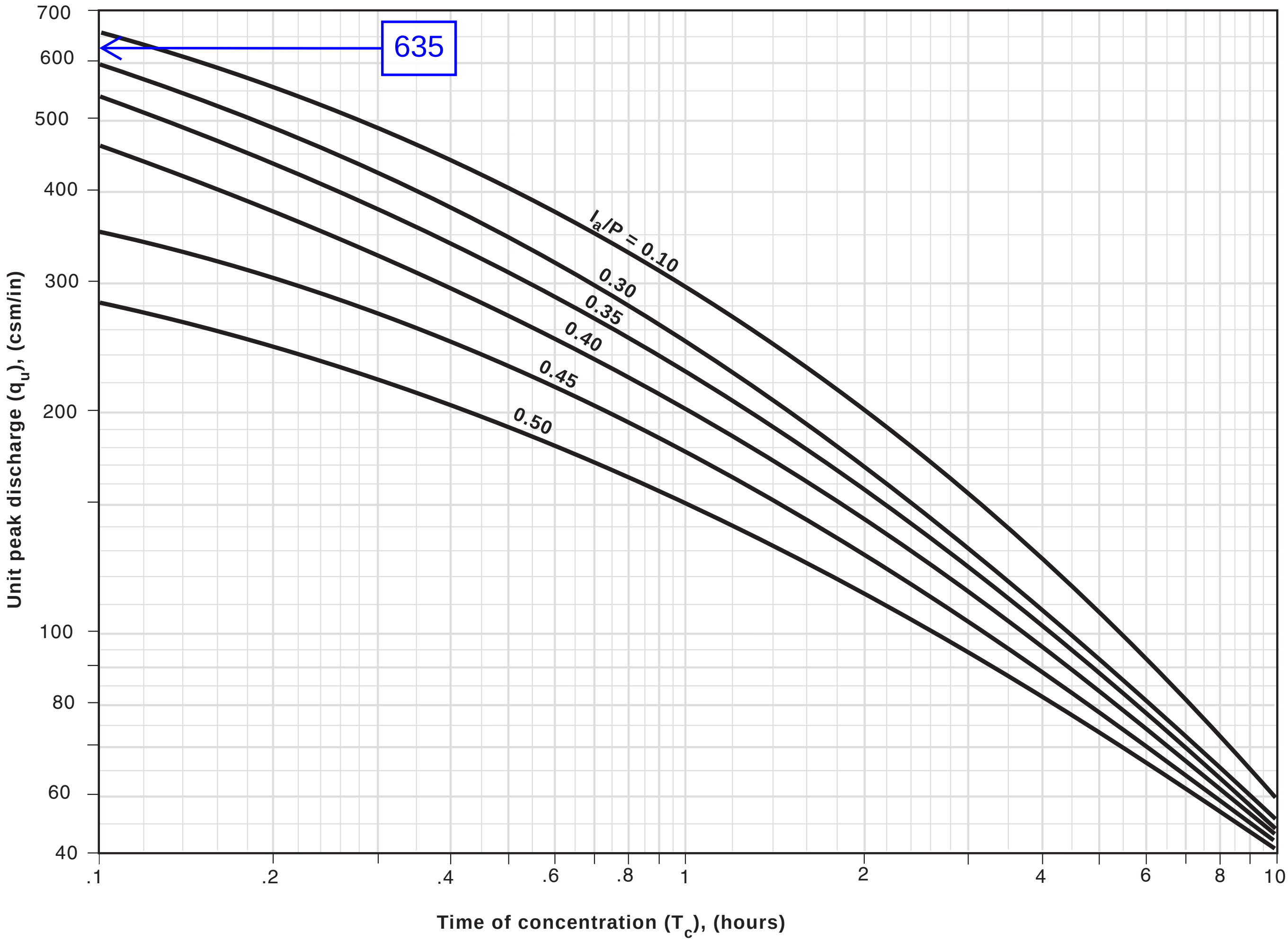
Water Quality Flow (WQF)

1	inches	P = Amount of rainfall. For WQF in NH, P = 1".
0.65	inches	Q = Water quality depth. Q = WQV/A
96	unitless	CN = Unit peak discharge curve number. CN =1000/(10+5P+10Q–10*[Q^2 + 1.25*Q*P] $^{0.5}$)
0.4	inches	S = Potential maximum retention. S = (1000/CN) - 10
0.076	inches	Ia = Initial abstraction. Ia = 0.2S
6.0	minutes	T_c = Time of Concentration
650.0	cfs/mi^2/in	q_u is the unit peak discharge. Obtain this value from TR-55 exhibits 4-II and 4-III.
1.609	cfs	WQF = q_u x WQV. Conversion: to convert "cfs/mi^2/in * ac-in" to "cfs" multiply by 1mi^2/640ac.

Designer's Notes: For Pretreatment to P-1.1: WQU C-20A

Tc=6 min (0.1hr) and Ia/P=0.15, qu=635 csm/in

Exhibit 4-III Unit peal discharge (q_u) for NRCS (SCS) type III rainfall distribution

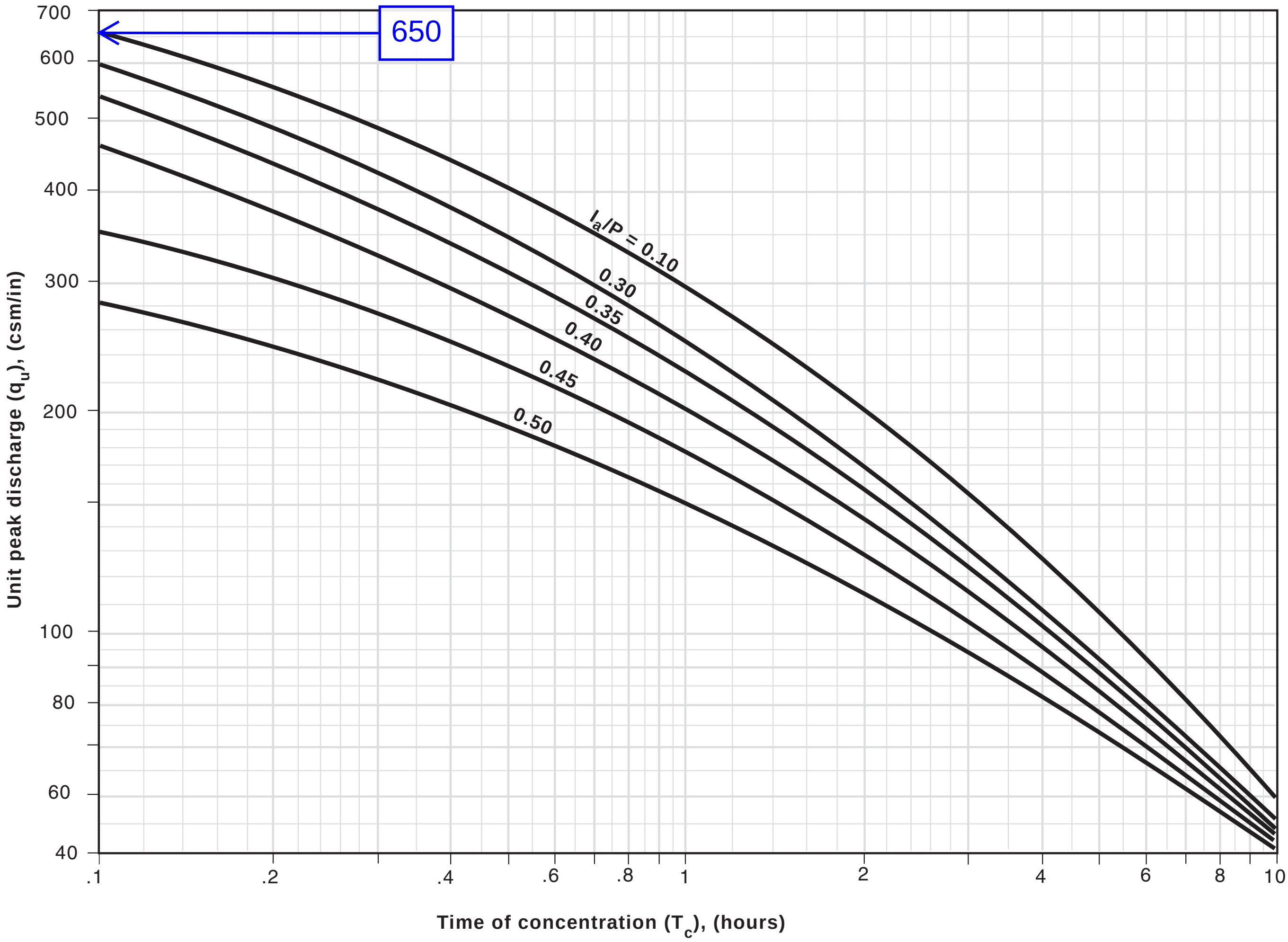


WQU-C-20A

Attachment "D"

Tc=6 min (0.1hr) and Ia/P<0.1 so minimum curve of 0.1 used

Exhibit 4-III Unit peal discharge (q_u) for NRCS (SCS) type III rainfall distribution



Attachment "D"

INFILTRATION PRACTICE CRITERIA
(Env-Wq 1508.07)

Type/Node Name: **P-1.1**

Enter the type of infiltration practice (such as basin, trench) and the node name in the drainage analysis, if applicable.

Value	Unit	Criteria	Requirement
Yes		Have you reviewed Env-Wq 1508.07(a) to ensure that infiltration is allowed?	**← yes**
6.04	ac	A = Area draining to the practice	
1.63	ac	A_I = Impervious area draining to the practice	
0.27	decimal	I = Percent impervious area draining to the practice, in decimal form	
0.29	unitless	Rv = Runoff coefficient = 0.05 + (0.9 x I)	
1.77	ac-in	WQV= 1” x Rv x A	
6,407	cf	WQV conversion (ac-in x 43,560 sf/ac x 1ft/12”)	
1,602	cf	25% x WQV (check calc for sediment forebay volume)	
WQU		Method of pretreatment? (not required for clean or roof runoff)	
N/A	cf	V_{SED} = Sediment forebay volume, if used for pretreatment	**≥ 25%WQV**
39,032	cf	V = Volume[1] (attach a stage-storage table)	**≥ WQV**
10,887	sf	A_{SA} = Surface area of the bottom of the pond	
3.00	iph	$Ksat_{DESIGN}$ = Design infiltration rate[2]	
2.4	hours	T_{DRAIN} = Drain time = V / (A_{SA} * I_{DESIGN})	**≤ 72-hrs**
136.70	feet	E_{BTM} = Elevation of the bottom of the basin	
133.70	feet	E_{SHWT} = Elevation of SHWT (if none found, enter the lowest elevation of the test pit)	
126.27	feet	E_{ROCK} = Elevation of bedrock (if none found, enter the lowest elevation of the test pit)	
3.00	feet	D_{SHWT} = Separation from SHWT	**≥ *** [3]
10.4	feet	D_{ROCK} = Separation from bedrock	**≥ *** [3]
N/A	ft	D_{amend} = Depth of amended soil, if applicable due high infiltation rate	**≥ 24"**
N/A	ft	D_T = Depth of trench, if trench proposed	**4 - 10 ft**
N/A	Yes/No	If a trench or underground system is proposed, has observation well been provided?	**←yes**
N/A		If a trench is proposed, does material meet Env-Wq 1508.07(k)(2) requirements.[4]	**← yes**
Yes	Yes/No	If a basin is proposed, Is the perimeter curvilinear, and basin floor flat?	**← yes**
3.0	:1	If a basin is proposed, pond side slopes.	**≥3:1**
138.67	ft	Peak elevation of the 10-year storm event (infiltration can be used in analysis)	
139.75	ft	Peak elevation of the 50-year storm event (infiltration can be used in analysis)	
140.75	ft	Elevation of the top of the practice (if a basin, this is the elevation of the berm)	
YES		10 peak elevation ≤ Elevation of the top of the trench?[5]	**← yes**
YES		If a basin is proposed, 50-year peak elevation ≤ Elevation of berm?	**← yes**

1. Volume below the lowest invert of the outlet structure and excludes forebay volume
2. $Ksat_{DESIGN}$ includes a factor of safety. See Env-Wq 1504.14 for requirements for determining the infiltr. rate
3. 1' separation if treatment not required; 4' for treatment in GPAs & WSIPAs; & 3' in all other areas.
4. Clean, washed well graded diameter of 1.5 to 3 inches above the in-situ soil.
5. If 50-year peak elevation exceeds top of trench, the overflow must be routed in HydroCAD as secondary discharge.

Designer's Notes:

Stage-Discharge for Pond P-1.1:

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
136.70	0.00	0.00	0.00	0.00
136.71	0.76	0.76	0.00	0.00
136.72	0.76	0.76	0.00	0.00
136.73	0.77	0.77	0.00	0.00
136.74	0.77	0.77	0.00	0.00
136.75	0.77	0.77	0.00	0.00
136.76	0.78	0.78	0.00	0.00
136.77	0.78	0.78	0.00	0.00
136.78	0.79	0.79	0.00	0.00
136.79	0.79	0.79	0.00	0.00
136.80	0.79	0.79	0.00	0.00
136.81	0.80	0.80	0.00	0.00
136.82	0.80	0.80	0.00	0.00
136.83	0.80	0.80	0.00	0.00
136.84	0.81	0.81	0.00	0.00
136.85	0.81	0.81	0.00	0.00
136.86	0.82	0.82	0.00	0.00
136.87	0.82	0.82	0.00	0.00
136.88	0.82	0.82	0.00	0.00
136.89	0.83	0.83	0.00	0.00
136.90	0.83	0.83	0.00	0.00
136.91	0.83	0.83	0.00	0.00
136.92	0.84	0.84	0.00	0.00
136.93	0.84	0.84	0.00	0.00
136.94	0.85	0.85	0.00	0.00
136.95	0.85	0.85	0.00	0.00
136.96	0.85	0.85	0.00	0.00
136.97	0.86	0.86	0.00	0.00
136.98	0.86	0.86	0.00	0.00
136.99	0.86	0.86	0.00	0.00
137.00	0.87	0.87	0.00	0.00
137.01	0.87	0.87	0.00	0.00
137.02	0.88	0.88	0.00	0.00
137.03	0.88	0.88	0.00	0.00
137.04	0.88	0.88	0.00	0.00
137.05	0.89	0.89	0.00	0.00
137.06	0.89	0.89	0.00	0.00
137.07	0.89	0.89	0.00	0.00
137.08	0.90	0.90	0.00	0.00
137.09	0.90	0.90	0.00	0.00
137.10	0.91	0.91	0.00	0.00
137.11	0.91	0.91	0.00	0.00
137.12	0.91	0.91	0.00	0.00
137.13	0.92	0.92	0.00	0.00
137.14	0.92	0.92	0.00	0.00
137.15	0.92	0.92	0.00	0.00
137.16	0.93	0.93	0.00	0.00
137.17	0.93	0.93	0.00	0.00
137.18	0.94	0.94	0.00	0.00
137.19	0.94	0.94	0.00	0.00
137.20	0.94	0.94	0.00	0.00
137.21	0.95	0.95	0.00	0.00

Stage-Discharge for Pond P-1.1: (continued)

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
137.22	0.95	0.95	0.00	0.00
137.23	0.96	0.96	0.00	0.00
137.24	0.96	0.96	0.00	0.00
137.25	0.96	0.96	0.00	0.00
137.26	0.97	0.97	0.00	0.00
137.27	0.97	0.97	0.00	0.00
137.28	0.97	0.97	0.00	0.00
137.29	0.98	0.98	0.00	0.00
137.30	0.98	0.98	0.00	0.00
137.31	0.99	0.99	0.00	0.00
137.32	0.99	0.99	0.00	0.00
137.33	0.99	0.99	0.00	0.00
137.34	1.00	1.00	0.00	0.00
137.35	1.00	1.00	0.00	0.00
137.36	1.01	1.01	0.00	0.00
137.37	1.01	1.01	0.00	0.00
137.38	1.01	1.01	0.00	0.00
137.39	1.02	1.02	0.00	0.00
137.40	1.02	1.02	0.00	0.00
137.41	1.03	1.03	0.00	0.00
137.42	1.03	1.03	0.00	0.00
137.43	1.03	1.03	0.00	0.00
137.44	1.04	1.04	0.00	0.00
137.45	1.04	1.04	0.00	0.00
137.46	1.04	1.04	0.00	0.00
137.47	1.05	1.05	0.00	0.00
137.48	1.05	1.05	0.00	0.00
137.49	1.06	1.06	0.00	0.00
137.50	1.06	1.06	0.00	0.00
137.51	1.06	1.06	0.00	0.00
137.52	1.07	1.07	0.00	0.00
137.53	1.07	1.07	0.00	0.00
137.54	1.08	1.08	0.00	0.00
137.55	1.08	1.08	0.00	0.00
137.56	1.08	1.08	0.00	0.00
137.57	1.09	1.09	0.00	0.00
137.58	1.09	1.09	0.00	0.00
137.59	1.10	1.10	0.00	0.00
137.60	1.10	1.10	0.00	0.00
137.61	1.10	1.10	0.00	0.00
137.62	1.11	1.11	0.00	0.00
137.63	1.11	1.11	0.00	0.00
137.64	1.12	1.12	0.00	0.00
137.65	1.12	1.12	0.00	0.00
137.66	1.12	1.12	0.00	0.00
137.67	1.13	1.13	0.00	0.00
137.68	1.13	1.13	0.00	0.00
137.69	1.14	1.14	0.00	0.00
137.70	1.14	1.14	0.00	0.00
137.71	1.14	1.14	0.00	0.00
137.72	1.15	1.15	0.00	0.00
137.73	1.15	1.15	0.00	0.00

Stage-Discharge for Pond P-1.1: (continued)

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
137.74	1.16	1.16	0.00	0.00
137.75	1.16	1.16	0.00	0.00
137.76	1.16	1.16	0.00	0.00
137.77	1.17	1.17	0.00	0.00
137.78	1.17	1.17	0.00	0.00
137.79	1.18	1.18	0.00	0.00
137.80	1.18	1.18	0.00	0.00
137.81	1.18	1.18	0.00	0.00
137.82	1.19	1.19	0.00	0.00
137.83	1.19	1.19	0.00	0.00
137.84	1.20	1.20	0.00	0.00
137.85	1.20	1.20	0.00	0.00
137.86	1.20	1.20	0.00	0.00
137.87	1.21	1.21	0.00	0.00
137.88	1.21	1.21	0.00	0.00
137.89	1.22	1.22	0.00	0.00
137.90	1.22	1.22	0.00	0.00
137.91	1.22	1.22	0.00	0.00
137.92	1.23	1.23	0.00	0.00
137.93	1.23	1.23	0.00	0.00
137.94	1.24	1.24	0.00	0.00
137.95	1.24	1.24	0.00	0.00
137.96	1.25	1.25	0.00	0.00
137.97	1.25	1.25	0.00	0.00
137.98	1.25	1.25	0.00	0.00
137.99	1.26	1.26	0.00	0.00
138.00	1.26	1.26	0.00	0.00
138.01	1.27	1.27	0.00	0.00
138.02	1.27	1.27	0.00	0.00
138.03	1.27	1.27	0.00	0.00
138.04	1.28	1.28	0.00	0.00
138.05	1.28	1.28	0.00	0.00
138.06	1.29	1.29	0.00	0.00
138.07	1.29	1.29	0.00	0.00
138.08	1.29	1.29	0.00	0.00
138.09	1.30	1.30	0.00	0.00
138.10	1.30	1.30	0.00	0.00
138.11	1.31	1.31	0.00	0.00
138.12	1.31	1.31	0.00	0.00
138.13	1.31	1.31	0.00	0.00
138.14	1.32	1.32	0.00	0.00
138.15	1.32	1.32	0.00	0.00
138.16	1.33	1.33	0.00	0.00
138.17	1.33	1.33	0.00	0.00
138.18	1.34	1.34	0.00	0.00
138.19	1.34	1.34	0.00	0.00
138.20	1.34	1.34	0.00	0.00
138.21	1.35	1.35	0.00	0.00
138.22	1.35	1.35	0.00	0.00
138.23	1.36	1.36	0.00	0.00
138.24	1.36	1.36	0.00	0.00
138.25	1.36	1.36	0.00	0.00

Stage-Discharge for Pond P-1.1: (continued)

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
138.26	1.37	1.37	0.00	0.00
138.27	1.37	1.37	0.00	0.00
138.28	1.38	1.38	0.00	0.00
138.29	1.38	1.38	0.00	0.00
138.30	1.38	1.38	0.00	0.00
138.31	1.39	1.39	0.00	0.00
138.32	1.39	1.39	0.00	0.00
138.33	1.40	1.40	0.00	0.00
138.34	1.40	1.40	0.00	0.00
138.35	1.41	1.41	0.00	0.00
138.36	1.41	1.41	0.00	0.00
138.37	1.41	1.41	0.00	0.00
138.38	1.42	1.42	0.00	0.00
138.39	1.42	1.42	0.00	0.00
138.40	1.43	1.43	0.00	0.00
138.41	1.43	1.43	0.00	0.00
138.42	1.44	1.44	0.00	0.00
138.43	1.44	1.44	0.00	0.00
138.44	1.44	1.44	0.00	0.00
138.45	1.45	1.45	0.00	0.00
138.46	1.45	1.45	0.00	0.00
138.47	1.46	1.46	0.00	0.00
138.48	1.46	1.46	0.00	0.00
138.49	1.46	1.46	0.00	0.00
138.50	1.47	1.47	0.00	0.00
138.51	1.47	1.47	0.00	0.00
138.52	1.48	1.48	0.00	0.00
138.53	1.48	1.48	0.00	0.00
138.54	1.49	1.49	0.00	0.00
138.55	1.49	1.49	0.00	0.00
138.56	1.49	1.49	0.00	0.00
138.57	1.50	1.50	0.00	0.00
138.58	1.50	1.50	0.00	0.00
138.59	1.51	1.51	0.00	0.00
138.60	1.51	1.51	0.00	0.00
138.61	1.52	1.52	0.00	0.00
138.62	1.52	1.52	0.00	0.00
138.63	1.52	1.52	0.00	0.00
138.64	1.53	1.53	0.00	0.00
138.65	1.53	1.53	0.00	0.00
138.66	1.54	1.54	0.00	0.00
138.67	1.54	1.54	0.00	0.00
138.68	1.54	1.54	0.00	0.00
138.69	1.55	1.55	0.00	0.00
138.70	1.55	1.55	0.00	0.00
138.71	1.56	1.56	0.00	0.00
138.72	1.56	1.56	0.00	0.00
138.73	1.57	1.57	0.00	0.00
138.74	1.57	1.57	0.00	0.00
138.75	1.57	1.57	0.00	0.00
138.76	1.58	1.58	0.00	0.00
138.77	1.58	1.58	0.00	0.00

Stage-Discharge for Pond P-1.1: (continued)

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
138.78	1.59	1.59	0.00	0.00
138.79	1.59	1.59	0.00	0.00
138.80	1.60	1.60	0.00	0.00
138.81	1.60	1.60	0.00	0.00
138.82	1.60	1.60	0.00	0.00
138.83	1.61	1.61	0.00	0.00
138.84	1.61	1.61	0.00	0.00
138.85	1.62	1.62	0.00	0.00
138.86	1.62	1.62	0.00	0.00
138.87	1.63	1.63	0.00	0.00
138.88	1.63	1.63	0.00	0.00
138.89	1.63	1.63	0.00	0.00
138.90	1.64	1.64	0.00	0.00
138.91	1.64	1.64	0.00	0.00
138.92	1.65	1.65	0.00	0.00
138.93	1.65	1.65	0.00	0.00
138.94	1.66	1.66	0.00	0.00
138.95	1.66	1.66	0.00	0.00
138.96	1.66	1.66	0.00	0.00
138.97	1.67	1.67	0.00	0.00
138.98	1.67	1.67	0.00	0.00
138.99	1.68	1.68	0.00	0.00
139.00	1.68	1.68	0.00	0.00
139.01	1.69	1.69	0.00	0.00
139.02	1.69	1.69	0.00	0.00
139.03	1.69	1.69	0.00	0.00
139.04	1.70	1.70	0.00	0.00
139.05	1.70	1.70	0.00	0.00
139.06	1.71	1.71	0.00	0.00
139.07	1.71	1.71	0.00	0.00
139.08	1.72	1.72	0.00	0.00
139.09	1.72	1.72	0.00	0.00
139.10	1.73	1.73	0.00	0.00
139.11	1.73	1.73	0.00	0.00
139.12	1.73	1.73	0.00	0.00
139.13	1.74	1.74	0.00	0.00
139.14	1.74	1.74	0.00	0.00
139.15	1.75	1.75	0.00	0.00
139.16	1.75	1.75	0.00	0.00
139.17	1.76	1.76	0.00	0.00
139.18	1.76	1.76	0.00	0.00
139.19	1.76	1.76	0.00	0.00
139.20	1.77	1.77	0.00	0.00
139.21	1.77	1.77	0.00	0.00
139.22	1.78	1.78	0.00	0.00
139.23	1.78	1.78	0.00	0.00
139.24	1.79	1.79	0.00	0.00
139.25	1.79	1.79	0.00	0.00
139.26	1.80	1.80	0.00	0.00
139.27	1.80	1.80	0.00	0.00
139.28	1.80	1.80	0.00	0.00
139.29	1.81	1.81	0.00	0.00

Stage-Discharge for Pond P-1.1: (continued)

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
139.30	1.81	1.81	0.00	0.00
139.31	1.82	1.82	0.00	0.00
139.32	1.82	1.82	0.00	0.00
139.33	1.83	1.83	0.00	0.00
139.34	1.83	1.83	0.00	0.00
139.35	1.83	1.83	0.00	0.00
139.36	1.84	1.84	0.00	0.00
139.37	1.84	1.84	0.00	0.00
139.38	1.85	1.85	0.00	0.00
139.39	1.85	1.85	0.00	0.00
139.40	1.86	1.86	0.00	0.00
139.41	1.86	1.86	0.00	0.00
139.42	1.87	1.87	0.00	0.00
139.43	1.87	1.87	0.00	0.00
139.44	1.87	1.87	0.00	0.00
139.45	1.88	1.88	0.00	0.00
139.46	1.88	1.88	0.00	0.00
139.47	1.89	1.89	0.00	0.00
139.48	1.89	1.89	0.00	0.00
139.49	1.90	1.90	0.00	0.00
139.50	1.90	1.90	0.00	0.00
139.51	1.91	1.91	0.00	0.00
139.52	1.91	1.91	0.00	0.00
139.53	1.91	1.91	0.00	0.00
139.54	1.92	1.92	0.00	0.00
139.55	1.92	1.92	0.00	0.00
139.56	1.93	1.93	0.00	0.00
139.57	1.93	1.93	0.00	0.00
139.58	1.94	1.94	0.00	0.00
139.59	1.94	1.94	0.00	0.00
139.60	1.95	1.95	0.00	0.00
139.61	1.95	1.95	0.00	0.00
139.62	1.95	1.95	0.00	0.00
139.63	1.96	1.96	0.00	0.00
139.64	2.03	1.96	0.07	0.00
139.65	2.15	1.97	0.18	0.00
139.66	2.31	1.97	0.34	0.00
139.67	2.50	1.98	0.52	0.00
139.68	2.71	1.98	0.73	0.00
139.69	2.95	1.99	0.96	0.00
139.70	3.20	1.99	1.21	0.00
139.71	3.47	1.99	1.48	0.00
139.72	3.76	2.00	1.77	0.00
139.73	4.07	2.00	2.07	0.00
139.74	4.39	2.01	2.39	0.00
139.75	4.73	2.01	2.72	0.00
139.76	5.11	2.02	3.07	0.02
139.77	5.51	2.02	3.43	0.07
139.78	5.95	2.03	3.80	0.12
139.79	6.41	2.03	4.19	0.19
139.80	6.89	2.03	4.58	0.27
139.81	7.39	2.04	4.99	0.35

Stage-Discharge for Pond P-1.1: (continued)

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
139.82	7.91	2.04	5.42	0.45
139.83	8.44	2.05	5.85	0.55
139.84	9.00	2.05	6.29	0.65
139.85	9.57	2.06	6.75	0.77
139.86	10.16	2.06	7.21	0.89
139.87	10.77	2.07	7.69	1.01
139.88	11.04	2.07	7.82	1.15
139.89	11.19	2.07	7.83	1.28
139.90	11.35	2.08	7.84	1.43
139.91	11.51	2.08	7.85	1.58
139.92	11.68	2.09	7.86	1.73
139.93	11.85	2.09	7.87	1.89
139.94	12.03	2.10	7.88	2.05
139.95	12.21	2.10	7.89	2.22
139.96	12.41	2.11	7.90	2.40
139.97	12.61	2.11	7.91	2.59
139.98	12.81	2.12	7.91	2.78
139.99	13.03	2.12	7.92	2.98
140.00	13.24	2.12	7.93	3.19
140.01	13.47	2.13	7.94	3.40
140.02	13.70	2.13	7.95	3.61
140.03	13.93	2.14	7.96	3.84
140.04	14.18	2.14	7.97	4.06
140.05	14.42	2.15	7.98	4.30
140.06	14.68	2.15	7.99	4.54
140.07	14.93	2.16	8.00	4.78
140.08	15.20	2.16	8.00	5.03
140.09	15.47	2.17	8.01	5.29
140.10	15.75	2.17	8.02	5.56
140.11	16.03	2.17	8.03	5.82
140.12	16.32	2.18	8.04	6.10
140.13	16.61	2.18	8.05	6.38
140.14	16.91	2.19	8.06	6.67
140.15	17.22	2.19	8.07	6.96
140.16	17.54	2.20	8.08	7.27
140.17	17.86	2.20	8.08	7.58
140.18	18.20	2.21	8.09	7.90
140.19	18.53	2.21	8.10	8.22
140.20	18.88	2.22	8.11	8.55
140.21	19.23	2.22	8.12	8.89
140.22	19.59	2.22	8.13	9.24
140.23	19.96	2.23	8.14	9.59
140.24	20.33	2.23	8.15	9.95
140.25	20.71	2.24	8.15	10.32
140.26	21.09	2.24	8.16	10.69
140.27	21.49	2.25	8.17	11.07
140.28	21.89	2.25	8.18	11.45
140.29	22.29	2.26	8.19	11.85
140.30	22.71	2.26	8.20	12.25
140.31	23.13	2.27	8.21	12.65
140.32	23.56	2.27	8.22	13.07
140.33	23.99	2.27	8.22	13.49

Stage-Discharge for Pond P-1.1: (continued)

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
140.34	24.43	2.28	8.23	13.92
140.35	24.88	2.28	8.24	14.36
140.36	25.28	2.29	8.25	14.74
140.37	25.68	2.29	8.26	15.13
140.38	26.09	2.30	8.27	15.53
140.39	26.50	2.30	8.28	15.92
140.40	26.92	2.31	8.29	16.33
140.41	27.34	2.31	8.29	16.73
140.42	27.76	2.32	8.30	17.14
140.43	28.19	2.32	8.31	17.56
140.44	28.62	2.33	8.32	17.98
140.45	29.06	2.33	8.33	18.40
140.46	29.50	2.33	8.34	18.83
140.47	29.94	2.34	8.35	19.26
140.48	30.39	2.34	8.35	19.70
140.49	30.85	2.35	8.36	20.13
140.50	31.30	2.35	8.37	20.58
140.51	31.76	2.36	8.38	21.03
140.52	32.23	2.36	8.39	21.48
140.53	32.70	2.37	8.40	21.93
140.54	33.17	2.37	8.41	22.39
140.55	33.65	2.38	8.41	22.86
140.56	34.14	2.38	8.42	23.34
140.57	34.63	2.39	8.43	23.82
140.58	35.13	2.39	8.44	24.30
140.59	35.63	2.39	8.45	24.79
140.60	36.14	2.40	8.46	25.29
140.61	36.65	2.40	8.46	25.79
140.62	37.17	2.41	8.47	26.29
140.63	37.69	2.41	8.48	26.80
140.64	38.22	2.42	8.49	27.31
140.65	38.75	2.42	8.50	27.82
140.66	39.28	2.43	8.51	28.35
140.67	39.82	2.43	8.52	28.87
140.68	40.36	2.44	8.52	29.40
140.69	40.91	2.44	8.53	29.93
140.70	**41.46**	**2.45**	**8.54**	**30.47**

Stage-Area-Storage for Pond P-1.1:

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
136.70	10,887	0	137.22	11,751	5,886
136.71	10,904	109	137.23	11,768	6,004
136.72	10,920	218	137.24	11,784	6,121
136.73	10,937	327	137.25	11,801	6,239
136.74	10,953	437	137.26	11,818	6,357
136.75	10,970	546	137.27	11,834	6,476
136.76	10,987	656	137.28	11,851	6,594
136.77	11,003	766	137.29	11,867	6,713
136.78	11,020	876	137.30	11,884	6,831
136.79	11,037	987	137.31	11,901	6,950
136.80	11,053	1,097	137.32	11,917	7,069
136.81	11,070	1,208	137.33	11,934	7,189
136.82	11,086	1,318	137.34	11,951	7,308
136.83	11,103	1,429	137.35	11,967	7,428
136.84	11,120	1,540	137.36	11,984	7,547
136.85	11,136	1,652	137.37	12,000	7,667
136.86	11,153	1,763	137.38	12,017	7,787
136.87	11,169	1,875	137.39	12,034	7,908
136.88	11,186	1,987	137.40	12,050	8,028
136.89	11,203	2,099	137.41	12,067	8,149
136.90	11,219	2,211	137.42	12,083	8,269
136.91	11,236	2,323	137.43	12,100	8,390
136.92	11,253	2,435	137.44	12,117	8,511
136.93	11,269	2,548	137.45	12,133	8,633
136.94	11,286	2,661	137.46	12,150	8,754
136.95	11,302	2,774	137.47	12,167	8,876
136.96	11,319	2,887	137.48	12,183	8,997
136.97	11,336	3,000	137.49	12,200	9,119
136.98	11,352	3,114	137.50	12,216	9,241
136.99	11,369	3,227	137.51	12,233	9,364
137.00	11,386	3,341	137.52	12,250	9,486
137.01	11,402	3,455	137.53	12,266	9,609
137.02	11,419	3,569	137.54	12,283	9,731
137.03	11,435	3,683	137.55	12,299	9,854
137.04	11,452	3,798	137.56	12,316	9,977
137.05	11,469	3,912	137.57	12,333	10,101
137.06	11,485	4,027	137.58	12,349	10,224
137.07	11,502	4,142	137.59	12,366	10,348
137.08	11,518	4,257	137.60	12,383	10,471
137.09	11,535	4,372	137.61	12,399	10,595
137.10	11,552	4,488	137.62	12,416	10,719
137.11	11,568	4,603	137.63	12,432	10,844
137.12	11,585	4,719	137.64	12,449	10,968
137.13	11,602	4,835	137.65	12,466	11,093
137.14	11,618	4,951	137.66	12,482	11,217
137.15	11,635	5,067	137.67	12,499	11,342
137.16	11,651	5,184	137.68	12,516	11,467
137.17	11,668	5,300	137.69	12,532	11,592
137.18	11,685	5,417	137.70	12,549	11,718
137.19	11,701	5,534	137.71	12,565	11,843
137.20	11,718	5,651	137.72	12,582	11,969
137.21	11,734	5,768	137.73	12,599	12,095

Stage-Area-Storage for Pond P-1.1: (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
137.74	12,615	12,221	138.26	13,479	19,006
137.75	12,632	12,347	138.27	13,496	19,141
137.76	12,648	12,474	138.28	13,513	19,276
137.77	12,665	12,600	138.29	13,529	19,411
137.78	12,682	12,727	138.30	13,546	19,546
137.79	12,698	12,854	138.31	13,562	19,682
137.80	12,715	12,981	138.32	13,579	19,817
137.81	12,732	13,108	138.33	13,596	19,953
137.82	12,748	13,236	138.34	13,612	20,089
137.83	12,765	13,363	138.35	13,629	20,226
137.84	12,781	13,491	138.36	13,646	20,362
137.85	12,798	13,619	138.37	13,662	20,499
137.86	12,815	13,747	138.38	13,679	20,635
137.87	12,831	13,875	138.39	13,695	20,772
137.88	12,848	14,004	138.40	13,712	20,909
137.89	12,864	14,132	138.41	13,729	21,046
137.90	12,881	14,261	138.42	13,745	21,184
137.91	12,898	14,390	138.43	13,762	21,321
137.92	12,914	14,519	138.44	13,778	21,459
137.93	12,931	14,648	138.45	13,795	21,597
137.94	12,948	14,777	138.46	13,812	21,735
137.95	12,964	14,907	138.47	13,828	21,873
137.96	12,981	15,037	138.48	13,845	22,011
137.97	12,997	15,167	138.49	13,862	22,150
137.98	13,014	15,297	138.50	13,878	22,289
137.99	13,031	15,427	138.51	13,895	22,427
138.00	13,047	15,557	138.52	13,911	22,567
138.01	13,064	15,688	138.53	13,928	22,706
138.02	13,081	15,819	138.54	13,945	22,845
138.03	13,097	15,949	138.55	13,961	22,985
138.04	13,114	16,080	138.56	13,978	23,124
138.05	13,130	16,212	138.57	13,994	23,264
138.06	13,147	16,343	138.58	14,011	23,404
138.07	13,164	16,475	138.59	14,028	23,544
138.08	13,180	16,606	138.60	14,044	23,685
138.09	13,197	16,738	138.61	14,061	23,825
138.10	13,213	16,870	138.62	14,078	23,966
138.11	13,230	17,003	138.63	14,094	24,107
138.12	13,247	17,135	138.64	14,111	24,248
138.13	13,263	17,267	138.65	14,127	24,389
138.14	13,280	17,400	138.66	14,144	24,530
138.15	13,297	17,533	138.67	14,161	24,672
138.16	13,313	17,666	138.68	14,177	24,814
138.17	13,330	17,799	138.69	14,194	24,955
138.18	13,346	17,933	138.70	14,211	25,098
138.19	13,363	18,066	138.71	14,227	25,240
138.20	13,380	18,200	138.72	14,244	25,382
138.21	13,396	18,334	138.73	14,260	25,525
138.22	13,413	18,468	138.74	14,277	25,667
138.23	13,429	18,602	138.75	14,294	25,810
138.24	13,446	18,736	138.76	14,310	25,953
138.25	13,463	18,871	138.77	14,327	26,096

Attachment "D"

Stage-Area-Storage for Pond P-1.1: (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	
138.78	14,343	26,240	139.30	15,208	33,923	
138.79	14,360	26,383	139.31	15,224	34,075	
138.80	14,377	26,527	139.32	15,241	34,227	
138.81	14,393	26,671	139.33	15,257	34,380	
138.82	14,410	26,815	139.34	15,274	34,533	
138.83	14,427	26,959	139.35	15,291	34,685	
138.84	14,443	27,103	139.36	15,307	34,838	
138.85	14,460	27,248	139.37	15,324	34,992	
138.86	14,476	27,392	139.38	15,340	35,145	
138.87	14,493	27,537	139.39	15,357	35,298	
138.88	14,510	27,682	139.40	15,374	35,452	
138.89	14,526	27,827	139.41	15,390	35,606	
138.90	14,543	27,973	139.42	15,407	35,760	
138.91	14,559	28,118	139.43	15,424	35,914	
138.92	14,576	28,264	139.44	15,440	36,068	
138.93	14,593	28,410	139.45	15,457	36,223	
138.94	14,609	28,556	139.46	15,473	36,377	
138.95	14,626	28,702	139.47	15,490	36,532	
138.96	14,643	28,848	139.48	15,507	36,687	
138.97	14,659	28,995	139.49	15,523	36,842	
138.98	14,676	29,142	139.50	15,540	36,998	
138.99	14,692	29,288	139.51	15,557	37,153	
139.00	14,709	29,435	139.52	15,573	37,309	
139.01	14,726	29,583	139.53	15,590	37,465	
139.02	14,742	29,730	139.54	15,606	37,621	
139.03	14,759	29,877	139.55	15,623	37,777	
139.04	14,775	30,025	139.56	15,640	37,933	
139.05	14,792	30,173	139.57	15,656	38,090	
139.06	14,809	30,321	139.58	15,673	38,246	
139.07	14,825	30,469	139.59	15,689	38,403	
139.08	14,842	30,617	139.60	15,706	38,560	
139.09	14,859	30,766	139.61	15,723	38,717	
139.10	14,875	30,915	139.62	15,739	38,874	
139.11	14,892	31,063	139.63	15,756	39,032	WQV - RIM ELEVATION
139.12	14,908	31,212	139.64	15,773	39,190	
139.13	14,925	31,362	139.65	15,789	39,347	
139.14	14,942	31,511	139.66	15,806	39,505	
139.15	14,958	31,660	139.67	15,822	39,663	
139.16	14,975	31,810	139.68	15,839	39,822	
139.17	14,992	31,960	139.69	15,856	39,980	
139.18	15,008	32,110	139.70	15,872	40,139	
139.19	15,025	32,260	139.71	15,889	40,298	
139.20	15,041	32,410	139.72	15,905	40,457	
139.21	15,058	32,561	139.73	15,922	40,616	
139.22	15,075	32,712	139.74	15,939	40,775	
139.23	15,091	32,862	139.75	15,955	40,935	
139.24	15,108	33,013	139.76	15,972	41,094	
139.25	15,124	33,165	139.77	15,989	41,254	
139.26	15,141	33,316	139.78	16,005	41,414	
139.27	15,158	33,467	139.79	16,022	41,574	
139.28	15,174	33,619	139.80	16,038	41,734	
139.29	15,191	33,771	139.81	16,055	41,895	

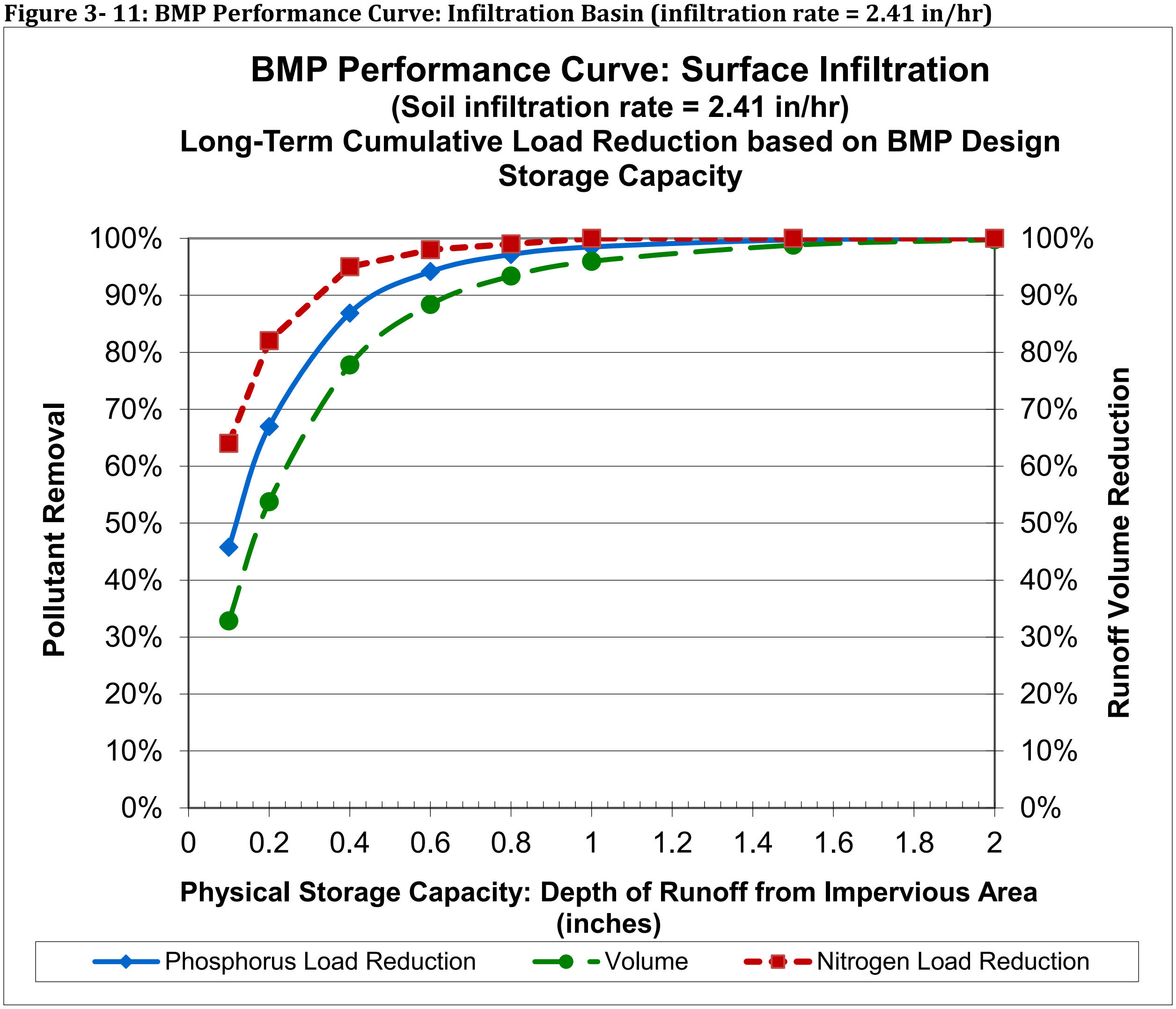
Stage-Area-Storage for Pond P-1.1: (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
139.82	16,072	42,056
139.83	16,088	42,216
139.84	16,105	42,377
139.85	16,122	42,538
139.86	16,138	42,700
139.87	16,155	42,861
139.88	16,171	43,023
139.89	16,188	43,185
139.90	16,205	43,347
139.91	16,221	43,509
139.92	16,238	43,671
139.93	16,254	43,833
139.94	16,271	43,996
139.95	16,288	44,159
139.96	16,304	44,322
139.97	16,321	44,485
139.98	16,338	44,648
139.99	16,354	44,812
140.00	16,371	44,975
140.01	16,387	45,139
140.02	16,404	45,303
140.03	16,421	45,467
140.04	16,437	45,631
140.05	16,454	45,796
140.06	16,470	45,961
140.07	16,487	46,125
140.08	16,504	46,290
140.09	16,520	46,455
140.10	16,537	46,621
140.11	16,554	46,786
140.12	16,570	46,952
140.13	16,587	47,118
140.14	16,603	47,284
140.15	16,620	47,450
140.16	16,637	47,616
140.17	16,653	47,782
140.18	16,670	47,949
140.19	16,687	48,116
140.20	16,703	48,283
140.21	16,720	48,450
140.22	16,736	48,617
140.23	16,753	48,785
140.24	16,770	48,952
140.25	16,786	49,120
140.26	16,803	49,288
140.27	16,819	49,456
140.28	16,836	49,624
140.29	16,853	49,793
140.30	16,869	49,961
140.31	16,886	50,130
140.32	16,903	50,299
140.33	16,919	50,468
140.34	16,936	50,637
140.35	16,952	50,807
140.36	16,969	50,976
140.37	16,986	51,146
140.38	17,002	51,316
140.39	17,019	51,486
140.40	17,035	51,657
140.41	17,052	51,827
140.42	17,069	51,998
140.43	17,085	52,168
140.44	17,102	52,339
140.45	17,119	52,510
140.46	17,135	52,682
140.47	17,152	52,853
140.48	17,168	53,025
140.49	17,185	53,197
140.50	17,202	53,368
140.51	17,218	53,541
140.52	17,235	53,713
140.53	17,252	53,885
140.54	17,268	54,058
140.55	17,285	54,231
140.56	17,301	54,404
140.57	17,318	54,577
140.58	17,335	54,750
140.59	17,351	54,923
140.60	17,368	55,097
140.61	17,384	55,271
140.62	17,401	55,445
140.63	17,418	55,619
140.64	17,434	55,793
140.65	17,451	55,967
140.66	17,468	56,142
140.67	17,484	56,317
140.68	17,501	56,492
140.69	17,517	56,667
140.70	**17,534**	**56,842**

Table 3- 16: Surface Infiltration (2.41 in/hr) BMP Performance Table

Surface Infiltration (2.41 in/hr) BMP Performance Table: Long-Term Phosphorus Load Reduction								
BMP Capacity: Depth of Runoff from Impervious Area (inches)	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Runoff Volume Reduction	32.8%	53.8%	77.8%	88.4%	93.4%	96.0%	98.8%	99.8%
Cumulative Phosphorus Load Reduction	46%	67%	87%	94%	97%	98%	100%	100%
Cumulative Nitrogen Load Reduction	64%	82%	95%	98%	99%	100%	100%	100%

Figure 3- 11: BMP Performance Curve: Infiltration Basin (infiltration rate = 2.41 in/hr)



SECTION K: DRAINAGE ANALYSIS:

- *RAINFALL DATA*
- *HYDROCAD REPORTS*
- *PIPE SIZING*
- *RIPRAP OUTLET PROTECTION CALCULATIONS*
- *PROPRIETARY UNIT SIZING AND INFORMATION*

Attachment "D"

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Metadata for Point	
Smoothing	Yes
State	
Location	
Latitude	42.722 degrees North
Longitude	71.423 degrees West
Elevation	40 feet
Date/Time	Wed Oct 22 2025 13:19:33 GMT-0400 (Eastern Daylight Time)

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day
1yr	0.27	0.42	0.52	0.69	0.86	1.08	**1yr**	0.74	1.02	1.25	1.57	1.97	2.49	2.73	**1yr**	2.21	2.63
2yr	0.33	0.51	0.64	0.84	1.06	1.33	**2yr**	0.91	1.22	1.54	1.92	2.39	2.98	3.31	**2yr**	2.64	3.18
5yr	0.40	0.62	0.77	1.03	1.32	1.68	**5yr**	1.14	1.53	1.94	2.43	3.03	3.76	4.20	**5yr**	3.33	4.04
10yr	0.44	0.70	0.88	1.20	1.56	2.00	**10yr**	1.35	1.81	2.33	2.92	3.63	4.49	5.04	**10yr**	3.97	4.85
25yr	0.53	0.84	1.07	1.47	1.95	2.52	**25yr**	1.68	2.26	2.94	3.69	4.60	5.67	6.42	**25yr**	5.02	6.17
50yr	0.59	0.95	1.22	1.71	2.31	3.02	**50yr**	2.00	2.68	3.54	4.45	5.51	6.78	7.70	**50yr**	6.00	7.41
100yr	0.68	1.10	1.42	2.01	2.74	3.60	**100yr**	2.37	3.18	4.22	5.32	6.60	8.10	9.25	**100yr**	7.17	8.90
200yr	0.78	1.27	1.64	2.35	3.25	4.30	**200yr**	2.81	3.77	5.06	6.38	7.91	9.68	11.12	**200yr**	8.57	10.69
500yr	0.93	1.54	2.00	2.91	4.08	5.43	**500yr**	3.52	4.73	6.41	8.10	10.03	12.27	14.19	**500yr**	10.86	13.64

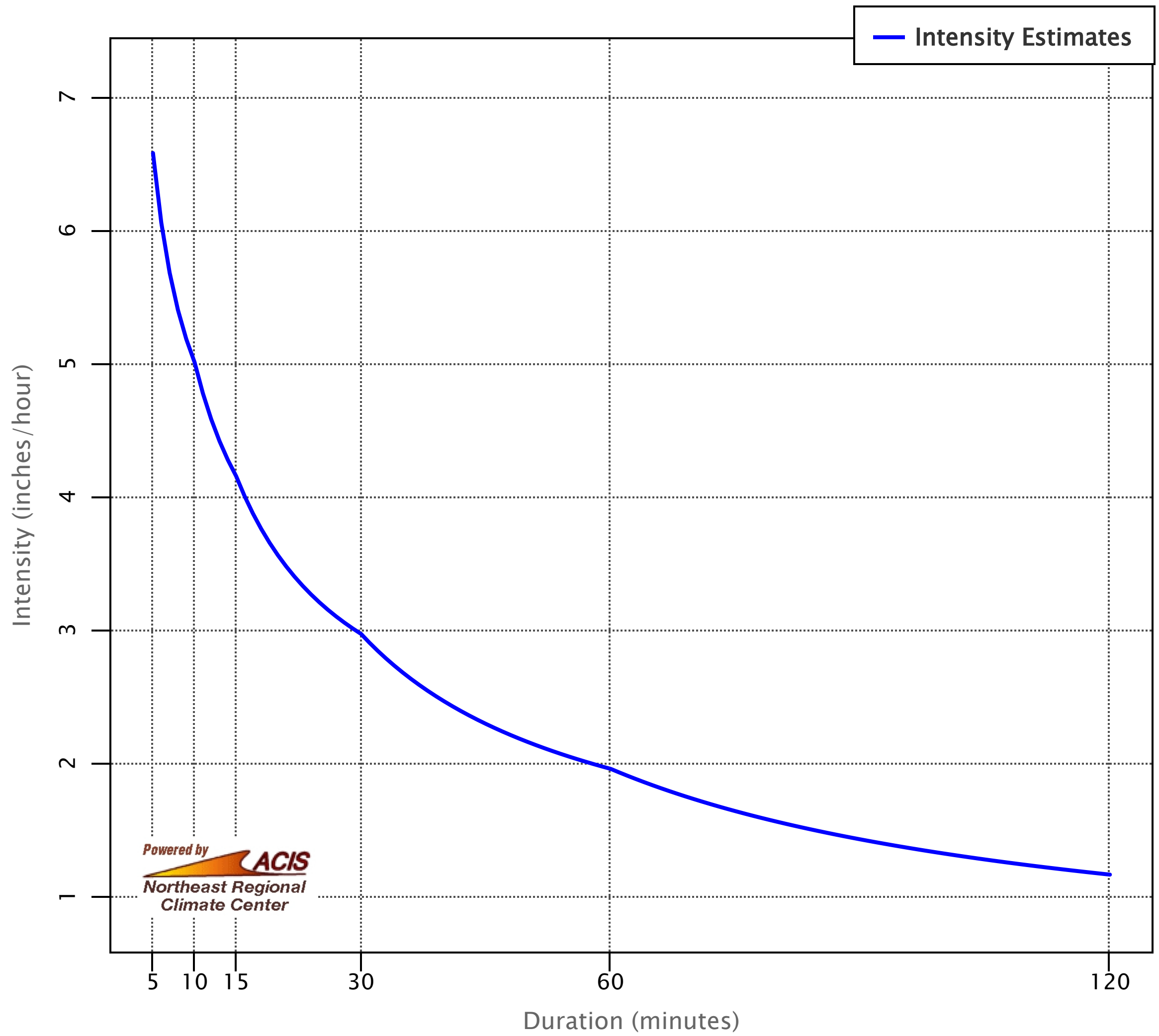
Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day
1yr	0.23	0.35	0.43	0.57	0.70	0.80	**1yr**	0.61	0.79	1.07	1.33	1.68	2.32	2.56	**1yr**	2.05	2.47

Attachment "D"

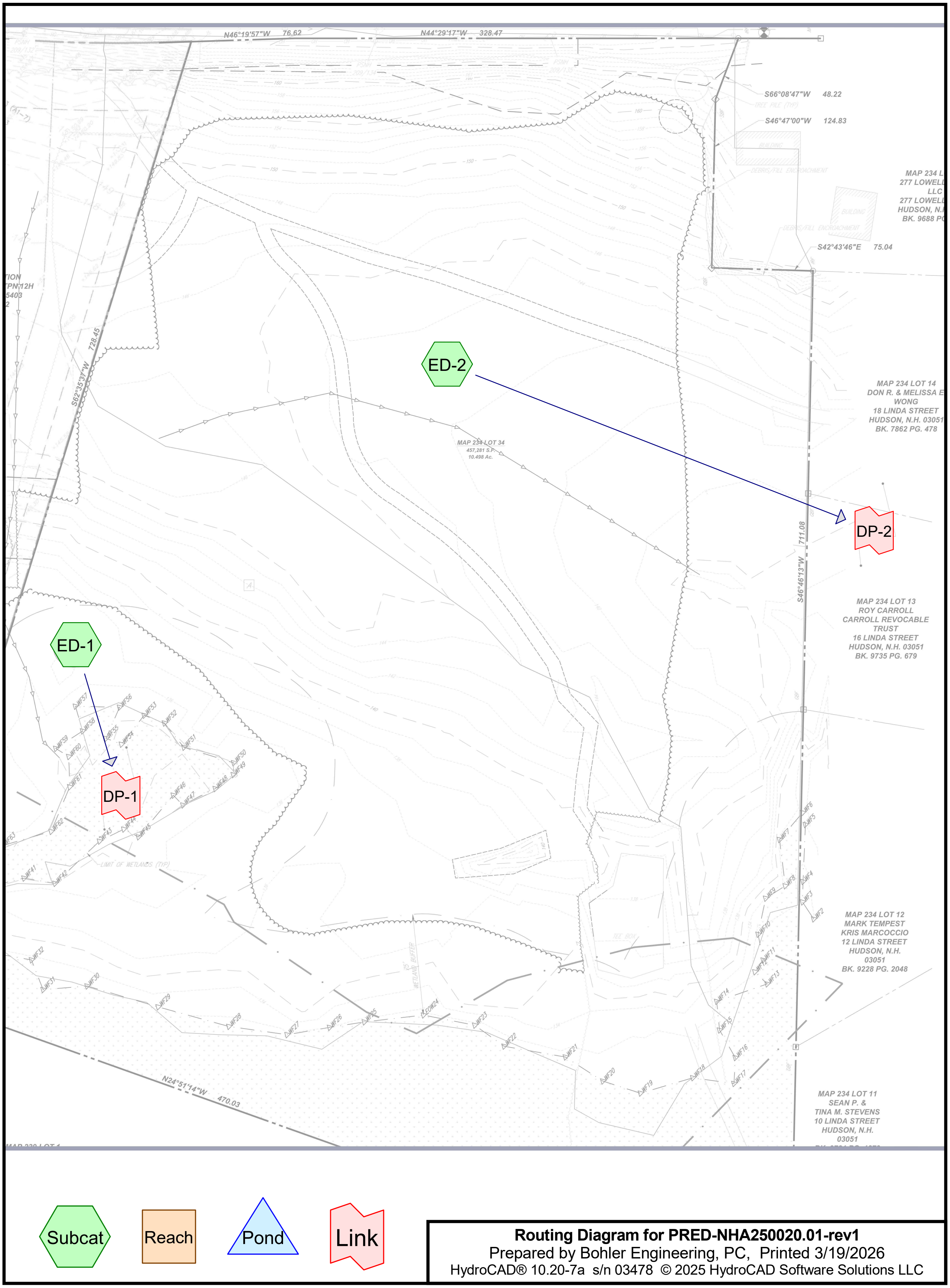
Intensity Frequency Duration - 25yr

(42.722N, -71.423W)



Time (hours)	Intensity (in/hr)
5*	6.58
6	6.05
7*	5.68
8*	5.40
9*	5.18
10*	5.00
11*	4.77
12	4.58
13*	4.41
14*	4.27
15*	4.15
16*	4.00
17*	3.87
18*	3.75
19*	3.65
20*	3.56
21*	3.47
22*	3.40
23*	3.32
24	3.26
25*	3.20

Attachment "D"



Routing Diagram for PRED-NHA250020.01-rev1
Prepared by Bohler Engineering, PC, Printed 3/19/2026
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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
26,392	39	>75% Grass cover, Good, HSG A (ED-1)
2,857	61	>75% Grass cover, Good, HSG B (ED-1)
12,081	72	Dirt roads, HSG A (ED-1, ED-2)
71,056	30	Meadow, non-grazed, HSG A (ED-1, ED-2)
10,308	58	Meadow, non-grazed, HSG B (ED-1, ED-2)
5,779	71	Meadow, non-grazed, HSG C (ED-1, ED-2)
263,102	30	Woods, Good, HSG A (ED-1, ED-2)
103,190	55	Woods, Good, HSG B (ED-1, ED-2)
15,772	70	Woods, Good, HSG C (ED-1, ED-2)
510,538	**39**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
372,632	HSG A	ED-1, ED-2
116,355	HSG B	ED-1, ED-2
21,551	HSG C	ED-1, ED-2
0	HSG D	
0	Other	
510,538		**TOTAL AREA**

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ED-1: Runoff Area=278,247 sf 0.00% Impervious Runoff Depth=0.05"
Flow Length=367' Tc=14.2 min CN=WQ Runoff=0.07 cfs 1,166 cf

Subcatchment ED-2: Runoff Area=232,291 sf 0.00% Impervious Runoff Depth=0.05"
Flow Length=438' Tc=22.3 min CN=WQ Runoff=0.17 cfs 1,039 cf

Link DP-1: Inflow=0.07 cfs 1,166 cf
Primary=0.07 cfs 1,166 cf

Link DP-2: Inflow=0.17 cfs 1,039 cf
Primary=0.17 cfs 1,039 cf

Total Runoff Area = 510,538 sf Runoff Volume = 2,205 cf Average Runoff Depth = 0.05"
100.00% Pervious = 510,538 sf 0.00% Impervious = 0 sf

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ED-1: Runoff Area=278,247 sf 0.00% Impervious Runoff Depth=0.10"
Flow Length=367' Tc=14.2 min CN=WQ Runoff=0.25 cfs 2,403 cf

Subcatchment ED-2: Runoff Area=232,291 sf 0.00% Impervious Runoff Depth=0.08"
Flow Length=438' Tc=22.3 min CN=WQ Runoff=0.29 cfs 1,628 cf

Link DP-1: Inflow=0.25 cfs 2,403 cf
Primary=0.25 cfs 2,403 cf

Link DP-2: Inflow=0.29 cfs 1,628 cf
Primary=0.29 cfs 1,628 cf

Total Runoff Area = 510,538 sf Runoff Volume = 4,031 cf Average Runoff Depth = 0.09"
100.00% Pervious = 510,538 sf 0.00% Impervious = 0 sf

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ED-1: Runoff Area=278,247 sf 0.00% Impervious Runoff Depth=1.07"
Flow Length=367' Tc=14.2 min CN=WQ Runoff=5.08 cfs 24,791 cf

Subcatchment ED-2: Runoff Area=232,291 sf 0.00% Impervious Runoff Depth=0.57"
Flow Length=438' Tc=22.3 min CN=WQ Runoff=1.68 cfs 11,125 cf

Link DP-1: Inflow=5.08 cfs 24,791 cf
Primary=5.08 cfs 24,791 cf

Link DP-2: Inflow=1.68 cfs 11,125 cf
Primary=1.68 cfs 11,125 cf

Total Runoff Area = 510,538 sf Runoff Volume = 35,917 cf Average Runoff Depth = 0.84"
100.00% Pervious = 510,538 sf 0.00% Impervious = 0 sf

Attachment "D"

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ED-1: Runoff Area=278,247 sf 0.00% Impervious Runoff Depth=0.37"
Flow Length=367' Tc=14.2 min CN=WQ Runoff=1.57 cfs 8,557 cf

Subcatchment ED-2: Runoff Area=232,291 sf 0.00% Impervious Runoff Depth=0.20"
Flow Length=438' Tc=22.3 min CN=WQ Runoff=0.77 cfs 3,910 cf

Link DP-1: Inflow=1.57 cfs 8,557 cf
Primary=1.57 cfs 8,557 cf

Link DP-2: Inflow=0.77 cfs 3,910 cf
Primary=0.77 cfs 3,910 cf

Total Runoff Area = 510,538 sf Runoff Volume = 12,467 cf Average Runoff Depth = 0.29"
100.00% Pervious = 510,538 sf 0.00% Impervious = 0 sf

Summary for Subcatchment ED-1:

Runoff = 1.57 cfs @ 12.23 hrs, Volume= 8,557 cf, Depth= 0.37"
Routed to Link DP-1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.49"

Area (sf)	CN	Description
26,392	39	>75% Grass cover, Good, HSG A
2,857	61	>75% Grass cover, Good, HSG B
1,292	72	Dirt roads, HSG A
61,467	30	Meadow, non-grazed, HSG A
10,054	58	Meadow, non-grazed, HSG B
2,700	71	Meadow, non-grazed, HSG C
70,384	30	Woods, Good, HSG A
98,172	55	Woods, Good, HSG B
4,929	70	Woods, Good, HSG C
278,247		Weighted Average
278,247		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.40"
2.7	183	0.0262	1.13		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	24	0.1050	4.86		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.5	45	0.0094	0.48		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.5	47	0.0105	0.51		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.4	18	0.0272	0.82		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.2	367	Total			

Summary for Subcatchment ED-2:

Runoff = 0.77 cfs @ 12.32 hrs, Volume= 3,910 cf, Depth= 0.20"
Routed to Link DP-2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.49"

Area (sf)	CN	Description
10,790	72	Dirt roads, HSG A
9,589	30	Meadow, non-grazed, HSG A
253	58	Meadow, non-grazed, HSG B
3,079	71	Meadow, non-grazed, HSG C
192,718	30	Woods, Good, HSG A
5,019	55	Woods, Good, HSG B
10,844	70	Woods, Good, HSG C
232,291		Weighted Average
232,291		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	50	0.0174	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
9.6	388	0.0180	0.67		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
22.3	438	Total			

Summary for Link DP-1:

Inflow Area = 278,247 sf, 0.00% Impervious, Inflow Depth = 0.37" for 10-Year event
Inflow = 1.57 cfs @ 12.23 hrs, Volume= 8,557 cf
Primary = 1.57 cfs @ 12.23 hrs, Volume= 8,557 cf, Atten= 0%, Lag= 0.0 min

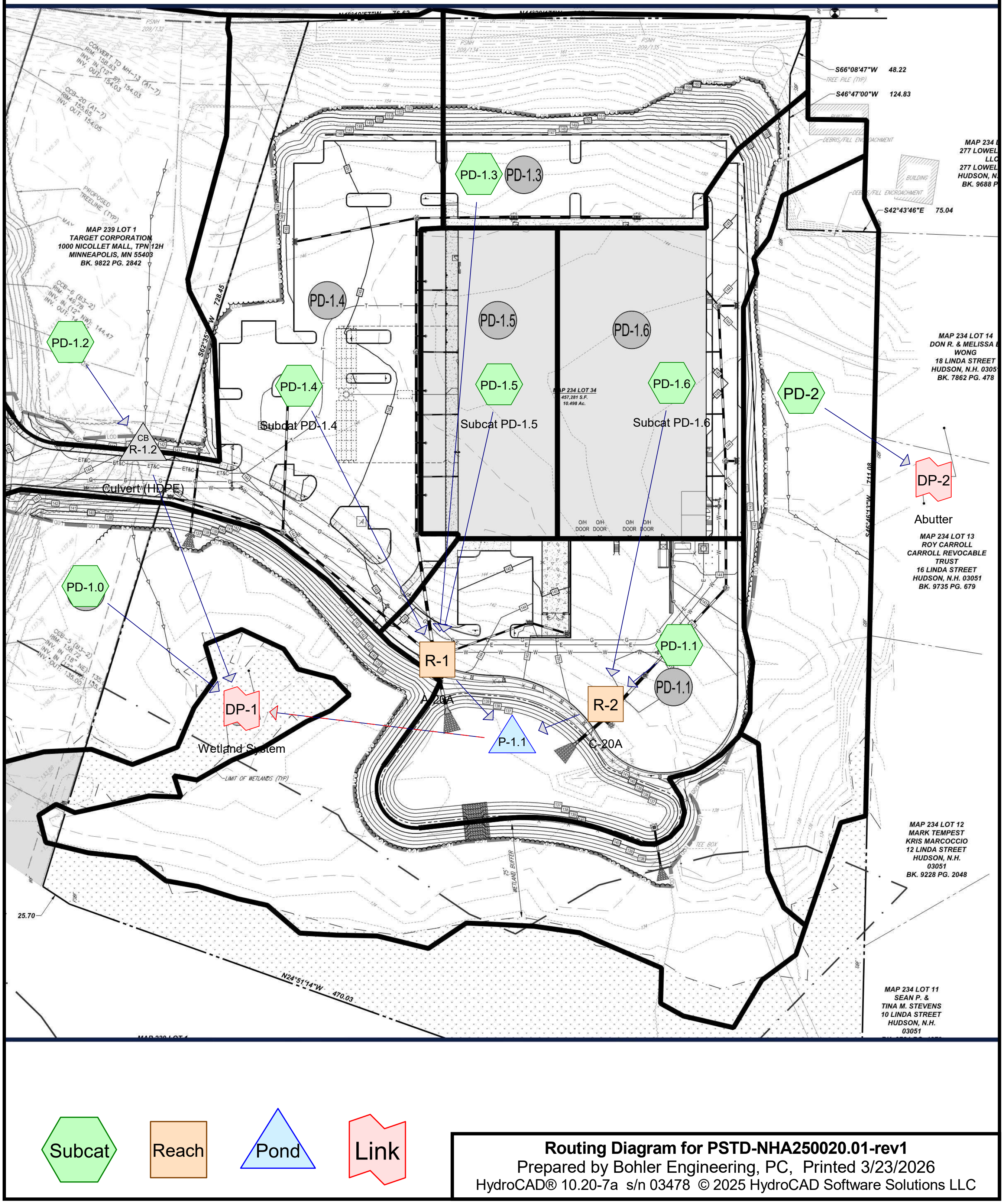
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link DP-2:

Inflow Area = 232,291 sf, 0.00% Impervious, Inflow Depth = 0.20" for 10-Year event
Inflow = 0.77 cfs @ 12.32 hrs, Volume= 3,910 cf
Primary = 0.77 cfs @ 12.32 hrs, Volume= 3,910 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Attachment "D"



Routing Diagram for PSTD-NHA250020.01-rev1
Prepared by Bohler Engineering, PC, Printed 3/23/2026
HydroCAD® 10.20-7a s/n 03478 © 2025 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
40,578	39	>75% Grass cover, Good, HSG A (PD-1.0, PD-1.1, PD-1.2, PD-1.3, PD-1.4, PD-1.6, PD-2)
1,371	61	>75% Grass cover, Good, HSG B (PD-1.0)
3,693	74	>75% Grass cover, Good, HSG C (PD-1.3, PD-1.6)
84,513	30	Meadow, non-grazed, HSG A (PD-1.0, PD-1.1, PD-1.2, PD-1.3, PD-1.4, PD-1.6, PD-2)
43,614	58	Meadow, non-grazed, HSG B (PD-1.0, PD-1.1, PD-1.4, PD-2)
5,779	71	Meadow, non-grazed, HSG C (PD-1.0, PD-1.3)
104,609	98	Paved parking, HSG A (PD-1.1, PD-1.2, PD-1.3, PD-1.4, PD-1.5, PD-1.6)
2,051	98	Paved parking, HSG B (PD-1.1, PD-1.4)
57,355	98	Roofs, HSG A (PD-1.5, PD-1.6)
85,577	30	Woods, Good, HSG A (PD-1.0, PD-1.1, PD-1.2, PD-1.3, PD-1.4, PD-1.6, PD-2)
69,319	55	Woods, Good, HSG B (PD-1.0, PD-2)
12,079	70	Woods, Good, HSG C (PD-1.0, PD-1.3, PD-1.6, PD-2)
510,538	**60**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
372,632	HSG A	PD-1.0, PD-1.1, PD-1.2, PD-1.3, PD-1.4, PD-1.5, PD-1.6, PD-2
116,355	HSG B	PD-1.0, PD-1.1, PD-1.4, PD-2
21,551	HSG C	PD-1.0, PD-1.3, PD-1.6, PD-2
0	HSG D	
0	Other	
510,538		**TOTAL AREA**

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PD-1.0: Runoff Area=117,852 sf 0.00% Impervious Runoff Depth=0.21"
Tc=14.2 min CN=WQ Runoff=0.22 cfs 2,046 cf

Subcatchment PD-1.1: Runoff Area=60,091 sf 57.41% Impervious Runoff Depth=1.66"
Tc=6.0 min CN=WQ Runoff=2.31 cfs 8,322 cf

Subcatchment PD-1.2: Runoff Area=75,868 sf 0.10% Impervious Runoff Depth=0.00"
Flow Length=367' Tc=14.2 min CN=WQ Runoff=0.00 cfs 17 cf

Subcatchment PD-1.3: Runoff Area=44,307 sf 33.42% Impervious Runoff Depth=1.13"
Tc=6.0 min CN=WQ Runoff=1.21 cfs 4,181 cf

Subcatchment PD-1.4: Subcat PD-1.4 Runoff Area=85,912 sf 59.29% Impervious Runoff Depth=1.63"
Tc=6.0 min CN=WQ Runoff=3.38 cfs 11,678 cf

Subcatchment PD-1.5: Subcat PD-1.5 Runoff Area=27,386 sf 100.00% Impervious Runoff Depth=2.75"
Tc=6.0 min CN=WQ Runoff=1.82 cfs 6,272 cf

Subcatchment PD-1.6: Subcat PD-1.6 Runoff Area=45,362 sf 80.06% Impervious Runoff Depth=2.21"
Tc=6.0 min CN=WQ Runoff=2.42 cfs 8,361 cf

Subcatchment PD-2: Runoff Area=53,760 sf 0.00% Impervious Runoff Depth=0.03"
Flow Length=202' Tc=17.7 min CN=WQ Runoff=0.01 cfs 138 cf

Reach R-1: A-20A Inflow=6.40 cfs 22,131 cf
Outflow=6.40 cfs 22,131 cf

Reach R-2: C-20A Inflow=4.73 cfs 16,684 cf
Outflow=4.73 cfs 16,684 cf

Pond P-1.1: Peak Elev=137.85' Storage=13,681 cf Inflow=11.12 cfs 38,815 cf
Discarded=1.20 cfs 38,815 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=1.20 cfs 38,815 cf

Pond R-1.2: Culvert (HDPE) Peak Elev=142.03' Inflow=0.00 cfs 17 cf
12.0" Round Culvert n=0.012 L=68.0' S=0.0735 '/' Outflow=0.00 cfs 17 cf

Link DP-1: Wetland System Inflow=0.22 cfs 2,063 cf
Primary=0.22 cfs 2,063 cf

Link DP-2: Abutter Inflow=0.01 cfs 138 cf
Primary=0.01 cfs 138 cf

Total Runoff Area = 510,538 sf Runoff Volume = 41,016 cf Average Runoff Depth = 0.96"
67.87% Pervious = 346,522 sf 32.13% Impervious = 164,015 sf

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PD-1.0: Runoff Area=117,852 sf 0.00% Impervious Runoff Depth=1.84"
Tc=14.2 min CN=WQ Runoff=4.12 cfs 18,048 cf

Subcatchment PD-1.1: Runoff Area=60,091 sf 57.41% Impervious Runoff Depth=4.52"
Tc=6.0 min CN=WQ Runoff=6.37 cfs 22,628 cf

Subcatchment PD-1.2: Runoff Area=75,868 sf 0.10% Impervious Runoff Depth=0.28"
Flow Length=367' Tc=14.2 min CN=WQ Runoff=0.11 cfs 1,745 cf

Subcatchment PD-1.3: Runoff Area=44,307 sf 33.42% Impervious Runoff Depth=3.31"
Tc=6.0 min CN=WQ Runoff=3.47 cfs 12,233 cf

Subcatchment PD-1.4: Subcat PD-1.4 Runoff Area=85,912 sf 59.29% Impervious Runoff Depth=4.03"
Tc=6.0 min CN=WQ Runoff=7.86 cfs 28,824 cf

Subcatchment PD-1.5: Subcat PD-1.5 Runoff Area=27,386 sf 100.00% Impervious Runoff Depth=6.54"
Tc=6.0 min CN=WQ Runoff=4.18 cfs 14,928 cf

Subcatchment PD-1.6: Subcat PD-1.6 Runoff Area=45,362 sf 80.06% Impervious Runoff Depth=5.37"
Tc=6.0 min CN=WQ Runoff=5.63 cfs 20,316 cf

Subcatchment PD-2: Runoff Area=53,760 sf 0.00% Impervious Runoff Depth=0.41"
Flow Length=202' Tc=17.7 min CN=WQ Runoff=0.24 cfs 1,833 cf

Reach R-1: A-20A Inflow=15.51 cfs 55,985 cf
Outflow=15.51 cfs 55,985 cf

Reach R-2: C-20A Inflow=12.01 cfs 42,944 cf
Outflow=12.01 cfs 42,944 cf

Pond P-1.1: Peak Elev=139.75' Storage=40,978 cf Inflow=27.52 cfs 98,929 cf
Discarded=2.01 cfs 94,005 cf Primary=2.80 cfs 4,924 cf Secondary=0.00 cfs 0 cf Outflow=4.82 cfs 98,929 cf

Pond R-1.2: Culvert (HDPE) Peak Elev=142.16' Inflow=0.11 cfs 1,745 cf
12.0" Round Culvert n=0.012 L=68.0' S=0.0735 '/' Outflow=0.11 cfs 1,745 cf

Link DP-1: Wetland System Inflow=5.05 cfs 24,717 cf
Primary=5.05 cfs 24,717 cf

Link DP-2: Abutter Inflow=0.24 cfs 1,833 cf
Primary=0.24 cfs 1,833 cf

Total Runoff Area = 510,538 sf Runoff Volume = 120,554 cf Average Runoff Depth = 2.83"
67.87% Pervious = 346,522 sf 32.13% Impervious = 164,015 sf

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PD-1.0: Runoff Area=117,852 sf 0.00% Impervious Runoff Depth=0.71"
Tc=14.2 min CN=WQ Runoff=1.33 cfs 6,967 cf

Subcatchment PD-1.1: Runoff Area=60,091 sf 57.41% Impervious Runoff Depth=2.73"
Tc=6.0 min CN=WQ Runoff=3.83 cfs 13,682 cf

Subcatchment PD-1.2: Runoff Area=75,868 sf 0.10% Impervious Runoff Depth=0.02"
Flow Length=367' Tc=14.2 min CN=WQ Runoff=0.01 cfs 152 cf

Subcatchment PD-1.3: Runoff Area=44,307 sf 33.42% Impervious Runoff Depth=1.93"
Tc=6.0 min CN=WQ Runoff=2.06 cfs 7,116 cf

Subcatchment PD-1.4: Subcat PD-1.4 Runoff Area=85,912 sf 59.29% Impervious Runoff Depth=2.54"
Tc=6.0 min CN=WQ Runoff=5.14 cfs 18,194 cf

Subcatchment PD-1.5: Subcat PD-1.5 Runoff Area=27,386 sf 100.00% Impervious Runoff Depth=4.25"
Tc=6.0 min CN=WQ Runoff=2.76 cfs 9,708 cf

Subcatchment PD-1.6: Subcat PD-1.6 Runoff Area=45,362 sf 80.06% Impervious Runoff Depth=3.44"
Tc=6.0 min CN=WQ Runoff=3.69 cfs 13,016 cf

Subcatchment PD-2: Runoff Area=53,760 sf 0.00% Impervious Runoff Depth=0.10"
Flow Length=202' Tc=17.7 min CN=WQ Runoff=0.08 cfs 453 cf

Reach R-1: A-20A Inflow=9.96 cfs 35,018 cf
Outflow=9.96 cfs 35,018 cf

Reach R-2: C-20A Inflow=7.52 cfs 26,698 cf
Outflow=7.52 cfs 26,698 cf

Pond P-1.1: Peak Elev=138.67' Storage=24,626 cf Inflow=17.48 cfs 61,716 cf
Discarded=1.54 cfs 61,716 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=1.54 cfs 61,716 cf

Pond R-1.2: Culvert (HDPE) Peak Elev=142.04' Inflow=0.01 cfs 152 cf
12.0" Round Culvert n=0.012 L=68.0' S=0.0735 '/' Outflow=0.01 cfs 152 cf

Link DP-1: Wetland System Inflow=1.34 cfs 7,119 cf
Primary=1.34 cfs 7,119 cf

Link DP-2: Abutter Inflow=0.08 cfs 453 cf
Primary=0.08 cfs 453 cf

Total Runoff Area = 510,538 sf Runoff Volume = 69,288 cf Average Runoff Depth = 1.63"
67.87% Pervious = 346,522 sf 32.13% Impervious = 164,015 sf

Summary for Subcatchment PD-1.0:

Runoff = 1.33 cfs @ 12.23 hrs, Volume= 6,967 cf, Depth= 0.71"
Routed to Link DP-1 : Wetland System

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.49"

Area (sf)	CN	Description
2,444	39	>75% Grass cover, Good, HSG A
1,371	61	>75% Grass cover, Good, HSG B
11,589	30	Meadow, non-grazed, HSG A
23,904	58	Meadow, non-grazed, HSG B
2,700	71	Meadow, non-grazed, HSG C
6,615	30	Woods, Good, HSG A
64,301	55	Woods, Good, HSG B
4,929	70	Woods, Good, HSG C
117,852		Weighted Average
117,852		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2					**Direct Entry, PD1.2 and PD1.0 Connected Via Culvert**

Summary for Subcatchment PD-1.1:

Runoff = 3.83 cfs @ 12.09 hrs, Volume= 13,682 cf, Depth= 2.73"
Routed to Reach R-2 : C-20A

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.49"

Area (sf)	CN	Description
3,756	39	>75% Grass cover, Good, HSG A
2,818	30	Meadow, non-grazed, HSG A
18,921	58	Meadow, non-grazed, HSG B
33,005	98	Paved parking, HSG A
1,491	98	Paved parking, HSG B
100	30	Woods, Good, HSG A
60,091		Weighted Average
25,594		42.59% Pervious Area
34,497		57.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment PD-1.2:

Runoff = 0.01 cfs @ 12.19 hrs, Volume= 152 cf, Depth= 0.02"
Routed to Pond R-1.2 : Culvert (HDPE)

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.49"

Area (sf)	CN	Description
13,865	39	>75% Grass cover, Good, HSG A
55,560	30	Meadow, non-grazed, HSG A
74	98	Paved parking, HSG A
6,369	30	Woods, Good, HSG A
75,868		Weighted Average
75,794		99.90% Pervious Area
74		0.10% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	50	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.40"
2.7	183	0.0262	1.13		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	24	0.1050	4.86		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.5	45	0.0094	0.48		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.5	47	0.0105	0.51		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.4	18	0.0272	0.82		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.2	367	Total			

Summary for Subcatchment PD-1.3:

Runoff = 2.06 cfs @ 12.09 hrs, Volume= 7,116 cf, Depth= 1.93"
Routed to Reach R-1 : A-20A

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.49"

Area (sf)	CN	Description
5,391	39	>75% Grass cover, Good, HSG A
3,434	74	>75% Grass cover, Good, HSG C
2,475	30	Meadow, non-grazed, HSG A
3,079	71	Meadow, non-grazed, HSG C
14,806	98	Paved parking, HSG A
9,293	30	Woods, Good, HSG A
5,830	70	Woods, Good, HSG C
44,307		Weighted Average
29,501		66.58% Pervious Area
14,806		33.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment PD-1.4: Subcat PD-1.4

Runoff = 5.14 cfs @ 12.08 hrs, Volume= 18,194 cf, Depth= 2.54"
Routed to Reach R-1 : A-20A

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.49"

Area (sf)	CN	Description
10,579	39	>75% Grass cover, Good, HSG A
8,182	30	Meadow, non-grazed, HSG A
536	58	Meadow, non-grazed, HSG B
50,377	98	Paved parking, HSG A
559	98	Paved parking, HSG B
15,679	30	Woods, Good, HSG A
85,912		Weighted Average
34,975		40.71% Pervious Area
50,937		59.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment PD-1.5: Subcat PD-1.5

Runoff = 2.76 cfs @ 12.08 hrs, Volume= 9,708 cf, Depth= 4.25"
Routed to Reach R-1 : A-20A

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.49"

Area (sf)	CN	Description
21	98	Paved parking, HSG A
27,365	98	Roofs, HSG A
27,386		Weighted Average
27,386		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment PD-1.6: Subcat PD-1.6

Runoff = 3.69 cfs @ 12.08 hrs, Volume= 13,016 cf, Depth= 3.44"
Routed to Reach R-2 : C-20A

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.49"

Area (sf)	CN	Description
4,528	39	>75% Grass cover, Good, HSG A
259	74	>75% Grass cover, Good, HSG C
17	30	Meadow, non-grazed, HSG A
6,326	98	Paved parking, HSG A
29,990	98	Roofs, HSG A
3,823	30	Woods, Good, HSG A
420	70	Woods, Good, HSG C
45,362		Weighted Average
9,046		19.94% Pervious Area
36,316		80.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment PD-2:

Runoff = 0.08 cfs @ 12.29 hrs, Volume= 453 cf, Depth= 0.10"
Routed to Link DP-2 : Abutter

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.49"

Area (sf)	CN	Description
17	39	>75% Grass cover, Good, HSG A
3,872	30	Meadow, non-grazed, HSG A
253	58	Meadow, non-grazed, HSG B
43,698	30	Woods, Good, HSG A
5,019	55	Woods, Good, HSG B
901	70	Woods, Good, HSG C
53,760		Weighted Average
53,760		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.2	50	0.0131	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.3	72	0.0328	0.91		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.2	80	0.0152	0.62		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.7	202	Total			

Summary for Reach R-1: A-20A

Inflow Area = 157,605 sf, 59.09% Impervious, Inflow Depth = 2.67" for 10-Year event
Inflow = 9.96 cfs @ 12.08 hrs, Volume= 35,018 cf
Outflow = 9.96 cfs @ 12.08 hrs, Volume= 35,018 cf, Atten= 0%, Lag= 0.0 min
Routed to Pond P-1.1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Reach R-2: C-20A

Inflow Area = 105,453 sf, 67.15% Impervious, Inflow Depth = 3.04" for 10-Year event
Inflow = 7.52 cfs @ 12.08 hrs, Volume= 26,698 cf
Outflow = 7.52 cfs @ 12.08 hrs, Volume= 26,698 cf, Atten= 0%, Lag= 0.0 min
Routed to Pond P-1.1 :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond P-1.1:

Inflow Area = 263,058 sf, 62.32% Impervious, Inflow Depth = 2.82" for 10-Year event
Inflow = 17.48 cfs @ 12.08 hrs, Volume= 61,716 cf
Outflow = 1.54 cfs @ 12.99 hrs, Volume= 61,716 cf, Atten= 91%, Lag= 54.3 min
Discarded = 1.54 cfs @ 12.99 hrs, Volume= 61,716 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link DP-1 : Wetland System
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link DP-1 : Wetland System

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Peak Elev= 138.67' @ 12.99 hrs Surf.Area= 14,157 sf Storage= 24,626 cf

Plug-Flow detention time= 146.0 min calculated for 61,707 cf (100% of inflow)
Center-of-Mass det. time= 146.0 min (903.4 - 757.4)

Volume	Invert	Avail.Storage	Storage Description
#1	136.70'	57,727 cf	**Infiltration Basin (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
136.70	10,887	0	0
140.75	17,620	57,727	57,727

Device	Routing	Invert	Outlet Devices
#1	Discarded	136.70'	**3.000 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 133.70' Phase-In= 0.01'
#2	Primary	135.10'	**12.0" Round Culvert** L= 33.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 135.10' / 134.86' S= 0.0073 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#3	Device 2	139.63'	**60.0" x 60.0" Horiz. OCS RIM** C= 0.600 Limited to weir flow at low heads
#4	Secondary	139.75'	**10.0' long + 3.0 '/' SideZ x 6.0' breadth Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=1.54 cfs @ 12.99 hrs HW=138.67' (Free Discharge)
└─**1=Exfiltration** (Controls 1.54 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=136.70' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.00 cfs of 3.74 cfs potential flow)
  └─**3=OCS RIM** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=136.70' TW=0.00' (Dynamic Tailwater)
└─**4=Emergency Spillway** (Controls 0.00 cfs)

Summary for Pond R-1.2: Culvert (HDPE)

Inflow Area = 75,868 sf, 0.10% Impervious, Inflow Depth = 0.02" for 10-Year event
Inflow = 0.01 cfs @ 12.19 hrs, Volume= 152 cf
Outflow = 0.01 cfs @ 12.19 hrs, Volume= 152 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.01 cfs @ 12.19 hrs, Volume= 152 cf
Routed to Link DP-1 : Wetland System

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 142.04' @ 12.19 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	142.00'	**12.0" Round Culvert** L= 68.0' Square-edged headwall, Ke= 0.500

Inlet / Outlet Invert= 142.00' / 137.00' S= 0.0735 '/' Cc= 0.900
n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.01 cfs @ 12.19 hrs HW=142.04' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.01 cfs @ 0.65 fps)

Summary for Link DP-1: Wetland System

Inflow Area =	456,778 sf, 35.91% Impervious,	Inflow Depth = 0.19"	for 10-Year event
Inflow =	1.34 cfs @ 12.23 hrs, Volume=	7,119 cf	
Primary =	1.34 cfs @ 12.23 hrs, Volume=	7,119 cf, Atten= 0%, Lag= 0.0 min	

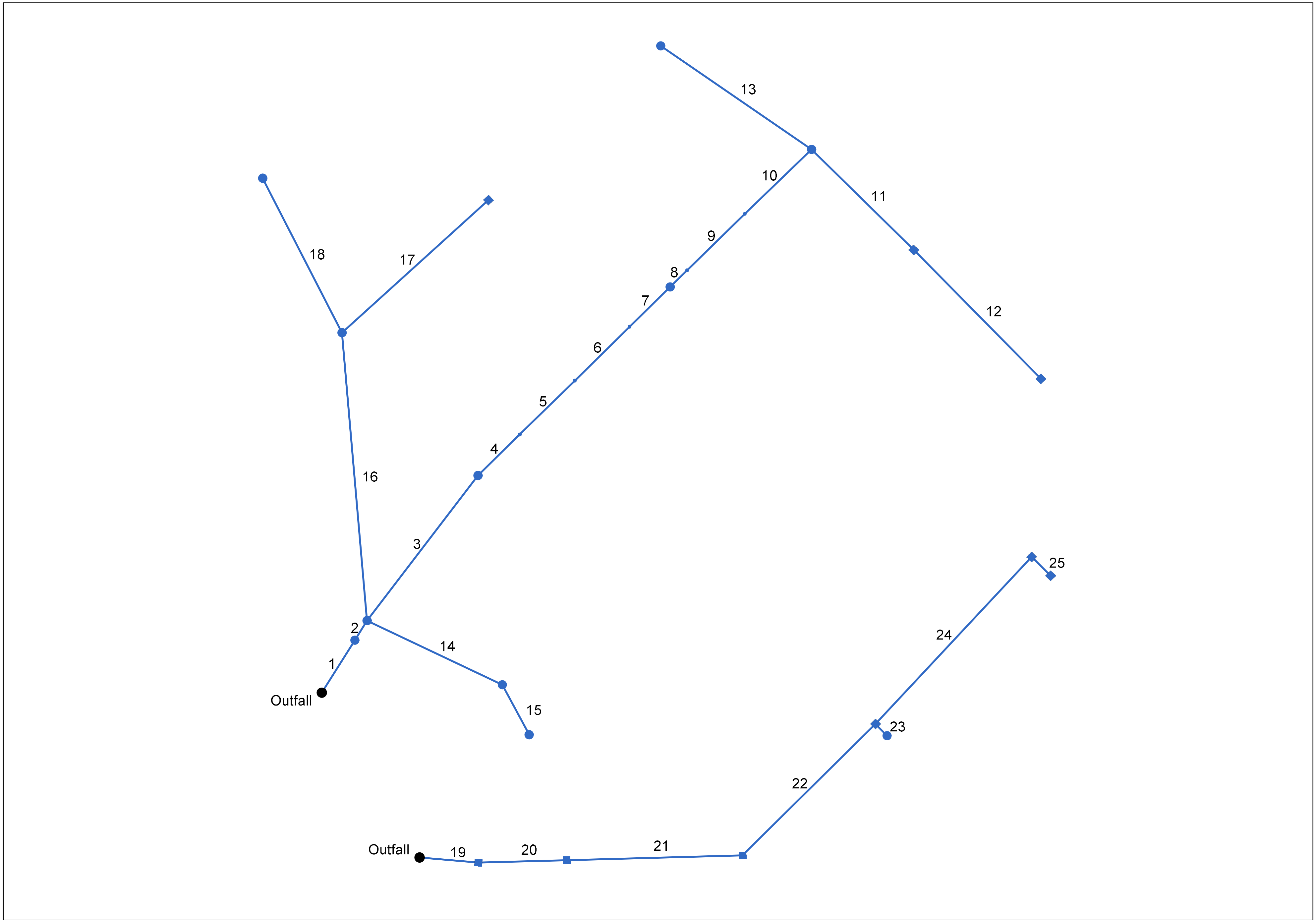
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Abutter

Inflow Area =	53,760 sf, 0.00% Impervious,	Inflow Depth = 0.10"	for 10-Year event
Inflow =	0.08 cfs @ 12.29 hrs, Volume=	453 cf	
Primary =	0.08 cfs @ 12.29 hrs, Volume=	453 cf, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan Attachment "D"



Project File: Storm System-rev1.stm	Number of lines: 25	Date: 3/20/2026

Storm Sewers v2024.00

Storm Sewer Inventory Report

Attachment "D"

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	34	-58	MH	0.00	0.00	0.90	5.0	136.70	0.50	136.87	24	Cir	0.012	0.15	144.56	A-10toA-20A_X2
2	1	13	-1	MH	0.00	0.00	0.90	5.0	136.87	0.48	136.93	24	Cir	0.012	1.00	144.42	A-20AtoA-40_X1
3	2	100	6	MH	0.14	0.00	0.90	5.0	137.12	0.50	137.62	24	Cir	0.012	0.17	145.65	A-40toA-50_X42
4	3	32	8	MH	0.99	0.00	0.90	5.0	137.62	0.50	137.78	18	Cir	0.012	0.15	145.62	A-50toA-60_X35
5	4	42	0	MH	0.99	0.00	0.90	5.0	137.78	0.50	137.99	18	Cir	0.012	0.15	145.48	A-60toA-70_X38
6	5	42	0	MH	0.14	0.00	0.90	5.0	137.99	0.50	138.20	18	Cir	0.012	0.15	145.36	A-70toA-80_X37
7	6	31	0	MH	0.85	0.00	0.90	5.0	138.20	0.48	138.35	18	Cir	0.012	0.15	145.52	A-80toA-90_X34
8	7	13	0	MH	0.17	0.00	0.90	5.0	138.35	0.54	138.42	18	Cir	0.012	0.15	145.61	A-90toA-100_X36
9	8	44	0	MH	0.29	0.00	0.90	5.0	138.42	0.50	138.64	15	Cir	0.012	0.15	145.56	A-100toA-110_X33
10	9	51	1	MH	0.00	0.00	0.90	5.0	138.64	0.49	138.89	15	Cir	0.012	1.00	145.59	A-110toA-120_X11
11	10	78	89	Comb	0.00	0.43	0.47	5.0	140.62	0.51	141.02	12	Cir	0.012	0.50	145.13	A-120toA-130_X17
12	11	99	1	Comb	0.00	0.59	0.41	5.0	141.02	0.49	141.51	12	Cir	0.012	1.00	145.13	A-130toA-140_X18
13	10	100	-101	Comb	0.00	0.98	0.46	5.0	139.89	0.50	140.39	12	Cir	0.012	1.00	144.02	A-120toA-120A_X12
14	2	82	84	Comb	0.00	0.11	0.80	5.0	139.45	0.49	139.85	12	Cir	0.012	0.97	143.61	A-40toA-42A_X25
15	14	31	36	Grate	0.00	0.04	0.90	5.0	139.85	3.03	140.79	12	Cir	0.012	1.00	144.38	A-42AtoA-42B_X31
16	2	158	-36	MH	0.00	0.00	0.90	5.0	137.70	0.50	138.49	18	Cir	0.012	0.83	143.85	A-40toA-41_X15
17	16	108	53	Comb	0.00	0.82	0.75	5.0	139.27	0.50	139.81	15	Cir	0.012	1.00	143.68	A-41toA-41A_X14
18	16	95	-22	Comb	0.00	0.15	0.82	5.0	138.76	0.51	139.24	12	Cir	0.012	1.00	142.86	A-41toA-41B_X13
19	End	32	5	MH	0.00	0.00	0.90	5.0	136.70	0.50	136.86	24	Cir	0.012	0.15	141.32	C-10toC-20A_X4
20	19	48	-7	Grate	0.00	0.76	0.82	5.0	136.86	0.50	137.10	24	Cir	0.012	0.50	140.73	C-20AtoC-30_X3
21	20	96	0	MH	0.85	0.00	0.90	5.0	137.34	0.50	137.82	15	Cir	0.012	0.73	143.55	C-30toC-40_X40
22	21	102	-43	MH	1.70	0.00	0.90	5.0	138.48	0.50	138.99	15	Cir	0.012	1.00	143.79	C-40toC-50_X39
23	22	9	90	Comb	0.00	0.09	0.73	5.0	139.94	0.56	139.99	12	Cir	0.012	1.00	143.61	C-50toC-50A_X26

Project File: Storm System-rev1.stm | Number of lines: 25 | Date: 3/20/2026

Storm Sewer Inventory Report

Attachment "D"

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
24	22	125	-2	MH	0.85	0.00	0.90	5.0	138.99	0.50	139.61	15	Cir	0.012	1.00	143.91	C-50toC-60_X5
25	24	15	92	Comb	0.00	0.27	0.43	5.0	139.91	0.55	139.99	12	Cir	0.012	1.00	143.61	C-60toC-70_X4

Project File: Storm System-rev1.stm | Number of lines: 25 | Date: 3/20/2026

Storm Sewer Tabulation

Attachment "D"

Station Line	Station To Line	Len (ft)	Drng Area Incr (ac)	Drng Area Total (ac)	Rnoff coeff (C)	Area x C Incr	Area x C Total	Tc Inlet (min)	Tc Syst (min)	Rain (I) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe Size (in)	Pipe Slope (%)	Invert Elev Dn (ft)	Invert Elev Up (ft)	HGL Elev Dn (ft)	HGL Elev Up (ft)	Grnd / Rim Elev Dn (ft)	Grnd / Rim Elev Up (ft)	Line ID
1	End	34	0.00	3.12	0.90	0.00	1.76	5.0	7.8	5.7	13.51	17.34	4.30	24	0.50	136.70	136.87	139.32	139.42	138.95	144.56	A-10toA-20A_X2
2	1	13	0.00	3.12	0.90	0.00	1.76	5.0	7.8	5.7	13.54	16.95	4.31	24	0.48	136.87	136.93	139.47	139.50	144.56	144.42	A-20AtoA-40_X1
3	2	100	0.00	2.00	0.90	0.00	0.89	5.0	7.2	5.8	8.80	17.34	2.80	24	0.50	137.12	137.62	139.79	139.92	144.42	145.65	A-40toA-50_X42
4	3	32	0.00	2.00	0.90	0.00	0.89	5.0	7.1	5.9	8.69	8.05	4.92	18	0.50	137.62	137.78	139.94	140.13	145.65	145.62	A-50toA-60_X35
5	4	42	0.00	2.00	0.90	0.00	0.89	5.0	6.9	5.9	7.74	8.04	4.38	18	0.50	137.78	137.99	140.19	140.38	145.62	145.48	A-60toA-70_X38
6	5	42	0.00	2.00	0.90	0.00	0.89	5.0	6.7	6.0	6.80	8.04	3.85	18	0.50	137.99	138.20	140.43	140.58	145.48	145.36	A-70toA-80_X37
7	6	31	0.00	2.00	0.90	0.00	0.89	5.0	6.6	6.0	6.70	7.91	3.79	18	0.48	138.20	138.35	140.61	140.72	145.36	145.52	A-80toA-90_X34
8	7	13	0.00	2.00	0.90	0.00	0.89	5.0	6.5	6.0	5.87	8.37	3.32	18	0.54	138.35	138.42	140.75	140.79	145.52	145.61	A-90toA-100_X36
9	8	44	0.00	2.00	0.90	0.00	0.89	5.0	6.4	6.1	5.74	4.95	4.68	15	0.50	138.42	138.64	140.81	141.11	145.61	145.56	A-100toA-110_X3
10	9	51	0.00	2.00	0.90	0.00	0.89	5.0	6.2	6.2	5.51	4.91	4.49	15	0.49	138.64	138.89	141.16	141.47	145.56	145.59	A-110toA-120_X1
11	10	78	0.43	1.02	0.47	0.20	0.44	5.0	5.8	6.3	2.79	2.76	3.55	12	0.51	140.62	141.02	141.79	142.20	145.59	145.13	A-120toA-130_X1
12	11	99	0.59	0.59	0.41	0.24	0.24	5.0	5.0	6.6	1.59	2.71	2.05	12	0.49	141.02	141.51	142.29	142.45	145.13	145.13	A-130toA-140_X1
13	10	100	0.98	0.98	0.46	0.45	0.45	5.0	5.0	6.6	2.97	2.73	3.78	12	0.50	139.89	140.39	141.79	142.38	145.59	144.02	A-120toA-120A_X
14	2	82	0.11	0.15	0.80	0.09	0.12	5.0	5.3	6.4	0.80	2.70	2.99	12	0.49	139.45	139.85	139.82	140.22	144.42	143.61	A-40toA-42A_X25
15	14	31	0.04	0.04	0.90	0.04	0.04	5.0	5.0	6.6	0.24	6.72	1.50	12	3.03	139.85	140.79	140.22	140.99	143.61	144.38	A-42AtoA-42B_X3
16	2	158	0.00	0.97	0.90	0.00	0.74	5.0	6.5	6.1	4.47	8.04	2.53	18	0.50	137.70	138.49	139.79	139.99	144.42	143.85	A-40toA-41_X15
17	16	108	0.82	0.82	0.75	0.62	0.62	5.0	5.0	6.6	4.05	4.95	4.50	15	0.50	139.27	139.81	140.13	140.67	143.85	143.68	A-41toA-41A_X14
18	16	95	0.15	0.15	0.82	0.12	0.12	5.0	5.0	6.6	0.81	2.74	1.07	12	0.51	138.76	139.24	140.07	140.11	143.85	142.86	A-41toA-41B_X13
19	End	32	0.00	1.12	0.90	0.00	0.81	5.0	7.7	5.7	7.97	17.26	2.54	24	0.50	136.70	136.86	139.32	139.35	138.95	141.32	C-10toC-20A_X4
20	19	48	0.76	1.12	0.82	0.62	0.81	5.0	7.4	5.8	8.04	17.34	2.56	24	0.50	136.86	137.10	139.37	139.42	141.32	140.73	C-20AtoC-30_X3
21	20	96	0.00	0.36	0.90	0.00	0.18	5.0	7.0	5.9	4.47	4.95	3.64	15	0.50	137.34	137.82	139.47	139.86	140.73	143.55	C-30toC-40_X40
22	21	102	0.00	0.36	0.90	0.00	0.18	5.0	6.4	6.1	3.65	4.94	2.98	15	0.50	138.48	138.99	140.02	140.29	143.55	143.79	C-40toC-50_X39

Project File: Storm System-rev1.stm | Number of lines: 25 | Run Date: 3/20/2026

NOTES:Intensity = 36.67 / (Inlet time + 6.70) ^ 0.70; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Attachment "D"

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
23	22	9	0.09	0.09	0.73	0.07	0.07	5.0	5.0	6.6	0.43	2.88	1.81	12	0.56	139.94	139.99	140.43	140.26	143.79	143.61	C-50toC-50A_X26
24	22	125	0.00	0.27	0.90	0.00	0.12	5.0	5.1	6.5	1.61	4.93	1.53	15	0.50	138.99	139.61	140.43	140.49	143.79	143.91	C-50toC-60_X5
25	24	15	0.27	0.27	0.43	0.12	0.12	5.0	5.0	6.6	0.76	2.86	2.21	12	0.55	139.91	139.99	140.54	140.35	143.91	143.61	C-60toC-70_X4

Project File: Storm System-rev1.stm | Number of lines: 25 | Run Date: 3/20/2026

NOTES:Intensity = 36.67 / (Inlet time + 6.70) ^ 0.70; Return period =Yrs. 25 ; c = cir e = ellip b = box

Inlet Report

Attachment "D"

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet Ht (in)	Curb Inlet L (ft)	Grate Inlet Area (sqft)	Grate Inlet L (ft)	Grate Inlet W (ft)	Gutter So (ft/ft)	Gutter W (ft)	Gutter Sw (ft/ft)	Gutter Sx (ft/ft)	Gutter n	Gutter Depth (ft)	Gutter Spread (ft)	Inlet Depth (ft)	Inlet Spread (ft)	Inlet Depr (in)	Byp Line No
1	A-20A	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	A-40	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
3	A-50	0.14*	0.00	0.00	0.14	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
4	A-60	0.99*	0.00	0.00	0.99	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
5	A-70	0.99*	0.00	0.00	0.99	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
6	A-80	0.14*	0.00	0.00	0.14	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
7	A-90	0.85*	0.00	0.00	0.85	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
8	A-100	0.17*	0.00	0.00	0.17	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
9	A-110	0.29*	0.00	0.00	0.29	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
10	A-120	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
11	A-130	1.33	0.00	1.33	0.00	Comb	4.0	4.00	3.00	4.00	2.00	Sag	2.00	0.015	0.015	0.000	0.16	10.69	0.16	10.69	0.0	Off
12	A-140	1.59	0.00	1.59	0.00	Comb	4.0	4.00	3.00	4.00	2.00	Sag	2.00	0.015	0.015	0.000	0.18	11.93	0.18	11.93	0.0	Off
13	A-120A	2.97	0.00	2.97	0.00	Comb	4.0	4.00	3.00	4.00	2.00	Sag	2.00	0.015	0.015	0.000	0.26	17.54	0.26	17.54	0.0	Off
14	A-42A	0.58	0.00	0.58	0.00	Comb	4.0	4.00	3.00	4.00	2.00	Sag	2.00	0.015	0.015	0.000	0.10	6.57	0.10	6.57	0.0	Off
15	A-42B	0.24	0.00	0.24	0.00	Grate	0.0	0.00	1.50	2.00	2.00	Sag	2.00	0.015	0.015	0.000	0.07	4.71	0.07	4.71	0.0	Off
16	A-41	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
17	A-41A	4.05	0.00	4.05	0.00	Comb	4.0	4.00	3.00	4.00	2.00	Sag	2.00	0.015	0.015	0.000	0.32	21.35	0.32	21.35	0.0	Off
18	A-41B	0.81	0.00	0.81	0.00	Comb	4.0	4.00	3.00	4.00	2.00	Sag	2.00	0.015	0.015	0.000	0.12	7.96	0.12	7.96	0.0	Off
19	C-20A	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
20	C-30	4.10	0.00	4.10	0.00	Grate	0.0	0.00	3.00	4.00	2.00	Sag	2.00	0.015	0.015	0.000	0.32	21.51	0.32	21.51	0.0	Off
21	C-40	0.85*	0.00	0.00	0.85	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
22	C-50	1.70*	0.00	0.00	1.70	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
23	C-50A	0.43	0.00	0.43	0.00	Comb	4.0	4.00	3.00	4.00	2.00	Sag	2.00	0.015	0.015	0.000	0.08	5.59	0.08	5.59	0.0	Off

Project File: Storm System-rev1.stm	Number of lines: 25	Run Date: 3/20/2026

NOTES: Inlet N-Values = 0.016; Intensity = 36.67 / (Inlet time + 6.70) ^ 0.70; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Inlet Report

Attachment "D"

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	C-60	0.85*	0.00	0.00	0.85	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
25	C-70	0.76	0.00	0.76	0.00	Comb	4.0	4.00	3.00	4.00	2.00	Sag	2.00	0.015	0.015	0.000	0.12	7.70	0.12	7.70	0.0	Off

Project File: Storm System-rev1.stm | Number of lines: 25 | Run Date: 3/20/2026

NOTES: Inlet N-Values = 0.016; Intensity = 36.67 / (Inlet time + 6.70) ^ 0.70; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Attachment "D"

Restaurant Depot - Hudson NH
273 Lowell Road
Hudson, NH
Bohler Job Number: NHA250020.01
1/23/2026, revised 03/24/26

Rip Rap Sizing Calculations

Design Period Storm: 25 & **50*** **Year**

Rip Rap Apron Sizing Calculations											
Location	Pipe Size (in.)	Sp (ft.)	Q (cfs)	TW (ft.)	V (fps)	W1 (ft.)	La (ft.)	W2 (ft.)	W3 (ft.)	Apron Type	Rip Rap Type
D-10*	12	1.0	0.10	0.13	3.37	3.00	10	10	NA	A	Modified
A-10	24	2.0	13.51	0.37	4.30	6.00	16	17	NA	A	Modified
B-10*	12	1.0	0.12	0.15	1.60	3.00	10	10	NA	A	Modified
C-10	24	2.0	7.97	0.37	2.54	6.00	12	14	NA	A	Modified

Based ConnDOT Drainage Manual - Type A, B, and C Riprap Aprons

Outlet Velocity (fps)
0-8 - Modified
8-10 - Intermediate
10-14 - Standard

Prepared By: Bohler
BOHLER
3 Executive Park Drive Suite 202
Bedford, NH 03110
(603) 441-2900

Attachment "D"

Product Flow Rates

CASCADE

Model	Treatment Rate (cfs)	Sediment Capacity[1] (CF)
CS-4	2.00	19
CS-5	3.50	29
CS-6	5.60	42
CS-8	12.00	75
CS-10	18.00	118

CDS

Model	Treatment Rate[2] (cfs)	Sediment Capacity[1] (CF)
1515-3	1.00	14
2015-4	1.40	25
2015-5	1.40	39
2015-6	1.40	57
2020-5	2.20	39
2020-6	2.20	57
2025-5	3.20	39
2025-6	3.20	57
3020-6	3.90	57
3025-6	5.00	57
3030-6	5.70	57
3035-6	6.50	57
4030-8	7.50	151
4040-8	9.50	151

VORTECHS

Model	Treatment Rate (cfs)	Sediment Capacity[3] (CF)
1000	1.60	16
2000	2.80	32
3000	4.50	49
4000	6.00	65
5000	8.50	86
7000	11.00	108
9000	14.00	130
11000	17.5	151
16000	25	192

STORMCEPTOR STC

Model	Treatment Rate (cfs)	Sediment Capacity[1] (CF)
STC 450i	0.40	46
STC 900	0.89	89
STC 2400	1.58	205
STC 4800	2.47	543
STC 7200	3.56	839
STC 11000	4.94	1086
STC 16000	7.12	1677

1 Additional sediment storage capacity available – Check with your local representative for information.

2 Treatment Capacity is based on laboratory testing using OK-110 (average D50 particle size of approximately 100 microns) and a 2400 micron screen.

3 Maintenance recommended when sediment depth has accumulated to within 12-18 inches of the dry weather water surface elevation.

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Attachment "D"

Estimated Net Annual Solids Load Reduction
Based on the Rational Rainfall Method

CONTECH ENGINEERED SOLUTIONS

CASCADE separator™

Prop Restaurant Depot
Hudson, NH
WQU A-20

AREA	3.62	acres	CASCADE MODEL	CS-5	
WEIGHTED C	0.57		PARTICLE SIZE	110	microns
TC	6.00	minutes			

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Hydraulic Loading Rate (gpm/ft2)	Removal Efficiency (%)	Incremental Removal (%)
0.02	13.0%	0.94	100.0	13.0
0.04	12.2%	1.89	100.0	12.2
0.06	11.2%	2.83	100.0	11.2
0.08	10.0%	3.77	100.0	10.0
0.10	8.2%	4.72	100.0	8.2
0.12	5.8%	5.66	100.0	5.8
0.14	6.5%	6.60	100.0	6.5
0.16	4.6%	7.55	100.0	4.6
0.18	3.7%	8.49	100.0	3.7
0.20	3.3%	9.43	100.0	3.3
0.25	6.7%	11.79	100.0	6.7
0.30	3.7%	14.15	98.6	3.6
0.35	2.4%	16.51	96.4	2.3
0.40	1.8%	18.87	94.2	1.7
0.45	1.9%	21.23	91.9	1.8
0.50	1.1%	23.58	89.7	1.0
0.75	2.6%	35.38	78.6	2.0
1.00	0.9%	47.17	67.6	0.6
1.50	0.4%	70.75	45.4	0.2
2.00	0.0%	80.01	31.1	0.0
				98.4
			Removal Efficiency Adjustment[2] =	6.5%
			Predicted % Annual Rainfall Treated =	93.5%
			Predicted Net Annual Load Removal Efficiency =	92.0%

1 - Based on 10 years of hourly precipitation data from NCDC 1683, Concord WSO Airport, Merrimack County, NH

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Attachment "D"

Estimated Net Annual Solids Load Reduction
Based on the Rational Rainfall Method

CONTECH ENGINEERED SOLUTIONS

CASCADE separator™

Prop Restaurant Depot
Hudson, NH
WQU C-20

AREA	2.42	acres	CASCADE MODEL	CS-5	
WEIGHTED C	0.70		PARTICLE SIZE	110	microns
TC	6.00	minutes			

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Hydraulic Loading Rate (gpm/ft2)	Removal Efficiency (%)	Incremental Removal (%)
0.02	13.0%	0.77	100.0	13.0
0.04	12.2%	1.55	100.0	12.2
0.06	11.2%	2.32	100.0	11.2
0.08	10.0%	3.10	100.0	10.0
0.10	8.2%	3.87	100.0	8.2
0.12	5.8%	4.65	100.0	5.8
0.14	6.5%	5.42	100.0	6.5
0.16	4.6%	6.20	100.0	4.6
0.18	3.7%	6.97	100.0	3.7
0.20	3.3%	7.74	100.0	3.3
0.25	6.7%	9.68	100.0	6.7
0.30	3.7%	11.62	100.0	3.7
0.35	2.4%	13.55	99.2	2.4
0.40	1.8%	15.49	97.3	1.8
0.45	1.9%	17.43	95.5	1.9
0.50	1.1%	19.36	93.7	1.0
0.75	2.6%	29.04	84.6	2.2
1.00	0.9%	38.72	75.5	0.7
1.50	0.4%	58.08	57.3	0.2
2.00	0.0%	77.45	39.1	0.0
				99.0

Removal Efficiency Adjustment[2] =	6.5%
Predicted % Annual Rainfall Treated =	93.5%
Predicted Net Annual Load Removal Efficiency =	92.5%

1 - Based on 10 years of hourly precipitation data from NCDC 1683, Concord WSO Airport, Merrimack County, NH

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

NJCAT TECHNOLOGY VERIFICATION

Removal Efficiency of Suspended Sediment with a Median Particle Size of 110 microns

Cascade Separator™
Contech Engineered Solutions, LLC

November 2019
(Amended Table A-1 August 2020)

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1. INTRODUCTION

In September 2019, the Cascade Separator™ received New Jersey Corporation for Advanced Technology (NJCAT) verification for testing completed under the New Jersey Department of Environmental Protection (NJDEP) Laboratory Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device (NJDEP Protocol) dated January 25, 2013. The Cascade Separator met the NJDEP Protocol requirements by demonstrating 50% weighted TSS removal with a target median particle size (D_{50}) of 75 µm at a target inlet sediment concentration of 200 mg/L.

Many jurisdictions in the United States are interested in data demonstrating solids removal for coarser particle sizes than that tested for NJDEP certification. A common standard used to evaluate and size hydrodynamic separators in other parts of North America is to utilize a sediment gradation with a D_{50} of 110 µm. The objective of this additional laboratory evaluation was to determine the total suspended solids (TSS) removal by the Cascade over a range of operating rates using a sediment gradation with a median particle size (D_{50}) of 110 µm at a target inlet sediment concentration of 280 mg/L. **The results of the study were submitted to NJCAT for verification, but the testing procedure falls outside of the NJDEP Protocol and process and therefore was not submitted to NJDEP for certification.**

2. DESCRIPTION OF TECHNOLOGY

The Cascade Separator is a manufactured treatment device (MTD) designed to protect waterways from stormwater runoff. The hydrodynamic separator device separates and traps trash, debris and sediment, even at high flow rates, and provides easy access for maintenance. The Cascade Separator is commonly used as a standalone stormwater quality control practice and as pretreatment for filtration, detention/infiltration, bioretention, rainwater harvesting systems and Low Impact Development designs.

The Cascade Separator (**Figure 1**) accepts flow through an inlet. Water enters the inlet chamber where a specially designed insert splits the flow into two flumes, creating vortices that rotate in opposite directions in the center chamber. This creates high and low velocity regions in the center chamber that facilitates the settling of particles. As water travels downward through the center chamber, sediment settles into the sump area where it is retained until maintenance is performed. The slanted skirt provides scour protection during peak events and its incline facilitates sediment transport into the sump. Treated stormwater moves upwards, leaves the center cylinder through the outlet window and travels through the outlet channel before exiting the system. Refer to the black flow arrows in **Figure 2** for the treatment flow path. The outlet deck incorporates two pipes that extend downward and allow the system to drain to the outlet pipe invert elevation after the storm event has subsided, while also preventing captured floating materials from leaving the system. The green arrows in **Figure 2** show the flow path through these components.

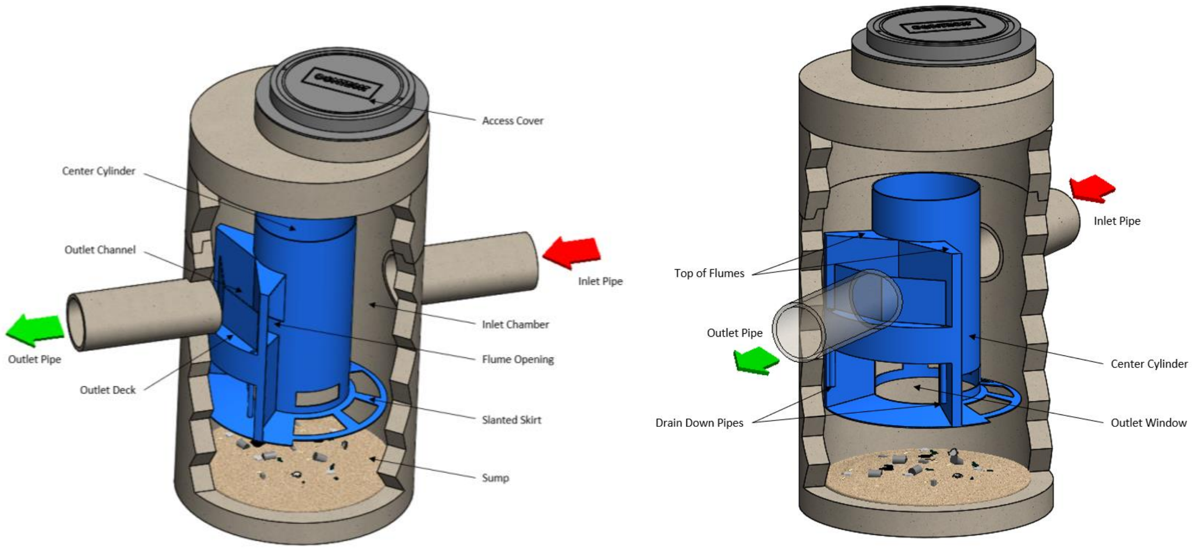


Figure 1: Model of the Cascade Separator

The Cascade Separator is designed to handle high flow rates without scouring previously captured pollutants. Each model is designed to allow a maximum flow rate through the treatment chambers and has an internal flow bypass for storm events that exceed the specific flow rate. While in internal bypass, the unit continues to treat the stormwater that enters the flumes while the excess flow passes over the flumes and exits the system untreated. This internal bypass feature allows the Cascade Separator to be installed online, therefore eliminating the need for additional bypass structures. The red arrows in **Figure 2** show how excess flow is bypassed over the flumes.

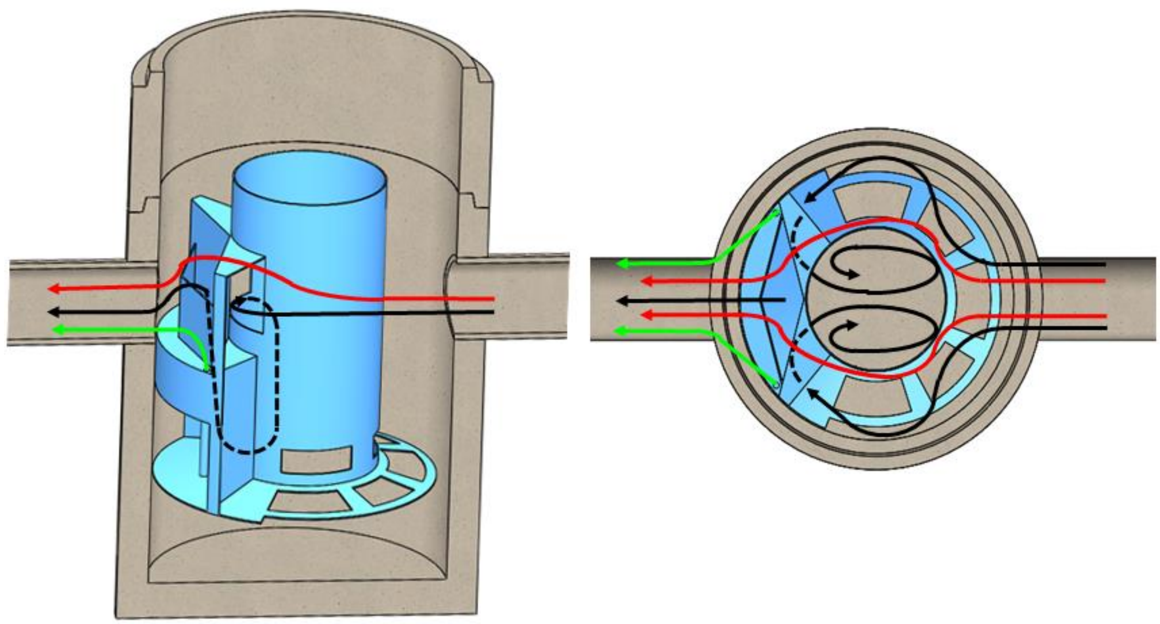


Figure 2: Cascade Separator Flow Paths

3. Laboratory Testing

All removal efficiency testing for this project was carried out at Contech's Portland, Oregon laboratory in April and May 2019. Independent third-party oversight was provided by Scott Wells, Ph.D. and his associate Chris Berger, Ph.D. Dr. Scott Wells and Dr. Chris Berger, from Portland State University, have extensive backgrounds in water quality including direct experience with the laboratory evaluation of stormwater MTDs. Dr. Scott Wells and Dr. Chris Berger have no conflict of interest that would disqualify them from serving as independent third-party observers during this testing process.

Test sediment samples for particle size distribution (PSD) analysis were processed in-house, under third-party observation according to ASTM D6913/D6913M-17 Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis. Test sediment samples for moisture content were processed in-house, under third-party observation according to ASTM D2216-2019 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass. TSS samples were processed in-house, under third-party observation according to ASTM D3977-97(2013) Standard Test Methods for Determining Sediment Concentration in Water Samples.

3.1. Test Unit

Laboratory testing was completed on a full-scale, dimensionally accurate 4 ft diameter Cascade Separator (CS-4) lab model, whose components and material are comparable to the commercially available product (**Figure 3**). The Cascade Separator was housed in a 4 ft diameter aluminum manhole with aluminum influent and effluent pipes, with the same inside diameter (ID) as a 24 in. PVC pipe (22.5 in. ID). The CS-4 has a depth of 48 in. from housing floor to effluent pipe invert. The CS-4 outlet channel height is 10.5 in. above the outlet pipe invert. The effective treatment area is 12.6 ft^2 and the maximum sediment storage capacity is 18.8 ft^3, or a depth of 18 in. above the floor. Removal efficiency was conducted at 50% of the maximum sediment storage depth. To accomplish this, an aluminum false floor was installed at 50% of the sediment storage depth, or 39 in. below the outlet pipe invert. The CS-4 permanent pool volume is 40.8 ft^3 from 50% sediment storage depth to outlet pipe invert. For this testing, the approximate full operation volume of 58.6 ft^3 (50% sediment storage depth to internal bypass elevation, 56 in. height) will be used to calculate the detention time as it is more conservative.

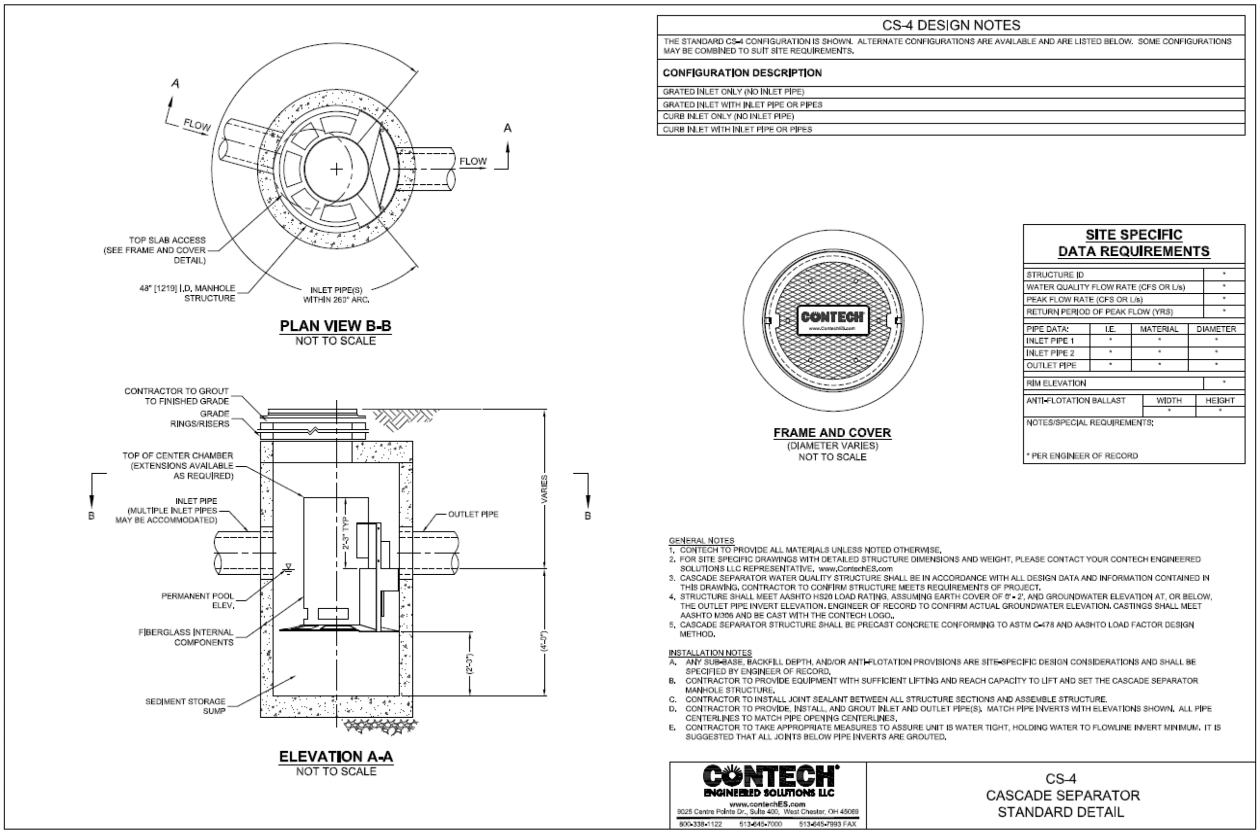


Figure 3: Cascade Separator Standard Detail

3.2. TEST SYSTEM

The Cascade Separator was tested on a recirculating laboratory system capable of delivering flow rates up to 5 cfs (**Figure 4**). During removal efficiency tests, clean water was drawn from a 3,500-gal influent tank using a 15 HP, Berkeley B6ZPLS centrifugal pump (Pump 1). Closed loop flow-control was maintained with a proportional-integral-derivative controlled variable frequency drive (VFD). The feedback signal to the VFD was provided from a Seametrics IMAG 4700 8 in. flowmeter. All flow from Pump 1 to the test unit was measured by the flowmeter (+/- 1.0% of reading) and logged at 5 sec intervals. Influent flow traveled through an inlet junction and into the influent pipe where background TSS samples were taken from a ¾ in. PVC pipe sampling port at the bottom of the influent pipe, upstream of the sediment injection point (**Figure 5**). Influent water was then dosed with sediment at the crown of the pipe from an Auger Feeders VF2 volumetric sediment feeder, located 112.5 in. upstream of the test unit (**Figure 6**). Influent water entered the manhole housing, was treated by the Cascade Separator, and exited the unit via the effluent pipe. Water exited the effluent pipe in a free-fall stream, where effluent TSS grab samples were taken by making a single sweeping pass through the cross section of the effluent stream before it entered the 2,350 gal effluent tank (**Figure 7**).

Effluent water traveled through an array of bag filters located inside the effluent tank and was then pumped through cartridge filter housings using a 25 HP Berkeley B5ZPBHS centrifugal pump (Pump 2). To maintain water balance between the isolated influent and effluent tanks, a closed-looped flow-control on Pump 2 was maintained using feedback from a Seametrics IMAG 4700 8 in. flowmeter. The filtered water was discharged into the influent tank for re-use. Flocculants were not used to reduce background TSS at any time.

The test water temperature was maintained using a Coates 32024CPH 24 kW heater, which recirculated influent water. Water temperature was measured in the inlet junction with an Omega HSRTD-3-100-B-80-E resistance temperature detector and logged at 5 sec intervals.

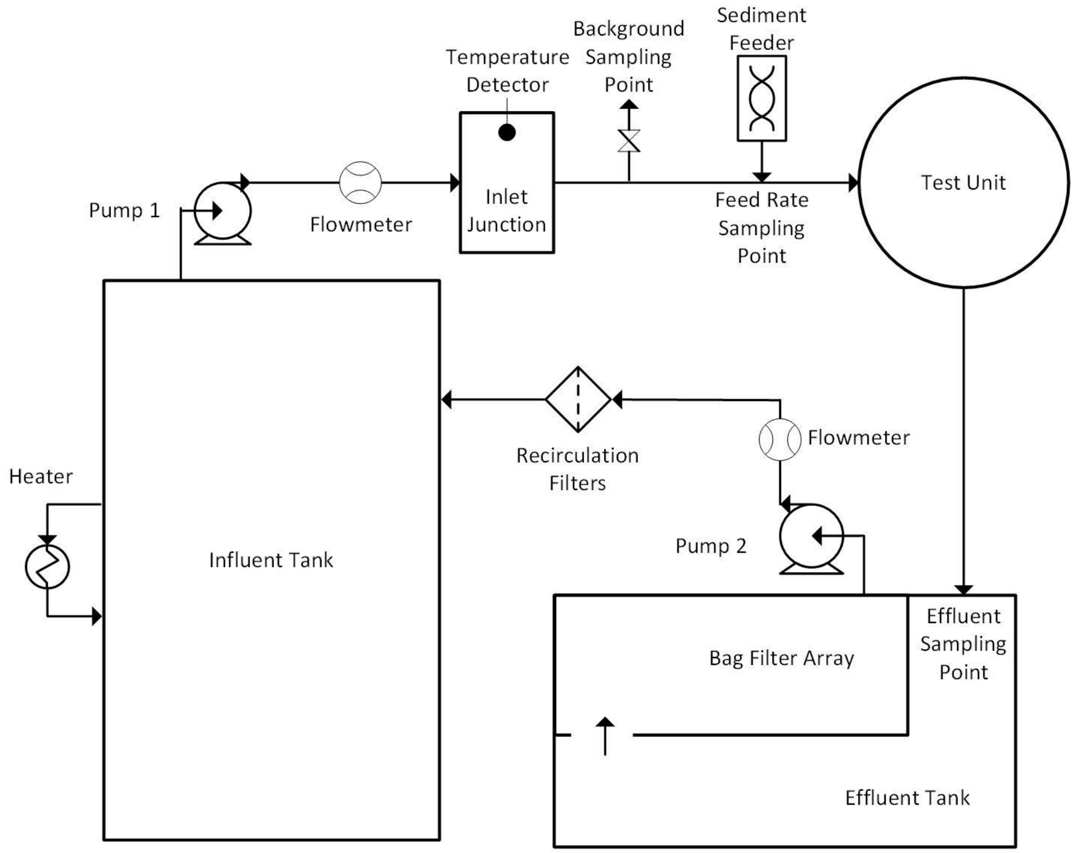


Figure 4: Lab Setup for Removal Efficiency Tests

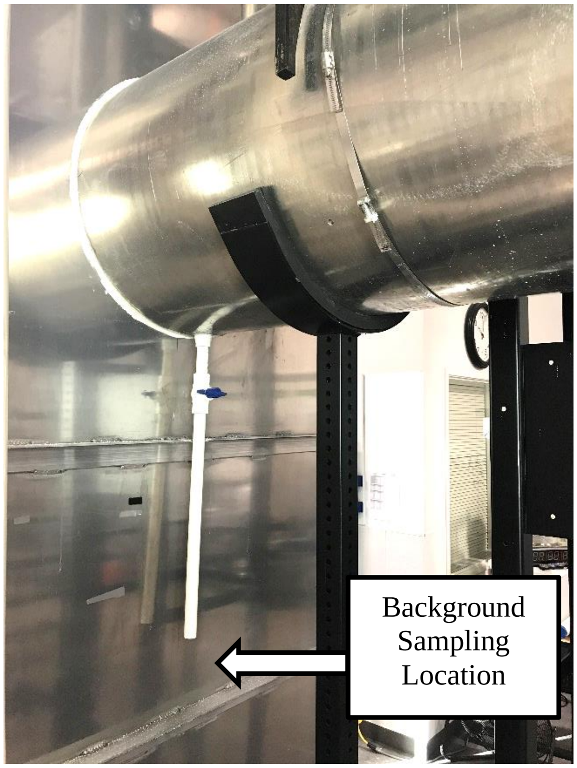


Figure 5: Background Sampling Location

Figure 6: Sediment Injection Location and Feed Rate Sampling Location

Figure 7: Manhole and Effluent Grab Sampling Location

3.3. Test Sediment

The sediment used for removal efficiency tests was a custom silica blend with a specific gravity of 2.65. The test sediment was blended in-house and used as an alternative to US Silica OK-110 sediment (**Figure 8**), which is no longer produced commercially. The custom sediment had a target D_{50} of 110 µm, with a range of particle sizes from 53 µm to 250 µm. After blending, the test sediment was batched, labeled and stored in covered bins for the duration of this project. Sediment sampling and analysis were conducted in-house, under third party observation. Twelve subsamples, taken from various locations within the test sediment bins were composited. From the composite, three samples were taken for PSD analysis and three samples for moisture content analysis. The average PSD (**Table 2**) derived from the three samples was used to determine compliance with the target PSD (**Figure 8**). The average sediment moisture content was used in feed rate calculations (**Equation 1**) and carried through in influent mass calculations (**Equation 2**).

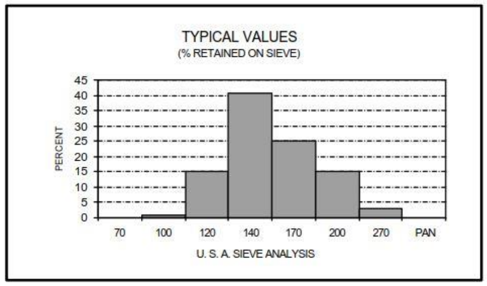
U.S. SILICA
Sands of Time

PRODUCT DATA

OK-110

UNGROUND SILICA

PLANT: MILL CREEK, OKLAHOMA



		TYPICAL VALUES		
USA STD SIEVE SIZE		% RETAINED		% PASSING
MESH	MILLIMETERS	INDIVIDUAL	CUMULATIVE	CUMULATIVE
70	0.212	0.2	0.2	99.8
100	0.150	1.0	1.2	98.8
120	0.125	15.0	16.2	83.8
140	0.106	40.8	57.0	43.0
170	0.088	25.0	82.0	18.0
200	0.075	15.0	97.0	3.0
270	0.053	3.0	100.0	0.0
PAN		0.0	100.0	

Figure 8: US Silica OK-110 Product Data Sheet

3.4. REMOVAL EFFICIENCY TESTING PROCEDURE

Three separate, continuous removal efficiency tests were performed over a range of hydraulic loading rates. The three resulting removal efficiency values at each hydraulic loading rate were plotted with a curve fit applied.

Each continuous test started with the highest target flow rate and continued with flow rates decreasing incrementally through the target values: 1.50 cfs, 1.20 cfs, 0.90 cfs, 0.60 cfs and 0.30 cfs. During each continuous test, each flow rate trial commenced once the feed rate was set and the flow rate was stabilized at the target rate for a minimum of three detention times. A sediment feed rate sample was taken at the beginning of each flow rate trial and a minimum of three detention times passed before the six effluent samples and six paired background samples were taken. After all effluent and background samples were collected, the second feed rate sample was taken. Each flow rate trial ended following the second feed rate sample. The flow rate and corresponding feed rate were then re-adjusted and allowed to stabilize before starting the next flow rate trial. Testing continued in this manner until the full set of flow rates were evaluated. The sampling procedure was the same for all flow rate trials, but the sample spacing and trial duration varied to accommodate differences in detention time (**Table 1**). The system was cleaned prior to each continuous test, but not between the flow rate trials within a test.

Table 1: Continuous Test Sampling Plan

Time (mm:ss)	Sample		
START OF CONTINUOUS TEST			
Stabilize flow for minimum duration of 01:57			
00:00	START 1.5 CFS TRIAL		
00:00	FEED 1		
03:00		EFF 1	BACK 1
03:30		EFF 2	BACK 2
04:00		EFF 3	BACK 3
04:30		EFF 4	BACK 4
05:00		EFF 5	BACK 5
05:30		EFF 6	BACK 6
05:30	FEED 2		
06:30	STOP 1.5 CFS TRIAL		
Stabilize flow for minimum duration of 02:27			
00:00	START 1.2 CFS TRIAL		
00:00	FEED 1		
03:30		EFF 1	BACK 1
04:00		EFF 2	BACK 2
04:30		EFF 3	BACK 3
05:00		EFF 4	BACK 4
05:30		EFF 5	BACK 5
06:00		EFF 6	BACK 6
06:00	FEED 2		
07:00	STOP 1.2 CFS TRIAL		
Stabilize flow for minimum duration of 03:15			
00:00	START 0.9 CFS TRIAL		
00:00	FEED 1		
04:30		EFF 1	BACK 1
05:00		EFF 2	BACK 2
05:30		EFF 3	BACK 3
06:00		EFF 4	BACK 4
06:30		EFF 5	BACK 5
07:00		EFF 6	BACK 6
07:00	FEED 2		
08:00	STOP 0.9 CFS TRIAL		

Time (mm:ss) *Continued*	Sample *Continued*		
Stabilize flow for minimum duration of 04:53			
00:00	START 0.6 CFS TRIAL		
00:00	FEED 1		
06:00		EFF 1	BACK 1
06:30		EFF 2	BACK 2
07:00		EFF 3	BACK 3
07:30		EFF 4	BACK 4
08:00		EFF 5	BACK 5
08:30		EFF 6	BACK 6
08:30	FEED 2		
09:30	STOP 0.6 CFS TRIAL		
Stabilize flow for minimum duration of 09:46			
00:00	START 0.3 CFS TRIAL		
00:00	FEED 1		
11:00		EFF 1	BACK 1
11:30		EFF 2	BACK 2
12:00		EFF 3	BACK 3
12:30		EFF 4	BACK 4
13:00		EFF 5	BACK 5
13:30		EFF 6	BACK 6
13:30	FEED 2		
14:30	STOP 0.3 CFS TRIAL		
END OF CONTINUOUS TEST			

During all testing the flow rate was held steady at ±10% of the target value with a target coefficient of variation (COV) of less than 0.03. Water temperature remained below 80 °F during all testing.

For each flow trial, sediment was injected at a known rate to produce a target average influent concentration of 280 mg/L (± 10%) with a COV of less than 0.10. Feed rates were determined by sampling the injection stream once at the beginning and once at the end of each flow trial. Samples were collected in clean, 1 L bottles at the injection point (**Figure 6**) for a target duration of 60 s. Sediment sample collection time was measured using a Thomas Scientific 1235026 traceable stopwatch. The samples were weighed to the mg (in-house) using an Ohaus AR3130 calibrated balance and feed rate for each run was calculated using **Equation 1**. Average influent TSS concentration was calculated from the average test feed rate and average flow rate for the flow trial using **Equation 2**.

$$\text{Feed Rate}\left({}^{\text{g}}/_{\text{min}}\right) = \frac{\text{Mass}_{\text{sample+bottle}}(\text{g}) - \text{Mass}_{\text{bottle}}(\text{g})}{\text{Time}_{\text{collection}}(\text{s}) \times \frac{\text{min}}{60\text{ s}}} \times [1 - \text{Sediment Moisure Content}]$$

Equation 1

$$Average\ Influent\ TSS\left({}^{mg}/_{L}\right) = \frac{Average\ Feed\ Rate\left({}^{g}/_{min}\right) \times \frac{1000\ mg}{g}}{Average\ Flow\ Rate\ \left({}^{gal}/_{min}\right) \times \frac{3.78541\ L}{gal}}$$

Equation 2

Six effluent grab samples were collected at evenly-spaced intervals during each flow rate trial. After the first feed rate sample was collected, effluent sampling began after a minimum of three detention times passed. Each sample volume was a minimum of 0.5 L. Samples were collected in clean, 1 L bottles by sweeping the bottle through the cross-section of the free-discharge effluent stream in a single pass. In the cases where the effluent TSS concentration was non-detect (ND), a value of half the detection limit was substituted. The detection limit is 1.55 mg/L.

Background samples were taken simultaneously with every effluent sample. Each sample was a minimum of 0.5 L in volume and was collected in a clean, 1 L bottle from the background sampling port. Background samples were collected after the sampling port was opened and the line was flushed for 3 sec. In the cases where the background TSS concentration was non-detect (ND), a value of half the detection limit was substituted. Average background concentration did not exceed 20 mg/L during any test. Paired effluent and background TSS concentration measurements were used to calculate an average adjusted effluent TSS value (**Equation 3**).

$$\text{Average Adjusted Effluent TSS}\left({}^{\text{mg}}/_{\text{L}}\right) = \frac{1}{6}\sum_{\text{i}=1}^{6}\left[\text{Effluent TSS}\left({}^{\text{mg}}/_{\text{L}}\right) - \text{Background TSS}\left({}^{\text{mg}}/_{\text{L}}\right)\right]_{\text{i}}$$

Equation 3

Removal efficiency at each flow rate was calculated using **Equation 4**. All removal efficiency values were plotted against the applicable hydraulic loading rate with a linear curve fit applied. The curve fit equation was used to determine the hydraulic loading rate at which 80% removal efficiency and 80% annualized weighted removal efficiency would occur. The New Jersey rainfall weighting factors used for the annualized removal efficiency determination are outlined in Table 1 of Appendix A, Section A in the NJDEP Protocol.

$$Removal\ Efficiency\ (\%) = \frac{Average\ Influent\ TSS\ \left(^{mg}/_{L}\right) - Average\ Adjusted\ Effluent\ \left(^{mg}/_{L}\right)}{Average\ Influent\ TSS\ \left(^{mg}/_{L}\right)} \times 100$$

Equation 4

4. PERFORMANCE CLAIMS

Some of the following performance claims are specific to the 4 ft Cascade Separator, the model size tested in this study. Additional information for all models is provided in **Table A-1.**

VERIFIED TOTAL SUSPENDED SOLIDS REMOVAL RATE

In general, the 'point on a curve' method to size an MTD for a target removal efficiency of a target particle size is a straightforward approach. The hydraulic loading rate which achieves the target removal efficiency is determined by interpolating or using a curve fit equation from the hydraulic loading rate v removal efficiency data set, which typically spans a large range of tested flow rates.

The testing performed on the Cascade Separator resulted in a hydraulic loading rate v removal efficiency curve fit equation on a data set spanning from 0.31 to 1.51 cfs. Removal efficiencies ranged from 60.3% to 100% respectively. The curve fit equation was used to determine that the hydraulic loading rate of 33.78 gpm/ft^2 of effective treatment area achieved 80% removal efficiency of the target particle size with a D_{50} of 110 µm at the target sediment inlet concentration of 280 mg/L.

VERIFIED ANNUALIZED TOTAL SUSPENDED SOLIDS REMOVAL RATE

Net annual sizing is another method for sizing MTDs for a target removal efficiency of a target particle size. This sizing method predicts MTD performance over a typical rain year by using annual rainfall intensity distributions from long-term records to develop a model. The net annual model will vary based on regional rainfall differences, allowing sizing for specific site needs. The model ties the annual occurrence of rainfall intensities to expected performance by applying weighting factors to the MTD removal efficiencies over a range of hydraulic loading rates. The fractional removal efficiencies are then summed to represent the net annualized removal efficiency of the MTD at the treatment flow rate.

In this laboratory testing, the New Jersey rainfall weighting factors in the NJDEP protocol were applied to the Cascade curve fit equation to determine the hydraulic loading rate at which an annualized weighted removal efficiency of 80% would occur. The Cascade Separator achieved 80% annualized TSS removal of the 110 µm test particle size at a hydraulic loading rate of 52.99 gpm/ft^2.

MAXIMUM SEDIMENT STORAGE DEPTH AND VOLUME

The maximum sediment storage depth is 18 in. on all Cascade Separator models. The CS-4 has a maximum sediment storage volume of 18.8 ft^3.

EFFECTIVE TREATMENT AREA

The effective treatment area, or sedimentation area is 12.6 ft^2 on the CS-4.

DETENTION TIME AND VOLUME

The operational volume of the CS-4 is 58.6 ft^3 from the 50% maximum sediment storage depth to inlet water surface elevation at full treatment capacity. Detention time will vary by flow rate, the detention time for the annualized maximum treatment flow rate (MTFR) of 1.48 cfs (666 gpm) is 39 s.

ONLINE OR OFFLINE INSTALLATION

In September 2019, the Cascade Separator received NJDEP certification qualifying it for online installation for the New Jersey water quality design storm.

5. SUPPORTING DOCUMENTATION

Copies of collected and measured data, spreadsheets containing original data from all performance test runs and particle size analysis, as well as all pertinent calculations have been provided to NJCAT for verification.

5.1. TEST SEDIMENT PSD

The average moisture content of the test sediment was determined to be 0.02%. The average PSD of the test sediment and US Silica standard are presented in **Table 2** and **Figure 9**. For a clear comparison, the percent finer values were interpolated to match the particle diameters listed in the US Silica OK-110 product data sheet (**Figure 8**). The test sediment distribution has a D_{50} particle size of 110 µm.

Table 2: Average Removal Efficiency Test Sediment PSD

Particle Diameter (µm)	Percent Finer by Mass (%)	
	US Silica OK-110 (Typical)	Average Test Sediment
500	-	99.9
212	99.8	99.2
150	98.8	98.2
125	83.8	79.0
106	43.0	41.9
88	18.0	18.6
75	3.0	1.4
53	0.0	0.1
D50	109 µm	110 µm

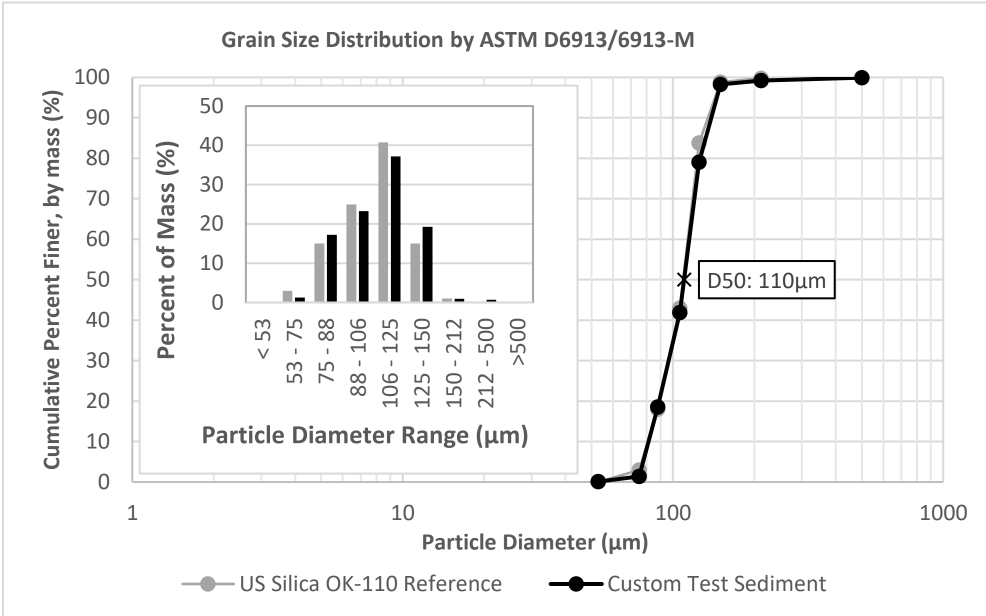


Figure 9: Test Sediment PSD

5.2. Removal Efficiency Test Results

A total of three continuous tests, comprised of five flow rate trials each, were conducted to evaluate TSS removal of a sediment gradation with a D50 of 110 µm. The CS-4 Cascade Separator achieved a TSS removal efficiency of 80% at a flow rate of 0.946 cfs or 424 gpm (33.78 gpm/ft^2) and an annualized weighted removal efficiency of 80% at a flow rate of 1.484 cfs or 666 gpm (52.99 gpm/ft^2). These performance claims were determined from a curve that is based on the verified test data generated in this study. This approach, while not typical of previous NJCAT verifications, is standard engineering practice.

Summary results from all continuous tests are included in **Table 3**, **Table 4** and **Figure 10**. Detailed results including sampling times, sample data and QA/QC results from each test are presented in **Table 5** through **Table 25.**

Table 3: Summary of Removal Efficiency Results

Average Flow Rate (cfs)	Average Hydraulic Loading Rate (gpm/ft^2)	Flow Rate (cfs)	Hydraulic Loading Rate (gpm/ft^2)	Influent TSS (mg/L)	Adjusted Effluent TSS (mg/L)	Removal Efficiency (%)	Average Removal Efficiency (%)
1.51	54.0	1.51	54.0	279	111	60.3	61.2
		1.51	54.0	275	102	62.8	
		1.51	54.0	277	110	60.4	
1.21	43.2	1.21	43.3	275	80.5	70.7	69.9
		1.21	43.2	274	81.1	70.4	
		1.21	43.3	275	86.3	68.7	
0.91	32.5	0.91	32.5	286	53.8	81.2	81.2
		0.91	32.5	281	53.2	81.1	
		0.91	32.5	277	51.5	81.4	
0.61	21.7	0.61	21.7	274	16.6	94.0	94.0
		0.61	21.7	269	14.2	94.7	
		0.61	21.7	268	18.2	93.2	
0.31	11.0	0.31	11.0	262	0.30	99.9	99.9
		0.31	11.0	272	0.28	99.9	
		0.31	11.0	260	0.13	100	

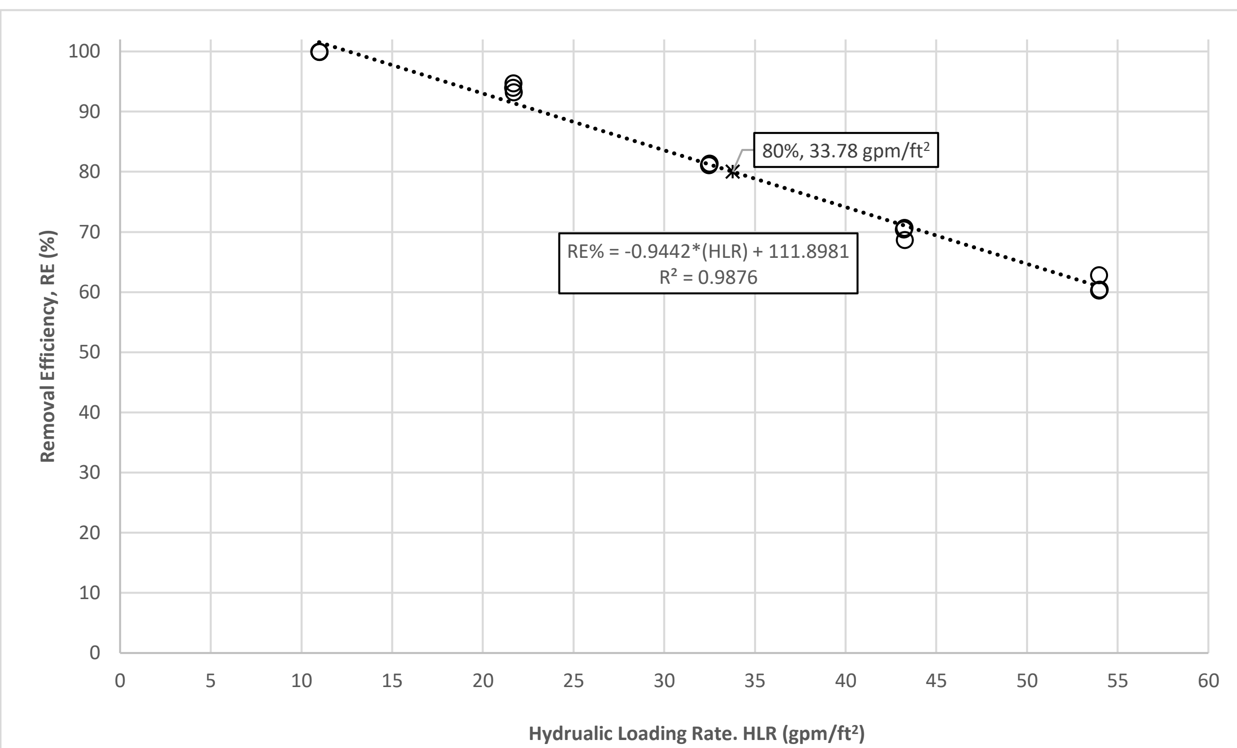


Figure 10: Removal Efficiency Results

Table 4: Annualized Removal Efficiency Results*

Annualized Treatment Hydraulic Loading Rate (gpm/ft^2)	Annualized Treatment Flow Rate for CS-4 (cfs)	Percent of Treatment Flow Rate (%)	Flow Rate (cfs)	Removal Efficiency (%)	Weighting Factor	Weighted Removal Efficiency (%)
52.99	1.48	25	0.37	99.4	0.25	24.8
		50	0.74	86.9	0.30	26.1
		75	1.11	74.4	0.20	14.9
		100	1.48	61.9	0.15	9.3
		125	1.85	49.4	0.10	4.9
Annualized Removal Efficiency at 52.99 gpm/ft^2 (%):						80.0

*Per NJDEP Protocol methodology

TEST 01 RESULTS

The results from Test 01 (T01) are summarized in **Table 5**. Complete sample data for each flow rate trial can be found in **Table 6** through **Table 10**. QA/QC results can be found in **Table 11**. The flow rate COV for trial T01-0.3 (0.05) exceeded the QA/QC limit of 0.03

The slightly higher flow rate variability (**Table 11**) did not appear to impact the removal efficiency result for this flow trial. The removal for T01-0.3 was 99.9%, which is equivalent to the removal efficiencies in the repeat flow rate trials (T02-0.3 at 99.9% and T03-0.3 at 100%). If the data point for this trial was excluded from the linear fit (**Figure 10**), the Cascade CS-4 would still achieve a removal efficiency of 80% at 0.946 cfs. The data point for trial T01-0.3 is considered representative and is included in the data set used for calculations.

Table 5: Test 01 Summary Results

Flow Trial ID	Average Flow Rate (cfs)	Average Hydraulic Loading Rate (gpm/ft^2)	Detention Time (mm:ss)	Sediment Injection Duration (min)	Average Influent TSS (mg/L)	Average Adjusted Effluent TSS Conc. (mg/L)	Removal Efficiency (%)
T01-1.5	1.51	54.0	0:38	4.50	279	111	60.3
T01-1.2	1.21	43.3	0:48	5.00	275	80.5	70.7
T01-0.9	0.91	32.5	1:04	6.00	286	53.8	81.2
T01-0.6	0.61	21.7	1:36	7.50	274	16.6	94.0
T01-0.3	0.31	11.0	3:10	12.50	262	0.30	99.9

Table 6: T01-1.5 Background TSS, Effluent TSS and Feed Rate

Background Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Reported Background TSS (mg/L)	Background TSS (mg/L)
Background 1	3:00	764	ND	0.78
Background 2	3:30	807	ND	0.78
Background 3	4:00	739	ND	0.78
Background 4	4:30	737	ND	0.78
Background 5	5:00	762	ND	0.78
Background 6	5:30	885	ND	0.78
			Average	*0.78*

Effluent Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Effluent TSS (mg/L)	Adjusted Effluent TSS (mg/L)
Effluent 1	3:00	863	97.6	96.8
Effluent 2	3:30	959	108	107
Effluent 3	4:00	987	118	117
Effluent 4	4:30	957	123	122
Effluent 5	5:00	966	108	107
Effluent 6	5:30	997	115	114
			Average	*111*

Feed Rate Sample ID	Test Time (mm:ss)	Moisture Corrected Sample Mass (g)	Sampling Duration (s)	Feed Rate (g/min)	Calculated Influent TSS (mg/L)
Feed Rate 1	0:00	717.669	60	717.669	279
Feed Rate 2	5:30	715.508	60	715.508	279
			Average	*716.589*	*279*

Table 7: T01-1.2 Background TSS, Effluent TSS and Feed Rate

Background Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Reported Background TSS (mg/L)	Background TSS (mg/L)
Background 1	3:30	908	ND	0.78
Background 2	4:00	655	ND	0.78
Background 3	4:30	837	ND	0.78
Background 4	5:00	765	ND	0.78
Background 5	5:30	804	ND	0.78
Background 6	6:00	748	ND	0.78
			Average	*0.78*

Effluent Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Effluent TSS (mg/L)	Adjusted Effluent TSS (mg/L)
Effluent 1	3:30	885	84.7	83.9
Effluent 2	4:00	962	83.1	82.3
Effluent 3	4:30	951	77.8	77.1
Effluent 4	5:00	880	81.1	80.3
Effluent 5	5:30	866	89.5	88.7
Effluent 6	6:00	976	71.8	71.0
			Average	*80.5*

Feed Rate Sample ID	Test Time (mm:ss)	Moisture Corrected Sample Mass (g)	Sampling Duration (s)	Feed Rate (g/min)	Calculated Influent TSS (mg/L)
Feed Rate 1	0:00	564.704	60	564.704	274
Feed Rate 2	6:00	565.431	60	565.431	275
			Average	*565.068*	*275*

Table 8: T01-0.9 Background TSS, Effluent TSS and Feed Rate

Background Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Reported Background TSS (mg/L)	Background TSS (mg/L)
Background 1	4:30	860	ND	0.78
Background 2	5:00	862	ND	0.78
Background 3	5:30	913	ND	0.78
Background 4	6:00	861	ND	0.78
Background 5	6:30	654	ND	0.78
Background 6	7:00	934	ND	0.78
			Average	0.78

Effluent Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Effluent TSS (mg/L)	Adjusted Effluent TSS (mg/L)
Effluent 1	4:30	929	53.0	52.2
Effluent 2	5:00	922	43.0	42.2
Effluent 3	5:30	973	59.2	58.4
Effluent 4	6:00	932	57.2	56.4
Effluent 5	6:30	955	66.5	65.7
Effluent 6	7:00	860	48.4	47.6
			Average	53.8

Feed Rate Sample ID	Test Time (mm:ss)	Moisture Corrected Sample Mass (g)	Sampling Duration (s)	Feed Rate (g/min)	Calculated Influent TSS (mg/L)
Feed Rate 1	0:00	442.820	60	442.820	287
Feed Rate 2	7:00	440.314	60	440.314	285
			Average	441.567	286

Table 9: T01-0.6 Background TSS, Effluent TSS and Feed Rate

Background Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Reported Background TSS (mg/L)	Background TSS (mg/L)
Background 1	6:00	761	ND	0.78
Background 2	6:30	768	ND	0.78
Background 3	7:00	803	ND	0.78
Background 4	7:30	772	ND	0.78
Background 5	8:00	862	ND	0.78
Background 6	8:30	750	ND	0.78
			Average	0.78

Effluent Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Effluent TSS (mg/L)	Adjusted Effluent TSS (mg/L)
Effluent 1	6:00	788	17.0	16.2
Effluent 2	6:31	882	17.7	16.9
Effluent 3	7:00	954	18.6	17.8
Effluent 4	7:30	932	18.3	17.6
Effluent 5	8:00	890	15.0	14.2
Effluent 6	8:30	966	17.6	16.8
			Average	16.6

Feed Rate Sample ID	Test Time (mm:ss)	Moisture Corrected Sample Mass (g)	Sampling Duration (s)	Feed Rate (g/min)	Calculated Influent TSS (mg/L)
Feed Rate 1	0:00	285.438	60	285.438	277
Feed Rate 2	8:30	280.455	60	280.455	272
			Average	282.947	274

Table 10: T01-0.3 Background TSS, Effluent TSS and Feed Rate

Background Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Reported Background TSS (mg/L)	Background TSS (mg/L)
Background 1	11:00	878	ND	0.78
Background 2	11:30	857	ND	0.78
Background 3	12:00	770	ND	0.78
Background 4	12:30	851	ND	0.78
Background 5	13:00	827	ND	0.78
Background 6	13:30	730	ND	0.78
			Average	*0.78*

Effluent Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Effluent TSS (mg/L)	Adjusted Effluent TSS (mg/L)
Effluent 1	11:00	895	1.79	1.01
Effluent 2	11:30	969	ND	0.00
Effluent 3	12:00	938	ND	0.00
Effluent 4	12:30	930	ND	0.00
Effluent 5	13:00	836	1.56	0.78
Effluent 6	13:30	902	ND	0.00
			Average	*0.30*

Feed Rate Sample ID	Test Time (mm:ss)	Moisture Corrected Sample Mass (g)	Sampling Duration (s)	Feed Rate (g/min)	Calculated Influent TSS (mg/L)
Feed Rate 1	0:00	137.291	60	137.291	262
Feed Rate 2	13:30	136.488	60	136.488	261
			Average	*136.889*	*262*

Table 11: Test 01 QA/QC

FLOW RATE AND WATER TEMPERATURE					
Test ID	QAQC PASS/FAIL	Target Flow Rate (ft^3/s)	Average Flow Rate (ft^3/s) (±10% of Target)	Flow Rate COV (<0.03)	Maximum Water Temperature (°F) (<80 °F)
T01-1.5	PASS	1.50	1.51	0.01	76.5
T01-1.2	PASS	1.20	1.21	0.01	76.4
T01-0.9	PASS	0.90	0.91	0.005	76.3
T01-0.6	PASS	0.60	0.61	0.01	76.2
T01-0.3	PASS*	0.30	0.31	0.05	76.1
INFLUENT AND BACKGROUND CONCENTRATION					
Test ID	QAQC PASS/FAIL	Target Influent TSS (mg/L)	Average Influent TSS (mg/L) (±10% of Target)	Feed Rate COV (<0.1)	Average Background TSS (<20 mg/L)
T01-1.5	PASS	280	279	0.002	0.78
T01-1.2	PASS	280	275	0.001	0.78
T01-0.9	PASS	280	286	0.004	0.78
T01-0.6	PASS	280	274	0.01	0.78
T01-0.3	PASS	280	262	0.004	0.78

*See the paragraphs on page 15 prior to Table 5 for discussion

TEST 02 RESULTS

The results from Test 02 (T02) are summarized in **Table 12**. Complete sample data for each flow rate trial can be found in **Table 13** through **Table 17**. QA/QC results can be found in **Table 18**.

Table 12: Test 02 Summary Results

Flow Trial ID	Average Flow Rate (ft^3/s)	Average Hydraulic Loading Rate (gpm/ft^2)	Detention Time (mm:ss)	Sediment Injection Duration (min)	Average Influent TSS (mg/L)	Average Adjusted Effluent TSS (mg/L)	Removal Efficiency (%)
T02-1.5	1.51	54.0	0:38	4.50	275	102	62.8
T02-1.2	1.21	43.2	0:48	5.00	274	81.1	70.4
T02-0.9	0.91	32.5	1:04	6.00	281	53.2	81.1
T02-0.6	0.61	21.7	1:36	7.50	269	14.2	94.7
T02-0.3	0.31	11.0	3:10	12.50	272	0.28	99.9

Table 13: T02-1.5 Background TSS, Effluent TSS and Feed Rate

Background Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Reported Background TSS (mg/L)	Background TSS (mg/L)
Background 1	3:00	825	ND	0.78
Background 2	3:30	778	ND	0.78
Background 3	4:00	777	ND	0.78
Background 4	4:30	741	ND	0.78
Background 5	5:00	698	ND	0.78
Background 6	5:30	707	ND	0.78
			Average	*0.78*

Effluent Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Effluent TSS (mg/L)	Adjusted Effluent TSS (mg/L)
Effluent 1	3:00	889	102	101
Effluent 2	3:30	966	110	109
Effluent 3	4:00	952	99.0	98.2
Effluent 4	4:30	887	89.8	89.0
Effluent 5	5:00	906	100	99
Effluent 6	5:30	992	118	117
			Average	*102*

Feed Rate Sample ID	Test Time (mm:ss)	Moisture Corrected Sample Mass (g)	Sampling Duration (s)	Feed Rate (g/min)	Calculated Influent TSS (mg/L)
Feed Rate 1	0:00	701.788	60	701.788	273
Feed Rate 2	5:30	710.498	60	710.498	277
			Average	*706.143*	*275*

Table 14: T02-1.2 Background TSS, Effluent TSS and Feed Rate

Background Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Reported Background TSS (mg/L)	Background TSS (mg/L)
Background 1	3:30	804	ND	0.78
Background 2	4:00	889	ND	0.78
Background 3	4:30	908	ND	0.78
Background 4	5:00	803	ND	0.78
Background 5	5:30	774	ND	0.78
Background 6	6:00	776	ND	0.78
			Average	*0.78*

Effluent Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Effluent TSS (mg/L)	Adjusted Effluent TSS (mg/L)
Effluent 1	3:30	941	80.5	79.7
Effluent 2	4:00	955	81.2	80.4
Effluent 3	4:30	944	85.4	84.6
Effluent 4	5:00	956	85.0	84.3
Effluent 5	5:30	839	81.0	80.2
Effluent 6	6:00	947	78.2	77.5
			Average	*81.1*

Feed Rate Sample ID	Test Time (mm:ss)	Moisture Corrected Sample Mass (g)	Sampling Duration (s)	Feed Rate (g/min)	Calculated Influent TSS (mg/L)
Feed Rate 1	0:00	560.833	60	560.833	273
Feed Rate 2	6:00	566.118	60	566.118	275
			Average	*563.475*	*274*

Table 15: T02-0.9 Background TSS, Effluent TSS and Feed Rate

Background Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Reported Background TSS (mg/L)	Background TSS (mg/L)
Background 1	4:30	739	ND	0.78
Background 2	5:00	839	ND	0.78
Background 3	5:30	739	ND	0.78
Background 4	6:00	780	ND	0.78
Background 5	6:30	859	ND	0.78
Background 6	7:00	788	ND	0.78
			Average	*0.78*

Effluent Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Effluent TSS (mg/L)	Adjusted Effluent TSS (mg/L)
Effluent 1	4:30	687	63.5	62.7
Effluent 2	5:00	950	55.1	54.3
Effluent 3	5:30	898	54.1	53.3
Effluent 4	6:00	946	55.2	54.4
Effluent 5	6:30	972	50.2	49.5
Effluent 6	7:00	962	45.6	44.8
			Average	*53.2*

Feed Rate Sample ID	Test Time (mm:ss)	Moisture Corrected Sample Mass (g)	Sampling Duration (s)	Feed Rate (g/min)	Calculated Influent TSS (mg/L)
Feed Rate 1	0:00	436.119	60	436.119	282
Feed Rate 2	7:00	433.142	60	433.142	280
			Average	*434.630*	*281*

Table 16: T02-0.6 Background TSS, Effluent TSS and Feed Rate

Background Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Reported Background TSS (mg/L)	Background TSS (mg/L)
Background 1	6:00	794	ND	0.78
Background 2	6:30	913	ND	0.78
Background 3	7:00	849	ND	0.78
Background 4	7:30	808	ND	0.78
Background 5	8:00	894	ND	0.78
Background 6	8:30	770	ND	0.78
			Average	*0.78*

Effluent Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Effluent TSS (mg/L)	Adjusted Effluent TSS (mg/L)
Effluent 1	6:00	895	21.6	20.8
Effluent 2	6:30	851	16.0	15.2
Effluent 3	7:00	954	13.2	12.4
Effluent 4	7:30	962	12.1	11.3
Effluent 5	8:00	953	13.1	12.3
Effluent 6	8:30	966	13.8	13.0
			Average	*14.2*

Feed Rate Sample ID	Test Time (mm:ss)	Moisture Corrected Sample Mass (g)	Sampling Duration (s)	Feed Rate (g/min)	Calculated Influent TSS (mg/L)
Feed Rate 1	0:00	276.959	60	276.959	268
Feed Rate 2	8:30	277.038	60	277.038	269
			Average	*276.999*	*269*

Table 17: T02-0.3 Background TSS, Effluent TSS and Feed Rate

Background Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Reported Background TSS (mg/L)	Background TSS (mg/L)
Background 1	11:00	906	ND	0.78
Background 2	11:30	871	ND	0.78
Background 3	12:00	836	ND	0.78
Background 4	12:30	823	ND	0.78
Background 5	13:00	772	ND	0.78
Background 6	13:30	833	ND	0.78
			Average	*0.78*

Effluent Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Effluent TSS (mg/L)	Adjusted Effluent TSS (mg/L)
Effluent 1	11:00	956	ND	0.00
Effluent 2	11:30	945	1.59	0.81
Effluent 3	12:00	939	ND	0.00
Effluent 4	12:30	932	ND	0.00
Effluent 5	13:00	917	1.64	0.86
Effluent 6	13:30	936	ND	0.00
			Average	*0.28*

Feed Rate Sample ID	Test Time (mm:ss)	Moisture Corrected Sample Mass (g)	Sampling Duration (s)	Feed Rate (g/min)	Calculated Influent TSS (mg/L)
Feed Rate 1	0:00	142.224	60	142.224	272.1
Feed Rate 2	13:30	141.984	60	141.984	271.7
			Average	*142.104*	*272*

Table 18: Test 02 QA/QC

FLOW RATE AND WATER TEMPERATURE					
Test ID	QAQC PASS/FAIL	Target Flow Rate (ft^3/s)	Average Flow Rate (ft^3/s) (±10% of Target)	Flow Rate COV (<0.03)	Maximum Water Temperature (°F) (<80 °F)
T02-1.5	PASS	1.50	1.51	0.01	75.9
T02-1.2	PASS	1.20	1.21	0.01	76.0
T02-0.9	PASS	0.90	0.91	0.01	75.9
T02-0.6	PASS	0.60	0.61	0.005	75.9
T02-0.3	PASS	0.30	0.31	0.02	76.0
INFLUENT AND BACKGROUND CONCENTRATION					
Test ID	QAQC PASS/FAIL	Target Influent TSS (mg/L)	Average Influent TSS (mg/L) (±10% of Target)	Feed Rate COV (<0.1)	Average Background TSS (<20 mg/L)
T02-1.5	PASS	280	275	0.01	0.78
T02-1.2	PASS	280	274	0.01	0.78
T02-0.9	PASS	280	281	0.005	0.78
T02-0.6	PASS	280	269	0.0002	0.78
T02-0.3	PASS	280	272	0.001	0.78

TEST 03 RESULTS

The results from Test 03 (T03) are summarized in **Table 19**. Complete sample data for each flow rate trial can be found in **Table 20** through **Table 24**. QA/QC results can be found in **Table 25**.

Table 19: Test 03 Summary Results

Flow Trial ID	Average Flow Rate (ft^3/s)	Average Hydraulic Loading Rate (gpm/ft^2)	Detention Time (mm:ss)	Sediment Injection Duration (min)	Average Influent TSS (mg/L)	Average Adjusted Effluent TSS (mg/L)	Removal Efficiency (%)
T03-1.5	1.51	54.0	0:38	4.50	277	110	60.4
T03-1.2	1.21	43.3	0:48	5.00	275	86.3	68.7
T03-0.9	0.91	32.5	1:04	6.00	277	51.5	81.4
T03-0.6	0.61	21.7	1:36	7.50	268	18.2	93.2
T03-0.3	0.31	11.0	3:10	12.50	260	0.13	100

Table 20: T03-1.5 Background TSS, Effluent TSS and Feed Rate

Background Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Reported Background TSS (mg/L)	Background TSS (mg/L)
Background 1	3:00	858	ND	0.78
Background 2	3:30	755	ND	0.78
Background 3	4:00	724	ND	0.78
Background 4	4:30	735	ND	0.78
Background 5	5:00	753	ND	0.78
Background 6	5:30	752	ND	0.78
			Average	*0.78*

Effluent Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Effluent TSS (mg/L)	Adjusted Effluent TSS (mg/L)
Effluent 1	3:00	950	115	114
Effluent 2	3:30	935	108	107
Effluent 3	4:00	938	100	98.9
Effluent 4	4:30	918	107	106
Effluent 5	5:00	914	118	118
Effluent 6	5:30	980	115	115
			Average	*110*

Feed Rate Sample ID	Test Time (mm:ss)	Moisture Corrected Sample Mass (g)	Sampling Duration (s)	Feed Rate (g/min)	Calculated Influent TSS (mg/L)
Feed Rate 1	0:00	710.513	60	710.513	277
Feed Rate 2	5:30	713.565	60	713.565	278
			Average	*712.039*	*277*

Table 21: T03-1.2 Background TSS, Effluent TSS and Feed Rate

Background Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Reported Background TSS (mg/L)	Background TSS (mg/L)
Background 1	3:30	736	ND	0.78
Background 2	4:00	820	ND	0.78
Background 3	4:30	741	ND	0.78
Background 4	5:00	851	ND	0.78
Background 5	5:30	865	ND	0.78
Background 6	6:00	819	ND	0.78
			Average	*0.78*

Effluent Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Effluent TSS (mg/L)	Adjusted Effluent TSS (mg/L)
Effluent 1	3:30	919	86.1	85.3
Effluent 2	4:00	971	92.5	91.7
Effluent 3	4:30	964	90.3	89.5
Effluent 4	5:00	964	82.6	81.8
Effluent 5	5:30	966	89.8	89.0
Effluent 6	6:00	970	81.4	80.6
			Average	*86.3*

Feed Rate Sample ID	Test Time (mm:ss)	Moisture Corrected Sample Mass (g)	Sampling Duration (s)	Feed Rate (g/min)	Calculated Influent TSS (mg/L)
Feed Rate 1	0:00	563.549	60	563.549	274
Feed Rate 2	6:00	569.778	60	569.778	277
			Average	*566.664*	*275*

Table 22: T03-0.9 Background TSS, Effluent TSS and Feed Rate

Background Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Reported Background TSS (mg/L)	Background TSS (mg/L)
Background 1	4:30	835	ND	0.78
Background 2	5:00	787	ND	0.78
Background 3	5:30	724	ND	0.78
Background 4	6:00	830	ND	0.78
Background 5	6:30	806	ND	0.78
Background 6	7:00	765	ND	0.78
			Average	*0.78*

Effluent Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Effluent TSS (mg/L)	Adjusted Effluent TSS (mg/L)
Effluent 1	4:30	924	52.5	51.7
Effluent 2	5:00	960	52.2	51.4
Effluent 3	5:30	931	51.8	51.0
Effluent 4	6:00	982	59.6	58.8
Effluent 5	6:30	955	45.4	44.7
Effluent 6	7:00	943	52.5	51.7
			Average	*51.5*

Feed Rate Sample ID	Test Time (mm:ss)	Moisture Corrected Sample Mass (g)	Sampling Duration (s)	Feed Rate (g/min)	Calculated Influent TSS (mg/L)
Feed Rate 1	0:00	429.416	60	429.416	278
Feed Rate 2	7:00	426.248	60	426.248	276
			Average	*427.832*	*277*

Table 23: T03-0.6 Background TSS, Effluent TSS and Feed Rate

Background Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Reported Background TSS (mg/L)	Background TSS (mg/L)
Background 1	6:00	795	ND	0.78
Background 2	6:30	831	ND	0.78
Background 3	7:00	769	ND	0.78
Background 4	7:30	845	ND	0.78
Background 5	8:00	812	ND	0.78
Background 6	8:30	862	ND	0.78
			Average	*0.78*

Effluent Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Effluent TSS (mg/L)	Adjusted Effluent TSS (mg/L)
Effluent 1	6:00	936	17.0	16.2
Effluent 2	6:30	943	18.0	17.3
Effluent 3	7:00	951	18.9	18.1
Effluent 4	7:30	966	21.5	20.8
Effluent 5	8:00	962	19.5	18.8
Effluent 6	8:30	951	19.0	18.2
			Average	*18.2*

Feed Rate Sample ID	Test Time (mm:ss)	Moisture Corrected Sample Mass (g)	Sampling Duration (s)	Feed Rate (g/min)	Calculated Influent TSS (mg/L)
Feed Rate 1	0:00	276.698	60	276.698	268
Feed Rate 2	8:30	276.160	60	276.160	267
			Average	*276.429*	*268*

Table 24: T03-0.3 Background TSS, Effluent TSS and Feed Rate

Background Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Reported Background TSS (mg/L)	Background TSS (mg/L)
Background 1	11:00	765	ND	0.78
Background 2	11:30	737	ND	0.78
Background 3	12:00	771	ND	0.78
Background 4	12:30	820	ND	0.78
Background 5	13:00	775	ND	0.78
Background 6	13:30	799	ND	0.78
			Average	*0.78*

Effluent Sample ID	Test Time (mm:ss)	Sample Volume (mL)	Effluent TSS (mg/L)	Adjusted Effluent TSS (mg/L)
Effluent 1	11:00	902	1.55	0.77
Effluent 2	11:30	921	ND	0.00
Effluent 3	12:00	954	ND	0.00
Effluent 4	12:30	966	ND	0.00
Effluent 5	13:00	851	ND	0.00
Effluent 6	13:30	932	ND	0.00
			Average	*0.13*

Feed Rate Sample ID	Test Time (mm:ss)	Moisture Corrected Sample Mass (g)	Sampling Duration (s)	Feed Rate (g/min)	Calculated Influent TSS (mg/L)
Feed Rate 1	0:00	133.795	60	133.795	256
Feed Rate 2	13:30	137.289	60	137.289	263
			Average	*135.542*	*260*

Table 25: Test 03 QA/QC

FLOW RATE AND WATER TEMPERATURE					
Test ID	QAQC PASS/FAIL	Target Flow Rate (ft^3/s)	Average Flow Rate (ft^3/s) (±10% of Target)	Flow Rate COV (<0.03)	Maximum Water Temperature (°F) (<80 °F)
T03-1.5	PASS	1.50	1.51	0.01	76.0
T03-1.2	PASS	1.20	1.21	0.01	76.0
T03-0.9	PASS	0.90	0.91	0.01	76.0
T03-0.6	PASS	0.60	0.61	0.01	76.0
T03-0.3	PASS	0.30	0.31	0.01	76.0
INFLUENT AND BACKGROUND CONCENTRATION					
Test ID	QAQC PASS/FAIL	Target Influent TSS (mg/L)	Average Influent TSS (mg/L) (±10% of Target)	Feed Rate COV (<0.1)	Average Background TSS (<20 mg/L)
T03-1.5	PASS	280	277	0.003	0.78
T03-1.2	PASS	280	275	0.01	0.78
T03-0.9	PASS	280	277	0.01	0.78
T03-0.6	PASS	280	268	0.001	0.78
T03-0.3	PASS	280	260	0.02	0.78

6. Design Limitations

Contech's engineering staff typically works with the site design engineer to ensure all potential constraints are addressed during the specification process and that the Cascade Separator treatment system will function as intended. Each install will have unique limitations or requirements, the following limitations should be considered general and not all-inclusive.

Required Soil Characteristics

The Cascade Separator is an enclosed system that is typically housed within a concrete manhole. The functionality of the Cascade Separator system is not affected by existing soil conditions at install location and as such the unit can be installed in all soil types.

Slope

It is generally not advisable to install the Cascade Separator unit with steep pipe slopes. When the Cascade Separator is being considered with pipe slopes exceeding 10% Contech recommends contacting their engineering staff to evaluate the design prior to specification.

Flow Rate

The hydraulic loading rate for 80% removal of 110 µm particles is 33.78 gpm/ft^2 of effective treatment area. The hydraulic loading rate for 80% annualized removal efficiency is 52.99 gpm/ft^2.

Maintenance Requirements

The Cascade Separator system must be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants depends heavily on specific site activities. See Maintenance Plan below for a more detailed discussion of maintenance and inspection requirements.

Driving Head

The driving head required for a given Cascade Separator model is typically a function of the model size and storm sewer characteristics. Contech's engineering staff consults with the design engineer on each project to ensure there will not be any adverse impacts to the hydraulic grade-line as a result of installing the Cascade Separator unit.

Installation Limitations

Prior to installation, Contech provides contractors detailed installation and assembly instructions and is also available to consult onsite during installation. Pick weights for Cascade Separator components are provided prior to delivery so that the contractor can secure proper equipment for lifting Cascade Separator units into place.

Configurations

Cascade Separator units can be installed online or offline. Online units can convey excess flows around the treatment chambers of the unit without the need for an external bypass structure. Contech's engineering staff can help determine the pipe size based on the site requirements.

Load Limitations

Cascade Separator units are typically designed for HS-20 loading (32,000 pounds per truck axle). If additional loading is expected it is advisable to contact Contech to assess loading options.

Pretreatment Requirements

There are no pre-treatment requirements for the Cascade Separator stormwater treatment system.

Limitations on Tailwater

If tailwater is present it is important to increase the available driving head within the unit to ensure that the full treatment flow rate is still treated prior to any internal bypass.

Depth to Seasonal High-Water Table

Cascade Separator unit performance is not typically impacted by high groundwater. Occasionally, when groundwater is expected to be within several feet of finished grade it may be necessary to add a base extension to the unit to counter buoyant forces. If high groundwater is expected, Contech's engineering staff can evaluate whether anti-buoyancy measures are required during the design process.

Additional Limitations

Each Cascade Separator has a recommended maximum inlet and outlet pipe size. When the size of the main storm drain exceeds the Cascade Separator maximum pipe size, Contech recommends contacting their engineering staff. In some conditions a larger pipe can be accommodated. The maximum pipe diameter for each Cascade Separator model is shown in **Table A-1**.

MAINTENANCE PLAN

The Cascade Separator system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects sediment and debris will depend upon on-site activities and site pollutant characteristics. For example, unstable soils or heavy winter sanding will cause the sediment storage sump to fill more quickly but regular sweeping of paved surfaces will slow accumulation. Additional information on maintenance, including a simple Inspection & Maintenance Log form, can be found in the Cascade Separator Inspection and Maintenance Guide at:

https://www.conteches.com/Portals/0/Documents/Maintenance%20Guides/Cascade-Maintenance%20Guide.pdf?ver=2018-11-05-093254-300

INSPECTION

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (i.e. spring and fall). However, more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment wash-down areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

A visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet chamber, flumes or outlet channel. The inspection should also quantify the accumulation of hydrocarbons, trash and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided in the Cascade Separator Inspection and Maintenance Guide.

Access to the Cascade Separator unit is typically achieved through one manhole access cover. The opening allows for inspection and cleanout of the center chamber (cylinder) and sediment storage sump, as well as inspection of the inlet chamber and slanted skirt. For large units, multiple manhole covers allow access to the chambers and sump.

The Cascade Separator system should be cleaned when the level of sediment in the sump has reached a depth of 9 in. or more to avoid exceeding the maximum 18 in. sediment depth (from standard sump floor level). The system should also be cleaned when an appreciable level of hydrocarbons and trash has accumulated. If sorbent material is used, it must be replaced when significant discoloration has occurred. Performance may be impacted when maximum sediment storage capacity is exceeded. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Finer, silty particles at the top of the pile typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine if the height of the sediment pile off the bottom of the sump floor exceeds 50% (9 in.) of the total height of sediment storage sump.

CLEANING

Cleaning of a Cascade Separator system should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole cover and insert the vacuum hose down through the center chamber and into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The areas outside the center chamber and the slanted skirt should also be washed off if pollutant build-up exists in these areas.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. Then the system should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and to ensure proper safety precautions. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the Cascade Separator system must be done in accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal. If any components are damaged, replacement parts can be ordered from the manufacturer.

7. STATEMENTS

The following signed conflict of interest and testing oversight statements from the third-party observer (Scott A. Wells and associates) are provided.

Scott A. Wells and Associates
Environmental Engineering and Modeling
2382 SW Cedar Street
Portland, OR 97205 USA

May 10, 2019

To Whom It May Concern:

Scott A. Wells and Associates provides environmental consulting services focusing on water quality and hydrodynamic models of hydraulic structures, rivers, reservoirs, and estuary systems. We are familiar with stormwater treatment research having conducted many studies in the past on the efficiency of particle and oil and grease removal using a CDS device. We also are familiar with the use of an analytical laboratory to process samples, proper sample technique, and calculations of flow, pollutant concentration, and pollutant loading. Our clients include the federal government (EPA, USBR, Corps of Engineers), state government (such as the Washington Department of Ecology and Departments of Environmental Quality in Idaho and Oregon), private consulting firms and government organizations in both the United States and abroad (China, Israel, Brazil, Canada). Either Scott Wells, Ph.D., P.E., or Chris Berger, Ph.D., P.E., will served as observers for this series of tests.

Scott Wells and Associates has provided the service of third party review of stormwater device testing to Contech Engineered Solutions between 2007 and 2018. Beyond this past review work, Scott Wells and Associates and Contech have no relationships that would constitute a conflict of interest, as outlined in *Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advanced Technology* (NJDEP 2013). For example, we have no ownership stake, do not receive commissions, do not have licensing agreements, do not receive funds or grants beyond those associated with the testing program.

Let me know if you have further questions on potential conflicts of interest.

Truly,

Scott A. Wells, P.E., Ph.D.   Christopher J. Berger, P. E., Ph.D.

503-935-6379
drswells@outlook.com

Scott A. Wells and Associates

Environmental Engineering and Modeling

2382 SW Cedar Street

Portland, OR 97205 USA

May 10, 2019

To Whom It May Concern:

Re: Cascade Separator Removal Efficiency of Suspended Sediment with Median Particle Size of 110 microns

Performance testing of the Contech Cascade Separator was overseen by Dr. Chris Berger and Dr. Scott Wells between April 22 and May 2, 2019 at the Contech Portland, Oregon laboratory. All phases of the analytical testing were also observed at the Contech laboratory. These tests included the particle size distribution by sieve analysis, moisture content, and sediment concentration in water samples. The flow rates and frequency of sampling reported for the performance tests were observed and are reported accurately. The test used applicable protocol, as outlined in the quality assurance project plan, and their Technical Bulletin (02) accurately reflects the testing observed by Dr. Berger and Dr. Wells.

Let us know if you have further questions on our observations of the testing performed in the laboratory.

Truly,

Scott A. Wells, P.E., Ph.D.   Christopher J. Berger, P. E., Ph.D.

503-935-6379

drswells@outlook.com

VERIFICATION APPENDIX

INTRODUCTION

- Contech Engineered Solutions is the manufacturer of the Cascade Separator hydrodynamic separation MTD

  Contech Engineered Solutions
  9025 Centre Point Drive
  West Chester, OH 45069
  Phone: (513) 645-7000
  Fax: (513) 645-7993
  www.ContechES.com

- MTD: Contech Cascade Separator™. Verified Contech Cascade models are shown in **Table A-1.**

- The Cascade Separator demonstrated a net annual 80% TSS removal rate of 110µm particles at the target influent sediment concentration of 280 mg/L.

- In September 2019, the Cascade Separator received NJDEP certification qualifying it for online installation for the New Jersey water quality design storm.

DETAILED SPECIFICATION

- Sizing table for the Cascade Separator is attached (**Table A-1**)

- Prior to installation, Contech provides contractors detailed installation and assembly instructions and is also available to consult onsite during installation.

- Maximum sediment depth for all units is 18 in. Recommended sediment depth prior to cleaning is 9 inches or more.

- See Contech Cascade Separator Inspection and Maintenance Guide for additional detailed maintenance information at: https://www.conteches.com/Portals/0/Documents/Maintenance%20Guides/Cascade-Maintenance%20Guide.pdf?ver=2018-11-05-093254-300

Table A-1: Cascade Separator Treatment Flow Rata, and Standard Dimensions

Model Number	Manhole Diameter (ft)	Annualized Maximum Treatment Flow Rate (cfs)	Hydraulic Loading Rate[1] (gpm/ft^2)	100% Maximum Sediment Storage Depth (in)	100% Maximum Sediment Storage Volume (ft^3)
CS-3	3	0.84	52.99	18	10.6
CS-4	4	1.48	52.99	18	18.8
CS-5	5	2.31	52.99	18	29.5
CS-6	6	3.33	52.99	18	42.4
CS-8	8	5.93	52.99	18	75.4
CS-10	10	9.27	52.99	18	117.8
CS-12	12	13.35	52.99	18	169.6
Model Number	**Effective Treatment Area (ft^2)**	**Effective Treatment Depth[2] (in)**	**Chamber Depth[3] (in)**	**Aspect Ratio[4]**	**Maximum Pipe Diameter (in)**
CS-3	7.1	27	36	0.75	18
CS-4	12.6	39	48	0.81	24
CS-5	19.6	45	54	0.75	30
CS-6	28.3	51	60	0.71	42
CS-8	50.3	66	75	0.69	48
CS-10	78.5	83	92	0.69	60
CS-12	113.1	99	108	0.69	72

1 Hydraulic loading rate is defined as the ratio of treatment flow rate to effective treatment area
2 Effective treatment depth is defined as depth from effluent invert to 50% maximum sediment storage depth
3 Chamber depth is defined as depth from effluent invert to sump floor
4 Aspect ratio is defined as the ratio of effective treatment depth to manhole diameter. All models are geometrically proportional to the tested CS-4 within the allowable ±15% tolerance (0.69 -0.93)

SECTION L: SITE SPECIFIC SOIL SURVEY REPORT

Attachment "D"

TES ENVIRONMENTAL CONSULTANTS, L.L.C.

Environmental Planning and Permitting
Soil and Wetlands Investigation

SITE-SPECIFIC SOIL SURVEY REPORT

performed at

Tax Map 234, Lot 34
273 Lowell Road
Hudson, NH

prepared for

Bohler Engineering
3 Executive Park Drive, Suite 202
Bedford, NH 03110

TES Project # 25-0039

1494 Route 3A, Unit 1
Bow, NH 03304
(603) 856-8925

tom@tesenviro.comcastbiz.net

STATE OF NEW HAMPSHIRE
THOMAS E. SOKOLOSKI
No. 063
CERTIFIED SOIL SCIENTIST
Thomas E. Sokoloski
1/20/2026

January 20, 2026

Keith Curran, P.E.
Senior Project Manager, Land Development
Bohler Engineering
3 Executive Park Drive, Suite 202
Bedford, NH 03110

RE: Site Specific Soil Map; Tax Map 234, Lot 34
273 Lowell Road, Hudson, New Hampshire

Dear Mr. Curran:

On September 10, 2025 I performed field work on the site of proposed development at 308 South River Road in Bedford, New Hampshire for a Site Specific Soil Survey as you requested. This Site Specific Soil Survey and this report were completed utilizing SSSNNE Special Publication No. 3; Site Specific Soil Mapping Standards for New Hampshire and Vermont, Version 7.0, July 2021. The soil legend used for this soil map conforms to the New Hampshire State-Wide Numerical Soils Legend, Issue #10, January 2011 established and maintained by the Natural Resources Conservation Service. This soil survey was prepared to support proposed lot development and a New Hampshire Department of Environmental Services Alteration of Terrain permit application.

The Soil Survey encompassed the entire 10.498-acre parcel, which is bounded by Lowell Road to the northeast, a road under construction to the northwest, forest to the southwest, and commercial and residential properties along the southeast side. The subject parcel was covered with mature forest with a steep slope up to Lowell Road to the northeast, and forested wetlands to the southwest. The land southwest of slope along Lowell Road declines gradually towards the wetlands. On the same day as the Soil Survey, I delineated all wetland boundaries on the site in accordance with applicable federal and state of New Hampshire requirements. My wetland boundary flagging was located by your survey staff and is depicted on the Site Specific Soil survey site plan. Ground locational control for the updated soil survey was ample, including tree lines, footpaths that cross the site, adjacent site development features, easily identifiable topographic features, and clearly-marked property boundaries.

Field work for this survey included the examination of numerous soil profiles via hand dug test pits and hand auger borings taken at intervals sufficient to delineate the boundaries between soil map units. These field observations were supplemented by review of a geotechnical report for the property prepared by Whitestone Associates, Inc. dated November 21, 2025. This report included profile descriptions from 13 test pits and logs from 8 borings conducted by Whitestone during October 2025 in locations across the parcel and the proposed building. The observations noted in these test pi and boring logs largely confirm the findings of my field observations, with site soils almost entirely derived from sandy glaciofluvial deposits, most of which are excessively drained and have no seasonal high water table indications within 40 inches of the soil surface. One small corner of the site adjacent to Lowell Road was found to have dense glacial till material within 40 inches of the surface. I did find evidence of a seasonal high water table less than 40 inches from the surface in the area approaching the wetlands along the southwestern side of the site where the test pits 11 and 13 did not, and the soils within the wetland, which were not examined by Whitestone, I found to have poorly drained soils derived from sandy glaciofluvial deposits.

The Soil Survey is depicted on a base plan of existing conditions with a scale of 1" = 50' and 2-foot contour intervals that was provided by you; a half-sized version (11" X 17") of that plan at a scale of 1" = 100' was provided to you on which the hand-drawn Site Specific Soil mapping was added.

The Soil Survey of Hillsborough County, New Hampshire, Eastern Part (USDA – Natural Resource Conservation Service) was reviewed (via Web Soil Survey) prior to site work for reference. This publication indicates that the soils across most of the parcel consists of Windsor loamy sand (WdA, WdB, and WdC) in the eastern part of the site; Agawam fine sandy loam (AgA) and Deerfield loamy sand (DeA) in the central portion, and Scarboro mucky fine sandy loam (So) in the general vicinity of site wetlands. These soil types were generally corroborated by the field work performed for this Site Specific Soil Survey and the geotechnical borings and test pits, with minor variations including the lack of loamy Agawam and very poorly drained Scarboro (poorly drained Walpole fine sandy loam instead), and the NRCS mapping not indicating the dense glacial till soil (Montauk fine sandy loam – 44 D and 44E) in the northeast site corner. I aggregated minor areas of disturbed soils, including footpaths and a widened road area in the southernmost portion of the parcel, into adjacent Windsor, Deerfield, and Walpole soil map units for the Site Specific Soil Survey.

The following portions of this report include a Site Specific Soil Map Key with Hydrologic Soil Groups and attached soil map unit descriptions. The general soil conditions on the site consisted of nearly level to steep undisturbed stratified sandy glacial outwash deposits.

If you have any questions regarding the soils on this site and the accompanying report please contact our office.

Very truly yours,

Thomas E. Sokoloski
Certified Soil Scientist #063

STATE OF NEW HAMPSHIRE
THOMAS E. SOKOLOSKI
No. 063
1/20/2026
CERTIFIED SOIL SCIENTIST

SITE SPECIFIC SOIL MAP UNIT KEY

Symbol*	Map Unit	Slope Class	Drainage Class	HISS Symbol	Hydro. Soil Group
26B	Windsor loamy sand	0-8%	Excessively	111BH	A
26C	Windsor loamy sand	8-15%	Excessively	111CH	A
26D	Windsor loamy sand	15-25%	Excessively	111DH	A
26E	Windsor loamy sand	25% +	Excessively	111EH	A
44D	Montauk fine sandy loam	15-25%	Well	223DH	C
44E	Montauk fine sandy loam	25% +	Well	223EH	C
313B	Deerfield loamy sand	0-8%	Moderately well	311BH	B
313C	Deerfield loamy sand	8-15%	Moderately well	311CH	B
313D	Deerfield loamy sand	15-25%	Moderately well	311DH	B
546B	Walpole fine sandy loam	0-8%	Poorly	511BH	C

This detailed Site-Specific Soil Map, prepared on September 10, 2025 by Thomas E. Sokoloski, Certified Soil Scientist #063 of TES Environmental Consultants, L.L.C. in Bow, New Hampshire, conforms to the standards of SSSNNE Publication No. 4, as amended, "Site-Specific Soil Mapping Standards for New Hampshire and Vermont", Version 7.0, July 2021. This map has been prepared to comply with soil mapping requirements of RSA 485 A: 17 and NHDES Env-Wq 1500, Alteration of Terrain. See accompanying report for methodology, map symbol legend, and interpretations.

SITE SPECIFIC SOIL MAP UNIT DESCRIPTIONS

Map Unit Symbol: 26

Map Unit Name: Windsor loamy sand

Landscape Settings: Higher portions of outwash plains and terraces

Surface Features: None

Drainage Class: Excessively

Parent Material: Sandy glaciofluvial deposits with no mineral restrictive features

Complex: Yes ( ) No (**X**)

Nature of Dissimilar Inclusions, Locations and Estimated Percent:

Some small areas of disturbed soil (Udorthents, sandy) are present along a few footpaths/woods roads on site – essentially no difference in land use potential. Less than 5% of map unit.

Additional Notes:

Soils with loamy sand to sand textures in the 15-40" control section; SHWT more than 40".

Typical observed soil profile description:

Depth	Horizon	Color	Texture	Structure	Consistency	Redox	Notes
0-1"	Oe	10YR 2/2	--	--	--	--	Duff
1-8"	Ap	10YR 3/2	Sandy loam	Granular	Very friable	None	
8-14"	Bw1	10YR 5/6	Sandy loam	Blocky	Friable	None	
14-32"	Bw2	10YR 5/6	Loamy sand	Single grain	Loose	None	
32-40"	C	2.5Y 5/4	Sand	Single grain	Loose	None	

Tax Map 234, Lot 34. Relatively undisturbed soils, eastern 2/3 of parcel. SHWT > 40"

Thomas E. Sokoloski 9/10/2025

Attachment "D"

SITE SPECIFIC SOIL MAP UNIT DESCRIPTIONS

Map Unit Symbol: 44

Map Unit Name: Montauk fine sandy loam

Landscape Settings: Higher portions of glacial till uplands

Surface Features: None

Drainage Class: Well

Parent Material: Sandy glacial till deposits with no mineral restrictive features (hardpan)

Complex: Yes ( ) No (**X**)

Nature of Dissimilar Inclusions, Locations and Estimated Percent:

None.

Additional Notes:

Soils with loamy sand textures in the substratum; SHWT more than 40". May have faint redoximorphic concentrations in deeper substratum, deemed not indicative of SHWT.

Typical observed soil profile description:

Depth	Horizon	Color	Texture	Structure	Consistency	Redox	Notes
0-1"	Oe	10YR 3/2	--	--	--	--	Duff
1-8"	Ap	10YR 3/2	Fine sandy loam	Granular	Very friable	None	
8-28"	Bw	10YR 5/6	Sandy loam	Blocky	Friable	None	
28-40"	Cd	2.5Y 5/3	Loamy sand	Massive	Firm	None or faint10YR 5/6	

Tax Map 234, Lot 34. Relatively undisturbed soils, easternmost corner of parcel. SHWT > 40"

Thomas E. Sokoloski 9/10/2025

SITE SPECIFIC SOIL MAP UNIT DESCRIPTIONS

Map Unit Symbol: 313

Map Unit Name: Deerfield loamy sand

Landscape Settings: Lower portions of glaciofluvial plains and terraces

Surface Features: None

Drainage Class: Moderately well

Parent Material: Loamy glaciofluvial deposits with no mineral restrictive features

Complex: Yes ( ) No (**X**)

Nature of Dissimilar Inclusions, Locations and Estimated Percent:

None.

Additional Notes:

SHWT between 15" and 40".

Typical observed soil profile description:

Depth	Horizon	Color	Texture	Structure	Consistency	Redox	Notes
0-1"	Oe	10YR 2/2	--	--	--	--	Duff
1-10"	Ap	10YR 2/2	Sandy loam	Granular	Very friable	None	
10-18"	Bw1	10YR 5/6	Sandy loam	Blocky	Friable	None	
18-40"	C	2.5Y 5/3	Loamy sand/sand	Single grain	Loose	10YR 5/8 @28"	

Tax Map 234, Lot 34. Relatively undisturbed soils, western side of parcel. SHWT 15-40"

Thomas E. Sokoloski 9/10/2025

SITE SPECIFIC SOIL MAP UNIT DESCRIPTIONS

Map Unit Symbol: 546

Map Unit Name: Walpole fine sandy loam

Landscape Settings: Low-lying portions of glaciofluvial plains and terraces

Surface Features: None

Drainage Class: Poorly

Parent Material: Sandy glaciofluvial deposits with no mineral restrictive features

Complex: Yes ( ) No (**X**)

Nature of Dissimilar Inclusions, Locations and Estimated Percent:

None.

Additional Notes:

Soils with sandy loam and fine sandy loam textures throughout the 40" control section; SHWT less than 12".

Typical observed soil profile description:

Depth	Horizon	Color	Texture	Structure	Consistency	Redox	Notes
0-4"	Oe	10YR 2/2	--	--	--	--	Muck
4-12"	A	10YR 2/2	Mucky sandy lm	Blocky	Very friable	--	
12-18"	Bg	10YR 5/2	Loamy sand	Blocky	Friable	10YR 5/6	
18-40"	Cg	2.5Y 5/2	Sand	Single grain	Loose	10YR 5/8	
28-40"	Cg2	2.5Y 5/1	Gravelly sand	Single grain	Loose	10YR 5/8	

Tax Map 234, Lot 34. Forested wetland, western side of parcel. SHWT <12"

Thomas E. Sokoloski 9/10/2025

Attachment "D"

UTILITY NOTE

THE UNDERGROUND UTILITIES DEPICTED HEREON HAVE BEEN DRAWN FROM FIELD SURVEY INFORMATION AND OR PLOTTED FROM EXISTING DRAWINGS. KEACH-NORDSTROM ASSOCIATES, INC. MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES DEPICTED COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. FURTHER, KEACH-NORDSTROM ASSOCIATES, INC. DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM THE INFORMATION AVAILABLE. KEACH-NORDSTROM ASSOCIATES, INC. HAS NOT PHYSICALLY LOCATED THE UNDERGROUND PORTIONS OF THE UTILITIES.

DIG SAFE

811 CALL TOLL FREE

UTILITIES UNDERGROUND PLANT DAMAGE PREVENTION SYSTEM

SCS SOILS LEGEND

AgA AGAWAM FINE SANDY LOAM, 0 TO 3 PERCENT SLOPES

DeA DEERFIELD LOAMY FINE SAND, 0 TO 3 PERCENT SLOPES

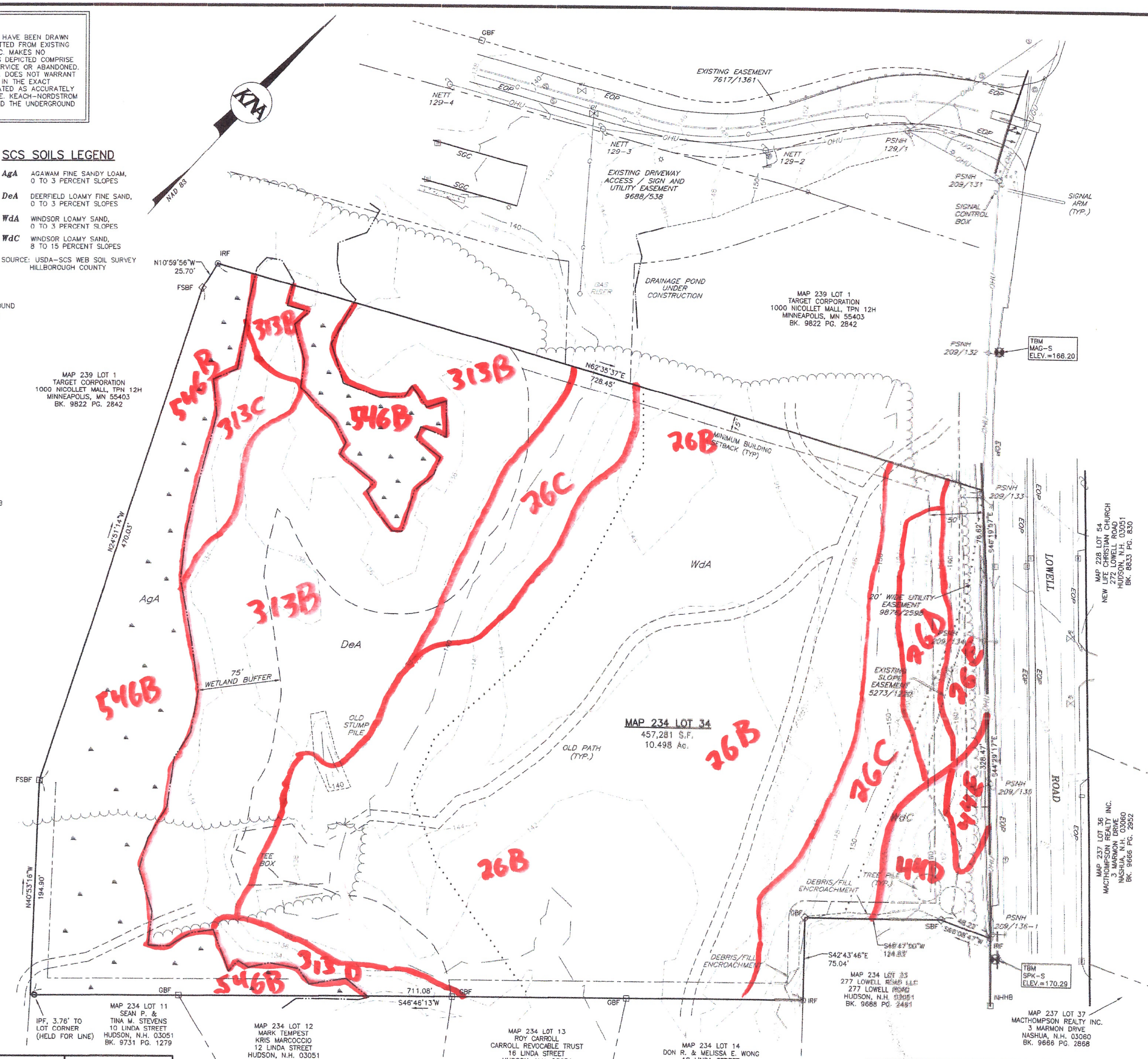
WdA WINDSOR LOAMY SAND, 0 TO 3 PERCENT SLOPES

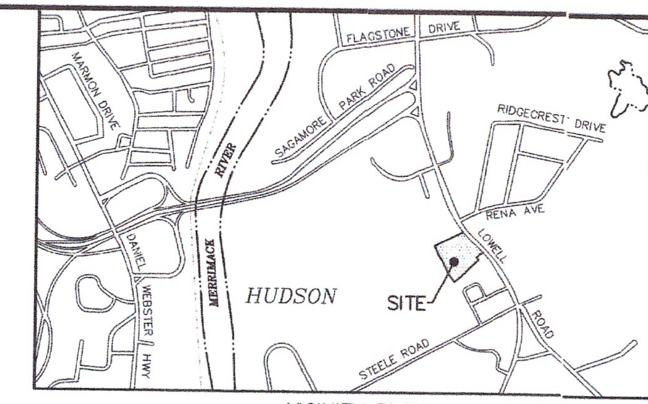
WdC WINDSOR LOAMY SAND, 8 TO 15 PERCENT SLOPES

SOURCE: USDA-SCS WEB SOIL SURVEY HILLSBOROUGH COUNTY

LEGEND

FSBF	FIELD STONE BOUND FOUND
GBF	GRANITE BOUND FOUND
SBF	STONE BOUND FOUND
IR-F	IRON ROD FOUND
IP-F	IRON PIPE FOUND
	BENCHMARK
	UTILITY POLE
	STREET LIGHT
	WATER VALVE
	CATCH BASIN
	ABUTTER LINE
	PROPERTY LINE
OHU	OVERHEAD UTILITIES
	TREELINE
	EDGE OF GRAVEL
EOP	EDGE OF PAVEMENT
VGC	VERTICAL GRANITE CURB
	10' CONTOUR
	2' CONTOUR
	SOIL LINE
	SETBACK
	WETLAND BUFFER
	GAS VALVE
	WELL
	SEWER MANHOLE
	DRAINAGE MANHOLE
	TELEPHONE MANHOLE
	GUARDRAIL
	WETLAND





VICINITY PLAN

SCALE: 1" = 2,000'

NOTES:

1. THE PURPOSE OF THIS PLAN IS TO DEPICT THE EXISTING CONDITIONS PRESENT ON MAP 234 LOT 34 IN THE TOWN OF HUDSON, NEW HAMPSHIRE.
2. EXISTING AREA OF PARCEL: 457,281 S.F. OR 10.498 ACRES.
3. THE SUBJECT PARCEL IS LOCATED ENTIRELY WITHIN THE GENERAL 1 (G-1) ZONING DISTRICT.
4. DIMENSIONAL REQUIREMENTS ARE AS FOLLOWS:
   - FRONT 50'
   - SIDE 15'
   - REAR 15'
5. THE HORIZONTAL DATUM IS NAD 83 AND THE VERTICAL DATUM IS NAVD 88 FROM REAL TIME GPS SURVEY METHODS.
6. EXAMINATION OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAPS (FIRM) FOR THE TOWN OF HUDSON, NEW HAMPSHIRE, HILLSBOROUGH COUNTY, COMMUNITY PANEL NUMBER 33011C0656D PANEL NUMBER 656 OF 701. EFFECTIVE DATE: SEPTEMBER 25, 2009 INDICATES THAT NO PORTION OF THE SUBJECT PARCEL IS LOCATED WITHIN FLOOD HAZARD ZONE.
7. THE LOCATION OF ANY UNDERGROUND UTILITY INFORMATION SHOWN HEREON IS APPROXIMATE. KEACH-NORDSTROM ASSOCIATES, INC. MAKES NO CLAIM TO THE ACCURACY OR COMPLETENESS OF THE UTILITIES SHOWN. PRIOR TO ANY EXCAVATION ON SITE THE CONTRACTOR OR OWNER SHALL CONTACT DIG-SAFE AT 811.
8. EASEMENTS, RIGHTS AND RESTRICTIONS SHOWN OR IDENTIFIED HEREON ARE THOSE FOUND DURING RESEARCH AT THE HILLSBOROUGH COUNTY REGISTRY OF DEEDS. OTHER EASEMENTS, RIGHTS AND RESTRICTIONS MAY EXIST WHICH A TITLE EXAMINATION OF THE SUBJECT PREMISES MAY DETERMINE.

REFERENCE PLANS

1. "PLAN OF LAND OF E. STUART & DORIS E. GRAVES, HUDSON, N.H." SCALE: 1" = 100', MAY 1951 PREPARED BY NED SPAULDING, CIVIL ENGINEER, H.C.R.D. PLAN #1231.
2. "LOT LINE RELOCATION PLAN FRIEL & GILE, MAP 7 LOTS 33 & 35, HUDSON, N.H" DATE: 9-3-91, LAST REVISED 9-25-91, PREPARED BY HOLDEN ENGINEERING & SURVEYING. H.C.R.D. PLAN #25441.
3. "THE STATE OF NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION RIGHT-OF-WAY PLANS FEDERAL AID PROJECT STP-X-000S(217) N.H. PROJECT NO. 12461 N.H. ROUTE 3A. H.C.R.D. PLAN #31211.
4. LOT LINE RELOCATION/CONSOLIDATION PLAN, HUDSON LOGISTICS CENTER, LOWELL AND STEELE ROADS HUDSON, NEW HAMPSHIRE." SCALE: 1"=100'. DATED: FEBRUARY 16, 2021. LAST REVISED: AUGUST 5, 2022. PREPARED BY: HSI HAYNER/SWANSON, INC. H.C.R.D. PLAN #41556.
5. "EASEMENT PLAN (MAP 234, LOTS 34 & 35 AND MAP 239, LOT 1) HUDSON LOGISTICS CENTER, LOWELL AND STEELE ROAD, HUDSON, NEW HAMPSHIRE. SCALE: 1"=40' 28 DECEMBER 2022" PREPARED BY HSI HAYNER/SWANSON, INC. H.C.R.D. PLAN #41727.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

EXISTING CONDITIONS PLAN

MAP 234 LOT 34
273 LOWELL ROAD
HUDSON, NEW HAMPSHIRE
HILLSBOROUGH COUNTY

OWNER:
THOMAS P. FRIEL TRUSTEE
FRIEL 2021 REVOCABLE TRUST
55 MARSH ROAD
HUDSON, N.H. 03051
H.C.R.D. BK. 9486 PG. 2979

KNA KEACH-NORDSTROM ASSOCIATES, INC.
Civil Engineering Land Surveying Landscape Architecture
10 Commerce Park North, Suite 3B, Bedford, NH 03110 Phone (603) 627-2881

WETLAND CERTIFICATION

THOMAS E. SOKOLOSKI CERTIFIED WETLAND SCIENTIST #127, OF TES ENVIRONMENTAL CONSULTANTS, LLC. PERFORMED THE WETLAND MAPPING IN SEPTEMBER OF 2025 ACCORDING TO THE TECHNICAL CRITERIA OF THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL (TECHNICAL REPORT Y-87-1, JANUARY 1987)

CERTIFIED WETLAND SCIENTIST DATE

CERTIFICATION:

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR THOSE UNDER MY DIRECT SUPERVISION. FURTHER, THAT THIS PLAN IS BASED ON AN ACTUAL FIELD SURVEY MADE BY THIS OFFICE DURING SEPTEMBER OF 2025. SAID SURVEY HAS A RELATIVE ERROR OF CLOSURE OF ONE PART IN TEN THOUSAND (1:10,000) OR BETTER.

LICENSED LAND SURVEYOR 10/9/25 DATE

STATE OF NEW HAMPSHIRE No. 911 LICENSED LAND SURVEYOR

REVISIONS			
No.	DATE	DESCRIPTION	BY

DATE: OCTOBER 9, 2025		SCALE:	1" = 50'
PROJECT NO: 25-0805-2		SHEET	1 OF 1

SECTION M: INFILTRATION FEASIBILITY REPORT

- *INFILTRATION FEASIBILITY REPORT*
- *GEOTECHNICAL TEST PIT LOGS*

Infiltration Feasibility Report

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II. Existing topography at the location of the practice 2
III. Test pit or boring locations 2
IV. Seasonal high water table (SHWT) and bedrock elevations 2
V. Profile Description 3
VI. Soil Plan 3
VII. Summary of Data used to determine the infiltration rate 5

The project proposes one (1) surface infiltration basin identified on the plans as P-1.1.

I. Location of the practice

P-1.1 is located on the center of the lot, south of the proposed building and associated accessways.

II. Existing topography at the location of the practice

P-1.1 - The existing topography in the area of the proposed infiltration basin P-1.1 has slopes ranging from 2% to 14% and is mostly wooded with narrow pathways.

III. Test pit or boring locations

Per Env-Wq 1504.13, depending on the size of the system, a minimum number of test pits or borings in the location of the infiltration system is required.

P-1.1 – The basin has a bottom area of 10,887± sf which requires at least 3 test pits. 4 test pits were dug within the basin footprint, identified as TP-10, -11, -12, and -13.

IV. Seasonal high water table (SHWT) and bedrock elevations

The following test pit data was collected in October 2025 by Whitestone Associates, Inc (Whitestone). Data from the CSS near TP 13 is the most restrictive of the tests so that pit established the design of P-1.1.

TP-13:

Bottom of Basin Elevation = 136.70

Existing Surface Elevation of TP = 136±

ESHWT = 7’ (elevation 129±), 28” (elevation133.7 per CSS (see below))

Bedrock = not encountered

Deepest Elevation of TP = 9.5’ (126.5±)

On September 10, 2025 soil information was collected by TES Environmental Consultants, LLC. In their report of their performed field work they noted that during the examination of numerous soil profiles via hand dug test pits and hand auger borings they found evidence of a seasonal high water table less than 40 inches from the surface in the area approaching the wetlands along the southwestern side of the site where test pits 11 and 13 observed by Whitestone. The SHWT range of 15" - 40" is not from an actual measurement, but a reference to the range of SHWT for a MWD soil such as Deerfield loamy sand. The 28” depth was an observation near test pit 13 based on a 1” diameter auger sample.

In accordance with Env-Wq 1504.13 our design is based on TES’ observations.

The basin bottom maintains >3’ separation to SHWT as the site is not within a groundwater protection area or water supply intake protection area.

V. Profile Description

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-13
Page 1 of 1

Project:	Proposed Restaurant Depot	**WAI Project No.:**	GM2524203.000
Location:	273 Lowell Road, Hudson, Hillsborough County, New Hampshire	**Client:**	Restaurant Depot LLC

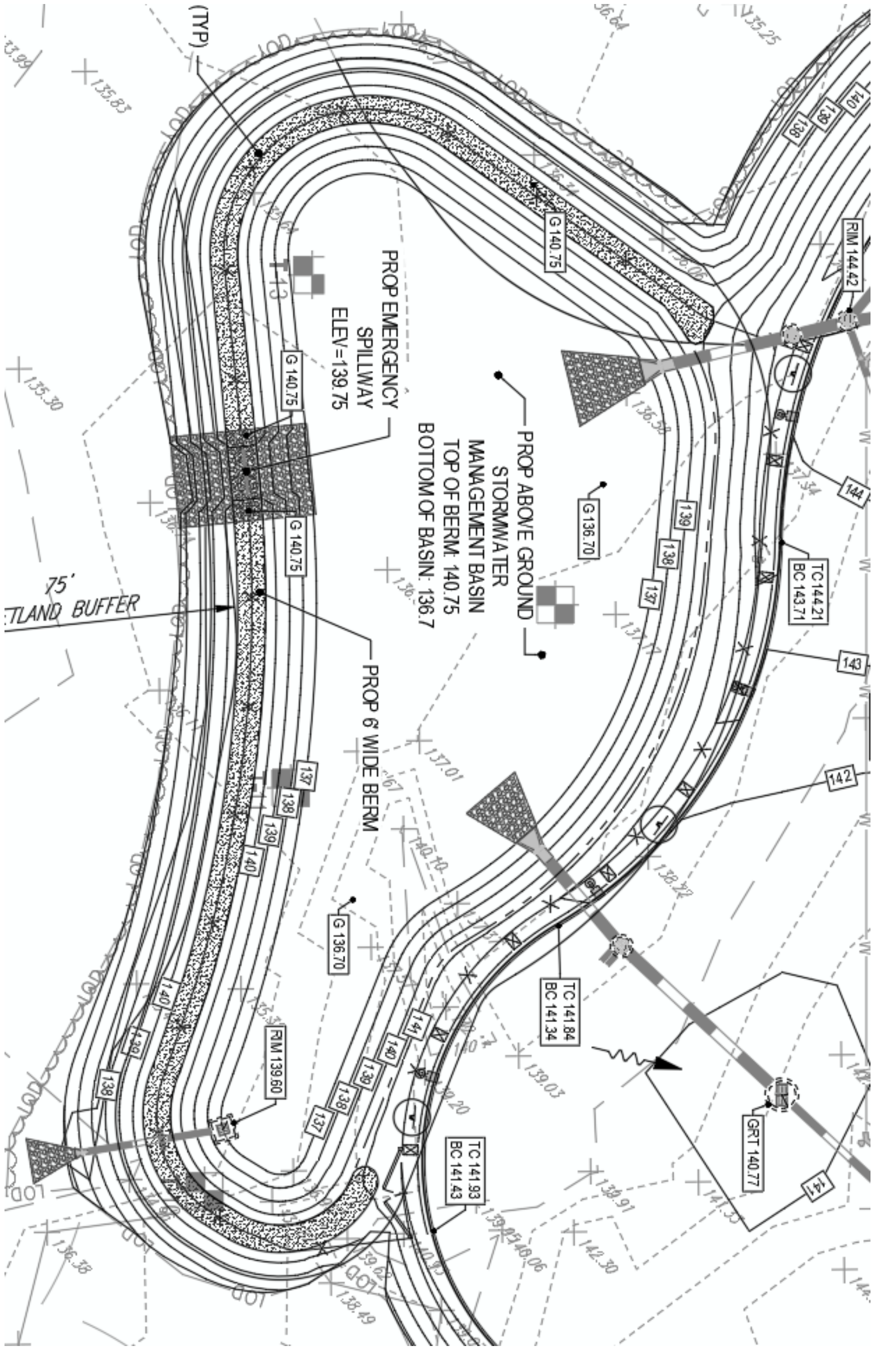
Surface Elevation:	± NS feet NAVD88	**Date Started:**	10/14/2025	**Water Depth (feet bgs) | Elevation (ft NAVD88)**		**Cave-In Depth (feet bgs) | Elevation (ft NAVD88)**	
Termination Depth:	9.5 feet bgs	**Date Completed:**	10/14/2025				
Proposed Location:	SWM Area	**Logged By:**	SA	**During:**	7.0 | --		
Excavating Method:	Compact Excavator	**Contractor:**	LE	**At Completion:**	-- | --	**At Completion:**	7.0 | --
Test Method:	Visual Observation	**Rig Type:**	Hitachi ZX50U	**24 Hours:**	-- | --		

SAMPLE INFORMATION			DEPTH	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)			
			0.0			
				TOPSOIL	6" Topsoil	
1.5	1	Grab		SUBSOIL	20" Subsoil, Roots	
			5.0	GLACIAL OUTWASH	Gray-Brown, Poorly Graded Sand with Silt (SP-SM)	
8.5	2	Grab				
			10.0		Test Pit TP-13 Terminated at Depth of 9.5 feet below ground surface.	

VI. Soil Plan

The Site-Specific Soil Survey map is included with the report. See below for the grading at P-1.1.

Attachment "D"



VII. <u>Summary of Data used to determine the infiltration rate</u>

As the practice is partially located within soils classified as Deerfield, field measurements are required for the design infiltration rate. Whitestone conducted Borehole Infiltration tests near 4 test pit locations TP-7, -9, -11, and -12. All field rates exceeded 10 in/hr, however, as recommended by Whitestone, and after applying a factor of safety, an infiltration rate of 3.0 in/hr should be used where there is more than 5' of glacial outwash. This aligns with the low Ksat in the B horizon for Agawam soil series (6 in/hr with an applied FS of 2).

P-1.1 – @ TP 1.1

- The basin is located within materials defined as Glacial outwash.
- The average infiltration rate exceeded 10 in/hr.
- After applying a FS, the design rate used in the drainage analysis is 3 in/hr.

Attachment "D"

WHITESTONE
An Employee-Owned Company

3 EXECUTIVE PARK DRIVE
SUITE 202
BEDFORD, NH 03110
603.514.2230
whitestoneassoc.com

SUPPLEMENTAL REPORT OF GEOTECHNICAL INVESTIGATION

PROPOSED RESTAURANT DEPOT
273 LOWELL ROAD
MAP 234, LOT 34
HUDSON, HILLSBOROUGH COUNTY, NEW HAMPSHIRE

Prepared for:

RESTAURANT DEPOT LLC
17-10 Whitestone Expressway
Whitestone, New York 11357

Prepared by:

WHITESTONE ASSOCIATES, INC.
3 Executive Park Drive, Suite 202
Bedford, New Hampshire 03110

Thomas Greenwood
Project Manager

Ryan R. Roy, PE
Vice President

Whitestone Project No.: GM2524203.001
December 23, 2025

WHITESTONE
An Employee-Owned Company

Attachment "D"

3 EXECUTIVE PARK DRIVE
SUITE 202
BEDFORD, NH 03110
603.514.2230
whitestoneassoc.com

December 23, 2025

via email

RESTAURANT DEPOT LLC
17-10 Whitestone Expressway
Whitestone, New York

Attention: Mr. Laurence Cohen
Vice President & Chief Operating Officer

Regarding: SUPPLEMENTAL REPORT OF GEOTECHNICAL INVESTIGATION
PROPOSED RESTAURANT DEPOT
273 LOWELL ROAD
MAP 234, LOT 34
HUDSON, HILLSBOROUGH COUNTY, NEW HAMPSHIRE
WHITESTONE PROJECT NO.: GM2524203.001

Dear Mr. Cohen:

Whitestone Associates, Inc. (Whitestone) is pleased to submit the *Supplemental Report of Geotechnical Investigation* for the above-referenced project. The report presents the results of Whitestone's subsurface exploration and includes design recommendations for the foundations, floor slab, pavements, and related earthwork associated with the proposed Restaurant Depot development. This report includes additional explorations to better assess the bedrock surface at the site, and contains information from and supersedes Whitestone's November 21, 2025 *Report of Geotechnical Investigation.*

Whitestone appreciates the opportunity to be of continuing service to Restaurant Depot LLC. Should you have questions regarding the enclosed report, contact us at (603) 514-2230.

Sincerely,

WHITESTONE ASSOCIATES, INC.

Thomas Greenwood
Project Manager

Ryan R. Roy, PE
Vice President

TG/th N:\Job Folders\2025\2524203GM\Reports and Submittals\GM2524203.001 Supplemental ROGI.docx
Enclosures
Copy: Laurence W. Keller, PE, Whitestone Associates, Inc.

Attachment "D"

SUPPLEMENTAL REPORT OF GEOTECHNICAL INVESTIGATION

Proposed Restaurant Depot
273 Lowell Road
Hudson, Hillsborough County, New Hampshire

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SUPPLEMENTAL REPORT OF GEOTECHNICAL INVESTIGATION

Proposed Restaurant Depot
273 Lowell Road
Hudson, Hillsborough County, New Hampshire

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(Continued)

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FIGURE 1 Test Location Plan
FIGURE 2 Bedrock Contour Plan

APPENDICES

APPENDIX A Records of Subsurface Exploration
(Borings B-1 through B-8; Test Pits TP-1 through TP-13)
APPENDIX B Laboratory Test Results
APPENDIX C Supplemental Information (USCS, Terms & Symbols)

SECTION 1.0
Summary of Findings

Whitestone has completed an exploration and evaluation of the subsurface conditions at the site of the proposed Restaurant Depot development located at 273 Lowell Road, Hudson, Hillsborough County, New Hampshire. Based on an October 1, 2025 *Grading and Drainage Plan* prepared by Bohler, LLC of Bedford, New Hampshire, the project consists of constructing a Restaurant Depot with a footprint of approximately 50,000 square feet, and associated paving, utilities, and landscaped areas. The finished floor elevation of the building will be 145 feet above North American Vertical Datum of 1988 (NAVD), requiring up to about 3.0 feet of fill within the proposed building footprint, a cut of up to 15 feet at the northern end of the site, and fill up to 7.0 feet at the southern end. A stormwater management (SWM) basin will be located at the southern end of the site. A septic system will be located on the northern side. Retaining walls are shown on the *Grading and Drainage Plan* at the loading docks.

The geotechnical investigation included conducting a reconnaissance of the project site, advancing eight borings and 22 bedrock probes, excavating 13 test pits, performing *in-situ* infiltration testing, and collecting soil samples for laboratory testing and characterization. Site subsurface conditions generally consisted of topsoil/subsoil, underlain by glacial outwash, in turn underlain by glacial till, then apparent bedrock. Groundwater was encountered during the exploration at depths of 7.0 feet below ground surface (fbgs) to 15 fbgs.

The results of the investigation indicate that the building may be supported on conventional shallow foundations bearing on the natural glacial outwash or glacial till, and/or compacted structural fill placed on these materials, following subgrade review by the geotechnical engineer, as specified in this report. The results of the investigation also indicate the site is suitable for a ground-supported floor slab deriving support from the properly inspected, improved, and approved glacial outwash or glacial till, and/or compacted structural fill placed over these materials, as specified in this report. Additionally, the site conditions support the use of typical pavement sections using standard New Hampshire Department of Transportation (NHDOT) specified materials.

The above summary is intended to provide an overview of the geotechnical findings and recommendations and is not fully developed. Greater detail is presented in the following sections. The entire report must be read for comprehensive understanding of the information contained herein.

SECTION 2.0
Introduction

2.1 AUTHORIZATION

Mr. Laurence Cohen, Vice President and Chief Operating Officer of Restaurant Depot LLC, issued authorization to Whitestone to conduct a geotechnical investigation on this site relevant to the construction of a proposed Restaurant Depot located at 273 Lowell Road, Hudson, Hillsborough County, Massachusetts. The geotechnical investigation was conducted in general accordance with Whitestone's September 30 and December 3, 2025 proposals.

2.2 PURPOSE

The purpose of this exploration and analysis was to:

- ascertain the various soil profile components at test locations;
- conduct preliminary infiltration testing;
- estimate the engineering characteristics of the proposed foundation bearing and subgrade materials;
- provide geotechnical criteria for use by the design engineers in preparing the foundation, slab, and pavement design;
- provide recommendations for required earthwork and subgrade preparation;
- record groundwater and/or bedrock levels (if encountered) at the time of the investigation and discuss the potential impact on the proposed construction; and
- recommend additional investigation and/or analysis, if warranted.

2.3 SCOPE

The scope of the exploration and analysis included the subsurface exploration, field testing and sampling, laboratory testing, evaluation of the subsurface materials, and a geotechnical engineering analysis. This *Report of Geotechnical Investigation* is limited to addressing the site conditions related to the physical support of the proposed construction.

2.3.1 Field Exploration

Field exploration of the project site was conducted by means of eight borings, identified as B-1 through B-8, advanced with an all-terrain vehicle (ATV) mounted CME-55 drill rig equipped with hollow stem augers to termination depths that ranged from 9.0 fbgs to 19 fbgs. Borings were backfilled with excavated soils generated from the investigation. The locations of the borings are shown on the *Test Location Plan* included as Figure 1. The *Records of Subsurface Exploration* for the borings are included in Appendix A.

Field explorations also consisted of excavating 13 test pits, identified as TP-1 through TP-13, with a Hitachi ZX50U compact excavator. The test pits were excavated to depths that ranged from approximately 5.0 fbgs to 10 fbgs. The test pits subsequently were backfilled to the surface with excavated soils from the investigation after observing soil conditions and conducting infiltration testing. The locations of the test pits are shown on the accompanying *Test Location Plan* included as Figure 1. *Records of Subsurface Exploration* for the test pits are provided in Appendix A.

Subsequently, Whitestone returned to the site to advance 22 bedrock probes, identified as P-1 through P-22. The bedrock probes were advanced with an air-track rock drill to termination depths that ranged from approximately 7.0 fbgs to 16 fbgs. The probes were backfilled with excavated soils generated from the investigation.

Test locations were based on project information provided to Whitestone at the time of the investigation, including the Bohler *Grading and Drainage Plan*. The subsurface tests were conducted in the presence of a Whitestone field engineer, who conducted field tests, recorded visual classifications, and collected samples of the various strata encountered. The tests were located in the field using phone-based GPS. These locations are presumed to be accurate to the degree implied by the method used (± 20 feet).

Borings and Standard Penetration Tests (SPTs) were conducted in general accordance with ASTM International (ASTM) designation D1586. The Standard Penetration Resistance value (N) can be used as an indicator of the consistency of fine-grained soils and the relative density of coarse-grained soils. The N-value for various soil types can be correlated with the engineering behavior of earthworks and foundations.

Groundwater level observations, where encountered, were recorded during and immediately following the completion of the testing operations within the borings. Seasonal variations, temperature effects, and recent rainfall conditions may influence the levels of the groundwater, and the observed levels will depend on the permeability of the soils. Groundwater elevations derived from sources other than seasonally observed groundwater monitoring wells may not be representative of true groundwater levels.

2.3.2 Infiltration Testing

Test pits TP-7, TP-9, TP-11, and TP-12 were advanced to depths of 7.0 fbgs to 10 fbgs to evaluate soil conditions prior to infiltration testing. Infiltration tests I-1, I-2, I-3, and I-4 were then conducted as falling head tests in cased holes in the test pits at the locations shown on the *Test Location Plan*. PVC casing, 4.0 inches in diameter, was installed to the depths tabulated below. The soil was pre-soaked prior to conducting infiltrations tests. Following testing, the casings were removed. The results are tabulated below.

SUMMARY OF INFILTRATION TESTING				
Location	**Approximate Ground Elevation (ft NAVD)**	**Test Depth (fbgs)**	**Approximate Test Elevation (ft NAVD)**	**Infiltration Rate (in/hr)**
I-1 (TP-7)	144	3.0	141	> 10
I-2 (TP-9)	141	3.2	138	> 10
I-3 (TP-11)	136	2.6	133	> 10
I-4 (TP-12)	137	4.3	133	> 10

The high infiltration rates are not necessarily reflective of the long-term acceptance rate. The native glacial outwash soils have an estimated Rawls infiltration rate of 2.9 to 4.3 inches per hour (in/hr), or less. Typically, a Factor of Safety (FoS) is applied to measured infiltration rates to account for siltation and consolidation of soil below the systems over time. Safety factors used should consider how critical the systems are to the development and the available storage. If the system is critical or storage limited, a higher FoS should be applied. Infiltration rates are variable and dependent on test depth and stratification. In addition, the glacial till at the site will have lower infiltration rates. Whitestone recommends that the design infiltration rate not exceed 1.0 in/hr to 2.0 in/hr in areas where glacial till is encountered and 3.0 in/hr in areas where there is more than 5.0 feet of glacial outwash overlying the glacial till.

2.3.2 Laboratory Testing

Laboratory testing was conducted to determine additional, pertinent engineering characteristics of representative samples of on-site soils. The laboratory testing was conducted in general accordance with applicable ASTM standard test methods and included physical testing of the glacial outwash and glacial till.

Physical/Textural Analysis: Representative samples of the site soils were subjected to a laboratory program that included moisture content determination (ASTM D2216) and washed gradation analyses (ASTM D422) in order to conduct supplementary engineering soil classifications and/or to assess possible re-use of the site soils as structural fill. The results of the laboratory testing are tabulated below.

LABORATORY TESTING SUMMARY					
Boring	**Sample Number**	**Depth (fbgs)**	**Moisture Content (%)**	**Passing No. 200 Sieve (%) (%)**	**USCS Classification**
B-2	S-4	7.0 - 9.0	7.9	29.3	SM
B-4	S-5	10.0 - 12.0	4.2	3.1	SP
TP-10	S-2	9.5	22.8	10.0	SP-SM
TP-13	S-2	8.5	26.4	9.8	SP-SM

The engineering classifications are useful when considered in conjunction with the additional site data to estimate properties of the soil types encountered and to predict soil behavior under construction and service loads. Laboratory test results are provided in Appendix B.

SECTION 3.0
Site Description

3.1 LOCATION & DESCRIPTION

The property is located at 273 Lowell Road in Hudson, Hillsborough County, New Hampshire, Latitude 42.7220 North, Longitude 71.4221 West. The 10.5-acre site, identified further as Map 234, Lot 34, is an undeveloped wooded lot.

The approximately rectangular site is bounded to the east by Lowell Road, to the north by an access road for a warehouse; to the west by wooded land, then an access road; to the south a golf course, and residential and commercial properties. Access to the site is from an access road connecting to Lowell Road. The site of the proposed construction is shown on the *Test Location Plan* included as Figure 1.

3.2 EXISTING CONDITIONS

Existing Development: The site is undeveloped wooded land. Adjacent to the site, construction for a warehouse is ongoing.

Topography: Based on a review of the *USGS 7.5 Minute Series Nashua South Quadrangle, New Hampshire,* (2024) and the Bohler October 1, 2025 *Grading and Drainage Plan*, and on Whitestone's visual observations, the site slopes down to the south from approximately elevation 170 feet above NAVD to elevation 135 feet above NAVD.

Utilities: The site is undeveloped and not yet fully serviced by utilities. The natural gas stub has been installed in anticipation of development. The utility information contained in this report is presented for general discussion only and is not intended for construction purposes.

Site Drainage: Surface run-off will follow site topography, generally flowing to Limit Brook south of the site.

3.3 SITE GEOLOGY

From a review of available surficial geology mapping, the site is underlain by glacial outwash. Glacial till is mapped nearby. The *Bedrock Geologic Map of New Hampshire* (1997), prepared by U.S. Geological Survey, indicates that the subject property is underlain, by the Ordovician- to Silurian-age Berwick Formation, part of the Merrimack Group, consisting of granofels and biotite-schist, part of the Nashoba-Casco-Miramichi Terrane, Merrimack Trough.

3.4 PROPOSED CONSTRUCTION

Based on the aforementioned Bohler October 1, 2025 *Grading and Drainage Plan*, the project consists of constructing a Restaurant Depot with a footprint of approximately 50,000 square feet, and associated paving, utilities, and landscaped areas. The finished floor elevation of the building will be 145 feet above NAVD, requiring up to about 3.0 feet of fill within the proposed building footprint, a cut of up to 15 feet at the northern end of the site, and fill up to 7.0 feet at the southern end. An SWM basin will be located at the southern end of the site. A septic system will be located on the northern side. Retaining walls are shown on the *Grading and Drainage Plan* at the loading docks.

Whitestone anticipates the proposed building will be a single-story, masonry and metal-framed structure constructed with a ground-supported concrete floor slab and no basement. Maximum column, wall, and floor loads are expected to be on the order of:

- interior columns - 100 kips;
- load bearing walls - 4.0 kips per linear foot; and
- floor slab - 600 pounds per square foot.

The scope of Whitestone's investigation and the professional advice contained in this report were generated based on the project details and loading noted herein. Revisions or additions to the design details enumerated in this report should be brought to the attention of Whitestone for additional evaluation as warranted.

SECTION 4.0
Subsurface Conditions

Details of the subsurface materials encountered are presented on the *Records of Subsurface Exploration* presented in Appendix A of this report. The subsurface soil conditions encountered in the current test locations consisted of the following generalized strata in order of increasing depth.

4.1 SUBSURFACE SOIL CONDITIONS

Surface Cover Materials: Exploration encountered 2.0 inches to 12 inches of topsoil at the ground surface underlain by 6.0 inches to 36 inches of subsoil with roots.

Glacial Outwash: Beneath the surface cover materials, the explorations, except test pits TP-3 and TP-4, encountered glacial outwash, consisting of brown to gray, medium dense (occasionally loose), poorly graded sand with silt, in places with gravel (USCS: SP-SM) to poorly graded sand (USCS: SP) to silty sand with gravel (USCS: SM). SPT N-values recorded within the glacial outwash were variable, ranging from 6 bpf to 25 bpf. Where penetrated in the borings, the glacial outwash extended to depths of 5.0 fbgs to 15 fbgs. Borings B-3 through B-6 terminated in the glacial outwash at depths of 9.0 fbgs to 19 fbgs. Where penetrated in the test pits, the glacial outwash extended to depths of 5.0 fbgs and 7.0 fbgs. The test pits, except TP-3, TP-4, and TP-7, terminated in the glacial outwash at depths of 9.0 fbgs to 10 fbgs.

Glacial Till: Beneath the glacial outwash or surface cover materials, borings B-1, B-2, B-7, and B-8 and test pits TP-3 and TP-4 encountered glacial till, consisting of brown to gray, dense to very dense (occasionally medium dense), silty sand with gravel (USCS: SM), cobbles, boulders. SPT N-values recorded within the glacial till were variable, ranging from 27 bpf to 100 bpf. Where penetrated, the glacial till extended to depths of 5.0 fbgs to 16.5 fbgs. Boring B-7 terminated in the glacial till at a depth of 9.0 fbgs.

Apparent Bedrock: Borings B-1, B-2, and B-8 terminated upon auger refusal on apparent bedrock at depths of 11 fbgs to 16.5 fbgs. Test Pits TP-3, TP-4, and TP-7 terminated upon excavator bucket refusal at depths of 5.0 fbgs to 7.0 fbgs. The bedrock probes encountered bedrock at depths ranging from 7.0 fbgs to 16 fbgs, as tabulated below, and as shown on Figure 2, *Bedrock Contour Plan*. The bedrock was not sampled through rock coring efforts but was inferred by auger, bedrock probe, or excavator bucket refusal. Rock coring techniques would be required to further characterize the nature and extent of the bedrock. The bedrock surface undulates between the exploration locations and may be encountered at shallower depths than in the explorations. As previously stated, the tests were located in the field using phone-based GPS. These locations are presumed to be accurate to the degree implied by the method used (± 20 feet) and actual bedrock elevations should be considered to vary up to a few feet as compared to the approximate locations shown on the *Bedrock Contour Plan*.

ESTIMATED BEDROCK ELEVATIONS (ft NAVD)							
Probe No.	**Ground Elevation (ft)**	**Depth to Bedrock (fbgs)**	**Bedrock Elevation**	**Probe No.**	**Ground Elevation (ft)**	**Depth to Bedrock (fbgs)**	**Bedrock Elevation**
P-1	144	11	133	P-12	148	9	139
P-2	144	12	132	P-13	148	9	139
P-3	143	14	129	P-14	149	13	136
P-4	143	15	128	P-15	154	12	142
P-5	143	16	127	P-16	152	8	144
P-6	147	12	135	P-17	150	7	143
P-7	146	10	136	P-18	149	12	137
P-8	144	13	131	P-19	150	9	141
P-9	145	15	130	P-20	163	12	151
P-10	145	15	130	P-21	160	9	151
P-11	149	14	135	P-22	162	6	156

Note: Ground surface elevations estimated based on October 1, 2025 *Grading and Drainage Plan*.

4.2 GROUNDWATER

Groundwater was encountered in the borings at a depth of 15 fbgs. Groundwater was encountered in test pit TP-13 at a depth of 7.0 fbgs. Indications of estimated seasonal groundwater high (ESGWH) were observed in test pits TP-10, TP-11, and TP-12 at depths of 5.5 fbgs to 8.5 fbgs. Static and perched/trapped water conditions generally will fluctuate seasonally and following periods of precipitation.

SECTION 5.0
Conclusions & Recommendations

5.1 GENERAL

The results of the investigation indicate that the building may be supported on conventional shallow foundations bearing on the natural glacial outwash or glacial till, and/or compacted structural fill placed on these materials, following subgrade review by the geotechnical engineer, as specified in this report. The results of the investigation also indicate the site is suitable for a ground-supported floor slab deriving support from the properly inspected, improved, and approved glacial outwash or glacial till, and/or compacted structural fill placed over these materials, as specified in this report. Additionally, the site conditions support the use of typical pavement sections using standard New Hampshire Department of Transportation (NHDOT) specified materials.

5.2 SITE PREPARATION & EARTHWORK

Surface Cover Stripping: Prior to stripping operations, any utilities should be identified and secured. Vegetation, topsoil, and organic matter should be removed from within and at least 5.0 feet beyond the limits of the proposed building footprint and paved areas, as well as any other area that will require controlled structural fill placement. Tree/shrub removal should include the removal of stumps and root material. Root structures will require removal in excess of the few inches of topsoil typically encountered at the ground surface. The contractor should be required to conduct earthwork in accordance with the recommendations in this report, including backfilling any excavation, etc. with structural fill. Fill or backfill placed within the proposed structural areas should be placed as structural fill in accordance with Sections 5.2, 5.3, and 5.11 of this report.

Surface Preparation/Proofrolling: Prior to placing fill or base materials to raise or restore grades to the desired subgrade elevations, the existing exposed soils should be compacted to a firm surface with several passes in two perpendicular directions of a minimum 10-ton vibratory roller. The surface should then be proofrolled with a loaded tandem axle truck in the presence of the geotechnical engineer to help identify soft or loose pockets that may require removal and replacement or further investigation. Proofrolling should be conducted after a suitable period of dry and non-freezing weather to reduce the likelihood of degrading an otherwise stable subgrade. Should construction be started during the winter months, when temperatures are below freezing, Whitestone should be contacted for alternate surface preparation procedures. Fill or backfill should be placed and compacted in accordance with Section 5.3.

Excavation Difficulties: The very dense glacial till with cobbles and boulders (and bedrock if encountered) will present excavation difficulties at marginal depths below the ground surface during site excavations at some locations. Excavation difficulties will be affected by excavation size and depth. The speed and ease of excavation also will depend on the type of equipment used and the skill of the operator. Although excavation of the dense soils and weathered/fractured bedrock will generally be feasible with a large excavator, a "hoe-ram" or other mechanical device may be required to break up large boulders and bedrock to facilitate excavation. However, removal of bedrock below the upper couple of feet of weathered and fractured rock will require more effort. Any removed boulders will require processing before reuse, or off-site disposal.

Weather Performance Criteria: Every effort should be made to maintain drainage of surface water runoff away from construction areas by grading and limiting the exposure of excavations and prepared subgrades to rainfall. Accordingly, excavation and fill placement procedures should be conducted during favorable weather conditions. Overexcavation of wet or disturbed soils and replacement with controlled structural fill per Section 5.3 of this report may be required prior to resuming work on subgrade soils.

Subgrade Protection and Maintenance: Portions of the site soils are moisture sensitive and could degrade if exposed to inclement weather, freeze-thaw cycles, or repeated construction traffic. However, if properly protected and maintained as recommended herein, the site soils will provide adequate support for the proposed structures and pavement. The site contractors should employ appropriate means and methods to protect the subgrade including, but not limited to the following:

- sealing exposed subgrade soils on a daily basis with a smooth drum roller operated in static mode;
- regrading the site as needed to maintain positive drainage away from open earthwork construction areas and to prevent standing water;
- removing wet surficial soils and ruts immediately; and
- limiting exposure to construction traffic and precipitation especially following inclement weather and subgrade thawing.

5.3 STRUCTURAL FILL & BACKFILL

Imported Fill Material: Imported material placed as structural fill or backfill to raise elevations or restore design grades should consist of clean, relatively well-graded sand or gravel with a maximum particle size of 3.0 inches and up to 15 percent, by weight, of material finer than a #200 sieve. Imported material should be free of clay lumps, organics, and deleterious material.

On-Site Material/Reuse: Whitestone anticipates that portions of the site soils will be suitable for selective reuse as structural fill/backfill material, provided that soil moisture contents are controlled within 3.0 percent of optimum moisture level, particles larger than 3.0 inches in diameter are either removed or crushed, and objectionable portions, such as organics if encountered, are segregated. The glacial till contains cobbles and boulders, which would have to be crushed before reuse, or discarded. The portions of the site soils have a relatively high fines content. Prior to reuse, drying may be necessary or mixing with more granular materials. In addition, reuse of on-site soil with a higher fines content should not be attempted during inclement weather or in damp conditions. Reuse of the site soils will be contingent on careful review in the field by the owner's geotechnical engineer by visual observation during construction as recommended herein.

Submerged Fill: In the wet (flooding, perched water, or groundwater), consideration should be given to placing an open-graded, 0.75-inch crushed stone to provide a working mat, expedite dewatering efforts and enable subsequent placement of structural fill or backfill in the dry. Prior to placing submerged fill materials, free water and disturbed materials should be removed to the extent recommended by the geotechnical engineer. A fines barrier geotextile, such as *Mirafi 140N* or equivalent, should be placed at the base and sides of the overexcavation to separate the crushed stone from underlying and adjacent soils. The fabric also should be placed on top of the crushed stone prior to subsequent fill placement, if fill soils with a substantial amount of fines are to be used to restore grade.

Compaction and Placement Requirements: Fill and backfill should be placed in maximum 12-inch-thick loose lifts when compacted using a vibratory drum roller with a minimum weight of 1.0 ton, and in maximum 8.0-inch thick loose lifts when compacted with a plate compactor. Structural fill and backfill should be compacted to at least 95 percent of the maximum dry density within 3.0 percent of the optimum moisture content, as determined by ASTM D1557 (Modified Proctor).

Structural Fill Testing: A sample of the imported fill material or on-site material proposed for re-use as structural fill or backfill should be submitted to the owner's geotechnical engineer for analysis and approval at least one week prior to its use. The placement of fill and backfill should be monitored by a qualified engineering technician, such that the specified material and lift thicknesses are properly installed. A sufficient number of in-place density tests should be conducted to check that the specified compaction is achieved throughout the height of the fill or backfill.

5.4 GROUNDWATER CONTROL

Groundwater was encountered in the borings during the exploration at depths of 7.0 fbgs to 15 fbgs. However, shallower perched/trapped water may be encountered above less permeable layers during construction. As such, construction phase dewatering may consist of removing surface water runoff, infiltrating water, or trapped water at this site. Whitestone anticipates that construction phase dewatering, if required, would include installing temporary sump pits and filtered pumps within trenches and excavations.

Proper grading and drainage should be incorporated into the site design and construction phase grading to discourage ponding of surface runoff. Every effort should be made to maintain drainage of surface run-off away from construction areas by grading. The contractor should limit exposure of excavations and prepared subgrades to rainfall. Overexcavation of wet soils and replacement with controlled structural fill per Section 5.3 of this report may be required prior to resuming work on disturbed subgrade soils.

5.5 FOUNDATIONS

Shallow Foundation Design Criteria: Whitestone recommends supporting the proposed structure on conventional spread and continuous wall footings designed to bear on the glacial outwash or glacial till, and/or structural fill placed over the glacial outwash or glacial till, provided these materials are properly evaluated, placed, and compacted in accordance with the recommendations of this report. Foundations bearing within these materials, which should be properly evaluated in accordance with Sections 5.2, 5.3, and 5.11 of this report, may be designed to impart a maximum net allowable bearing pressure of 4,000 pounds per square foot.

Foundation soil subgrades should be compacted in the presence of the geotechnical engineer to densify any loose and disturbed soils. Regardless of loading conditions, new foundations should be sized no less than minimum dimensions of 24 inches for continuous wall footings and 36 inches for isolated column footings.

Footings should be designed such that the maximum toe pressure due to the combined effect of vertical loads (including soil weight) and overturning moment does not exceed the recommended maximum allowable bearing pressure. In addition, positive contact pressure should be maintained throughout the base of the footings, such that no uplift or tension exists between the base of the footings and the supporting soil. Uplift loads should be resisted by the weight of the concrete footing and the weight of the soil above the footing. Side friction should be neglected when proportioning the footings, such that lateral resistance is provided by friction resistance at the base of the footings. A coefficient of friction against sliding of 0.4 is recommended for use in the design of the foundations bearing within the site soils or imported structural fill.

Foundation Inspection/Overexcavation Criteria: Whitestone recommends that the suitability of the bearing materials along new footing bottoms be reviewed by a Whitestone geotechnical engineer prior to placing concrete for the footings. Following review by the owner's geotechnical engineer, the exposed subgrade may be compacted. Special attention should be given to areas of the site underlain by any soft/loose conditions. In the event that isolated areas of unsuitable materials are encountered in footing excavations, overexcavation and replacement of the materials or deeper foundation embedment may be necessary to provide a suitable footing subgrade. Overexcavation to be restored with structural fill will need to extend at least 1.0 foot laterally beyond footing edges for each vertical foot of overexcavation. Lateral overexcavation may be eliminated if grade is restored with lean concrete.

Settlement: Whitestone estimates post-construction settlements of building foundations will be on the order of less than 1.0 inch, if the recommendations outlined in this report are properly implemented. Differential settlements of building foundations should be less than about ½ inch.

Frost Coverage: Footings subject to frost action (including during construction) should be placed at least 48 inches below adjacent exterior grades, in accordance with the *State of New Hampshire Building Code* to provide protection from frost penetration. Interior footings not subject to frost action (including during construction) may be placed at a minimum depth of 18 inches below the slab subgrade, but should not be placed on existing fill if encountered.

5.6 FLOOR SLAB

Whitestone anticipates that the properly inspected, approved, and improved glacial outwash or glacial till, and/or compacted structural fill, will be suitable for support of the proposed floor slab provided these materials are properly evaluated, compacted, and proofrolled in accordance with Sections 5.2, 5.3, and 5.12 of this report during favorable weather conditions. Areas that are, or become, softened or disturbed as a result of wetting and/or repeated exposure to construction traffic and areas containing unsuitable soils as determined by the geotechnical engineer should be removed and replaced with compacted structural fill. The properly prepared on-site soils are expected to yield a minimum subgrade modulus (k) of 150 psi/in.

A minimum 12-inch-thick layer of NHDOT *304.3 Crushed Gravel* (or approved equivalent) should be placed below the floor slab to provide a uniform subbase. A moisture vapor barrier should be installed beneath the floor slab in accordance with flooring manufacturer's recommendations.

5.7 PAVEMENT DESIGN CRITERIA

General: Whitestone anticipates that the properly inspected, approved, and improved glacial outwash or glacial till, or compacted structural fill and/or backfill placed to raise or restore design elevations will be suitable for the support of the proposed pavements, provided these materials are properly evaluated, compacted, and proofrolled in accordance with Sections 5.2, 5.3, and 5.11 of this report during favorable weather conditions.

Design Criteria: A California Bearing Ratio value of 8.0 has been assigned to the properly prepared subgrade soils for pavement design purposes. This value was correlated with pertinent soil support values and assumed traffic loads to prepare flexible and rigid pavement designs per the AASHTO *Guide for the Design of Pavement Structures*.

Design traffic loads were assumed based on typical volumes for similar facilities and correlated with 18-kip equivalent single axle loads (ESAL) for a 20-year life. Estimated maximum pavement loads of 30,000 ESALs and 75,000 ESALs were used for the standard-duty and heavy-duty pavement areas, respectively.

These values assume the pavements primarily will accommodate both automobile and limited heavier truck traffic, with the heavier truck traffic designated to the main drive lanes.

Pavement Sections: Pavement components should meet material specifications from NHDOT *Standard Specifications* specified below. The recommended flexible pavement sections are tabulated below:

FLEXIBLE PAVEMENT SECTION			
Layer	**Material**	**Standard-Duty Thickness (inches)**	**Heavy-Duty Thickness (inches)**
Asphalt Surface Course	NHDOT "Wearing Course"	1.5	1.5
Asphalt Binder Course	NHDOT "Binder Course"	1.5	2.5
Granular Subbase	NHDOT 304.3 Crushed Gravel	12.0	12.0

A rigid concrete pavement should be used to provide suitable support at areas of high traffic or severe turns, such as ingress/egress location(s) and the trash enclosure. The recommended rigid pavement is tabulated below:

RIGID PAVEMENT SECTION		
Layer	**Material**	**Thickness (inches)**
Surface	4,000 psi Air-Entrained Concrete	6.0[1]
Granular Subbase	NHDOT 304.3 Crushed Gravel	12.0

[1] The outer edges of concrete pavements are susceptible to damage as trucks move from rigid pavement to adjacent flexible pavement. Therefore, the thickness at the outer 2.0 feet of the rigid concrete pavement should be 12 inches. The concrete should be reinforced with at least one layer of 6.0-inch by 6.0-inch W5.4/W5.4 welded wire fabric (ASTM A185).

Additional Design Considerations: The pavement section thickness designs presented in this report are based on the design parameters detailed herein and are contingent on proper construction, inspection, and maintenance. Additional pavement thickness may be required by local code. The designs are contingent on achieving the minimum soil support value in the field. To accomplish this requirement, subgrade soil and supporting fill or backfill must be placed, compacted, and evaluated in accordance with Sections 5.2, 5.3, and 5.11 of this report. Proper drainage should be provided for the pavement structure, including appropriate grading and surface water control.

The performance of the pavement also will depend on the quality of materials and workmanship. Whitestone recommends that NHDOT standards for materials, workmanship, and maintenance be applied to this site. Project specifications should include verifying that the installed asphaltic concrete material composition is within tolerance for the specified materials and that the percentage of air voids of the installed pavement is within specified ranges for the respective materials. Rigid concrete pavements should be suitably air-entrained, jointed, and reinforced in general accordance with ACI 330R-08 *Guide for the Design and Construction of Concrete Parking Lots*.

5.8 RETAINING WALLS/LATERAL EARTH PRESSURES

General: The following parameters may be used for design of retaining walls at loading docks, any below-grade walls, and other structures reliant on granular materials to provide adequate drainage. However, the parameters are not directly applicable to the design of mechanically stabilized earth (MSE) retaining walls, which require proprietary design methods for the selected earth retention system.

Lateral Earth Pressures: Retaining/below-grade walls should be capable of withstanding active and at-rest earth pressures. With an active earth pressure coefficient (K_a) of 0.33 and assuming a level backfill and an assumed maximum backfill soil unit weight of 140 pounds per cubic foot (pcf), an equivalent fluid pressure of 46 psf per foot of wall height should be used in design of retaining/below-grade walls which are free to rotate.

Retaining/below-grade walls and wall corners that are restrained from lateral movement should be designed using at-rest earth pressures. A coefficient of at-rest earth pressure (K_o) of 0.5, for a level backfill, is recommended for retaining/below-grade walls designed to resist at-rest earth pressures, which assume no lateral movement. With an assumed maximum total unit weight of backfill of approximately 140 pcf, an equivalent fluid pressure of 70 pounds per square foot per foot of wall height should be used in design of restrained retaining/below-grade wall and wall corners. A coefficient of friction of 0.4 against sliding can be used for concrete on the existing site soils. Additional lateral earth pressures from a sloped backfill or any temporary or long-term surcharge loads also should be included in the design. Retaining wall design should include a global stability analysis.

Backfill Criteria: Whitestone recommends that granular soils be used to backfill behind retaining walls. The granular backfill materials should consist of clean, relatively well-graded sand or gravel with a maximum particle size of 3.0 inches and up to 15 percent, by weight, of material finer than a #200 U.S. Standard sieve.

Whitestone recommends that backfill directly behind any walls be compacted with light, hand-held compactors. Heavy compactors and grading equipment should not be allowed to operate within a zone of influence measured at a 45-degree angle from the base of the walls during backfilling to avoid developing excessive temporary or long-term lateral soil pressures.

Wall Drainage: Positive drainage should be provided at the base of the below-grade walls. Where wall drainage is not provided, the wall should be designed to withstand full hydrostatic pressure. All below grade walls should also include a minimum 18 inches of open graded stone backfill immediately adjacent to the wall that re-directs water from the building. Geotextile separation fabric should be placed between the open graded stone and the site soils.

Whitestone should be notified if any other retaining structures or design considerations requiring lateral earth pressure estimations are proposed. Specific recommendations for temporary retaining structures are beyond Whitestone's scope of work.

5.9 SOIL SLOPES

Whitestone's exploration did not include a detailed analysis of soil slope stability for any temporary or permanent condition. Based upon common local practice and Whitestone's experience with stable soil slopes, soil slopes no steeper than 3:1 (horizontal to vertical) are recommended. For high slopes, benches are recommended approximately every 15 feet of slope height to facilitate runoff control and slope maintenance. For slopes steeper than 3:1 (horizontal to vertical), riprap covering would likely be required for long-term stability and erosion control.

Temporary slopes should be regularly evaluated for signs of movement or unsafe conditions. The site soils are prone to erosion by precipitation and runoff. Soil slopes should be covered for protection from rain. Surface runoff should be diverted away from the slopes. For erosion protection, a protective cover of grass or other vegetation should be established on permanent soil slopes as soon as possible. Erosion control matting would provide protection until vegetation is fully established. In places, boulders of significant size may be exposed on the slopes, which should be dressed by removing protruding boulders and placing granular fill before positioning erosion protection.

5.10 SEISMIC & LIQUEFACTION CONSIDERATIONS

The subsurface conditions are most consistent with a Site Class C, as defined by the *State of New Hampshire Building Code*. The site soils are not susceptible to earthquake induced liquefaction.

5.11 EXCAVATIONS

The site soils encountered during this investigation typically are, at a minimum, consistent with Type C Soil Conditions as defined by 29 CFR Part 1926 (OSHA) that require a maximum unbraced excavation angle of 1.5:1 (horizontal to vertical). Actual conditions encountered during construction should be evaluated by a competent person (as defined by OSHA), such that safe excavation methods and/or shoring and bracing requirements are implemented.

5.12 SUPPLEMENTAL POST INVESTIGATION SERVICES

Construction Inspection and Monitoring: The owner's geotechnical engineer with specific knowledge of the site subsurface conditions and design intent should conduct inspection, testing, and consultation during construction as described in previous sections of this report. Monitoring and testing should also be conducted to confirm that the existing surface cover materials are properly removed, any encountered underground structures are properly backfilled, and suitable materials, used for controlled fill, are properly placed and compacted over suitable subgrade soils. The proofrolling of all subgrades prior to foundation, slab, and pavement support should be witnessed and documented by the owner's geotechnical engineer.

SECTION 6.0
General Comments

Supplemental comments and/or recommendations may be made after finalization of construction plans or if significant changes are made in or to the characteristics or location of the proposed structure. Whitestone recommends that soil bearing conditions be checked at the appropriate time to ensure consistency with those conditions Whitestone encountered during the geotechnical investigation.

The recommendations presented herein should be utilized by a qualified engineer in preparing the project plans and specifications. Whitestone recommends that the engineer consider these recommendations as minimum physical standards that may be superseded by local and regional building codes and structural considerations. These recommendations are prepared for the sole use of Restaurant Depot LLC for the specific project detailed and must not be used by any third party, same being strictly prohibited. These recommendations are relevant to the design phase and should not be substituted for construction specifications. The possibility exists that conditions between borings and soil profile pits may differ from those at specific test locations, and conditions may not be as anticipated by the designers or contractors. In addition, the construction process may alter soil and rock conditions. Accordingly, experienced geotechnical personnel should observe and document the construction procedures used and all conditions encountered.

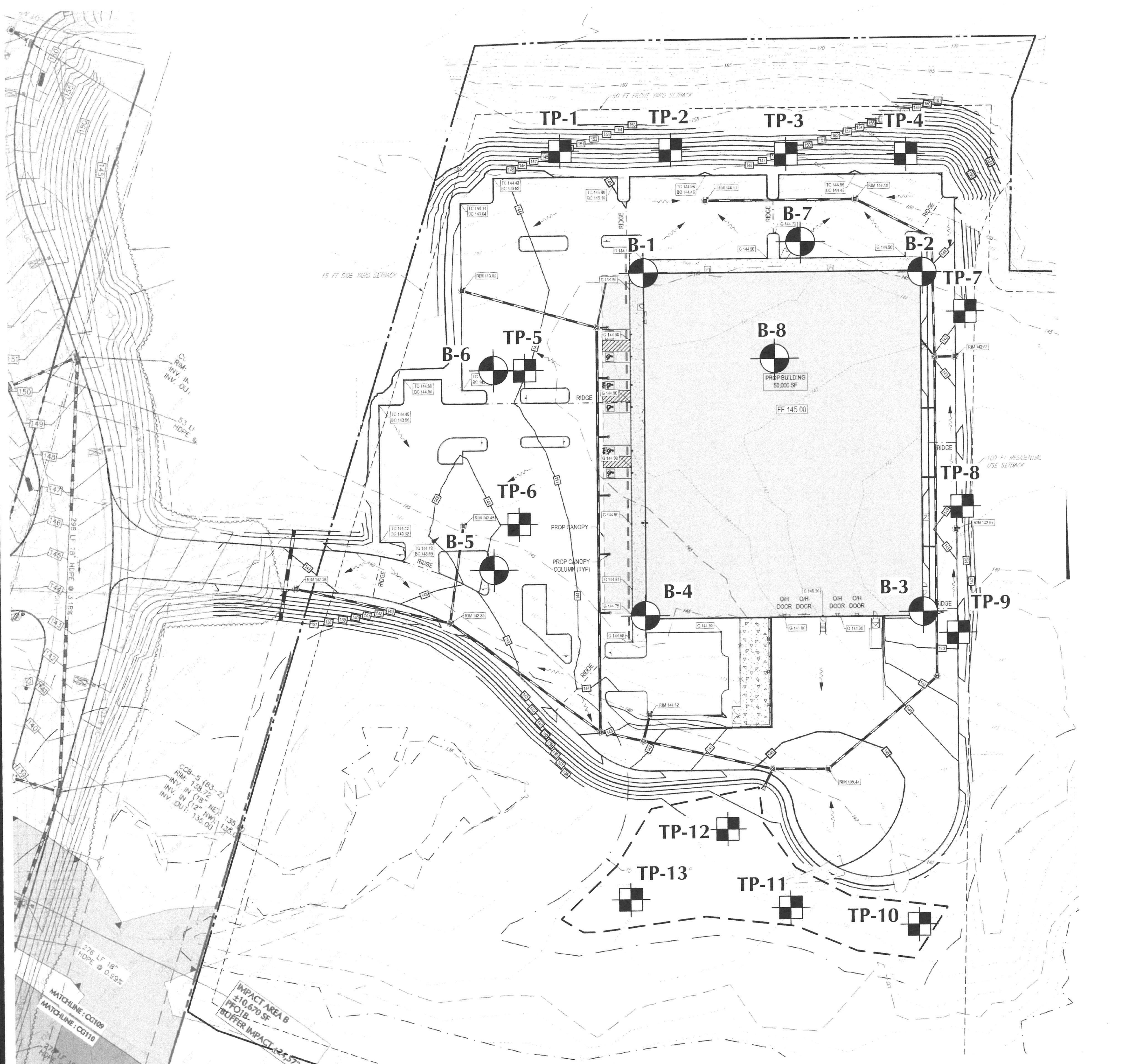
Whitestone assumes that a qualified contractor will be retained and employed, by others, to conduct the construction work, and that contractor must be required to exercise care and operate within the standard of care to ensure that all excavations are conducted in strict accordance with applicable regulations and good, sound practice. Whitestone recommends the contractor pay close attention in order to avoid damaging or in any way undermining adjacent properties and in order to strictly maintain slope stability.

Whitestone recommends that the services of the geotechnical engineer be engaged to test and evaluate the soils in the footing excavations prior to concreting in order to evaluate whether the soils will support the bearing capacities. Monitoring and testing also should be conducted to verify that suitable and permissible materials are used for controlled fills and that these materials are properly placed and compacted over suitable subgrade soils.

The exploration and analysis of the foundation conditions reported herein are considered sufficient in detail and scope to form a reasonable basis for the foundation design. The recommendations submitted for the proposed construction are based on the available soil information and the design details furnished by Restaurant Depot LLC and Bohler, LLC. Deviations from the noted subsurface conditions encountered during construction should and must promptly be brought to the attention of the geotechnical engineer.

The geotechnical engineer confirms that the findings, recommendations, specifications, or professional advice contained herein have been promulgated after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics, and engineering geology. There are no warranties, either implied or expressed.

Attachment "D"



0 80
1 inch = 80 ft.

LEGEND

BORING LOCATION

TEST PIT LOCATION

SUBJECT PROPERTY BOUNDARY

REFERENCE

THIS PLAN IS BASED ON AN OCTOBER 1, 2025 GRADING AND DRAINAGE PLAN PREPARED BY BOHLER, LLC.

ALL LOCATIONS ARE APPROXIMATE.

WHITESTONE

An Employee-Owned Company

3 EXECUTIVE PARK DRIVE, SUITE 202, BEDFORD, NH 03110
603.514.2230 WHITESTONEASSOC.COM

DRAWING TITLE:
TEST LOCATION PLAN

CLIENT:
RESTAURANT DEPOT, LLC

PROJECT:
PROPOSED RESTAURANT DEPOT
273 LOWELL ROAD
HUDSON, HILLSBOROUGH COUNTY, NEW HAMPSHIRE

PROJECT #: GM2524203.000	
DESIGNED BY: MR	PROJ. MGR.: RR
DATE: 1/21/26	FIGURE: 1
SCALE: 1" = 80'	

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Attachment "D"

Bedrock Probe	Ground Elev. (ft.)	Depth to Bedrock (ft.)	Bedrock Elev. (ft.)
P1	144	11	133
P2	144	12	132
P3	143	14	129
P4	143	15	128
P5	143	16	127
P6	147	12	135
P7	146	10	136
P8	144	13	131
P9	145	15	130
P10	145	15	130
P11	149	14	135
P12	148	9	139
P13	148	9	139
P14	149	13	136
P15	154	12	142
P16	152	8	144
P17	150	7	143
P18	149	12	137
P19	150	9	141
P20	163	12	151
P21	160	9	151
P22	162	6	156

NOTES:
1. BEDROCK CONTOURS ARE BASED ON BEDROCK PROBE LOCATIONS.
2. EXPLORATION LOCATIONS ARE BASED ON PHONE-BASED GPS AND EXISTING SURVEY DATA. ACTUAL LOCATIONS COULD BE WITHIN 20 FEET OF THOSE SHOWN.
3. VARIATIONS BETWEEN PLAN AND FIELD CONDITIONS ARE EXPECTED. ACTUAL BEDROCK CONTOURS MAY VARY BY A FEW FEET FROM THAT SHOWN.

0 50
1 inch = 50 ft.

LEGEND

P-1 133 — BEDROCK PROBE / BEDROCK ELEVATION

BEDROCK CONTOUR

BORING LOCATION

TEST PIT LOCATION

REFERENCE

THIS PLAN IS BASED ON AN OCTOBER 1, 2025 GRADING AND DRAINAGE PLAN PREPARED BY BOHLER, LLC.

ALL LOCATIONS ARE APPROXIMATE.

WHITESTONE
An Employee-Owned Company
3 EXECUTIVE PARK DRIVE, SUITE 202, BEDFORD, NH 03110
603.514.2230 WHITESTONEASSOC.COM

DRAWING TITLE: BEDROCK CONTOUR PLAN

CLIENT: RESTAURANT DEPOT, LLC

PROJECT: PROPOSED RESTAURANT DEPOT
273 LOWELL ROAD
HUDSON, HILLSBOROUGH COUNTY, NEW HAMPSHIRE

PROJECT #: GM2524203.001	
DESIGNED BY: MR	PROJ. MGR.: RR
DATE: 12/23/25	FIGURE: 2
SCALE: 1" = 50'	

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WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Attachment "D" Boring No.: B-1

Project:	Proposed Restaurant Depot
WAI Project No.:	GM2524203.000
Location:	273 Lowell Road, Hudson, Hillsborough County, New Hampshire
Client:	Restaurant Depot LLC
Surface Elevation:	± NS feet Above NAVD88
Termination Depth:	16.5 feet bgs
Proposed Location:	Building
Drill / Test Method:	HSA / SPT (Autohammer)
Date Started:	10/16/2025
Date Completed:	10/16/2025
Logged By:	SA
Contractor:	DE
Equipment:	CME 55

	Water Depth (feet bgs) | Elevation (ft NAVD88)
During:	15.0 | --
At Completion:	-- | --
24 Hours:	-- | --

	Cave-In Depth (feet bgs) | Elevation (ft NAVD88)
At Completion:	-- | --
24 Hours:	-- | --

Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0	TS	4" Topsoil	
0 - 2	S-1	X	WOH /12" - 2 - 1	16	2		SUBSOIL	12" Subsoil, Roots	
2 - 4	S-2	X	4 - 4 - 4 - 5	8	8		GLACIAL OUTWASH	Brown, Loose, Poorly Graded Sand with Silt (SP-SM)	
						5.0			
5 - 7	S-3	X	3 - 4 - 6 - 6	20	10			As Above, Gray-Brown, Loose to Medium Dense (SP-SM)	
7 - 9	S-4	X	8 - 6 - 5 - 6	16	11			Brown, Medium Dense, Poorly Graded Sand with Silt and Gravel (SP-SM)	
						10.0			
10 - 12	S-5	X	9 - 13 - 12 - 15	9	25			As Above (SP-SM)	
						15.0			
15 - 16.5	S-6	X	6 - 10 - 17 - 50/0"	18	27		GLACIAL TILL	Brown, Medium Dense, Silty Sand with Gravel (SM)	
								Boring Log B-1 Terminated upon Auger Refusal at Depth of 16.5 fbgs	
						20.0			
						25.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Attachment "D"

Boring No.: B-2

Page 1 of 1

Project:	Proposed Restaurant Depot	WAI Project No.:	GM2524203.000
Location:	273 Lowell Road, Hudson, Hillsborough County, New Hampshire	Client:	Restaurant Depot LLC

Surface Elevation:	± NS feet Above NAVD88	Date Started:	10/16/2025
Termination Depth:	11.0 feet bgs	Date Completed:	10/16/2025
Proposed Location:	Building	Logged By:	SA
Drill / Test Method:	HSA / SPT (Autohammer)	Contractor:	DE
		Equipment:	CME 55

Water Depth | Elevation (feet bgs) | (ft NAVD88)	
During:	-- | --
At Completion:	-- | --
24 Hours:	-- | --

Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)	
At Completion:	-- | --
24 Hours:	-- | --

Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0	TS	4" Topsoil	
							SUBSOIL	6" Subsoil, Roots	
0 - 2	S-1	X	3 - 5 - 5 - 4	17	10		GLACIAL OUTWASH	Brown, Loose to Medium Dense, Silty Sand (SM)	
2 - 4	S-2	X	6 - 4 - 6 - 6	19	10			As Above (SM)	
						5.0			
5 - 7	S-3	X	10 - 17 - 19 - 21	21	36		GLACIAL TILL	Gray, Dense, Silty Sand with Gravel (SM)	
7 - 9	S-4	X	29 - 26 - 25 - 25	16	51			As Above, Very Dense (SM)	
						10.0			
10 - 11	S-5	X	16 - 50	12	100			As Above, Brown (SM)	
								Boring Log B-2 Terminated upon Auger Refusal at Depth of 11 fbgs	
						15.0			
						20.0			
						25.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Attachment "D" Boring No.: B-3

Project:	Proposed Restaurant Depot	**WAI Project No.:**	GM2524203.000
Location:	273 Lowell Road, Hudson, Hillsborough County, New Hampshire	**Client:**	Restaurant Depot LLC

Surface Elevation:	± NS feet Above NAVD88	**Date Started:**	10/16/2025	**Water Depth | Elevation (feet bgs) | (ft NAVD88)**		**Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)**	
Termination Depth:	19.0 feet bgs	**Date Completed:**	10/16/2025				
Proposed Location:	Building	**Logged By:**	SA	**During:**	15.0 | --		
Drill / Test Method:	HSA / SPT (Autohammer)	**Contractor:**	DE	**At Completion:**	-- | --	**At Completion:**	-- | --
		Equipment:	CME 55	**24 Hours:**	-- | --	**24 Hours:**	-- | --

Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0	TS	4" Topsoil	
							SUBSOIL	6" Subsoil, Roots	
0 - 2	S-1	X	2 - 2 - 2 - 1	10	4		GLACIAL OUTWASH	Gray-Brown, Loose, Poorly Graded Sand with Silt (SP-SM)	
2 - 4	S-2	X	3 - 4 - 6 - 8	24	10			As Above, Loose to Medium Dense (SP-SM)	
5 - 7	S-3	X	4 - 6 - 5 - 7	24	11	5.0		As Above, Medium Dense (SP-SM)	
7 - 9	S-4	X	8 - 8 - 8 - 6	19	16			As Above (SP-SM)	
10 - 12	S-5	X	5 - 6 - 5 - 4	20	10	10.0		As Above, Loose to Medium Dense (SP-SM)	
15 - 17	S-6	X	1 - 4 - 6 - 6	12	10	15.0		As Above (SP-SM)	
17 - 19	S-7	X	3 - 4 - 4 - 8	0	8			No Recovery. Loose	
						20.0		Boring Log B-3 Terminated at Depth of 19 feet below ground surface.	
						25.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Attachment "D" Boring No.: B-4

Project: Proposed Restaurant Depot		**WAI Project No.:**	GM2524203.000
Location: 273 Lowell Road, Hudson, Hillsborough County, New Hampshire		**Client:**	Restaurant Depot LLC

Surface Elevation: ± NS feet Above NAVD88	**Date Started:** 10/16/2025	**Water Depth | Elevation (feet bgs) | (ft NAVD88)**		**Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)**	
Termination Depth: 19.0 feet bgs	**Date Completed:** 10/16/2025				
Proposed Location: Building	**Logged By:** SA	**During:**	15.0 | --		
Drill / Test Method: HSA / SPT (Autohammer)	**Contractor:** DE	**At Completion:**	-- | --	**At Completion:**	-- | --
	Equipment: CME 55	**24 Hours:**	-- | --	**24 Hours:**	-- | --

Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0	TS	2" Topsoil	
							SUBSOIL	9" Subsoil, Roots	
0 - 2	S-1	X	2 - 2 - 2 - 3	11	4		GLACIAL OUTWASH	Brown, Very Loose to Loose, Silty Sand (SM)	
2 - 4	S-2	X	3 - 4 - 3 - 4	18	7			As Above, Loose (SM)	
5 - 7	S-3	X	4 - 3 - 4 - 5	18	7	5.0		Gray, Loose, Poorly Graded Sand with Silt (SP-SM)	
7 - 9	S-4	X	6 - 3 - 6 - 7	14	9			As Above (SP-SM)	
10 - 12	S-5	X	3 - 3 - 5 - 6	18	8	10.0		Gray, Loose, Poorly Graded Sand (SP)	
15 - 17	S-6	X	2 - 3 - 3 - 5	17	6	15.0		As Above (SP)	
17 - 19	S-7	X	3 - 3 - 5 - 5	0	8			No Recovery. Loose	
						20.0		Boring Log B-4 Terminated at Depth of 19 feet below ground surface.	
						25.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Attachment "D" Boring No.: B-5

Project:	Proposed Restaurant Depot	**WAI Project No.:**	GM2524203.000
Location:	273 Lowell Road, Hudson, Hillsborough County, New Hampshire	**Client:**	Restaurant Depot LLC

Surface Elevation:	± NS feet Above NAVD88	**Date Started:**	10/16/2025	**Water Depth | Elevation (feet bgs) | (ft NAVD88)**	**Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)**
Termination Depth:	9.0 feet bgs	**Date Completed:**	10/16/2025	**During:** -- | --	
Proposed Location:	Parking	**Logged By:**	SA	**At Completion:** -- | --	**At Completion:** -- | --
Drill / Test Method:	HSA / SPT (Autohammer)	**Contractor:**	DE	**24 Hours:** -- | --	**24 Hours:** -- | --
		Equipment:	CME 55		

SAMPLE INFORMATION Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0	TS	6" Topsoil	
							SUBSOIL	6" Subsoil, Roots	
0 - 2	S-1	X	2 - 2 - 2 - 3	12	4		GLACIAL OUTWASH	Brown, Very Loose to Loose, Silty Sand (SM)	
2 - 4	S-2	X	4 - 6 - 5 - 7	14	11			As Above, Medium Dense (SM)	
								Gray, Medium Dense, Poorly Graded Sand with Silt and Gravel (SP-SM)	
5 - 7	S-3	X	4 - 4 - 5 - 5	18	9	5.0		As Above, Loose (SP-SM)	
7 - 9	S-4	X	8 - 6 - 7 - 8	20	13			As Above, Medium Dense (SP-SM)	
								Boring Log B-5 Terminated at Depth of 9 feet below ground surface.	
						10.0			
						15.0			
						20.0			
						25.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Attachment "D"

Boring No.: B-6

Project:	Proposed Restaurant Depot	**WAI Project No.:**	GM2524203.000
Location:	273 Lowell Road, Hudson, Hillsborough County, New Hampshire	**Client:**	Restaurant Depot LLC

Surface Elevation:	± NS feet Above NAVD88	**Date Started:**	10/16/2025	**Water Depth | Elevation** (feet bgs) | (ft NAVD88)		**Cave-In Depth | Elevation** (feet bgs) | (ft NAVD88)	
Termination Depth:	9.0 feet bgs	**Date Completed:**	10/16/2025				
Proposed Location:	Parking	**Logged By:**	SA	**During:**	-- | --		
Drill / Test Method:	HSA / SPT (Autohammer)	**Contractor:**	DE	**At Completion:**	-- | --	**At Completion:**	-- | --
		Equipment:	CME 55	**24 Hours:**	-- | --	**24 Hours:**	-- | --

Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0	TS	4" Topsoil	
							SUBSOIL	6" Subsoil, Roots	
0 - 2	S-1		2 - 3 - 2 - 1	10	5		GLACIAL OUTWASH	Brown, Loose, Silty Sand (SM)	
2 - 4	S-2		4 - 4 - 6 - 7	12	10			Gray, Loose to Medium Dense, Poorly Graded Sand with Silt and Gravel (SM)	
						5.0			
5 - 7	S-3		4 - 6 - 5 - 6	20	11			As Above, Medium Dense (SP-SM)	
7 - 9	S-4		9 - 8 - 10 - 11	12	18			As Above (SP-SM)	
								Boring Log B-6 Terminated at Depth of 9 feet below ground surface.	
						10.0			
						15.0			
						20.0			
						25.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Attachment "D"

Boring No.: B-7

Project: Proposed Restaurant Depot
WAI Project No.: GM2524203.000
Location: 273 Lowell Road, Hudson, Hillsborough County, New Hampshire
Client: Restaurant Depot LLC

Surface Elevation: ± NS feet Above NAVD88
Termination Depth: 9.0 feet bgs
Proposed Location: Parking Lot
Drill / Test Method: HSA / SPT (Autohammer)

Date Started: 10/16/2025
Date Completed: 10/16/2025
Logged By: SA
Contractor: DE
Equipment: CME 55

Water Depth | Elevation (feet bgs) | (ft NAVD88)
During: -- | --
At Completion: -- | --
24 Hours: -- | --

Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)
At Completion: -- | --
24 Hours: -- | --

Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0	TS	7" Topsoil	
							SUBSOIL	7" Subsoil, Roots	
0 - 2	S-1	X	1 - 2 - 2 - 3	14	4		GLACIAL OUTWASH	Brown, Very Loose to Loose, Silty Sand (SM)	
2 - 4	S-2	X	5 - 6 - 5 - 6	15	11		GLACIAL OUTWASH	Brown, Medium Dense, Silty Sand with Gravel (SM)	
						5.0			
5 - 7	S-3	X	4 - 5 - 10 - 16	17	15		GLACIAL OUTWASH	Gray-Brown, Medium Dense, Poorly Graded Sand with Silt and Gravel (SP-SM)	
7 - 9	S-4	X	26 - 24 - 23 - 21	13	47	7.0	GLACIAL TILL	Gray-Brown, Dense, Silty Sand with Gravel (SM)	
						10.0		Boring Log B-7 Terminated at Depth of 9 feet below ground surface.	
						15.0			
						20.0			
						25.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Attachment "D"

Boring No.: B-8

Project:	Proposed Restaurant Depot
WAI Project No.:	GM2524203.000
Location:	273 Lowell Road, Hudson, Hillsborough County, New Hampshire
Client:	Restaurant Depot LLC
Surface Elevation:	± NS feet Above NAVD88
Termination Depth:	15.5 feet bgs
Proposed Location:	Building
Drill / Test Method:	HSA / SPT (Autohammer)
Date Started:	10/16/2025
Date Completed:	10/16/2025
Logged By:	SA
Contractor:	DE
Equipment:	CME 55

	Water Depth (feet bgs) | Elevation (ft NAVD88)	Cave-In Depth (feet bgs) | Elevation (ft NAVD88)
During:	15.0 | --	
At Completion:	-- | --	-- | --
24 Hours:	-- | --	-- | --

Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0	TS	2" Topsoil	
							SUBSOIL	6" Subsoil, Roots	
0 - 2	S-1		WOH - 2 - 3 - 3	2	5		GLACIAL OUTWASH	Brown, Loose, Silty Sand with Gravel (SM)	
2 - 4	S-2		4 - 5 - 5 - 6	19	10			As Above, Loose to Medium Dense (SM)	
5 - 7	S-3		5 - 7 - 6 - 7	14	13	5.0		Brown, Medium Dense, Poorly Graded Sand with Silt and Gravel (SP-SM)	
7 - 9	S-4		6 - 6 - 8 - 7	17	14			As Above (SP-SM)	
10 - 12	S-5		9 - 22 - 36 - 50	9	58	10.0	GLACIAL TILL	Brown, Very Dense, Silty Sand with Gravel (SM)	
15 - 15.5	S-6		50	2	-	15.0		As Above (SM)	
								Boring Log B-8 Terminated upon Auger Refusal at Depth of 15.5 fbgs	
						20.0			
						25.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

Attachment "D"

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-1
Page 1 of 1

Project: Proposed Restaurant Depot		**WAI Project No.:** GM2524203.000	
Location: 273 Lowell Road, Hudson, Hillsborough County, New Hampshire		**Client:** Restaurant Depot LLC	

Surface Elevation: ± NS feet NAVD88	**Date Started:** 10/14/2025	**Water Depth (feet bgs) | Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs) | Elevation (ft NAVD88)**
Termination Depth: 10.0 feet bgs	**Date Completed:** 10/14/2025	**During:** -- | --	
Proposed Location: Septic Area	**Logged By:** SA	**At Completion:** -- | --	**At Completion:** -- | --
Excavating Method: Compact Excavator	**Contractor:** LE	**24 Hours:** -- | --	
Test Method: Visual Observation	**Rig Type:** Hitachi ZX50U		

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			No Indication of ESHGW
				TOPSOIL	10" Topsoil	
				SUBSOIL	36" Subsoil, Roots	
			5.0	GLACIAL OUTWASH	Brown, Poorly Graded Sand with Silt (SP-SM)	
			10.0			
					Test Pit TP-1 Terminated at Depth of 10 feet below ground surface.	
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

Attachment "D"

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-2

Project:	Proposed Restaurant Depot	**WAI Project No.:**	GM2524203.000
Location:	273 Lowell Road, Hudson, Hillsborough County, New Hampshire	**Client:**	Restaurant Depot LLC

Surface Elevation: ±	NS feet NAVD88	**Date Started:**	10/14/2025	**Water Depth (feet bgs) | Elevation (ft NAVD88)**		**Cave-In Depth (feet bgs) | Elevation (ft NAVD88)**	
Termination Depth:	10.0 feet bgs	**Date Completed:**	10/14/2025				
Proposed Location:	Septic Area	**Logged By:**	SA	**During:**	-- | --		
Excavating Method:	Compact Excavator	**Contractor:**	LE	**At Completion:**	-- | --	**At Completion:**	-- | --
Test Method:	Visual Observation	**Rig Type:**	Hitachi ZX50U	**24 Hours:**	-- | --		

SAMPLE INFORMATION			DEPTH	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)			
			0.0			No Indication of ESHGW
				TOPSOIL	8" Topsoil	
				SUBSOIL	34" Subsoil, Roots	
			5.0	GLACIAL OUTWASH	Brown, Poorly Graded Sand with Silt (SP-SM)	
			10.0		Test Pit TP-2 Terminated at Depth of 10 feet below ground surface.	
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

Attachment "D"

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-3
Page 1 of 1

Project:	Proposed Restaurant Depot	**WAI Project No.:**	GM2524203.000
Location:	273 Lowell Road, Hudson, Hillsborough County, New Hampshire	**Client:**	Restaurant Depot LLC

Surface Elevation: ±	NS feet NAVD88	**Date Started:**	10/14/2025	**Water Depth | Elevation (feet bgs) | (ft NAVD88)**	**Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)**
Termination Depth:	5.0 feet bgs	**Date Completed:**	10/14/2025	**During:** -- | --	
Proposed Location:	Septic Area	**Logged By:**	SA	**At Completion:** -- | --	**At Completion:** -- | --
Excavating Method:	Compact Excavator	**Contractor:**	LE	**24 Hours:** -- | --	
Test Method:	Visual Observation	**Rig Type:**	Hitachi ZX50U		

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			No Indication of ESHGW
				TOPSOIL	8" Topsoil	
				SUBSOIL	18" Subsoil, Roots	
			5.0	GLACIAL TILL	Gray-Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	
			10.0		Test Pit TP-3 Terminated upon Refusal at Depth of 5 feet below ground surface.	
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

Attachment "D"

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-4

Project: Proposed Restaurant Depot		**WAI Project No.:**	GM2524203.000
Location: 273 Lowell Road, Hudson, Hillsborough County, New Hampshire		**Client:**	Restaurant Depot LLC

Surface Elevation: ±	NS feet NAVD88	**Date Started:**	10/14/2025	**Water Depth | Elevation (feet bgs) | (ft NAVD88)**	**Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)**
Termination Depth:	6.5 feet bgs	**Date Completed:**	10/14/2025		
Proposed Location:	Septic Area	**Logged By:**	SA	**During:** -- | --	
Excavating Method:	Compact Excavator	**Contractor:**	LE	**At Completion:** -- | --	**At Completion:** -- | --
Test Method:	Visual Observation	**Rig Type:**	Hitachi ZX50U	**24 Hours:** -- | --	

SAMPLE INFORMATION			DEPTH	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)			
			0.0			No Indication of ESHGW
				TOPSOIL	4" Topsoil	
				SUBSOIL	14" Subsoil, Roots	
			5.0	GLACIAL TILL	Gray-Brown, Silty Sand with Gravel, Cobbles, Boulders (SM)	
			10.0		Test Pit TP-4 Terminated upon Refusal at Depth of 6.5 feet below ground surface.	
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

Attachment "D"

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-5
Page 1 of 1

Project:	Proposed Restaurant Depot	**WAI Project No.:**	GM2524203.000
Location:	273 Lowell Road, Hudson, Hillsborough County, New Hampshire	**Client:**	Restaurant Depot LLC

Surface Elevation: ± NS feet NAVD88	**Date Started:**	10/14/2025		**Water Depth (feet bgs) | Elevation (ft NAVD88)**		**Cave-In Depth (feet bgs) | Elevation (ft NAVD88)**
Termination Depth: 9.5 feet bgs	**Date Completed:**	10/14/2025	**During:**	-- | --	**At Completion:**	-- | --
Proposed Location: Septic Area	**Logged By:**	SA	**At Completion:**	-- | --		
Excavating Method: Compact Excavator	**Contractor:**	LE	**24 Hours:**	-- | --		
Test Method: Visual Observation	**Rig Type:**	Hitachi ZX50U				

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			No Indication of ESHGW
				TOPSOIL	6" Topsoil	
				SUBSOIL	26" Subsoil, Roots	
			5.0	GLACIAL OUTWASH	Brown, Poorly Graded Sand with Silt (SP-SM)	
			10.0		Test Pit TP-5 Terminated at Depth of 9.5 feet below ground surface.	
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

Attachment "D"

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-6

Project: Proposed Restaurant Depot		**WAI Project No.:**	GM2524203.000
Location: 273 Lowell Road, Hudson, Hillsborough County, New Hampshire		**Client:**	Restaurant Depot LLC

Surface Elevation: ± NS feet NAVD88	**Date Started:** 10/14/2025	**Water Depth** (feet bgs) | **Elevation** (ft NAVD88)	**Cave-In Depth** (feet bgs) | **Elevation** (ft NAVD88)
Termination Depth: 10.0 feet bgs	**Date Completed:** 10/14/2025		
Proposed Location: SWM Area	**Logged By:** SA	**During:** -- | --	
Excavating Method: Compact Excavator	**Contractor:** LE	**At Completion:** -- | --	**At Completion:** -- | --
Test Method: Visual Observation	**Rig Type:** Hitachi ZX50U	**24 Hours:** -- | --	

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			No Indication of ESHGW
				TOPSOIL	6" Topsoil	
1.5	1	Grab		SUBSOIL	18" Subsoil, Roots	
			2.0			
3	2	Grab				
			5.0	GLACIAL OUTWASH	Brown, Poorly Graded Sand with Silt (SP-SM)	
			10.0			
					Test Pit TP-6 Terminated at Depth of 10 feet below ground surface.	
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-7
Page 1 of 1

Project:	Proposed Restaurant Depot	**WAI Project No.:**	GM2524203.000
Location:	273 Lowell Road, Hudson, Hillsborough County, New Hampshire	**Client:**	Restaurant Depot LLC

Surface Elevation: ± NS feet NAVD88
Termination Depth: 5.0 to 7.0 feet bgs
Proposed Location: SWM Area
Excavating Method: Compact Excavator
Test Method: Visual Observation

Date Started: 10/14/2025
Date Completed: 10/14/2025
Logged By: SA
Contractor: LE
Rig Type: Hitachi ZX50U

Water Depth (feet bgs) | Elevation (ft NAVD88)		
During:	--	--
At Completion:	--	--
24 Hours:	--	--

Cave-In Depth (feet bgs) | Elevation (ft NAVD88)		
At Completion:	--	--

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			No Indication of ESHGW
				TOPSOIL	6" Topsoil	
1.5	1	Grab		SUBSOIL	15" Subsoil, Roots	
3.5	2	Grab	5.0	GLACIAL OUTWASH	Gray-Brown, Poorly Graded Sand with Silt (SP-SM)	
			10.0		Test Pit TP-7 Terminated upon Refusal at Depths of 5 fbgs to 7 fbgs across test pit.	
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

Attachment "D"

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-8
Page 1 of 1

Project:	Proposed Restaurant Depot	**WAI Project No.:**	GM2524203.000
Location:	273 Lowell Road, Hudson, Hillsborough County, New Hampshire	**Client:**	Restaurant Depot LLC

Surface Elevation: ±	NS feet NAVD88	**Date Started:**	10/14/2025	**Water Depth | Elevation (feet bgs) | (ft NAVD88)**	**Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)**
Termination Depth:	9.0 feet bgs	**Date Completed:**	10/14/2025	**During:** -- | --	
Proposed Location:	SWM Area	**Logged By:**	SA	**At Completion:** -- | --	**At Completion:** -- | --
Excavating Method:	Compact Excavator	**Contractor:**	LE	**24 Hours:** -- | --	
Test Method:	Visual Observation	**Rig Type:**	Hitachi ZX50U		

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			No Indication of ESHGW
				TOPSOIL	9" Topsoil	
1.5	1	Grab		SUBSOIL	15" Subsoil, Roots	
4.5	2	Grab	5.0	GLACIAL OUTWASH	Gray-Brown, Poorly Graded Sand with Silt (SP-SM)	
			10.0		Test Pit TP-8 Terminated at Depth of 9 feet below ground surface.	
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-9
Page 1 of 1

Project:	Proposed Restaurant Depot	**WAI Project No.:**	GM2524203.000
Location:	273 Lowell Road, Hudson, Hillsborough County, New Hampshire	**Client:**	Restaurant Depot LLC

Surface Elevation: ±	NS feet NAVD88	**Date Started:**	10/14/2025	**Water Depth (feet bgs) | Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs) | Elevation (ft NAVD88)**
Termination Depth:	10.0 feet bgs	**Date Completed:**	10/14/2025	**During:** -- | --	
Proposed Location:	SWM Area	**Logged By:**	SA	**At Completion:** -- | --	**At Completion:** -- | --
Excavating Method:	Compact Excavator	**Contractor:**	LE	**24 Hours:** -- | --	
Test Method:	Visual Observation	**Rig Type:**	Hitachi ZX50U		

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			No Indication of ESHGW
				TOPSOIL	8" Topsoil	
				SUBSOIL	24" Subsoil	
			5.0	GLACIAL OUTWASH	Brown, Silty Sand (SM)	
			10.0		Test Pit TP-9 Terminated at Depth of 10 feet below ground surface.	
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

Attachment "D"

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-10
Page 1 of 1

Project: Proposed Restaurant Depot		**WAI Project No.:**	GM2524203.000
Location: 273 Lowell Road, Hudson, Hillsborough County, New Hampshire		**Client:**	Restaurant Depot LLC

Surface Elevation: ± NS feet NAVD88	**Date Started:** 10/14/2025	**Water Depth (feet bgs) | Elevation (ft NAVD88)**		**Cave-In Depth (feet bgs) | Elevation (ft NAVD88)**	
Termination Depth: 10.0 feet bgs	**Date Completed:** 10/14/2025	**During:**	-- | --		
Proposed Location: SWM Area	**Logged By:** SA	**At Completion:**	-- | --	**At Completion:**	-- | --
Excavating Method: Compact Excavator	**Contractor:** LE	**24 Hours:**	-- | --		
Test Method: Visual Observation	**Rig Type:** Hitachi ZX50U				

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0	TOPSOIL	12" Topsoil	
1.5	1	Grab		SUBSOIL	12" Subsoil, Roots	
			5.0	GLACIAL OUTWASH	Gray, Poorly Graded Sand with Silt (SP-SM)	ESHGW @ 5.5 fbgs
9.5	2	Grab	10.0			
			15.0		Test Pit TP-10 Terminated at Depth of 10 feet below ground surface.	

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

Attachment "D"

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-11
Page 1 of 1

Project: Proposed Restaurant Depot		**WAI Project No.:** GM2524203.000	
Location: 273 Lowell Road, Hudson, Hillsborough County, New Hampshire		**Client:** Restaurant Depot LLC	

Surface Elevation: ± NS feet NAVD88	**Date Started:** 10/14/2025	**Water Depth (feet bgs) | Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs) | Elevation (ft NAVD88)**
Termination Depth: 9.5 feet bgs	**Date Completed:** 10/14/2025		
Proposed Location: SWM Area	**Logged By:** SA	**During:** 8.5 | --	
Excavating Method: Compact Excavator	**Contractor:** LE	**At Completion:** -- | --	**At Completion:** -- | --
Test Method: Visual Observation	**Rig Type:** Hitachi ZX50U	**24 Hours:** -- | --	

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0	TOPSOIL	8" Topsoil	
				SUBSOIL	24" Subsoil, Roots	
			5.0	GLACIAL OUTWASH	Gray, Silty Sand (SM)	ESHGW @ 8.5 fbgs
			10.0		Test Pit TP-11 Terminated at Depth of 9.5 feet below ground surface.	
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

Attachment "D"

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-12

Page 1 of 1

Project: Proposed Restaurant Depot		**WAI Project No.:**	GM2524203.000
Location: 273 Lowell Road, Hudson, Hillsborough County, New Hampshire		**Client:**	Restaurant Depot LLC

Surface Elevation: ± NS feet NAVD88	**Date Started:** 10/14/2025		**Water Depth (feet bgs) | Elevation (ft NAVD88)**		**Cave-In Depth (feet bgs) | Elevation (ft NAVD88)**
Termination Depth: 9.3 feet bgs	**Date Completed:** 10/14/2025				
Proposed Location: SWM Area	**Logged By:** SA	**During:**	-- | --		
Excavating Method: Compact Excavator	**Contractor:** LE	**At Completion:**	-- | --	**At Completion:**	-- | --
Test Method: Visual Observation	**Rig Type:** Hitachi ZX50U	**24 Hours:**	-- | --		

SAMPLE INFORMATION Depth (ft.)	Number	Type	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
			0.0			
				TOPSOIL	7" Topsoil	
1.5	1	Grab		SUBSOIL	20" Subsoil, Roots	
3.5	2	Grab				
			5.0	GLACIAL OUTWASH	Brown, Poorly Graded Sand with Silt (SP-SM)	ESHGW @ 6 fbgs
			10.0		Test Pit TP-12 Terminated at Depth of 9.3 feet below ground surface.	
			15.0			

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

Attachment "D"

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-13
Page 1 of 1

Project:	Proposed Restaurant Depot	**WAI Project No.:**	GM2524203.000
Location:	273 Lowell Road, Hudson, Hillsborough County, New Hampshire	**Client:**	Restaurant Depot LLC

Surface Elevation: ± NS feet NAVD88	**Date Started:** 10/14/2025	**Water Depth | Elevation (feet bgs) | (ft NAVD88)**		**Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)**
Termination Depth: 9.5 feet bgs	**Date Completed:** 10/14/2025			
Proposed Location: SWM Area	**Logged By:** SA	**During:**	7.0 | --	
Excavating Method: Compact Excavator	**Contractor:** LE	**At Completion:**	-- | --	**At Completion:** 7.0 | --
Test Method: Visual Observation	**Rig Type:** Hitachi ZX50U	**24 Hours:**	-- | --	

Sample Depth (ft.)	Number	Type	Depth (feet)	Strata	Description of Materials (Classification)	Remarks
			0.0			
				TOPSOIL	6" Topsoil	
1.5	1	Grab		SUBSOIL	20" Subsoil, Roots	
			5.0			
				GLACIAL OUTWASH	Gray-Brown, Poorly Graded Sand with Silt (SP-SM)	
8.5	2	Grab				
			10.0		Test Pit TP-13 Terminated at Depth of 9.5 feet below ground surface.	
			15.0			

SECTION N: INSPECTION AND MAINTENANCE MANUAL

STORMWATER INSPECTION AND MAINTENANCE PLAN

Proposed Restaurant Depot
273 Lowell Road
Hudson, NH

RESPONSIBLE PARTY DURING CONSTRUCTION:

TBD

RESPONSIBLE PARTY POST CONSTRUCTION:

TBD

The APPLICANT and its Owner/ Successor shall bear final responsibility for the installation, construction, inspection and disposition of all stormwater management and erosion control measures.

The APPLICANT, OWNER, and OWNER's legally designated representative (if any) shall all hold responsibility for implementing the Stormwater Management and Erosion Control Plan (SMECP).

Emergency contact name and number below for stormwater management emergency incidents. The contact name and number shall remain current during the life of the permit and shall be able to respond to an emergency as soon as possible and no more than four hours at any given time.

Emergency contact name and number: TBD (XXX) XXX-XXXX

Construction Phase

The APPLICANT and the APPLICANT's Engineer (or technical representative) shall schedule and attend a mandatory preconstruction meeting with the Town Engineer or his/her/its designee at least two weeks prior to commencement of construction. Perimeter erosion controls and any markings or protective fencing indicating no-disturbance areas shall be installed and be clearly visible prior to the preconstruction meeting.

During the construction phase, all erosion control devices and measures shall be maintained in accordance with the final record plans, local/state approvals and conditions, the EPA Construction General Permit and the Stormwater Pollution Prevention Plan (SWPPP) if applicable. Additionally, the maintenance of all erosion / siltation control measures during construction shall be the responsibility of the general contractor. Contact information of the OWNER and CONTRACTOR shall be listed in the SWPPP for this site. The SWPPP also includes information regarding construction period allowable and illicit discharges, housekeeping and emergency response procedures. Upon proper notice to the property owner, the Town or its authorized designee shall be allowed to enter the property at a reasonable time and in a reasonable manner for the purposes of inspection.

During the construction period, inspections shall be conducted at least once every seven calendar days or once every 14 calendar days and within 24 hours of the end of a storm event of 0.5 inch or greater.

Post Development Controls

Once construction is completed, the post development stormwater controls are to be operated and maintained in compliance with the following permanent procedures (note that the continued implementation of these procedures shall be the responsibility of the Owner or its assignee):

1. Parking lots: Sweep at least one (1) time per year and on a more frequent basis depending on sanding operations, preferably as soon as possible after the snow melts to reduce the amount of sand, grit, and debris and associated pollutants from winter sanding from entering surface waters. Swept areas shall include all parking, drive aisles, and access aisles. All resulting sweepings shall be collected and properly disposed of offsite in accordance with NHDES and other applicable requirements.

2. Catch basins, yard drains, trench drains, manholes and piping: Inspect two (2) times per year at the end of foliage and snow-removal seasons. These features shall be cleaned two (2) times per year or whenever the depth of deposits is half the sump depth. Accumulated sediment and hydrocarbons present must be removed and properly disposed of off-site in accordance with NHDES and other applicable requirements.

3. Riprap apron / Scour Hole: Riprap and scour holes should be checked at least annually and after every major storm event (generally equal or greater to 3.0 inches in 24 hours) for displaced stones, slumping, and erosion at edges, especially downstream or downslope. If the riprap is damaged, it should be repaired before further damage can take place. Note and repair any erosion, stone displacement or low spots in the areas. Woody vegetation should be removed from the riprap annually.

4. Infiltration Basin: Preventative maintenance after every major storm event and at least twice per year. Inspect structure and pretreatment BMP to ensure proper operation after every major storm event (generally equal or greater to 2.5 inches in 24 hours). Mow the buffer area, side slopes and basin bottom if grassed floor, rake if stone or sand bottom, remove trash and debris, remove grass clippings and accumulate organic matter. Remove accumulated sediment as warranted by inspection, but no less than once annually. Any sediment removed shall be disposed of in accordance with local, state, federal, and other applicable requirements. If an infiltration system does not drain within 72-hours following a rainfall event, then a qualified professional should assess the condition of the facility to determine measures required to restore infiltration function, including but not limited to removal of accumulated sediments or reconstruction of the infiltration basin.

5. Water Quality Unit (Proprietary Separator): Follow manufacturer's recommendations (attached) and inspect at least annually.

All components of the stormwater system shall be accessible by the owner or their assignee.

General notes:

1. All components of the stormwater system shall be accessible by the owner or their assignee.

2. A photograph of each practice is required at each inspection of that practice

3. If invasives species are found in stormwater management practices, mechanically remove in accordance with the methods outlined in Synder, Ellen. *Mechanical Control of Terrestrial Invasive Plants*. UNH Cooperative Extension, Mar. 2021. https://extension.unh.edu/resource/mechanical-control-terrestrial-invasives-plants

4. Refer to the attached plan depicting the location of each practice subject to maintenance.

5. Inspection reports are to be kept on-site in a location easily accessible to a Town Engineer.

Attachment "D"

STORMWATER MANAGEMENT SYSTEM

POST-CONSTRUCTION INSPECTION REPORT

LOCATION:

Proposed Restaurant Depot
273 Lowell Road
Hudson, NH

RESPONSIBLE PARTY:

TBD

NAME OF INSPECTOR:	INSPECTION DATE:
Note Condition of the Following (sediment depth, debris, standing water, damage, etc.):	
Parking lot:	
Catch basins, yard drains, trench drains, manholes and piping:	
Discharge Points/ Flared End Sections / Rip Rap:	
Infiltration Basin:	
Water Quality Unit (Proprietary Separator):	
Other:	

Attachment "D"

Note Recommended Actions to be taken (sediment and/or debris removal, repairs, etc.):

Comments:

Attachment "D"

STORMWATER INSPECTION AND MAINTENANCE LOG FORM

Proposed Restaurant Depot
273 Lowell Road
Hudson, NH

Stormwater Management Practice	Responsible Party	Date	Maintenance Activity Performed

LONG-TERM POLLUTION PREVENTION PLAN

Proposed Restaurant Depot
273 Lowell Road
Hudson, NH

RESPONSIBLE PARTY DURING CONSTRUCTION:

TBD

RESPONSIBLE PARTY POST CONSTRUCTION:

TBD

For this site, the Long-Term Pollution Prevention Plan (LTPPP) will consist of the following:

- The property owner shall be responsible for “good housekeeping” including proper periodic maintenance of building and pavement areas, curbing, landscaping, etc.
- Proper storage and removal of solid waste (dumpsters).
- Sweeping of roadways, parking lots, drive aisles and access aisles a minimum of twice per year with a commercial cleaning unit. Any sediment removed shall be disposed of in accordance with applicable local and state requirements.
- Regular inspections and maintenance of Stormwater Management System as noted in the “O&M Plan”.
- No outdoor maintenance or washing of vehicles allowed.
- Trash and other debris shall be removed from all areas of the site at least twice yearly.
- Reseed any bare areas as soon as they occur. Erosion control measures shall be installed in these areas to prevent deposits of sediment from entering the drainage system.
- Grass shall be maintained at a minimum blade height of two to three inches and only 1/3 of the plant height shall be removed at a time. Clippings shall not be disposed of within stormwater management areas or adjacent resource areas.
- Deliveries shall be monitored by owner or owner’s representative to ensure proper delivery and in the event that a spillage occurs it shall be contained and cleaned up immediately in accordance with the spill prevention program for the project.
- Recycle materials whenever possible. Provide separate containers for recycle materials. Recycling products will be removed by a certified waste hauler.
- Long-Term Pollution Prevention measures during winter conditions:

- Snow removal shall be the responsibility of the property owner. Snow shall not be plowed, dumped and/or placed in forebays, infiltration basins or similar stormwater controls. Deicing and/or sanding of pavement / walkway areas during winter conditions shall only be done in accordance with all state/local requirements and approvals.

- Snow piles shall be located adjacent to or on pervious surfaces in upland areas. This will allow snow melt water to filter into the soil, leaving behind sand and debris which can be removed in the springtime.

- In no case shall snow be disposed of or stored in resource areas (wetlands, floodplain, streams, or other water bodies).

- If necessary, stockpiled snow will be removed from the Site and disposed of at an off-site location in accordance with all local, state and federal regulations.

- The amount of sand and deicing chemicals shall be kept at the minimum amount required to provide safe pedestrian and vehicle travel.

- Deicing chemicals are recommended as a pretreatment to storm events to minimize the amount of applied sand.

- Sand and deicing chemicals should be stockpiled under covered storage facilities that prevent precipitation and adjacent runoff from coming in contact with the deicing materials. Stockpile areas shall be located outside resource areas.

- The primary agents used for deicing at parking lots, sidewalks and the access roads shall consist of salt alternatives such as calcium carbonate ($CaCO_3$) or potassium chloride (KCl).

SPILL PREVENTION AND RESPONSE PROCEDURES (POST CONSTRUCTION)

In order to prevent or minimize the potential for a spill of Hazardous Substances or Oil or come into contact with stormwater, the following steps will be implemented:

1. All Hazardous Substances or Oil (such as pesticides, petroleum products, fertilizers, detergents, acids, paints, paint solvents, cleaning solvents, etc.) will be stored in a secure location, with their lids on, preferably under cover, when not in use.

2. The minimum practical quantity of all such materials will be kept on site.

3. A spill control and containment kit (containing, for example, absorbent materials, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided on site.

4. Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be trained regarding these procedures and the location of the information and cleanup supplies.

5. It is the OWNER's responsibility to ensure that all Hazardous Waste on site is disposed of properly by a licensed hazardous material disposal company. The OWNER is responsible for not exceeding Hazardous Waste storage requirements mandated by the EPA or state and local authorities.

In the event of a spill of Hazardous Substances or Oil, the following procedures should be followed:

1. All measures should be taken to contain and abate the spill and to prevent the discharge of the Hazardous Substance or Oil to stormwater or off-site. (The spill area should be kept well ventilated and personnel should wear appropriate protective clothing to prevent injury from contact with the Hazardous Substances.)

2. For spills of less than five (5) gallons of material, proceed with source control and containment, clean-up with absorbent materials or other applicable means unless an imminent hazard or other circumstances dictate that the spill should be treated by a professional emergency response contractor.

3. For spills greater than five (5) gallons of material immediately contact the NHDES at the toll-free 24-hour statewide emergency number: **1-603-271-3899**, the local fire department (**9-1-1**) and an approved emergency response contractor. Provide information on the type of material spilled, the location of the spill, the quantity spilled, and the time of the spill to the emergency response contractor or coordinator, and proceed with prevention, containment and/or clean-up if so desired. (Use the form provided, or similar).

4. If there is a Reportable Quantity (RQ) release, then the National Response Center should be notified immediately at (800) 424-8802; within 14 days a report should be submitted to the EPA regional office describing the release, the date and circumstances of the release and the steps taken to prevent another release. This Pollution Prevention Plan should be updated to reflect any such steps or actions taken and measures to prevent the same from reoccurring.

Attachment "D"

SPILL PREVENTION CONTROL AND COUNTERMEASURE FORM

Proposed Restaurant Depot
273 Lowell Road
Hudson, NH

Where a release containing a hazardous substance occurs, the following steps shall be taken by the facility manager and/or supervisor:

1. Immediately notify The Town Fire Department (at **9-1-1**)

2. All measures must be taken to contain and abate the spill and to prevent the discharge of the pollutant(s) to off-site locations, receiving waters, wetlands and/or resource areas.

3. Notify the Town Health Officer at (603) 886-6005.

4. Provide documentation from licensed contractor showing disposal and cleanup procedures were completed as well as details on chemicals that were spilled to the Health Officer.

Date of spill:_____________ Time:________ Reported By:____________________

Weather Conditions:_______________________________

Material Spilled	**Location of Spill**	**Approximate Quantity of Spill (in gallons)**	**Agency(s) Notified**	**Date of Notification**

Attachment "D"

Cause of Spill:____
____

Measures Taken to Clean up Spill:____
____

Type of equipment: _____________ Make: _____________ Size:_______________

License or S/N: ________________

Location and Method of Disposal____
____

Procedures, method, and precautions instituted to prevent a similar occurrence from recurring:______
____
____

Additional Contact Numbers:

- NHDES SPILL RESPONSE EMERGENCY PHONE:
  - MON-FRI 8AM-4PM: (603) 271-3899
  - ALL OTHER TIMES: (603) 223-4381
- NATIONAL RESPONSE CENTER PHONE: (800) 424-8802
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Attachment "D"

CONTECH®
ENGINEERED SOLUTIONS

Cascade Separator® Inspection and Maintenance Guide

CASCADE
separator®

Attachment "D"

Maintenance

The Cascade Separator® system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects sediment and debris will depend upon on-site activities and site pollutant characteristics. For example, unstable soils or heavy winter sanding will cause the sediment storage sump to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (i.e. spring and fall). However, more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment wash-down areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

A visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet chamber, flumes or outlet channel. The inspection should also quantify the accumulation of hydrocarbons, trash and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided in this Inspection and Maintenance Guide.

Access to the Cascade Separator unit is typically achieved through one manhole access cover. The opening allows for inspection and cleanout of the center chamber (cylinder) and sediment storage sump, as well as inspection of the inlet chamber and slanted skirt. For large units, multiple manhole covers allow access to the chambers and sump.

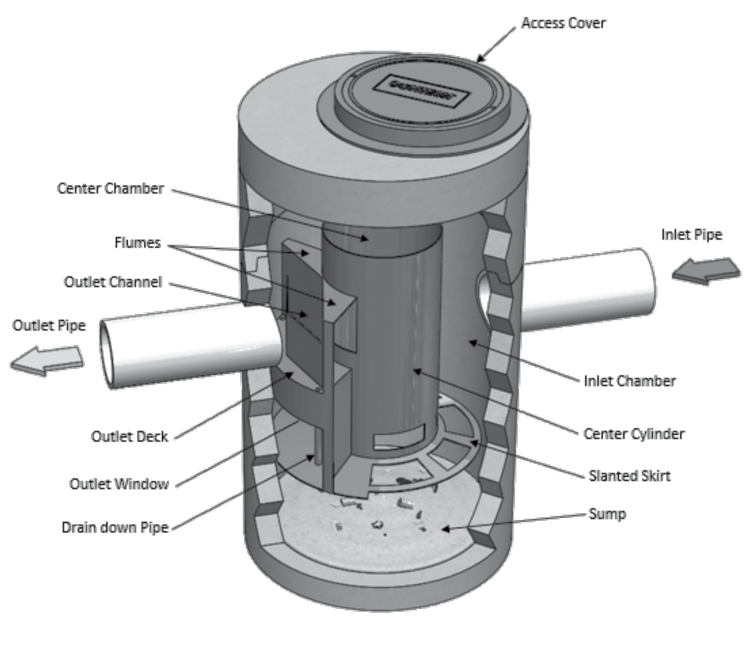
The Cascade Separator system should be cleaned before the level of sediment in the sump reaches the maximum sediment depth and/or when an appreciable level of hydrocarbons and trash has accumulated. If sorbent material is used, it must be replaced when significant discoloration has occurred. Performance may be impacted when maximum sediment storage capacity is exceeded. Contech recommends maintaining the system when sediment level reaches 50% of maximum storage volume. The level of sediment is easily determined by measuring the distance from the system outlet invert (standing water level) to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Finer, silty particles at the top of the pile typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the chart in this document to determine if the height of the sediment pile off the bottom of the sump floor exceeds 50% of the maximum sediment storage.

Cleaning

Cleaning of a Cascade Separator system should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole cover and insert the vacuum tube down through the center chamber and into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The areas outside the center chamber and the slanted skirt should also be washed off if pollutant build-up exists in these areas.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. Then the system should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and to ensure proper safety precautions. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the Cascade Separator system must be done in accordance with local regulations. In many locations, disposal of evacuated sediments may be handled in the same manner as disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal. If any components are damaged, replacement parts can be ordered from the manufacturer.



Attachment "D"

Cascade Separator® Maintenance Indicators and Sediment Storage Capacities

Model Number	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CS-3	3	0.9	1.5	0.5	0.4	0.3
CS-4	4	1.2	2.5	0.8	0.7	0.5
CS-5	5	1.3	3	0.9	1.1	0.8
CS-6	6	1.8	3.5	1	1.6	1.2
CS-8	8	2.4	4.8	1.4	2.8	2.1
CS-10	10	3.0	6.2	1.9	4.4	3.3
CS-12	12	3.6	7.5	2.3	6.3	4.8

Note: The information in the chart is for standard units. Units may have been designed with non-standard sediment storage depth.

A Cascade Separator unit can be easily cleaned in less than 30 minutes.

A vacuum truck excavates pollutants from the systems.

Cascade Separator® Inspection & Maintenance Log

Cascade Model:		Location:			
Date	Depth Below Invert to Top of Sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The depth to sediment is determined by taking a measurement from the manhole outlet invert (standing water level) to the top of the sediment pile. Once this measurement is recorded, it should be compared to the chart in the maintenance guide to determine if the height of the sediment pile off the bottom of the sump floor exceeds 50% of the maximum sediment storage. Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.
2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

SUPPORT

- Drawings and specifications are available at www.ContechES.com.
- Site-specific design support is available from our engineers.

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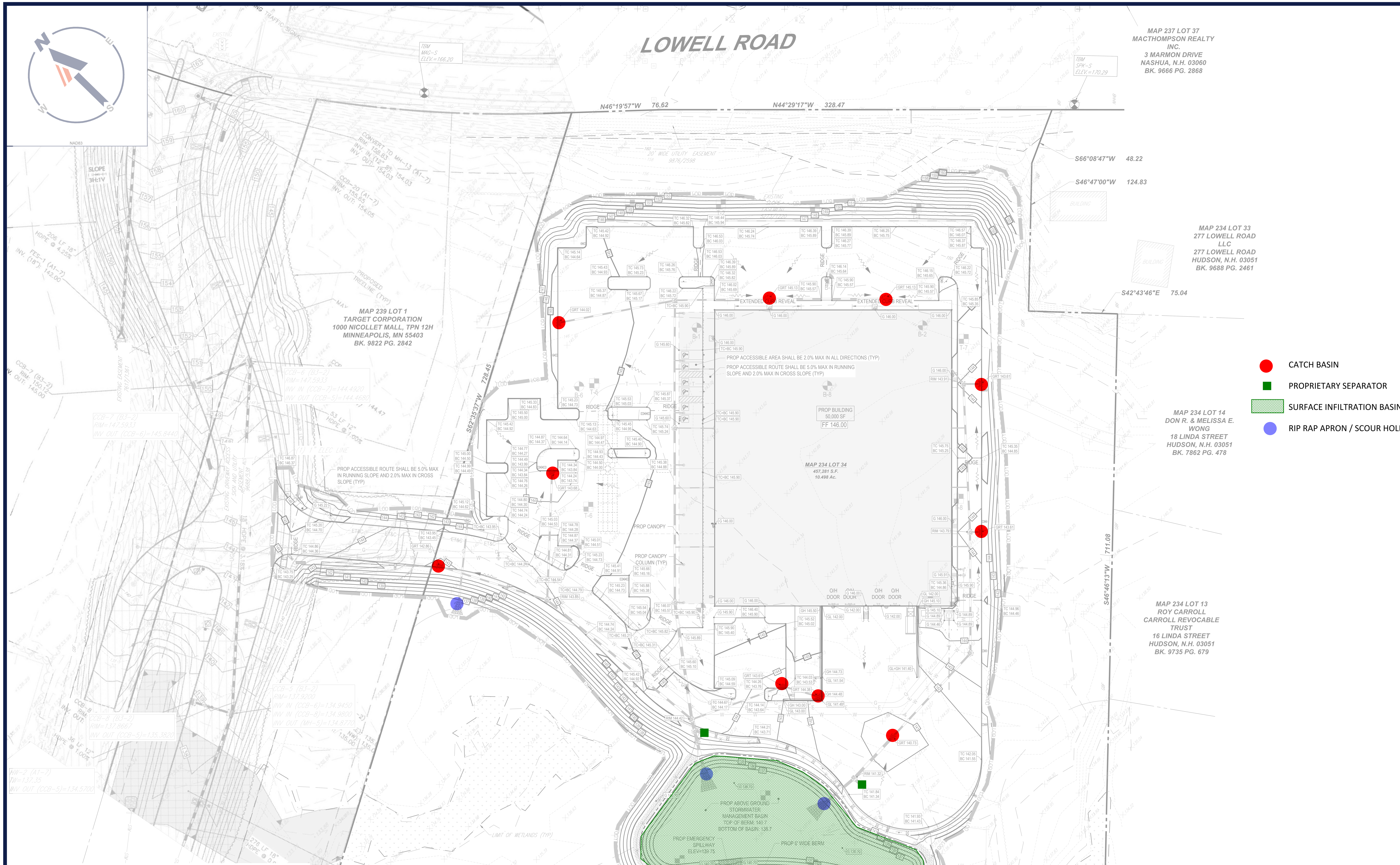

APPROVAL BLOCK

APPROVED BY THE HUDSON, NH PLANNING BOARD
DATE OF MEETING: ________

PLANNING BOARD CHAIRMAN — SIGNATURE DATE

PLANNING BOARD SECRETARY — SIGNATURE DATE

SITE PLANS ARE VALID FOR TWO YEARS FROM THE DATE OF PLANNING BOARD MEETING FINAL APPROVAL. FINAL APPROVAL COMMENCES AT THE PLANNING BOARD MEETING DATE AT WHICH THE PLAN RECEIVES FINAL APPROVAL.

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SUSTAINABLE DESIGN
PERMITTING SERVICES
TRANSPORTATION SERVICES

REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY
1	03/24/2026	TOWN & PEER REVIEW COMMENTS	MJW / KWC

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PROJECT No.:	NHA250020.01-1A
DRAWN BY:	MJW
CHECKED BY:	KWC
DATE:	01/23/2026
CAD I.D.:	P-CIVL-PROP

PROJECT:

SITE DEVELOPMENT PLANS

FOR

PROPOSED RESTAURANT DEPOT

273 LOWELL ROAD
HUDSON, NEW HAMPSHIRE
PARCEL ID: 234-034-000

BOHLER
3 EXECUTIVE PARK DRIVE FLOOR 2
BEDFORD, NH 03110
Phone: (603) 441-2900
www.BohlerEngineering.com

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RHODE ISLAND LICENSE No. 9616
MAINE LICENSE No. 12553

SHEET TITLE:

OPERATION AND MAINTENANCE PLAN

SHEET NUMBER:

OM-1

REVISION 1 - 03/24/2026

SECTION O: PLANS

- *SITE DEVELOPMENT PLANS 22"X34" (BOUND SEPARATELY)*
- *PRE- AND POST-DEVELOPMENT COLOR CODED SOILS PLAN 11"X17" (BOUND SEPARATELY)*
- *PRE- AND POST-DEVELOPMENT DRAINAGE AREA PLANS 22"X34" (BOUND SEPARATELY)*

Attachment "E"

CHAPPELL ENGINEERING ASSOCIATES, LLC

Civil • Environmental • Land Surveying
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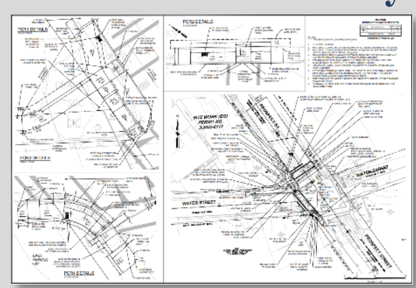
201 Boston Post Rd. West, Ste 205
Marlborough, MA 01752
Tel.: (508) 481-7400
Fax: (508) 481-7406
www.chappellengineering.com

Quality

Traffic Impact and Access Study

Restaurant Depot
273 Lowell Road
Hudson, New Hampshire

Accuracy



Prepared for:

Restaurant Depot
Whitestone, NY 11357

Integrity

January 15, 2026

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201 Boston Post Road West, Suite 205
Marlborough, MA 01752
Tel.: (508) 481-7400
Fax: (508) 481-7406
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Traffic Impact and Access Study

To:	Mr. Larry Cohen Restaurant Depot 17-10 Whitestone Expressway Whitestone, NY 11357	Reg:	Restaurant Depot 273 Lowell Road Hudson, NH
		Date:	January 15, 2026
From:	Shaun P. Kelly, Sr. Project Manager Ashley Ryan, Traffic Engineer	Project #:	25103

INTRODUCTION

Chappell Engineering Associates, LLC (CEA) has conducted this Traffic Impact and Access Study (TIAS) to identify the anticipated traffic impacts associated with the proposed development of a Restaurant Depot store at 273 Lowell Road (Route 3A) in Hudson, New Hampshire. The project entails the development of an approximate 50,000± sf store that will provide a total of 176 parking spaces, including 6 handicap accessible parking spaces. Access to the project would be provided by way of a new driveway onto the southern side of Green Meadow Drive, approximately 300 feet west of its intersection with Lowell Road.

This study evaluates existing traffic characteristics of area roadways and intersections expected to accommodate the majority of project-related traffic, provides an estimate of the expected trip generation characteristics of the project, evaluates the impact of that traffic on the adjacent transportation system, and determines the necessity for improvements to the area roadway system. This study also reviews the anticipated parking supply requirements of the project, based on a review of parking demand characteristics of operational Restaurant Depot sites. This study was prepared in general conformance with industry and New Hampshire Department of Transportation (NHDOT) guidelines for the preparation of traffic impact assessments.

As documented in this study, the proposed Restaurant Depot store project is expected to generate approximately one new vehicle trip per minute during peak hours of commuter traffic, and is expected to result in no notable impact to area traffic operations, following the implementation of ongoing roadway and traffic signal improvements along the Lowell Road corridor. The proposed parking supply for the project well exceeds the observed parking supply at similar Restaurant Depot locations.

PROJECT DESCRIPTION AND HISTORY

The project involves the development of an approximate 50,000± sf Restaurant Depot store that will provide a total of 176 parking spaces, including 6 handicap accessible parking spaces. The project site is generally bounded by Lowell Road to the east and private properties to the north, south and west. Access to the project would be provided by way of a new driveway onto the southern side of Green Meadow Drive, approximately 300 feet west of its intersection with Lowell Road.

The location of the project site, relative to the surrounding transportation network is displayed on Figure 1.

Figure 1
Site Location Map

EXISTING CONDITIONS

Study Area

Evaluation of the traffic impacts associated with the project requires an examination of existing and projected traffic volumes, the volume of traffic expected to be generated by the project, and the impact that this traffic will have on the adjacent streets and intersections. The study area scope for this assessment, as depicted in Figure 2, includes locations expected to accommodate the majority of project-related traffic, including the following intersections:

1. Lowell Road (Route 3A) at Rena Avenue and Green Meadow Drive
2. Lowell Road at Dracut Road and Steele Road
3. Green Meadow Drive at site driveway

Figure 2
Study Area Intersections

Lowell Road (Route 3A) is a principal arterial roadway under the jurisdiction of NHDOT's District 5 Office, that traverses the study area in a general north-south orientation, providing connections to the interchange with Route 3 and Central Street to the north, and the Town of Tyngsborough, Massachusetts to the south. Within the study area, Lowell Road provides two approximate 11-foot lanes of travel in each direction, with additional turning lanes provided at signalized intersections along the corridor. Within the study area northbound and southbound traffic flows are separated by a raised median. The posted speed limit on Lowell Road is 30 miles per hour (mph) in the vicinity of the project site, and increases to 35 mph further north on the corridor. On street parking is prohibited along both sides of Lowell Road within the study area. Sidewalk is not provided along either side of the corridor. Illumination along Lowell Road is provided via overhead streetlights. Land use along Lowell Road within the study area is predominantly commercial in nature.

Dracut Road is a major collector roadway under the jurisdiction of the Town of Hudson, that traverses the study area in a general northwest-southeast orientation, between its northern terminus at Lowell Road and the Massachusetts state line to the south. Within the study area Dracut Road provides a single approximate 11-foot lane of travel in each direction, with an approximate 2- to 5-foot wide shoulder provided along both sides of the corridor. The posted speed limit on Dracut Road is 35 mph. Sidewalk is not provided along either side of the corridor. Land use along Dracut Road within the study area consists primarily of commercial uses.

Steele Road is a local roadway under the jurisdiction of the Town of Hudson, that traverses the study area in a general east-west orientation, between its eastern terminus at Lowell Road and its western terminus at the Hudson Logistic Center site. Within the study area Steele Road provides a single approximate 11-foot lane of travel in each direction. The posted speed limit on Steele Road is 30 mph. Sidewalk is not provided along either side of the corridor. Land use along Steele Road within the study area consists primarily of commercial uses.

Lowell Road intersects Rena Avenue and Green Meadow Drive from the north and south to form a four-way intersection that operates under traffic signal control. The Lowell Road northbound and southbound approaches to this intersection provide an exclusive left-turn lane, a through lane and a shared through/right-turn lane. The Rena Avenue eastbound approach provides a single general-purpose travel lane. The Green Meadow Drive westbound approach provides an exclusive right-turn lane and a shared left-turn/through lane. Neither sidewalks nor crosswalks are currently provided at this location. The traffic signal at this location operates under a three-phase signal cycle, with a protected left-turn phase provided for northbound and southbound traffic on Lowell Road. Land use in the vicinity of this intersection is predominantly commercial in nature.

At the time of this report's preparation, significant roadway and traffic signal improvements are currently under construction at this location, including the widening of the Green Meadow Drive eastbound approach to provide two exclusive left-turn lanes and a shared through/right-turn lane and the construction of a new exclusive right-turn lane in the southbound direction on Lowell Road.

Lowell Road intersects Dracut Road and Steele Road from the north and south to form a four-way intersection that operates under traffic signal control. The Lowell Road northbound and southbound approaches to this intersection currently provide an exclusive left-turn lane, a through lane and a shared through/right-turn lane. The Steele Road eastbound approach provides an exclusive left-turn lane and a shared through/right-turn lane. The Dracut Road north-westbound approach provides a shared left-turn/through lane and an exclusive right-turn lane. Neither sidewalks nor crosswalks are currently provided at this location. The traffic signal at this location operates under a four-phase signal cycle, with a protected left-turn phase provided for northbound and southbound traffic on Lowell Road, and split-phasing for eastbound traffic on Steele Road and north-westbound traffic on Dracut Road. Land use in the vicinity of this intersection is predominantly commercial in nature.

At the time of this report's preparation, significant roadway and traffic signal improvements are currently under construction at this location, including the widening of the Dracut Road receiving area to allow for the conversion of the Lowell Road southbound approach to provide two exclusive left-turn lanes onto Dracut Road.

Traffic Volumes

Base traffic conditions within the study area were developed by conducting manual turning movement and vehicle classification counts (TMC's) at the intersection of Lowell Road with Rena Avenue and Green Meadow Drive in October 2025. The TMC's were conducted during the weekday AM (7:00 to 9:00 AM) and weekday PM (4:00 to 6:00 PM) time periods. These time periods were chosen as they represent the peak time period for project-related traffic and commuter traffic flows along the corridor. Additionally, daily traffic counts conducted by the NHDOT on Lowell Road were also reviewed. All traffic count data are provided in the Appendix.

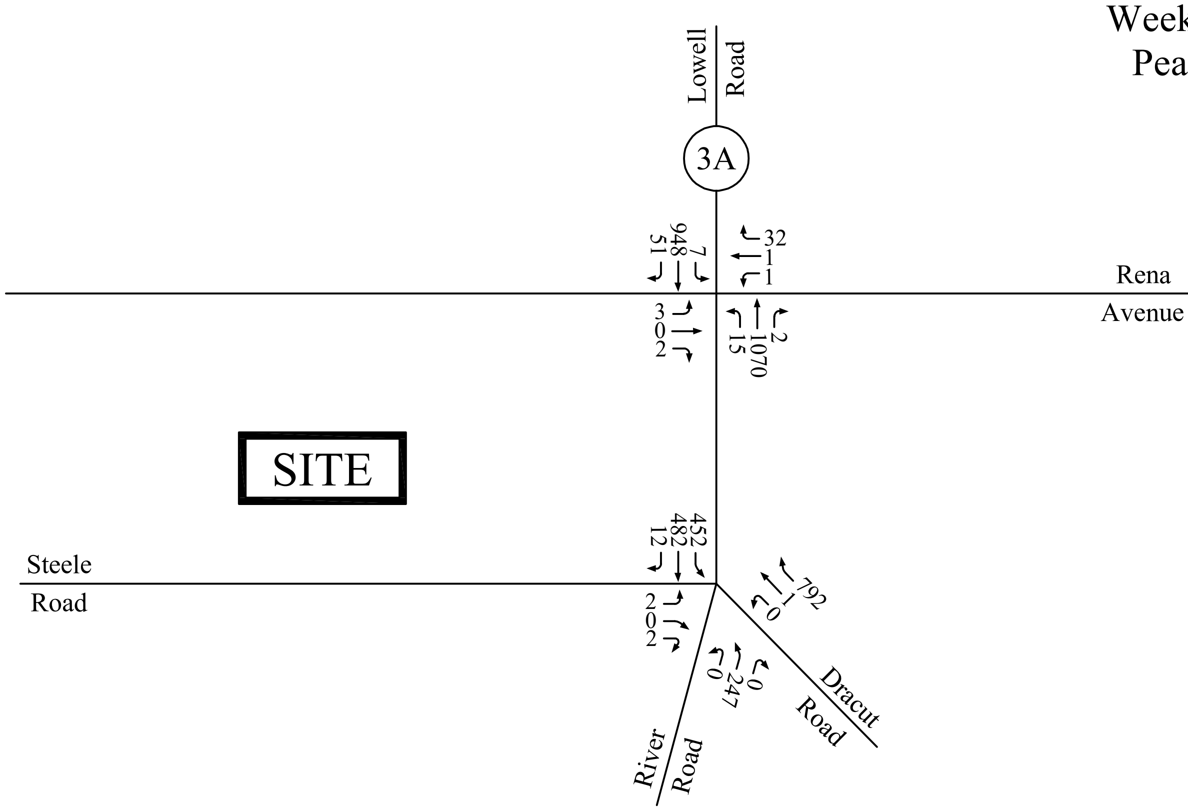
Based on a review of the collected data, October 2025 traffic volumes along Lowell Road were notably lower than prior traffic counts conducted as part of the traffic study for the proposed Hudson Logistics Center warehouse distribution facility currently under construction to the west of the project site. This is likely attributable to ongoing construction activities along the corridor, resulting in disruptions to typical traffic flow conditions. As such, the higher existing condition counts conducted as part of the warehouse project were utilized for the existing baseline condition. It is noted that these volumes were reviewed and approved by the NHDOT as part of the warehouse development permitting process.

The count data indicate that in the vicinity of the project site, the weekday AM peak hour occurs between 7:15 and 8:15 AM, with the weekday PM peak hour occurring between 4:30 and 5:30 PM. It is also noted that these volumes had been adjusted to represent peak month conditions, consistent with New Hampshire Department of Transportation (NHDOT) guidelines for traffic impact studies. The 2025 Existing Peak Month Peak Hour traffic flow networks are shown graphically on Figure 3. The daily and peak hour traffic flows are summarized in Table 1.

Attachment "E"

Figure 3
2025 Existing Peak Month
Peak Hour Traffic Volumes

Weekday AM
Peak Hour



Weekday PM
Peak Hour

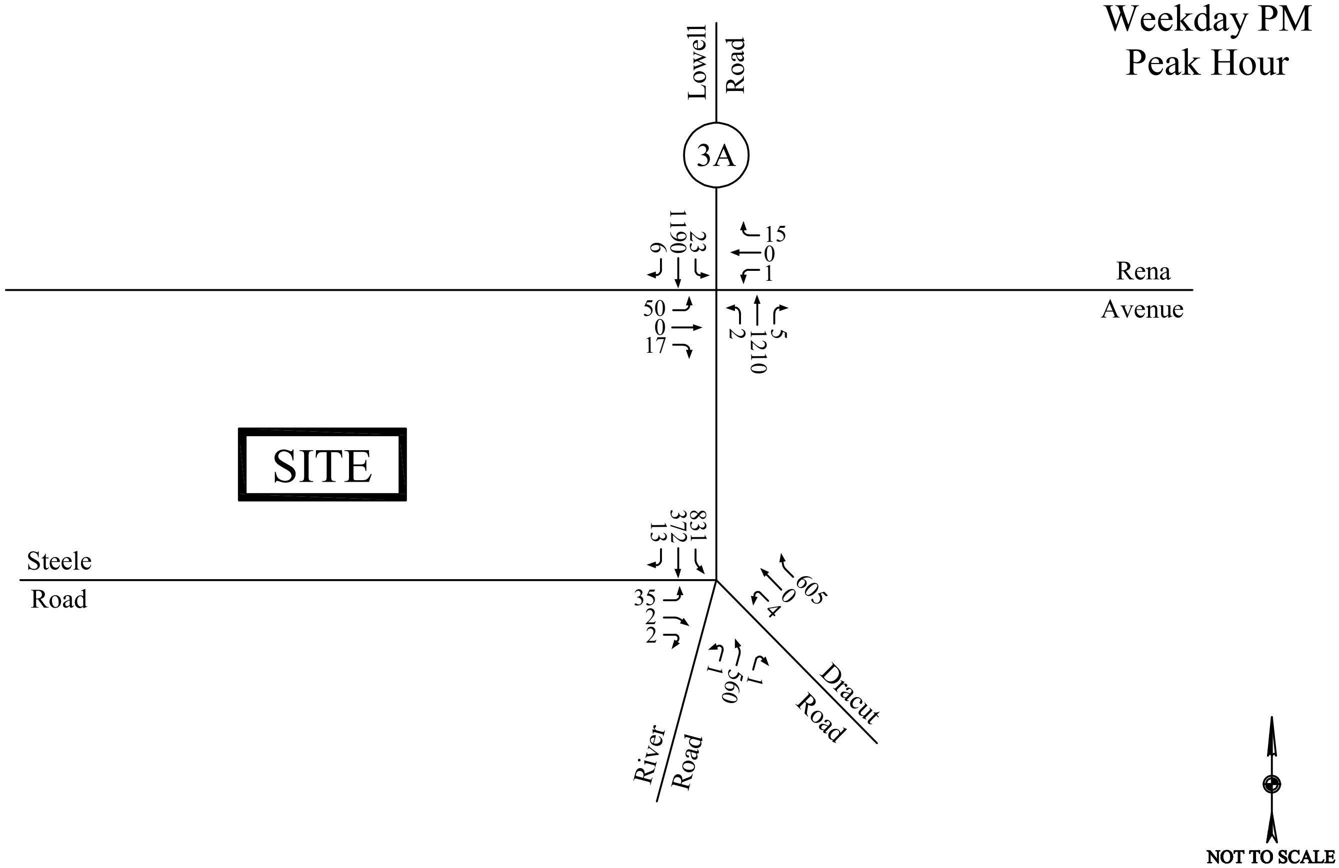


Table 1
Existing Traffic Volume Summary

Location/Time Period	Daily Volume[a]	Peak Hour Volume[b]		K Factor[c]	Directional Distribution[d]
Lowell Road (Route 3A):	23,261	Weekday AM:	2,111	9.1%	52% NB
Weekday		Weekday PM:	2,480	10.7%	51% NB

[a] In vehicles per day, based on NHDOT count data 82229049, Lowell Road, south of Rena Avenue.
[b] In vehicles per hour.
[c] Percentage of daily traffic occurring during the peak hour.
[d] NB = northbound.

As summarized in Table 1, Lowell Road currently accommodates approximately 23,261 vehicles per day (vpd), including 2,111 vehicles per hour (vph) during the weekday AM peak hour and 2,480 vph during the weekday PM peak hour. During the weekday AM peak hour, traffic is oriented 52 percent in the northbound direction, with traffic oriented 51 percent northbound during the weekday PM peak hour.

Motor Vehicle Crash Data

Motor vehicle crash data were requested from NHDOT's highway safety division to identify whether there are any notable crash trends within the study area. Based on the data provided, the crash frequency at the intersection of Lowell Road with Rena Avenue and Green Meadow Drive was relatively low, with only seven motor vehicle collisions reported over the last five calendar years. At the time of this report's preparation crash data for the intersection of Lowell Road with Dracut Road and Steele Road have not been provided. However as noted in subsequent sections of this report, significant roadway geometric and traffic signal improvements are currently under construction along Lowell Road, which are expected to enhance both future traffic operations and safety within the study area.

FUTURE CONDITIONS

Traffic Growth

Future traffic conditions were projected to the years 2027 and 2037, representing the Opening Year and a future 10-year planning horizon from the opening of the project, consistent with NHDOT guidelines for the preparation of traffic impact assessments. To account for growth in traffic, a growth rate was applied to the peak hour traffic volumes. Based on historical traffic volume information obtained from NHDOT Count Station 82229049, located on Lowell Road, south of Rena Avenue, traffic volumes have generally shown little to no growth since pre-COVID conditions. In order to account for growth in traffic, peak hour traffic volumes were increased by a compounded 1.0 percent per year annual growth rate over the two- and twelve-year planning horizons, consistent with the methodology utilized as part of the logistics center warehouse development.

Background Development Projects

The Town of Hudson Planning Department was contacted to identify whether there are any planned or approved development projects that are expected to influence traffic volumes within the study area, beyond the aforementioned background growth rate. Based on these discussions, the following projects were identified:

- ***Proposed Hudson Logistics Center (HLC) Warehouse Development – 43 Steele Road, Hudson, New Hampshire –*** the Hudson Logistics Center warehouse development entails the redevelopment of the former 377 acre Green Meadows Golf Course in order to accommodate an e-commerce fulfillment center warehouse development within three separate buildings totaling approximately 1,500,000± sf of space. In conjunction with the project a new access roadway (Green Meadow Drive) will be constructed and connect to Lowell Road, opposite Rena Avenue, with access also provided via the extension of Walmart Boulevard further north. Additional traffic expected to be generated by this project were determined based on a review of the traffic study[1] prepared for this project, and have been incorporated into the analysis of future traffic conditions.

- ***Proposed Restaurant Development –256 Lowell Road, Hudson, New Hampshire –*** this project entails the construction of an approximate 9,500± sf T-Bones restaurant. Additional traffic expected to be generated by this project were determined based on a review of the traffic study[2] prepared for this project, and have been incorporated into the analysis of future traffic conditions.

Proposed Roadway Improvements

In conjunction with the HLC warehouse development project, significant roadway geometric and traffic signal improvements are proposed at a number of locations along the Lowell Road corridor, including the intersection of Lowell Road with Rena Avenue and the future Green Meadow Drive, which will serve vehicles entering and exiting the proposed project. In conjunction with the improvement project, this intersection will be upgraded to provide two exclusive left-turn lanes and a shared through/right-turn lane on the reconstructed Green Meadow Drive approach to Lowell

[1] *Traffic Impact Study for Hudson Logistics Center, Hudson, New Hampshire;* Langan Engineering & Environmental Services, Inc., September 2020.
[2] *Traffic Impact Assessment – T-Bones Restaurant, 256 Lowell Road, Hudson, New Hampshire;* Langan Engineering & Environmental Services, Inc., December 2024.

Road. Additionally, the southbound Lowell Road approach will be widened to accommodate a left-turn lane, two through lanes and an exclusive right-turn lane onto Green Meadow Drive.

At the intersection of Lowell Road with Dracut Road and Steele Road, significant roadway and traffic signal improvements are currently under construction, including the widening of the Dracut Road receiving area to allow for the conversion of the Lowell Road southbound approach to provide two exclusive left-turn lanes onto Dracut Road.

In conjunction with these geometric improvements, new adaptive traffic signal control will be installed at the intersections of Lowell Road with Wason Road/Flagstone Drive, Sagamore Bridge Road, Walmart Boulevard, Green Meadow Drive/Rena Avenue, and Dracut Road/Steele Road. Analysis of future traffic operations reflect proposed improvements within the study area.

No-Build Conditions

The 2027 Opening Year and 2037 Future No-Build traffic volume networks were accordingly developed by applying a compounded 1.0 percent annual growth rate to the existing adjacent street and intersection volumes as well as traffic associated with the identified background development projects. The 2027 Opening Year No-Build and 2037 Future No-Build peak-hour traffic-flow networks are displayed on Figure 4 and Figure 5, respectively.

Trip Generation

In order to identify the anticipated trip generation characteristics of the project, empirical trip generation data collected at five existing operational Restaurant Depot sites were reviewed. Specifically, data collected as part of a prior traffic study for three sites in Massachusetts (Chicopee, Andover, and Avon), as well as two sites in Pennsylvania (Bethlehem and Langhorne) were examined. Based on the observed trip generation, empirical trip generation rates were developed for both the weekday AM and weekday PM peak hours. These rates were applied to the proposed 50,000 sf facility to identify the anticipated project-related traffic for typical weekday AM and weekday PM peak commuter hours, which are summarized in Table 2.

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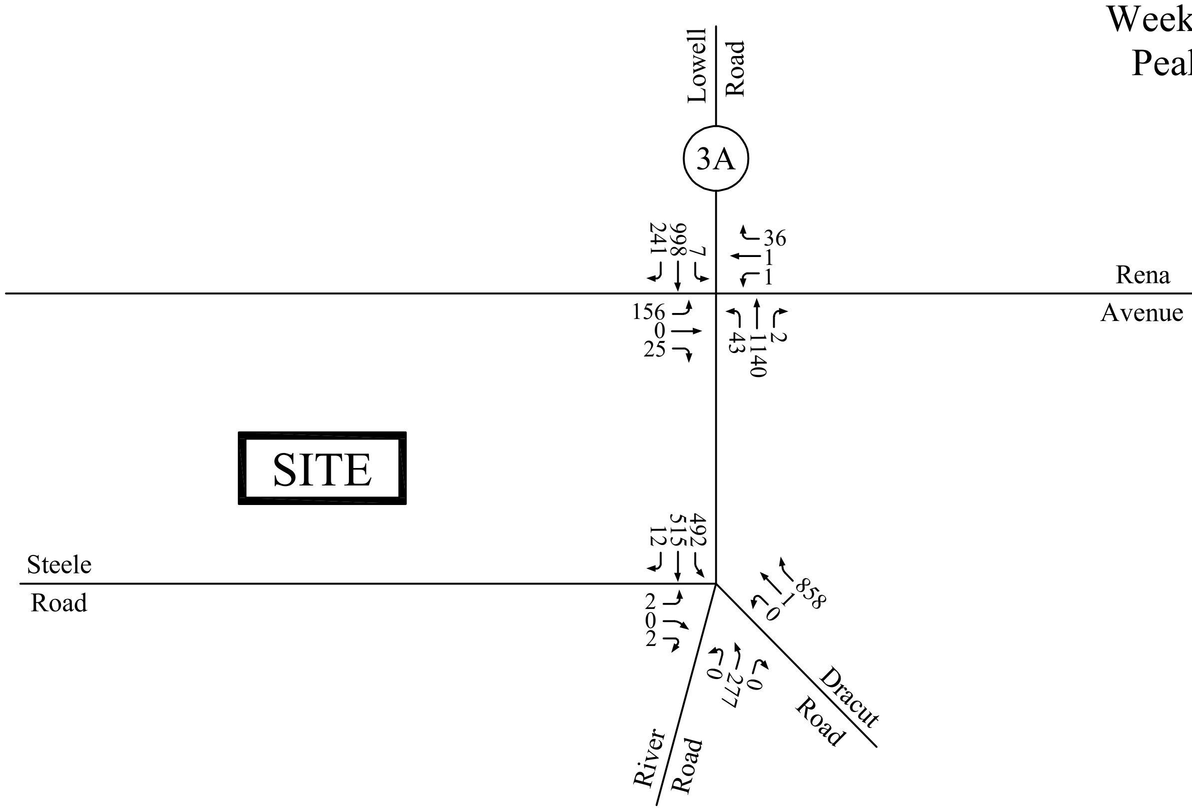
Attachment "E"

Figure 4

2027 No-Build Peak Month
Peak Hour Traffic Volumes

Weekday AM
Peak Hour



Weekday PM
Peak Hour

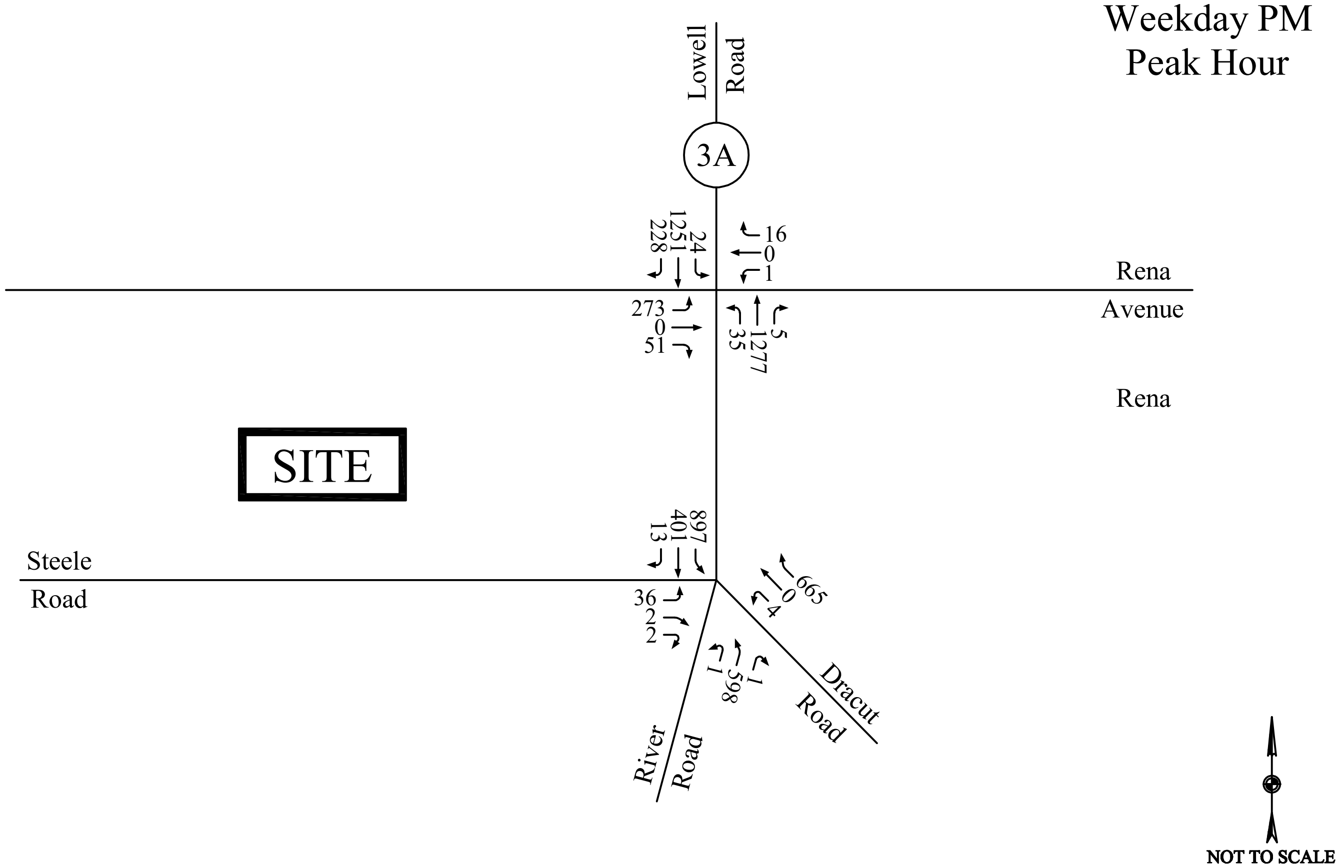


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Figure 5

2037 No-Build Peak Month
Peak Hour Traffic Volumes

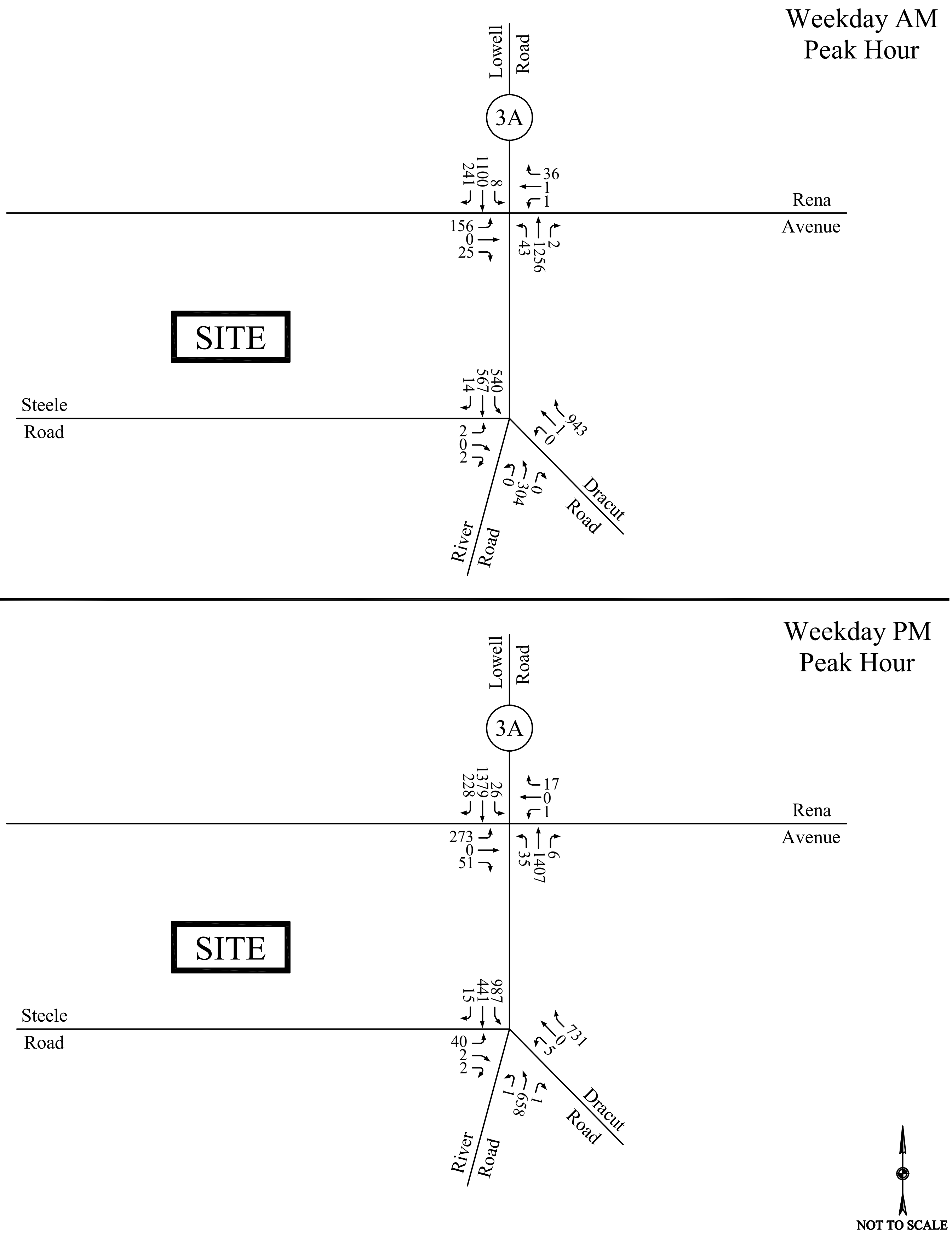


Table 2
Trip Generation Summary

Time Period	Empirical Trip Generation Rate (trips/ksf)	Vehicle Trips[a]
Weekday AM Peak Hour	0.65	33
Enter	0.39	19
Exit	1.04	52
Total		
Weekday PM Peak Hour		
Enter	0.45	22
Exit	0.49	25
Total	0.94	47

[a] Based on empirical trip generation data, applied to 50,000 sf.

As summarized in Table 2, on a typical weekday the proposed Restaurant Depot is expected to generate 52 new trips (33 entering and 19 exiting) during the weekday AM peak hour and 47 new vehicle trips (22 entering and 25 exiting) during the weekday PM peak hour.

Trip Distribution

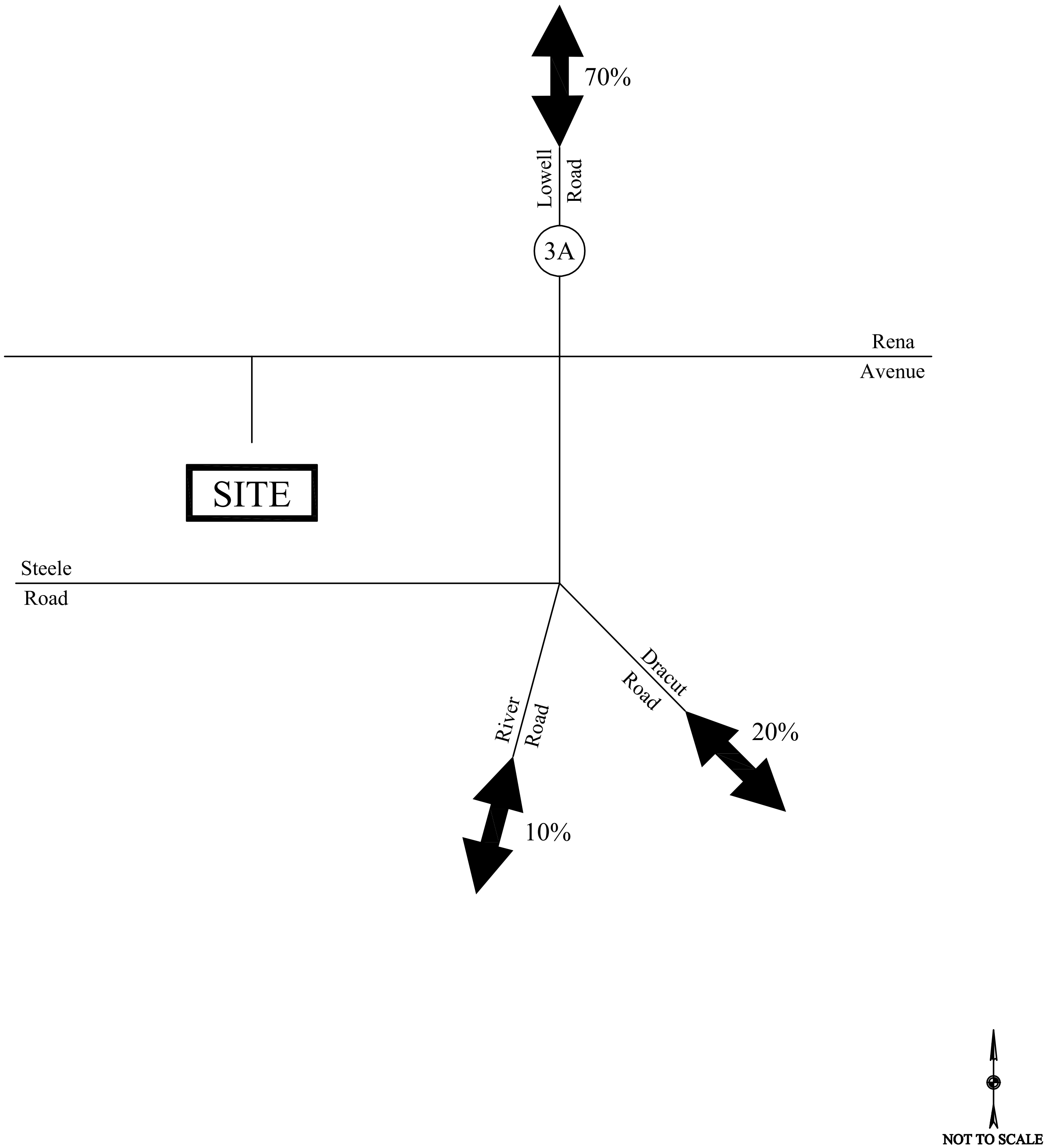
Additional trips expected to be generated by the project were distributed onto the local roadway network based on a review of existing traffic patterns and anticipated patterns for customer related traffic. In general, it is expected that 70 percent of project-related traffic will arrive and depart via Lowell Street, to the north, including traffic oriented to and from the Route 3 corridor via Sagamore Bridge Road. The remaining 30 percent of project-related traffic is expected to be distributed 20 percent to and from Dracut Road, south of the project and 10 percent to and from Lowell Road, south of the project. Trip distribution patterns are displayed in Figure 6.

Build Conditions

Based on the traffic generation projections and trip distribution patterns, the weekday AM and weekday PM peak hour traffic volumes expected to be generated by the proposed project were assigned to the roadway network as shown on Figure 7. These volumes were added to the 2027 Opening Year No-Build traffic volumes and 2037 Future No-Build traffic volumes to develop the 2027 Opening Year Build traffic volumes and 2037 Future Build traffic volumes, which are graphically depicted on Figure 8 and Figure 9, respectively.

Attachment "E"

Figure 6
Trip Distribution Map



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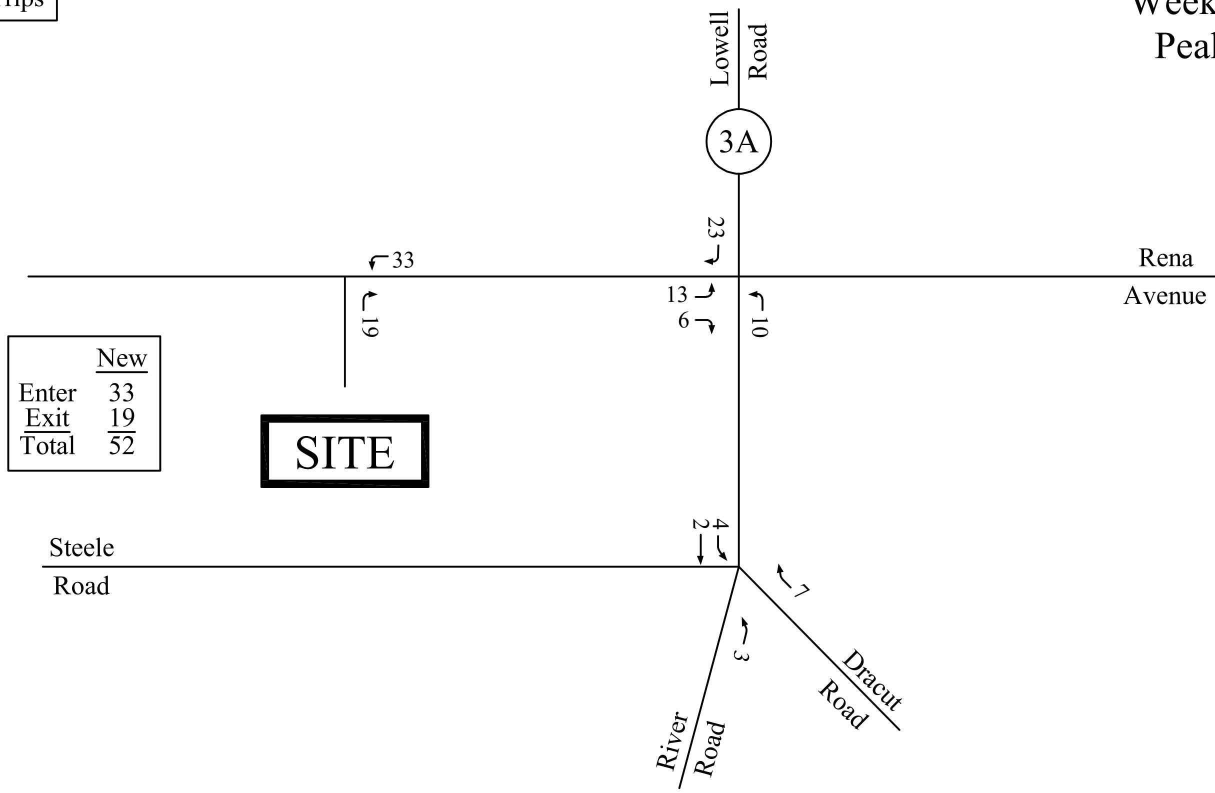
Attachment "E"

Figure 7

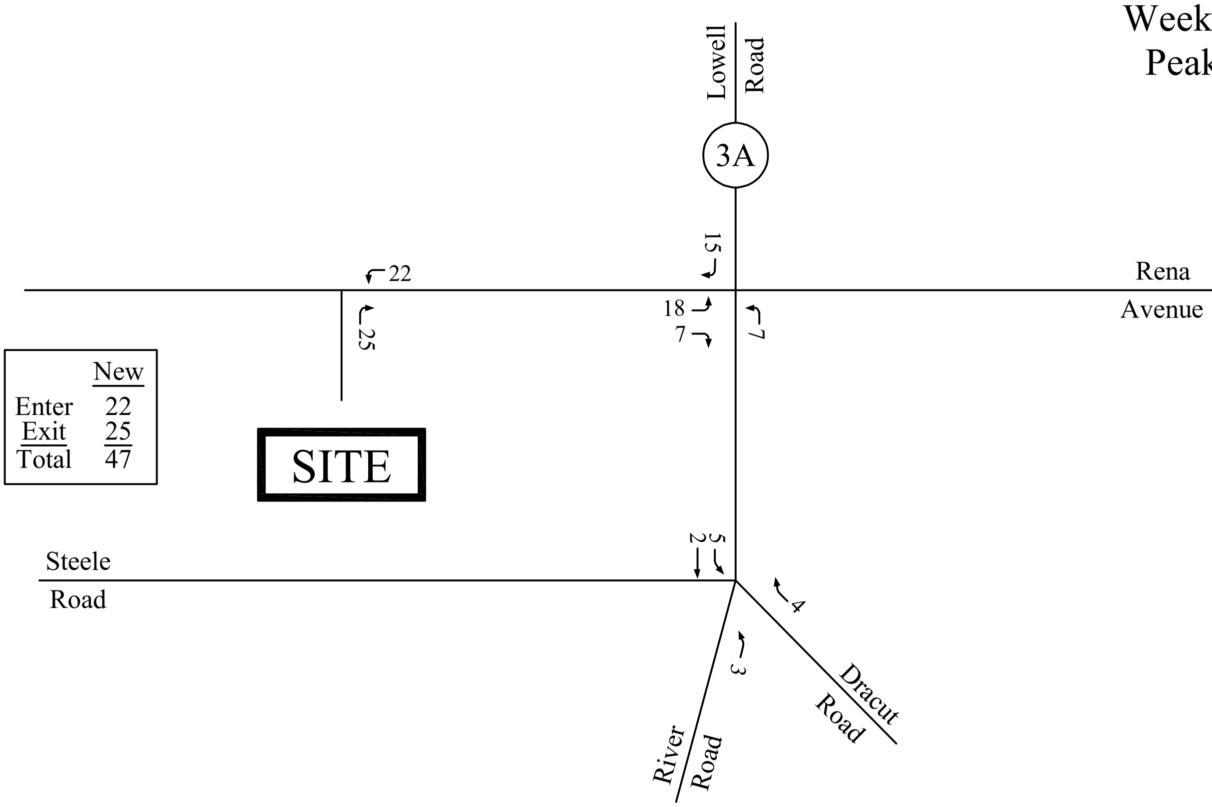
Project-Generated Peak Hour Traffic Volumes

XX - New Trips

Weekday AM Peak Hour



Weekday PM Peak Hour



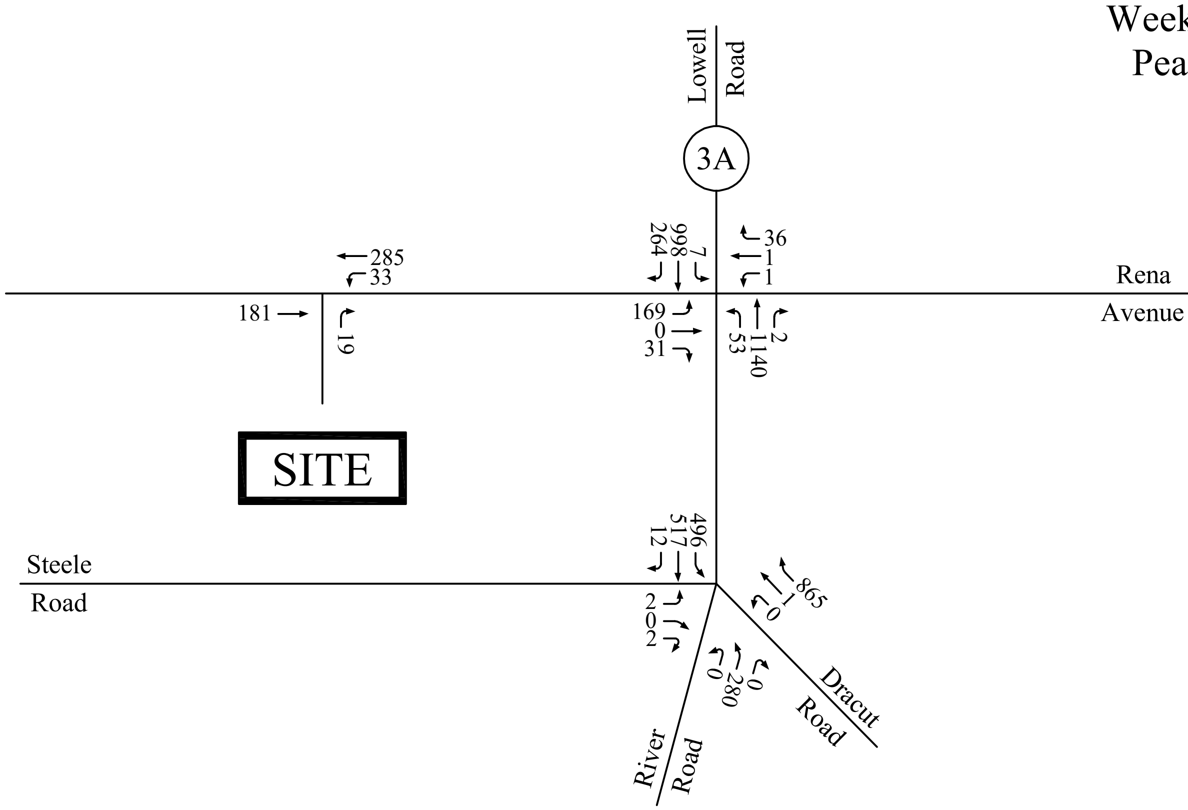
NOT TO SCALE

Attachment "E"

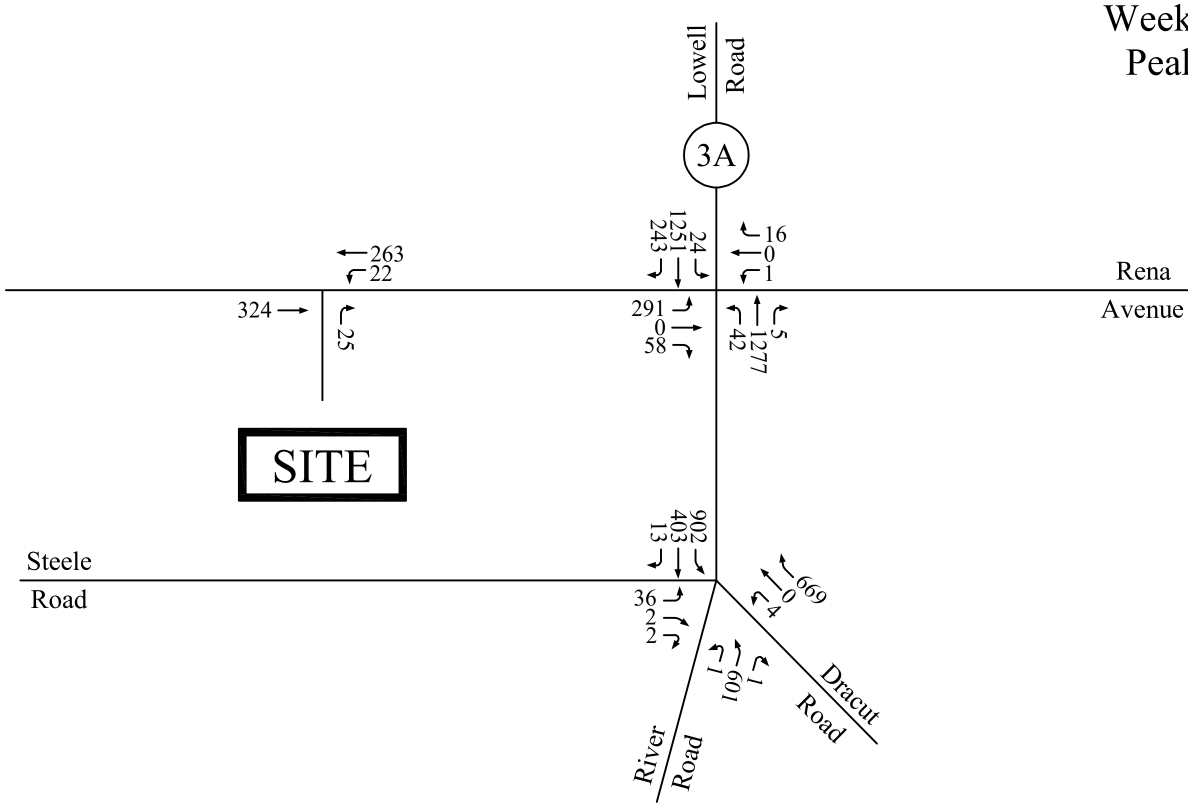
Figure 8

2027 Build Peak Month Peak Hour Traffic Volumes

Weekday AM Peak Hour



Weekday PM Peak Hour

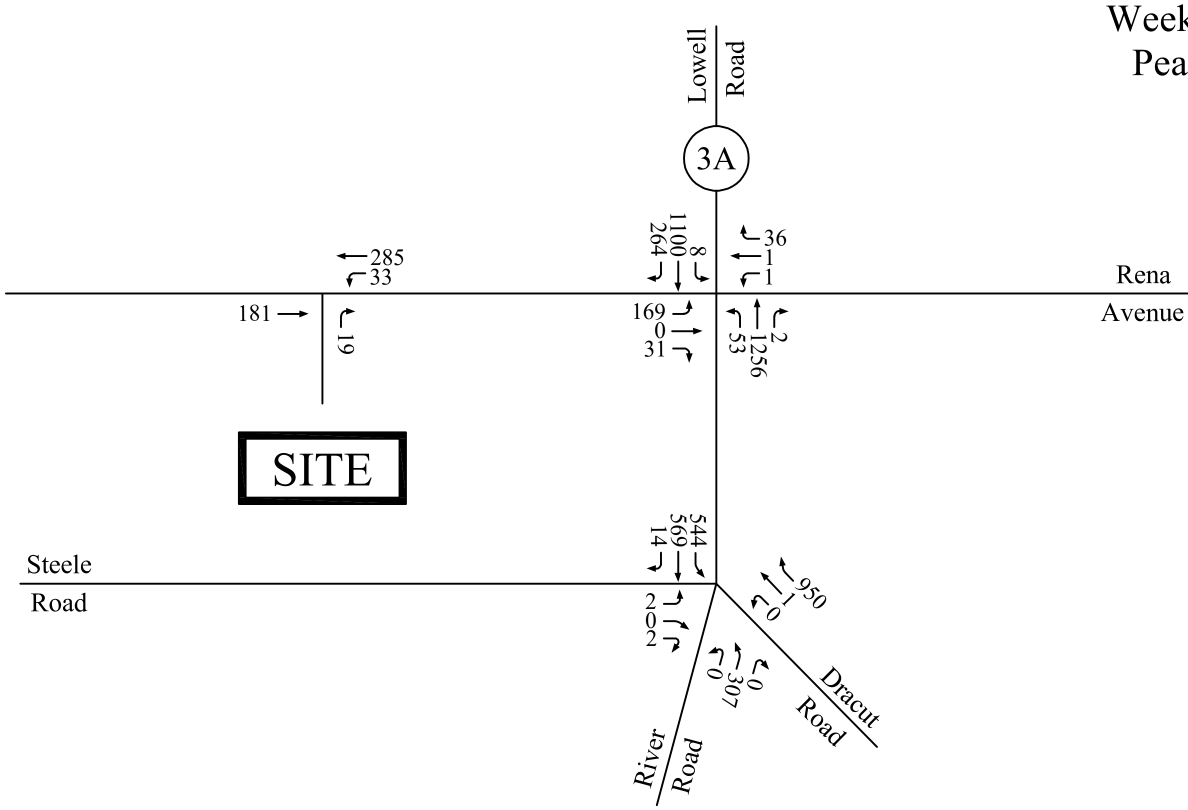


NOT TO SCALE

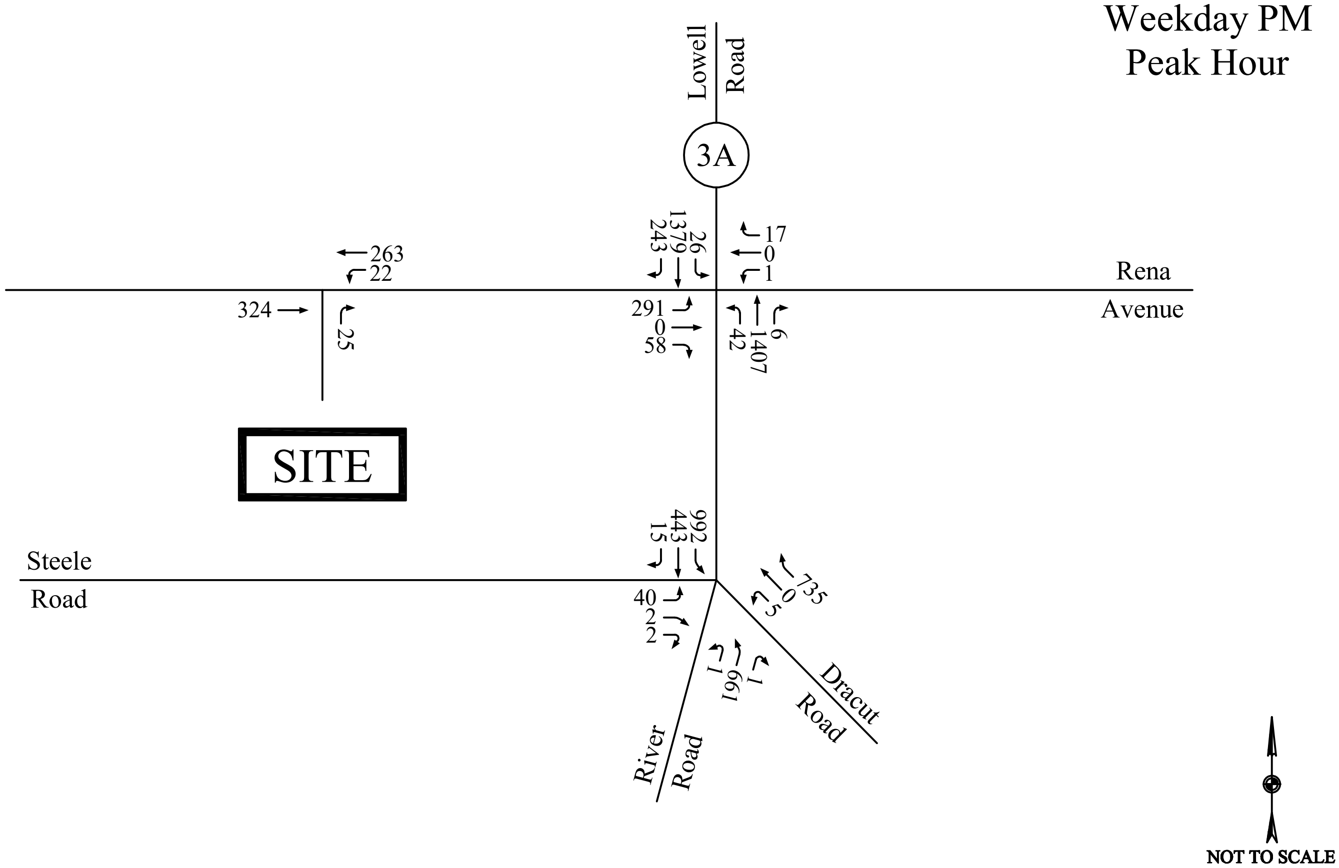
Attachment "E"

Figure 9
2037 Build Peak Month
Peak Hour Traffic Volumes

Weekday AM
Peak Hour



Weekday PM
Peak Hour



CAPACITY ANALYSIS

Level-of-service (LOS) analyses were conducted at the study area intersections under existing and projected volume conditions to determine the effect that the additional site-generated traffic will have on traffic operations. The capacity analysis methodology is based on the concepts and procedures in the *Highway Capacity Manual*[3] (HCM) and is described in the Appendix. For signalized intersections, the maximum back of queue during an average signal cycle and a 95th percentile signal cycle was calculated for each lane group during the peak periods studied. The back of queue is the length of a backup of vehicles from the stop line of a signalized intersection to the last car in the queue that is required to stop, regardless of the signal indication. The length of this queue depends on a number of factors including signal timing, vehicle arrival patterns, and the saturation flow rate. For unsignalized intersections, the 95th percentile queue represents the length of queue of the critical minor-street movement that is not expected to be exceeded 95 percent of the time during the analysis period (typically one hour). The queue length is a function of the capacity of the movement and the movement's degree of saturation. The Synchro analysis program was used for all capacity analyses.

The level-of-service and queue results for the study area intersections are presented in Table 3 and Table 4, and are discussed below. Capacity analysis worksheets are provided in the Appendix.

As summarized in Table 3, under 2025 Existing conditions, the intersection of Lowell Road with Rena Avenue and Green Meadow Drive currently operates at an overall LOS B during both the weekday AM and weekday PM peak hours. Under future 2027 Opening Year No-Build and 2037 Future No-Build conditions, this location is projected to continue to operate at LOS B during both peak periods. Under 2027 Opening Year Build and 2037 Future Build conditions, this location is projected to operate at an overall LOS B during the weekday AM peak hour and LOS C during the weekday PM peak hour, with project-related traffic projected to result in increases to overall delays of approximately 0.6 to 0.9 seconds as compared to respective No-Build conditions. In all instances vehicle queues are expected to increase by less than one vehicle length as compared to No-Build conditions.

Under 2025 Existing conditions, the intersection of Lowell Road with Dracut Road and Steele Road currently operates at an overall LOS B during both the weekday AM peak hour and at an overall LOS E during the weekday PM peak hours. Under future 2027 Opening Year No-Build and 2037 Future No-Build conditions, following the completion of roadway improvements by others, this location is projected to operate at LOS C or better during both peak periods. Under 2027 Opening Year Build and 2037 Future Build conditions, this location is projected to continue to operate at an overall LOS C or better during the weekday AM and weekday PM peak hours, with project-related traffic projected to result in increases to overall delays of approximately 0.1 to 0.4 seconds as compared to respective No-Build conditions. In all instances vehicle queues are expected to increase by less than one vehicle length as compared to No-Build conditions.

[3] *Highway Capacity Manual 2010;* Transportation Research Board; Washington, DC; 2010.

Table 3
Level-of-Service Analysis Summary

Location/Peak Hour	2025 Existing				2027 No-Build				2027 Build				2037 No-Build				2037 Build			
Movement	v/c[a]	Delay[b]	LOS[c]	Max Q[d]	v/c	Delay	LOS	Max Q	v/c	Delay	LOS	Max Q	v/c	Delay	LOS	Max Q	v/c	Delay	LOS	Max Q
Lowell Road at Green Meadow Drive and Rena Avenue																				
Weekday AM Peak																				
EB LT/TH	0.02	29.9	C	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EB RT	0.03	30.0	C	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EB LT	--	--	--	--	0.68	40.5	D	4	0.68	44.1	D	4	0.68	40.5	D	4	0.73	44.1	D	4
EB TH/RT	--	--	--	--	0.09	25.3	C	0	0.09	25.5	C	0	0.09	25.3	C	0	0.12	25.5	C	0
WB ALL	0.30	31.9	C	1	0.31	35.7	D	1	0.31	35.8	D	1	0.31	35.7	D	1	0.31	35.8	D	1
NB LT	0.47	41.0	D	1	0.63	43.7	D	2	0.63	45.3	D	3	0.63	43.7	D	2	0.70	45.3	D	3
NB TH/RT	0.46	5.7	A	9	0.59	12.2	B	12	0.59	12.3	B	12	0.65	13.5	B	14	0.54	13.6	B	14
SB LT	0.44	47.3	D	1	0.44	52.4	D	1	0.44	52.8	D	1	0.44	51.4	D	1	0.45	51.4	D	1
SB TH/RT	0.86	15.4	B	32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB TH	--	--	--	--	0.56	11.9	B	10	0.56	12.3	B	11	0.61	13.1	B	12	0.62	13.1	B	13
SB RT	--	--	--	--	0.30	9.8	A	1	0.30	10.4	A	1	0.30	10.4	B	1	0.33	10.4	B	1
Intersection	**--**	**11.1**	**B**	--	**--**	**14.6**	**B**	--	**--**	**15.3**	**B**	--	**--**	**15.3**	**B**	--	**--**	**16.0**	**B**	--
Weekday PM Peak																				
EB LT/TH	0.30	36.8	D	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EB RT	0.21	36.3	D	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EB LT	--	--	--	--	0.78	43.9	D	6	0.79	45.0	D	6	0.78	44.0	D	6	0.79	45.0	D	6
EB TH/RT	--	--	--	--	0.17	31.0	C	0	0.19	31.1	C	0	0.17	31.0	C	0	0.19	31.1	C	0
WB ALL	0.13	35.6	D	0	0.16	43.9	D	0	0.16	44.3	D	0	0.17	44.0	D	0	0.17	44.4	D	0
NB LT	0.41	87.0	F	0	0.64	55.7	E	2	0.70	57.9	E	3	0.64	55.7	E	2	0.70	57.9	E	3
NB TH/RT	0.51	6.8	A	12	0.65	15.7	B	19	0.65	16.1	B	19	0.71	17.7	B	22	0.72	18.2	B	22
SB LT	0.53	46.1	D	2	0.56	55.2	E	2	0.56	55.9	E	2	0.57	55.2	E	2	0.57	55.9	E	2
SB TH/RT	0.96	25.4	C	45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB TH	--	--	--	--	0.66	14.7	B	19	0.66	15.4	B	19	0.72	16.2	B	22	0.73	17.0	B	22
SB RT	--	--	--	--	0.27	10.8	B	2	0.29	10.9	B	2	0.27	10.2	B	2	0.29	10.9	B	2
Intersection	**--**	**17.0**	**B**	--	**--**	**18.4**	**B**	--	**--**	**19.3**	**B**	--	**--**	**19.7**	**B**	--	**--**	**20.5**	**C**	--

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

[a] Volume-to-capacity ratio.
[b] Average control delay (sec./vehicle).
[c] Level of service.
[d] 95th percentile queue in vehicles, assuming 25 feet/vehicle.

Table 3
Level-of-Service Analysis Summary

Location/Peak Hour	2025 Existing				2027 No-Build				2027 Build				2037 No-Build				2037 Build			
Movement	v/c[a]	Delay[b]	LOS[c]	Max Q[d]	v/c	Delay	LOS	Max Q	v/c	Delay	LOS	Max Q	v/c	Delay	LOS	Max Q	v/c	Delay	LOS	Max Q
Lowell Road at Dracut Road and Steele Road																				
Weekday AM Peak																				
EB LT	0.02	35.0	C	0	0.03	40.0	D	0	0.03	40.0	D	0	0.03	40.0	D	0	0.03	40.0	D	0
EB TH/RT	0.00	0.0	A	0	0.00	0.0	A	0	0.00	0.0	A	0	0.01	0.0	A	0	0.01	0.0	A	0
NWB LT/TH	0.00	0.0	A	0	0.01	36.0	D	0	0.01	36.0	D	0	0.01	36.0	D	0	0.01	36.0	D	0
NWB RT	0.82	13.2	B	12	0.84	14.8	B	20	0.84	14.8	B	22	0.84	20.2	C	32	0.91	21.0	C	32
NB LT	0.00	0.0	A	0	0.00	0.0	A	0	0.00	0.0	A	0	0.00	0.0	A	0	0.00	0.0	A	0
NB TH/RT	0.44	29.5	C	4	0.54	38.0	D	5	0.54	40.1	D	5	0.54	43.3	D	6	0.54	43.6	D	6
SB LT	0.74	27.5	C	14	0.32	15.4	C	6	0.32	15.4	C	6	0.32	14.8	C	7	0.32	14.8	C	7
SB TH/RT	0.23	5.5	A	4	0.42	6.7	A	10	0.42	6.7	A	10	0.42	7.2	A	11	0.42	7.2	A	11
Intersection	**--**	**16.7**	**B**	--	**--**	**16.3**	**B**	--	**--**	**16.4**	**B**	--	**--**	**19.2**	**B**	--	**--**	**19.6**	**B**	--
Weekday AM Peak																				
EB LT	0.07	56.8	E	2	0.36	60.4	E	3	0.36	60.4	E	3	0.39	60.8	E	3	0.39	60.8	E	3
EB TH/RT	0.07	0.2	A	0	0.02	0.2	A	0	0.02	0.2	A	0	0.02	0.2	A	0	0.02	0.2	A	0
NWB LT/TH	0.06	50.8	D	1	0.06	56.0	E	1	0.06	56.0	E	1	0.08	56.6	E	1	0.08	56.6	E	1
NWB RT	0.71	15.0	B	12	0.79	17.0	B	12	0.80	17.1	B	12	0.85	21.1	C	15	0.85	21.1	C	15
NB LT	0.01	52.0	D	0	0.01	55.0	D	0	0.01	55.0	D	0	0.01	55.0	D	0	0.01	55.0	D	0
NB TH/RT	0.74	46.4	D	12	0.57	38.4	D	14	0.58	38.7	D	15	0.71	44.9	D	20	0.71	44.9	D	20
SB LT	1.28	168.2	F	47	0.80	39.3	D	16	0.80	39.3	D	16	0.81	36.9	D	17	0.81	36.9	D	17
SB TH/RT	0.18	8.1	A	4	0.34	8.6	A	10	0.35	8.6	A	10	0.38	9.2	A	12	0.38	9.2	A	12
Intersection	**--**	**74.5**	**E**	--	**--**	**28.9**	**C**	--	**--**	**28.9**	**C**	--	**--**	**30.7**	**C**	--	**--**	**30.7**	**C**	--

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

[a] Volume-to-capacity ratio.
[b] Average control delay (sec./vehicle).
[c] Level of service.
[d] 95th percentile queue in vehicles, assuming 25 feet/vehicle.

Table 4
Unsignalized Intersection Level-of-Service Analysis Summary

Location/Peak Hour/Movement	2025 Existing				2027 Build				2037 Build			
	V/C[a]	Delay[b]	LOS[c]	Queue[d]	V/C	Delay	LOS	Queue	V/C	Delay	LOS	Queue
Green Meadow Drive at Site Driveway												
Weekday AM Peak Hour												
WB LT/TH	--	--	--	--	0.03	0.9	A	0	0.03	0.9	A	0
NB LT/RT	--	--	--	--	0.00	8.9	A	0	0.00	8.9	A	0
Weekday PM Peak Hour												
WB LT/TH	--	--	--	--	0.02	0.6	A	0	0.02	0.6	A	0
NB LT/RT	--	--	--	--	0.03	9.4	A	0	0.03	9.4	A	0

WB = westbound; NB = northbound; LT = left-turn; TH = through; RT = right-turn
[a] Volume-to-capacity ratio.
[b] Average control delay in seconds per vehicle.
[c] Level of service.
[d] 95th percentile queue in feet, assuming 25 feet per vehicle.

As summarized in Table 4, under both 2027 Opening Year Build and 2037 Future Build conditions, the site driveway onto Green Meadow Drive is projected to operate at LOS A, with vehicle queues of one vehicle or less expected on the driveway approach.

PARKING DEMAND ANALYSIS

As previously noted, the project proposes a total of 176 parking spaces, including 6 handicap accessible parking spaces. Customer parking most proximate to the store will be provided under a canopy off the west side of the proposed building.

In order to ensure that the proposed parking supply is adequate to meet the peak demands of the facility, empirical parking demand data were collected at two existing Restaurant Depot stores located in Andover, Massachusetts and Avon, Massachusetts. Parking demand observations were conducted during both peak weekday and Saturday time periods.

Based on the collected data, the maximum observed parking demand at the Avon facility occurred during the weekday midday (11:45 AM to 12:00 PM) when a total of 78 parked vehicles were observed. The maximum observed parking demand at the Andover facility occurred during the Saturday midday peak hour (11:00 to 11:15 AM) when a total of 87 parked vehicles were observed. Based on these observations, the proposed parking supply well exceeds the anticipated peak demand for the project.

CONCLUSIONS

Existing and future conditions at the study area intersections have been described and analyzed with respect to traffic operations and the impact of the proposed project. Conclusions of this effort and recommendations are presented below.

- The development entails the construction of an approximate 50,000± sf Restaurant Depot store=
  that will provide a total of 176 parking spaces, including 6 handicap accessible parking spaces.=
  The project site is generally bounded by Lowell Road to the east and private properties to the=
  north, south and west.

- Access to the project would be provided by way of a new driveway onto the southern side of=
  the reconstructed Green Meadow Drive, approximately 300 feet west of its intersection with=
  Lowell Road.

- It is recommended that the proposed site driveway provides a minimum 24-feet in width to=
  accommodate a 12-foot entering and 12-foot exiting travel lane.

- The site driveway should be placed under STOP-sign (MUTCD R1-1) control, with a painted=
  STOP-line provided at the driveway terminus. A painted double-yellow centerline should be=
  provided to delineate inbound and outbound travel lanes.

- It is recommended that any signs or landscaping be 2 feet in height or less, or be placed outside=
  the driveway sight triangles to ensure safe access is provided under post-development=
  conditions.

- Based on empirical trip generation data collected at operational Restaurant Depot sites, the=
  project is expected to generate a total of 52 new trips (33 entering and 19 exiting) during the=
  weekday AM peak hour and 47 new vehicle trips (22 entering and 25 exiting) during the=
  weekday PM peak hour.

- Based on empirical data collected at operational Restaurant Depot sites, the proposed parking=
  supply well exceeds the peak demand for the project.

- In comparison to future No-Build conditions, project-related traffic results in only a minor=
  increase to area traffic of approximately 1 to 2 percent.

- Project-related traffic increases result in no notable impacts to area traffic operations, with=
  minimal increases to both delays and vehicle queuing projected. In all instances overall delays=
  are expected to increase by less than 1 second due to project-related traffic, with no notable=
  impact to vehicular queuing expected due to the project.

In summary, the project is expected to result in only minor increases to vehicle delays and queuing, that result in no notable change in traffic operations. With implementation of the recommended measures in this report, safe and efficient access to the project will be provided.

APPENDIX

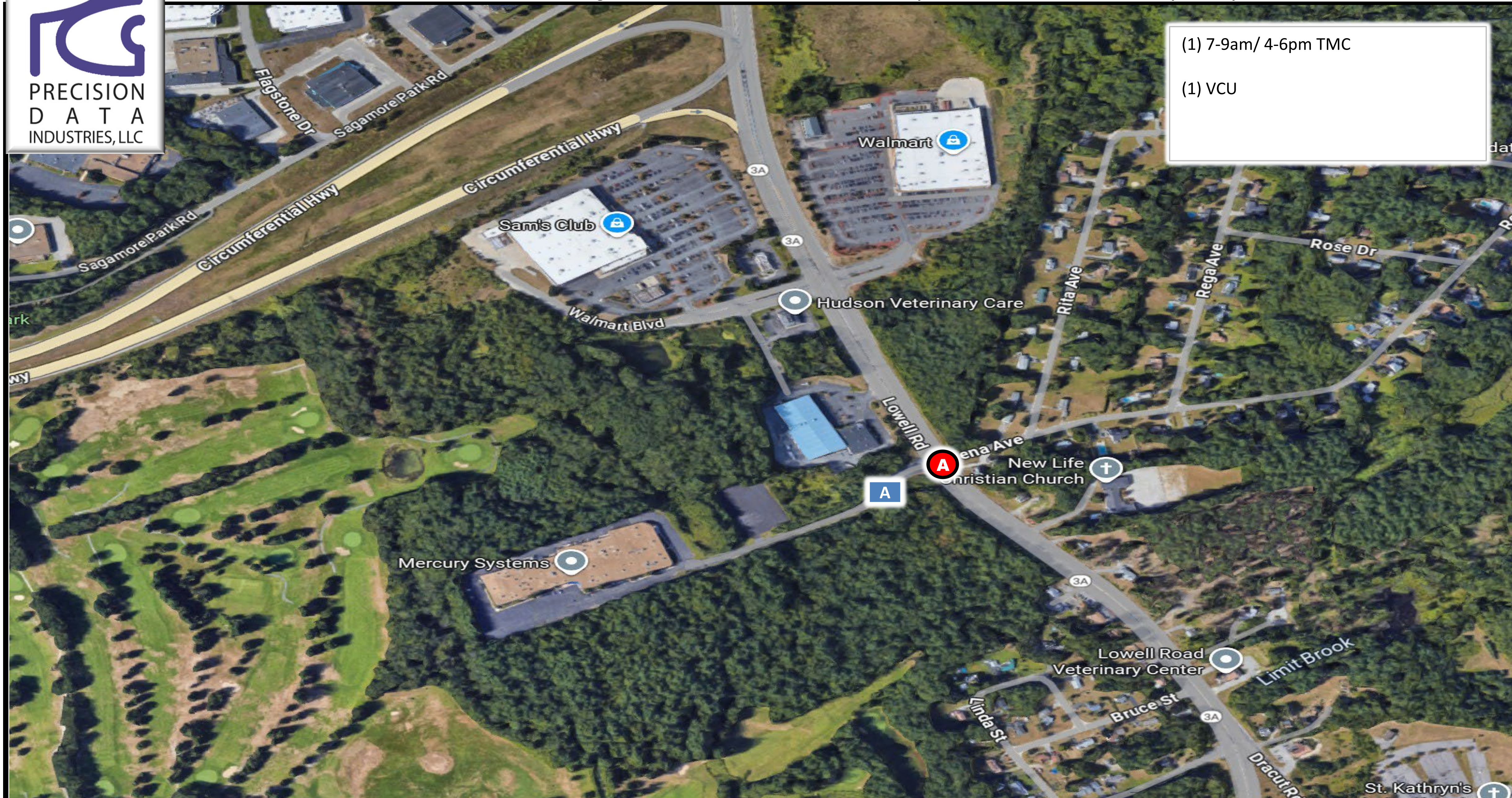
Traffic Count Data
Background Growth Information
Trip Generation Calculations
Capacity Analysis Worksheets
Parking Demand Analysis

Traffic Count Data

Attachment "E"

Location Map: 250836 Hudson, NH

Precision Data Industries, LLC 157 Washington Street, Suite 2, Hudson, MA 01749 ph: 508-875-0100 email: datarequests@pdillc.com



Client:	Engineer:	Site Code:	Date:	PDI Job #	City, State:
Chappell	S. Kelly	25103	Thurs 10/30/2025	250836	Hudson, NH

Attachment "E"

PRECISION DATA INDUSTRIES, LLC
157 Washington Street, Suite 2
Hudson, MA 01749
Office: 508-875-0100 Fax: 508-875-0118

PDI File #: **250836 A**
Location: **N: Lowell Road (Route 3A) S: Lowell Road (Route 3A)**
Location: **E: Rena Avenue W: Green Meadow Drive**
City, State: **Hudson, NH**
Client: **Chappell/ S. Kelly**
Site Code: **25103**
Count Date: **Wednesday, October 29, 2025**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

Cars and Heavy Vehicles (Combined)

	Lowell Road (Route 3A)					Rena Avenue					Lowell Road (Route 3A)					Green Meadow Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	1	306	13	1	321	4	0	2	0	6	0	218	1	0	219	8	0	20	0	28	574
4:15 PM	1	279	10	1	291	5	0	1	0	6	0	236	1	0	237	3	0	13	0	16	550
4:30 PM	3	300	3	0	306	4	0	0	0	4	0	275	1	2	278	9	0	15	0	24	612
4:45 PM	2	295	5	0	302	6	0	3	0	9	0	241	1	4	246	5	0	15	0	20	577
Total	7	1180	31	2	1220	19	0	6	0	25	0	970	4	6	980	25	0	63	0	88	2313
5:00 PM	2	294	7	0	303	3	0	0	0	3	0	249	0	2	251	3	2	15	0	20	577
5:15 PM	0	313	5	0	318	3	0	0	0	3	0	259	0	1	260	1	1	7	0	9	590
5:30 PM	0	275	11	0	286	4	0	0	0	4	0	291	0	2	293	5	0	14	0	19	602
5:45 PM	0	265	6	0	271	6	0	1	0	7	0	231	0	1	232	2	0	21	0	23	533
Total	2	1147	29	0	1178	16	0	1	0	17	0	1030	0	6	1036	11	3	57	0	71	2302
Grand Total	9	2327	60	2	2398	35	0	7	0	42	0	2000	4	12	2016	36	3	120	0	159	4615
Approach %	0.4	97.0	2.5	0.1		83.3	0.0	16.7	0.0		0.0	99.2	0.2	0.6		22.6	1.9	75.5	0.0		
Total %	0.2	50.4	1.3	0.0	52.0	0.8	0.0	0.2	0.0	0.9	0.0	43.3	0.1	0.3	43.7	0.8	0.1	2.6	0.0	3.4	
Exiting Leg Total					2157					63					2382					13	4615
Cars	7	2308	60	2	2377	35	0	7	0	42	0	1985	2	12	1999	35	3	117	0	155	4573
% Cars	77.8	99.2	100.0	100.0	99.1	100.0	0.0	100.0	0.0	100.0	0.0	99.3	50.0	100.0	99.2	97.2	100.0	97.5	0.0	97.5	99.1
Exiting Leg Total					2139					63					2362					9	4573
Heavy Vehicles	2	19	0	0	21	0	0	0	0	0	0	15	2	0	17	1	0	3	0	4	42
% Heavy Vehicles	22.2	0.8	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.8	50.0	0.0	0.8	2.8	0.0	2.5	0.0	2.5	0.9
Exiting Leg Total					18					0					20					4	42

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:30 PM	Lowell Road (Route 3A)					Rena Avenue					Lowell Road (Route 3A)					Green Meadow Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:30 PM	3	300	3	0	306	4	0	0	0	4	0	275	1	2	278	9	0	15	0	24	612
4:45 PM	2	295	5	0	302	6	0	3	0	9	0	241	1	4	246	5	0	15	0	20	577
5:00 PM	2	294	7	0	303	3	0	0	0	3	0	249	0	2	251	3	2	15	0	20	577
5:15 PM	0	313	5	0	318	3	0	0	0	3	0	259	0	1	260	1	1	7	0	9	590
Total Volume	7	1202	20	0	1229	16	0	3	0	19	0	1024	2	9	1035	18	3	52	0	73	2356
% Approach Total	0.6	97.8	1.6	0.0		84.2	0.0	15.8	0.0		0.0	98.9	0.2	0.9		24.7	4.1	71.2	0.0		
PHF	0.583	0.960	0.714	0.000	0.966	0.667	0.000	0.250	0.000	0.528	0.000	0.931	0.500	0.563	0.931	0.500	0.375	0.867	0.000	0.760	0.962
Cars	5	1189	20	0	1214	16	0	3	0	19	0	1022	2	9	1033	17	3	51	0	71	2337
Cars %	71.4	98.9	100.0	0.0	98.8	100.0	0.0	100.0	0.0	100.0	0.0	99.8	100.0	100.0	99.8	94.4	100.0	98.1	0.0	97.3	99.2
Heavy Vehicles	2	13	0	0	15	0	0	0	0	0	0	2	0	0	2	1	0	1	0	2	19
Heavy Vehicles %	28.6	1.1	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2	5.6	0.0	1.9	0.0	2.7	0.8
Cars Enter Leg	5	1189	20	0	1214	16	0	3	0	19	0	1022	2	9	1033	17	3	51	0	71	2337
Heavy Enter Leg	2	13	0	0	15	0	0	0	0	0	0	2	0	0	2	1	0	1	0	2	19
Total Entering Leg	7	1202	20	0	1229	16	0	3	0	19	0	1024	2	9	1035	18	3	52	0	73	2356
Cars Exiting Leg					1089					23					1218					7	2337
Heavy Exiting Leg					3					0					14					2	19
Total Exiting Leg					1092					23					1232					9	2356

PDI File #: **250836 A**
Location: **N: Lowell Road (Route 3A) S: Lowell Road (Route 3A)**
Location: **E: Rena Avenue W: Green Meadow Drive**
City, State: **Hudson, NH**
Client: **Chappell/ S. Kelly**
Site Code: **25103**
Count Date: **Wednesday, October 29, 2025**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
157 Washington Street, Suite 2
Hudson, MA 01749
Office: 508-875-0100 Fax: 508-875-0118

Attachment "E"

Cars

	Lowell Road (Route 3A) from North					Rena Avenue from East					Lowell Road (Route 3A) from South					Green Meadow Drive from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	1	305	13	1	320	4	0	2	0	6	0	212	0	0	212	8	0	19	0	27	565
4:15 PM	1	275	10	1	287	5	0	1	0	6	0	232	0	0	232	3	0	12	0	15	540
4:30 PM	2	295	3	0	300	4	0	0	0	4	0	275	1	2	278	9	0	15	0	24	606
4:45 PM	1	292	5	0	298	6	0	3	0	9	0	240	1	4	245	4	0	14	0	18	570
Total	5	1167	31	2	1205	19	0	6	0	25	0	959	2	6	967	24	0	60	0	84	2281
5:00 PM	2	290	7	0	299	3	0	0	0	3	0	248	0	2	250	3	2	15	0	20	572
5:15 PM	0	312	5	0	317	3	0	0	0	3	0	259	0	1	260	1	1	7	0	9	589
5:30 PM	0	275	11	0	286	4	0	0	0	4	0	289	0	2	291	5	0	14	0	19	600
5:45 PM	0	264	6	0	270	6	0	1	0	7	0	230	0	1	231	2	0	21	0	23	531
Total	2	1141	29	0	1172	16	0	1	0	17	0	1026	0	6	1032	11	3	57	0	71	2292
Grand Total	7	2308	60	2	2377	35	0	7	0	42	0	1985	2	12	1999	35	3	117	0	155	4573
Approach %	0.3	97.1	2.5	0.1		83.3	0.0	16.7	0.0		0.0	99.3	0.1	0.6		22.6	1.9	75.5	0.0		
Total %	0.2	50.5	1.3	0.0	52.0	0.8	0.0	0.2	0.0	0.9	0.0	43.4	0.0	0.3	43.7	0.8	0.1	2.6	0.0	3.4	
Exiting Leg Total					2139					63					2362					9	4573

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:30 PM	Lowell Road (Route 3A) from North					Rena Avenue from East					Lowell Road (Route 3A) from South					Green Meadow Drive from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:30 PM	2	295	3	0	300	4	0	0	0	4	0	275	1	2	278	9	0	15	0	24	606
4:45 PM	1	292	5	0	298	6	0	3	0	9	0	240	1	4	245	4	0	14	0	18	570
5:00 PM	2	290	7	0	299	3	0	0	0	3	0	248	0	2	250	3	2	15	0	20	572
5:15 PM	0	312	5	0	317	3	0	0	0	3	0	259	0	1	260	1	1	7	0	9	589
Total Volume	5	1189	20	0	1214	16	0	3	0	19	0	1022	2	9	1033	17	3	51	0	71	2337
% Approach Total	0.4	97.9	1.6	0.0		84.2	0.0	15.8	0.0		0.0	98.9	0.2	0.9		23.9	4.2	71.8	0.0		
PHF	0.625	0.953	0.714	0.000	0.957	0.667	0.000	0.250	0.000	0.528	0.000	0.929	0.500	0.563	0.929	0.472	0.375	0.850	0.000	0.740	0.964
Entering Leg	5	1189	20	0	1214	16	0	3	0	19	0	1022	2	9	1033	17	3	51	0	71	2337
Exiting Leg					1089					23					1218					7	2337
Total					2303					42					2251					78	4674

PDI File #:	**250836 A**
Location:	**N: Lowell Road (Route 3A) S: Lowell Road (Route 3A)**
Location:	**E: Rena Avenue W: Green Meadow Drive**
City, State:	**Hudson, NH**
Client:	**Chappell/ S. Kelly**
Site Code:	**25103**
Count Date:	**Wednesday, October 29, 2025**
Start Time:	**4:00 PM**
End Time:	**6:00 PM**

PRECISION
D A T A
INDUSTRIES, LLC
157 Washington Street, Suite 2
Hudson, MA 01749
Office: 508-875-0100 Fax: 508-875-0118

Attachment "E"

Class: **Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)**

	Lowell Road (Route 3A)					Rena Avenue					Lowell Road (Route 3A)					Green Meadow Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	1	0	0	1	0	0	0	0	0	0	6	1	0	7	0	0	1	0	1	9
4:15 PM	0	4	0	0	4	0	0	0	0	0	0	4	1	0	5	0	0	1	0	1	10
4:30 PM	1	5	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
4:45 PM	1	3	0	0	4	0	0	0	0	0	0	1	0	0	1	1	0	1	0	2	7
Total	2	13	0	0	15	0	0	0	0	0	0	11	2	0	13	1	0	3	0	4	32
5:00 PM	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
5:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
5:45 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
Total	0	6	0	0	6	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	10
Grand Total	2	19	0	0	21	0	0	0	0	0	0	15	2	0	17	1	0	3	0	4	42
Approach %	9.5	90.5	0.0	0.0		0.0	0.0	0.0	0.0		0.0	88.2	11.8	0.0		25.0	0.0	75.0	0.0		
Total %	4.8	45.2	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	35.7	4.8	0.0	40.5	2.4	0.0	7.1	0.0	9.5	
Exiting Leg Total					18					0					20					4	42
Buses	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
% Buses	0.0	5.3	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	4.8
Exiting Leg Total					1					0					1					0	2
Single-Unit Trucks	2	17	0	0	19	0	0	0	0	0	0	13	2	0	15	1	0	3	0	4	38
% Single-Unit	100.0	89.5	0.0	0.0	90.5	0.0	0.0	0.0	0.0	0.0	0.0	86.7	100.0	0.0	88.2	100.0	0.0	100.0	0.0	100.0	90.5
Exiting Leg Total					16					0					18					4	38
Articulated Trucks	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
% Articulated	0.0	5.3	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	4.8
Exiting Leg Total					1					0					1					0	2

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Lowell Road (Route 3A)					Rena Avenue					Lowell Road (Route 3A)					Green Meadow Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	1	0	0	1	0	0	0	0	0	0	6	1	0	7	0	0	1	0	1	9
4:15 PM	0	4	0	0	4	0	0	0	0	0	0	4	1	0	5	0	0	1	0	1	10
4:30 PM	1	5	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
4:45 PM	1	3	0	0	4	0	0	0	0	0	0	1	0	0	1	1	0	1	0	2	7
Total Volume	2	13	0	0	15	0	0	0	0	0	0	11	2	0	13	1	0	3	0	4	32
% Approach Total	13.3	86.7	0.0	0.0		0.0	0.0	0.0	0.0		0.0	84.6	15.4	0.0		25.0	0.0	75.0	0.0		
PHF	0.500	0.650	0.000	0.000	0.625	0.000	0.000	0.000	0.000	0.000	0.000	0.458	0.500	0.000	0.464	0.250	0.000	0.750	0.000	0.500	0.800
Buses	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
Buses %	0.0	7.7	0.0	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	9.1	0.0	0.0	7.7	0.0	0.0	0.0	0.0	0.0	6.3
Single-Unit Trucks	2	12	0	0	14	0	0	0	0	0	0	9	2	0	11	1	0	3	0	4	29
Single-Unit %	100.0	92.3	0.0	0.0	93.3	0.0	0.0	0.0	0.0	0.0	0.0	81.8	100.0	0.0	84.6	100.0	0.0	100.0	0.0	100.0	90.6
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Articulated %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1	0.0	0.0	7.7	0.0	0.0	0.0	0.0	0.0	3.1
Buses	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
Single-Unit Trucks	2	12	0	0	14	0	0	0	0	0	0	9	2	0	11	1	0	3	0	4	29
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Total Entering Leg	2	13	0	0	15	0	0	0	0	0	0	11	2	0	13	1	0	3	0	4	32
Buses					1					0					1					0	2
Single-Unit Trucks					12					0					13					4	29
Articulated Trucks					1					0					0					0	1
Total Exiting Leg					14					0					14					4	32

PRECISION DATA INDUSTRIES, LLC
157 Washington Street, Suite 2
Hudson, MA 01749
Office: 508-875-0100 Fax: 508-875-0118

Attachment "E"

PDI File #: **250836 A**
Location: **N: Lowell Road (Route 3A) S: Lowell Road (Route 3A)**
Location: **E: Rena Avenue W: Green Meadow Drive**
City, State: **Hudson, NH**
Client: **Chappell/ S. Kelly**
Site Code: **25103**
Count Date: **Wednesday, October 29, 2025**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class: **Buses**

	Lowell Road (Route 3A) from North					Rena Avenue from East					Lowell Road (Route 3A) from South					Green Meadow Drive from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
Approach %	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total					1					0					1					0	2

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Lowell Road (Route 3A) from North					Rena Avenue from East					Lowell Road (Route 3A) from South					Green Meadow Drive from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
% Approach Total	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
PHF	0.000	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.250
Entering Leg	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
Exiting Leg					1					0					1					0	2
Total					2					0					2					0	4

PDI File #: **250836 A**
Location: **N: Lowell Road (Route 3A) S: Lowell Road (Route 3A)**
Location: **E: Rena Avenue W: Green Meadow Drive**
City, State: **Hudson, NH**
Client: **Chappell/ S. Kelly**
Site Code: **25103**
Count Date: **Wednesday, October 29, 2025**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
157 Washington Street, Suite 2
Hudson, MA 01749
Office: 508-875-0100 Fax: 508-875-0118

Attachment "E"

Single-Unit Trucks

	Lowell Road (Route 3A)					Rena Avenue					Lowell Road (Route 3A)					Green Meadow Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	1	0	0	1	0	0	0	0	0	0	6	1	0	7	0	0	1	0	1	9
4:15 PM	0	3	0	0	3	0	0	0	0	0	0	2	1	0	3	0	0	1	0	1	7
4:30 PM	1	5	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
4:45 PM	1	3	0	0	4	0	0	0	0	0	0	1	0	0	1	1	0	1	0	2	7
Total	2	12	0	0	14	0	0	0	0	0	0	9	2	0	11	1	0	3	0	4	29
5:00 PM	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	4
5:15 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
5:45 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
Total	0	5	0	0	5	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	9
Grand Total	2	17	0	0	19	0	0	0	0	0	0	13	2	0	15	1	0	3	0	4	38
Approach %	10.5	89.5	0.0	0.0		0.0	0.0	0.0	0.0		0.0	86.7	13.3	0.0		25.0	0.0	75.0	0.0		
Total %	5.3	44.7	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	34.2	5.3	0.0	39.5	2.6	0.0	7.9	0.0	10.5	
Exiting Leg Total					16					0					18					4	38

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Lowell Road (Route 3A)					Rena Avenue					Lowell Road (Route 3A)					Green Meadow Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	1	0	0	1	0	0	0	0	0	0	6	1	0	7	0	0	1	0	1	9
4:15 PM	0	3	0	0	3	0	0	0	0	0	0	2	1	0	3	0	0	1	0	1	7
4:30 PM	1	5	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
4:45 PM	1	3	0	0	4	0	0	0	0	0	0	1	0	0	1	1	0	1	0	2	7
Total Volume	2	12	0	0	14	0	0	0	0	0	0	9	2	0	11	1	0	3	0	4	29
% Approach Total	14.3	85.7	0.0	0.0		0.0	0.0	0.0	0.0		0.0	81.8	18.2	0.0		25.0	0.0	75.0	0.0		
PHF	0.500	0.600	0.000	0.000	0.583	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.500	0.000	0.393	0.250	0.000	0.750	0.000	0.500	0.806
Entering Leg	2	12	0	0	14	0	0	0	0	0	0	9	2	0	11	1	0	3	0	4	29
Exiting Leg					12					0					13					4	29
Total					26					0					24					8	58

Attachment "E"

PDI File #:	**250836 A**
Location:	**N: Lowell Road (Route 3A) S: Lowell Road (Route 3A)**
Location:	**E: Rena Avenue W: Green Meadow Drive**
City, State:	**Hudson, NH**
Client:	**Chappell/ S. Kelly**
Site Code:	**25103**
Count Date:	**Wednesday, October 29, 2025**
Start Time:	**4:00 PM**
End Time:	**6:00 PM**
Class:	

PRECISION
D A T A
INDUSTRIES, LLC
157 Washington Street, Suite 2
Hudson, MA 01749
Office: 508-875-0100 Fax: 508-875-0118

Articulated Trucks

	Lowell Road (Route 3A) from North					Rena Avenue from East					Lowell Road (Route 3A) from South					Green Meadow Drive from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
5:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Grand Total	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
Approach %	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total					1					0					1					0	2

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:15 PM	Lowell Road (Route 3A) from North					Rena Avenue from East					Lowell Road (Route 3A) from South					Green Meadow Drive from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
% Approach Total	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
PHF	0.000	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.500
Entering Leg	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
Exiting Leg					1					0					1					0	2
Total					2					0					2					0	4

PDI File #: **250836 A**
Location: **N: Lowell Road (Route 3A) S: Lowell Road (Route 3A)**
Location: **E: Rena Avenue W: Green Meadow Drive**
City, State: **Hudson, NH**
Client: **Chappell/ S. Kelly**
Site Code: **25103**
Count Date: **Wednesday, October 29, 2025**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class:

PRECISION DATA INDUSTRIES, LLC
157 Washington Street, Suite 2
Hudson, MA 01749
Office: 508-875-0100 Fax: 508-875-0118

Attachment "E"

Bicycles (on Roadway and Crosswalks)

	Lowell Road (Route 3A) from North							Rena Avenue from East							Lowell Road (Route 3A) from South							Green Meadow Drive from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	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	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1
Grand Total	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	2
Approach %	0.0	100.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		
Total %	0.0	50.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total							1							0							1							0	2

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM

	Lowell Road (Route 3A) from North							Rena Avenue from East							Lowell Road (Route 3A) from South							Green Meadow Drive from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	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 Volume	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
% Approach Total	0.0	100.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		
PHF	0.000	0.250	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250
Entering Leg	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Exiting Leg							0							0							1							0	1
Total							1							0							1							0	2

Attachment "E"

PRECISION
D A T A
INDUSTRIES, LLC
157 Washington Street, Suite 2
Hudson, MA 01749
Office: 508-875-0100 Fax: 508-875-0118

PDI File #: **250836 A**
Location: **N: Lowell Road (Route 3A) S: Lowell Road (Route 3A)**
Location: **E: Rena Avenue W: Green Meadow Drive**
City, State: **Hudson, NH**
Client: **Chappell/ S. Kelly**
Site Code: **25103**
Count Date: **Wednesday, October 29, 2025**
Start Time: **4:00 PM**
End Time: **6:00 PM**
Class: **Pedestrians**

	Lowell Road (Route 3A)							Rena Avenue							Lowell Road (Route 3A)							Green Meadow Drive							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Approach %	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 %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Exiting Leg Total							0							0							0							0	0

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Lowell Road (Route 3A)							Rena Avenue							Lowell Road (Route 3A)							Green Meadow Drive							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	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 Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exiting Leg							0							0							0							0	0
Total							0							0							0							0	0

Attachment "E"

PDI File #: **250836 A**
Location: **N: Lowell Road (Route 3A) S: Lowell Road (Route 3A)**
Location: **E: Rena Avenue W: Green Meadow Drive**
City, State: **Hudson, NH**
Client: **Chappell/ S. Kelly**
Site Code: **25103**
Count Date: **Thursday, October 30, 2025**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
157 Washington Street, Suite 2
Hudson, MA 01749
Office: 508-875-0100 Fax: 508-875-0118

Cars and Heavy Vehicles (Combined)

	Lowell Road (Route 3A)					Rena Avenue					Lowell Road (Route 3A)					Green Meadow Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	10	169	3	0	182	9	0	3	0	12	0	215	5	0	220	0	0	4	0	4	418
7:15 AM	12	155	1	1	169	9	0	1	0	10	0	249	2	0	251	0	0	2	0	2	432
7:30 AM	18	225	1	1	245	6	1	2	0	9	0	265	1	0	266	0	0	1	0	1	521
7:45 AM	12	214	3	0	229	1	0	2	0	3	0	246	2	0	248	2	0	5	0	7	487
Total	52	763	8	2	825	25	1	8	0	34	0	975	10	0	985	2	0	12	0	14	1858
8:00 AM	21	173	1	0	195	6	1	3	0	10	0	214	0	0	214	2	0	3	0	5	424
8:15 AM	14	164	2	0	180	8	0	2	0	10	0	229	3	0	232	0	0	5	0	5	427
8:30 AM	12	176	4	0	192	0	0	1	0	1	0	184	0	1	185	1	0	1	0	2	380
8:45 AM	12	187	2	0	201	3	0	0	0	3	0	226	1	0	227	1	0	2	0	3	434
Total	59	700	9	0	768	17	1	6	0	24	0	853	4	1	858	4	0	11	0	15	1665
Grand Total	111	1463	17	2	1593	42	2	14	0	58	0	1828	14	1	1843	6	0	23	0	29	3523
Approach %	7.0	91.8	1.1	0.1		72.4	3.4	24.1	0.0		0.0	99.2	0.8	0.1		20.7	0.0	79.3	0.0		
Total %	3.2	41.5	0.5	0.1	45.2	1.2	0.1	0.4	0.0	1.6	0.0	51.9	0.4	0.0	52.3	0.2	0.0	0.7	0.0	0.8	
Exiting Leg Total					1895					17					1484					127	3523
Cars	98	1406	15	2	1521	38	2	14	0	54	0	1781	13	1	1795	5	0	11	0	16	3386
% Cars	88.3	96.1	88.2	100.0	95.5	90.5	100.0	100.0	0.0	93.1	0.0	97.4	92.9	100.0	97.4	83.3	0.0	47.8	0.0	55.2	96.1
Exiting Leg Total					1832					15					1426					113	3386
Heavy Vehicles	13	57	2	0	72	4	0	0	0	4	0	47	1	0	48	1	0	12	0	13	137
% Heavy Vehicles	11.7	3.9	11.8	0.0	4.5	9.5	0.0	0.0	0.0	6.9	0.0	2.6	7.1	0.0	2.6	16.7	0.0	52.2	0.0	44.8	3.9
Exiting Leg Total					63					2					58					14	137

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:15 AM	Lowell Road (Route 3A)					Rena Avenue					Lowell Road (Route 3A)					Green Meadow Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:15 AM	12	155	1	1	169	9	0	1	0	10	0	249	2	0	251	0	0	2	0	2	432
7:30 AM	18	225	1	1	245	6	1	2	0	9	0	265	1	0	266	0	0	1	0	1	521
7:45 AM	12	214	3	0	229	1	0	2	0	3	0	246	2	0	248	2	0	5	0	7	487
8:00 AM	21	173	1	0	195	6	1	3	0	10	0	214	0	0	214	2	0	3	0	5	424
Total Volume	63	767	6	2	838	22	2	8	0	32	0	974	5	0	979	4	0	11	0	15	1864
% Approach Total	7.5	91.5	0.7	0.2		68.8	6.3	25.0	0.0		0.0	99.5	0.5	0.0		26.7	0.0	73.3	0.0		
PHF	0.750	0.852	0.500	0.500	0.855	0.611	0.500	0.667	0.000	0.800	0.000	0.919	0.625	0.000	0.920	0.500	0.000	0.550	0.000	0.536	0.894
Cars	58	732	5	2	797	19	2	8	0	29	0	943	5	0	948	3	0	4	0	7	1781
Cars %	92.1	95.4	83.3	100.0	95.1	86.4	100.0	100.0	0.0	90.6	0.0	96.8	100.0	0.0	96.8	75.0	0.0	36.4	0.0	46.7	95.5
Heavy Vehicles	5	35	1	0	41	3	0	0	0	3	0	31	0	0	31	1	0	7	0	8	83
Heavy Vehicles %	7.9	4.6	16.7	0.0	4.9	13.6	0.0	0.0	0.0	9.4	0.0	3.2	0.0	0.0	3.2	25.0	0.0	63.6	0.0	53.3	4.5
Cars Enter Leg	58	732	5	2	797	19	2	8	0	29	0	943	5	0	948	3	0	4	0	7	1781
Heavy Enter Leg	5	35	1	0	41	3	0	0	0	3	0	31	0	0	31	1	0	7	0	8	83
Total Entering Leg	63	767	6	2	838	22	2	8	0	32	0	974	5	0	979	4	0	11	0	15	1864
Cars Exiting Leg					968					5					743					65	1781
Heavy Exiting Leg					41					1					36					5	83
Total Exiting Leg					1009					6					779					70	1864

PDI File #: **250836 A**
Location: **N: Lowell Road (Route 3A) S: Lowell Road (Route 3A)**
Location: **E: Rena Avenue W: Green Meadow Drive**
City, State: **Hudson, NH**
Client: **Chappell/ S. Kelly**
Site Code: **25103**
Count Date: **Thursday, October 30, 2025**
Start Time: **7:00 AM**
End Time: **9:00 AM**

PRECISION
D A T A
INDUSTRIES, LLC
157 Washington Street, Suite 2
Hudson, MA 01749
Office: 508-875-0100 Fax: 508-875-0118

Attachment "E"

Class: **Cars**

	Lowell Road (Route 3A)					Rena Avenue					Lowell Road (Route 3A)					Green Meadow Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	9	165	3	0	177	9	0	3	0	12	0	212	5	0	217	0	0	4	0	4	410
7:15 AM	11	150	1	1	163	8	0	1	0	9	0	244	2	0	246	0	0	1	0	1	419
7:30 AM	16	211	1	1	229	5	1	2	0	8	0	255	1	0	256	0	0	0	0	0	493
7:45 AM	12	205	2	0	219	1	0	2	0	3	0	240	2	0	242	2	0	2	0	4	468
Total	48	731	7	2	788	23	1	8	0	32	0	951	10	0	961	2	0	7	0	9	1790
8:00 AM	19	166	1	0	186	5	1	3	0	9	0	204	0	0	204	1	0	1	0	2	401
8:15 AM	12	162	1	0	175	7	0	2	0	9	0	223	2	0	225	0	0	2	0	2	411
8:30 AM	10	166	4	0	180	0	0	1	0	1	0	182	0	1	183	1	0	0	0	1	365
8:45 AM	9	181	2	0	192	3	0	0	0	3	0	221	1	0	222	1	0	1	0	2	419
Total	50	675	8	0	733	15	1	6	0	22	0	830	3	1	834	3	0	4	0	7	1596
Grand Total	98	1406	15	2	1521	38	2	14	0	54	0	1781	13	1	1795	5	0	11	0	16	3386
Approach %	6.4	92.4	1.0	0.1		70.4	3.7	25.9	0.0		0.0	99.2	0.7	0.1		31.3	0.0	68.8	0.0		
Total %	2.9	41.5	0.4	0.1	44.9	1.1	0.1	0.4	0.0	1.6	0.0	52.6	0.4	0.0	53.0	0.1	0.0	0.3	0.0	0.5	
Exiting Leg Total					1832					15					1426					113	3386

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:00 AM	Lowell Road (Route 3A)					Rena Avenue					Lowell Road (Route 3A)					Green Meadow Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	9	165	3	0	177	9	0	3	0	12	0	212	5	0	217	0	0	4	0	4	410
7:15 AM	11	150	1	1	163	8	0	1	0	9	0	244	2	0	246	0	0	1	0	1	419
7:30 AM	16	211	1	1	229	5	1	2	0	8	0	255	1	0	256	0	0	0	0	0	493
7:45 AM	12	205	2	0	219	1	0	2	0	3	0	240	2	0	242	2	0	2	0	4	468
Total Volume	48	731	7	2	788	23	1	8	0	32	0	951	10	0	961	2	0	7	0	9	1790
% Approach Total	6.1	92.8	0.9	0.3		71.9	3.1	25.0	0.0		0.0	99.0	1.0	0.0		22.2	0.0	77.8	0.0		
PHF	0.750	0.866	0.583	0.500	0.860	0.639	0.250	0.667	0.000	0.667	0.000	0.932	0.500	0.000	0.938	0.250	0.000	0.438	0.000	0.563	0.908
Entering Leg	48	731	7	2	788	23	1	8	0	32	0	951	10	0	961	2	0	7	0	9	1790
Exiting Leg					983					7					741					59	1790
Total					1771					39					1702					68	3580

PDI File #: **250836 A**
Location: **N: Lowell Road (Route 3A) S: Lowell Road (Route 3A)**
Location: **E: Rena Avenue W: Green Meadow Drive**
City, State: **Hudson, NH**
Client: **Chappell/ S. Kelly**
Site Code: **25103**
Count Date: **Thursday, October 30, 2025**
Start Time: **7:00 AM**
End Time: **9:00 AM**

PRECISION DATA INDUSTRIES, LLC
157 Washington Street, Suite 2
Hudson, MA 01749
Office: 508-875-0100 Fax: 508-875-0118

Attachment "E"

Class: **Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)**

	Lowell Road (Route 3A) from North					Rena Avenue from East					Lowell Road (Route 3A) from South					Green Meadow Drive from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	1	4	0	0	5	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	8
7:15 AM	1	5	0	0	6	1	0	0	0	1	0	5	0	0	5	0	0	1	0	1	13
7:30 AM	2	14	0	0	16	1	0	0	0	1	0	10	0	0	10	0	0	1	0	1	28
7:45 AM	0	9	1	0	10	0	0	0	0	0	0	6	0	0	6	0	0	3	0	3	19
Total	4	32	1	0	37	2	0	0	0	2	0	24	0	0	24	0	0	5	0	5	68
8:00 AM	2	7	0	0	9	1	0	0	0	1	0	10	0	0	10	1	0	2	0	3	23
8:15 AM	2	2	1	0	5	1	0	0	0	1	0	6	1	0	7	0	0	3	0	3	16
8:30 AM	2	10	0	0	12	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	15
8:45 AM	3	6	0	0	9	0	0	0	0	0	0	5	0	0	5	0	0	1	0	1	15
Total	9	25	1	0	35	2	0	0	0	2	0	23	1	0	24	1	0	7	0	8	69
Grand Total	13	57	2	0	72	4	0	0	0	4	0	47	1	0	48	1	0	12	0	13	137
Approach %	18.1	79.2	2.8	0.0		100.0	0.0	0.0	0.0		0.0	97.9	2.1	0.0		7.7	0.0	92.3	0.0		
Total %	9.5	41.6	1.5	0.0	52.6	2.9	0.0	0.0	0.0	2.9	0.0	34.3	0.7	0.0	35.0	0.7	0.0	8.8	0.0	9.5	
Exiting Leg Total					63					2					58					14	137
Buses	0	5	1	0	6	2	0	0	0	2	0	6	0	0	6	0	0	0	0	0	14
% Buses	0.0	8.8	50.0	0.0	8.3	50.0	0.0	0.0	0.0	50.0	0.0	12.8	0.0	0.0	12.5	0.0	0.0	0.0	0.0	0.0	10.2
Exiting Leg Total					8					1					5					0	14
Single-Unit Trucks	10	43	1	0	54	2	0	0	0	2	0	33	1	0	34	1	0	11	0	12	102
% Single-Unit	76.9	75.4	50.0	0.0	75.0	50.0	0.0	0.0	0.0	50.0	0.0	70.2	100.0	0.0	70.8	100.0	0.0	91.7	0.0	92.3	74.5
Exiting Leg Total					46					1					44					11	102
Articulated Trucks	3	9	0	0	12	0	0	0	0	0	0	8	0	0	8	0	0	1	0	1	21
% Articulated	23.1	15.8	0.0	0.0	16.7	0.0	0.0	0.0	0.0	0.0	0.0	17.0	0.0	0.0	16.7	0.0	0.0	8.3	0.0	7.7	15.3
Exiting Leg Total					9					0					9					3	21

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:30 AM	Lowell Road (Route 3A) from North					Rena Avenue from East					Lowell Road (Route 3A) from South					Green Meadow Drive from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:30 AM	2	14	0	0	16	1	0	0	0	1	0	10	0	0	10	0	0	1	0	1	28
7:45 AM	0	9	1	0	10	0	0	0	0	0	0	6	0	0	6	0	0	3	0	3	19
8:00 AM	2	7	0	0	9	1	0	0	0	1	0	10	0	0	10	1	0	2	0	3	23
8:15 AM	2	2	1	0	5	1	0	0	0	1	0	6	1	0	7	0	0	3	0	3	16
Total Volume	6	32	2	0	40	3	0	0	0	3	0	32	1	0	33	1	0	9	0	10	86
% Approach Total	15.0	80.0	5.0	0.0		100.0	0.0	0.0	0.0		0.0	97.0	3.0	0.0		10.0	0.0	90.0	0.0		
PHF	0.750	0.571	0.500	0.000	0.625	0.750	0.000	0.000	0.000	0.750	0.000	0.800	0.250	0.000	0.825	0.250	0.000	0.750	0.000	0.833	0.768
Buses	0	2	1	0	3	1	0	0	0	1	0	4	0	0	4	0	0	0	0	0	8
Buses %	0.0	6.3	50.0	0.0	7.5	33.3	0.0	0.0	0.0	33.3	0.0	12.5	0.0	0.0	12.1	0.0	0.0	0.0	0.0	0.0	9.3
Single-Unit Trucks	5	25	1	0	31	2	0	0	0	2	0	24	1	0	25	1	0	8	0	9	67
Single-Unit %	83.3	78.1	50.0	0.0	77.5	66.7	0.0	0.0	0.0	66.7	0.0	75.0	100.0	0.0	75.8	100.0	0.0	88.9	0.0	90.0	77.9
Articulated Trucks	1	5	0	0	6	0	0	0	0	0	0	4	0	0	4	0	0	1	0	1	11
Articulated %	16.7	15.6	0.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	12.5	0.0	0.0	12.1	0.0	0.0	11.1	0.0	10.0	12.8
Buses	0	2	1	0	3	1	0	0	0	1	0	4	0	0	4	0	0	0	0	0	8
Single-Unit Trucks	5	25	1	0	31	2	0	0	0	2	0	24	1	0	25	1	0	8	0	9	67
Articulated Trucks	1	5	0	0	6	0	0	0	0	0	0	4	0	0	4	0	0	1	0	1	11
Total Entering Leg	6	32	2	0	40	3	0	0	0	3	0	32	1	0	33	1	0	9	0	10	86
Buses					5					1					2					0	8
Single-Unit Trucks					34					1					26					6	67
Articulated Trucks					5					0					5					1	11
Total Exiting Leg					44					2					33					7	86

PDI File #:	**250836 A**
Location:	**N: Lowell Road (Route 3A) S: Lowell Road (Route 3A)**
Location:	**E: Rena Avenue W: Green Meadow Drive**
City, State:	**Hudson, NH**
Client:	**Chappell/ S. Kelly**
Site Code:	**25103**
Count Date:	**Thursday, October 30, 2025**
Start Time:	**7:00 AM**
End Time:	**9:00 AM**
Class:	

PRECISION DATA INDUSTRIES, LLC

157 Washington Street, Suite 2
Hudson, MA 01749
Office: 508-875-0100 Fax: 508-875-0118

Attachment "E"

Buses

	Lowell Road (Route 3A)					Rena Avenue					Lowell Road (Route 3A)					Green Meadow Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:15 AM	0	0	0	0	0	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	2
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	2	1	0	3	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	4
Total	0	3	1	0	4	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	7
8:00 AM	0	0	0	0	0	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	3
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
8:30 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:45 AM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
Total	0	2	0	0	2	1	0	0	0	1	0	4	0	0	4	0	0	0	0	0	7
Grand Total	0	5	1	0	6	2	0	0	0	2	0	6	0	0	6	0	0	0	0	0	14
Approach %	0.0	83.3	16.7	0.0		100.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	0.0	35.7	7.1	0.0	42.9	14.3	0.0	0.0	0.0	14.3	0.0	42.9	0.0	0.0	42.9	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total					8					1					5					0	14

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:15 AM	Lowell Road (Route 3A)					Rena Avenue					Lowell Road (Route 3A)					Green Meadow Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:15 AM	0	0	0	0	0	1	0	0	0	1	0	1	0	0	1	0	0	0	0	0	2
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	2	1	0	3	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	4
8:00 AM	0	0	0	0	0	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	3
Total Volume	0	2	1	0	3	2	0	0	0	2	0	4	0	0	4	0	0	0	0	0	9
% Approach Total	0.0	66.7	33.3	0.0		100.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
PHF	0.000	0.250	0.250	0.000	0.250	0.500	0.000	0.000	0.000	0.500	0.000	0.500	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.563
Entering Leg	0	2	1	0	3	2	0	0	0	2	0	4	0	0	4	0	0	0	0	0	9
Exiting Leg					6					1					2					0	9
Total					9					3					6					0	18

PDI File #: **250836 A**
Location: **N: Lowell Road (Route 3A) S: Lowell Road (Route 3A)**
Location: **E: Rena Avenue W: Green Meadow Drive**
City, State: **Hudson, NH**
Client: **Chappell/ S. Kelly**
Site Code: **25103**
Count Date: **Thursday, October 30, 2025**
Start Time: **7:00 AM**
End Time: **9:00 AM**

PRECISION DATA INDUSTRIES, LLC
157 Washington Street, Suite 2
Hudson, MA 01749
Office: 508-875-0100 Fax: 508-875-0118

Attachment "E"

Class: **Single-Unit Trucks**

	Lowell Road (Route 3A)					Rena Avenue					Lowell Road (Route 3A)					Green Meadow Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	1	2	0	0	3	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	4
7:15 AM	0	5	0	0	5	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	8
7:30 AM	1	9	0	0	10	1	0	0	0	1	0	9	0	0	9	0	0	0	0	0	20
7:45 AM	0	7	0	0	7	0	0	0	0	0	0	3	0	0	3	0	0	3	0	3	13
Total	2	23	0	0	25	1	0	0	0	1	0	15	0	0	15	0	0	4	0	4	45
8:00 AM	2	7	0	0	9	0	0	0	0	0	0	8	0	0	8	1	0	2	0	3	20
8:15 AM	2	2	1	0	5	1	0	0	0	1	0	4	1	0	5	0	0	3	0	3	14
8:30 AM	2	7	0	0	9	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	12
8:45 AM	2	4	0	0	6	0	0	0	0	0	0	4	0	0	4	0	0	1	0	1	11
Total	8	20	1	0	29	1	0	0	0	1	0	18	1	0	19	1	0	7	0	8	57
Grand Total	10	43	1	0	54	2	0	0	0	2	0	33	1	0	34	1	0	11	0	12	102
Approach %	18.5	79.6	1.9	0.0		100.0	0.0	0.0	0.0		0.0	97.1	2.9	0.0		8.3	0.0	91.7	0.0		
Total %	9.8	42.2	1.0	0.0	52.9	2.0	0.0	0.0	0.0	2.0	0.0	32.4	1.0	0.0	33.3	1.0	0.0	10.8	0.0	11.8	
Exiting Leg Total					46					1					44					11	102

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:30 AM	Lowell Road (Route 3A)					Rena Avenue					Lowell Road (Route 3A)					Green Meadow Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:30 AM	1	9	0	0	10	1	0	0	0	1	0	9	0	0	9	0	0	0	0	0	20
7:45 AM	0	7	0	0	7	0	0	0	0	0	0	3	0	0	3	0	0	3	0	3	13
8:00 AM	2	7	0	0	9	0	0	0	0	0	0	8	0	0	8	1	0	2	0	3	20
8:15 AM	2	2	1	0	5	1	0	0	0	1	0	4	1	0	5	0	0	3	0	3	14
Total Volume	5	25	1	0	31	2	0	0	0	2	0	24	1	0	25	1	0	8	0	9	67
% Approach Total	16.1	80.6	3.2	0.0		100.0	0.0	0.0	0.0		0.0	96.0	4.0	0.0		11.1	0.0	88.9	0.0		
PHF	0.625	0.694	0.250	0.000	0.775	0.500	0.000	0.000	0.000	0.500	0.000	0.667	0.250	0.000	0.694	0.250	0.000	0.667	0.000	0.750	0.838
Entering Leg	5	25	1	0	31	2	0	0	0	2	0	24	1	0	25	1	0	8	0	9	67
Exiting Leg					34					1					26					6	67
Total					65					3					51					15	134

Attachment "E"

PDI File #: **250836 A**
Location: **N: Lowell Road (Route 3A) S: Lowell Road (Route 3A)**
Location: **E: Rena Avenue W: Green Meadow Drive**
City, State: **Hudson, NH**
Client: **Chappell/ S. Kelly**
Site Code: **25103**
Count Date: **Thursday, October 30, 2025**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class: **Articulated Trucks**

PRECISION DATA INDUSTRIES, LLC
157 Washington Street, Suite 2
Hudson, MA 01749
Office: 508-875-0100 Fax: 508-875-0118

Articulated Trucks

	Lowell Road (Route 3A)					Rena Avenue					Lowell Road (Route 3A)					Green Meadow Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	3
7:15 AM	1	0	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	3
7:30 AM	1	5	0	0	6	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	8
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
Total	2	6	0	0	8	0	0	0	0	0	0	7	0	0	7	0	0	1	0	1	16
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
8:30 AM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
8:45 AM	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	1	3	0	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
Grand Total	3	9	0	0	12	0	0	0	0	0	0	8	0	0	8	0	0	1	0	1	21
Approach %	25.0	75.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	100.0	0.0		
Total %	14.3	42.9	0.0	0.0	57.1	0.0	0.0	0.0	0.0	0.0	0.0	38.1	0.0	0.0	38.1	0.0	0.0	4.8	0.0	4.8	
Exiting Leg Total					9					0					9					3	21

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:00 AM

	Lowell Road (Route 3A)					Rena Avenue					Lowell Road (Route 3A)					Green Meadow Drive					
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Total
7:00 AM	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	3
7:15 AM	1	0	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	3
7:30 AM	1	5	0	0	6	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	8
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
Total Volume	2	6	0	0	8	0	0	0	0	0	0	7	0	0	7	0	0	1	0	1	16
% Approach Total	25.0	75.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	100.0	0.0		
PHF	0.500	0.300	0.000	0.000	0.333	0.000	0.000	0.000	0.000	0.000	0.000	0.875	0.000	0.000	0.875	0.000	0.000	0.250	0.000	0.250	0.500
Entering Leg	2	6	0	0	8	0	0	0	0	0	0	7	0	0	7	0	0	1	0	1	16
Exiting Leg					8					0					6					2	16
Total					16					0					13					3	32

PDI File #: **250836 A**
Location: **N: Lowell Road (Route 3A) S: Lowell Road (Route 3A)**
Location: **E: Rena Avenue W: Green Meadow Drive**
City, State: **Hudson, NH**
Client: **Chappell/ S. Kelly**
Site Code: **25103**
Count Date: **Thursday, October 30, 2025**
Start Time: **7:00 AM**
End Time: **9:00 AM**
Class:

PRECISION DATA INDUSTRIES, LLC
157 Washington Street, Suite 2
Hudson, MA 01749
Office: 508-875-0100 Fax: 508-875-0118

Attachment "E"

Bicycles (on Roadway and Crosswalks)

	Lowell Road (Route 3A)							Rena Avenue							Lowell Road (Route 3A)							Green Meadow Drive							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Approach %	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		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 %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total							0							0							0							0	0

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:00 AM	Lowell Road (Route 3A)							Rena Avenue							Lowell Road (Route 3A)							Green Meadow Drive							
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	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 Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exiting Leg							0							0							0							0	0
Total							0							0							0							0	0

PDI File #:	**250836 A**
Location:	**N: Lowell Road (Route 3A) S: Lowell Road (Route 3A)**
Location:	**E: Rena Avenue W: Green Meadow Drive**
City, State:	**Hudson, NH**
Client:	**Chappell/ S. Kelly**
Site Code:	**25103**
Count Date:	**Thursday, October 30, 2025**
Start Time:	**7:00 AM**
End Time:	**9:00 AM**
Class:	

PRECISION DATA INDUSTRIES, LLC
157 Washington Street, Suite 2
Hudson, MA 01749
Office: 508-875-0100 Fax: 508-875-0118

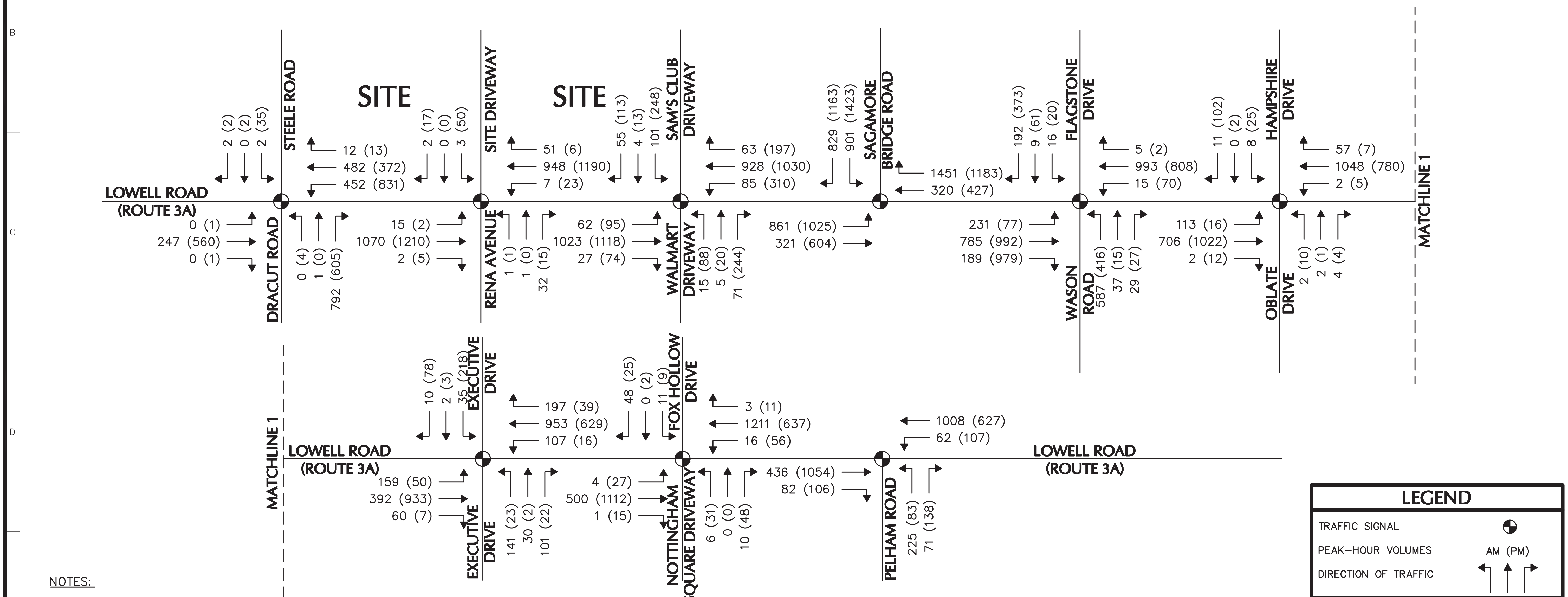
Attachment "E"

Pedestrians

	Lowell Road (Route 3A) from North							Rena Avenue from East							Lowell Road (Route 3A) from South							Green Meadow Drive from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Approach %	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 %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Exiting Leg Total							0							0							0							0	0

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:00 AM	Lowell Road (Route 3A) from North							Rena Avenue from East							Lowell Road (Route 3A) from South							Green Meadow Drive from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	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 Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exiting Leg							0							0							0							0	0
Total							0							0							0							0	0

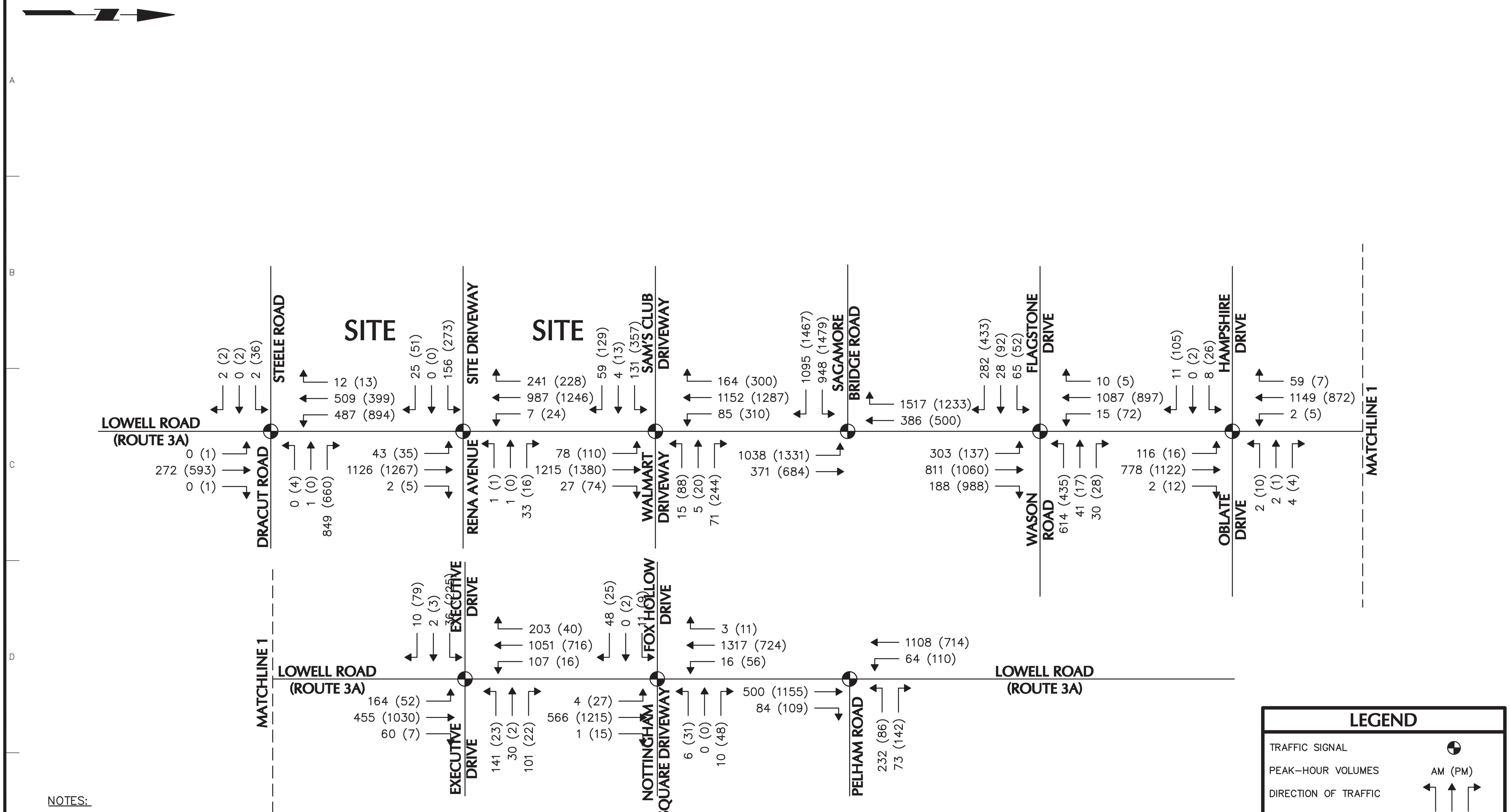


NOTES:

1. WEEKDAY MORNING AND EVENING PEAK-HOUR TRAFFIC VOLUMES ARE BASED ON TRAFFIC VOLUMES OBSERVED ON 10/08/2019 BY ACCURATE COUNTS.
2. MORNING PEAK-HOUR: 7:15 A.M. – 8:15 A.M.
3. EVENING PEAK-HOUR: 4:30 P.M. – 5:30 P.M.

LANGAN Langan Engineering and Environmental Services, Inc. www.langan.com	Project HUDSON LOGISTICS CENTER HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE	Drawing Title 2019 EXISTING PEAK-HOUR TRAFFIC VOLUMES	Project No. 151010101 Date 03/04/2020 Drawn By CJM Checked By LAM	Drawing No. FIG. 3 Sheet 3 of 17

Attachment "E"

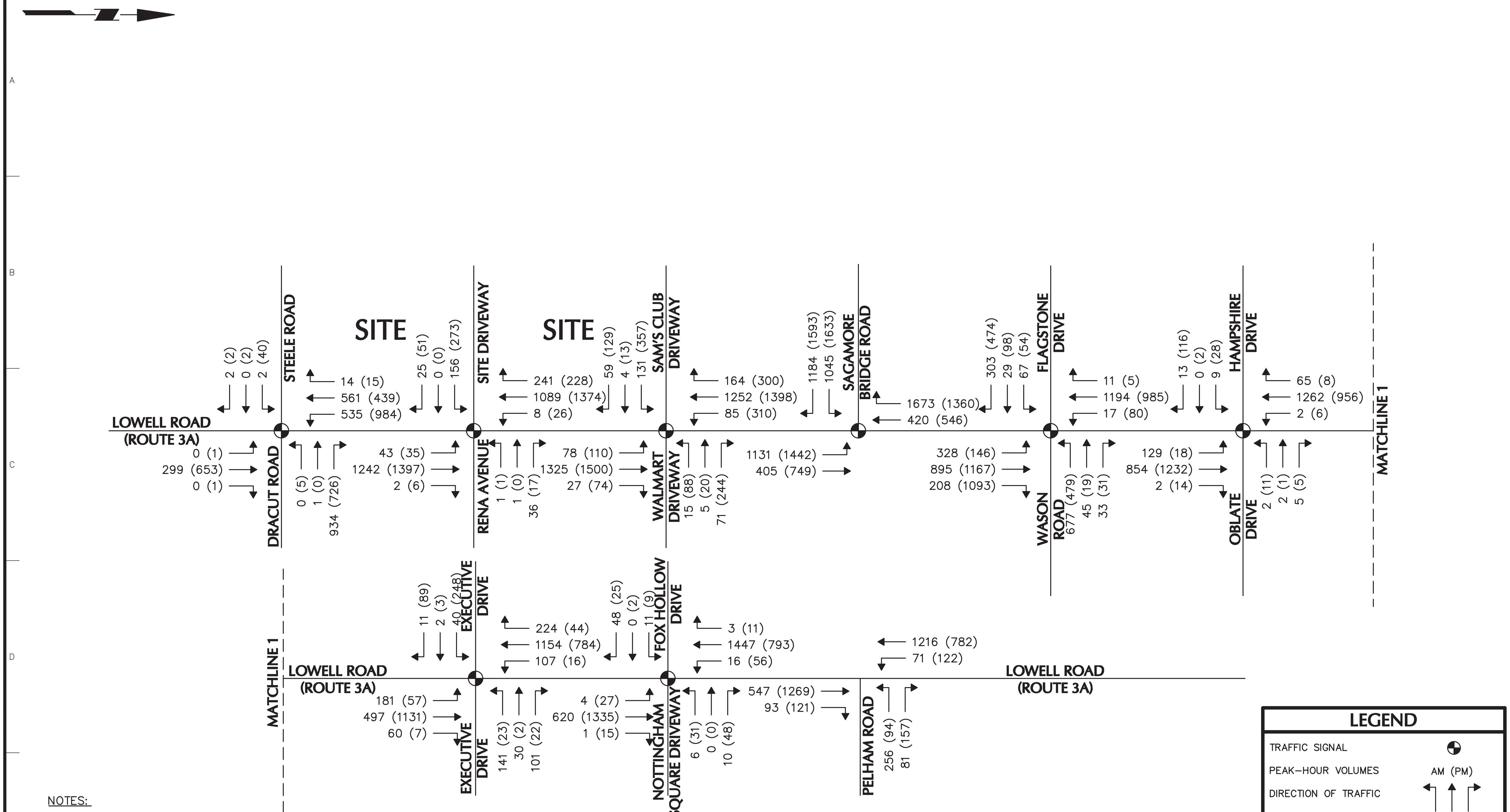


NOTES:

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.

LANGAN Langan Engineering and Environmental Services, Inc. www.langan.com	Project HUDSON LOGISTICS CENTER HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE	Drawing Title 2022 BUILD PEAK-HOUR TRAFFIC VOLUMES	Project No. 151010101 Date 03/04/2020 Drawn By CJM Checked By LAM	Drawing No. FIG. 8 Sheet 11 of 17

Attachment "E"



NOTES:

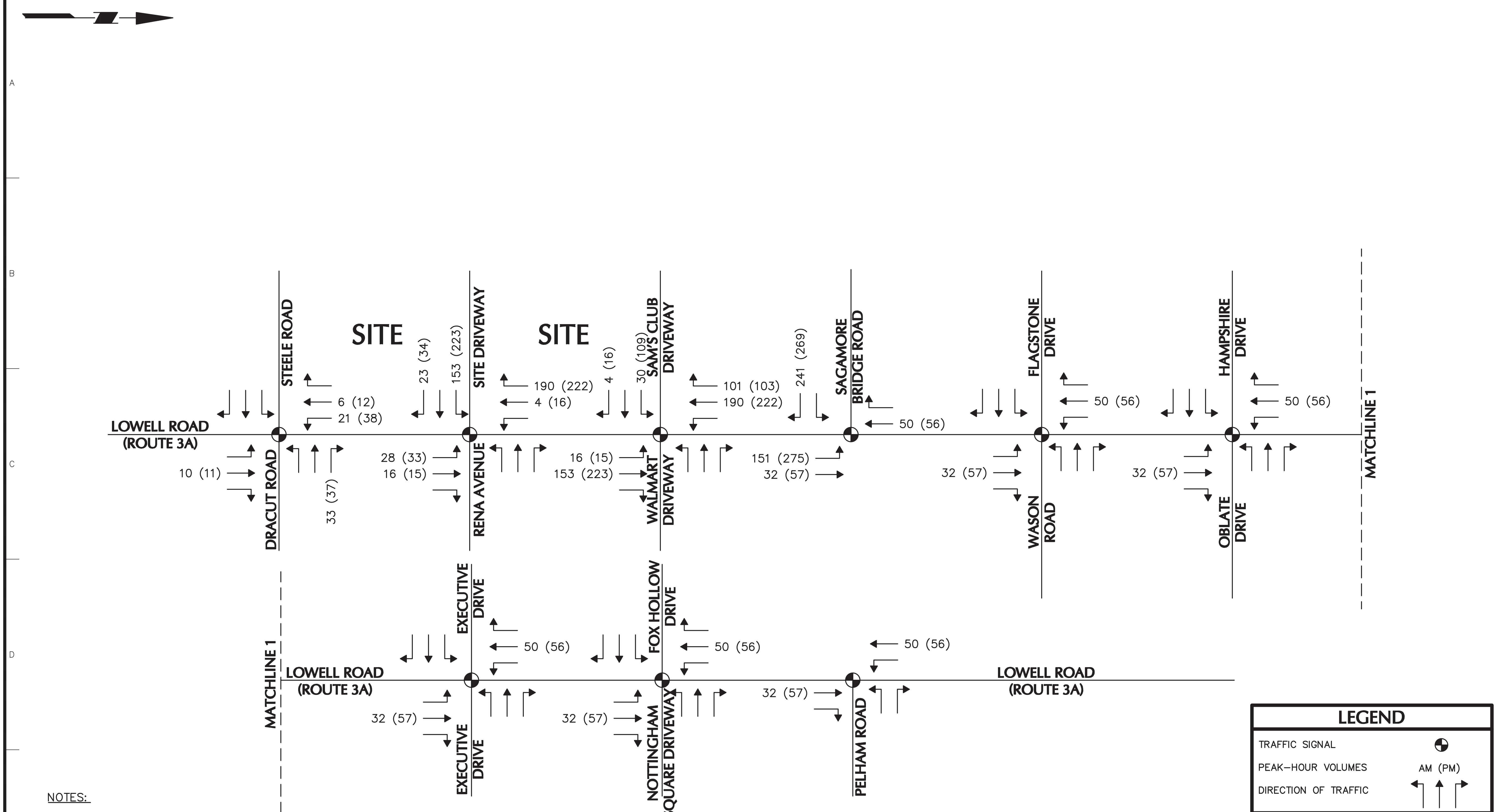
1. WEEKDAY MORNING AND EVENING PEAK-HOUR TRAFFIC VOLUMES ARE BASED ON THE COMBINATION OF TRAFFIC VOLUMES FROM FIGURE 5 AND FIGURE 7 OF THIS REPORT.
2. MORNING PEAK-HOUR: 7:15 A.M. – 8:15 A.M.
3. EVENING PEAK-HOUR: 4:30 P.M. – 5:30 P.M.

LANGAN Langan Engineering and Environmental Services, Inc. www.langan.com	Project HUDSON LOGISTICS CENTER HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE	Drawing Title 2032 BUILD PEAK-HOUR TRAFFIC VOLUMES	Project No. 151010101 Date 03/04/2020 Drawn By CJM Checked By LAM	Drawing No. FIG. 9 Sheet 12 of 17

Date: 6/19/2020 Time: 16:05 User: cmclean Style Table: Langan.stb Layout: FIG. 9 Document Code: 151010101-0202-KT101-0109

Background Growth Information

Attachment "E"



NOTES:

1. WEEKDAY TRIPS ARE ASSIGNED BASED ON THE PERCENTAGES SHOWN IN FIGURE 6 OF THIS REPORT AND THE TRIP GENERATION TABLE IN 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.

LANGAN
Langan Engineering and Environmental Services, Inc.
www.langan.com

Project: HUDSON LOGISTICS CENTER
HUDSON
HILLSBOROUGH COUNTY NEW HAMPSHIRE

Drawing Title: TRIP ASSIGNMENT

Project No. 151010101
Date 03/04/2020
Drawn By CJM
Checked By LAM

Drawing No. FIG. 7

Sheet 10 of 17

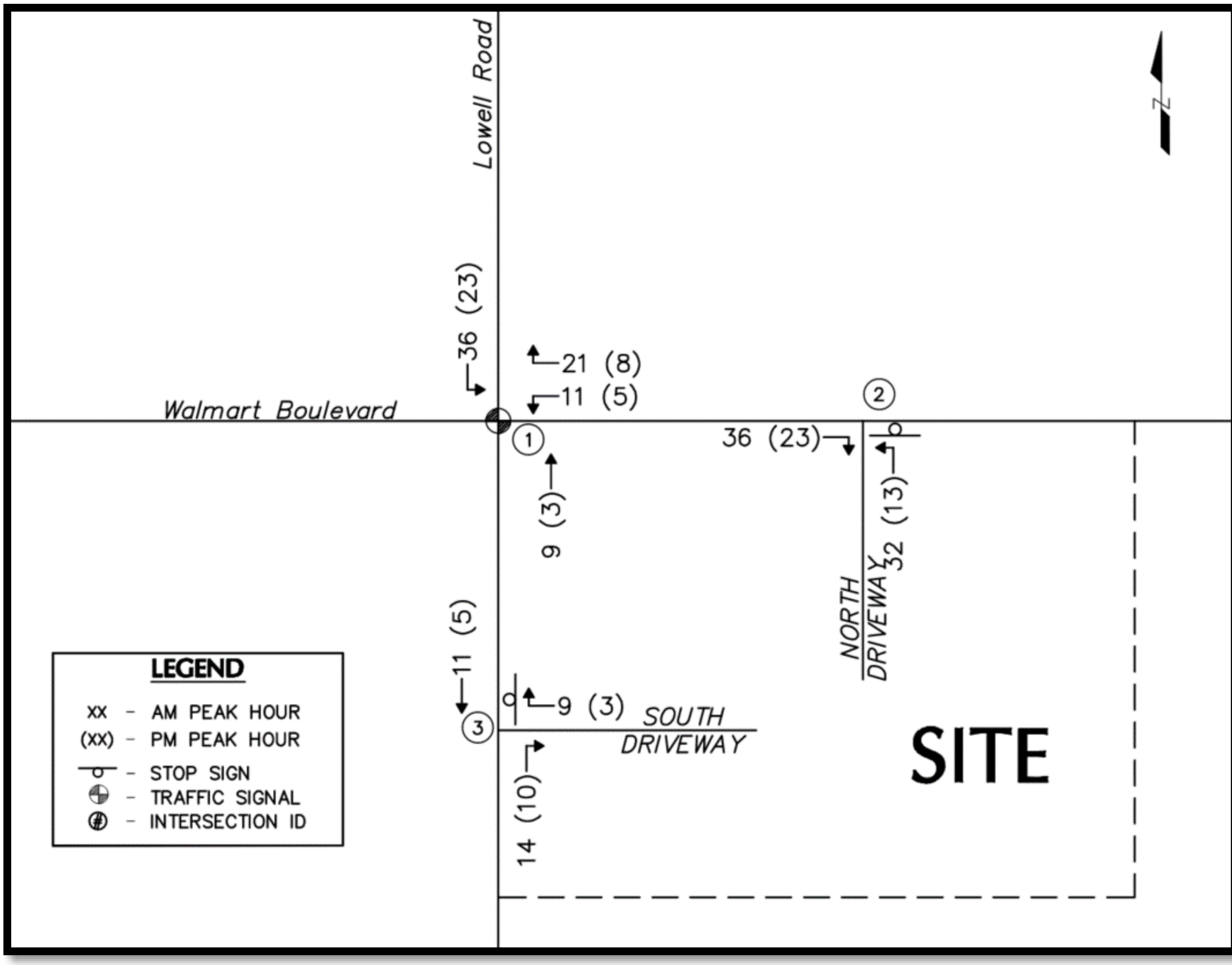


Figure 6: Project Traffic Assignment

Trip Generation Calculations

Attachment "E"

Trip Generation Estimate
Proposed Restaurant Depot
1308 Buckley Road, Town of Salina, NY

Historical Trip Generation data provided by Restaurant Depot - Collected 2018

		Total Trips Generated		Trip Generation Rate per 1,000 SF	
Store Location	**Store Size (SF)**	**Morning Peak Hour**	**Evening Peak Hour**	**Morning Peak Hour**	**Evening Peak Hour**
Chicoppe, MA	60,000	44	62	0.73	1.03
Bethlehem, PA	61,000	42	58	0.69	0.95
Andover, MA	78,000	50	70	0.64	0.90
Langhorne, PA	66,922	140	64	2.09	0.96
Avon, MA	88,000	90	78	1.02	0.89
Aveage Value	**70784**	**73**	**66**	**1.04**	**0.94**

Proposed Restaurant Depot **45,000 SF**

Morning Peak Hour - 1.04 x 45 = 47 Total Trips **29 Entering*** **18 Exiting***

* - Assume 62% Enter / 38% Exit based on Shopping Center Directional Split

Evening Peak Hour - 0.94 x 45 = 42 Total Trips **20 Entering**** **22 Exiting****

** - Assume 48% Enter / 52% Exit based on Shopping Center Directional Split

Assume all trips are new trips

Capacity Analysis Worksheets

Lane Group	EBT	EBR	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	3	2	37	16	1165	8	1085
v/c Ratio	0.02	0.01	0.20	0.09	0.38	0.05	0.68
Control Delay (s/veh)	28.3	0.0	14.8	29.1	4.0	29.3	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	28.3	0.0	14.8	29.1	4.0	29.3	10.6
Queue Length 50th (ft)	1	0	1	4	0	2	0
Queue Length 95th (ft)	9	0	27	25	211	16	#779
Internal Link Dist (ft)	662		748		858		957
Turn Bay Length (ft)				300		375	
Base Capacity (vph)	440	444	407	460	3045	377	1587
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	0.01	0.00	0.09	0.03	0.38	0.02	0.68

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	0	2	1	1	32	15	1070	2	7	948	51
Future Volume (veh/h)	3	0	2	1	1	32	15	1070	2	7	948	51
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	3	0	2	1	1	35	16	1163	2	8	1030	55
Adj No. of Lanes	0	1	1	0	1	0	1	2	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	176	0	65	58	2	61	34	2516	4	18	1201	64
Arrive On Green	0.04	0.00	0.04	0.04	0.04	0.04	0.02	0.69	0.69	0.01	0.69	0.69
Sat Flow, veh/h	1594	0	1583	35	51	1501	1774	3625	6	1774	1753	94
Grp Volume(v), veh/h	3	0	2	37	0	0	16	568	597	8	0	1085
Grp Sat Flow(s),veh/h/ln	1594	0	1583	1587	0	0	1774	1770	1862	1774	0	1846
Q Serve(g_s), s	0.0	0.0	0.1	1.0	0.0	0.0	0.6	9.4	9.4	0.3	0.0	29.1
Cycle Q Clear(g_c), s	0.1	0.0	0.1	1.5	0.0	0.0	0.6	9.4	9.4	0.3	0.0	29.1
Prop In Lane	1.00		1.00	0.03		0.95	1.00		0.00	1.00		0.05
Lane Grp Cap(c), veh/h	176	0	65	122	0	0	34	1228	1292	18	0	1265
V/C Ratio(X)	0.02	0.00	0.03	0.30	0.00	0.00	0.47	0.46	0.46	0.44	0.00	0.86
Avail Cap(c_a), veh/h	437	0	366	424	0	0	452	1228	1292	369	0	1265
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	29.9	0.0	29.9	30.5	0.0	0.0	31.5	4.5	4.5	31.9	0.0	7.8
Incr Delay (d2), s/veh	0.0	0.0	0.2	1.4	0.0	0.0	9.6	1.3	1.2	15.4	0.0	7.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.0	0.7	0.0	0.0	0.4	4.8	5.1	0.2	0.0	17.2
LnGrp Delay(d), s/veh	29.9	0.0	30.0	31.9	0.0	0.0	41.0	5.7	5.7	47.3	0.0	15.4
LnGrp LOS	C		C	C			D	A	A	D		B
Approach Vol, veh/h		5			37			1181			1093	
Approach Delay, s/veh		30.0			31.9			6.2			15.7	
Approach LOS		C			C			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.2	51.0		8.7	5.8	50.4		8.7
Change Period (Y+Rc), s	4.5	6.0		6.0	4.5	6.0		6.0
Max Green Setting (Gmax), s	13.5	45.0		15.0	16.5	42.0		15.0
Max Q Clear Time (g_c+I1), s	2.3	11.4		2.1	2.6	31.1		3.5
Green Ext Time (p_c), s	0.0	9.7		0.0	0.0	6.4		0.1

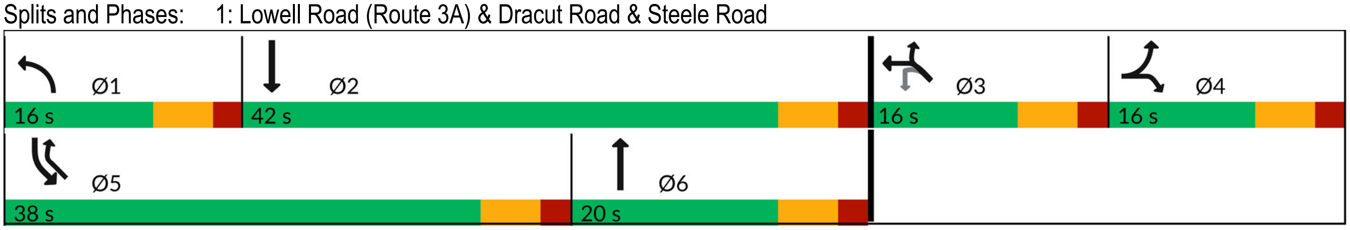
Intersection Summary	
HCM 2010 Ctrl Delay, s/veh	11.1
HCM 2010 LOS	B

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	2	0	2	0	247	0	452	482	12	1	792
Future Volume (vph)	2	0	2	0	247	0	452	482	12	1	792
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		250		300	775		0	200	0
Storage Lanes	1	1		1		0	1		0	1	1
Taper Length (ft)	25			25			25			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)	1770	1583	0	1863	3539	0	1770	3525	0	1770	1583
Flt Permitted	0.950						0.950			0.950	
Satd. Flow (perm)	1770	1583	0	1863	3539	0	1770	3525	0	1770	1583
Right Turn on Red			Yes			Yes			Yes		Yes
Satd. Flow (RTOR)		554						3			484
Link Speed (mph)	30				30			30		30	
Link Distance (ft)	1269				1792			1735		2109	
Travel Time (s)	28.8				40.7			39.4		47.9	
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
Adj. Flow (vph)	3	0	3	0	309	0	491	524	13	1	921
Shared Lane Traffic (%)											
Lane Group Flow (vph)	3	3	0	0	309	0	491	537	0	1	921
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Right
Median Width(ft)	12				12			12		12	
Link Offset(ft)	0				0			0		0	
Crosswalk Width(ft)	16				16			16		16	
Two way Left Turn Lane											
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	9
Number of Detectors	1	1		1	2		1	2		1	1
Detector Template	Left	Right		Left	Thru		Left	Thru		Left	Right
Leading Detector (ft)	20	20		20	100		20	100		20	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0
Detector 1 Size(ft)	20	20		20	6		20	6		20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel											
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 2 Position(ft)					94			94			
Detector 2 Size(ft)					6			6			
Detector 2 Type					Cl+Ex			Cl+Ex			
Detector 2 Channel											
Detector 2 Extend (s)					0.0			0.0			
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Prot	pt+ov
Protected Phases	4	4		1	6		5	2		3	3 5
Permitted Phases		4									

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Detector Phase	4	4		1	6		5	2		3	3 5
Switch Phase											
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		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	3.0		3.0	3.0		3.0	
Recall Mode	None	None		None	Max		None	Max		None	
Act Effct Green (s)	5.8	5.8			14.2		26.9	47.2		10.2	42.1
Actuated g/C Ratio	0.08	0.08			0.20		0.38	0.66		0.14	0.59
v/c Ratio	0.02	0.00			0.44		0.74	0.23		0.00	0.82
Control Delay (s/veh)	35.0	0.0			29.5		27.5	5.5		31.0	13.2
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0
Total Delay (s/veh)	35.0	0.0			29.5		27.5	5.5		31.0	13.2
LOS	C	A			C		C	A		C	B
Approach Delay (s/veh)	17.5				29.5			16.0		13.2	
Approach LOS	B				C			B		B	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 71.6	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay (s/veh): 16.7	Intersection LOS: B
Intersection Capacity Utilization 65.9%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	3	3	309	491	537	1	921
v/c Ratio	0.02	0.00	0.44	0.74	0.23	0.00	0.82
Control Delay (s/veh)	35.0	0.0	29.5	27.5	5.5	31.0	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	35.0	0.0	29.5	27.5	5.5	31.0	13.2
Queue Length 50th (ft)	1	0	66	173	37	0	99
Queue Length 95th (ft)	9	0	110	353	92	5	#286
Internal Link Dist (ft)	1189		1712		1655	2029	
Turn Bay Length (ft)		50		775		200	
Base Capacity (vph)	251	700	703	803	2325	251	1217
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	0.01	0.00	0.44	0.61	0.23	0.00	0.76

Intersection Summary

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

Lane Group	EBT	EBR	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	54	18	17	2	1320	25	1300
v/c Ratio	0.37	0.08	0.07	0.02	0.51	0.17	0.91
Control Delay (s/veh)	42.6	0.7	0.6	39.5	8.1	39.9	22.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	42.6	0.7	0.6	39.5	8.1	39.9	22.8
Queue Length 50th (ft)	24	0	0	1	110	11	428
Queue Length 95th (ft)	65	0	0	8	306	38	#1134
Internal Link Dist (ft)	662		748		858		957
Turn Bay Length (ft)				300		375	
Base Capacity (vph)	448	556	558	493	2607	493	1431
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	0.12	0.03	0.03	0.00	0.51	0.05	0.91

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	0	17	1	0	15	2	1210	5	23	1190	6
Future Volume (veh/h)	50	0	17	1	0	15	2	1210	5	23	1190	6
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	54	0	18	1	0	16	2	1315	5	25	1293	7
Adj No. of Lanes	0	1	1	0	1	0	1	2	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	180	0	87	51	2	75	5	2554	10	48	1352	7
Arrive On Green	0.05	0.00	0.05	0.05	0.00	0.05	0.00	0.71	0.71	0.03	0.73	0.73
Sat Flow, veh/h	1599	0	1583	42	43	1366	1774	3616	14	1774	1851	10
Grp Volume(v), veh/h	54	0	18	17	0	0	2	643	677	25	0	1300
Grp Sat Flow(s),veh/h/ln	1599	0	1583	1452	0	0	1774	1770	1860	1774	0	1861
Q Serve(g_s), s	0.0	0.0	0.8	0.0	0.0	0.0	0.1	13.1	13.1	1.1	0.0	48.6
Cycle Q Clear(g_c), s	2.3	0.0	0.8	2.3	0.0	0.0	0.1	13.1	13.1	1.1	0.0	48.6
Prop In Lane	1.00		1.00	0.06		0.94	1.00		0.01	1.00		0.01
Lane Grp Cap(c), veh/h	180	0	87	129	0	0	5	1250	1314	48	0	1359
V/C Ratio(X)	0.30	0.00	0.21	0.13	0.00	0.00	0.41	0.51	0.51	0.53	0.00	0.96
Avail Cap(c_a), veh/h	569	0	529	567	0	0	513	1250	1314	513	0	1359
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	35.9	0.0	35.2	35.2	0.0	0.0	38.8	5.3	5.3	37.4	0.0	9.4
Incr Delay (d2), s/veh	0.9	0.0	1.2	0.5	0.0	0.0	48.3	1.5	1.4	8.7	0.0	16.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	0.4	0.4	0.0	0.0	0.1	6.8	7.1	0.6	0.0	30.2
LnGrp Delay(d), s/veh	36.8	0.0	36.3	35.6	0.0	0.0	87.0	6.8	6.7	46.1	0.0	25.4
LnGrp LOS	D		D	D			F	A	A	D		C
Approach Vol, veh/h		72			17			1322			1325	
Approach Delay, s/veh		36.7			35.6			6.9			25.7	
Approach LOS		D			D			A			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.6	61.0		10.3	4.7	62.9		10.3
Change Period (Y+Rc), s	4.5	6.0		6.0	4.5	6.0		6.0
Max Green Setting (Gmax), s	22.5	55.0		26.0	22.5	55.0		26.0
Max Q Clear Time (g_c+I1), s	3.1	15.1		4.3	2.1	50.6		4.3
Green Ext Time (p_c), s	0.0	12.4		0.3	0.0	3.6		0.0

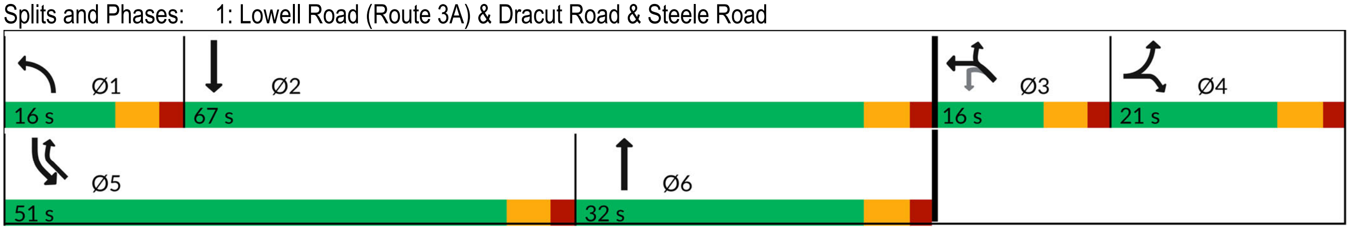
Intersection Summary	
HCM 2010 Ctrl Delay, s/veh	17.0
HCM 2010 LOS	B

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Traffic Volume (vph)	35	2	2	1	560	1	831	372	13	4	0	605
Future Volume (vph)	35	2	2	1	560	1	831	372	13	4	0	605
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		250		300	775		0		200	0
Storage Lanes	1	1		1		0	1		0		1	1
Taper Length (ft)	25			25			25				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)	1770	1583	0	1770	3539	0	1770	3522	0	0	1770	1583
Flt Permitted	0.950			0.950			0.950				0.400	
Satd. Flow (perm)	1770	1583	0	1770	3539	0	1770	3522	0	0	745	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		191						4				269
Link Speed (mph)	30				30			30			30	
Link Distance (ft)	1269				1792			1735			2109	
Travel Time (s)	28.8				40.7			39.4			47.9	
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
Adj. Flow (vph)	44	3	3	1	615	1	923	413	14	4	0	665
Shared Lane Traffic (%)												
Lane Group Flow (vph)	44	6	0	1	616	0	923	427	0	0	4	665
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12				12			12			12	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16				16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	15	9
Number of Detectors	1	1		1	2		1	2			1	1
Detector Template	Left	Right		Left	Thru		Left	Thru			Left	Right
Leading Detector (ft)	20	20		20	100		20	100			20	20
Trailing Detector (ft)	0	0		0	0		0	0			0	0
Detector 1 Position(ft)	0	0		0	0		0	0			0	0
Detector 1 Size(ft)	20	20		20	6		20	6			20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 2 Position(ft)					94			94				
Detector 2 Size(ft)					6			6				
Detector 2 Type					Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Perm	Prot	pt+ov
Protected Phases	4	4		1	6		5	2			3	3 5
Permitted Phases		4								3		

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Detector Phase	4	4		1	6		5	2		3	3	3 5
Switch Phase												
Minimum Initial (s)	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	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	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	Max		None	Max		None	None	
Act Effct Green (s)	8.2	8.2		5.7	26.1		45.2	75.0			10.0	56.5
Actuated g/C Ratio	0.07	0.07		0.05	0.24		0.41	0.68			0.09	0.51
v/c Ratio	0.34	0.02		0.01	0.74		1.28	0.18			0.06	0.71
Control Delay (s/veh)	56.8	0.2		52.0	46.4		168.2	8.1			50.8	15.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay (s/veh)	56.8	0.2		52.0	46.4		168.2	8.1			50.8	15.0
LOS	E	A		D	D		F	A			D	B
Approach Delay (s/veh)	50.0				46.4			117.5			15.2	
Approach LOS	D				D			F			B	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 111	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.28	
Intersection Signal Delay (s/veh): 74.5	Intersection LOS: E
Intersection Capacity Utilization 89.9%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBL	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	44	6	1	616	923	427	4	665
v/c Ratio	0.34	0.02	0.01	0.74	1.28	0.18	0.06	0.71
Control Delay (s/veh)	56.8	0.2	52.0	46.4	168.2	8.1	50.8	15.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	56.8	0.2	52.0	46.4	168.2	8.1	50.8	15.0
Queue Length 50th (ft)	32	0	1	224	~881	54	3	135
Queue Length 95th (ft)	62	0	7	302	#1171	110	15	299
Internal Link Dist (ft)	1189			1712		1655	2029	
Turn Bay Length (ft)		50	250		775		200	
Base Capacity (vph)	240	379	160	831	720	2380	67	938
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	0.18	0.02	0.01	0.74	1.28	0.18	0.06	0.71

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	170	27	41	47	1241	8	1085	262
v/c Ratio	0.57	0.05	0.28	0.26	0.53	0.05	0.52	0.25
Control Delay (s/veh)	44.2	0.2	18.8	36.5	9.0	35.9	12.5	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	44.2	0.2	18.8	36.5	9.0	35.9	12.5	2.3
Queue Length 50th (ft)	43	0	1	22	146	4	188	0
Queue Length 95th (ft)	#93	0	32	54	294	17	267	36
Internal Link Dist (ft)		662	748		858		957	
Turn Bay Length (ft)				300		375		
Base Capacity (vph)	298	593	148	433	2326	384	2078	1037
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	0.57	0.05	0.28	0.11	0.53	0.02	0.52	0.25

Intersection Summary

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

Attachment "E"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	156	0	25	1	1	36	43	1140	2	7	998	241
Future Volume (veh/h)	156	0	25	1	1	36	43	1140	2	7	998	241
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	170	0	27	1	1	39	47	1239	2	8	1085	262
Adj No. of Lanes	2	1	0	0	1	0	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	251	0	292	51	3	77	74	2115	3	18	1953	874
Arrive On Green	0.07	0.00	0.18	0.05	0.05	0.05	0.04	0.58	0.58	0.01	0.55	0.55
Sat Flow, veh/h	3442	0	1583	23	54	1511	1774	3625	6	1774	3539	1583
Grp Volume(v), veh/h	170	0	27	41	0	0	47	605	636	8	1085	262
Grp Sat Flow(s),veh/h/ln	1721	0	1583	1588	0	0	1774	1770	1862	1774	1770	1583
Q Serve(g_s), s	3.6	0.0	1.1	0.4	0.0	0.0	1.9	16.1	16.1	0.3	14.7	6.6
Cycle Q Clear(g_c), s	3.6	0.0	1.1	1.9	0.0	0.0	1.9	16.1	16.1	0.3	14.7	6.6
Prop In Lane	1.00		1.00	0.02		0.95	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	251	0	292	130	0	0	74	1032	1086	18	1953	874
V/C Ratio(X)	0.68	0.00	0.09	0.31	0.00	0.00	0.63	0.59	0.59	0.44	0.56	0.30
Avail Cap(c_a), veh/h	255	0	320	156	0	0	418	1032	1086	370	1953	874
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.6	0.0	25.1	34.4	0.0	0.0	35.0	9.8	9.8	36.6	10.8	8.9
Incr Delay (d2), s/veh	6.9	0.0	0.1	1.4	0.0	0.0	8.6	2.4	2.3	15.8	1.1	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	0.5	0.9	0.0	0.0	1.1	8.4	8.8	0.2	7.4	3.1
LnGrp Delay(d), s/veh	40.5	0.0	25.3	35.7	0.0	0.0	43.7	12.2	12.1	52.4	11.9	9.8
LnGrp LOS	D		C	D			D	B	B	D	B	A
Approach Vol, veh/h		197			41			1288			1355	
Approach Delay, s/veh		38.4			35.7			13.3			11.7	
Approach LOS		D			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.3	49.3		19.7	7.6	47.0	9.9	9.8
Change Period (Y+Rc), s	4.5	6.0		6.0	4.5	6.0	4.5	6.0
Max Green Setting (Gmax), s	15.5	43.0		15.0	17.5	41.0	5.5	5.0
Max Q Clear Time (g_c+I1), s	2.3	18.1		3.1	3.9	16.7	5.6	3.9
Green Ext Time (p_c), s	0.0	9.6		0.0	0.1	9.9	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay, s/veh	14.6
HCM 2010 LOS	B

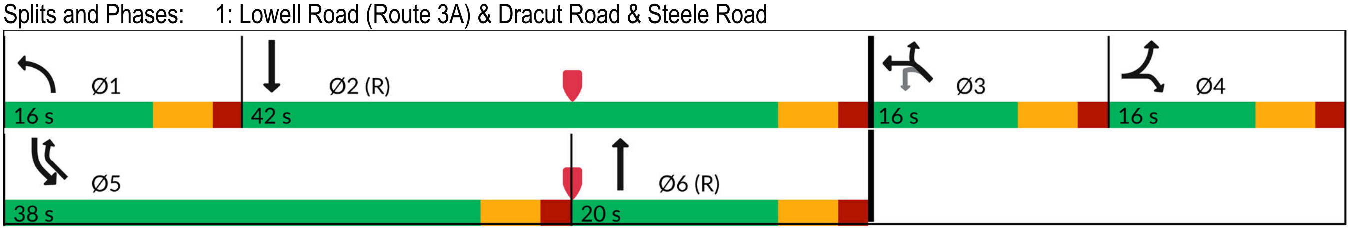
Attachment "E"

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	2	0	2	0	277	0	492	515	12	1	858
Future Volume (vph)	2	0	2	0	277	0	492	515	12	1	858
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		250		300	775		0	200	0
Storage Lanes	1	1		1		0	2		0	1	1
Taper Length (ft)	25			25			25			25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00
Frt		0.850						0.997			0.850
Flt Protected	0.950						0.950			0.950	
Satd. Flow (prot)	1770	1583	0	1863	3539	0	3433	1857	0	1770	1583
Flt Permitted	0.950						0.950			0.950	
Satd. Flow (perm)	1770	1583	0	1863	3539	0	3433	1857	0	1770	1583
Right Turn on Red			Yes			Yes			Yes		Yes
Satd. Flow (RTOR)		540						2			472
Link Speed (mph)	30				30			30		30	
Link Distance (ft)	1269				1792			1735		2109	
Travel Time (s)	28.8				40.7			39.4		47.9	
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
Adj. Flow (vph)	3	0	3	0	346	0	535	560	13	1	998
Shared Lane Traffic (%)											
Lane Group Flow (vph)	3	3	0	0	346	0	535	573	0	1	998
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Right
Median Width(ft)	12				24			24		12	
Link Offset(ft)	0				0			0		0	
Crosswalk Width(ft)	16				16			16		16	
Two way Left Turn Lane											
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	9
Number of Detectors	1	1		1	2		1	2		1	1
Detector Template	Left	Right		Left	Thru		Left	Thru		Left	Right
Leading Detector (ft)	20	20		20	100		20	100		20	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0
Detector 1 Size(ft)	20	20		20	6		20	6		20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel											
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 2 Position(ft)					94			94			
Detector 2 Size(ft)					6			6			
Detector 2 Type					Cl+Ex			Cl+Ex			
Detector 2 Channel											
Detector 2 Extend (s)					0.0			0.0			
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Prot	pt+ov
Protected Phases	4	4		1	6		5	2		3	3 5
Permitted Phases		4									

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Detector Phase	4	4		1	6		5	2		3	3 5
Switch Phase											
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		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	3.0		3.0	3.0		3.0	
Recall Mode	None	None		None	C-Max		None	C-Max		None	
Act Effct Green (s)	5.8	5.8			16.2		43.4	65.5		10.0	58.2
Actuated g/C Ratio	0.06	0.06			0.18		0.48	0.73		0.11	0.65
v/c Ratio	0.03	0.00			0.54		0.32	0.42		0.01	0.84
Control Delay (s/veh)	40.0	0.0			38.0		15.4	6.7		36.0	14.8
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0
Total Delay (s/veh)	40.0	0.0			38.0		15.4	6.7		36.0	14.8
LOS	D	A			D		B	A		D	B
Approach Delay (s/veh)	20.0				38.0			10.9		14.8	
Approach LOS	B				D			B		B	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 38 (42%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay (s/veh): 16.3	Intersection LOS: B
Intersection Capacity Utilization 70.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	3	3	346	535	573	1	998
v/c Ratio	0.03	0.00	0.54	0.32	0.42	0.01	0.84
Control Delay (s/veh)	40.0	0.0	38.0	15.4	6.7	36.0	14.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	40.0	0.0	38.0	15.4	6.7	36.0	14.8
Queue Length 50th (ft)	2	0	100	82	93	1	148
Queue Length 95th (ft)	9	0	127	154	245	5	#507
Internal Link Dist (ft)	1189		1712		1655	2029	
Turn Bay Length (ft)		50		775		200	
Base Capacity (vph)	196	655	636	1653	1352	196	1190
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	0.54	0.32	0.42	0.01	0.84

Intersection Summary

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

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	297	55	18	38	1393	26	1360	248
v/c Ratio	0.61	0.10	0.09	0.26	0.61	0.19	0.62	0.23
Control Delay (s/veh)	44.0	0.4	0.9	47.9	13.7	47.5	15.3	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	44.0	0.4	0.9	47.9	13.7	47.5	15.3	3.5
Queue Length 50th (ft)	82	0	0	21	147	14	237	8
Queue Length 95th (ft)	143	0	0	58	472	45	465	53
Internal Link Dist (ft)		662	748		858		957	
Turn Bay Length (ft)				300		375		
Base Capacity (vph)	638	697	194	448	2298	448	2193	1061
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	0.08	0.09	0.08	0.61	0.06	0.62	0.23

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	273	0	51	1	0	16	35	1277	5	24	1251	228
Future Volume (veh/h)	273	0	51	1	0	16	35	1277	5	24	1251	228
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	297	0	55	1	0	17	38	1388	5	26	1360	248
Adj No. of Lanes	2	1	0	0	1	0	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	383	0	324	43	2	68	59	2146	8	47	2074	928
Arrive On Green	0.11	0.00	0.20	0.05	0.00	0.05	0.03	0.59	0.59	0.03	0.59	0.59
Sat Flow, veh/h	3442	0	1583	48	40	1493	1774	3617	13	1774	3539	1583
Grp Volume(v), veh/h	297	0	55	18	0	0	38	679	714	26	1360	248
Grp Sat Flow(s),veh/h/ln	1721	0	1583	1581	0	0	1774	1770	1860	1774	1770	1583
Q Serve(g_s), s	7.9	0.0	2.7	0.0	0.0	0.0	2.0	23.8	23.8	1.4	24.2	7.2
Cycle Q Clear(g_c), s	7.9	0.0	2.7	1.0	0.0	0.0	2.0	23.8	23.8	1.4	24.2	7.2
Prop In Lane	1.00		1.00	0.06		0.94	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	383	0	324	112	0	0	59	1050	1104	47	2074	928
V/C Ratio(X)	0.78	0.00	0.17	0.16	0.00	0.00	0.64	0.65	0.65	0.56	0.66	0.27
Avail Cap(c_a), veh/h	605	0	439	125	0	0	425	1050	1104	425	2074	928
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.6	0.0	30.8	43.3	0.0	0.0	44.8	12.6	12.6	45.2	13.1	9.5
Incr Delay (d2), s/veh	3.4	0.0	0.2	0.7	0.0	0.0	10.9	3.1	2.9	10.1	1.6	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	0.0	1.2	0.5	0.0	0.0	1.2	12.4	13.0	0.8	12.2	3.3
LnGrp Delay(d), s/veh	43.9	0.0	31.0	43.9	0.0	0.0	55.7	15.7	15.5	55.2	14.7	10.2
LnGrp LOS	D		C	D			E	B	B	E	B	B
Approach Vol, veh/h		352			18			1431			1634	
Approach Delay, s/veh		41.9			43.9			16.7			14.7	
Approach LOS		D			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.0	61.7		25.2	7.6	61.0	14.9	10.3
Change Period (Y+Rc), s	4.5	6.0		6.0	4.5	6.0	4.5	6.0
Max Green Setting (Gmax), s	22.5	55.0		26.0	22.5	55.0	16.5	5.0
Max Q Clear Time (g_c+I1), s	3.4	25.8		4.7	4.0	26.2	9.9	3.0
Green Ext Time (p_c), s	0.0	12.2		0.2	0.1	13.9	0.6	0.0

Intersection Summary	
HCM 2010 Ctrl Delay, s/veh	18.4
HCM 2010 LOS	B

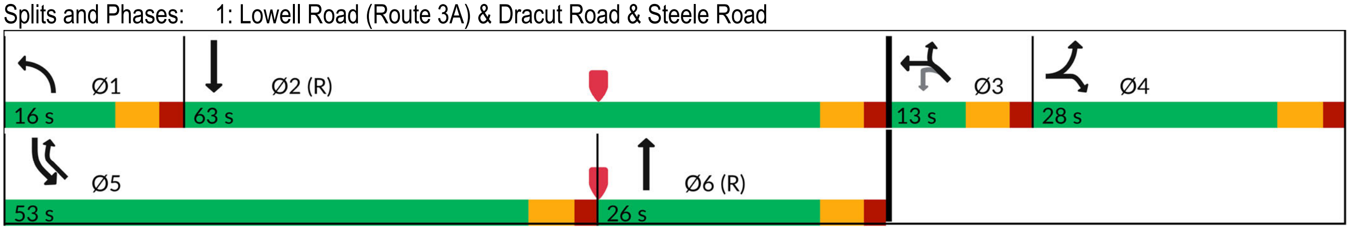
Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Traffic Volume (vph)	36	2	2	1	598	1	897	401	13	4	0	665
Future Volume (vph)	36	2	2	1	598	1	897	401	13	4	0	665
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		250		300	775		0		200	0
Storage Lanes	1	1		1		0	2		0		1	1
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.97	1.00	1.00	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)	1770	1583	0	1770	3539	0	3433	1853	0	0	1770	1583
Flt Permitted	0.950			0.950			0.950				0.571	
Satd. Flow (perm)	1770	1583	0	1770	3539	0	3433	1853	0	0	1064	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		191						2				420
Link Speed (mph)	30				30			30			30	
Link Distance (ft)	1269				1792			1735			2109	
Travel Time (s)	28.8				40.7			39.4			47.9	
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
Adj. Flow (vph)	45	3	3	1	657	1	997	446	14	4	0	731
Shared Lane Traffic (%)												
Lane Group Flow (vph)	45	6	0	1	658	0	997	460	0	0	4	731
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12				24			24			12	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16				16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	15	9
Number of Detectors	1	1		1	2		1	2			1	1
Detector Template	Left	Right		Left	Thru		Left	Thru			Left	Right
Leading Detector (ft)	20	20		20	100		20	100			20	20
Trailing Detector (ft)	0	0		0	0		0	0			0	0
Detector 1 Position(ft)	0	0		0	0		0	0			0	0
Detector 1 Size(ft)	20	20		20	6		20	6			20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 2 Position(ft)					94			94				
Detector 2 Size(ft)					6			6				
Detector 2 Type					Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Perm	Prot	pt+ov
Protected Phases	4	4		1	6		5	2			3	3 5
Permitted Phases		4								3		

Attachment "E"

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Detector Phase	4	4		1	6		5	2		3	3	3 5
Switch Phase												
Minimum Initial (s)	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	14.0		14.0	14.0		11.0	11.0	
Total Split (s)	28.0	28.0		16.0	26.0		53.0	63.0		13.0	13.0	
Total Split (%)	23.3%	23.3%		13.3%	21.7%		44.2%	52.5%		10.8%	10.8%	
Maximum Green (s)	22.0	22.0		10.0	20.0		47.0	57.0		7.0	7.0	
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	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	C-Max		None	C-Max		None	None	
Act Effct Green (s)	8.5	8.5		5.6	39.2		43.6	86.4			7.0	51.8
Actuated g/C Ratio	0.07	0.07		0.05	0.33		0.36	0.72			0.06	0.43
v/c Ratio	0.36	0.02		0.01	0.57		0.80	0.34			0.06	0.79
Control Delay (s/veh)	60.4	0.2		55.0	38.4		39.3	8.6			56.0	17.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay (s/veh)	60.4	0.2		55.0	38.4		39.3	8.6			56.0	17.0
LOS	E	A		D	D		D	A			E	B
Approach Delay (s/veh)	53.3				38.4			29.6			17.2	
Approach LOS	D				D			C			B	

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 Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay (s/veh): 28.9	Intersection LOS: C
Intersection Capacity Utilization 70.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBL	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	45	6	1	658	997	460	4	731
v/c Ratio	0.36	0.02	0.01	0.57	0.80	0.34	0.06	0.79
Control Delay (s/veh)	60.4	0.2	55.0	38.4	39.3	8.6	56.0	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	60.4	0.2	55.0	38.4	39.3	8.6	56.0	17.0
Queue Length 50th (ft)	34	0	1	232	357	118	3	145
Queue Length 95th (ft)	64	0	7	#354	397	258	15	289
Internal Link Dist (ft)	1189			1712		1655	2029	
Turn Bay Length (ft)		50	250		775		200	
Base Capacity (vph)	324	446	147	1156	1368	1334	62	963
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	0.14	0.01	0.01	0.57	0.73	0.34	0.06	0.76

Intersection Summary

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

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	184	34	41	58	1241	8	1085	287
v/c Ratio	0.62	0.07	0.28	0.30	0.53	0.06	0.52	0.27
Control Delay (s/veh)	46.4	0.3	19.0	37.0	9.0	36.1	12.7	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	46.4	0.3	19.0	37.0	9.0	36.1	12.7	2.3
Queue Length 50th (ft)	47	0	1	28	146	4	191	0
Queue Length 95th (ft)	#105	0	31	63	294	17	272	38
Internal Link Dist (ft)		445	748		858		957	
Turn Bay Length (ft)				300		375		
Base Capacity (vph)	297	593	148	431	2332	382	2070	1045
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.06	0.28	0.13	0.53	0.02	0.52	0.27

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	169	0	31	1	1	36	53	1140	2	7	998	264
Future Volume (veh/h)	169	0	31	1	1	36	53	1140	2	7	998	264
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	184	0	34	1	1	39	58	1239	2	8	1085	287
Adj No. of Lanes	2	1	0	0	1	0	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	253	0	295	50	3	80	83	2116	3	18	1936	866
Arrive On Green	0.07	0.00	0.19	0.05	0.05	0.05	0.05	0.58	0.58	0.01	0.55	0.55
Sat Flow, veh/h	3442	0	1583	22	55	1511	1774	3625	6	1774	3539	1583
Grp Volume(v), veh/h	184	0	34	41	0	0	58	605	636	8	1085	287
Grp Sat Flow(s),veh/h/ln	1721	0	1583	1588	0	0	1774	1770	1862	1774	1770	1583
Q Serve(g_s), s	3.9	0.0	1.3	0.2	0.0	0.0	2.4	16.2	16.2	0.3	15.0	7.5
Cycle Q Clear(g_c), s	3.9	0.0	1.3	1.9	0.0	0.0	2.4	16.2	16.2	0.3	15.0	7.5
Prop In Lane	1.00		1.00	0.02		0.95	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	253	0	295	133	0	0	83	1033	1086	18	1936	866
V/C Ratio(X)	0.73	0.00	0.12	0.31	0.00	0.00	0.70	0.59	0.59	0.44	0.56	0.33
Avail Cap(c_a), veh/h	253	0	317	155	0	0	414	1033	1086	367	1936	866
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.0	0.0	25.4	34.5	0.0	0.0	35.2	9.9	9.9	36.9	11.1	9.4
Incr Delay (d2), s/veh	10.2	0.0	0.2	1.3	0.0	0.0	10.1	2.4	2.3	15.9	1.2	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.0	0.6	0.9	0.0	0.0	1.4	8.6	9.0	0.2	7.6	3.5
LnGrp Delay(d), s/veh	44.1	0.0	25.5	35.8	0.0	0.0	45.3	12.3	12.2	52.8	12.3	10.4
LnGrp LOS	D		C	D			D	B	B	D	B	B
Approach Vol, veh/h		218			41			1299			1380	
Approach Delay, s/veh		41.2			35.8			13.7			12.1	
Approach LOS		D			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.3	49.7		20.0	8.0	47.0	10.0	10.0
Change Period (Y+Rc), s	4.5	6.0		6.0	4.5	6.0	4.5	6.0
Max Green Setting (Gmax), s	15.5	43.0		15.0	17.5	41.0	5.5	5.0
Max Q Clear Time (g_c+I1), s	2.3	18.2		3.3	4.4	17.0	5.9	3.9
Green Ext Time (p_c), s	0.0	9.6		0.1	0.1	10.0	0.0	0.0

Intersection Summary		
HCM 2010 Ctrl Delay, s/veh		15.3
HCM 2010 LOS		B

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	181	0	33	258	0	19
Future Vol, veh/h	181	0	33	258	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	197	0	36	280	0	21

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	197	0	-	99
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.13	-	-	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.219	-	-	3.319
Pot Cap-1 Maneuver	-	-	1374	-	0	938
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1374	-	-	938
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.9	8.9
HCM LOS			A

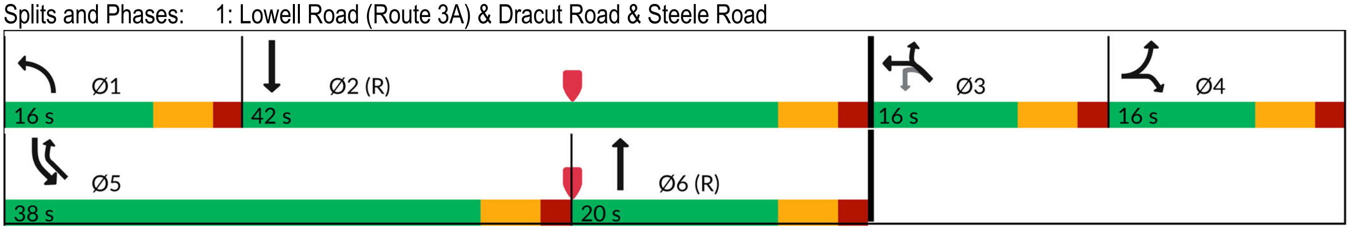
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	938	-	-	1374	-
HCM Lane V/C Ratio	0.022	-	-	0.026	-
HCM Ctrl Dly (s/v)	8.9	-	-	7.7	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	2	0	2	0	280	0	496	517	12	1	865
Future Volume (vph)	2	0	2	0	280	0	496	517	12	1	865
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		250		300	775		0	200	0
Storage Lanes	1	1		1		0	2		0	1	1
Taper Length (ft)	25			25			25			25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00
Frt		0.850						0.997			0.850
Flt Protected	0.950						0.950			0.950	
Satd. Flow (prot)	1770	1583	0	1863	3539	0	3433	1857	0	1770	1583
Flt Permitted	0.950						0.950			0.950	
Satd. Flow (perm)	1770	1583	0	1863	3539	0	3433	1857	0	1770	1583
Right Turn on Red			Yes			Yes			Yes		Yes
Satd. Flow (RTOR)		540						2			470
Link Speed (mph)	30				30			30		30	
Link Distance (ft)	1269				1792			1735		2109	
Travel Time (s)	28.8				40.7			39.4		47.9	
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
Adj. Flow (vph)	3	0	3	0	350	0	539	562	13	1	1006
Shared Lane Traffic (%)											
Lane Group Flow (vph)	3	3	0	0	350	0	539	575	0	1	1006
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Right
Median Width(ft)	12				24			24		12	
Link Offset(ft)	0				0			0		0	
Crosswalk Width(ft)	16				16			16		16	
Two way Left Turn Lane											
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	9
Number of Detectors	1	1		1	2		1	2		1	1
Detector Template	Left	Right		Left	Thru		Left	Thru		Left	Right
Leading Detector (ft)	20	20		20	100		20	100		20	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0
Detector 1 Size(ft)	20	20		20	6		20	6		20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel											
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 2 Position(ft)					94			94			
Detector 2 Size(ft)					6			6			
Detector 2 Type					Cl+Ex			Cl+Ex			
Detector 2 Channel											
Detector 2 Extend (s)					0.0			0.0			
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Prot	pt+ov
Protected Phases	4	4		1	6		5	2		3	3 5
Permitted Phases		4									

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Detector Phase	4	4		1	6		5	2		3	3 5
Switch Phase											
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		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	3.0		3.0	3.0		3.0	
Recall Mode	None	None		None	C-Max		None	C-Max		None	
Act Effct Green (s)	5.8	5.8			14.8		44.7	65.5		10.0	59.5
Actuated g/C Ratio	0.06	0.06			0.16		0.50	0.73		0.11	0.66
v/c Ratio	0.03	0.00			0.60		0.32	0.43		0.01	0.83
Control Delay (s/veh)	40.0	0.0			40.1		14.8	6.7		36.0	14.4
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0
Total Delay (s/veh)	40.0	0.0			40.1		14.8	6.7		36.0	14.4
LOS	D	A			D		B	A		D	B
Approach Delay (s/veh)	20.0				40.1			10.6		14.5	
Approach LOS	B				D			B		B	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 38 (42%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.83	
Intersection Signal Delay (s/veh): 16.4	Intersection LOS: B
Intersection Capacity Utilization 71.3%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	3	3	350	539	575	1	1006
v/c Ratio	0.03	0.00	0.60	0.32	0.43	0.01	0.83
Control Delay (s/veh)	40.0	0.0	40.1	14.8	6.7	36.0	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	40.0	0.0	40.1	14.8	6.7	36.0	14.4
Queue Length 50th (ft)	2	0	101	84	94	1	153
Queue Length 95th (ft)	9	0	129	155	246	5	#542
Internal Link Dist (ft)	1189		1712		1655	2029	
Turn Bay Length (ft)		50		775		200	
Base Capacity (vph)	196	655	582	1706	1352	196	1206
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	0.60	0.32	0.43	0.01	0.83

Intersection Summary

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

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	316	63	18	46	1393	26	1360	264
v/c Ratio	0.62	0.12	0.09	0.30	0.61	0.19	0.63	0.25
Control Delay (s/veh)	44.4	0.4	0.9	48.5	14.0	48.0	15.9	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	44.4	0.4	0.9	48.5	14.0	48.0	15.9	3.6
Queue Length 50th (ft)	89	0	0	25	152	14	245	8
Queue Length 95th (ft)	153	0	0	67	472	45	473	55
Internal Link Dist (ft)		445	748		858		957	
Turn Bay Length (ft)				300		375		
Base Capacity (vph)	631	693	193	443	2284	443	2169	1057
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	0.50	0.09	0.09	0.10	0.61	0.06	0.63	0.25

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	291	0	58	1	0	16	42	1277	5	24	1251	243
Future Volume (veh/h)	291	0	58	1	0	16	42	1277	5	24	1251	243
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	316	0	63	1	0	17	46	1388	5	26	1360	264
Adj No. of Lanes	2	1	0	0	1	0	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	401	0	333	42	2	69	66	2134	8	46	2049	917
Arrive On Green	0.12	0.00	0.21	0.05	0.00	0.05	0.04	0.59	0.59	0.03	0.58	0.58
Sat Flow, veh/h	3442	0	1583	47	41	1493	1774	3617	13	1774	3539	1583
Grp Volume(v), veh/h	316	0	63	18	0	0	46	679	714	26	1360	264
Grp Sat Flow(s),veh/h/ln	1721	0	1583	1581	0	0	1774	1770	1860	1774	1770	1583
Q Serve(g_s), s	8.5	0.0	3.1	0.0	0.0	0.0	2.4	24.3	24.3	1.4	25.0	8.0
Cycle Q Clear(g_c), s	8.5	0.0	3.1	1.0	0.0	0.0	2.4	24.3	24.3	1.4	25.0	8.0
Prop In Lane	1.00		1.00	0.06		0.94	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	401	0	333	113	0	0	66	1044	1097	46	2049	917
V/C Ratio(X)	0.79	0.00	0.19	0.16	0.00	0.00	0.70	0.65	0.65	0.56	0.66	0.29
Avail Cap(c_a), veh/h	598	0	433	123	0	0	420	1044	1097	420	2049	917
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.8	0.0	30.8	43.7	0.0	0.0	45.2	13.0	13.0	45.7	13.7	10.1
Incr Delay (d2), s/veh	4.2	0.0	0.3	0.6	0.0	0.0	12.7	3.1	3.0	10.2	1.7	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	0.0	1.4	0.5	0.0	0.0	1.4	12.6	13.2	0.8	12.6	3.6
LnGrp Delay(d), s/veh	45.0	0.0	31.1	44.3	0.0	0.0	57.9	16.1	16.0	55.9	15.4	10.9
LnGrp LOS	D		C	D			E	B	B	E	B	B
Approach Vol, veh/h		379			18			1439			1650	
Approach Delay, s/veh		42.7			44.3			17.4			15.3	
Approach LOS		D			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.0	62.0		26.0	8.0	61.0	15.6	10.4
Change Period (Y+Rc), s	4.5	6.0		6.0	4.5	6.0	4.5	6.0
Max Green Setting (Gmax), s	22.5	55.0		26.0	22.5	55.0	16.5	5.0
Max Q Clear Time (g_c+I1), s	3.4	26.3		5.1	4.4	27.0	10.5	3.0
Green Ext Time (p_c), s	0.0	12.1		0.3	0.1	13.8	0.6	0.0

Intersection Summary	
HCM 2010 Ctrl Delay, s/veh	19.3
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	324	0	22	263	0	25
Future Vol, veh/h	324	0	22	263	0	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	352	0	24	286	0	27

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	352	0	-	176
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.13	-	-	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.219	-	-	3.319
Pot Cap-1 Maneuver	-	-	1205	-	0	837
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1205	-	-	837
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.6	9.4
HCM LOS			A

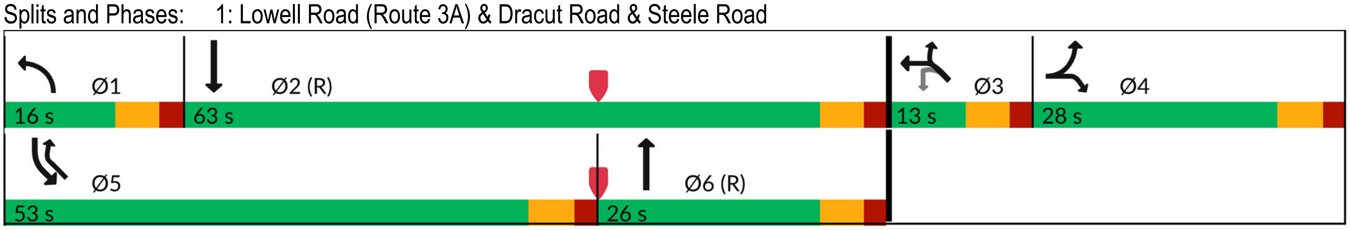
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	837	-	-	1205	-
HCM Lane V/C Ratio	0.032	-	-	0.02	-
HCM Ctrl Dly (s/v)	9.4	-	-	8	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Traffic Volume (vph)	36	2	2	1	601	1	902	403	13	4	0	669
Future Volume (vph)	36	2	2	1	601	1	902	403	13	4	0	669
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		250		300	775		0		200	0
Storage Lanes	1	1		1		0	2		0		1	1
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.97	1.00	1.00	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)	1770	1583	0	1770	3539	0	3433	1853	0	0	1770	1583
Flt Permitted	0.950			0.950			0.950				0.571	
Satd. Flow (perm)	1770	1583	0	1770	3539	0	3433	1853	0	0	1064	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		191						2				420
Link Speed (mph)	30				30			30			30	
Link Distance (ft)	1269				1792			1735			2109	
Travel Time (s)	28.8				40.7			39.4			47.9	
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
Adj. Flow (vph)	45	3	3	1	660	1	1002	448	14	4	0	735
Shared Lane Traffic (%)												
Lane Group Flow (vph)	45	6	0	1	661	0	1002	462	0	0	4	735
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12				24			24			12	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16				16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	15	9
Number of Detectors	1	1		1	2		1	2			1	1
Detector Template	Left	Right		Left	Thru		Left	Thru			Left	Right
Leading Detector (ft)	20	20		20	100		20	100			20	20
Trailing Detector (ft)	0	0		0	0		0	0			0	0
Detector 1 Position(ft)	0	0		0	0		0	0			0	0
Detector 1 Size(ft)	20	20		20	6		20	6			20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 2 Position(ft)					94			94				
Detector 2 Size(ft)					6			6				
Detector 2 Type					Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Perm	Prot	pt+ov
Protected Phases	4	4		1	6		5	2			3	3 5
Permitted Phases		4								3		

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Detector Phase	4	4		1	6		5	2		3	3	3 5
Switch Phase												
Minimum Initial (s)	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	14.0		14.0	14.0		11.0	11.0	
Total Split (s)	28.0	28.0		16.0	26.0		53.0	63.0		13.0	13.0	
Total Split (%)	23.3%	23.3%		13.3%	21.7%		44.2%	52.5%		10.8%	10.8%	
Maximum Green (s)	22.0	22.0		10.0	20.0		47.0	57.0		7.0	7.0	
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	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	C-Max		None	C-Max		None	None	
Act Effct Green (s)	8.5	8.5		5.6	39.0		43.9	86.4			7.0	52.1
Actuated g/C Ratio	0.07	0.07		0.05	0.33		0.37	0.72			0.06	0.43
v/c Ratio	0.36	0.02		0.01	0.58		0.80	0.35			0.06	0.80
Control Delay (s/veh)	60.4	0.2		55.0	38.7		39.1	8.6			56.0	17.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay (s/veh)	60.4	0.2		55.0	38.7		39.1	8.6			56.0	17.1
LOS	E	A		D	D		D	A			E	B
Approach Delay (s/veh)	53.3				38.7			29.4			17.3	
Approach LOS	D				D			C			B	

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 Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay (s/veh): 28.9	Intersection LOS: C
Intersection Capacity Utilization 70.7%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBL	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	45	6	1	661	1002	462	4	735
v/c Ratio	0.36	0.02	0.01	0.58	0.80	0.35	0.06	0.80
Control Delay (s/veh)	60.4	0.2	55.0	38.7	39.1	8.6	56.0	17.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	60.4	0.2	55.0	38.7	39.1	8.6	56.0	17.1
Queue Length 50th (ft)	34	0	1	234	358	118	3	149
Queue Length 95th (ft)	64	0	7	#365	396	259	15	288
Internal Link Dist (ft)	1189			1712		1655	2029	
Turn Bay Length (ft)		50	250		775		200	
Base Capacity (vph)	324	446	147	1148	1373	1334	62	964
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	0.14	0.01	0.01	0.58	0.73	0.35	0.06	0.76

Intersection Summary

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

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	170	27	41	47	1367	9	1196	262
v/c Ratio	0.57	0.05	0.28	0.26	0.59	0.06	0.58	0.25
Control Delay (s/veh)	44.2	0.2	18.8	36.5	9.8	35.9	13.3	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	44.2	0.2	18.8	36.5	9.8	35.9	13.3	2.3
Queue Length 50th (ft)	43	0	1	22	171	4	217	0
Queue Length 95th (ft)	#93	0	32	54	342	19	306	36
Internal Link Dist (ft)		662	748		858		957	
Turn Bay Length (ft)				300		375		
Base Capacity (vph)	298	586	148	433	2325	384	2078	1037
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	0.57	0.05	0.28	0.11	0.59	0.02	0.58	0.25

Intersection Summary

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

Attachment "E"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	156	0	25	1	1	36	43	1256	2	8	1100	241
Future Volume (veh/h)	156	0	25	1	1	36	43	1256	2	8	1100	241
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	170	0	27	1	1	39	47	1365	2	9	1196	262
Adj No. of Lanes	2	1	0	0	1	0	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	251	0	292	51	3	77	74	2111	3	20	1953	874
Arrive On Green	0.07	0.00	0.18	0.05	0.05	0.05	0.04	0.58	0.58	0.01	0.55	0.55
Sat Flow, veh/h	3442	0	1583	23	54	1511	1774	3626	5	1774	3539	1583
Grp Volume(v), veh/h	170	0	27	41	0	0	47	666	701	9	1196	262
Grp Sat Flow(s),veh/h/ln	1721	0	1583	1588	0	0	1774	1770	1862	1774	1770	1583
Q Serve(g_s), s	3.6	0.0	1.1	0.4	0.0	0.0	1.9	18.7	18.7	0.4	17.0	6.6
Cycle Q Clear(g_c), s	3.6	0.0	1.1	1.9	0.0	0.0	1.9	18.7	18.7	0.4	17.0	6.6
Prop In Lane	1.00		1.00	0.02		0.95	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	251	0	292	130	0	0	74	1030	1084	20	1953	874
V/C Ratio(X)	0.68	0.00	0.09	0.31	0.00	0.00	0.63	0.65	0.65	0.44	0.61	0.30
Avail Cap(c_a), veh/h	255	0	320	156	0	0	418	1030	1084	370	1953	874
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.6	0.0	25.1	34.4	0.0	0.0	35.0	10.4	10.4	36.5	11.3	8.9
Incr Delay (d2), s/veh	6.9	0.0	0.1	1.4	0.0	0.0	8.6	3.1	3.0	14.5	1.4	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	0.5	0.9	0.0	0.0	1.1	10.0	10.4	0.3	8.5	3.1
LnGrp Delay(d), s/veh	40.5	0.0	25.3	35.7	0.0	0.0	43.7	13.5	13.4	51.0	12.7	9.8
LnGrp LOS	D		C	D			D	B	B	D	B	A
Approach Vol, veh/h		197			41			1414			1467	
Approach Delay, s/veh		38.4			35.7			14.5			12.4	
Approach LOS		D			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.3	49.3		19.7	7.6	47.0	9.9	9.8
Change Period (Y+Rc), s	4.5	6.0		6.0	4.5	6.0	4.5	6.0
Max Green Setting (Gmax), s	15.5	43.0		15.0	17.5	41.0	5.5	5.0
Max Q Clear Time (g_c+I1), s	2.4	20.7		3.1	3.9	19.0	5.6	3.9
Green Ext Time (p_c), s	0.0	10.4		0.0	0.1	10.5	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay, s/veh	15.3
HCM 2010 LOS	B

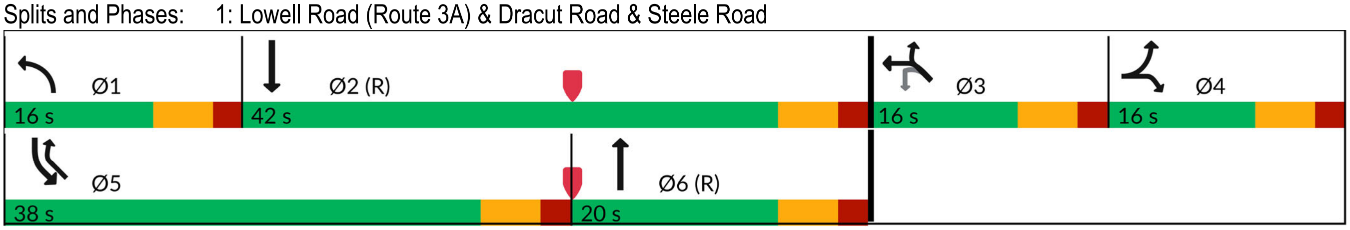
Attachment "E"

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	2	0	2	0	304	0	540	567	14	1	943
Future Volume (vph)	2	0	2	0	304	0	540	567	14	1	943
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		250		300	775		0	200	0
Storage Lanes	1	1		1		0	2		0	1	1
Taper Length (ft)	25			25			25			25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00
Frt		0.850						0.996			0.850
Flt Protected	0.950						0.950			0.950	
Satd. Flow (prot)	1770	1583	0	1863	3539	0	3433	1855	0	1770	1583
Flt Permitted	0.950						0.950			0.950	
Satd. Flow (perm)	1770	1583	0	1863	3539	0	3433	1855	0	1770	1583
Right Turn on Red			Yes			Yes			Yes		Yes
Satd. Flow (RTOR)		522						2			463
Link Speed (mph)	30				30			30		30	
Link Distance (ft)	1269				1792			1735		2109	
Travel Time (s)	28.8				40.7			39.4		47.9	
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
Adj. Flow (vph)	3	0	3	0	380	0	587	616	15	1	1097
Shared Lane Traffic (%)											
Lane Group Flow (vph)	3	3	0	0	380	0	587	631	0	1	1097
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Right
Median Width(ft)	12				24			24		12	
Link Offset(ft)	0				0			0		0	
Crosswalk Width(ft)	16				16			16		16	
Two way Left Turn Lane											
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	9
Number of Detectors	1	1		1	2		1	2		1	1
Detector Template	Left	Right		Left	Thru		Left	Thru		Left	Right
Leading Detector (ft)	20	20		20	100		20	100		20	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0
Detector 1 Size(ft)	20	20		20	6		20	6		20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel											
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 2 Position(ft)					94			94			
Detector 2 Size(ft)					6			6			
Detector 2 Type					Cl+Ex			Cl+Ex			
Detector 2 Channel											
Detector 2 Extend (s)					0.0			0.0			
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Prot	pt+ov
Protected Phases	4	4		1	6		5	2		3	3 5
Permitted Phases		4									

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Detector Phase	4	4		1	6		5	2		3	3 5
Switch Phase											
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		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	3.0		3.0	3.0		3.0	
Recall Mode	None	None		None	C-Max		None	C-Max		None	
Act Effct Green (s)	5.8	5.8			14.0		45.5	65.5		10.0	60.3
Actuated g/C Ratio	0.06	0.06			0.16		0.51	0.73		0.11	0.67
v/c Ratio	0.03	0.01			0.69		0.34	0.47		0.01	0.90
Control Delay (s/veh)	40.0	0.0			43.3		14.8	7.2		36.0	20.2
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0
Total Delay (s/veh)	40.0	0.0			43.3		14.8	7.2		36.0	20.2
LOS	D	A			D		B	A		D	C
Approach Delay (s/veh)	20.0				43.3			10.9		20.2	
Approach LOS	B				D			B		C	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 38 (42%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 140	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay (s/veh): 19.2	Intersection LOS: B
Intersection Capacity Utilization 76.8%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	3	3	380	587	631	1	1097
v/c Ratio	0.03	0.01	0.69	0.34	0.47	0.01	0.90
Control Delay (s/veh)	40.0	0.0	43.3	14.8	7.2	36.0	20.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	40.0	0.0	43.3	14.8	7.2	36.0	20.2
Queue Length 50th (ft)	2	0	110	92	108	1	229
Queue Length 95th (ft)	9	0	139	170	283	5	#800
Internal Link Dist (ft)	1189		1712		1655	2029	
Turn Bay Length (ft)		50		775		200	
Base Capacity (vph)	196	639	550	1736	1351	196	1213
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	0.69	0.34	0.47	0.01	0.90

Intersection Summary

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

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	297	55	19	38	1536	28	1499	248
v/c Ratio	0.61	0.10	0.10	0.26	0.67	0.20	0.68	0.24
Control Delay (s/veh)	44.0	0.4	1.0	47.9	15.2	47.5	16.8	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	44.0	0.4	1.0	47.9	15.2	47.5	16.8	4.1
Queue Length 50th (ft)	82	0	0	21	173	15	279	12
Queue Length 95th (ft)	143	0	0	58	558	47	546	61
Internal Link Dist (ft)		662	748		858		957	
Turn Bay Length (ft)				300		375		
Base Capacity (vph)	638	693	194	448	2295	448	2193	1053
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	0.08	0.10	0.08	0.67	0.06	0.68	0.24

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	273	0	51	1	0	17	35	1407	6	26	1379	228
Future Volume (veh/h)	273	0	51	1	0	17	35	1407	6	26	1379	228
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	297	0	55	1	0	18	38	1529	7	28	1499	248
Adj No. of Lanes	2	1	0	0	1	0	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	383	0	324	42	2	68	59	2138	10	49	2074	928
Arrive On Green	0.11	0.00	0.20	0.05	0.00	0.05	0.03	0.59	0.59	0.03	0.59	0.59
Sat Flow, veh/h	3442	0	1583	45	38	1498	1774	3613	17	1774	3539	1583
Grp Volume(v), veh/h	297	0	55	19	0	0	38	749	787	28	1499	248
Grp Sat Flow(s),veh/h/ln	1721	0	1583	1581	0	0	1774	1770	1860	1774	1770	1583
Q Serve(g_s), s	7.9	0.0	2.7	0.0	0.0	0.0	2.0	28.1	28.1	1.5	28.6	7.2
Cycle Q Clear(g_c), s	7.9	0.0	2.7	1.1	0.0	0.0	2.0	28.1	28.1	1.5	28.6	7.2
Prop In Lane	1.00		1.00	0.05		0.95	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	383	0	324	112	0	0	59	1047	1101	49	2074	928
V/C Ratio(X)	0.78	0.00	0.17	0.17	0.00	0.00	0.64	0.71	0.72	0.57	0.72	0.27
Avail Cap(c_a), veh/h	605	0	439	124	0	0	425	1047	1101	425	2074	928
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.6	0.0	30.7	43.3	0.0	0.0	44.8	13.6	13.6	45.1	14.0	9.5
Incr Delay (d2), s/veh	3.4	0.0	0.2	0.7	0.0	0.0	10.9	4.2	4.0	10.1	2.2	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	0.0	1.2	0.5	0.0	0.0	1.2	14.7	15.4	0.9	14.4	3.3
LnGrp Delay(d), s/veh	44.0	0.0	31.0	44.0	0.0	0.0	55.7	17.7	17.5	55.2	16.2	10.2
LnGrp LOS	D		C	D			E	B	B	E	B	B
Approach Vol, veh/h		352			19			1574			1775	
Approach Delay, s/veh		41.9			44.0			18.5			16.0	
Approach LOS		D			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.1	61.6		25.2	7.6	61.0	14.9	10.3
Change Period (Y+Rc), s	4.5	6.0		6.0	4.5	6.0	4.5	6.0
Max Green Setting (Gmax), s	22.5	55.0		26.0	22.5	55.0	16.5	5.0
Max Q Clear Time (g_c+I1), s	3.5	30.1		4.7	4.0	30.6	9.9	3.1
Green Ext Time (p_c), s	0.0	12.9		0.2	0.1	14.2	0.6	0.0

Intersection Summary	
HCM 2010 Ctrl Delay, s/veh	19.7
HCM 2010 LOS	B

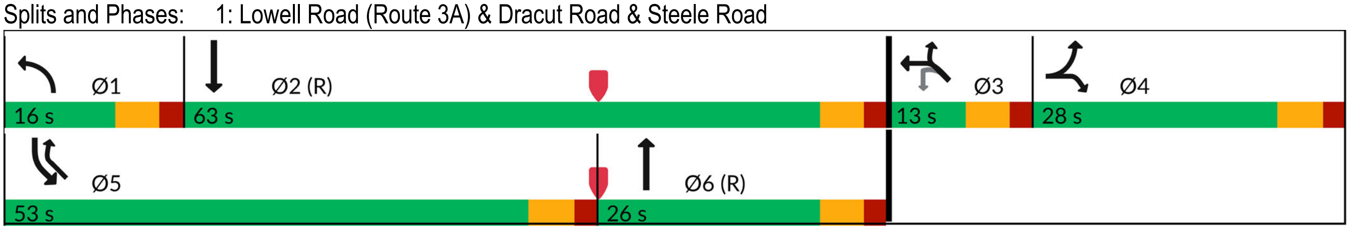
Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Traffic Volume (vph)	40	2	2	1	661	1	992	443	15	5	0	735
Future Volume (vph)	40	2	2	1	661	1	992	443	15	5	0	735
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		250		300	775		0		200	0
Storage Lanes	1	1		1		0	2		0		1	1
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.97	1.00	1.00	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)	1770	1583	0	1770	3539	0	3433	1853	0	0	1770	1583
Flt Permitted	0.950			0.950			0.950				0.571	
Satd. Flow (perm)	1770	1583	0	1770	3539	0	3433	1853	0	0	1064	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		191						2				405
Link Speed (mph)	30				30			30			30	
Link Distance (ft)	1269				1792			1735			2109	
Travel Time (s)	28.8				40.7			39.4			47.9	
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
Adj. Flow (vph)	50	3	3	1	726	1	1102	492	17	5	0	808
Shared Lane Traffic (%)												
Lane Group Flow (vph)	50	6	0	1	727	0	1102	509	0	0	5	808
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12				24			24			12	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16				16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	15	9
Number of Detectors	1	1		1	2		1	2			1	1
Detector Template	Left	Right		Left	Thru		Left	Thru			Left	Right
Leading Detector (ft)	20	20		20	100		20	100			20	20
Trailing Detector (ft)	0	0		0	0		0	0			0	0
Detector 1 Position(ft)	0	0		0	0		0	0			0	0
Detector 1 Size(ft)	20	20		20	6		20	6			20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 2 Position(ft)					94			94				
Detector 2 Size(ft)					6			6				
Detector 2 Type					Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Perm	Prot	pt+ov
Protected Phases	4	4		1	6		5	2			3	3 5
Permitted Phases		4								3		

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Detector Phase	4	4		1	6		5	2		3	3	3 5
Switch Phase												
Minimum Initial (s)	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	14.0		14.0	14.0		11.0	11.0	
Total Split (s)	28.0	28.0		16.0	26.0		53.0	63.0		13.0	13.0	
Total Split (%)	23.3%	23.3%		13.3%	21.7%		44.2%	52.5%		10.8%	10.8%	
Maximum Green (s)	22.0	22.0		10.0	20.0		47.0	57.0		7.0	7.0	
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	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	C-Max		None	C-Max		None	None	
Act Effct Green (s)	8.8	8.8		5.6	34.8		47.7	86.1			7.0	55.9
Actuated g/C Ratio	0.07	0.07		0.05	0.29		0.40	0.72			0.06	0.47
v/c Ratio	0.39	0.02		0.01	0.71		0.81	0.38			0.08	0.85
Control Delay (s/veh)	60.8	0.2		55.0	44.9		36.9	9.2			56.6	21.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay (s/veh)	60.8	0.2		55.0	44.9		36.9	9.2			56.6	21.1
LOS	E	A		D	D		D	A			E	C
Approach Delay (s/veh)	54.3				44.9			28.1			21.3	
Approach LOS	D				D			C			C	

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 Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay (s/veh): 30.7 Intersection LOS: C
Intersection Capacity Utilization 74.9% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBL	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	50	6	1	727	1102	509	5	808
v/c Ratio	0.39	0.02	0.01	0.71	0.81	0.38	0.08	0.85
Control Delay (s/veh)	60.8	0.2	55.0	44.9	36.9	9.2	56.6	21.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	60.8	0.2	55.0	44.9	36.9	9.2	56.6	21.1
Queue Length 50th (ft)	38	0	1	276	392	137	4	232
Queue Length 95th (ft)	69	0	7	#498	414	297	18	374
Internal Link Dist (ft)	1189			1712		1655	2029	
Turn Bay Length (ft)		50	250		775		200	
Base Capacity (vph)	324	446	147	1026	1423	1330	62	974
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	0.15	0.01	0.01	0.71	0.77	0.38	0.08	0.83

Intersection Summary

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

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	184	34	41	58	1367	9	1196	287
v/c Ratio	0.62	0.07	0.28	0.30	0.59	0.06	0.58	0.27
Control Delay (s/veh)	46.4	0.3	19.0	37.0	9.7	36.1	13.5	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	46.4	0.3	19.0	37.0	9.7	36.1	13.5	2.3
Queue Length 50th (ft)	47	0	1	28	171	4	221	0
Queue Length 95th (ft)	#105	0	31	63	343	19	313	38
Internal Link Dist (ft)		445	748		858		957	
Turn Bay Length (ft)				300		375		
Base Capacity (vph)	297	585	148	431	2331	382	2070	1045
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.06	0.28	0.13	0.59	0.02	0.58	0.27

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	169	0	31	1	1	36	53	1256	2	8	1100	264
Future Volume (veh/h)	169	0	31	1	1	36	53	1256	2	8	1100	264
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	184	0	34	1	1	39	58	1365	2	9	1196	287
Adj No. of Lanes	2	1	0	0	1	0	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	253	0	295	50	3	80	83	2112	3	20	1936	866
Arrive On Green	0.07	0.00	0.19	0.05	0.05	0.05	0.05	0.58	0.58	0.01	0.55	0.55
Sat Flow, veh/h	3442	0	1583	22	55	1511	1774	3626	5	1774	3539	1583
Grp Volume(v), veh/h	184	0	34	41	0	0	58	666	701	9	1196	287
Grp Sat Flow(s),veh/h/ln	1721	0	1583	1588	0	0	1774	1770	1862	1774	1770	1583
Q Serve(g_s), s	3.9	0.0	1.3	0.2	0.0	0.0	2.4	18.9	18.9	0.4	17.3	7.5
Cycle Q Clear(g_c), s	3.9	0.0	1.3	1.9	0.0	0.0	2.4	18.9	18.9	0.4	17.3	7.5
Prop In Lane	1.00		1.00	0.02		0.95	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	253	0	295	133	0	0	83	1031	1084	20	1936	866
V/C Ratio(X)	0.73	0.00	0.12	0.31	0.00	0.00	0.70	0.65	0.65	0.45	0.62	0.33
Avail Cap(c_a), veh/h	253	0	317	155	0	0	414	1031	1084	367	1936	866
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.0	0.0	25.4	34.5	0.0	0.0	35.2	10.5	10.5	36.8	11.6	9.4
Incr Delay (d2), s/veh	10.2	0.0	0.2	1.3	0.0	0.0	10.1	3.1	3.0	14.6	1.5	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.0	0.6	0.9	0.0	0.0	1.4	10.0	10.4	0.3	8.7	3.5
LnGrp Delay(d), s/veh	44.1	0.0	25.5	35.8	0.0	0.0	45.3	13.6	13.5	51.4	13.1	10.4
LnGrp LOS	D		C	D			D	B	B	D	B	B
Approach Vol, veh/h		218			41			1425			1492	
Approach Delay, s/veh		41.2			35.8			14.8			12.8	
Approach LOS		D			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.4	49.7		20.0	8.0	47.0	10.0	10.0
Change Period (Y+Rc), s	4.5	6.0		6.0	4.5	6.0	4.5	6.0
Max Green Setting (Gmax), s	15.5	43.0		15.0	17.5	41.0	5.5	5.0
Max Q Clear Time (g_c+I1), s	2.4	20.9		3.3	4.4	19.3	5.9	3.9
Green Ext Time (p_c), s	0.0	10.4		0.1	0.1	10.6	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay, s/veh	16.0
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱			↰↑		↱
Traffic Vol, veh/h	181	0	33	258	0	19
Future Vol, veh/h	181	0	33	258	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	197	0	36	280	0	21

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	197	0	-	99
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.13	-	-	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.219	-	-	3.319
Pot Cap-1 Maneuver	-	-	1374	-	0	938
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1374	-	-	938
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.9	8.9
HCM LOS			A

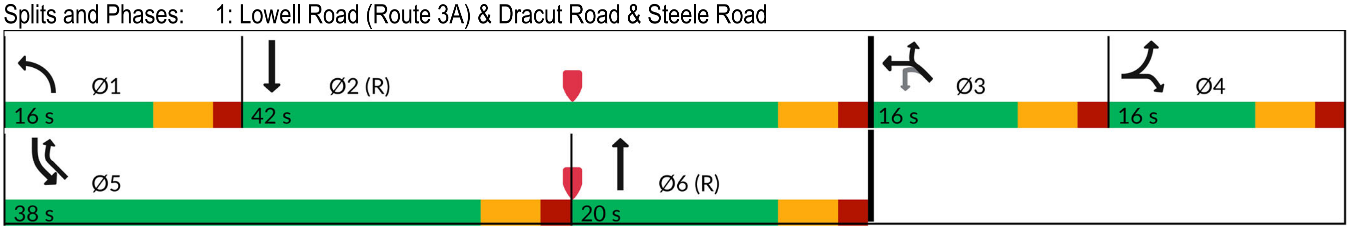
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	938	-	-	1374	-
HCM Lane V/C Ratio	0.022	-	-	0.026	-
HCM Ctrl Dly (s/v)	8.9	-	-	7.7	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	2	0	2	0	307	0	544	569	14	1	950
Future Volume (vph)	2	0	2	0	307	0	544	569	14	1	950
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		250		300	775		0	200	0
Storage Lanes	1	1		1		0	2		0	1	1
Taper Length (ft)	25			25			25			25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00
Frt		0.850						0.996			0.850
Flt Protected	0.950						0.950			0.950	
Satd. Flow (prot)	1770	1583	0	1863	3539	0	3433	1855	0	1770	1583
Flt Permitted	0.950						0.950			0.950	
Satd. Flow (perm)	1770	1583	0	1863	3539	0	3433	1855	0	1770	1583
Right Turn on Red			Yes			Yes			Yes		Yes
Satd. Flow (RTOR)		522						2			462
Link Speed (mph)	30				30			30		30	
Link Distance (ft)	1269				1792			1735		2109	
Travel Time (s)	28.8				40.7			39.4		47.9	
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
Adj. Flow (vph)	3	0	3	0	384	0	591	618	15	1	1105
Shared Lane Traffic (%)											
Lane Group Flow (vph)	3	3	0	0	384	0	591	633	0	1	1105
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Right
Median Width(ft)	12				24			24		12	
Link Offset(ft)	0				0			0		0	
Crosswalk Width(ft)	16				16			16		16	
Two way Left Turn Lane											
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	9
Number of Detectors	1	1		1	2		1	2		1	1
Detector Template	Left	Right		Left	Thru		Left	Thru		Left	Right
Leading Detector (ft)	20	20		20	100		20	100		20	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0
Detector 1 Size(ft)	20	20		20	6		20	6		20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel											
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 2 Position(ft)					94			94			
Detector 2 Size(ft)					6			6			
Detector 2 Type					Cl+Ex			Cl+Ex			
Detector 2 Channel											
Detector 2 Extend (s)					0.0			0.0			
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Prot	pt+ov
Protected Phases	4	4		1	6		5	2		3	3 5
Permitted Phases		4									

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Detector Phase	4	4		1	6		5	2		3	3 5
Switch Phase											
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		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	3.0		3.0	3.0		3.0	
Recall Mode	None	None		None	C-Max		None	C-Max		None	
Act Effct Green (s)	5.8	5.8			14.0		45.5	65.5		10.0	60.3
Actuated g/C Ratio	0.06	0.06			0.16		0.51	0.73		0.11	0.67
v/c Ratio	0.03	0.01			0.70		0.34	0.47		0.01	0.91
Control Delay (s/veh)	40.0	0.0			43.6		14.8	7.2		36.0	21.0
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0
Total Delay (s/veh)	40.0	0.0			43.6		14.8	7.2		36.0	21.0
LOS	D	A			D		B	A		D	C
Approach Delay (s/veh)	20.0				43.6			10.9		21.0	
Approach LOS	B				D			B		C	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 38 (42%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.91	
Intersection Signal Delay (s/veh): 19.6	Intersection LOS: B
Intersection Capacity Utilization 77.3%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	3	3	384	591	633	1	1105
v/c Ratio	0.03	0.01	0.70	0.34	0.47	0.01	0.91
Control Delay (s/veh)	40.0	0.0	43.6	14.8	7.2	36.0	21.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	40.0	0.0	43.6	14.8	7.2	36.0	21.0
Queue Length 50th (ft)	2	0	112	93	108	1	236
Queue Length 95th (ft)	9	0	141	171	284	5	#811
Internal Link Dist (ft)	1189		1712		1655	2029	
Turn Bay Length (ft)		50		775		200	
Base Capacity (vph)	196	639	550	1736	1351	196	1213
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	0.70	0.34	0.47	0.01	0.91

Intersection Summary

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

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	316	63	19	46	1534	28	1499	264
v/c Ratio	0.62	0.12	0.10	0.30	0.67	0.20	0.69	0.25
Control Delay (s/veh)	44.4	0.4	1.0	48.5	15.3	48.2	17.4	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	44.4	0.4	1.0	48.5	15.3	48.2	17.4	4.2
Queue Length 50th (ft)	89	0	0	25	179	16	289	13
Queue Length 95th (ft)	153	0	0	67	557	47	555	64
Internal Link Dist (ft)		445	748		858		957	
Turn Bay Length (ft)				300		375		
Base Capacity (vph)	631	689	193	443	2285	443	2169	1049
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	0.50	0.09	0.10	0.10	0.67	0.06	0.69	0.25

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	291	0	58	1	0	17	42	1407	5	26	1379	243
Future Volume (veh/h)	291	0	58	1	0	17	42	1407	5	26	1379	243
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	316	0	63	1	0	18	46	1529	5	28	1499	264
Adj No. of Lanes	2	1	0	0	1	0	1	2	0	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	401	0	333	42	2	70	66	2129	7	49	2049	917
Arrive On Green	0.12	0.00	0.21	0.05	0.00	0.05	0.04	0.59	0.59	0.03	0.58	0.58
Sat Flow, veh/h	3442	0	1583	44	39	1498	1774	3618	12	1774	3539	1583
Grp Volume(v), veh/h	316	0	63	19	0	0	46	748	786	28	1499	264
Grp Sat Flow(s),veh/h/ln	1721	0	1583	1581	0	0	1774	1770	1861	1774	1770	1583
Q Serve(g_s), s	8.5	0.0	3.1	0.0	0.0	0.0	2.4	28.6	28.6	1.5	29.4	8.0
Cycle Q Clear(g_c), s	8.5	0.0	3.1	1.1	0.0	0.0	2.4	28.6	28.6	1.5	29.4	8.0
Prop In Lane	1.00		1.00	0.05		0.95	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	401	0	333	114	0	0	66	1041	1095	49	2049	917
V/C Ratio(X)	0.79	0.00	0.19	0.17	0.00	0.00	0.70	0.72	0.72	0.57	0.73	0.29
Avail Cap(c_a), veh/h	598	0	433	123	0	0	420	1041	1095	420	2049	917
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.8	0.0	30.8	43.7	0.0	0.0	45.2	13.9	13.9	45.6	14.6	10.1
Incr Delay (d2), s/veh	4.2	0.0	0.3	0.7	0.0	0.0	12.7	4.3	4.1	10.2	2.3	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	0.0	1.4	0.5	0.0	0.0	1.4	15.1	15.9	0.9	14.8	3.6
LnGrp Delay(d), s/veh	45.0	0.0	31.1	44.4	0.0	0.0	57.9	18.2	18.0	55.9	17.0	10.9
LnGrp LOS	D		C	D			E	B	B	E	B	B
Approach Vol, veh/h		379			19			1580			1791	
Approach Delay, s/veh		42.7			44.4			19.3			16.7	
Approach LOS		D			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.1	61.9		26.0	8.0	61.0	15.6	10.4
Change Period (Y+Rc), s	4.5	6.0		6.0	4.5	6.0	4.5	6.0
Max Green Setting (Gmax), s	22.5	55.0		26.0	22.5	55.0	16.5	5.0
Max Q Clear Time (g_c+I1), s	3.5	30.6		5.1	4.4	31.4	10.5	3.1
Green Ext Time (p_c), s	0.0	12.8		0.3	0.1	14.0	0.6	0.0

Intersection Summary	
HCM 2010 Ctrl Delay, s/veh	20.5
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	324	0	22	263	0	25
Future Vol, veh/h	324	0	22	263	0	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	352	0	24	286	0	27

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	352	0	-	176
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.13	-	-	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.219	-	-	3.319
Pot Cap-1 Maneuver	-	-	1205	-	0	837
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1205	-	-	837
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.6	9.4
HCM LOS			A

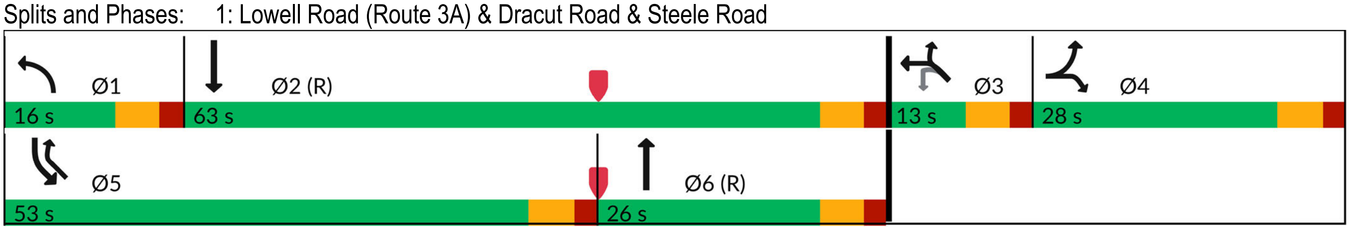
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	837	-	-	1205	-
HCM Lane V/C Ratio	0.032	-	-	0.02	-
HCM Ctrl Dly (s/v)	9.4	-	-	8	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Traffic Volume (vph)	40	2	2	1	658	1	987	441	15	5	0	731
Future Volume (vph)	40	2	2	1	658	1	987	441	15	5	0	731
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		250		300	775		0		200	0
Storage Lanes	1	1		1		0	2		0		1	1
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.97	1.00	1.00	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)	1770	1583	0	1770	3539	0	3433	1853	0	0	1770	1583
Flt Permitted	0.950			0.950			0.950				0.571	
Satd. Flow (perm)	1770	1583	0	1770	3539	0	3433	1853	0	0	1064	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		191						2				405
Link Speed (mph)	30				30			30			30	
Link Distance (ft)	1269				1792			1735			2109	
Travel Time (s)	28.8				40.7			39.4			47.9	
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
Adj. Flow (vph)	50	3	3	1	723	1	1097	490	17	5	0	803
Shared Lane Traffic (%)												
Lane Group Flow (vph)	50	6	0	1	724	0	1097	507	0	0	5	803
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12				24			24			12	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16				16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	15	9
Number of Detectors	1	1		1	2		1	2			1	1
Detector Template	Left	Right		Left	Thru		Left	Thru			Left	Right
Leading Detector (ft)	20	20		20	100		20	100			20	20
Trailing Detector (ft)	0	0		0	0		0	0			0	0
Detector 1 Position(ft)	0	0		0	0		0	0			0	0
Detector 1 Size(ft)	20	20		20	6		20	6			20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 2 Position(ft)					94			94				
Detector 2 Size(ft)					6			6				
Detector 2 Type					Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Perm	Prot	pt+ov
Protected Phases	4	4		1	6		5	2			3	3 5
Permitted Phases		4								3		

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Detector Phase	4	4		1	6		5	2		3	3	3 5
Switch Phase												
Minimum Initial (s)	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	14.0		14.0	14.0		11.0	11.0	
Total Split (s)	28.0	28.0		16.0	26.0		53.0	63.0		13.0	13.0	
Total Split (%)	23.3%	23.3%		13.3%	21.7%		44.2%	52.5%		10.8%	10.8%	
Maximum Green (s)	22.0	22.0		10.0	20.0		47.0	57.0		7.0	7.0	
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	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	C-Max		None	C-Max		None	None	
Act Effct Green (s)	8.8	8.8		5.6	34.9		47.6	86.1			7.0	55.8
Actuated g/C Ratio	0.07	0.07		0.05	0.29		0.40	0.72			0.06	0.47
v/c Ratio	0.39	0.02		0.01	0.70		0.81	0.38			0.08	0.84
Control Delay (s/veh)	60.8	0.2		55.0	44.6		36.9	9.1			56.6	20.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay (s/veh)	60.8	0.2		55.0	44.6		36.9	9.1			56.6	20.7
LOS	E	A		D	D		D	A			E	C
Approach Delay (s/veh)	54.3				44.6			28.1			21.0	
Approach LOS	D				D			C			C	

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 Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.84	
Intersection Signal Delay (s/veh): 30.5	Intersection LOS: C
Intersection Capacity Utilization 74.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBL	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	50	6	1	724	1097	507	5	803
v/c Ratio	0.39	0.02	0.01	0.70	0.81	0.38	0.08	0.84
Control Delay (s/veh)	60.8	0.2	55.0	44.6	36.9	9.1	56.6	20.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	60.8	0.2	55.0	44.6	36.9	9.1	56.6	20.7
Queue Length 50th (ft)	38	0	1	274	390	136	4	227
Queue Length 95th (ft)	69	0	7	#494	411	296	18	364
Internal Link Dist (ft)	1189			1712		1655	2029	
Turn Bay Length (ft)		50	250		775		200	
Base Capacity (vph)	324	446	147	1030	1422	1330	62	973
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	0.15	0.01	0.01	0.70	0.77	0.38	0.08	0.83

Intersection Summary

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

Parking Demand Analysis

Attachment "E"

Parking Demand Observations - Restaurant Depot - 146 Dascomb Road, Andover, MA

Thursday January 8, 2026

Start Time	Under Canopy	Parking Lot	Total
11:00	27	41	68
11:15	26	50	76
11:30	25	48	73
11:45	22	52	74
12:00	23	41	64
12:15	23	35	58
12:30	25	34	59
12:45	21	32	53

4:00	14	23	37
4:15	8	20	28
4:30	16	15	31
4:45	14	18	32
5:00	14	15	29
5:15	17	15	32
5:30	14	17	31
5:45	14	15	29

Saturday January 10, 2026

Start Time	Under Canopy	Parking Lot	Total
11:00	22	65	87
11:15	24	58	82
11:30	26	54	80
11:45	26	47	73
12:00	24	45	69
12:15	27	44	71
12:30	24	39	63
12:45	26	41	67
1:00	26	43	69
1:15	24	35	59
1:30	23	37	60
1:45	21	48	69

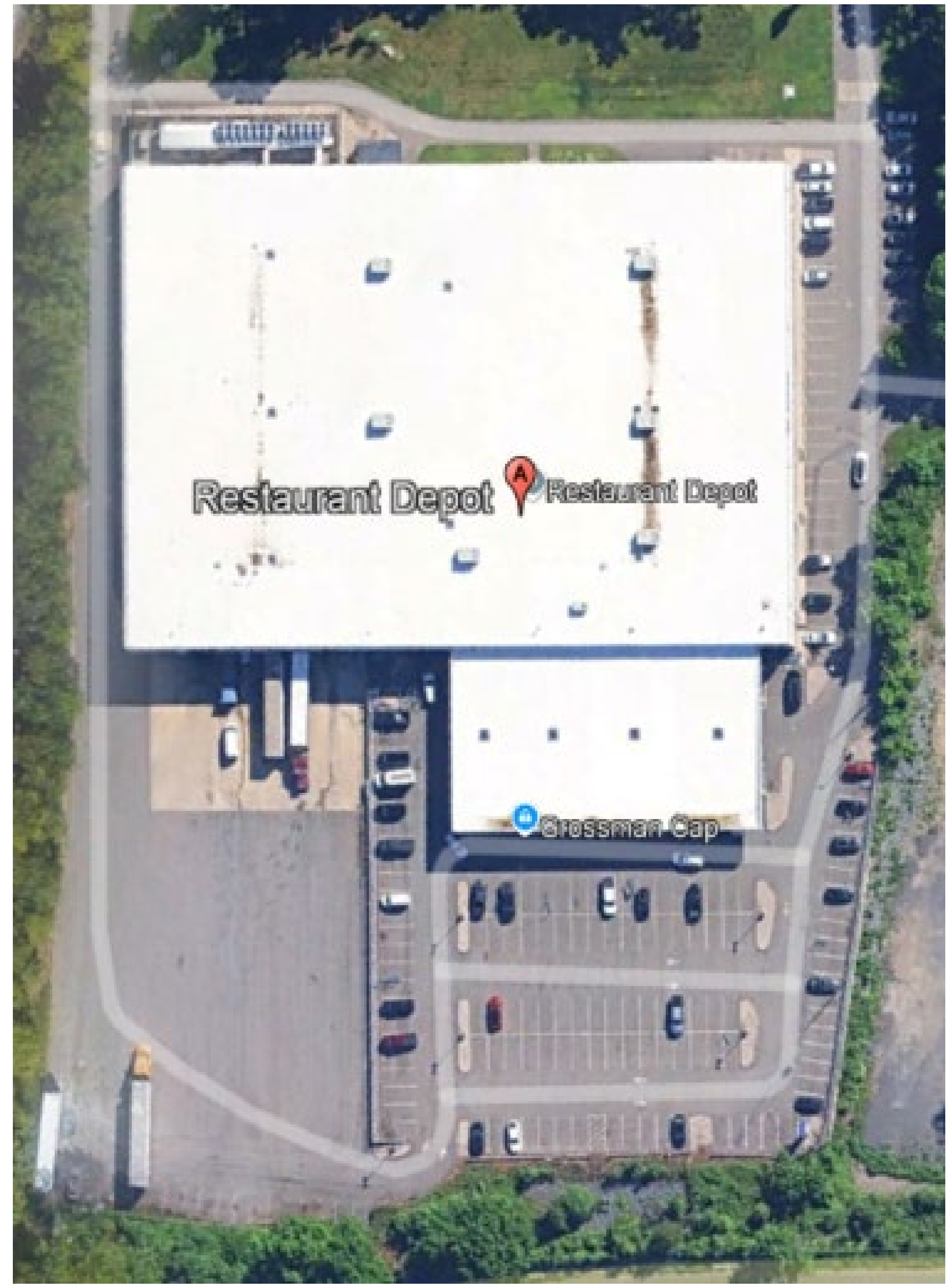
Attachment "E"

Parking Demand Observations - Restaurant Depot - 30 Bodwell Street, Avon, MA

Thursday January 8, 2026

Start Time	Under Canopy	Parking Lot	Total
11:00	29	36	65
11:15	35	34	69
11:30	36	38	74
11:45	37	41	78
12:00	36	41	77
12:15	36	38	74
12:30	33	38	71
12:45	39	40	79

4:00	21	21	42
4:15	22	22	44
4:30	26	21	47
4:45	24	21	45
5:00	20	26	46
5:15	28	23	51
5:30	26	21	47
5:45	16	21	37



Saturday January 10, 2026

Start Time	Under Canopy	Parking Lot	Total
11:00	31	18	49
11:15	37	21	58
11:30	40	24	64
11:45	34	23	57
12:00	37	29	66
12:15	39	25	64
12:30	34	25	59
12:45	36	29	65
1:00	38	26	64
1:15	35	30	65
1:30	38	28	66
1:45	37	28	65

Attachment "F"

FUSS & O'NEILL
50 Commercial Street, Suite 2S
Manchester, NH 03101
603.668.8223
www.fando.com

February 10, 2026

Ms. Brooke Dubowik
Town Planner
Town of Hudson
12 School Street
Hudson, NH 03051

Re: Town of Hudson Planning Board Review
Restaurant Depot Site Plan, 273 Lowell Road
Tax Map 243 Lot 34; Acct. #1350-734
Reference No. 20030249.261

Dear Ms. Dubowik:

Fuss & O'Neill (F&O) has reviewed the first submission of materials received on January 27, 2026, related to the above-referenced project. Authorization to proceed was received on January 28, 2026. 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 constructing a 50,000 square foot commercial restaurant supply building on a previously undeveloped lot. Proposed improvements to the site include the construction of parking areas, drainage, utilities, landscaping and lighting. The site is to be serviced by public water and a private onsite subsurface disposal system.

The following items are noted:

1. **Site Plan Review Codes (HR 275)**
   a. Hudson Regulation (HR) 275-6.C & T.(1)(b) The applicant has proposed site sidewalks to connect to the sidewalk along Green Meadow Drive.
   b. HR 275-6.I. The scope of this review does not include the adequacy of any fire protection provisions for the site. The applicant has shown a proposed eight-inch water line with a fire service connection to the building with one hydrant proposed onsite.
   c. HR 275-6.T. The applicant is proposing limited off-site improvements that include utility connections and driveway installations within the private Green Meadow Drive roadway. The applicant has shown an existing Driveway Access Sign & Utility Easement on the plan.
   d. HR 275-8.C.(2) and Zoning Ordinance (ZO) 334-15.A. The applicant has provided parking calculations on the plan set for both retail and warehouse uses, showing that the site would require 250 spaces as a retail use and 84 spaces as a warehouse use. The applicant has proposed 173 spaces and noted on Site Plan sheet C-301 that the parking criteria varies depending on how Zoning classifies the use. Additional information related to that use classification was not included in the submission documents. The applicant should coordinate with the Town for the use classification and review the need for a possible waiver from parking requirements.
   e. HR 275-8.C.(4) The applicant has proposed a mix of 9 foot wide by 18 foot long and standard 10 foot by 20 foot parking spaces. The Planning Board will need to vote for approval to deviate from the standard parking space dimensions, which the applicant has noted on Site Plan sheet C-301.

f. HR 275-8.C.(6)(b). The applicant has shown a loading dock on the side of the building. It appears that the area will accommodate four loading spaces. We note that five loading spaces are required by the Regulation. The applicant should show and note loading space requirements on the plan set.
g. HR 275-8.C.(11). The applicant has provided six handicap accessible parking spaces for the site which meets the minimum requirement.
h. HR 275-9.F. The applicant did not provide copies of any easement or deeds as part of the package received for review.

2. Administrative Review Codes (HR 276)

a. HR 276-11.1.B.(12)(c). The applicant has shown and met the 100-foot setback required on the southeast side of the site where there are abutting residential uses.
b. HR 276-11.1.B.(13). The applicant should add the required sign note to the plan.
c. HR 276-11.1.B.(16). The applicant has not provided locations of driveways and parking areas within 200 feet of the site.
d. HR 276-11.1.B.(24). The applicant should provide the open space requirement on the plan. We note the required lot coverage number says N/S.
e. HR 276-11.1.B.(25). The applicant has requested a waiver for parking spaces within the side lot line and the setback line.

3. Driveway Review Codes (HR 275-6.B/Chapter 193)

a. HR 193.10.E. The applicant should show driveway sight distance information on the plan.

4. Traffic (HR 275-9.B)

a. Fuss & O'Neill, Inc. has reviewed the Traffic Impact and Access Study prepared by Chappell Engineering Associates, LLC. (CEA) dated January 15, 2026, for the proposed Restaurant Depot development at 273 Lowell Road in Hudson, New Hampshire (Tax Map 234, Block 34, Lots 0). The project proposes the development of a 50,000 square foot (sf) Restaurant Depot store. Access to and egress from the site will be provided via a proposed driveway on the northwest side of the project site onto Green Meadow Drive.
b. The report notes the speed limit along Lowell Road in the vicinity of the project site is 30 mph, increasing to 35 mph further north on Lowell Road. It is our understanding that the speed limit on Lowell Road throughout the project area is 35 mph. The applicant should confirm the speed limit and revise the report and capacity analysis model accordingly as needed.
c. The applicant should confirm that the 2019 count data utilized from the Langan traffic impact study was already seasonally adjusted. The 2019 Existing Peak Hour Traffic Volumes figure provided in the appendix notes that the volumes are “based on traffic volumes observed on 10/08/2019 by Accurate Counts”, which suggests the data may reflect raw counts rather than seasonally adjusted values.
d. Covid adjustments are typically calculated using data from the nearest continuous (permanent) count station. NHDOT Count Station 82229049 is not a continuous count station. The applicant should confirm whether a Covid adjustment is warranted.
e. Although NHDOT typically prefers count data taken within the last 3 years, the use of the 2019 traffic count data from the Langan study appears reasonable in this case given that the 2025 counts don't reflect typical conditions.
f. The applicant should confirm if 2025 counts were collected at the Lowell Road/Dracut Road/Steele Road intersection. If so, how do they compare to the 2019 counts used in the Langan study? Only new counts from the Lowell Road at Rena Avenue intersection were provided.

g. While we agree with the methodology used for trip generation - specifically the use of empirical data from comparable Restaurant Depot sites rather than ITE rates, the applicant should confirm if this analysis accounts for the potential influence of the New Hampshire location. Sites in this border area often experience higher demand due to Massachusetts customers seeking to avoid sales tax, which may affect trip generation.
h. The empirical trip generation data used from other Restaurant Depot sites appears reasonable. However, the source data is from 2018 and therefore predates both COVID related disruptions and recent industry recovery. The applicant should confirm that these older datasets still reflect current operating conditions for comparable Restaurant Depot locations.
i. Restaurant Depot appears to primarily serve restaurants and other food service businesses rather than general retail customers. Given this, is a Saturday peak hour analysis warranted for this land use? If empirical data from comparable sites indicates that weekend activity is minimal or similar to weekday peak hours, it would be helpful for the applicant to note this information.
j. The report description and Synchro lane configuration for the Steele Road intersection approach appears to be miscoded. Pavement markings indicate a shared left turn/thru lane and an exclusive right turn lane, not an exclusive left turn lane and a shared thru/right lane. The applicant should confirm and revise the analysis accordingly.
k. The applicant should confirm whether heavy vehicle percentages were calculated from the count data and incorporated into the Synchro models.
l. The Existing Conditions Synchro model for the Lowell Road at Green Meadow Drive and Rena Avenue intersection appears to omit a southbound through lane, showing only an exclusive left turn lane and a shared thru/right turn lane. The applicant should verify the lane configuration and update the model as necessary.
m. The No-Build and Build Conditions Synchro model for the southbound Lowell Road approach at Dracut Road and Steele Road shows two southbound left turn lanes and a shared thru/right turn lane. The applicant should review if there should be an additional thru lane in the model, or confirm that corridor improvement projects are converting the existing middle thru lane to a left turn lane.
n. Peak hour factor values appear to be set to 0.92 (the default setting) for the Lowell Road at Green Meadow Drive and Rena Avenue intersection in the Synchro model for all conditions. The applicant should clarify how these values were calculated and applied. If PHF data is not available or cannot be calculated, NHDOT Synchro guidelines recommend using a value of 0.90.
o. NHDOT guidance allows for peak hour factors of approaches with peak hour factors under 0.90 to be increased to 0.90 for Future Year conditions. The applicant should update the Synchro model to reflect this.
p. The westbound Rena Avenue approach is posted No Turn on Red. Please confirm that this restriction is reflected in the Synchro model.
q. The storage lane taper lengths appear to be inaccurately modeled in Synchro. The applicant should verify and update the geometric inputs if needed.
r. The applicant should clarify how Davenport Road is treated in the Steele Road intersection phasing. Is it served under a split phase? What level of activity does this approach generate? We note that there is no mention of this approach in the report.
s. The detector settings in the Synchro model appear to retain default detection lengths and placements, while recall and extension settings were updated. The physical detection zones should also reflect field conditions or approved signal plans. The applicant should verify and update the detector lengths and locations as needed.
t. For signalized intersections, NHDOT's preferred Synchro report format is the HCM 2000 report. The applicant should provide HCM 2000 reports for all signalized intersections instead of HCM 2010 reports. The applicant should also provide Lanes, Volumes and Timings reports for each signalized intersection for all scenarios.

u. Signal timings for the Green Meadow intersection were not included in the Synchro output. The applicant should provide the timing sheets or include the timing report with the Synchro reports.
v. The applicant should confirm whether the signal timings/phasing used for both intersections were coordinated with the Town and/or NHDOT, and identify or provide the source of the timing plans.
w. The analysis shows timing changes only during the PM peak under the new adaptive system. The AM peak signal timings appear unchanged across all scenarios in the Synchro model. The applicant should confirm whether any AM peak timing adjustments are anticipated and update Synchro model to reflect if needed.
x. The Lost Time Adjust values appear to be set to 0 seconds. NHDOT Synchro guidance calculates this as 4 seconds – (yellow time + red time). While the impact is likely minor, we recommend the applicant update this parameter for consistency with NHDOT modeling practices.
y. The report notes in several places that the project includes 176 proposed parking spaces. The actual parking space count on the site plans is 173.

5. Utility Design/Conflicts

a. HR 275-9.E & 276-13. The applicant should review with the Town to confirm the availability of sufficient water flow to accommodate the site.
b. HR 275-9.E & Hudson Engineering Technical Guidelines & Typical Details (ETGTD) Detail W-2. There are several locations with drain lines crossing the proposed water service main where invert elevations show the drain would conflict or have minimal separation from the water main if the water main is installed with five feet of cover. The applicant should review proposed drain and water pipe grading and make adjustments as needed. The applicant should also provide a water/drain crossing detail in the plans.
c. HR 275-9.E & 276-13.G. The applicant has not provided a typical design for the individual sewage disposal system as required by the Regulations. The applicant has shown the proposed location on the plan and referenced septic plans that were not provided as part of the review.

6. Drainage Design/Stormwater Management (HR 275-9.A./Chapter 290)

a. HR 290-5.A.(12). The applicant should provide a more detailed I&M Maintenance Log, noting all individual items/practices. This will ensure all proposed drainage features are properly maintained, including but not limited to; individual catch basins and DMHs, subsurface chamber systems, rip rap outlets, closed drainage networks, etc.
b. HR 290-5.A.(12). The applicant should provide project specific information in the I&M document, such as the responsible parties and their contact information.
c. HR 290-5.A.(12). To ensure effective winter maintenance, the applicant should clearly identify designated snow storage areas on the Inspection & Maintenance (I&M) plan, as the maintenance crew does not routinely reference full site plans.
d. HR 290-6.A.(8). The applicant should ensure the plans note a pre-construction meeting is required with the Town Engineer.
e. HR 290-6.A.(9). The applicant should add the required disturbed area note to the plan set. We note AOT Erosion Control Note #7 on Plan Sheet C1-103 calls for 45 days, rather than the Town required 30 days.
f. HR 290-7.B.(16). The applicant should provide locations upon the plan set for proposed snow storage areas. We note snow storage is not allowed within the treatment bays of stormwater basins, prior to pre-treatment. The applicant should review the need for signage and possibly fencing to prevent untreated snow and snow melt from entering the treatment bay.

g. HR 275-8.A.(4). and (5). The applicant should ensure a note is upon the plan set stating the requirement to coordinate the need for a Bond or Escrow with the Town Engineer.
h. HR 275-10.A. The applicant should keep the Town informed of all communication with NHDES in relation to the required Alteration of Terrain Permit being requested to ensure NHDES comments/requirements do not alter the drainage design/calculations.
i. HR 275-10.A. We note the applicant has provided stormwater calculations with the Town approved NRCS Soils. We note that the NHDES AoT permit requires Site Specific Soils to be utilized.
j. HR 275-10.A. The applicant should provide additional information on the outlet structure detail on Plan Sheet C-903 including the following:
   i. The applicant should provide additional information for a trash rack on the 6" orifice.
   ii. We note the detail illustrates a shut off valve. The applicant should provide additional information on the purpose and management of the valve, and review with both NHDES and the Town Engineer on the approval of a valve such as this.
k. ETGTD Detail D-3. The applicant should ensure that the detail on Plan Sheet C-904 states the 4.0 foot minimum cover requirement. We note there are several proposed drain lines within paved areas where there is less than 4.0 feet of cover.
l. The Infiltration Basin (Landscape Bottom) detail does not identify the estimated seasonal high groundwater elevation (ESHGW).
m. The Infiltration Basin (Landscape Bottom) detail says to 'See Details' for the Basin Berm With Impervious Core. The plans show the proposed berm being 6 feet wide, while the Basin Emergency Spillway shows the top of the dike beyond the spillway as 10 feet wide. The applicant should coordinate the plan and details and provide additional detail for the construction of the basin berm.
n. The applicant will be required to comply with all provisions of the Town of Hudson's MS4 permit, including but not limited to annual reporting requirements, construction site stormwater runoff control, and record keeping requirements. The applicant has noted that the project has been designed to meet MS4 requirements.
o. Please note that this review was carried out in accordance with applicable regulations and standards in place in New Hampshire at this time. Note that conditions at the site, including average weather conditions, patterns and trends, and design storm characteristics, may change in the future. In addition, future changes in federal, state or local laws, rules or regulations, or in generally accepted scientific or industry information concerning environmental, atmospheric and geotechnical conditions and developments may affect the information and conclusions set forth in this review. In no way shall Fuss & O'Neill be liable for any of these changed conditions that may impact this review, regardless of the source of or reason for such changed conditions. Other than as described herein, no other investigation or analysis has been requested by the Client or performed by Fuss & O'Neill in preparing this review.

7. Zoning (ZO 334)

a. ZO 334-17 & 334-21. The subject parcel is located within the General One (G-1) zoning district and the applicant has noted this on the plans. The proposed uses of warehouse and retail business are both allowed within the district.
b. ZO 334-35. The applicant has noted that a Conditional Use Permit is required for the Wetlands Buffer impacts of a driveway and stormwater treatment.
c. ZO 334-58. The applicant has shown a proposed freestanding sign location on the plans but has not included any detailed information for that sign.
d. ZO 334-83 and HR 218-4.E. The applicant has noted that the site is not located within a Food Hazard Area.

8. Erosion Control/Wetland Impacts

a. The applicant should note that the Town of Hudson reserves 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 should provide landscaping calculations on the plan showing that the requirements of the Regulation are met.
b. HR 275-8.C.(8). The applicant has proposed to leave existing vegetation around the perimeter of the site and provided screening for the loading area from the parking lot.
c. HR 275-17.D.2. The applicant should note the hours of operation for the site and the relationship of those hours to the site lighting, including if any timers or motion detectors are proposed to reduce light levels after operating hours.
d. HR 275-17.D.6. The applicant has shown light trespass onto the abutting lots around the driveway area and at the corner of lot 33. We also note that not all of the lot boundaries are shown on the lighting plan so light trespass at some abutting lot areas could not be verified.
e. HR 275-17.E.1. The applicant should revise their light pole base detail to match the Regulation.

10. State and Local Permits (HR 275-9.G.)

a. HR 275-9.G. The applicant should list the required permits and their status on the plan set.
b. HR 275-9.G. The applicant should provide copies of any applicable Town, State or Federal approvals or permits.
c. Additional local and state permitting may be required.

11. Other

a. 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. We could not locate a note regarding this requirement on the plans, and it is recommended that these requirements be stated on the plans for the Contractors attention.
b. The applicant has included a detail for sidewalk curb ramps at handicap parking spaces but has not shown their proposed locations on the plans.

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
Bohler, LLC – kcurran@bohlereng.com

CHAPPELL ENGINEERING ASSOCIATES, LLC
Civil • Structural • Transportation• Surveying

Attachment "G"

201 Boston Post Road West
Marlborough, MA 01752
Tel.: (508) 481-7400
Fax: (508) 481-7406
www.chappellengineering.com

Ref.: 25103

March 6, 2026

Ms. Brooke Dubowik
Town Planner
Town of Hudson
12 School Street
Hudson, NH 03051

Reg.: Response to Transportation Peer Review Comments
Proposed Restaurant Depot
273 Lowell Road, Hudson, NH

Dear Ms. Dubowik:

Chappell Engineering Associates (CEA) has prepared this letter in response to transportation peer review comments issued by the Town of Hudson's transportation peer review consultant, Fuss & O'Neill, as outlined in their February 10, 2026, letter to the Town of Hudson Planning Department. The letter included comments specific to the initial Traffic Impact and Access Study[1] and site plans prepared for the above-referenced project. Comments related to this plan are provided under separate cover.

As documented in this response letter, based on the results of supplemental analyses requested by Fuss & O'Neill, the findings of the initial traffic study remain unchanged. Project-related traffic increases are expected to result in only minimal impacts to area traffic operations, with overall delays expected to increase by less than 1 second as compared to future No-Build conditions.

To facilitate your review of this document, responses are provided to each individual comment issued in the peer review letter. Responses to comments on the site plan are provided under separate cover.

[1] *Traffic Impact and Access Study, Restaurant Depot, 273 Lowell Road, Hudson, New Hampshire;* Chappell Engineering Associates, January 15, 2026.

Comment a: "Fuss & O'Neill, Inc. has reviewed the Traffic Impact and Access Study prepared by Chappell Engineering Associates, LLC. (CEA) dated January 15, 2026, for the proposed Restaurant Depot development at 273 Lowell Road in Hudson, New Hampshire (Tax Map 234, Block 34, Lots 0). The project proposes the development of a 50,000 square foot (sf) Restaurant Depot store. Access to and egress from the site will be provided via a proposed driveway on the northwest side of the project site onto Green Meadow Drive."

Response: Comment noted.

Comment b: "The report notes the speed limit along Lowell Road in the vicinity of the project site is 30 mph, increasing to 35 mph further north on Lowell Road. It is our understanding that the speed limit on Lowell Road throughout the project area is 35 mph. The applicant should confirm the speed limit and revise the report and capacity analysis model accordingly as needed."

Response: CEA has confirmed that the speed limit on Lowell Road within the entirety of the study area is 35 mph and only decreases to 30 mph north of the study area, at Executive Drive. The capacity analyses have been revised to reflect this higher 35 mph speed limit as requested.

Comment c: "The applicant should confirm that the 2019 count data utilized from the Langan traffic impact study was already seasonally adjusted. The 2019 Existing Peak Hour Traffic Volumes figure provided in the appendix notes that the volumes are "based on traffic volumes observed on 10/08/2019 by Accurate Counts", which suggests the data may reflect raw counts rather than seasonally adjusted values."

Response: In accordance with New Hampshire Department of Transportation (NHDOT) guidelines for preparation of traffic impact studies, the October 2019 traffic volumes collected by Langan were seasonally adjusted to represent peak month conditions. It is noted that the Langan traffic study was reviewed and approved by both the NHDOT and the Town of Hudson, and serves as the basis for the off-site roadway improvements currently under construction along the Lowell Street corridor.

Comment d: "Covid adjustments are typically calculated using data from the nearest continuous (permanent) count station. NHDOT Count Station 82229049 is not a continuous count station. The applicant should confirm whether a Covid adjustment is warranted."

Response: The 2019 traffic count data were collected prior to the impact of COVID-19 on area traffic volumes and therefore do not require a COVID adjustment. It is again noted that these volumes, which were seasonally adjusted to peak month conditions were reviewed and approved by both the NHDOT and Town of Hudson, and represent the basis for the for the off-site roadway improvements currently under construction along the Lowell Street corridor.

Comment e: "Although NHDOT typically prefers count data taken within the last 3 years, the use of the 2019 traffic count data from the Langan study appears reasonable in this case given that the 2025 counts don't reflect typical conditions."

Response: CEA concurs with F&O that typically traffic count data less than 3 years old is preferred. However, as noted in the traffic study, a review of current traffic counts reveals that baseline volumes from 2019 represent a higher more conservative baseline conditions, and therefore were utilized for analysis purposes.

Comment f: "The applicant should confirm if 2025 counts were collected at the Lowell Road/Dracut Road/Steele Road intersection. If so, how do they compare to the 2019 counts used in the Langan study? Only new counts from the Lowell Road at Rena Avenue intersection were provided."

Response: Traffic counts conducted in 2025 were conducted at the intersection of Lowell Road with Rena Avenue. Based on a review of the collected data these volumes were lower than the 2019 baseline condition utilized in the Langan study for the HLC project. Traffic counts were not conducted in 2025 at the intersection of Lowell Road with Dracut Road and Steele Road, as almost every vehicle that travels through this intersection also travels through the intersection of Lowell Road with Rena Avenue, and as such would also represent a less conservative assessment than the prior 2019 Langan data. Specifically, based on a review of the 2019 existing Langan traffic volume networks, during the weekday AM peak hour, of the 1,990 vehicles that pass through the intersection of Lowell Road with Dracut Road and Steele Road, 1,987 vehicles (99.8%) either arrive from or depart to the intersection of Lowell Road with Rena Avenue. Similarly, during the weekday PM peak hour, of the 2,426 vehicles that pass through this intersection, 2,416 (99.6%) either arrive from or depart to the intersection of Lowell Road with Rena Avenue.

Comment g: "While we agree with the methodology used for trip generation - specifically the use of empirical data from comparable Restaurant Depot sites rather than ITE rates, the applicant should confirm if this analysis accounts for the potential influence of the New Hampshire location. Sites in this border area often experience higher demand due to Massachusetts customers seeking to avoid sales tax, which may affect trip generation."

Response: Based on consultation with Restaurant Depot, it is expected that the proposed Hudson facility will be one of their slower stores, given that the other stores monitored to develop the trip generation data serve larger markets. It is also noted that food is not subject to sales tax in Massachusetts, and as such there is no financial incentive to travel to the site to avoid sales tax.

Comment h: "The empirical trip generation data used from other Restaurant Depot sites appears reasonable. However, the source data is from 2018 and therefore predates both COVID related disruptions and recent industry recovery. The applicant should confirm that these older datasets still reflect current operating conditions for comparable Restaurant Depot locations."

Response: Based on consultation with Restaurant Depot, there has been no notable change is site specific sales since pre-COVID conditions. It is again noted that their expectation is the Hudson facility will represent a slower store than the sites included in the trip generation assessment as those stores serve larger market areas.

Comment i: "Restaurant Depot appears to primarily serve restaurants and other food service businesses rather than general retail customers. Given this, is a Saturday peak hour analysis warranted for this land use? If empirical data from comparable sites indicates that weekend activity is minimal or similar to weekday peak hours, it would be helpful for the applicant to note this information."

Response: Based on consultation with Restaurant Depot, the majority of their sales occur during weekday conditions, as restaurants typically stock up for their heavier sales periods which occur during the weekend. It is also noted that area traffic volumes are generally much lower during Saturday conditions than during corresponding weekday conditions. Based on traffic count data published by the NHDOT for Count Station 82229049, located on Route 3, south of Rena Avenue, weekday daily traffic was determined to be approximately 12 percent higher than the corresponding Saturday traffic, with weekday PM traffic nearly 200 vehicles per hour higher than the corresponding Saturday midday peak. As such, the weekday PM peak hour represents the critical time period for project impacts. It is noted that a Saturday analysis was not required by the NHDOT or Town of Hudson for the larger HCL project.

Comment j: "The report description and Synchro lane configuration for the Steele Road intersection approach appears to be miscoded. Pavement markings indicate a shared left turn/thru lane and an exclusive right turn lane, not an exclusive left turn lane and a shared thru/right lane. The applicant should confirm and revise the analysis accordingly."

Response: Consistent with the NHDOT approved Langhan traffic study, Steele Road has been modeled as an exclusive left turn lane (vehicles turning to Lowell Road northbound) and an exclusive right turn lane (vehicles turning onto Dracut Road or River Road).

Comment k: "The applicant should confirm whether heavy vehicle percentages were calculated from the count data and incorporated into the Synchro models."

Response: The heavy vehicle percentages utilized in the analyses provided in this response document are based on the approved heavy vehicle percentages included in the capacity analysis worksheets from the Langan traffic study.

Comment l: "The Existing Conditions Synchro model for the Lowell Road at Green Meadow Drive and Rena Avenue intersection appears to omit a southbound through lane, showing only an exclusive left turn lane and a shared thru/right turn lane. The applicant should verify the lane configuration and update the model as necessary.*"*

Response: As requested by Fuss & O'Neill, the existing conditions capacity analyses have been corrected to reflect a three lane approach on Lowell Road southbound at Rena Avenue, including an exclusive left-turn lane, a through lane and a shared through/right-turn lane.

Comment m: "The No-Build and Build Conditions Synchro model for the southbound Lowell Road approach at Dracut Road and Steele Road shows two southbound left turn lanes and a shared thru/right turn lane. The applicant should review if there should be an additional thru lane in the model, or confirm that corridor improvement projects are converting the existing middle thru lane to a left turn lane.*"*

Response: CEA has confirmed that the proposed improvements at the intersection of Lowell Road with Dracut Road and River Road include the conversion of the middle through lane to a second exclusive left-turn lane onto Dracut Road, with only a single through lane provided for southbound traffic from Lowell Road to River Road. The conceptual improvement plan depicting these improvements is provided as an attachment to this letter.

Comment n: "Peak hour factor values appear to be set to 0.92 (the default setting) for the Lowell Road at Green Meadow Drive and Rena Avenue intersection in the Synchro model for all conditions. The applicant should clarify how these values were calculated and applied. If PHF data is not available or cannot be calculated, NHDOT Synchro guidelines recommend using a value of 0.90."

Response: As requested by Fuss & O'Neill, the peak hour factors utilized in the analyses provided in this response document are based on the approved peak hour factors included in the capacity analysis worksheets from the Langan traffic study. The peak hour factors at the intersection of Lowell Road with Rena Avenue that were below 0.90 under existing conditions have been increased to 0.90 under future conditions, consistent with NHDOT recommended practice.

Comment o: "NHDOT guidance allows for peak hour factors of approaches with peak hour factors under 0.90 to be increased to 0.90 for Future Year conditions. The applicant should update the Synchro model to reflect this."

Response: As requested by Fuss & O'Neill, the future condition peak hour factors have been adjusted to 0.90 where warranted.

Comment p: "The westbound Rena Avenue approach is posted No Turn on Red. Please confirm that this restriction is reflected in the Synchro model."

Response: As requested by Fuss & O'Neill, the right turn restriction on Rena Avenue has been incorporated into the capacity analyses.

Comment q: "The storage lane taper lengths appear to be inaccurately modeled in Synchro. The applicant should verify and update the geometric inputs if needed."

Response: As requested by Fuss & O'Neill, storage lane lengths, where necessary, have been adjusted.

Comment r: "The applicant should clarify how Davenport Road is treated in the Steele Road intersection phasing. Is it served under a split phase? What level of activity does this approach generate? We note that there is no mention of this approach in the report."

Response: The signal phasing utilized for the intersection of Lowell Road with Dracut Road and River Road was obtained from the mitigated capacity analysis worksheets for this location, as provided in the NHDOT approved Langhan traffic study for the HLC project. This proposed phasing did not include Davenport Road in the mitigated signal analysis, nor are traffic volumes for this approach included in either the existing or proposed traffic volumes as outlined in that report.

It is noted that based on aerial imagery, this small private dead end roadway, that is signed 'Do Not Enter' to public traffic, appears to provide access to only two residential properties, with a number of used vehicles stored in the rear of the last lot. As such, it is likely that the total volume either entering or exiting this corridor during peak hours amounts to 1 or 2 vehicles, or less. This level of traffic, even if called on an exclusive phase once or twice per hour, would result in no notable impact to the overall traffic operations at this location during peak hours.

Comment s: “The detector settings in the Synchro model appear to retain default detection lengths and placements, while recall and extension settings were updated. The physical detection zones should also reflect field conditions or approved signal plans. The applicant should verify and update the detector lengths and locations as needed.”

Response: The Synchro model reflects the timing and phasing plan as included in the Langhan study for the HCL. It is noted that both intersections will operate under adaptive signal control, and as such will operate under optimized operations under future No-Build and Build conditions. As the conceptual improvement plans provided in the HCL report did not identify the detector lengths and locations, default Synchro values were utilized. It is noted that modifications to these inputs result in no perceptible change to either the vehicle delay or queuing results as presented in the TIAS or this updated response letter.

Comment t: “For signalized intersections, NHDOT’s preferred Synchro report format is the HCM 2000 report. The applicant should provide HCM 2000 reports for all signalized intersections instead of HCM 2010 reports. The applicant should also provide Lanes, Volumes and Timings reports for each signalized intersection for all scenarios.”

Response: As requested by Fuss & O’Neill, capacity analyses were run utilizing the HCM 2000 methodology, with the Lanes, Volumes and Timings reports also provided for each location under each analysis scenario. The revised capacity analysis worksheets and summary table are provided in the appendix of this document.

Comment u: “Signal timings for the Green Meadow intersection were not included in the Synchro output. The applicant should provide the timing sheets or include the timing report with the Synchro reports.”

Response: As requested by Fuss & O’Neill, signal timing sheets are included with the updated Synchro reports.

Comment v: “The applicant should confirm whether the signal timings/phasing used for both intersections were coordinated with the Town and/or NHDOT, and identify or provide the source of the timing plans.”

Response: The timing and phasing plans for the signalized locations were obtained from the Langhan traffic study that was provided by the Town and has been approved by both NHDOT and the Town of Hudson. As previously noted, both study area locations will operate under adaptive signal control and as such will operate under optimized signal operations.

Comment w: "The analysis shows timing changes only during the PM peak under the new adaptive system. The AM peak signal timings appear unchanged across all scenarios in the Synchro model. The applicant should confirm whether any AM peak timing adjustments are anticipated and update Synchro model to reflect if needed."

Response: In order to allow for a comparison of project impacts between No-Build and Build conditions, the future condition timing plan was not modified between these conditions.

Comment x: "The Lost Time Adjust values appear to be set to 0 seconds. NHDOT Synchro guidance calculates this as 4 seconds – (yellow time + red time). While the impact is likely minor, we recommend the applicant update this parameter for consistency with NHDOT modeling practices."

Response: As requested by Fuss & O'Neill, the lost time has been adjusted to 4 seconds – (yellow time + red time) under all analysis scenarios.

Comment y: "The report notes in several places that the project includes 176 proposed parking spaces. The actual parking space count on the site plans is 173."

Response: CEA notes that the current parking space count on the site plan is 173 spaces.

As summarized in this response letter, based on the results of the supplemental analysis provided in response to the peer review comments, the findings of the initial TIAS remain unchanged, that project-related traffic increases are expected to result in no notable impact to area traffic operations. Proposed improvements currently under construction to accommodate the HCL project provide ample reserve capacity to accommodate project-related traffic increases, with project-related traffic expected to result in only minor increases to overall delays, of approximately 1 second per vehicle, or less.

<u>Attachment "G"</u>

We trust the enclosed information adequately addresses the peer review comments issued on the project. Please feel free to contact me directly should you have any questions.

Sincerely,

Chappell Engineering Associates

Shaun P. Kelly

Shaun P. Kelly
Senior Project Manager

Attachments

APPENDIX

Traffic Count Data
Conceptual Improvement Plans
Capacity Analysis Worksheets

Traffic Count Data

Attachment "G"

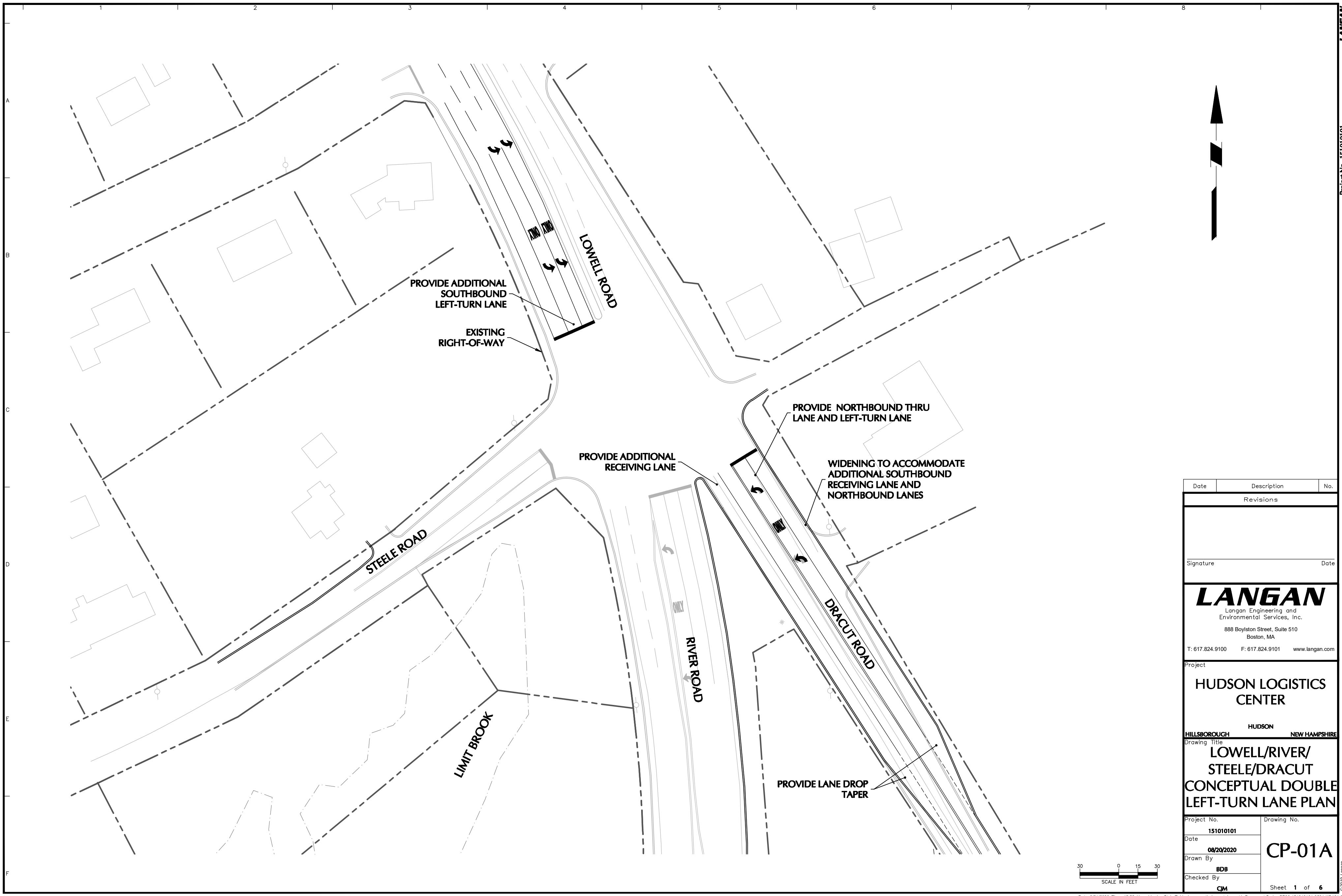
Traffic Count Data Comparison - Route 3, Hudson, New Hampshire

Source: NHDOT Count Station 82229049

Date	Daily Traffic	Peak Hour
Tuesday, August 11, 2020	23376	1984
Wednesday, August 12, 2020	24046	2029
Thursday, August 13, 2020	24885	2183
Friday, August 14, 2020	25484	2122
Weekday Average	24448	2080
Saturday, August 15, 2020	21739	1909

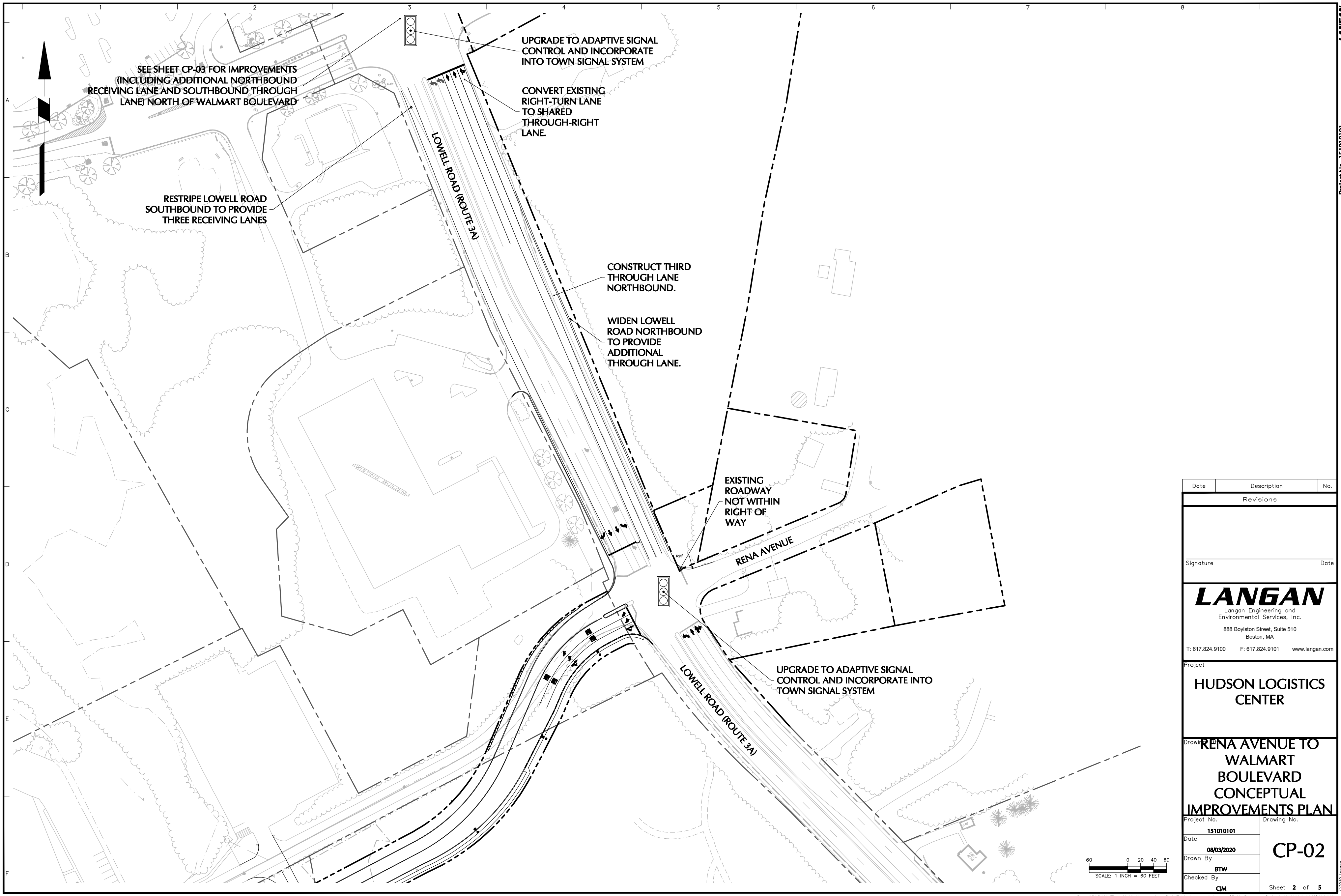
Conceptual Improvement Plans

Attachment "G"



Date: 8/21/2020 Time: 15:52 User: bburke Style Table: Langan.stb Layout: Layout1 Document Code: CP06-151010101-0501-KO101-0108

Attachment "G"



Date: 8/28/2020 Time: 08:43 User: cmclean Style Table: Langan.stb Layout: CP-02 Document Code: 151010101-0501-KO101-0107

Capacity Analysis Worksheets

Table 3
Level-of-Service Analysis Summary

Location/Peak Hour	2025 Existing				2027 No-Build				2027 Build				2037 No-Build				2037 Build			
Movement	v/c[a]	Delay[b]	LOS[c]	Max Q[d]	v/c	Delay	LOS	Max Q	v/c	Delay	LOS	Max Q	v/c	Delay	LOS	Max Q	v/c	Delay	LOS	Max Q
Lowell Road at Green Meadow Drive and Rena Avenue																				
Weekday AM Peak																				
EB LT/TH	0.02	26.0	C	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EB RT	0.01	0.0	A	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EB LT	--	--	--	--	0.53	41.4	D	4	0.63	46.7	D	4	0.53	41.4	D	4	0.63	46.7	D	4
EB TH/RT	--	--	--	--	0.06	0.2	A	0	0.07	0.3	A	0	0.06	0.2	A	0	0.07	0.3	A	0
WB ALL	0.18	27.4	C	2	0.27	39.1	D	2	0.27	39.5	D	2	0.27	39.1	D	2	0.27	39.5	D	2
NB LT	0.10	29.1	C	1	0.24	35.5	D	2	0.29	35.9	D	3	0.24	35.5	D	2	0.29	35.9	D	3
NB TH/RT	0.41	4.1	A	9	0.52	8.0	A	11	0.52	7.9	A	11	0.58	8.7	A	13	0.58	8.6	A	13
SB LT	0.04	29.6	C	1	0.05	35.3	D	1	0.05	35.6	D	1	0.06	35.4	D	1	0.06	35.6	D	1
SB TH/RT	0.35	3.8	A	7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB TH	--	--	--	--	0.48	10.9	B	10	0.48	11.1	B	10	0.53	11.5	B	11	0.53	11.8	B	11
SB RT	--	--	--	--	0.23	2.1	A	1	0.27	2.2	A	1	0.23	2.1	A	1	0.27	2.2	A	1
Intersection	**--**	**4.6**	**A**	--	**--**	**11.4**	**B**	--	**--**	**12.0**	**B**	--	**--**	**11.8**	**B**	--	**--**	**12.4**	**B**	--
Weekday PM Peak																				
EB LT/TH	0.32	38.0	D	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EB RT	0.07	0.5	A	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
EB LT	--	--	--	--	0.59	42.8	D	6	0.62	43.6	D	6	0.59	42.8	D	6	0.62	43.6	D	6
EB TH/RT	--	--	--	--	0.10	0.4	A	0	0.11	0.4	A	0	0.10	0.4	A	0	0.11	0.4	A	0
WB ALL	0.09	33.5	C	1	0.15	48.3	D	1	0.15	48.8	D	1	0.16	48.4	D	2	0.16	48.9	D	2
NB LT	0.01	39.5	D	0	0.24	46.7	D	2	0.27	47.3	D	3	0.24	46.7	D	2	0.27	47.3	D	3
NB TH/RT	0.48	7.1	A	11	0.57	12.1	B	18	0.57	12.3	B	17	0.65	14.6	B	21	0.66	14.9	B	21
SB LT	0.16	39.3	D	2	0.18	46.6	D	2	0.18	47.1	D	2	0.19	46.6	D	2	0.19	47.0	D	2
SB TH/RT	0.47	5.4	A	11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SB TH	--	--	--	--	0.60	13.9	B	18	0.61	14.4	B	18	0.66	15.1	B	21	0.67	15.7	B	22
SB RT	--	--	--	--	0.25	3.3	A	2	0.27	3.4	A	2	0.25	3.9	A	2	0.27	4.0	A	2
Intersection	**--**	**7.4**	**A**	--	**--**	**15.5**	**B**	--	**--**	**16.0**	**B**	--	**--**	**16.9**	**B**	--	**--**	**17.5**	**B**	--

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

[a] Volume-to-capacity ratio.
[b] Average control delay (sec./vehicle).
[c] Level of service.
[d] 95th percentile queue in vehicles, assuming 25 feet/vehicle.

Table 3
Level-of-Service Analysis Summary

Location/Peak Hour	2025 Existing				2027 No-Build				2027 Build				2037 No-Build				2037 Build			
Movement	v/c[a]	Delay[b]	LOS[c]	Max Q[d]	v/c	Delay	LOS	Max Q	v/c	Delay	LOS	Max Q	v/c	Delay	LOS	Max Q	v/c	Delay	LOS	Max Q
Lowell Road at Dracut Road and Steele Road																				
Weekday AM Peak																				
EB LT	0.02	33.0	C	0	0.01	37.5	D	0	0.01	37.5	D	0	0.01	37.5	D	0	0.01	37.5	D	0
EB TH/RT	0.00	0.0	A	0	0.00	0.0	A	0	0.00	0.0	A	0	0.00	0.0	A	0	0.00	0.0	A	0
NWB LT/TH	0.00	30.0	C	0	0.00	34.0	C	0	0.00	34.0	C	0	0.00	34.0	C	0	0.00	34.0	C	0
NWB RT	0.81	12.7	B	10	0.87	17.8	B	18	0.87	17.4	B	19	0.86	15.5	B	31	0.86	16.0	B	32
NB LT	0.00	0.0	A	0	0.00	0.0	A	0	0.00	0.0	A	0	0.00	0.0	A	0	0.00	0.0	A	0
NB TH/RT	0.38	26.7	C	4	0.28	27.5	C	5	0.30	28.3	C	5	0.53	37.1	D	5	0.54	37.2	D	5
SB LT	0.70	24.2	C	13	0.39	19.4	B	6	0.38	18.8	B	6	0.32	13.5	B	6	0.33	13.5	B	6
SB TH/RT	0.22	4.7	A	3	0.41	5.7	A	9	0.41	5.8	A	9	0.45	6.2	A	10	0.45	6.2	A	10
Intersection	--	**15.2**	**B**	--	--	**16.5**	**B**	--	--	**16.5**	**B**	--	--	**15.6**	**B**	--	--	**15.8**	**B**	--
Weekday PM Peak																				
EB LT	0.27	52.1	D	2	0.26	55.0	E	3	0.26	55.0	E	3	0.29	55.3	E	3	0.29	55.3	E	3
EB TH/RT	0.02	0.2	A	0	0.01	0.0	A	0	0.01	0.0	A	0	0.01	0.0	A	0	0.01	0.0	A	0
NWB LT/TH	0.06	49.0	D	1	0.06	54.0	D	1	0.06	54.0	D	1	0.08	54.8	D	1	0.08	54.8	D	1
NWB RT	0.69	13.6	B	11	0.77	14.9	B	10	0.78	15.1	B	10	0.82	18.2	B	13	0.82	17.9	B	12
NB LT	0.01	50.0	D	0	0.01	53.0	D	0	0.01	53.0	D	0	0.01	53.0	D	0	0.01	53.0	D	0
NB TH/RT	0.67	42.4	D	12	0.52	35.3	D	13	0.52	35.5	D	13	0.65	41.3	D	18	0.64	41.1	D	18
SB LT	1.20	134.9	F	45	0.76	36.4	D	15	0.76	36.4	D	15	0.76	33.6	C	15	0.76	33.6	C	15
SB TH/RT	0.17	7.3	A	4	0.33	7.5	A	9	0.33	7.5	A	10	0.37	8.0	A	11	0.37	8.0	A	11
Intersection	--	**61.5**	**E**	--	--	**26.4**	**C**	--	--	**26.5**	**C**	--	--	**27.7**	**C**	--	--	**27.7**	**C**	--

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

[a] Volume-to-capacity ratio.
[b] Average control delay (sec./vehicle).
[c] Level of service.
[d] 95th percentile queue in vehicles, assuming 25 feet/vehicle.

Table 4
Unsignalized Intersection Level-of-Service Analysis Summary

Location/Peak Hour/Movement	2025 Existing				2027 Build				2037 Build			
	V/C[a]	Delay[b]	LOS[c]	Queue[d]	V/C	Delay	LOS	Queue	V/C	Delay	LOS	Queue
Green Meadow Drive at Site Driveway												
Weekday AM Peak Hour												
WB LT/TH	--	--	--	--	0.03	0.9	A	0	0.03	0.9	A	0
NB LT/RT	--	--	--	--	0.02	8.9	A	0	0.02	8.9	A	0
Weekday PM Peak Hour												
WB LT/TH	--	--	--	--	0.02	0.6	A	0	0.02	0.6	A	0
NB LT/RT	--	--	--	--	0.03	9.5	A	0	0.03	9.5	A	0

WB = westbound; NB = northbound; LT = left-turn; TH = through; RT = right-turn

[a] Volume-to-capacity ratio.
[b] Average control delay in seconds per vehicle.
[c] Level of service.
[d] 95th percentile queue in feet, assuming 25 feet per vehicle.

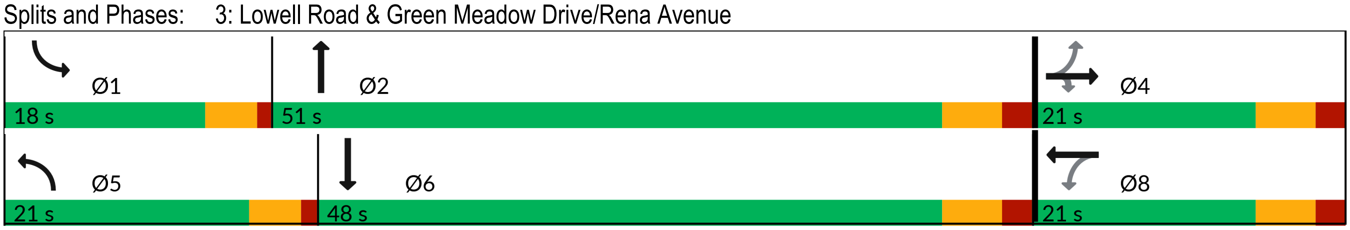
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	0	2	1	1	32	15	1070	2	7	948	51
Future Volume (vph)	3	0	2	1	1	32	15	1070	2	7	948	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		50	0		0	300		0	350		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			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						0.992	
Flt Protected		0.950			0.999		0.950			0.950		
Satd. Flow (prot)	0	1805	1214	0	1606	0	1805	3538	0	1570	3514	0
Flt Permitted		0.769			0.991		0.950			0.950		
Satd. Flow (perm)	0	1461	1214	0	1593	0	1805	3538	0	1570	3514	0
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)			91								8	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		742			828			938			1037	
Travel Time (s)		16.9			18.8			18.3			20.2	
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 (%)	0%	0%	33%	9%	0%	3%	0%	2%	20%	15%	2%	0%
Adj. Flow (vph)	4	0	3	1	1	38	18	1259	2	7	998	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	4	3	0	40	0	18	1261	0	7	1052	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		2	1		2		1	2		1	2	
Detector Template		Thru	Right		Thru		Left	Thru		Left	Thru	
Leading Detector (ft)		100	20		100		20	100		20	100	
Trailing Detector (ft)		0	0		0		0	0		0	0	
Detector 1 Position(ft)		0	0		0		0	0		0	0	
Detector 1 Size(ft)		6	20		6		20	6		20	6	
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8								
Detector Phase	4	4	4	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	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	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		16.5	45.0		13.5	42.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		3.5	4.0		3.5	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		-2.0	-2.0		-2.0		-0.5	-2.0		-0.5	-2.0	
Total Lost Time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	Max		None	Max	
Act Effct Green (s)		8.8	8.8		9.3		6.9	56.4		6.5	56.3	
Actuated g/C Ratio		0.13	0.13		0.14		0.11	0.87		0.10	0.86	
v/c Ratio		0.02	0.01		0.18		0.10	0.41		0.04	0.35	
Control Delay (s/veh)		26.0	0.0		27.4		29.1	4.1		29.6	3.8	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)		26.0	0.0		27.4		29.1	4.1		29.6	3.8	
LOS		C	A		C		C	A		C	A	
Approach Delay (s/veh)		14.9			27.4			4.4			3.9	
Approach LOS		B			C			A			A	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 65.2
Natural Cycle: 45
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.41
Intersection Signal Delay (s/veh): 4.6 — Intersection LOS: A
Intersection Capacity Utilization 46.2% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Lowell Road & Green Meadow Drive/Rena Avenue



Lane Group	EBT	EBR	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	4	3	40	18	1261	7	1052
v/c Ratio	0.02	0.01	0.18	0.10	0.41	0.04	0.35
Control Delay (s/veh)	26.0	0.0	27.4	29.1	4.1	29.6	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	26.0	0.0	27.4	29.1	4.1	29.6	3.8
Queue Length 50th (ft)	1	0	10	5	0	2	0
Queue Length 95th (ft)	9	0	42	25	214	15	186
Internal Link Dist (ft)	662		748		858		957
Turn Bay Length (ft)		50		300		350	
Base Capacity (vph)	388	389	423	479	3062	343	3035
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	0.01	0.01	0.09	0.04	0.41	0.02	0.35

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	0	2	1	1	32	15	1070	2	7	948	51
Future Volume (vph)	3	0	2	1	1	32	15	1070	2	7	948	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85		0.87		1.00	1.00		1.00	0.99	
Flt Protected		0.95	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1805	1214		1605		1805	3537		1570	3516	
Flt Permitted		0.77	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1462	1214		1592		1805	3537		1570	3516	
Peak-hour factor, PHF	0.80	0.80	0.80	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.95
Adj. Flow (vph)	4	0	2	1	1	38	18	1259	2	7	998	54
RTOR Reduction (vph)	0	0	3	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	4	0	0	40	0	18	1261	0	7	1050	0
Heavy Vehicles (%)	0%	0%	33%	9%	0%	3%	0%	2%	20%	15%	2%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		3.2	3.2		3.2		1.3	51.8		1.1	51.6	
Effective Green, g (s)		5.2	5.2		5.2		1.8	53.8		1.6	53.6	
Actuated g/C Ratio		0.07	0.07		0.07		0.02	0.74		0.02	0.74	
Clearance Time (s)		6.0	6.0		6.0		4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		104	86		114		44	2621		34	2595	
v/s Ratio Prot							c0.01	c0.36		0.00	0.30	
v/s Ratio Perm		0.00	0.00		c0.03							
v/c Ratio		0.04	0.00		0.35		0.41	0.48		0.21	0.40	
Uniform Delay, d1		31.4	31.3		32.1		34.9	3.8		34.9	3.5	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.2	0.0		1.9		6.1	0.6		3.0	0.5	
Delay (s)		31.5	31.3		34.0		41.0	4.4		37.9	4.0	
Level of Service		C	C		C		D	A		D	A	
Approach Delay (s/veh)		31.4			34.0			4.9			4.2	
Approach LOS		C			C			A			A	

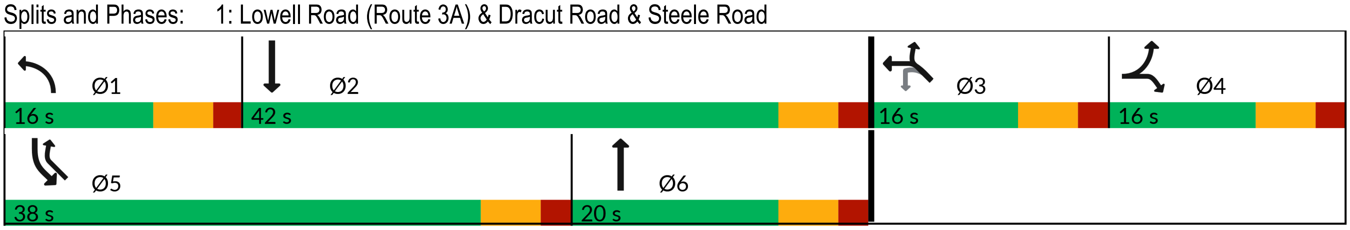
Intersection Summary			
HCM 2000 Control Delay (s/veh)	5.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	72.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	2	0	2	0	247	0	452	482	12	1	792
Future Volume (vph)	2	0	2	0	247	0	452	482	12	1	792
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		200		300	775		0	100	0
Storage Lanes	1	1		1		0	1		0	1	1
Taper Length (ft)	25			25			25			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)	1805	1214	0	1900	3574	0	1770	3561	0	1805	1583
Flt Permitted	0.950						0.950			0.950	
Satd. Flow (perm)	1805	1214	0	1900	3574	0	1770	3561	0	1805	1583
Right Turn on Red			Yes			Yes			Yes		Yes
Satd. Flow (RTOR)		566						3			505
Link Speed (mph)	30				35			35		30	
Link Distance (ft)	1269				1792			1735		2109	
Travel Time (s)	28.8				34.9			33.8		47.9	
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	309	0	491	524	13	1	921
Shared Lane Traffic (%)											
Lane Group Flow (vph)	3	3	0	0	309	0	491	537	0	1	921
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Right
Median Width(ft)	12				12			12		12	
Link Offset(ft)	0				0			0		0	
Crosswalk Width(ft)	16				16			16		16	
Two way Left Turn Lane											
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	9
Number of Detectors	1	1		1	2		1	2		1	1
Detector Template	Left	Right		Left	Thru		Left	Thru		Left	Right
Leading Detector (ft)	20	20		20	100		20	100		20	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0
Detector 1 Size(ft)	20	20		20	6		20	6		20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel											
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 2 Position(ft)					94			94			
Detector 2 Size(ft)					6			6			
Detector 2 Type					Cl+Ex			Cl+Ex			
Detector 2 Channel											
Detector 2 Extend (s)					0.0			0.0			
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Prot	pt+ov
Protected Phases	4	4		1	6		5	2		3	3 5

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Permitted Phases		4									
Detector Phase	4	4		1	6		5	2		3	3 5
Switch Phase											
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		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)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	
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	3.0		3.0	3.0		3.0	
Recall Mode	None	None		None	Max		None	Max		None	
Act Effct Green (s)	7.8	7.8			16.3		28.2	48.6		12.2	41.5
Actuated g/C Ratio	0.11	0.11			0.23		0.40	0.69		0.17	0.59
v/c Ratio	0.02	0.00			0.38		0.70	0.22		0.00	0.81
Control Delay (s/veh)	33.0	0.0			26.7		24.2	4.7		30.0	12.7
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0
Total Delay (s/veh)	33.0	0.0			26.7		24.2	4.7		30.0	12.7
LOS	C	A			C		C	A		C	B
Approach Delay (s/veh)	16.5				26.7			14.1		12.7	
Approach LOS	B				C			B		B	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 70.9	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay (s/veh): 15.2	Intersection LOS: B
Intersection Capacity Utilization 64.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	3	3	309	491	537	1	921
v/c Ratio	0.02	0.00	0.38	0.70	0.22	0.00	0.81
Control Delay (s/veh)	33.0	0.0	26.7	24.2	4.7	30.0	12.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	33.0	0.0	26.7	24.2	4.7	30.0	12.7
Queue Length 50th (ft)	1	0	60	160	32	0	89
Queue Length 95th (ft)	9	0	104	333	83	5	#252
Internal Link Dist (ft)	1189		1712		1655	2029	
Turn Bay Length (ft)		50		775		100	
Base Capacity (vph)	310	677	820	863	2439	310	1232
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	0.01	0.00	0.38	0.57	0.22	0.00	0.75

Intersection Summary

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

Movement	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	2	0	2	0	247	0	452	482	12	1	792
Future Volume (vph)	2	0	2	0	247	0	452	482	12	1	792
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	6.0
Lane Util. Factor	1.00	1.00			0.95		1.00	0.95		1.00	1.00
Frt	1.00	0.85			1.00		1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00
Satd. Flow (prot)	1805	1214			3574		1770	3562		1805	1583
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00
Satd. Flow (perm)	1805	1214			3574		1770	3562		1805	1583
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.92	0.92	0.92	0.86	0.86
Adj. Flow (vph)	2	0	2	0	309	0	491	524	13	1	921
RTOR Reduction (vph)	0	3	0	0	0	0	0	1	0	0	262
Lane Group Flow (vph)	3	0	0	0	309	0	491	536	0	1	659
Heavy Vehicles (%)	0%	0%	33%	0%	1%	0%	2%	1%	0%	0%	2%
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Prot	pt+ov
Protected Phases	4	4		1	6		5	2		3	3 5
Permitted Phases		4									
Actuated Green, G (s)	1.0	1.0			14.3		26.2	46.5		10.2	36.4
Effective Green, g (s)	3.0	3.0			16.3		28.2	48.5		12.2	36.4
Actuated g/C Ratio	0.04	0.04			0.22		0.37	0.64		0.16	0.48
Clearance Time (s)	6.0	6.0			6.0		6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)	71	48			769		659	2282		290	761
v/s Ratio Prot	c0.00	0.00			c0.09		0.28	0.15		0.00	c0.42
v/s Ratio Perm											
v/c Ratio	0.04	0.00			0.40		0.75	0.23		0.00	0.87
Uniform Delay, d1	35.0	34.9			25.5		20.6	5.8		26.6	17.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	0.0			1.6		4.6	0.2		0.0	10.1
Delay (s)	35.2	34.9			27.1		25.2	6.0		26.7	27.6
Level of Service	D	C			C		C	A		C	C
Approach Delay (s/veh)	35.1				27.1			15.2		27.6	
Approach LOS	D				C			B		C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	75.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

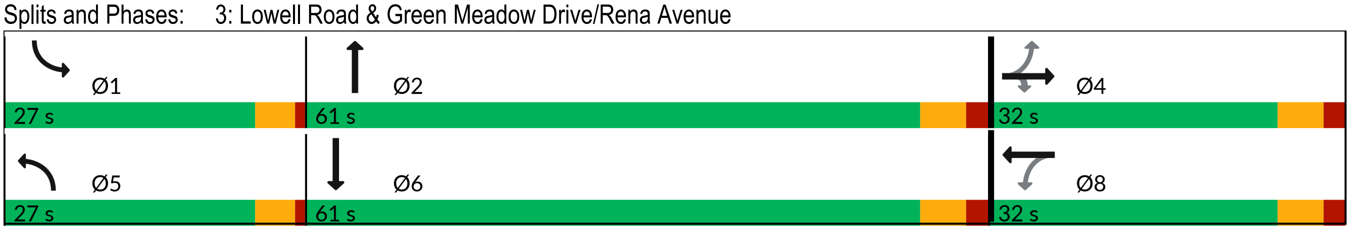
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	0	17	1	0	15	2	1210	5	23	1190	6
Future Volume (vph)	50	0	17	1	0	15	2	1210	5	23	1190	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		50	0		0	300		0	350		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			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			0.999			0.999	
Flt Protected		0.950			0.998		0.950			0.950		
Satd. Flow (prot)	0	1787	1615	0	1653	0	1805	3606	0	1805	3605	0
Flt Permitted		0.744			0.985		0.950			0.950		
Satd. Flow (perm)	0	1400	1615	0	1632	0	1805	3606	0	1805	3605	0
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)			68								1	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		742			828			938			1037	
Travel Time (s)		16.9			18.8			18.3			20.2	
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 (%)	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9%
Adj. Flow (vph)	60	0	20	1	0	19	2	1301	5	26	1322	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	60	20	0	20	0	2	1306	0	26	1329	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors		2	1		2		1	2		1	2	
Detector Template		Thru	Right		Thru		Left	Thru		Left	Thru	
Leading Detector (ft)		100	20		100		20	100		20	100	
Trailing Detector (ft)		0	0		0		0	0		0	0	
Detector 1 Position(ft)		0	0		0		0	0		0	0	
Detector 1 Size(ft)		6	20		6		20	6		20	6	
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	

Attachment "G"

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8								
Detector Phase	4	4	4	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	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	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		22.5	55.0		22.5	55.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		3.5	4.0		3.5	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)		-2.0	-2.0		-2.0		-0.5	-2.0		-0.5	-2.0	
Total Lost Time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	Max		None	Max	
Act Effct Green (s)		11.0	11.0		11.0		6.2	61.6		7.3	64.2	
Actuated g/C Ratio		0.13	0.13		0.13		0.08	0.75		0.09	0.78	
v/c Ratio		0.32	0.07		0.09		0.01	0.48		0.16	0.47	
Control Delay (s/veh)		38.0	0.5		33.5		39.5	7.1		39.3	5.4	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)		38.0	0.5		33.5		39.5	7.1		39.3	5.4	
LOS		D	A		C		D	A		D	A	
Approach Delay (s/veh)		28.6			33.5			7.1			6.1	
Approach LOS		C			C			A			A	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 81.8	
Natural Cycle: 50	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.48	
Intersection Signal Delay (s/veh): 7.4	Intersection LOS: A
Intersection Capacity Utilization 51.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Lowell Road & Green Meadow Drive/Rena Avenue



Lane Group	EBT	EBR	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	60	20	20	2	1306	26	1329
v/c Ratio	0.32	0.07	0.09	0.01	0.48	0.16	0.47
Control Delay (s/veh)	38.0	0.5	33.5	39.5	7.1	39.3	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	38.0	0.5	33.5	39.5	7.1	39.3	5.4
Queue Length 50th (ft)	26	0	8	1	97	12	101
Queue Length 95th (ft)	64	0	27	8	283	39	266
Internal Link Dist (ft)	662		748		858		957
Turn Bay Length (ft)		50		300		350	
Base Capacity (vph)	483	602	563	512	2716	512	2831
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	0.12	0.03	0.04	0.00	0.48	0.05	0.47

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	0	17	1	0	15	2	1210	5	23	1190	6
Future Volume (vph)	50	0	17	1	0	15	2	1210	5	23	1190	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85		0.87		1.00	1.00		1.00	1.00	
Flt Protected		0.95	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1787	1615		1652		1805	3608		1805	3605	
Flt Permitted		0.74	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1400	1615		1631		1805	3608		1805	3605	
Peak-hour factor, PHF	0.84	0.84	0.84	0.80	0.80	0.80	0.93	0.93	0.93	0.90	0.90	0.90
Adj. Flow (vph)	60	0	20	1	0	19	2	1301	5	26	1322	7
RTOR Reduction (vph)	0	0	18	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	60	2	0	20	0	2	1306	0	26	1329	0
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9%
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		7.8	7.8		7.8		1.1	59.5		2.9	61.3	
Effective Green, g (s)		9.8	9.8		9.8		1.6	61.5		3.4	63.3	
Actuated g/C Ratio		0.11	0.11		0.11		0.02	0.71		0.04	0.73	
Clearance Time (s)		6.0	6.0		6.0		4.5	6.0		4.5	6.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		158	182		184		33	2559		70	2632	
v/s Ratio Prot							0.00	0.36		c0.01	c0.37	
v/s Ratio Perm		c0.04	0.00		0.01							
v/c Ratio		0.38	0.01		0.11		0.06	0.51		0.37	0.50	
Uniform Delay, d1		35.6	34.2		34.5		41.8	5.7		40.6	5.0	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.5	0.0		0.3		0.8	0.7		3.3	0.7	
Delay (s)		37.2	34.2		34.8		42.6	6.5		43.9	5.7	
Level of Service		D	C		C		D	A		D	A	
Approach Delay (s/veh)		36.4			34.8			6.5			6.4	
Approach LOS		D			C			A			A	

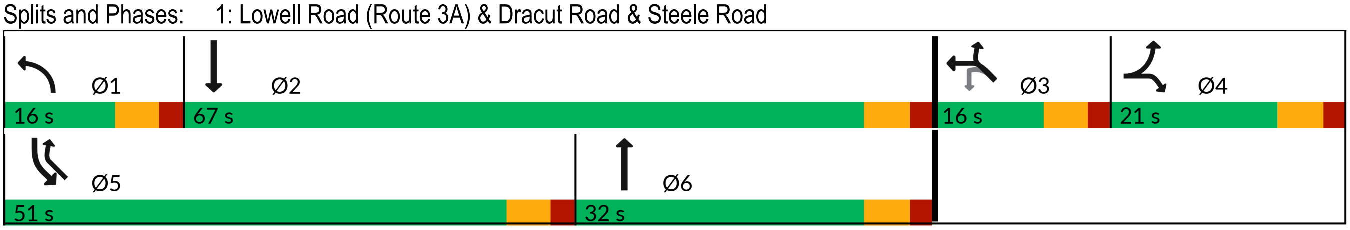
Intersection Summary			
HCM 2000 Control Delay (s/veh)	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	86.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Traffic Volume (vph)	35	2	2	1	560	1	831	372	13	4	0	605
Future Volume (vph)	35	2	2	1	560	1	831	372	13	4	0	605
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		200		300	775		0		100	0
Storage Lanes	1	1		1		0	1		0		1	1
Taper Length (ft)	25			25			25				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)	1787	1615	0	1805	3610	0	1805	3558	0	0	1805	1615
Flt Permitted	0.950			0.950			0.950				0.333	
Satd. Flow (perm)	1787	1615	0	1805	3610	0	1805	3558	0	0	633	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		191						4				288
Link Speed (mph)	30				35			35			30	
Link Distance (ft)	1269				1792			1735			2109	
Travel Time (s)	28.8				34.9			33.8			47.9	
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)	44	3	3	1	615	1	923	413	14	4	0	665
Shared Lane Traffic (%)												
Lane Group Flow (vph)	44	6	0	1	616	0	923	427	0	0	4	665
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12				12			12			12	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16				16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	15	9
Number of Detectors	1	1		1	2		1	2			1	1
Detector Template	Left	Right		Left	Thru		Left	Thru			Left	Right
Leading Detector (ft)	20	20		20	100		20	100			20	20
Trailing Detector (ft)	0	0		0	0		0	0			0	0
Detector 1 Position(ft)	0	0		0	0		0	0			0	0
Detector 1 Size(ft)	20	20		20	6		20	6			20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 2 Position(ft)					94			94				
Detector 2 Size(ft)					6			6				
Detector 2 Type					Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Perm	Prot	pt+ov
Protected Phases	4	4		1	6		5	2			3	3 5

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Permitted Phases		4								3		
Detector Phase	4	4		1	6		5	2		3	3	3 5
Switch Phase												
Minimum Initial (s)	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	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)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0			-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
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	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	Max		None	Max		None	None	
Act Effct Green (s)	10.2	10.2		7.7	28.1		47.2	77.0			12.0	56.5
Actuated g/C Ratio	0.09	0.09		0.07	0.25		0.43	0.69			0.11	0.51
v/c Ratio	0.27	0.02		0.01	0.67		1.20	0.17			0.06	0.69
Control Delay (s/veh)	52.1	0.2		50.0	42.4		134.9	7.3			49.0	13.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay (s/veh)	52.1	0.2		50.0	42.4		134.9	7.3			49.0	13.6
LOS	D	A		D	D		F	A			D	B
Approach Delay (s/veh)	45.8				42.5			94.5			13.8	
Approach LOS	D				D			F			B	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 111	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.20	
Intersection Signal Delay (s/veh): 61.5	Intersection LOS: E
Intersection Capacity Utilization 83.2%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBL	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	44	6	1	616	923	427	4	665
v/c Ratio	0.27	0.02	0.01	0.67	1.20	0.17	0.06	0.69
Control Delay (s/veh)	52.1	0.2	50.0	42.4	134.9	7.3	49.0	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	52.1	0.2	50.0	42.4	134.9	7.3	49.0	13.6
Queue Length 50th (ft)	30	0	1	215	~832	49	3	122
Queue Length 95th (ft)	59	0	6	288	#1116	102	14	267
Internal Link Dist (ft)	1189			1712		1655	2029	
Turn Bay Length (ft)		50	200		775		100	
Base Capacity (vph)	274	409	195	913	767	2469	68	963
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	0.16	0.01	0.01	0.67	1.20	0.17	0.06	0.69

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Movement	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Traffic Volume (vph)	35	2	2	1	560	1	831	372	13	4	0	605
Future Volume (vph)	35	2	2	1	560	1	831	372	13	4	0	605
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	6.0
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95			1.00	1.00
Frt	1.00	0.85		1.00	1.00		1.00	1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.95	1.00
Satd. Flow (prot)	1787	1615		1805	3609		1805	3558			1805	1615
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00			0.33	1.00
Satd. Flow (perm)	1787	1615		1805	3609		1805	3558			633	1615
Peak-hour factor, PHF	0.80	0.80	0.80	0.91	0.91	0.91	0.90	0.90	0.90	0.91	0.91	0.91
Adj. Flow (vph)	44	2	2	1	615	1	923	413	14	4	0	665
RTOR Reduction (vph)	0	6	0	0	0	0	0	1	0	0	0	152
Lane Group Flow (vph)	44	0	0	1	616	0	923	426	0	0	4	513
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Perm	Prot	pt+ov
Protected Phases	4	4		1	6		5	2			3	3 5
Permitted Phases		4								3		
Actuated Green, G (s)	7.0	7.0		1.1	31.0		45.1	75.0			10.0	55.1
Effective Green, g (s)	9.0	9.0		3.1	33.0		47.1	77.0			12.0	55.1
Actuated g/C Ratio	0.08	0.08		0.03	0.28		0.40	0.66			0.10	0.47
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	137	124		47	1017		726	2339			64	759
v/s Ratio Prot	c0.02	0.00		0.00	c0.17		c0.51	0.12				c0.32
v/s Ratio Perm											0.01	
v/c Ratio	0.32	0.00		0.02	0.61		1.27	0.18			0.06	0.68
Uniform Delay, d1	51.2	49.9		55.5	36.4		35.0	7.8			47.5	24.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	1.4	0.0		0.2	2.7		132.8	0.2			0.4	2.4
Delay (s)	52.5	49.9		55.7	39.1		167.8	8.0			47.9	26.4
Level of Service	D	D		E	D		F	A			D	C
Approach Delay (s/veh)	52.2				39.1			117.2			26.6	
Approach LOS	D				D			F			C	

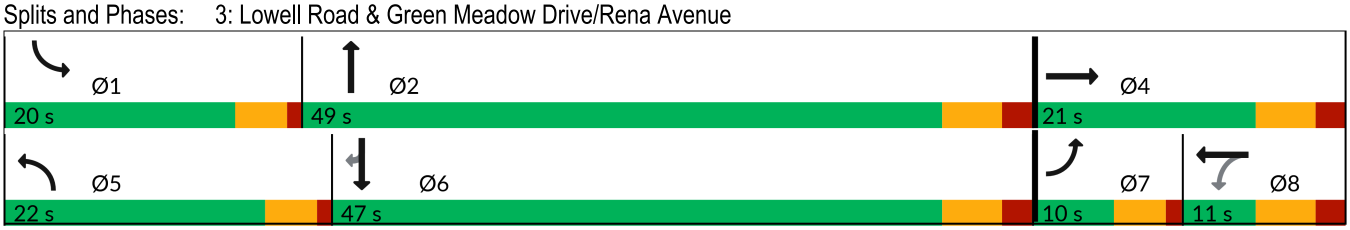
Intersection Summary			
HCM 2000 Control Delay (s/veh)	75.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	117.1	Sum of lost time (s)	20.0
Intersection Capacity Utilization	83.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

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	1140	2	7	998	241
Future Volume (vph)	156	0	25	1	1	36	43	1140	2	7	998	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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			25			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							0.850
Flt Protected	0.950				0.999		0.950			0.950		
Satd. Flow (prot)	3502	1214	0	0	1604	0	1805	3538	0	1570	3539	1615
Flt Permitted	0.950				0.990		0.950			0.950		
Satd. Flow (perm)	3502	1214	0	0	1590	0	1805	3538	0	1570	3539	1615
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)		341										254
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		742			828			938			1037	
Travel Time (s)		16.9			18.8			18.3			20.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	33%	9%	0%	3%	0%	2%	20%	15%	2%	0%
Adj. Flow (vph)	173	0	28	1	1	40	48	1267	2	7	1051	254
Shared Lane Traffic (%)												
Lane Group Flow (vph)	173	28	0	0	42	0	48	1269	0	7	1051	254
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2			2		1	2		1	2	1
Detector Template	Left	Thru			Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100			100		20	100		20	100	20
Trailing Detector (ft)	0	0			0		0	0		0	0	0
Detector 1 Position(ft)	0	0			0		0	0		0	0	0
Detector 1 Size(ft)	20	6			6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				8								6
Detector Phase	7	4		8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	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)	5.5	15.0		5.0	5.0		17.5	43.0		15.5	41.0	41.0
Yellow Time (s)	3.5	4.0		4.0	4.0		3.5	4.0		3.5	4.0	4.0
All-Red Time (s)	1.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	2.0
Lost Time Adjust (s)	-0.5	-2.0			-2.0		-0.5	-2.0		-0.5	-2.0	-2.0
Total Lost Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max		None	Max	Max
Act Effct Green (s)	6.8	12.8			7.1		8.0	49.9		6.6	44.9	44.9
Actuated g/C Ratio	0.09	0.18			0.10		0.11	0.68		0.09	0.62	0.62
v/c Ratio	0.53	0.06			0.27		0.24	0.52		0.05	0.48	0.23
Control Delay (s/veh)	41.4	0.2			39.1		35.5	8.0		35.3	10.9	2.1
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay (s/veh)	41.4	0.2			39.1		35.5	8.0		35.3	10.9	2.1
LOS	D	A			D		D	A		D	B	A
Approach Delay (s/veh)		35.6			39.1			9.0			9.3	
Approach LOS		D			D			A			A	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 72.9	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.53	
Intersection Signal Delay (s/veh): 11.4	Intersection LOS: B
Intersection Capacity Utilization 53.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Lowell Road & Green Meadow Drive/Rena Avenue



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	173	28	42	48	1269	7	1051	254
v/c Ratio	0.53	0.06	0.27	0.24	0.52	0.05	0.48	0.23
Control Delay (s/veh)	41.4	0.2	39.1	35.5	8.0	35.3	10.9	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	41.4	0.2	39.1	35.5	8.0	35.3	10.9	2.1
Queue Length 50th (ft)	44	0	20	23	137	3	169	0
Queue Length 95th (ft)	#88	0	52	54	286	16	240	33
Internal Link Dist (ft)		662	748		858		957	
Turn Bay Length (ft)				300		350		
Base Capacity (vph)	329	548	155	455	2423	352	2178	1091
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	0.53	0.05	0.27	0.11	0.52	0.02	0.48	0.23

Intersection Summary

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

Attachment "G"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	156	0	25	1	1	36	43	1140	2	7	998	241
Future Volume (vph)	156	0	25	1	1	36	43	1140	2	7	998	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.85			0.87		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	1214			1604		1805	3537		1570	3539	1615
Flt Permitted	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	1214			1591		1805	3537		1570	3539	1615
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	173	0	28	1	1	40	48	1267	2	7	1051	254
RTOR Reduction (vph)	0	23	0	0	0	0	0	0	0	0	0	105
Lane Group Flow (vph)	173	5	0	0	42	0	48	1269	0	7	1051	149
Heavy Vehicles (%)	0%	0%	33%	9%	0%	3%	0%	2%	20%	15%	2%	0%
Turn Type	Prot	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases				8								6
Actuated Green, G (s)	6.3	13.5			2.7		4.7	47.9		1.2	44.4	44.4
Effective Green, g (s)	6.8	15.5			4.7		5.2	49.9		1.7	46.4	46.4
Actuated g/C Ratio	0.09	0.20			0.06		0.07	0.63		0.02	0.59	0.59
Clearance Time (s)	4.5	6.0			6.0		4.5	6.0		4.5	6.0	6.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	301	237			94		118	2231		33	2075	947
v/s Ratio Prot	c0.05	0.00					c0.03	c0.36		0.00	0.30	
v/s Ratio Perm					c0.03							0.09
v/c Ratio	0.57	0.02			0.45		0.41	0.57		0.21	0.51	0.16
Uniform Delay, d1	34.8	25.7			35.9		35.5	8.4		38.0	9.6	7.4
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.6	0.0			3.4		2.3	1.1		3.2	0.9	0.4
Delay (s)	37.4	25.7			39.3		37.8	9.5		41.2	10.5	7.8
Level of Service	D	C			D		D	A		D	B	A
Approach Delay (s/veh)		35.8			39.3			10.5			10.1	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	79.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

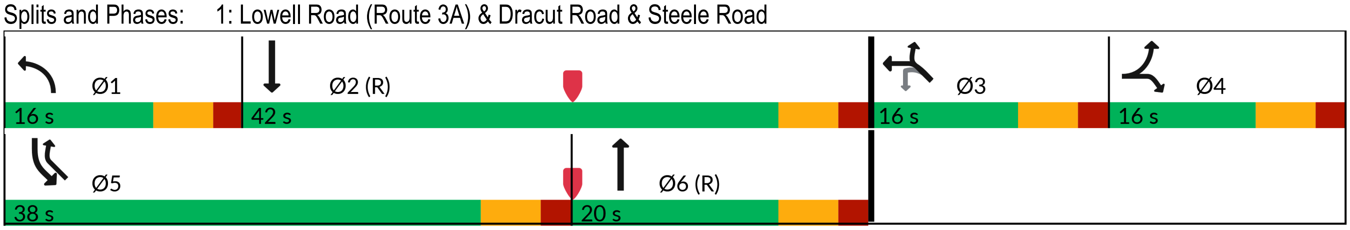
Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	2	0	2	0	277	0	492	515	12	1	858
Future Volume (vph)	2	0	2	0	277	0	492	515	12	1	858
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		200		300	775		0	100	0
Storage Lanes	1	1		1		0	2		0	1	1
Taper Length (ft)	25			25			25			25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00
Frt		0.850						0.997			0.850
Flt Protected	0.950						0.950			0.950	
Satd. Flow (prot)	1805	1214	0	1900	3574	0	3433	1876	0	1805	1583
Flt Permitted	0.950						0.950			0.950	
Satd. Flow (perm)	1805	1214	0	1900	3574	0	3433	1876	0	1805	1583
Right Turn on Red			Yes			Yes			Yes		Yes
Satd. Flow (RTOR)		552						2			510
Link Speed (mph)	30				35			35		30	
Link Distance (ft)	1269				1792			1735		2109	
Travel Time (s)	28.8				34.9			33.8		47.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.92	0.92	0.92	0.90	0.90
Heavy Vehicles (%)	0%	0%	33%	0%	1%	0%	2%	1%	0%	0%	2%
Adj. Flow (vph)	2	0	2	0	308	0	535	560	13	1	953
Shared Lane Traffic (%)											
Lane Group Flow (vph)	2	2	0	0	308	0	535	573	0	1	953
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Right
Median Width(ft)	12				24			24		12	
Link Offset(ft)	0				0			0		0	
Crosswalk Width(ft)	16				16			16		16	
Two way Left Turn Lane											
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	9
Number of Detectors	1	1		1	2		1	2		1	1
Detector Template	Left	Right		Left	Thru		Left	Thru		Left	Right
Leading Detector (ft)	20	20		20	100		20	100		20	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0
Detector 1 Size(ft)	20	20		20	6		20	6		20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel											
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 2 Position(ft)					94			94			
Detector 2 Size(ft)					6			6			
Detector 2 Type					Cl+Ex			Cl+Ex			
Detector 2 Channel											
Detector 2 Extend (s)					0.0			0.0			
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Prot	pt+ov
Protected Phases	4	4		1	6		5	2		3	3 5

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Permitted Phases		4									
Detector Phase	4	4		1	6		5	2		3	3 5
Switch Phase											
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		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)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	
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	3.0		3.0	3.0		3.0	
Recall Mode	None	None		None	C-Max		None	C-Max		None	
Act Effct Green (s)	7.7	7.7			27.6		36.0	67.6		12.0	48.8
Actuated g/C Ratio	0.09	0.09			0.31		0.40	0.75		0.13	0.54
v/c Ratio	0.01	0.00			0.28		0.39	0.41		0.00	0.87
Control Delay (s/veh)	37.5	0.0			27.5		19.4	5.7		34.0	17.8
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0
Total Delay (s/veh)	37.5	0.0			27.5		19.4	5.7		34.0	17.8
LOS	D	A			C		B	A		C	B
Approach Delay (s/veh)	18.8				27.5			12.3		17.8	
Approach LOS	B				C			B		B	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 38 (42%), Referenced to phase 2:SBT and 6:NBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay (s/veh): 16.5 Intersection LOS: B
Intersection Capacity Utilization 69.1% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	2	2	308	535	573	1	953
v/c Ratio	0.01	0.00	0.28	0.39	0.41	0.00	0.87
Control Delay (s/veh)	37.5	0.0	27.5	19.4	5.7	34.0	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	37.5	0.0	27.5	19.4	5.7	34.0	17.8
Queue Length 50th (ft)	1	0	69	103	80	1	192
Queue Length 95th (ft)	8	0	125	144	221	5	#449
Internal Link Dist (ft)	1189		1712		1655	2029	
Turn Bay Length (ft)		50		775		100	
Base Capacity (vph)	240	640	1094	1458	1409	240	1118
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	0.01	0.00	0.28	0.37	0.41	0.00	0.85

Intersection Summary

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

Movement	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	2	0	2	0	277	0	492	515	12	1	858
Future Volume (vph)	2	0	2	0	277	0	492	515	12	1	858
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	6.0
Lane Util. Factor	1.00	1.00			0.95		0.97	1.00		1.00	1.00
Frt	1.00	0.85			1.00		1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00
Satd. Flow (prot)	1805	1214			3574		3433	1875		1805	1583
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00
Satd. Flow (perm)	1805	1214			3574		3433	1875		1805	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.92	0.92	0.92	0.90	0.90
Adj. Flow (vph)	2	0	2	0	308	0	535	560	13	1	953
RTOR Reduction (vph)	0	2	0	0	0	0	0	1	0	0	261
Lane Group Flow (vph)	2	0	0	0	308	0	535	572	0	1	692
Heavy Vehicles (%)	0%	0%	33%	0%	1%	0%	2%	1%	0%	0%	2%
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Prot	pt+ov
Protected Phases	4	4		1	6		5	2		3	3 5
Permitted Phases		4									
Actuated Green, G (s)	1.2	1.2			20.8		34.0	60.8		10.0	44.0
Effective Green, g (s)	3.2	3.2			22.8		36.0	62.8		12.0	44.0
Actuated g/C Ratio	0.04	0.04			0.25		0.40	0.70		0.13	0.49
Clearance Time (s)	6.0	6.0			6.0		6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)	64	43			905		1373	1308		240	773
v/s Ratio Prot	c0.00	0.00			0.09		0.16	c0.31		0.00	c0.44
v/s Ratio Perm											
v/c Ratio	0.03	0.00			0.34		0.39	0.44		0.00	0.90
Uniform Delay, d1	41.9	41.9			27.5		19.2	5.9		33.8	20.9
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	0.0			1.0		0.2	1.1		0.0	12.9
Delay (s)	42.1	41.9			28.5		19.4	7.0		33.8	33.8
Level of Service	D	D			C		B	A		C	C
Approach Delay (s/veh)	42.0				28.5			13.0		33.8	
Approach LOS	D				C			B		C	

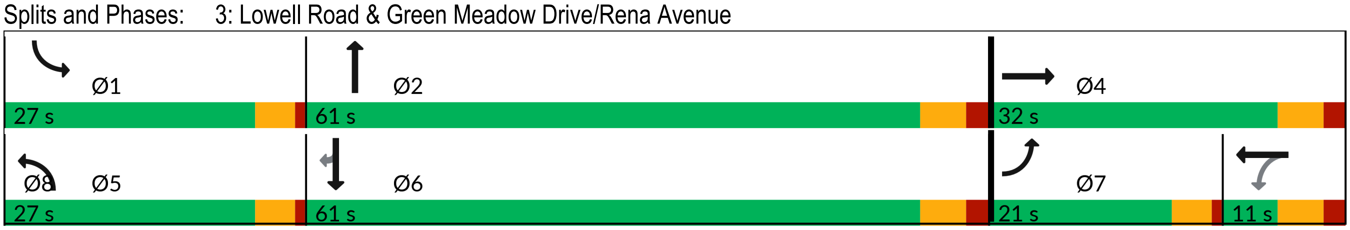
Intersection Summary			
HCM 2000 Control Delay (s/veh)	23.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	273	0	51	1	0	16	35	1277	5	24	1251	228
Future Volume (vph)	273	0	51	1	0	16	35	1277	5	24	1251	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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			25			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			0.872			0.999				0.850
Flt Protected	0.950				0.997		0.950			0.950		
Satd. Flow (prot)	3467	1615	0	0	1652	0	1805	3606	0	1805	3610	1482
Flt Permitted	0.950				0.976		0.950			0.950		
Satd. Flow (perm)	3467	1615	0	0	1617	0	1805	3606	0	1805	3610	1482
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)		331										217
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		742			828			938			1037	
Travel Time (s)		16.9			18.8			18.3			20.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.93	0.93	0.93	0.90	0.90	0.90
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9%
Adj. Flow (vph)	303	0	57	1	0	18	38	1373	5	27	1390	253
Shared Lane Traffic (%)												
Lane Group Flow (vph)	303	57	0	0	19	0	38	1378	0	27	1390	253
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2			2		1	2		1	2	1
Detector Template	Left	Thru			Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100			100		20	100		20	100	20
Trailing Detector (ft)	0	0			0		0	0		0	0	0
Detector 1 Position(ft)	0	0			0		0	0		0	0	0
Detector 1 Size(ft)	20	6			6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				8								6
Detector Phase	7	4		8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	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)	16.5	26.0		5.0	5.0		22.5	55.0		22.5	55.0	55.0
Yellow Time (s)	3.5	4.0		4.0	4.0		3.5	4.0		3.5	4.0	4.0
All-Red Time (s)	1.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	2.0
Lost Time Adjust (s)	-0.5	-2.0			-2.0		-0.5	-2.0		-0.5	-2.0	-2.0
Total Lost Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max		None	Max	Max
Act Effct Green (s)	13.5	17.2			7.2		8.0	61.0		7.5	58.4	58.4
Actuated g/C Ratio	0.15	0.19			0.08		0.09	0.67		0.08	0.64	0.64
v/c Ratio	0.59	0.10			0.15		0.24	0.57		0.18	0.60	0.25
Control Delay (s/veh)	42.8	0.4			48.3		46.7	12.1		46.6	13.9	3.3
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay (s/veh)	42.8	0.4			48.3		46.7	12.1		46.6	13.9	3.3
LOS	D	A			D		D	B		D	B	A
Approach Delay (s/veh)		36.1			48.3			13.0			12.8	
Approach LOS		D			D			B			B	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 90.9	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.60	
Intersection Signal Delay (s/veh): 15.5	Intersection LOS: B
Intersection Capacity Utilization 56.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Lowell Road & Green Meadow Drive/Rena Avenue



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	303	57	19	38	1378	27	1390	253
v/c Ratio	0.59	0.10	0.15	0.24	0.57	0.18	0.60	0.25
Control Delay (s/veh)	42.8	0.4	48.3	46.7	12.1	46.6	13.9	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	42.8	0.4	48.3	46.7	12.1	46.6	13.9	3.3
Queue Length 50th (ft)	84	0	10	21	127	15	226	7
Queue Length 95th (ft)	145	0	37	58	437	45	453	51
Internal Link Dist (ft)		662	748		858		957	
Turn Bay Length (ft)				300		350		
Base Capacity (vph)	663	736	127	467	2421	467	2317	1029
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	0.46	0.08	0.15	0.08	0.57	0.06	0.60	0.25

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	273	0	51	1	0	16	35	1277	5	24	1251	228
Future Volume (vph)	273	0	51	1	0	16	35	1277	5	24	1251	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.85			0.87		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3467	1615			1653		1805	3608		1805	3610	1482
Flt Permitted	0.95	1.00			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3467	1615			1618		1805	3608		1805	3610	1482
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.93	0.93	0.93	0.90	0.90	0.90
Adj. Flow (vph)	303	0	57	1	0	18	38	1373	5	27	1390	253
RTOR Reduction (vph)	0	45	0	0	0	0	0	0	0	0	0	85
Lane Group Flow (vph)	303	12	0	0	19	0	38	1378	0	27	1390	168
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9%
Turn Type	Prot	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases				8								6
Actuated Green, G (s)	13.0	19.2			1.7		4.7	59.0		2.9	57.2	57.2
Effective Green, g (s)	13.5	21.2			3.7		5.2	61.0		3.4	59.2	59.2
Actuated g/C Ratio	0.14	0.22			0.04		0.05	0.63		0.03	0.61	0.61
Clearance Time (s)	4.5	6.0			6.0		4.5	6.0		4.5	6.0	6.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	479	350			61		96	2255		62	2189	898
v/s Ratio Prot	c0.09	0.01					c0.02	0.38		0.01	c0.39	
v/s Ratio Perm					c0.01							0.11
v/c Ratio	0.63	0.04			0.31		0.40	0.61		0.44	0.63	0.19
Uniform Delay, d1	39.7	30.1			45.7		44.7	11.1		46.2	12.3	8.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.7	0.0			2.9		2.7	1.2		4.8	1.4	0.5
Delay (s)	42.4	30.2			48.6		47.4	12.3		51.0	13.7	9.0
Level of Service	D	C			D		D	B		D	B	A
Approach Delay (s/veh)		40.5			48.6			13.3			13.6	
Approach LOS		D			D			B			B	

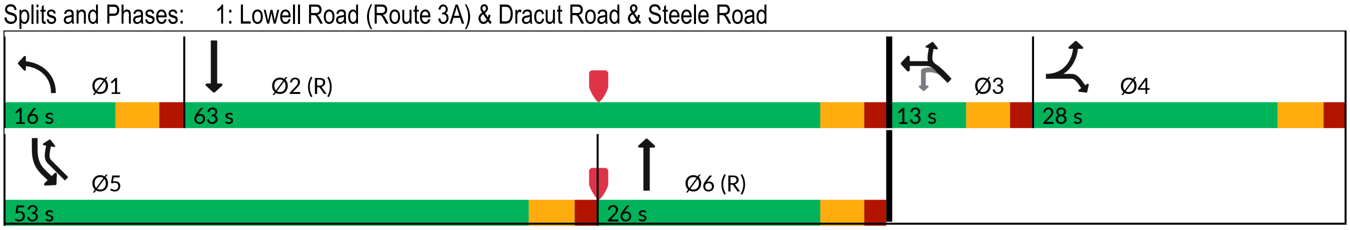
Intersection Summary			
HCM 2000 Control Delay (s/veh)	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	97.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Traffic Volume (vph)	36	2	2	1	598	1	897	401	13	4	0	665
Future Volume (vph)	36	2	2	1	598	1	897	401	13	4	0	665
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		200		300	775		0		100	0
Storage Lanes	1	1		1		0	2		0		1	1
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.97	1.00	1.00	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)	1787	1615	0	1805	3610	0	3502	1872	0	0	1805	1615
Flt Permitted	0.950			0.950			0.950				0.444	
Satd. Flow (perm)	1787	1615	0	1805	3610	0	3502	1872	0	0	844	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		191						2				447
Link Speed (mph)	30				35			35			30	
Link Distance (ft)	1269				1792			1735			2109	
Travel Time (s)	28.8				34.9			33.8			47.9	
Peak Hour Factor	0.90	0.90	0.90	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)	40	2	2	1	657	1	997	446	14	4	0	731
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	4	0	1	658	0	997	460	0	0	4	731
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12				24			24			12	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16				16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	15	9
Number of Detectors	1	1		1	2		1	2			1	1
Detector Template	Left	Right		Left	Thru		Left	Thru			Left	Right
Leading Detector (ft)	20	20		20	100		20	100			20	20
Trailing Detector (ft)	0	0		0	0		0	0			0	0
Detector 1 Position(ft)	0	0		0	0		0	0			0	0
Detector 1 Size(ft)	20	20		20	6		20	6			20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 2 Position(ft)					94			94				
Detector 2 Size(ft)					6			6				
Detector 2 Type					Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Perm	Prot	pt+ov
Protected Phases	4	4		1	6		5	2			3	3 5

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Permitted Phases		4								3		
Detector Phase	4	4		1	6		5	2		3	3	3 5
Switch Phase												
Minimum Initial (s)	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	14.0		14.0	14.0		11.0	11.0	
Total Split (s)	28.0	28.0		16.0	26.0		53.0	63.0		13.0	13.0	
Total Split (%)	23.3%	23.3%		13.3%	21.7%		44.2%	52.5%		10.8%	10.8%	
Maximum Green (s)	22.0	22.0		10.0	20.0		47.0	57.0		7.0	7.0	
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)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0			-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
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	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	C-Max		None	C-Max		None	None	
Act Effct Green (s)	10.2	10.2		7.6	42.0		45.1	88.7			9.0	51.3
Actuated g/C Ratio	0.09	0.09		0.06	0.35		0.38	0.74			0.08	0.43
v/c Ratio	0.26	0.01		0.01	0.52		0.76	0.33			0.06	0.77
Control Delay (s/veh)	55.0	0.0		53.0	35.3		36.4	7.5			54.0	14.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay (s/veh)	55.0	0.0		53.0	35.3		36.4	7.5			54.0	14.9
LOS	E	A		D	D		D	A			D	B
Approach Delay (s/veh)	50.0				35.3			27.3			15.1	
Approach LOS	D				D			C			B	

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 Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay (s/veh): 26.4	Intersection LOS: C
Intersection Capacity Utilization 66.1%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBL	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	40	4	1	658	997	460	4	731
v/c Ratio	0.26	0.01	0.01	0.52	0.76	0.33	0.06	0.77
Control Delay (s/veh)	55.0	0.0	53.0	35.3	36.4	7.5	54.0	14.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	55.0	0.0	53.0	35.3	36.4	7.5	54.0	14.9
Queue Length 50th (ft)	30	0	1	220	340	106	3	122
Queue Length 95th (ft)	64	0	7	317	377	237	15	251
Internal Link Dist (ft)	1189			1712		1655	2029	
Turn Bay Length (ft)		50	200		775		100	
Base Capacity (vph)	357	475	180	1264	1450	1385	63	991
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	0.11	0.01	0.01	0.52	0.69	0.33	0.06	0.74

Intersection Summary

Movement	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Traffic Volume (vph)	36	2	2	1	598	1	897	401	13	4	0	665
Future Volume (vph)	36	2	2	1	598	1	897	401	13	4	0	665
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	6.0
Lane Util. Factor	1.00	1.00		1.00	0.95		0.97	1.00			1.00	1.00
Frt	1.00	0.85		1.00	1.00		1.00	1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.95	1.00
Satd. Flow (prot)	1787	1615		1805	3609		3502	1873			1805	1615
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00			0.44	1.00
Satd. Flow (perm)	1787	1615		1805	3609		3502	1873			844	1615
Peak-hour factor, PHF	0.90	0.90	0.90	0.91	0.91	0.91	0.90	0.90	0.90	0.91	0.91	0.91
Adj. Flow (vph)	40	2	2	1	657	1	997	446	14	4	0	731
RTOR Reduction (vph)	0	4	0	0	0	0	0	1	0	0	0	260
Lane Group Flow (vph)	40	0	0	1	658	0	997	459	0	0	4	471
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Perm	Prot	pt+ov
Protected Phases	4	4		1	6		5	2			3	3 5
Permitted Phases		4								3		
Actuated Green, G (s)	7.1	7.1		1.2	38.8		43.1	80.7			7.0	50.1
Effective Green, g (s)	9.1	9.1		3.2	40.8		45.1	82.7			9.0	50.1
Actuated g/C Ratio	0.08	0.08		0.03	0.34		0.38	0.69			0.08	0.42
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	135	122		48	1227		1316	1290			63	674
v/s Ratio Prot	c0.02	0.00		0.00	c0.18		c0.28	0.25				c0.29
v/s Ratio Perm											0.00	
v/c Ratio	0.30	0.00		0.02	0.54		0.76	0.36			0.06	0.70
Uniform Delay, d1	52.4	51.3		56.9	32.0		32.7	7.7			51.6	28.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	1.2	0.0		0.2	1.7		2.5	0.8			0.4	3.2
Delay (s)	53.7	51.3		57.0	33.6		35.2	8.5			52.0	31.9
Level of Service	D	D		E	C		D	A			D	C
Approach Delay (s/veh)	53.4				33.7			26.8			32.0	
Approach LOS	D				C			C			C	

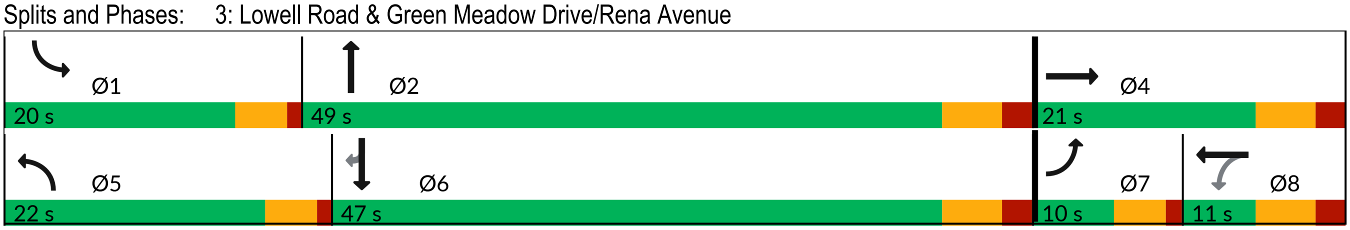
Intersection Summary			
HCM 2000 Control Delay (s/veh)	30.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	169	0	31	1	1	36	53	1140	2	7	998	264
Future Volume (vph)	169	0	31	1	1	36	53	1140	2	7	998	264
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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			25			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							0.850
Flt Protected	0.950				0.999		0.950			0.950		
Satd. Flow (prot)	3183	1214	0	0	1604	0	1805	3538	0	1570	3539	1524
Flt Permitted	0.950				0.990		0.950			0.950		
Satd. Flow (perm)	3183	1214	0	0	1590	0	1805	3538	0	1570	3539	1524
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)		341										278
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		525			828			938			1037	
Travel Time (s)		11.9			18.8			18.3			20.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.95	0.95	0.95
Heavy Vehicles (%)	10%	0%	33%	9%	0%	3%	0%	2%	20%	15%	2%	6%
Adj. Flow (vph)	188	0	34	1	1	40	59	1267	2	7	1051	278
Shared Lane Traffic (%)												
Lane Group Flow (vph)	188	34	0	0	42	0	59	1269	0	7	1051	278
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2			2		1	2		1	2	1
Detector Template	Left	Thru			Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100			100		20	100		20	100	20
Trailing Detector (ft)	0	0			0		0	0		0	0	0
Detector 1 Position(ft)	0	0			0		0	0		0	0	0
Detector 1 Size(ft)	20	6			6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				8								6
Detector Phase	7	4		8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	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)	5.5	15.0		5.0	5.0		17.5	43.0		15.5	41.0	41.0
Yellow Time (s)	3.5	4.0		4.0	4.0		3.5	4.0		3.5	4.0	4.0
All-Red Time (s)	1.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	2.0
Lost Time Adjust (s)	-0.5	-2.0			-2.0		-0.5	-2.0		-0.5	-2.0	-2.0
Total Lost Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max		None	Max	Max
Act Effct Green (s)	6.9	12.8			7.2		8.4	50.3		6.6	44.9	44.9
Actuated g/C Ratio	0.09	0.17			0.10		0.11	0.69		0.09	0.61	0.61
v/c Ratio	0.63	0.07			0.27		0.29	0.52		0.05	0.48	0.27
Control Delay (s/veh)	46.7	0.3			39.5		35.9	7.9		35.6	11.1	2.2
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay (s/veh)	46.7	0.3			39.5		35.9	7.9		35.6	11.1	2.2
LOS	D	A			D		D	A		D	B	A
Approach Delay (s/veh)		39.6			39.5			9.2			9.4	
Approach LOS		D			D			A			A	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 73.3	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay (s/veh): 12.0	Intersection LOS: B
Intersection Capacity Utilization 57.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Lowell Road & Green Meadow Drive/Rena Avenue



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	188	34	42	59	1269	7	1051	278
v/c Ratio	0.63	0.07	0.27	0.29	0.52	0.05	0.48	0.27
Control Delay (s/veh)	46.7	0.3	39.5	35.9	7.9	35.6	11.1	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	46.7	0.3	39.5	35.9	7.9	35.6	11.1	2.2
Queue Length 50th (ft)	48	0	20	28	137	3	172	0
Queue Length 95th (ft)	#106	0	53	63	285	16	246	35
Internal Link Dist (ft)		445	748		858		957	
Turn Bay Length (ft)				300		350		
Base Capacity (vph)	297	548	155	453	2429	350	2168	1041
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	0.63	0.06	0.27	0.13	0.52	0.02	0.48	0.27

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	169	0	31	1	1	36	53	1140	2	7	998	264
Future Volume (vph)	169	0	31	1	1	36	53	1140	2	7	998	264
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.85			0.87		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3183	1214			1604		1805	3537		1570	3539	1524
Flt Permitted	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3183	1214			1590		1805	3537		1570	3539	1524
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	188	0	34	1	1	40	59	1267	2	7	1051	278
RTOR Reduction (vph)	0	27	0	0	0	0	0	0	0	0	0	115
Lane Group Flow (vph)	188	7	0	0	42	0	59	1269	0	7	1051	163
Heavy Vehicles (%)	10%	0%	33%	9%	0%	3%	0%	2%	20%	15%	2%	6%
Turn Type	Prot	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases				8								6
Actuated Green, G (s)	6.3	13.5			2.7		5.0	48.3		1.2	44.5	44.5
Effective Green, g (s)	6.8	15.5			4.7		5.5	50.3		1.7	46.5	46.5
Actuated g/C Ratio	0.09	0.19			0.06		0.07	0.63		0.02	0.58	0.58
Clearance Time (s)	4.5	6.0			6.0		4.5	6.0		4.5	6.0	6.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	272	236			94		124	2237		33	2069	891
v/s Ratio Prot	c0.06	0.01					c0.03	c0.36		0.00	0.30	
v/s Ratio Perm					c0.03							0.11
v/c Ratio	0.69	0.03			0.45		0.48	0.57		0.21	0.51	0.18
Uniform Delay, d1	35.3	25.9			36.1		35.6	8.4		38.2	9.7	7.7
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	7.4	0.0			3.4		2.9	1.0		3.2	0.9	0.5
Delay (s)	42.7	26.0			39.5		38.5	9.4		41.4	10.6	8.1
Level of Service	D	C			D		D	A		D	B	A
Approach Delay (s/veh)		40.1			39.5			10.7			10.3	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	79.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	181	0	33	258	0	19
Future Volume (vph)	181	0	33	258	0	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected				0.994		
Satd. Flow (prot)	3539	0	0	1852	0	1611
Flt Permitted				0.994		
Satd. Flow (perm)	3539	0	0	1852	0	1611
Link Speed (mph)	30			30	30	
Link Distance (ft)	217			525	202	
Travel Time (s)	4.9			11.9	4.6	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	201	0	37	287	0	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	201	0	0	324	0	21
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 27.1%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	181	0	33	258	0	19
Future Vol, veh/h	181	0	33	258	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	201	0	37	287	0	21

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	201	0	-	101
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.13	-	-	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.219	-	-	3.319
Pot Cap-1 Maneuver	-	-	1370	-	0	935
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1370	-	-	935
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.9	8.9
HCM LOS			A

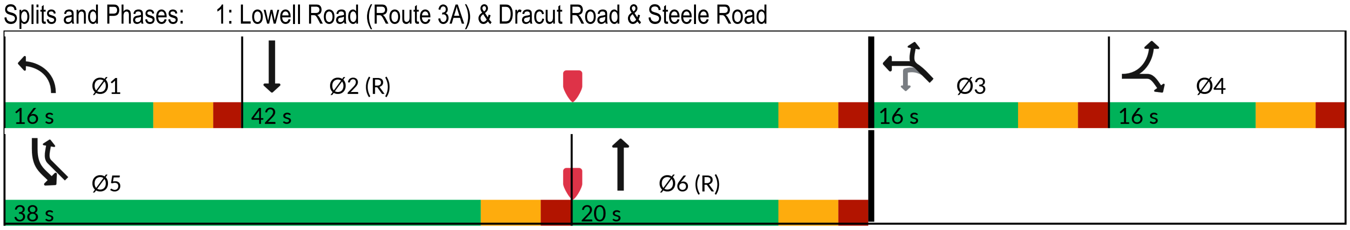
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	935	-	-	1370	-
HCM Lane V/C Ratio	0.023	-	-	0.027	-
HCM Ctrl Dly (s/v)	8.9	-	-	7.7	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	2	0	2	0	280	0	496	517	12	1	865
Future Volume (vph)	2	0	2	0	280	0	496	517	12	1	865
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		200		300	775		0	100	0
Storage Lanes	1	1		1		0	2		0	1	1
Taper Length (ft)	25			25			25			25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00
Frt		0.850						0.997			0.850
Flt Protected	0.950						0.950			0.950	
Satd. Flow (prot)	1805	1214	0	1900	3574	0	3433	1876	0	1805	1583
Flt Permitted	0.950						0.950			0.950	
Satd. Flow (perm)	1805	1214	0	1900	3574	0	3433	1876	0	1805	1583
Right Turn on Red			Yes			Yes			Yes		Yes
Satd. Flow (RTOR)		551						2			509
Link Speed (mph)	30				35			35		30	
Link Distance (ft)	1269				1792			1735		2109	
Travel Time (s)	28.8				34.9			33.8		47.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.92	0.92	0.92	0.90	0.90
Heavy Vehicles (%)	0%	0%	33%	0%	1%	0%	2%	1%	0%	0%	2%
Adj. Flow (vph)	2	0	2	0	311	0	539	562	13	1	961
Shared Lane Traffic (%)											
Lane Group Flow (vph)	2	2	0	0	311	0	539	575	0	1	961
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Right
Median Width(ft)	12				24			24		12	
Link Offset(ft)	0				0			0		0	
Crosswalk Width(ft)	16				16			16		16	
Two way Left Turn Lane											
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	9
Number of Detectors	1	1		1	2		1	2		1	1
Detector Template	Left	Right		Left	Thru		Left	Thru		Left	Right
Leading Detector (ft)	20	20		20	100		20	100		20	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0
Detector 1 Size(ft)	20	20		20	6		20	6		20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel											
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 2 Position(ft)					94			94			
Detector 2 Size(ft)					6			6			
Detector 2 Type					Cl+Ex			Cl+Ex			
Detector 2 Channel											
Detector 2 Extend (s)					0.0			0.0			
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Prot	pt+ov
Protected Phases	4	4		1	6		5	2		3	3 5

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Permitted Phases		4									
Detector Phase	4	4		1	6		5	2		3	3 5
Switch Phase											
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		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)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	
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	3.0		3.0	3.0		3.0	
Recall Mode	None	None		None	C-Max		None	C-Max		None	
Act Effct Green (s)	7.7	7.7			26.5		37.1	67.6		12.0	49.9
Actuated g/C Ratio	0.09	0.09			0.29		0.41	0.75		0.13	0.55
v/c Ratio	0.01	0.00			0.30		0.38	0.41		0.00	0.87
Control Delay (s/veh)	37.5	0.0			28.3		18.8	5.8		34.0	17.4
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0
Total Delay (s/veh)	37.5	0.0			28.3		18.8	5.8		34.0	17.4
LOS	D	A			C		B	A		C	B
Approach Delay (s/veh)	18.8				28.3			12.0		17.5	
Approach LOS	B				C			B		B	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 38 (42%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.87	
Intersection Signal Delay (s/veh): 16.3	Intersection LOS: B
Intersection Capacity Utilization 69.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	2	2	311	539	575	1	961
v/c Ratio	0.01	0.00	0.30	0.38	0.41	0.00	0.87
Control Delay (s/veh)	37.5	0.0	28.3	18.8	5.8	34.0	17.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	37.5	0.0	28.3	18.8	5.8	34.0	17.4
Queue Length 50th (ft)	1	0	70	103	81	1	195
Queue Length 95th (ft)	8	0	126	145	222	5	#487
Internal Link Dist (ft)	1189		1712		1655	2029	
Turn Bay Length (ft)		50		775		100	
Base Capacity (vph)	240	639	1052	1485	1409	240	1126
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	0.01	0.00	0.30	0.36	0.41	0.00	0.85

Intersection Summary

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

Movement	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	2	0	2	0	280	0	496	517	12	1	865
Future Volume (vph)	2	0	2	0	280	0	496	517	12	1	865
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	6.0
Lane Util. Factor	1.00	1.00			0.95		0.97	1.00		1.00	1.00
Frt	1.00	0.85			1.00		1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00
Satd. Flow (prot)	1805	1214			3574		3433	1875		1805	1583
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00
Satd. Flow (perm)	1805	1214			3574		3433	1875		1805	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.92	0.92	0.92	0.90	0.90
Adj. Flow (vph)	2	0	2	0	311	0	539	562	13	1	961
RTOR Reduction (vph)	0	2	0	0	0	0	0	1	0	0	254
Lane Group Flow (vph)	2	0	0	0	311	0	539	574	0	1	707
Heavy Vehicles (%)	0%	0%	33%	0%	1%	0%	2%	1%	0%	0%	2%
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Prot	pt+ov
Protected Phases	4	4		1	6		5	2		3	3 5
Permitted Phases		4									
Actuated Green, G (s)	1.2	1.2			19.7		35.1	60.8		10.0	45.1
Effective Green, g (s)	3.2	3.2			21.7		37.1	62.8		12.0	45.1
Actuated g/C Ratio	0.04	0.04			0.24		0.41	0.70		0.13	0.50
Clearance Time (s)	6.0	6.0			6.0		6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)	64	43			861		1415	1308		240	793
v/s Ratio Prot	c0.00	0.00			0.09		0.16	c0.31		0.00	c0.45
v/s Ratio Perm											
v/c Ratio	0.03	0.00			0.36		0.38	0.44		0.00	0.89
Uniform Delay, d1	41.9	41.9			28.4		18.4	5.9		33.8	20.2
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	0.0			1.2		0.2	1.1		0.0	12.3
Delay (s)	42.1	41.9			29.6		18.6	7.0		33.8	32.5
Level of Service	D	D			C		B	A		C	C
Approach Delay (s/veh)	42.0				29.6			12.6		32.5	
Approach LOS	D				C			B		C	

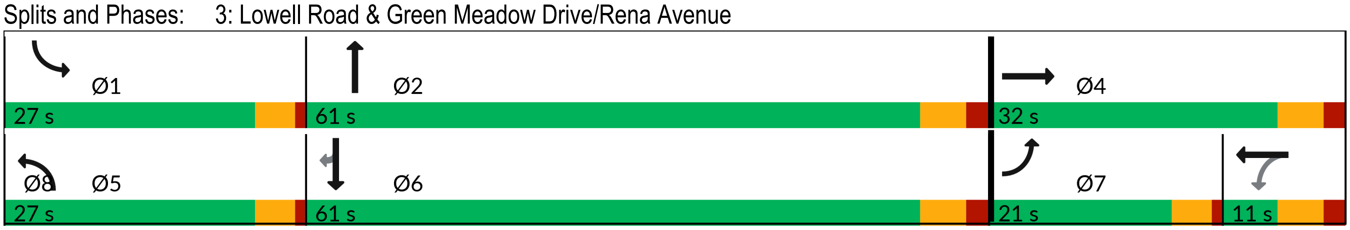
Intersection Summary			
HCM 2000 Control Delay (s/veh)	22.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	291	0	58	1	0	16	42	1277	5	24	1251	243
Future Volume (vph)	291	0	58	1	0	16	42	1277	5	24	1251	243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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			25			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			0.872			0.999				0.850
Flt Protected	0.950				0.997		0.950			0.950		
Satd. Flow (prot)	3367	1615	0	0	1652	0	1805	3606	0	1805	3610	1442
Flt Permitted	0.950				0.976		0.950			0.950		
Satd. Flow (perm)	3367	1615	0	0	1617	0	1805	3606	0	1805	3610	1442
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)		331										232
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		525			828			938			1037	
Travel Time (s)		11.9			18.8			18.3			20.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	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)	323	0	64	1	0	18	45	1373	5	27	1390	270
Shared Lane Traffic (%)												
Lane Group Flow (vph)	323	64	0	0	19	0	45	1378	0	27	1390	270
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2			2		1	2		1	2	1
Detector Template	Left	Thru			Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100			100		20	100		20	100	20
Trailing Detector (ft)	0	0			0		0	0		0	0	0
Detector 1 Position(ft)	0	0			0		0	0		0	0	0
Detector 1 Size(ft)	20	6			6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				8								6
Detector Phase	7	4		8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	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)	16.5	26.0		5.0	5.0		22.5	55.0		22.5	55.0	55.0
Yellow Time (s)	3.5	4.0		4.0	4.0		3.5	4.0		3.5	4.0	4.0
All-Red Time (s)	1.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	2.0
Lost Time Adjust (s)	-0.5	-2.0			-2.0		-0.5	-2.0		-0.5	-2.0	-2.0
Total Lost Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max		None	Max	Max
Act Effct Green (s)	14.3	18.0			7.2		8.4	61.2		7.5	58.3	58.3
Actuated g/C Ratio	0.16	0.20			0.08		0.09	0.67		0.08	0.63	0.63
v/c Ratio	0.62	0.11			0.15		0.27	0.57		0.18	0.61	0.27
Control Delay (s/veh)	43.6	0.4			48.8		47.3	12.3		47.1	14.4	3.4
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay (s/veh)	43.6	0.4			48.8		47.3	12.3		47.1	14.4	3.4
LOS	D	A			D		D	B		D	B	A
Approach Delay (s/veh)		36.5			48.8			13.4			13.2	
Approach LOS		D			D			B			B	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 91.9	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.62	
Intersection Signal Delay (s/veh): 16.0	Intersection LOS: B
Intersection Capacity Utilization 57.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Lowell Road & Green Meadow Drive/Rena Avenue



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	323	64	19	45	1378	27	1390	270
v/c Ratio	0.62	0.11	0.15	0.27	0.57	0.18	0.61	0.27
Control Delay (s/veh)	43.6	0.4	48.8	47.3	12.3	47.1	14.4	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	43.6	0.4	48.8	47.3	12.3	47.1	14.4	3.4
Queue Length 50th (ft)	91	0	11	25	134	15	237	8
Queue Length 95th (ft)	156	0	37	66	436	46	460	53
Internal Link Dist (ft)		445	748		858		957	
Turn Bay Length (ft)				300		350		
Base Capacity (vph)	637	731	126	462	2403	462	2290	999
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	0.09	0.15	0.10	0.57	0.06	0.61	0.27

Intersection Summary

Attachment "G"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	291	0	58	1	0	16	42	1277	5	24	1251	243
Future Volume (vph)	291	0	58	1	0	16	42	1277	5	24	1251	243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.85			0.87		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3367	1615			1653		1805	3608		1805	3610	1442
Flt Permitted	0.95	1.00			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3367	1615			1617		1805	3608		1805	3610	1442
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.93	0.93	0.93	0.90	0.90	0.90
Adj. Flow (vph)	323	0	64	1	0	18	45	1373	5	27	1390	270
RTOR Reduction (vph)	0	50	0	0	0	0	0	0	0	0	0	93
Lane Group Flow (vph)	323	14	0	0	19	0	45	1378	0	27	1390	177
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	12%
Turn Type	Prot	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases				8								6
Actuated Green, G (s)	13.8	20.0			1.7		4.9	59.2		2.9	57.2	57.2
Effective Green, g (s)	14.3	22.0			3.7		5.4	61.2		3.4	59.2	59.2
Actuated g/C Ratio	0.15	0.22			0.04		0.05	0.62		0.03	0.60	0.60
Clearance Time (s)	4.5	6.0			6.0		4.5	6.0		4.5	6.0	6.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	488	360			60		98	2239		62	2167	865
v/s Ratio Prot	c0.10	0.01					c0.02	0.38		0.01	c0.39	
v/s Ratio Perm					c0.01							0.12
v/c Ratio	0.66	0.04			0.32		0.46	0.62		0.44	0.64	0.20
Uniform Delay, d1	39.9	30.0			46.2		45.2	11.5		46.7	12.8	9.0
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.4	0.0			3.0		3.4	1.3		4.8	1.5	0.5
Delay (s)	43.2	30.1			49.2		48.6	12.8		51.5	14.3	9.5
Level of Service	D	C			D		D	B		D	B	A
Approach Delay (s/veh)		41.0			49.2			13.9			14.1	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	98.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	324	0	22	263	0	25
Future Volume (vph)	324	0	22	263	0	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected				0.996		
Satd. Flow (prot)	3539	0	0	1855	0	1611
Flt Permitted				0.996		
Satd. Flow (perm)	3539	0	0	1855	0	1611
Link Speed (mph)	30			30	30	
Link Distance (ft)	217			525	202	
Travel Time (s)	4.9			11.9	4.6	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	360	0	24	292	0	28
Shared Lane Traffic (%)						
Lane Group Flow (vph)	360	0	0	316	0	28
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 30.7% ICU Level of Service A

Analysis Period (min) 15

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	324	0	22	263	0	25
Future Vol, veh/h	324	0	22	263	0	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	360	0	24	292	0	28

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	360	0	-	180
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.13	-	-	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.219	-	-	3.319
Pot Cap-1 Maneuver	-	-	1197	-	0	832
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1197	-	-	832
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.6	9.5
HCM LOS			A

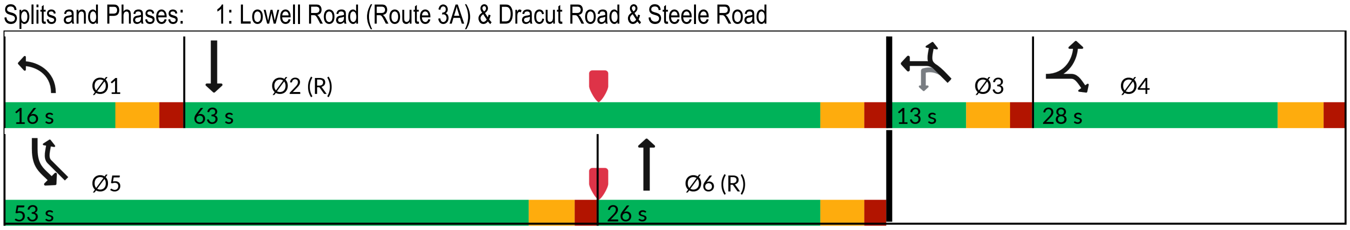
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	832	-	-	1197	-
HCM Lane V/C Ratio	0.033	-	-	0.02	-
HCM Ctrl Dly (s/v)	9.5	-	-	8.1	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Traffic Volume (vph)	36	2	2	1	601	1	902	403	13	4	0	669
Future Volume (vph)	36	2	2	1	601	1	902	403	13	4	0	669
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		200		300	775		0		100	0
Storage Lanes	1	1		1		0	2		0		1	1
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.97	1.00	1.00	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)	1787	1615	0	1805	3610	0	3502	1872	0	0	1805	1615
Flt Permitted	0.950			0.950			0.950				0.444	
Satd. Flow (perm)	1787	1615	0	1805	3610	0	3502	1872	0	0	844	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		191						2				447
Link Speed (mph)	30				35			35			30	
Link Distance (ft)	1269				1792			1735			2109	
Travel Time (s)	28.8				34.9			33.8			47.9	
Peak Hour Factor	0.90	0.90	0.90	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)	40	2	2	1	660	1	1002	448	14	4	0	735
Shared Lane Traffic (%)												
Lane Group Flow (vph)	40	4	0	1	661	0	1002	462	0	0	4	735
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12				24			24			12	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16				16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	15	9
Number of Detectors	1	1		1	2		1	2			1	1
Detector Template	Left	Right		Left	Thru		Left	Thru			Left	Right
Leading Detector (ft)	20	20		20	100		20	100			20	20
Trailing Detector (ft)	0	0		0	0		0	0			0	0
Detector 1 Position(ft)	0	0		0	0		0	0			0	0
Detector 1 Size(ft)	20	20		20	6		20	6			20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 2 Position(ft)					94			94				
Detector 2 Size(ft)					6			6				
Detector 2 Type					Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Perm	Prot	pt+ov
Protected Phases	4	4		1	6		5	2			3	3 5

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Permitted Phases		4								3		
Detector Phase	4	4		1	6		5	2		3	3	3 5
Switch Phase												
Minimum Initial (s)	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	14.0		14.0	14.0		11.0	11.0	
Total Split (s)	28.0	28.0		16.0	26.0		53.0	63.0		13.0	13.0	
Total Split (%)	23.3%	23.3%		13.3%	21.7%		44.2%	52.5%		10.8%	10.8%	
Maximum Green (s)	22.0	22.0		10.0	20.0		47.0	57.0		7.0	7.0	
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)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0			-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
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	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	C-Max		None	C-Max		None	None	
Act Effct Green (s)	10.2	10.2		7.6	41.9		45.2	88.7			9.0	51.4
Actuated g/C Ratio	0.09	0.09		0.06	0.35		0.38	0.74			0.08	0.43
v/c Ratio	0.26	0.01		0.01	0.52		0.76	0.33			0.06	0.78
Control Delay (s/veh)	55.0	0.0		53.0	35.5		36.4	7.5			54.0	15.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay (s/veh)	55.0	0.0		53.0	35.5		36.4	7.5			54.0	15.1
LOS	E	A		D	D		D	A			D	B
Approach Delay (s/veh)	50.0				35.5			27.3			15.3	
Approach LOS	D				D			C			B	

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 Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay (s/veh): 26.5	Intersection LOS: C
Intersection Capacity Utilization 66.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBL	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	40	4	1	661	1002	462	4	735
v/c Ratio	0.26	0.01	0.01	0.52	0.76	0.33	0.06	0.78
Control Delay (s/veh)	55.0	0.0	53.0	35.5	36.4	7.5	54.0	15.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	55.0	0.0	53.0	35.5	36.4	7.5	54.0	15.1
Queue Length 50th (ft)	30	0	1	221	342	107	3	125
Queue Length 95th (ft)	64	0	7	320	379	238	15	255
Internal Link Dist (ft)	1189			1712		1655	2029	
Turn Bay Length (ft)		50	200		775		100	
Base Capacity (vph)	357	475	180	1261	1451	1385	63	991
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	0.11	0.01	0.01	0.52	0.69	0.33	0.06	0.74

Intersection Summary

Movement	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Traffic Volume (vph)	36	2	2	1	601	1	902	403	13	4	0	669
Future Volume (vph)	36	2	2	1	601	1	902	403	13	4	0	669
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	6.0
Lane Util. Factor	1.00	1.00		1.00	0.95		0.97	1.00			1.00	1.00
Frt	1.00	0.85		1.00	1.00		1.00	1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.95	1.00
Satd. Flow (prot)	1787	1615		1805	3609		3502	1873			1805	1615
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00			0.44	1.00
Satd. Flow (perm)	1787	1615		1805	3609		3502	1873			844	1615
Peak-hour factor, PHF	0.90	0.90	0.90	0.91	0.91	0.91	0.90	0.90	0.90	0.91	0.91	0.91
Adj. Flow (vph)	40	2	2	1	660	1	1002	448	14	4	0	735
RTOR Reduction (vph)	0	4	0	0	0	0	0	1	0	0	0	260
Lane Group Flow (vph)	40	0	0	1	661	0	1002	461	0	0	4	475
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Perm	Prot	pt+ov
Protected Phases	4	4		1	6		5	2			3	3 5
Permitted Phases		4								3		
Actuated Green, G (s)	7.1	7.1		1.2	38.7		43.2	80.7			7.0	50.2
Effective Green, g (s)	9.1	9.1		3.2	40.7		45.2	82.7			9.0	50.2
Actuated g/C Ratio	0.08	0.08		0.03	0.34		0.38	0.69			0.08	0.42
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	135	122		48	1224		1319	1290			63	675
v/s Ratio Prot	c0.02	0.00		0.00	c0.18		c0.29	0.25				c0.29
v/s Ratio Perm											0.00	
v/c Ratio	0.30	0.00		0.02	0.54		0.76	0.36			0.06	0.70
Uniform Delay, d1	52.4	51.3		56.9	32.1		32.7	7.7			51.6	28.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	1.2	0.0		0.2	1.7		2.6	0.8			0.4	3.3
Delay (s)	53.7	51.3		57.0	33.8		35.2	8.5			52.0	32.1
Level of Service	D	D		E	C		D	A			D	C
Approach Delay (s/veh)	53.4				33.8			26.8			32.2	
Approach LOS	D				C			C			C	

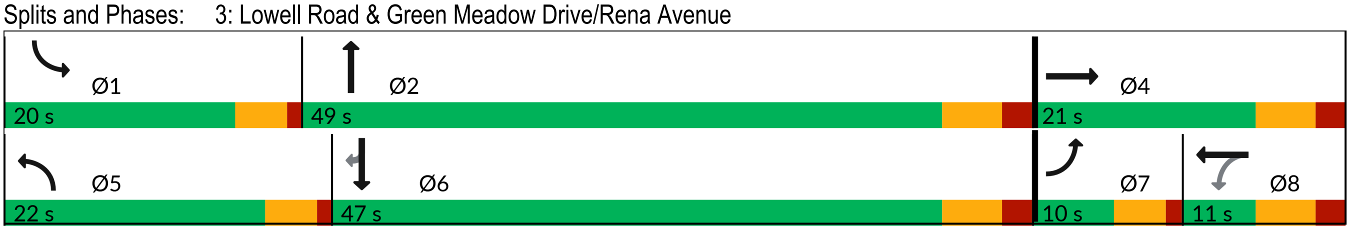
Intersection Summary			
HCM 2000 Control Delay (s/veh)	30.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	156	0	25	1	1	36	43	1256	2	8	1100	241
Future Volume (vph)	156	0	25	1	1	36	43	1256	2	8	1100	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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			25			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							0.850
Flt Protected	0.950				0.999		0.950			0.950		
Satd. Flow (prot)	3502	1214	0	0	1604	0	1805	3538	0	1570	3539	1615
Flt Permitted	0.950				0.990		0.950			0.950		
Satd. Flow (perm)	3502	1214	0	0	1590	0	1805	3538	0	1570	3539	1615
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)		330										254
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		742			828			938			1037	
Travel Time (s)		16.9			18.8			18.3			20.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	33%	9%	0%	3%	0%	2%	20%	15%	2%	0%
Adj. Flow (vph)	173	0	28	1	1	40	48	1396	2	8	1158	254
Shared Lane Traffic (%)												
Lane Group Flow (vph)	173	28	0	0	42	0	48	1398	0	8	1158	254
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2			2		1	2		1	2	1
Detector Template	Left	Thru			Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100			100		20	100		20	100	20
Trailing Detector (ft)	0	0			0		0	0		0	0	0
Detector 1 Position(ft)	0	0			0		0	0		0	0	0
Detector 1 Size(ft)	20	6			6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				8								6
Detector Phase	7	4		8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	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)	5.5	15.0		5.0	5.0		17.5	43.0		15.5	41.0	41.0
Yellow Time (s)	3.5	4.0		4.0	4.0		3.5	4.0		3.5	4.0	4.0
All-Red Time (s)	1.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	2.0
Lost Time Adjust (s)	-0.5	-2.0			-2.0		-0.5	-2.0		-0.5	-2.0	-2.0
Total Lost Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max		None	Max	Max
Act Effct Green (s)	6.8	12.8			7.1		8.0	49.9		6.6	44.9	44.9
Actuated g/C Ratio	0.09	0.18			0.10		0.11	0.68		0.09	0.62	0.62
v/c Ratio	0.53	0.06			0.27		0.24	0.58		0.06	0.53	0.23
Control Delay (s/veh)	41.4	0.2			39.1		35.5	8.7		35.4	11.5	2.1
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay (s/veh)	41.4	0.2			39.1		35.5	8.7		35.4	11.5	2.1
LOS	D	A			D		D	A		D	B	A
Approach Delay (s/veh)		35.6			39.1			9.6			10.0	
Approach LOS		D			D			A			A	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 72.9	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay (s/veh): 11.8	Intersection LOS: B
Intersection Capacity Utilization 53.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Lowell Road & Green Meadow Drive/Rena Avenue



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	173	28	42	48	1398	8	1158	254
v/c Ratio	0.53	0.06	0.27	0.24	0.58	0.06	0.53	0.23
Control Delay (s/veh)	41.4	0.2	39.1	35.5	8.7	35.4	11.5	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	41.4	0.2	39.1	35.5	8.7	35.4	11.5	2.1
Queue Length 50th (ft)	44	0	20	23	160	4	194	0
Queue Length 95th (ft)	#88	0	52	54	335	17	275	33
Internal Link Dist (ft)		662	748		858		957	
Turn Bay Length (ft)				300		350		
Base Capacity (vph)	329	540	155	455	2422	352	2178	1091
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	0.53	0.05	0.27	0.11	0.58	0.02	0.53	0.23

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	156	0	25	1	1	36	43	1256	2	8	1100	241
Future Volume (vph)	156	0	25	1	1	36	43	1256	2	8	1100	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.85			0.87		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	1214			1604		1805	3538		1570	3539	1615
Flt Permitted	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	1214			1591		1805	3538		1570	3539	1615
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	173	0	28	1	1	40	48	1396	2	8	1158	254
RTOR Reduction (vph)	0	23	0	0	0	0	0	0	0	0	0	105
Lane Group Flow (vph)	173	5	0	0	42	0	48	1398	0	8	1158	149
Heavy Vehicles (%)	0%	0%	33%	9%	0%	3%	0%	2%	20%	15%	2%	0%
Turn Type	Prot	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases				8								6
Actuated Green, G (s)	6.3	13.5			2.7		4.7	47.9		1.2	44.4	44.4
Effective Green, g (s)	6.8	15.5			4.7		5.2	49.9		1.7	46.4	46.4
Actuated g/C Ratio	0.09	0.20			0.06		0.07	0.63		0.02	0.59	0.59
Clearance Time (s)	4.5	6.0			6.0		4.5	6.0		4.5	6.0	6.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	301	237			94		118	2231		33	2075	947
v/s Ratio Prot	c0.05	0.00					c0.03	c0.40		0.01	0.33	
v/s Ratio Perm					c0.03							0.09
v/c Ratio	0.57	0.02			0.45		0.41	0.63		0.24	0.56	0.16
Uniform Delay, d1	34.8	25.7			35.9		35.5	8.9		38.1	10.0	7.4
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.6	0.0			3.4		2.3	1.3		3.8	1.1	0.4
Delay (s)	37.4	25.7			39.3		37.8	10.3		41.9	11.1	7.8
Level of Service	D	C			D		D	B		D	B	A
Approach Delay (s/veh)		35.8			39.3			11.2			10.7	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	79.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

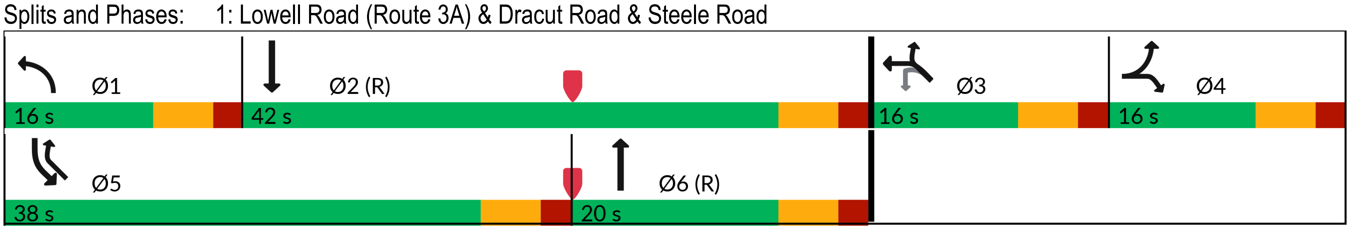
Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	2	0	2	0	304	0	540	567	14	1	943
Future Volume (vph)	2	0	2	0	304	0	540	567	14	1	943
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		200		300	775		0	100	0
Storage Lanes	1	1		1		0	2		0	1	1
Taper Length (ft)	25			25			25			25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00
Frt		0.850						0.996			0.850
Flt Protected	0.950						0.950			0.950	
Satd. Flow (prot)	1805	1214	0	1900	3574	0	3433	1874	0	1805	1583
Flt Permitted	0.950						0.950			0.950	
Satd. Flow (perm)	1805	1214	0	1900	3574	0	3433	1874	0	1805	1583
Right Turn on Red			Yes			Yes			Yes		Yes
Satd. Flow (RTOR)		533						2			497
Link Speed (mph)	30				35			35		30	
Link Distance (ft)	1269				1792			1735		2109	
Travel Time (s)	28.8				34.9			33.8		47.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.92	0.92	0.92	0.90	0.90
Heavy Vehicles (%)	0%	0%	33%	0%	1%	0%	2%	1%	0%	0%	2%
Adj. Flow (vph)	2	0	2	0	338	0	587	616	15	1	1048
Shared Lane Traffic (%)											
Lane Group Flow (vph)	2	2	0	0	338	0	587	631	0	1	1048
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Right
Median Width(ft)	12				24			24		12	
Link Offset(ft)	0				0			0		0	
Crosswalk Width(ft)	16				16			16		16	
Two way Left Turn Lane											
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	9
Number of Detectors	1	1		1	2		1	2		1	1
Detector Template	Left	Right		Left	Thru		Left	Thru		Left	Right
Leading Detector (ft)	20	20		20	100		20	100		20	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0
Detector 1 Size(ft)	20	20		20	6		20	6		20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel											
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 2 Position(ft)					94			94			
Detector 2 Size(ft)					6			6			
Detector 2 Type					Cl+Ex			Cl+Ex			
Detector 2 Channel											
Detector 2 Extend (s)					0.0			0.0			
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Prot	pt+ov
Protected Phases	4	4		1	6		5	2		3	3 5

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Permitted Phases		4									
Detector Phase	4	4		1	6		5	2		3	3 5
Switch Phase											
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		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)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	
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	3.0		3.0	3.0		3.0	
Recall Mode	None	None		None	C-Max		None	C-Max		None	
Act Effct Green (s)	7.7	7.7			16.0		47.6	67.6		12.0	60.4
Actuated g/C Ratio	0.09	0.09			0.18		0.53	0.75		0.13	0.67
v/c Ratio	0.01	0.00			0.53		0.32	0.45		0.00	0.86
Control Delay (s/veh)	37.5	0.0			37.1		13.5	6.2		34.0	15.5
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0
Total Delay (s/veh)	37.5	0.0			37.1		13.5	6.2		34.0	15.5
LOS	D	A			D		B	A		C	B
Approach Delay (s/veh)	18.8				37.1			9.7		15.5	
Approach LOS	B				D			A		B	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 38 (42%), Referenced to phase 2:SBT and 6:NBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay (s/veh): 15.6 Intersection LOS: B
Intersection Capacity Utilization 75.1% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	2	2	338	587	631	1	1048
v/c Ratio	0.01	0.00	0.53	0.32	0.45	0.00	0.86
Control Delay (s/veh)	37.5	0.0	37.1	13.5	6.2	34.0	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	37.5	0.0	37.1	13.5	6.2	34.0	15.5
Queue Length 50th (ft)	1	0	92	86	92	1	167
Queue Length 95th (ft)	8	0	136	159	254	5	#778
Internal Link Dist (ft)	1189		1712		1655	2029	
Turn Bay Length (ft)		50		775		100	
Base Capacity (vph)	240	623	635	1815	1408	240	1225
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	0.01	0.00	0.53	0.32	0.45	0.00	0.86

Intersection Summary

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

Movement	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	2	0	2	0	304	0	540	567	14	1	943
Future Volume (vph)	2	0	2	0	304	0	540	567	14	1	943
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	6.0
Lane Util. Factor	1.00	1.00			0.95		0.97	1.00		1.00	1.00
Frt	1.00	0.85			1.00		1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00
Satd. Flow (prot)	1805	1214			3574		3433	1875		1805	1583
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00
Satd. Flow (perm)	1805	1214			3574		3433	1875		1805	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.92	0.92	0.92	0.90	0.90
Adj. Flow (vph)	2	0	2	0	338	0	587	616	15	1	1048
RTOR Reduction (vph)	0	2	0	0	0	0	0	1	0	0	190
Lane Group Flow (vph)	2	0	0	0	338	0	587	630	0	1	858
Heavy Vehicles (%)	0%	0%	33%	0%	1%	0%	2%	1%	0%	0%	2%
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Prot	pt+ov
Protected Phases	4	4		1	6		5	2		3	3 5
Permitted Phases		4									
Actuated Green, G (s)	1.2	1.2			9.2		45.6	60.8		10.0	55.6
Effective Green, g (s)	3.2	3.2			11.2		47.6	62.8		12.0	55.6
Actuated g/C Ratio	0.04	0.04			0.12		0.53	0.70		0.13	0.62
Clearance Time (s)	6.0	6.0			6.0		6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)	64	43			444		1815	1308		240	977
v/s Ratio Prot	c0.00	0.00			c0.09		0.17	0.34		0.00	c0.54
v/s Ratio Perm											
v/c Ratio	0.03	0.00			0.76		0.32	0.48		0.00	0.88
Uniform Delay, d1	41.9	41.9			38.1		12.0	6.2		33.8	14.4
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	0.0			11.7		0.1	1.3		0.0	9.0
Delay (s)	42.1	41.9			49.8		12.2	7.5		33.8	23.4
Level of Service	D	D			D		B	A		C	C
Approach Delay (s/veh)	42.0				49.8			9.7		23.4	
Approach LOS	D				D			A		C	

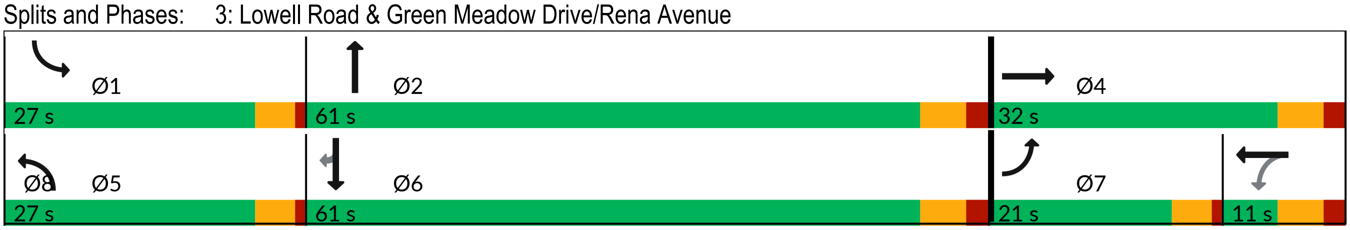
Intersection Summary			
HCM 2000 Control Delay (s/veh)	20.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

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	1407	6	26	1379	228
Future Volume (vph)	273	0	51	1	0	17	35	1407	6	26	1379	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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			25			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			0.872			0.999				0.850
Flt Protected	0.950				0.998		0.950			0.950		
Satd. Flow (prot)	3467	1615	0	0	1653	0	1805	3606	0	1805	3610	1482
Flt Permitted	0.950				0.977		0.950			0.950		
Satd. Flow (perm)	3467	1615	0	0	1619	0	1805	3606	0	1805	3610	1482
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)		326										197
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		742			828			938			1037	
Travel Time (s)		16.9			18.8			18.3			20.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.93	0.93	0.93	0.90	0.90	0.90
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9%
Adj. Flow (vph)	303	0	57	1	0	19	38	1513	6	29	1532	253
Shared Lane Traffic (%)												
Lane Group Flow (vph)	303	57	0	0	20	0	38	1519	0	29	1532	253
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2			2		1	2		1	2	1
Detector Template	Left	Thru			Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100			100		20	100		20	100	20
Trailing Detector (ft)	0	0			0		0	0		0	0	0
Detector 1 Position(ft)	0	0			0		0	0		0	0	0
Detector 1 Size(ft)	20	6			6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				8								6
Detector Phase	7	4		8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	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)	16.5	26.0		5.0	5.0		22.5	55.0		22.5	55.0	55.0
Yellow Time (s)	3.5	4.0		4.0	4.0		3.5	4.0		3.5	4.0	4.0
All-Red Time (s)	1.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	2.0
Lost Time Adjust (s)	-0.5	-2.0			-2.0		-0.5	-2.0		-0.5	-2.0	-2.0
Total Lost Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max		None	Max	Max
Act Effct Green (s)	13.5	17.2			7.2		8.0	58.7		7.6	58.4	58.4
Actuated g/C Ratio	0.15	0.19			0.08		0.09	0.65		0.08	0.64	0.64
v/c Ratio	0.59	0.10			0.16		0.24	0.65		0.19	0.66	0.25
Control Delay (s/veh)	42.8	0.4			48.4		46.7	14.6		46.6	15.1	3.9
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay (s/veh)	42.8	0.4			48.4		46.7	14.6		46.6	15.1	3.9
LOS	D	A			D		D	B		D	B	A
Approach Delay (s/veh)		36.1			48.4			15.4			14.1	
Approach LOS		D			D			B			B	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 90.9	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.66	
Intersection Signal Delay (s/veh): 16.9	Intersection LOS: B
Intersection Capacity Utilization 60.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Lowell Road & Green Meadow Drive/Rena Avenue



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	303	57	20	38	1519	29	1532	253
v/c Ratio	0.59	0.10	0.16	0.24	0.65	0.19	0.66	0.25
Control Delay (s/veh)	42.8	0.4	48.4	46.7	14.6	46.6	15.1	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	42.8	0.4	48.4	46.7	14.6	46.6	15.1	3.9
Queue Length 50th (ft)	84	0	11	21	259	16	266	11
Queue Length 95th (ft)	145	0	39	58	515	48	532	58
Internal Link Dist (ft)		662	748		858		957	
Turn Bay Length (ft)				300		350		
Base Capacity (vph)	663	732	127	467	2328	467	2317	1021
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	0.46	0.08	0.16	0.08	0.65	0.06	0.66	0.25

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	273	0	51	1	0	17	35	1407	6	26	1379	228
Future Volume (vph)	273	0	51	1	0	17	35	1407	6	26	1379	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.85			0.87		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3467	1615			1652		1805	3608		1805	3610	1482
Flt Permitted	0.95	1.00			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3467	1615			1619		1805	3608		1805	3610	1482
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.93	0.93	0.93	0.90	0.90	0.90
Adj. Flow (vph)	303	0	57	1	0	19	38	1513	6	29	1532	253
RTOR Reduction (vph)	0	45	0	0	0	0	0	0	0	0	0	78
Lane Group Flow (vph)	303	12	0	0	20	0	38	1519	0	29	1532	175
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9%
Turn Type	Prot	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases				8								6
Actuated Green, G (s)	13.0	19.2			1.7		4.7	56.7		4.3	56.3	56.3
Effective Green, g (s)	13.5	21.2			3.7		5.2	58.7		4.8	58.3	58.3
Actuated g/C Ratio	0.14	0.22			0.04		0.05	0.61		0.05	0.60	0.60
Clearance Time (s)	4.5	6.0			6.0		4.5	6.0		4.5	6.0	6.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	484	354			61		97	2190		89	2176	893
v/s Ratio Prot	c0.09	0.01					c0.02	0.42		0.02	c0.42	
v/s Ratio Perm					c0.01							0.12
v/c Ratio	0.63	0.04			0.33		0.39	0.69		0.33	0.70	0.20
Uniform Delay, d1	39.2	29.7			45.3		44.2	12.9		44.4	13.2	8.6
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.5	0.0			3.1		2.6	1.8		2.1	1.9	0.5
Delay (s)	41.7	29.7			48.4		46.8	14.7		46.5	15.2	9.1
Level of Service	D	C			D		D	B		D	B	A
Approach Delay (s/veh)		39.8			48.4			15.5			14.8	
Approach LOS		D			D			B			B	

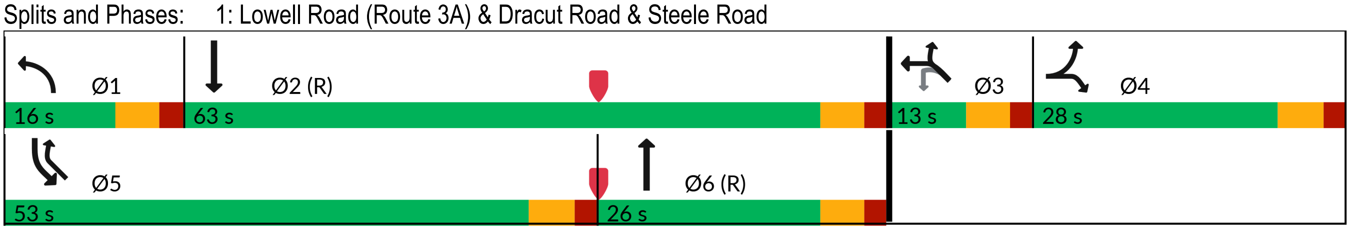
Intersection Summary			
HCM 2000 Control Delay (s/veh)	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	96.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Traffic Volume (vph)	40	2	2	1	661	1	992	443	15	5	0	735
Future Volume (vph)	40	2	2	1	661	1	992	443	15	5	0	735
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		200		300	775		0		100	0
Storage Lanes	1	1		1		0	2		0		1	1
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.97	1.00	1.00	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)	1787	1615	0	1805	3610	0	3502	1872	0	0	1805	1615
Flt Permitted	0.950			0.950			0.950				0.444	
Satd. Flow (perm)	1787	1615	0	1805	3610	0	3502	1872	0	0	844	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		191						2				434
Link Speed (mph)	30				35			35			30	
Link Distance (ft)	1269				1792			1735			2109	
Travel Time (s)	28.8				34.9			33.8			47.9	
Peak Hour Factor	0.90	0.90	0.90	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)	44	2	2	1	726	1	1102	492	17	5	0	808
Shared Lane Traffic (%)												
Lane Group Flow (vph)	44	4	0	1	727	0	1102	509	0	0	5	808
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12				24			24			12	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16				16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	15	9
Number of Detectors	1	1		1	2		1	2			1	1
Detector Template	Left	Right		Left	Thru		Left	Thru			Left	Right
Leading Detector (ft)	20	20		20	100		20	100			20	20
Trailing Detector (ft)	0	0		0	0		0	0			0	0
Detector 1 Position(ft)	0	0		0	0		0	0			0	0
Detector 1 Size(ft)	20	20		20	6		20	6			20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 2 Position(ft)					94			94				
Detector 2 Size(ft)					6			6				
Detector 2 Type					Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Perm	Prot	pt+ov
Protected Phases	4	4		1	6		5	2			3	3 5

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Permitted Phases		4								3		
Detector Phase	4	4		1	6		5	2		3	3	3 5
Switch Phase												
Minimum Initial (s)	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	14.0		14.0	14.0		11.0	11.0	
Total Split (s)	28.0	28.0		16.0	26.0		53.0	63.0		13.0	13.0	
Total Split (%)	23.3%	23.3%		13.3%	21.7%		44.2%	52.5%		10.8%	10.8%	
Maximum Green (s)	22.0	22.0		10.0	20.0		47.0	57.0		7.0	7.0	
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)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0			-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
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	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	C-Max		None	C-Max		None	None	
Act Effct Green (s)	10.4	10.4		7.6	37.4		49.5	88.5			9.0	55.7
Actuated g/C Ratio	0.09	0.09		0.06	0.31		0.41	0.74			0.08	0.46
v/c Ratio	0.29	0.01		0.01	0.65		0.76	0.37			0.08	0.82
Control Delay (s/veh)	55.3	0.0		53.0	41.3		33.6	8.0			54.8	18.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay (s/veh)	55.3	0.0		53.0	41.3		33.6	8.0			54.8	18.2
LOS	E	A		D	D		C	A			D	B
Approach Delay (s/veh)	50.6				41.3			25.5			18.5	
Approach LOS	D				D			C			B	

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 Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay (s/veh): 27.7	Intersection LOS: C
Intersection Capacity Utilization 72.1%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBL	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	44	4	1	727	1102	509	5	808
v/c Ratio	0.29	0.01	0.01	0.65	0.76	0.37	0.08	0.82
Control Delay (s/veh)	55.3	0.0	53.0	41.3	33.6	8.0	54.8	18.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	55.3	0.0	53.0	41.3	33.6	8.0	54.8	18.2
Queue Length 50th (ft)	33	0	1	261	373	122	4	197
Queue Length 95th (ft)	69	0	7	#460	384	272	17	319
Internal Link Dist (ft)	1189			1712		1655	2029	
Turn Bay Length (ft)		50	200		775		100	
Base Capacity (vph)	357	475	180	1126	1510	1381	63	1004
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	0.12	0.01	0.01	0.65	0.73	0.37	0.08	0.80

Intersection Summary

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

Movement	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Traffic Volume (vph)	40	2	2	1	661	1	992	443	15	5	0	735
Future Volume (vph)	40	2	2	1	661	1	992	443	15	5	0	735
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	6.0
Lane Util. Factor	1.00	1.00		1.00	0.95		0.97	1.00			1.00	1.00
Frt	1.00	0.85		1.00	1.00		1.00	0.99			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.95	1.00
Satd. Flow (prot)	1787	1615		1805	3609		3502	1872			1805	1615
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00			0.44	1.00
Satd. Flow (perm)	1787	1615		1805	3609		3502	1872			844	1615
Peak-hour factor, PHF	0.90	0.90	0.90	0.91	0.91	0.91	0.90	0.90	0.90	0.91	0.91	0.91
Adj. Flow (vph)	44	2	2	1	726	1	1102	492	17	5	0	808
RTOR Reduction (vph)	0	4	0	0	0	0	0	1	0	0	0	237
Lane Group Flow (vph)	44	0	0	1	727	0	1102	508	0	0	5	571
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Perm	Prot	pt+ov
Protected Phases	4	4		1	6		5	2			3	3 5
Permitted Phases		4								3		
Actuated Green, G (s)	7.3	7.3		1.2	34.2		47.5	80.5			7.0	54.5
Effective Green, g (s)	9.3	9.3		3.2	36.2		49.5	82.5			9.0	54.5
Actuated g/C Ratio	0.08	0.08		0.03	0.30		0.41	0.69			0.08	0.45
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	138	125		48	1088		1444	1287			63	733
v/s Ratio Prot	c0.02	0.00		0.00	c0.20		c0.31	0.27				c0.35
v/s Ratio Perm											0.01	
v/c Ratio	0.32	0.00		0.02	0.67		0.76	0.40			0.08	0.78
Uniform Delay, d1	52.4	51.1		56.9	36.6		30.2	8.0			51.6	27.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	1.3	0.0		0.2	3.3		2.5	0.9			0.5	5.2
Delay (s)	53.7	51.1		57.0	39.9		32.7	9.0			52.2	32.9
Level of Service	D	D		E	D		C	A			D	C
Approach Delay (s/veh)	53.5				39.9			25.2			33.0	
Approach LOS	D				D			C			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	31.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

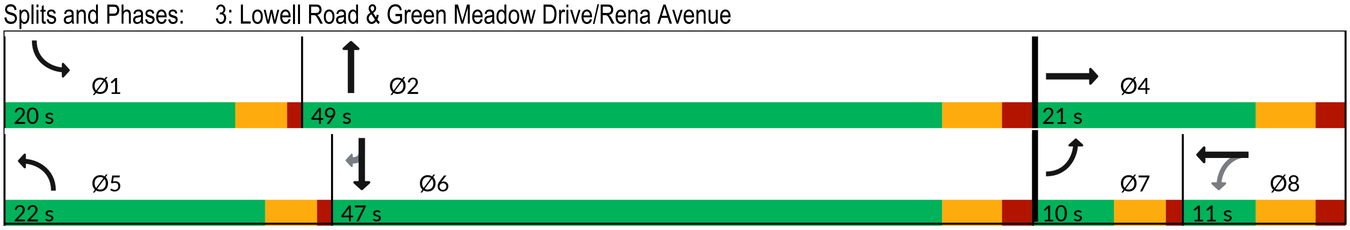
Attachment "G"

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	169	0	31	1	1	36	53	1256	2	8	1100	264
Future Volume (vph)	169	0	31	1	1	36	53	1256	2	8	1100	264
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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			25			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							0.850
Flt Protected	0.950				0.999		0.950			0.950		
Satd. Flow (prot)	3183	1214	0	0	1604	0	1805	3538	0	1570	3539	1524
Flt Permitted	0.950				0.990		0.950			0.950		
Satd. Flow (perm)	3183	1214	0	0	1590	0	1805	3538	0	1570	3539	1524
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)		330										278
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		525			828			938			1037	
Travel Time (s)		11.9			18.8			18.3			20.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.95	0.95	0.95
Heavy Vehicles (%)	10%	0%	33%	9%	0%	3%	0%	2%	20%	15%	2%	6%
Adj. Flow (vph)	188	0	34	1	1	40	59	1396	2	8	1158	278
Shared Lane Traffic (%)												
Lane Group Flow (vph)	188	34	0	0	42	0	59	1398	0	8	1158	278
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2			2		1	2		1	2	1
Detector Template	Left	Thru			Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100			100		20	100		20	100	20
Trailing Detector (ft)	0	0			0		0	0		0	0	0
Detector 1 Position(ft)	0	0			0		0	0		0	0	0
Detector 1 Size(ft)	20	6			6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				8								6
Detector Phase	7	4		8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	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)	5.5	15.0		5.0	5.0		17.5	43.0		15.5	41.0	41.0
Yellow Time (s)	3.5	4.0		4.0	4.0		3.5	4.0		3.5	4.0	4.0
All-Red Time (s)	1.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	2.0
Lost Time Adjust (s)	-0.5	-2.0			-2.0		-0.5	-2.0		-0.5	-2.0	-2.0
Total Lost Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max		None	Max	Max
Act Effct Green (s)	6.9	12.8			7.2		8.4	50.3		6.6	44.9	44.9
Actuated g/C Ratio	0.09	0.17			0.10		0.11	0.69		0.09	0.61	0.61
v/c Ratio	0.63	0.07			0.27		0.29	0.58		0.06	0.53	0.27
Control Delay (s/veh)	46.7	0.3			39.5		35.9	8.6		35.6	11.8	2.2
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay (s/veh)	46.7	0.3			39.5		35.9	8.6		35.6	11.8	2.2
LOS	D	A			D		D	A		D	B	A
Approach Delay (s/veh)		39.6			39.5			9.7			10.1	
Approach LOS		D			D			A			B	

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 73.3	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay (s/veh): 12.4	Intersection LOS: B
Intersection Capacity Utilization 60.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Lowell Road & Green Meadow Drive/Rena Avenue



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	188	34	42	59	1398	8	1158	278
v/c Ratio	0.63	0.07	0.27	0.29	0.58	0.06	0.53	0.27
Control Delay (s/veh)	46.7	0.3	39.5	35.9	8.6	35.6	11.8	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	46.7	0.3	39.5	35.9	8.6	35.6	11.8	2.2
Queue Length 50th (ft)	48	0	20	28	160	4	198	0
Queue Length 95th (ft)	#106	0	53	63	334	17	281	35
Internal Link Dist (ft)		445	748		858		957	
Turn Bay Length (ft)				300		350		
Base Capacity (vph)	297	539	155	453	2429	350	2168	1041
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	0.63	0.06	0.27	0.13	0.58	0.02	0.53	0.27

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	169	0	31	1	1	36	53	1256	2	8	1100	264
Future Volume (vph)	169	0	31	1	1	36	53	1256	2	8	1100	264
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.85			0.87		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3183	1214			1604		1805	3538		1570	3539	1524
Flt Permitted	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3183	1214			1590		1805	3538		1570	3539	1524
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.95	0.95	0.95
Adj. Flow (vph)	188	0	34	1	1	40	59	1396	2	8	1158	278
RTOR Reduction (vph)	0	27	0	0	0	0	0	0	0	0	0	115
Lane Group Flow (vph)	188	7	0	0	42	0	59	1398	0	8	1158	163
Heavy Vehicles (%)	10%	0%	33%	9%	0%	3%	0%	2%	20%	15%	2%	6%
Turn Type	Prot	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases				8								6
Actuated Green, G (s)	6.3	13.5			2.7		5.0	48.3		1.2	44.5	44.5
Effective Green, g (s)	6.8	15.5			4.7		5.5	50.3		1.7	46.5	46.5
Actuated g/C Ratio	0.09	0.19			0.06		0.07	0.63		0.02	0.58	0.58
Clearance Time (s)	4.5	6.0			6.0		4.5	6.0		4.5	6.0	6.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	272	236			94		124	2238		33	2069	891
v/s Ratio Prot	c0.06	0.01					c0.03	c0.40		0.01	0.33	
v/s Ratio Perm					c0.03							0.11
v/c Ratio	0.69	0.03			0.45		0.48	0.62		0.24	0.56	0.18
Uniform Delay, d1	35.3	25.9			36.1		35.6	8.9		38.3	10.2	7.7
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	7.4	0.0			3.4		2.9	1.3		3.8	1.1	0.5
Delay (s)	42.7	26.0			39.5		38.5	10.2		42.1	11.3	8.1
Level of Service	D	C			D		D	B		D	B	A
Approach Delay (s/veh)		40.1			39.5			11.3			10.8	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	13.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	79.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	181	0	33	258	0	19
Future Volume (vph)	181	0	33	258	0	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected				0.994		
Satd. Flow (prot)	3539	0	0	1852	0	1611
Flt Permitted				0.994		
Satd. Flow (perm)	3539	0	0	1852	0	1611
Link Speed (mph)	30			30	30	
Link Distance (ft)	217			525	202	
Travel Time (s)	4.9			11.9	4.6	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	201	0	37	287	0	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	201	0	0	324	0	21
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 27.1% ICU Level of Service A

Analysis Period (min) 15

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	181	0	33	258	0	19
Future Vol, veh/h	181	0	33	258	0	19
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	201	0	37	287	0	21

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	201	0	-	101
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.13	-	-	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.219	-	-	3.319
Pot Cap-1 Maneuver	-	-	1370	-	0	935
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1370	-	-	935
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.9	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	935	-	-	1370	-
HCM Lane V/C Ratio	0.023	-	-	0.027	-
HCM Ctrl Dly (s/v)	8.9	-	-	7.7	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

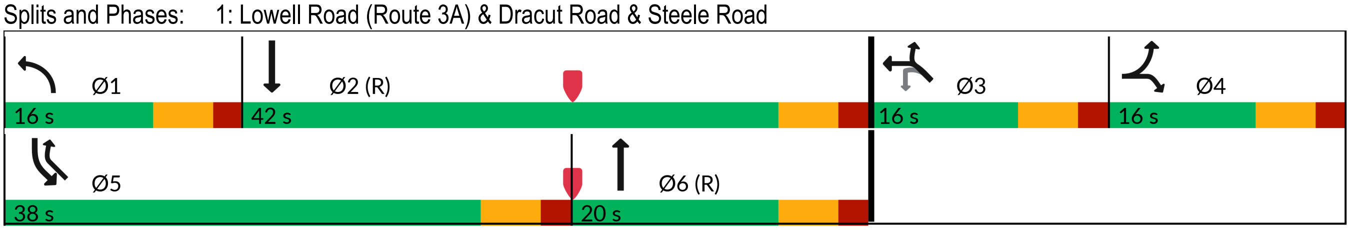
Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	2	0	2	0	307	0	544	569	14	1	950
Future Volume (vph)	2	0	2	0	307	0	544	569	14	1	950
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		200		300	775		0	100	0
Storage Lanes	1	1		1		0	2		0	1	1
Taper Length (ft)	25			25			25			25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00
Frt		0.850						0.996			0.850
Flt Protected	0.950						0.950			0.950	
Satd. Flow (prot)	1805	1214	0	1900	3574	0	3433	1874	0	1805	1583
Flt Permitted	0.950						0.950			0.950	
Satd. Flow (perm)	1805	1214	0	1900	3574	0	3433	1874	0	1805	1583
Right Turn on Red			Yes			Yes			Yes		Yes
Satd. Flow (RTOR)		532						2			496
Link Speed (mph)	30				35			35		30	
Link Distance (ft)	1269				1792			1735		2109	
Travel Time (s)	28.8				34.9			33.8		47.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.92	0.92	0.92	0.90	0.90
Heavy Vehicles (%)	0%	0%	33%	0%	1%	0%	2%	1%	0%	0%	2%
Adj. Flow (vph)	2	0	2	0	341	0	591	618	15	1	1056
Shared Lane Traffic (%)											
Lane Group Flow (vph)	2	2	0	0	341	0	591	633	0	1	1056
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Right
Median Width(ft)	12				24			24		12	
Link Offset(ft)	0				0			0		0	
Crosswalk Width(ft)	16				16			16		16	
Two way Left Turn Lane											
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	9
Number of Detectors	1	1		1	2		1	2		1	1
Detector Template	Left	Right		Left	Thru		Left	Thru		Left	Right
Leading Detector (ft)	20	20		20	100		20	100		20	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0
Detector 1 Size(ft)	20	20		20	6		20	6		20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel											
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Detector 2 Position(ft)					94			94			
Detector 2 Size(ft)					6			6			
Detector 2 Type					Cl+Ex			Cl+Ex			
Detector 2 Channel											
Detector 2 Extend (s)					0.0			0.0			
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Prot	pt+ov
Protected Phases	4	4		1	6		5	2		3	3 5

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Permitted Phases		4									
Detector Phase	4	4		1	6		5	2		3	3 5
Switch Phase											
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		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)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	
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	3.0		3.0	3.0		3.0	
Recall Mode	None	None		None	C-Max		None	C-Max		None	
Act Effct Green (s)	7.7	7.7			16.0		47.6	67.6		12.0	60.4
Actuated g/C Ratio	0.09	0.09			0.18		0.53	0.75		0.13	0.67
v/c Ratio	0.01	0.00			0.54		0.33	0.45		0.00	0.86
Control Delay (s/veh)	37.5	0.0			37.2		13.5	6.2		34.0	16.0
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0
Total Delay (s/veh)	37.5	0.0			37.2		13.5	6.2		34.0	16.0
LOS	D	A			D		B	A		C	B
Approach Delay (s/veh)	18.8				37.2			9.7		16.0	
Approach LOS	B				D			A		B	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 38 (42%), Referenced to phase 2:SBT and 6:NBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay (s/veh): 15.8 Intersection LOS: B
Intersection Capacity Utilization 75.6% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	2	2	341	591	633	1	1056
v/c Ratio	0.01	0.00	0.54	0.33	0.45	0.00	0.86
Control Delay (s/veh)	37.5	0.0	37.2	13.5	6.2	34.0	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	37.5	0.0	37.2	13.5	6.2	34.0	16.0
Queue Length 50th (ft)	1	0	93	87	93	1	173
Queue Length 95th (ft)	8	0	137	161	256	5	#788
Internal Link Dist (ft)	1189		1712		1655	2029	
Turn Bay Length (ft)		50		775		100	
Base Capacity (vph)	240	622	635	1815	1408	240	1224
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	0.01	0.00	0.54	0.33	0.45	0.00	0.86

Intersection Summary

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

Movement	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	2	0	2	0	307	0	544	569	14	1	950
Future Volume (vph)	2	0	2	0	307	0	544	569	14	1	950
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	6.0
Lane Util. Factor	1.00	1.00			0.95		0.97	1.00		1.00	1.00
Frt	1.00	0.85			1.00		1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00
Satd. Flow (prot)	1805	1214			3574		3433	1875		1805	1583
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95	1.00
Satd. Flow (perm)	1805	1214			3574		3433	1875		1805	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.92	0.92	0.92	0.90	0.90
Adj. Flow (vph)	2	0	2	0	341	0	591	618	15	1	1056
RTOR Reduction (vph)	0	2	0	0	0	0	0	1	0	0	190
Lane Group Flow (vph)	2	0	0	0	341	0	591	632	0	1	866
Heavy Vehicles (%)	0%	0%	33%	0%	1%	0%	2%	1%	0%	0%	2%
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Prot	pt+ov
Protected Phases	4	4		1	6		5	2		3	3 5
Permitted Phases		4									
Actuated Green, G (s)	1.2	1.2			9.2		45.6	60.8		10.0	55.6
Effective Green, g (s)	3.2	3.2			11.2		47.6	62.8		12.0	55.6
Actuated g/C Ratio	0.04	0.04			0.12		0.53	0.70		0.13	0.62
Clearance Time (s)	6.0	6.0			6.0		6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	
Lane Grp Cap (vph)	64	43			444		1815	1308		240	977
v/s Ratio Prot	c0.00	0.00			c0.10		0.17	0.34		0.00	c0.55
v/s Ratio Perm											
v/c Ratio	0.03	0.00			0.77		0.33	0.48		0.00	0.89
Uniform Delay, d1	41.9	41.9			38.1		12.1	6.2		33.8	14.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	0.0			12.0		0.1	1.3		0.0	9.8
Delay (s)	42.1	41.9			50.2		12.2	7.5		33.8	24.3
Level of Service	D	D			D		B	A		C	C
Approach Delay (s/veh)	42.0				50.2			9.7		24.3	
Approach LOS	D				D			A		C	

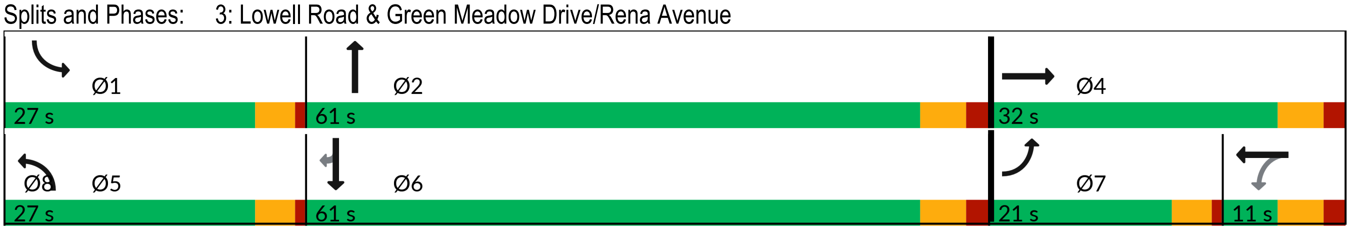
Intersection Summary			
HCM 2000 Control Delay (s/veh)	20.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	75.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	291	0	58	1	0	17	42	1407	5	26	1379	243
Future Volume (vph)	291	0	58	1	0	17	42	1407	5	26	1379	243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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			25			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			0.872							0.850
Flt Protected	0.950				0.998		0.950			0.950		
Satd. Flow (prot)	3367	1615	0	0	1653	0	1805	3610	0	1805	3610	1442
Flt Permitted	0.950				0.977		0.950			0.950		
Satd. Flow (perm)	3367	1615	0	0	1619	0	1805	3610	0	1805	3610	1442
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)		326										211
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		525			828			938			1037	
Travel Time (s)		11.9			18.8			18.3			20.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	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)	323	0	64	1	0	19	45	1513	5	29	1532	270
Shared Lane Traffic (%)												
Lane Group Flow (vph)	323	64	0	0	20	0	45	1518	0	29	1532	270
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2			2		1	2		1	2	1
Detector Template	Left	Thru			Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100			100		20	100		20	100	20
Trailing Detector (ft)	0	0			0		0	0		0	0	0
Detector 1 Position(ft)	0	0			0		0	0		0	0	0
Detector 1 Size(ft)	20	6			6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4			8		5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases				8								6
Detector Phase	7	4		8	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	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)	16.5	26.0		5.0	5.0		22.5	55.0		22.5	55.0	55.0
Yellow Time (s)	3.5	4.0		4.0	4.0		3.5	4.0		3.5	4.0	4.0
All-Red Time (s)	1.0	2.0		2.0	2.0		1.0	2.0		1.0	2.0	2.0
Lost Time Adjust (s)	-0.5	-2.0			-2.0		-0.5	-2.0		-0.5	-2.0	-2.0
Total Lost Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max		None	Max	Max
Act Effct Green (s)	14.3	18.0			7.2		8.4	58.9		7.7	58.3	58.3
Actuated g/C Ratio	0.16	0.20			0.08		0.09	0.64		0.08	0.63	0.63
v/c Ratio	0.62	0.11			0.16		0.27	0.66		0.19	0.67	0.27
Control Delay (s/veh)	43.6	0.4			48.9		47.3	14.9		47.0	15.7	4.0
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay (s/veh)	43.6	0.4			48.9		47.3	14.9		47.0	15.7	4.0
LOS	D	A			D		D	B		D	B	A
Approach Delay (s/veh)		36.5			48.9			15.8			14.5	
Approach LOS		D			D			B			B	

Intersection Summary	
Area Type: Other	
Cycle Length: 120	
Actuated Cycle Length: 91.9	
Natural Cycle: 75	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay (s/veh): 17.5	Intersection LOS: B
Intersection Capacity Utilization 60.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 3: Lowell Road & Green Meadow Drive/Rena Avenue



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	323	64	20	45	1518	29	1532	270
v/c Ratio	0.62	0.11	0.16	0.27	0.66	0.19	0.67	0.27
Control Delay (s/veh)	43.6	0.4	48.9	47.3	14.9	47.0	15.7	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	43.6	0.4	48.9	47.3	14.9	47.0	15.7	4.0
Queue Length 50th (ft)	91	0	11	25	267	16	278	12
Queue Length 95th (ft)	156	0	38	66	515	48	540	62
Internal Link Dist (ft)		445	748		858		957	
Turn Bay Length (ft)				300		350		
Base Capacity (vph)	637	727	126	462	2313	462	2290	992
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	0.09	0.16	0.10	0.66	0.06	0.67	0.27

Intersection Summary

Attachment "G"

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	291	0	58	1	0	17	42	1407	5	26	1379	243
Future Volume (vph)	291	0	58	1	0	17	42	1407	5	26	1379	243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.85			0.87		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3367	1615			1652		1805	3608		1805	3610	1442
Flt Permitted	0.95	1.00			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3367	1615			1618		1805	3608		1805	3610	1442
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.93	0.93	0.93	0.90	0.90	0.90
Adj. Flow (vph)	323	0	64	1	0	19	45	1513	5	29	1532	270
RTOR Reduction (vph)	0	50	0	0	0	0	0	0	0	0	0	85
Lane Group Flow (vph)	323	14	0	0	20	0	45	1518	0	29	1532	185
Heavy Vehicles (%)	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	12%
Turn Type	Prot	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases				8								6
Actuated Green, G (s)	13.8	20.0			1.7		4.9	56.9		4.4	56.4	56.4
Effective Green, g (s)	14.3	22.0			3.7		5.4	58.9		4.9	58.4	58.4
Actuated g/C Ratio	0.15	0.22			0.04		0.06	0.60		0.05	0.60	0.60
Clearance Time (s)	4.5	6.0			6.0		4.5	6.0		4.5	6.0	6.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	492	363			61		99	2172		90	2155	861
v/s Ratio Prot	c0.10	0.01					c0.02	0.42		0.02	c0.42	
v/s Ratio Perm					c0.01							0.13
v/c Ratio	0.66	0.04			0.33		0.45	0.70		0.32	0.71	0.21
Uniform Delay, d1	39.4	29.6			45.8		44.8	13.4		44.8	13.8	9.1
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.2	0.0			3.1		3.3	1.9		2.1	2.0	0.6
Delay (s)	42.6	29.7			49.0		48.1	15.3		46.9	15.8	9.7
Level of Service	D	C			D		D	B		D	B	A
Approach Delay (s/veh)		40.4			49.0			16.2			15.4	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	97.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	324	0	22	263	0	25
Future Volume (vph)	324	0	22	263	0	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt						0.865
Flt Protected				0.996		
Satd. Flow (prot)	3539	0	0	1855	0	1611
Flt Permitted				0.996		
Satd. Flow (perm)	3539	0	0	1855	0	1611
Link Speed (mph)	30			30	30	
Link Distance (ft)	217			525	202	
Travel Time (s)	4.9			11.9	4.6	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	360	0	24	292	0	28
Shared Lane Traffic (%)						
Lane Group Flow (vph)	360	0	0	316	0	28
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 30.7%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	324	0	22	263	0	25
Future Vol, veh/h	324	0	22	263	0	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	360	0	24	292	0	28

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	360	0	-	180
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.13	-	-	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.219	-	-	3.319
Pot Cap-1 Maneuver	-	-	1197	-	0	832
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1197	-	-	832
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Ctrl Dly, s/v	0	0.6	9.5
HCM LOS			A

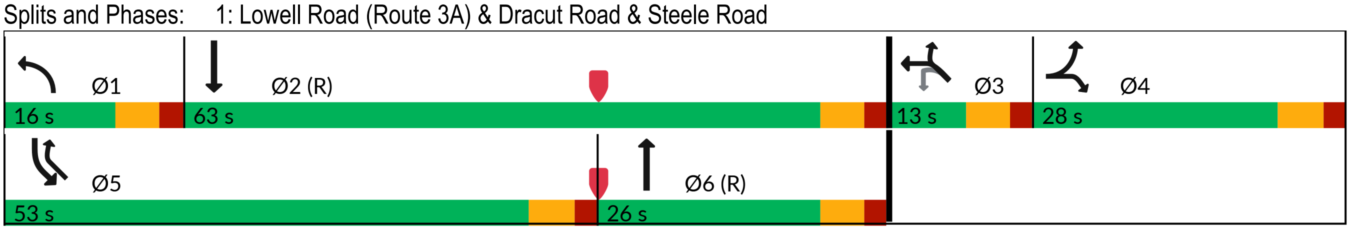
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	832	-	-	1197	-
HCM Lane V/C Ratio	0.033	-	-	0.02	-
HCM Ctrl Dly (s/v)	9.5	-	-	8.1	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Traffic Volume (vph)	40	2	2	1	658	1	987	441	15	5	0	731
Future Volume (vph)	40	2	2	1	658	1	987	441	15	5	0	731
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		200		300	775		0		100	0
Storage Lanes	1	1		1		0	2		0		1	1
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	0.97	1.00	1.00	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)	1787	1615	0	1805	3610	0	3502	1872	0	0	1805	1615
Flt Permitted	0.950			0.950			0.950				0.444	
Satd. Flow (perm)	1787	1615	0	1805	3610	0	3502	1872	0	0	844	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		191						2				434
Link Speed (mph)	30				35			35			30	
Link Distance (ft)	1269				1792			1735			2109	
Travel Time (s)	28.8				34.9			33.8			47.9	
Peak Hour Factor	0.90	0.90	0.90	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)	44	2	2	1	723	1	1097	490	17	5	0	803
Shared Lane Traffic (%)												
Lane Group Flow (vph)	44	4	0	1	724	0	1097	507	0	0	5	803
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12				24			24			12	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16				16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15		9	15		9	15	15	9
Number of Detectors	1	1		1	2		1	2			1	1
Detector Template	Left	Right		Left	Thru		Left	Thru			Left	Right
Leading Detector (ft)	20	20		20	100		20	100			20	20
Trailing Detector (ft)	0	0		0	0		0	0			0	0
Detector 1 Position(ft)	0	0		0	0		0	0			0	0
Detector 1 Size(ft)	20	20		20	6		20	6			20	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Detector 2 Position(ft)					94			94				
Detector 2 Size(ft)					6			6				
Detector 2 Type					Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Perm	Prot	pt+ov
Protected Phases	4	4		1	6		5	2			3	3 5

Lane Group	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Permitted Phases		4								3		
Detector Phase	4	4		1	6		5	2		3	3	3 5
Switch Phase												
Minimum Initial (s)	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	14.0		14.0	14.0		11.0	11.0	
Total Split (s)	28.0	28.0		16.0	26.0		53.0	63.0		13.0	13.0	
Total Split (%)	23.3%	23.3%		13.3%	21.7%		44.2%	52.5%		10.8%	10.8%	
Maximum Green (s)	22.0	22.0		10.0	20.0		47.0	57.0		7.0	7.0	
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)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0			-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
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	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	C-Max		None	C-Max		None	None	
Act Effct Green (s)	10.4	10.4		7.6	37.6		49.4	88.5			9.0	55.6
Actuated g/C Ratio	0.09	0.09		0.06	0.31		0.41	0.74			0.08	0.46
v/c Ratio	0.29	0.01		0.01	0.64		0.76	0.37			0.08	0.82
Control Delay (s/veh)	55.3	0.0		53.0	41.1		33.6	8.0			54.8	17.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay (s/veh)	55.3	0.0		53.0	41.1		33.6	8.0			54.8	17.9
LOS	E	A		D	D		C	A			D	B
Approach Delay (s/veh)	50.6				41.1			25.5			18.2	
Approach LOS	D				D			C			B	

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 Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay (s/veh): 27.6	Intersection LOS: C
Intersection Capacity Utilization 71.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Lowell Road (Route 3A) & Dracut Road & Steele Road



Lane Group	EBL	EBR	NBL	NBT	SBL	SBT	NWL	NWR
Lane Group Flow (vph)	44	4	1	724	1097	507	5	803
v/c Ratio	0.29	0.01	0.01	0.64	0.76	0.37	0.08	0.82
Control Delay (s/veh)	55.3	0.0	53.0	41.1	33.6	8.0	54.8	17.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	55.3	0.0	53.0	41.1	33.6	8.0	54.8	17.9
Queue Length 50th (ft)	33	0	1	258	372	122	4	193
Queue Length 95th (ft)	69	0	7	#456	381	271	17	311
Internal Link Dist (ft)	1189			1712		1655	2029	
Turn Bay Length (ft)		50	200		775		100	
Base Capacity (vph)	357	475	180	1129	1509	1381	63	1004
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	0.12	0.01	0.01	0.64	0.73	0.37	0.08	0.80

Intersection Summary

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

Movement	EBL	EBR	EBR2	NBL	NBT	NBR	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations												
Traffic Volume (vph)	40	2	2	1	658	1	987	441	15	5	0	731
Future Volume (vph)	40	2	2	1	658	1	987	441	15	5	0	731
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	6.0
Lane Util. Factor	1.00	1.00		1.00	0.95		0.97	1.00			1.00	1.00
Frt	1.00	0.85		1.00	1.00		1.00	0.99			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.95	1.00
Satd. Flow (prot)	1787	1615		1805	3609		3502	1872			1805	1615
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00			0.44	1.00
Satd. Flow (perm)	1787	1615		1805	3609		3502	1872			844	1615
Peak-hour factor, PHF	0.90	0.90	0.90	0.91	0.91	0.91	0.90	0.90	0.90	0.91	0.91	0.91
Adj. Flow (vph)	44	2	2	1	723	1	1097	490	17	5	0	803
RTOR Reduction (vph)	0	4	0	0	0	0	0	1	0	0	0	237
Lane Group Flow (vph)	44	0	0	1	724	0	1097	506	0	0	5	566
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
Turn Type	Prot	Prot		Prot	NA		Prot	NA		Perm	Prot	pt+ov
Protected Phases	4	4		1	6		5	2			3	3 5
Permitted Phases		4								3		
Actuated Green, G (s)	7.3	7.3		1.2	34.3		47.4	80.5			7.0	54.4
Effective Green, g (s)	9.3	9.3		3.2	36.3		49.4	82.5			9.0	54.4
Actuated g/C Ratio	0.08	0.08		0.03	0.30		0.41	0.69			0.08	0.45
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	138	125		48	1091		1441	1287			63	732
v/s Ratio Prot	c0.02	0.00		0.00	c0.20		c0.31	0.27				c0.35
v/s Ratio Perm											0.01	
v/c Ratio	0.32	0.00		0.02	0.66		0.76	0.39			0.08	0.77
Uniform Delay, d1	52.4	51.1		56.9	36.5		30.2	8.0			51.6	27.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	1.3	0.0		0.2	3.2		2.4	0.9			0.5	5.1
Delay (s)	53.7	51.1		57.0	39.7		32.7	8.9			52.2	32.7
Level of Service	D	D		E	D		C	A			D	C
Approach Delay (s/veh)	53.5				39.7			25.2			32.8	
Approach LOS	D				D			C			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	30.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Attachment "H"

TOWN OF HUDSON

Planning Department

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

CAP FEE WORKSHEET - 2026

Date: 08/04/26 Zone # 1 Map/Lot: 234-034-000
273 Lowell Road

Project Name: Restaurant Depot Site Plan

Proposed ITE Use #1: Shopping Center

Proposed Building Area (square footage): 50,000 sq. ft.

CAP FEES: (ONE CHECK NEEDED)

1.	**(Account)**	**($4.14 x 9,500 sq. ft.)**	
	2070-701	**Traffic Improvement (Zone 1)**	**$ 207,000.00**
		Total CAP Fee	**$ 207,000.00**

***** This CAP Fee amount is based on the 2025 CAP FEE ASSESSMENT *****

CAP FEE to be paid prior to Certificate of Occupancy application.

Check should be made payable to the Town of Hudson

Thank you,

Brooke Dubowik

Planning Administrative Aide II