

# **T-BONES RESTAURANT SITE PLAN & CONDITIONAL USE PERMIT**

**SP# 01-25 & CUP# 01-25**

## **STAFF REPORT**

February 26, 2025

**SITE:** 256 Lowell Road, Map 228/Lot 007-000

**ZONING:** Business (B)

**PURPOSE OF PLAN:** to propose the development of a 9,500+/- square-foot restaurant and other associated site improvements which will impact approximately 15,500 square-feet of wetland buffer.

### **PLAN UNDER REVIEW:**

T-Bones at Lowell Road Non-Residential Site Plan, SP# 01-25 & CUP# 01-25, Map 228 Lot 007, 256 Lowell Road, Hudson, NH; prepared by: Meridian Land Services, Inc., 31 Old Nashua Road, Amherst, NH 03031; prepared for: Lowell RD, LLC., 124 Bedford Center Road, Bedford, NH 03110; consisting of 23 sheets and general notes 1-20 on Sheet GN-1; dated October 2, 2024, revised January 7, 2025.

### **ATTACHMENTS:**

- 1) Site Plan & CUP Applications with associated waiver request, received January 21, 2025– Attachment “A”.
- 2) Project Narrative – Attachment “B”
- 3) Department Review Comments – Attachment “C.”
- 4) Stormwater Management Report, prepared by Meridian Land Services, Inc., dated January 21, 2025 – Attachment “D”. (Digital Only)
- 5) Site Plan & Stormwater Management Report peer review, prepared by Fuss & O’Neill, dated February 10, 2025 –Attachment “E”.
- 6) Traffic Impact Assessment (TIA), prepared by Langan Engineering & Environmental Services, LLC., dated December, 2024– Attachment “F”. (Digital Only)
- 7) Traffic Impact Assessment (TIA) peer review, prepared by Fuss & O’Neill, dated February 11, 2025 – Attachment “G”.
- 8) CAP fee sheet dated February 18, 2025– Attachment “H”.
- 9) Site Plan dated October 2, 2024, Revised January 7, 2025.

### **APPLICATION TRACKING:**

- January 21, 2025 – Site plan & CUP applications received.
- February 10, 2025 – Public Hearing before ConCom
- February 12, 2025 – Site Walk conducted by ConCom
- February 26, 2025 – Public Hearing scheduled.
- March 10, 2025 – 2<sup>nd</sup> Public Hearing ConCom

**WAIVER REQUESTED:**

§275-8.7.D – Landscaping Requirements.

**COMMENTS & RECOMMENDATIONS:**

BACKGROUND

The site is approximately 6.4 acres and is located in the Business zone. The site was previously occupied by a single-family residence which was razed over two decades ago. The site is served by Town water and sewer. No section of the property falls within FEMA designated flood zones. The site contains wetlands along the southern half of the property and gently slopes up towards the eastern edge of the property within the primary buildable area. The site currently has no curb cuts, and is proposed to be serviced an easement granting driveway access to Walmart Boulevard and a by a right-in/right-out access from Lowell Road,. The applicant is seeking one waiver, for which additional information may be found below.

DEPARTMENT COMMENTS

Multiple departments opted to provide comment on the site plan and CUP applications, which may be found below

**Engineering** has provided the following comments:

1. *Applicant shall propose guardrail along the access road and parking area, adjacent to grading exceeding 4 feet in vertical drop.*
2. *Applicant shall provide the slope along access road on Lowell Road.*
3. *Taking in consideration the traffic volume and the speed limit, the proposed access right in / right out on Lowell Road without a slip lane is a bad idea.*
4. *Applicant shall provide warning signs along Lowell Road about the proposed access curb cut.*
5. *Applicant shall provide a maintenance sewer manhole, to be located in the grass area, between edge of Wal-Mart access road and edge of parking lot.*
6. *Applicant shall provide gate valve locations for the wet tap fire service and domestic service.*
7. *Applicant shall revisit the size of the proposed water service, it appears undersized.*
8. *Applicant shall size the proposed grease trap tank.*
9. *Applicant shall show snow storage area onsite.*
10. *Applicant shall revisit the layout of the detention basin to minimize impact to the wetland buffer.*
11. *Applicant shall consider drainage system under the parking area instead of an open area detention basin.*
12. *Proposed detention basin appears to be 4 feet deep, which requires a safety perimeter fence*
13. *It's unclear how drainage runoff crosses the proposed access road on Lower Road, without a culvert in place.*
14. *Applicant shall provide a wetland scientist stamp on the plans.*

**Fire** has provided the following comments:

1. *Show dimensions conforming to NFPA 1, 2021 Edition, Chapter 18 for Fire Department Access, Roadways, Fire Lanes, and Parking lot lanes.*
2. *Show fire lane marking on the parking lot.*
3. *Show apparatus turning radius within the site.*
4. *Add two fire hydrants, one on the north end and one on the south end.*
5. *Show the fire service size.*

**Zoning** provided the following comments:

1. *On sheet SP3 in the chart the wetland buffer says 50' Commercial Buffers, they are 75' per Article VII 334-35.(A).3 – Boundaries*
2. *Please label the 75' wetland buffer and darken the line.*
3. *Can you use a line type for property boundaries?*

Full Comments can be found in **Attachment “C.”**

#### WAIVER REQUESTED

As noted above, the Applicant is seeking one waiver:

1. Waiver for Landscaping Requirements, **§275-8.7.D–Landscaping Requirements**, to allow for a total of 99 shrubs where 374 would otherwise be required. The Applicant states that 99 shrubs provide adequate screening, due to the wetlands and natural woods that are being preserved on the southern and eastern portions of the property.

#### STORMWATER MANAGEMENT REPORT

As part of the application, a Stormwater Management Report dated January 21, 2025 has been supplied (Attachment “D”). This report concludes that no adverse downstream impacts shall occur, and that peak flow rates shall remain the same or diminish in many cases. This report may be subject to change pending alterations to the drainage design in line with Engineering, Conservation Commission, and peer review comments.

#### PEER REVIEW

Fuss & O’Neill completed a review of the proposed plan set and Stormwater management report on October 23, 2024 (Attachment “E”). The majority of issues outlined within the review are administrative in nature, with no major design flaws noted.

#### TRAFFIC STUDY

As part of their application, the applicant has supplied a traffic impact study completed by Langan Engineering dated December 2024 (Attachment “F”). In the report, Langan notes no meaningful increase in traffic on Lowell road and that the network is capable of handling the increase in traffic. Fuss & O’Neill have provided a review of the report dated February 11, 2025 (Attachment “G”). This review provided for a number of revisions that are recommended.

STAFF COMMENTS

The applicant needs to address peer review and department comments as well as any potential comments from the Planning Board and public. The requested waiver and CUP permit are also required. The application does not have any other outstanding issues that are known at this time.

The project has been heard by the Conservation Commission on February 10, 2025, for which a site walk was then conducted February 12, 2025. Several design critiques and requested changes were noted related to the drainage pond located on site within the wetland buffer. The project is scheduled to be heard on March 10, 2025 by the Conservation Commission.

RECOMMENDATIONS

Staff recommend deliberation and consideration of the site plan and waiver requests, alongside any revisions to be made. Staff recommend determination of any other studies the board feels will be required to render a decision.

**DRAFT MOTIONS:**

**MOTION TO DEFER SITE PLAN APPLICATION:**

I move to defer the T-Bones Restaurant Site Plan Application:, SP# 01-25, Map 228 / Lot 007, 256 Lowell Road, Hudson, NH, to date certain: \_\_\_\_\_.

Motion by: \_\_\_\_\_ Second: \_\_\_\_\_ Carried/Failed: \_\_\_\_\_

I move to defer the T-Bones Restaurant Conditional Use Permit Application: CUP# 01-25, Map 228 / Lot 007, 256 Lowell Road, Hudson, NH to date certain \_\_\_\_\_.

Motion by: \_\_\_\_\_ Second: \_\_\_\_\_ Carried/Failed: \_\_\_\_\_

**MOTION TO ACCEPT SITE PLAN APPLICATION:**

I move to accept the T-Bones Restaurant Site Plan Application: SP# 01-25, Map 228 Lot 007, 256 Lowell Road, Hudson, NH.

Motion by: \_\_\_\_\_ Second: \_\_\_\_\_ Carried/Failed: \_\_\_\_\_

I move to accept the T-Bones Restaurant Conditional Use Permit Application: CUP# 01-25, Map 228 Lot 007, 256 Lowell Road, Hudson, NH.

Motion by: \_\_\_\_\_ Second: \_\_\_\_\_ Carried/Failed: \_\_\_\_\_

**MOTION TO GRANT A WAIVER:**

I move to grant a waiver **§275-8.7.(D)–Landscaping Requirements**, to allow for 99 shrubs where 374 would be required, based on the Board’s discussion, the testimony of the Applicant’s representative, and in accordance with the language included in the submitted Waiver Request Form for said waiver.

Motion by: \_\_\_\_\_ Second: \_\_\_\_\_ Carried/Failed: \_\_\_\_\_



**MOTION TO CONTINUE SITE PLAN APPLICATION:**

I move to continue the T-Bones Restaurant Site Plan Application: SP# 01-25, Map 228 Lot 007, 256 Lowell Road, Hudson, NH, to date certain \_\_\_\_\_

Motion by: \_\_\_\_\_ Second: \_\_\_\_\_ Carried/Failed: \_\_\_\_\_

I move to continue the T-Bones Restaurant Conditional Use Permit Application:, CUP# 01-25, Map 228 Lot 007, 256 Lowell Road, Hudson, NH, to date certain \_\_\_\_\_

Motion by: \_\_\_\_\_ Second: \_\_\_\_\_ Carried/Failed: \_\_\_\_\_

**MOTION TO APPROVE SITE PLAN APPLICATION:**

I move to approve the T-Bones Restaurant Site Plan Application: T-Bones at Lowell Road Non-Residential Site Plan, SP# 01-25, Map 228 / Lot 007, 256 Lowell Road, Hudson, NH; prepared by: Meridian Land Services, Inc., 31 Old Nashua Road, Amherst, NH 03031; prepared for: Lowell RD, LLC., 124 Bedford Center Road, Bedford, NH 03110; consisting of 23 sheets and general notes 1-20 on Sheet GN-1; dated October 2, 2024, revised January 7, 2025; and:

That the Planning Board finds that this application complies with the Zoning Ordinance, and with the Land Use Regulations with consideration of the waivers granted and for the reasons set forth in the written submissions, together with the testimony and factual representations made by the applicant during the public hearing;

Subject to, and revised per, the following stipulations:

1. All stipulations of approval shall be incorporated into the Development Agreement, which shall be recorded at the HCRD, together with the Plan.
2. Prior to the issuance of a final certificate of occupancy, an L.L.S. Certified "As-Built" site plan shall be provided to the Town of Hudson Land Use Department, confirming that the site conforms to the Planning Board approved Site Plan.
3. Prior to the Planning Board endorsement of the Plan, it shall be subject to final administrative review by Town Planner and Town Engineer.
4. A cost allocation procedure (CAP) amount of \$ \$80,465.00 shall be paid prior to the issuance of a Certificate of Occupancy for the lot improvements to be made.
5. Prior to application for a building permit, the Applicant shall schedule a pre-construction meeting with the Town Engineer.
6. Construction activities involving the subject lot shall be limited to the hours between 7:00 A.M. and 7:00 P.M., Monday through Saturday. No exterior construction activities shall be allowed on Sundays.
7. Hours of refuse removal shall be exclusive to the hours between 7:00 A.M. and 7:00 P.M., Monday through Friday only.

Motion by: \_\_\_\_\_ Second: \_\_\_\_\_ Carried/Failed: \_\_\_\_\_

**MOTION TO APPROVE CONDITIONAL USE PERMIT**

I move to approve the T-Bones Restaurant Conditional Use Permit Application for the Site Plan: T-Bones at Lowell Road Non-Residential Site Plan, CUP# 01-25, Map 228 / Lot 007, 256 Lowell Road, Hudson, NH; prepared by: Meridian Land Services, Inc., 31 Old Nashua Road, Amherst, NH 03031; prepared for: Lowell RD, LLC., 124 Bedford Center Road, Bedford, NH 03110; consisting of 23 sheets and general notes 1-20 on Sheet GN-1; dated October 2, 2024, revised January 7, 2025; subject to, and revised per, the following stipulations:

1. All stipulations of approval shall be incorporated into the Site Plan Development Agreement, which shall be recorded at the HCRD, together with the Plan.
2. Prior to the Planning Board endorsement of the Plan, it shall be subject to final administrative review by the Interim Town Planner, Town Engineer, and Town Counsel.
3. Planning Board endorsement of the Plan shall be contingent upon proof of valid Alteration of Terrain (AOT) and Shoreland Permits issued by New Hampshire Department of Environmental Services (NHDES).
4. Construction activities involving the subject lot shall be limited to the hours between 7:00 A.M. and 7:00 P.M, Monday thru Saturday. No exterior construction activities shall be allowed on Sundays.
5. The approval shall be contingent upon recommendation for approval by the Conservation Commission.
6. The approval shall be contingent upon compliance with conditions recommended by the Conservation Commission.

Motion by: \_\_\_\_\_ Second: \_\_\_\_\_ Carried/Failed: \_\_\_\_\_

SITE PLAN APPLICATION

Date of Application: 1/21/25 Tax Map #: 228 Lot #: 7

Site Address: 256 LOWELL RD, Hudson NH

Name of Project: T-Bones @Lowell Rd

Zoning District: B - Business General SP#: \_\_\_\_\_  
(For Town Use Only)

Z.B.A. Action: \_\_\_\_\_

PROPERTY OWNER:

DEVELOPER:

Name: 256 LOWELL ROAD, LLC

Lowell RD, LLC

Address: 9 OLD DERRY RD.,

124 Bedford Center Road SB,

Address: HUDSON, NH 03051

Bedford, NH 03110

Telephone # \_\_\_\_\_

Email: \_\_\_\_\_

PROJECT ENGINEER:

SURVEYOR:

Name: Sam Foisie, P.E., Meridian Land Services, Inc

Chris Hickey, LLS, Keach-Nordstrom Associates, inc.

Address: 31 Old Nashua RD

10 Commerce Park North, Suite 3

Address: Amherst, NH 03055

Bedford, NH 03110

Telephone # 603-673-1441

(603) 627-2881

Email: SRFoisie@meridianlandservices.com

chickey@keachnordstrom.com

PURPOSE OF PLAN:

The purpose of the plan is to show the sirte improvemetns to construct a t-bones restuarant

(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: \_\_\_

**SITE DATA SHEET**

PLAN NAME: T-Bones @Lowell Rd

PLAN TYPE: SITE PLAN

LEGAL DESCRIPTION: MAP 228 LOT 7

DATE: 1/21/25

Location by Street: 256 LOWELL RD

Zoning: B-Business

Proposed Land Use: Restaurant

Existing Use: Vacant

Surrounding Land Use(s): Big Box Retail and Single family residential

Number of Lots Occupied: 1

Existing Area Covered by Building: 0

Existing Buildings to be removed: N/A

Proposed Area Covered by Building: 8,500 sf +/-

Open Space Proposed: 67%

Open Space Required: \_\_\_\_\_

Total Area: S.F.: 280,025 Acres: 6.429

Area in Wetland: 45,578 sf Area Steep Slopes: 0

Required Lot Size: 30,000 SF

Existing Frontage: 769LF +/-

Required Frontage: 150 LF

Building Setbacks:	<u>Required*</u>	<u>Proposed</u>
Front:	<u>50</u>	<u>50</u>
Side:	<u>15</u>	<u>15</u>
Rear:	<u>15</u>	<u>15</u>

**SITE DATA SHEET**

(Continued)

Flood Zone Reference: Zone X, found on flood panel 33011C0656D

Width of Driveways: 24'

Number of Curb Cuts: 1 on RT 3 and on connecting to Walmart driveway

Proposed Parking Spaces: 169

Required Parking Spaces: 127

Basis of Required Parking (Use): 1 space per 75 sf

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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Waiver Requests

<i>Town Code Reference:</i>	<i>Regulation Description:</i>
<u>See attached</u>	
_____	_____
_____	_____
_____	_____
_____	_____

<b>(For Town Use Only)</b>	
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: 1-20-2025

Print Name of Owner: Marco Plante

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

Signature of Developer:  Date: 1/20/2025

Print Name of Developer: William Grene

- ❖ 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:**

<b><u>1. Site Plan Use</u></b>	<b><u>Project Size/Fee</u></b>	
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.	\$ _____
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 \_\_\_\_\_ acres @ \$600.00 per acre, or \$1,250.00, whichever is greater. \$ \_\_\_\_\_

*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:**

\_\_\_\_\_ Direct Abutters Applicant, Professionals, etc. as required by RSA 676:4.1.d @\$5.58 (or Current Certified Mail Rate) \$ \_\_\_\_\_

\_\_\_\_\_ Indirect Abutters (property owners within 200 feet) @\$0.73 (or Current First Class Rate) \$ \_\_\_\_\_

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

**TOTAL** \$ See attached

**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**

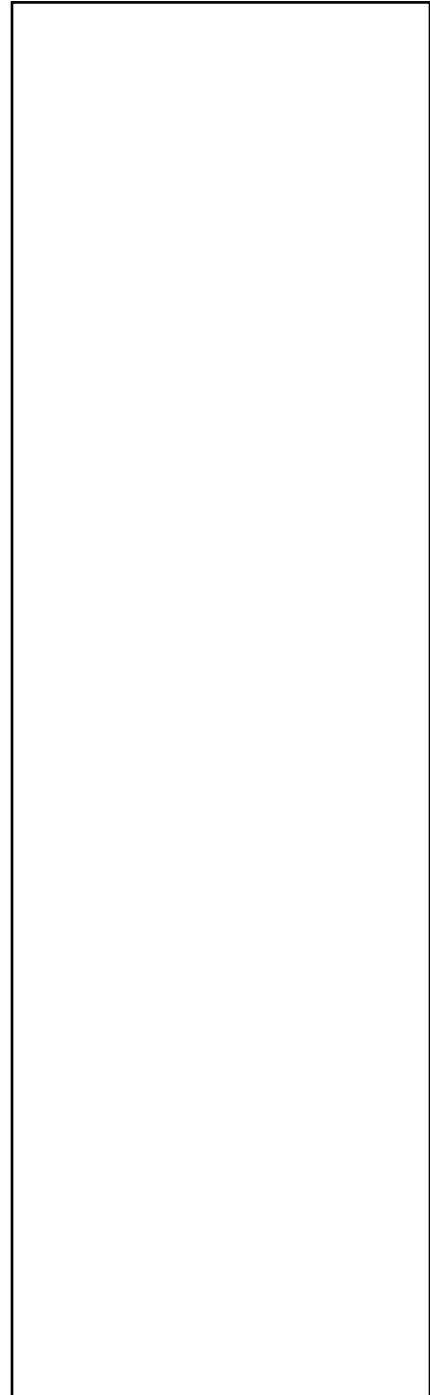
- |     | <u>Y</u>                            | <u>P</u>                            | <u>W</u>                 |  |
|-----|-------------------------------------|-------------------------------------|--------------------------|--|
| 1.  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | - 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.  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | - Sets of plans and copies as indicated on application.  |
| 3.  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | - Scale no smaller than 50 feet to the inch (1" = 50') [§ 276-11.1.B.(2)]  |
| 4.  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | - Title block in the lower right-hand corner of the plan, containing: [§ 276-11.1.B.(3)]   |
| 5.  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | - Title, including the term "site plan" or "subdivision plan"  |
| 6.  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | - The name for whom the plan was prepared  |
| 7.  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | - Preparer of the plan   |
| 8.  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | - The scale(s) of the plan   |
| 9.  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | - Date of the plan   |
| 10. | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | - Appropriate revision block   |
| 11. | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | - 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. | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/> | - Owner's printed name and address and signature [§ 276-11.1.B.(6)]  |
| 13. | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | - Name and address of all abutting property owners [§ 276-11.1.B.(7)]  |
| 14. | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | - A locus plan at one inch equals 1,000 feet (1" = 1,000') [§ 276-11.1.B.(8)]  |

Notes

**(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)**

- |     | <u>Y</u>                            | <u>P</u>                 | <u>W</u>                            | <u>NA</u>                           |   |
|-----|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|---|
| 30. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | - 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. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | - 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)]<br>*The discrepancy on the note language is correct – reference to the Planning Board in the regulations is outdated. |
| 32. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | - 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. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | - Required open space, including the calculation showing the requirement is met [§ 276-11.1.B.(24)]   |
| 34. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | - Parking space calculation showing and a statement stating the required parking spaces are provided [§ 275-8.C.(2) & (3)]  |
| 35. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | - Required dimensions for parking space [§ 275-8.C.(4)]   |
| 36. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | - Required dimensions for aisle/access drive [§ 275-8.C.(5)]  |
| 37. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | - Required off-street loading spaces [§ 275-8.C.(6)]  |
| 38. | <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | - Required landscaping for the parking lot, including calculation shown the planting requirement is met [§ 275-8.C.(7)]   |
| 39. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | - Required screening for visual separation of incompatible uses [§ 275-8.C.(8)]   |
| 40. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | - Handicap accessibility provided in accordance with the latest ADA Regulations [§ 275-8.C.(11)]  |
| 41. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | - Stormwater Management Plan [§ 275-9.A]  |
| 42. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | - Traffic Study, if required [§ 275-9.B]  |
| 43. | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | - Noise Study, if required [§ 275-9.C]  |

Notes

**(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)

- |     | <u>Y</u>                            | <u>P</u>                 | <u>W</u>                 | <u>NA</u>                           |   |
|-----|-------------------------------------|--------------------------|--------------------------|-------------------------------------|---|
| 44. | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | - Fiscal Impact Study, if required [§ 275-9.D]  |
| 45. | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | - Utility Study [§ 275-9.E]   |
| 46. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | - Copies of any proposed or existing easements, covenants, deed restrictions or any other similar document pertinent to the Site Plan [§ 275-9.F] |
| 47. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | - A copy of all applicable Town, state, county or federal approvals or applications [§ 275-9.G]   |
| 48. | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | - Environmental Impact Study, if required [§ 275-9.I]   |

Notes

(End of checklist)

CONDITIONAL USE PERMIT APPLICATION

Date of Application: 1/21/25 Tax Map #: 228 Lot #: 7

Site Address: 256 LOWELL RD, Hudson NH

Name of Project: T-Bones @ Lowell Rd

Zoning District: B-Business General CUP#: \_\_\_\_\_  
(For Town Use Only)

Z.B.A. Action: \_\_\_\_\_

PROPERTY OWNER:

Name: 256 LOWELL ROAD, LLC

Address: 9 OLD DERRY RD.,

Address: HUDSON, NH 03051

Telephone # \_\_\_\_\_

Email: \_\_\_\_\_

DEVELOPER:

Lowell RD, LLC

124 Bedford Center Road SB,

Bedford, NH 03110

PROJECT ENGINEER or SURVEYOR:

Name: Sam Foisie, P.E., Meridian Land Services, Inc

Address: 31 Old Nashua RD

Address: Amherst, NH 03055

Telephone # 603-673-1441

Email: SRFoisie@meridianlandservices.com

CERTIFIED WETLANDS SCIENTIST:

Chris Hickey, LLS, Keach-Nordstrom Associates, inc.

10 Commerce Park North, Suite 3

Bedford, NH 03110

(603) 627-2881

chickey@keachnordstrom.com

PURPOSE OF PLAN:

The purpose of the plan is to show the sirte improvemetns to construct a t-bones restuarant

**(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: \_\_\_

SITE DATA SHEET

PLAN NAME: T-Bones @Lowell Rd

PLAN TYPE: (Site Plan, Subdivision, or other) Site Plan

LEGAL DESCRIPTION: MAP 228 LOT 7

DATE: 1/21/25

Location by Street: 256 LOWELL RD

Zoning: B-Business

Proposed Land Use: Restaurant

Existing Use: Vacant

Total Site Area: S.F.: 280,025 Acres: 6.429

Total Wetland Area (SF): 45,578 sf

Permanent Wetland Impact Area (SF): 0

Permanent Wetland Buffer Impact Area (SF): ~~TBD~~ 10,250 SF

Temporary Wetland Impact Area (SF): 0

Temporary Wetland Buffer Impact Area (SF): ~~TBD~~ 5,250 SF

Flood Zone Reference: Zone X, found on flood panel 33011C0656D

Proposed Mitigation:

Minimization of buffer impact, temporary impacts as needed, and removal of invasive species within remaining wetlands and buffer

(For Town Use Only)

Data Sheets Checked By: \_\_\_\_\_ Date: \_\_\_\_\_

CONDITIONAL USE PERMIT APPLICATION AUTHORIZATION

I hereby apply for *Conditional Use Permit* 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 *Conditional Use Permit* 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 Hudson Conservation Commission, 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: Marco Blante Date: 1-20-2025

Print Name of Owner: Marco Blante

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

Signature of Developer: William Greer Date: 1/20/2025

Print Name of Developer: William Greer

- ❖ 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**

(Fee covers both Conservation Commission & Planning Board)

**A. REVIEW FEES:**

1. Conditional Use Permit  
\$100 Flat Fee \$ 100.00

**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:**

\_\_\_\_\_ Direct Abutters Applicant, Professionals, etc. as required \$ \_\_\_\_\_  
by RSA 676:4.1.d @\$5.58 (or Current Certified Mail Rate)

\_\_\_\_\_ Indirect Abutters (property owners within 200 feet) \$ \_\_\_\_\_  
@\$0.73 (or Current First Class Rate)

**TOTAL** \$ See Attached

(For Town Use)	
AMOUNT RECEIVED: \$ _____	DATE RECEIVED: _____
RECEIPT NO.: _____	RECEIVED BY: _____



**WETLAND CONDITIONAL USE PERMIT CHECKLIST**

Yes	No	NA	<u>QUESTIONS/INFORMATION NEEDED</u>	HCC Comments
<b>NARRATIVE REPORT</b>				
Existing Conditions				
<input type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	Has a DES Dredge and Fill Permit been issued for any part of this site? If yes, provide number, date, and description.	
<input type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	Is there evidence of altered wetlands or surface waters on site?	
<input type="radio"/>	<input checked="" type="checkbox"/>	<input type="radio"/>	All prime and other wetlands in the vicinity, plus any wetlands/watersheds past the immediate vicinity affected by this project	
<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	• Description of each wetland and associated values	
<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	Wetland mapping results – Including the flagging date and technique plus the name, company and qualifications of the wetland scientist	
<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	Was property surveyed? If yes, the date of survey. (Please attach the survey plan)	
<b>National Wetland Inventory</b>				
<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	• Vegetative cover types	
<input type="radio"/>	<input checked="" type="checkbox"/>	<input type="radio"/>	• Existence of vernal pools and associated habitat	
<input type="radio"/>	<input checked="" type="checkbox"/>	<input type="radio"/>	• Unique geological and cultural features	
<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	NH Natural Heritage inventory – For list of rare and endangered species, contact the • NH Division of Forests and Lands (603)271-3623	
<input type="radio"/>	<input checked="" type="checkbox"/>	<input type="radio"/>	• Wildlife and fauna species, including estimated number and locations (large projects)	
<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	• Public or private wells located within the vicinity	
<input type="radio"/>	<input checked="" type="checkbox"/>	<input type="radio"/>	• Monitoring well(s) located on site	
<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	• Current land use and zoning district	
<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	Photos of existing area (please use color photos)	
<b>Proposed Project Description</b>				
<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	Entire project and associated activities	
<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	Time table of project and anticipated phasing	
<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	Land use	
<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	Grading plan	
<b>Impact to Wetlands and/or Buffers</b>				
<input type="radio"/>	<input type="radio"/>	<input checked="" type="checkbox"/>	• Depending on size and proposed impacts, a report from a biologist may be appropriate	
<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	Removing, filling, dredging, or altering (Area square ft. and locations)	
<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	Intercepting or diverging of ground or surface water (Locations and size)	
<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	• Change in run-off characteristics	
<input checked="" type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	Delineation of drainage area contributing to each discharge point	

# Attachment "A"

Yes	No	NA	Questions/Information Needed	HCC COMMENTS
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Estimated water quality characteristics of runoff at each point of discharge for both pre- and post-development	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Erosion control practices	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> <li>If using rip-rap, attach documentation explaining why other erosion control methods are not feasible</li> </ul>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> <li>How storm water runoff will be handled</li> </ul>	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If backyards or lots include a buffer area, buffer restriction wording shall be included in each deed (A physical marker may be requested to designate buffer boundaries at site)	

### Mitigation

<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Square footage of mitigation – wetland and upland areas	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Wetland or upland plants identified to replace any losses	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> <li>Restoration plan for planting and vegetation</li> </ul>	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Conservation easements, including location and aesthetic, wildlife and vegetative values	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> <li>If easement is on or added to the site(s), a copy of the legal document shall be given to the HCC (HCC conservation easement markers may also be required along the easement)</li> </ul>	

## CONCEPTUAL SITE PLAN/DRAWING

<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Locus map depicting project site and vicinity within approximately ½ mile and also on a larger scale	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	All prime and other wetlands in the vicinity	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Wetland(s) impacted (identified as prime or other) and the wetland boundaries with 50', buffer areas highlighted in color	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Assessor's sheet(s), lot(s), and property account number(s)	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Existing and proposed structures	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Square footage listed for temporary and permanent impact	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Erosion control plan (Suggested: Biodegradable silt fences so area won't be disturbed again and no hay to avoid invasive species)	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Topographical map with contours	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Storm water treatment swales and basins highlighted in color if in buffer area	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Conservation and utility easements	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Grading plan	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Culvert, arch, bridge - sizes, material, etc.	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Vegetative cover types	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Vernal pools	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Existing and proposed stone walls, tree lines, and unusually large, rare or beautiful trees, and other notable site features	



# MERIDIAN LAND SERVICES, INC.

CIVIL ENGINEERING | LAND SURVEYING | PERMITTING | SOIL & WETLAND MAPPING | SEPTIC DESIGN | ENVIRONMENTAL

## Attachment "A"

Office: 31 Old Nashua Road, Suite 2, Amherst, NH 03031

Mailing: PO Box 118, Milford, NH 03055

Phone: 603-673-1441 \* Fax 603-673-1584

www.MeridianLandServices.com

January 21<sup>st</sup>, 2025

**Re: T-Bones @ Lowell Rd  
256 Lowell Rd  
Lot 228-7  
Hudson, NH**

### **Conditional Use Permit Application: Wetland Conservation Overlay District – Checklist Questions**

1. Will the increased discharge cause erosion and channelization?

**No, the stormwater management system controls the stormwater to meet predevelopment rates.**

2. Is there potential for off-site flooding?

**No, the stormwater management system controls the stormwater to meet predevelopment rates. It also slowly releases the runoff over a longer period of time and infiltrates the groundwater recharge volume (GRV).**

3. Does the decreased infiltration in the drainage area cause vegetation stress due to reduced or increased ground water or surface water discharge into wetland?

**No, the stormwater management system is an infiltration basin. This basin infiltrated the required GRV to mitigate for the increased impervious area.**

4. Will the nutrients in the runoff increase eutrophication potential in downstream water bodies?

**No, the stormwater management system has been designed to comply with nutrient removal requirements established within the town of Hudson's stormwater regulations.**

5. Do you own any adjacent parcels or easements for roadways across adjacent parcels which could be used for access to avoid a wetland crossing?

**No wetland crossings are proposed. The site has been designed to minimize the disturbance to the wetland buffer areas as much as reasonably possible.**

6. Does a wetland crossing occur where it will result in the least amount of alteration to a wetland?

**N/A - The site has been designed to minimize the disturbance to the wetland buffer areas as much as reasonably possible.**

7. Is preservation of upland areas adjacent to the impacted wetland a priority?

**Yes, The majority of the disturbances to the wetland buffer area are for stormwater management, to protect the wetlands, and access to the property to provide safe access into the property and circulation through the site.**



# MERIDIAN LAND SERVICES, INC.

CIVIL ENGINEERING | LAND SURVEYING | PERMITTING | SOIL & WETLAND MAPPING | SEPTIC DESIGN | ENVIRONMENTAL

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www.MeridianLandServices.com

T-Bones @ Lowell Rd  
Site Plan and CUP – Initial Submittal

January 21<sup>st</sup>, 2025  
Page 2 of 2

8. Can using an alternative crossing design such as a bridge, retaining wall, etc. decrease the width or area of wetland alteration?

N/A

9. Does a proposed road crossing of a wetland exceed the minimum width acceptable to the Planning Board and can this be negotiated downwards?

N/A

10. Have you established that no reasonable alternative access from a public way to an upland is possible?

**Yes. See responses above.**

11. Can the parking lot spaces be decreased?

**No. T-Bones is a very successful restaurant. The parking spaces are proposed are to meet the business' demands. This also provides safe circulation to avoid customers waiting in the access isles for parking spaces to become available.**

12. Is the roadway designed in such a way that does not restrict the flow of water?

**Yes.**

13. Is additional information needed to assess water quality impacts due to runoff?

**No.**

14. Is there an increase in other pollutants (e.g., heavy metals, turbidity, coli form) from streets and parking lots?

**No, the stormwater management system mitigates increases in pollutants.**

15. Is there a need to restrict or prohibit the use of pesticides and fertilizers?

**No.**

16. Is there a need to restrict the use of roadway salting?

**No.**



# MERIDIAN

LAND SERVICES, INC.

CIVIL ENGINEERING | LAND SURVEYING | PERMITTING  
SOIL & WETLAND MAPPING | SEPTIC DESIGN | ENVIRONMENTAL

## Attachment "A"

T-Bones @ Lowell Rd

256 Lowell Rd

Lot 228-7

Hudson, NH

### Planning Board Application - Fee Calculation

Site Plan				
Description	Fee Calculation		Units	Amount
Commercial/Semi Public/Civic or Recreational	\$ 157.00	\$157.00/1,000 sq. ft. for first 100,000 sq.ft. (bldg. area): \$78.50/1,000 sq.ft. thereafter.	9500	\$ 1,491.50
Notice to Direct Abutters	\$ 5.58	per Owner, applicant & consultants	16	\$ 89.28
Notice to Indirect Abutters	\$ 0.73	per Owner, applicant & consultants	3	\$ 2.19
Tax map Update fee	\$ 275.00	Flat fee	1	\$ 275.00
<b>Subtotal</b>				<b>\$ 1,857.97</b>

WETLAND CONSERVATION OVERLAY DISTRICT Conditional Use Permits (CUP)				
Description	Fee Calculation		Units	Amount
Base Fee	\$ 100.00	Per Application	1	\$ 100.00
Notice to Direct Abutters		NOTICES INCLUDED FOR SITE PLAN FEE		\$ -
Notice to Indirect Abutters		NOTICES INCLUDED FOR SITE PLAN FEE		\$ -
<b>Subtotal</b>				<b>\$ 100.00</b>

<b>Total Permitting Fees Made Payable to the Town of Hudson =</b>	<b>\$ 1,957.97</b>
---	--------------------

CONSULTANT REVIEW FEE:	\$ 600.00	\$600 per acre or \$1,250 whichever is greater	3	<b>\$ 1,800.00</b>
<b>Made Payable to the town of Hudson</b>				

NOTES



**MERIDIAN**  
**LAND SERVICES, INC.**

CIVIL ENGINEERING | LAND SURVEYING | PERMITTING | SOIL & WETLAND MAPPING | SEPTIC DESIGN | ENVIRONMENTAL

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www.MeridianLandServices.com

**LIST OF ABUTTERS**

**Tax Map 228 Lot 7**

**Lowell Road  
Hudson, NH**

January 13th, 2025  
#12542-00

MERIDIAN LAND SERVICES, INC.  
PO BOX 118  
MILFORD, NH 03055  
ATTN: SAM FOISIE

LOWELL RD, LLC  
ATTN: BILL GREINER  
124 BEDFORD CENTER ROAD  
BEDFORD, NH 03110

Map 228 Lots 7 & 8  
256 LOWELL ROAD, LLC  
9 OLD DERRY RD.  
HUDSON, NH 03051

Map 228 Lot 6  
WAL-MART STORES, INC. #1785  
C/O WAL-MART PROP TAX DEPT.  
PO BOX 8050 MS 0555  
BENTONVILLE, AR 72716-8050

Map 234 Lot 35  
267 LOWELL ROAD, LLC  
C/O CHESTNUT REALTY MGMT, LLC  
PO BOX 15228  
SPRINGFIELD, MA 01115-5228

Map 228 Lot 1  
261 LOWELL ROAD LLC  
41 PARK AVE.  
ARLINGTON, MA 02476

Map 228 Lot 2  
ANTON, CHARLES A., TR.  
ANTON'S REALTY TRUST II  
500 CLARK RD.  
TEWKSBURY, MA 01876

Map 228 Lot 4  
SAM'S RE BUSINESS TRUST  
C/O WAL-MART PROP TAX DEPT.  
PO BOX 8050 MS 0555  
BENTONVILLE, AR 72716-8050

Map 228 Lot 9  
REED, NICOLE J.  
0 RITA AVE.  
HUDSON, NH 03051

Map 228 Lot 10  
DALPHOND, SUSAN M.  
2 RITA AVE.  
HUDSON, NH 03051

Map 228 Lot 11  
GOYETTE, COLIN E.  
GOYETTE, BARBARA E.  
4 RITA AVENUE  
HUDSON, NH 03051

Map 228 Lot 12  
CAOQUETTE, MANDY  
6 RITA AVENUE  
HUDSON, NH 03051

Map 228 Lot 13  
BELLVILLE, ROBERT M.  
BELLVILLE, ELLEN C.  
8 RITA AVENUE  
HUDSON, NH 03051

Map 228 Lot 14  
CIMINO, ALANDRIA  
10 RITA AVENUE  
HUDSON, NH 03051

Map 228 Lot 15  
GORBY, ERIC  
COLLINS, KAREN  
12 RITA AVENUE  
HUDSON, NH 03051

Keach-Nordstrom Associates, Inc.  
10 Commerce Park North  
Suite 3  
Bedford, NH 03110



**MERIDIAN  
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**LIST OF ABUTTERS**

**Tax Map 228 Lot 7  
Lowell Road  
Hudson, NH**

**(Indirect Abutters)**

January 13th, 2025  
#12542-00

Map 228 Lot 3  
COLLEY-MCCOY MANAGEMENT CO LLC  
P.O. BOX 6300  
AMHERST, NH 03031-6300

Map 228 Lot 16  
MAGLIO, FRANCESCO A. III  
14 RITA AVENUE  
HUDSON, NH 03051

Map 228 Lot 52  
DEXTER, KAREN  
DIAZ, JILL  
268A LOWELL RD.  
HUDSON, NH 03051

**WAIVER REQUEST FORM**

Name of Subdivision/Site Plan: T-Bones @ Lowell Rd

Street Address: 256 Lowell Rd

I Sam Foisie, P.E., Meridian Land Services, Inc hereby request that the Planning Board waive the requirements of item 275-8.7.D of the Hudson Land Use Regulations in reference to a plan presented by Sam Foisie, P.E., Meridian Land Services, Inc (name of surveyor and engineer) dated January 21, 2025 for property tax map(s) 228 and lot(s) 7 in the Town of Hudson, NH.

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

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

Section 275-8.7.D stated "One shrub per 200 square feet of paved area shall be planted or 1.6 shrubs per every parking space."

This would require 374 shrubs, where 99 are proposed. Based on the site design this number of shrubs are not needed to adequately buffer/screen the site. There is also no  
enough room to appropriately fit 374 shrubs.

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

While the number of shrubs is less than what is required, the site is well screened and buffered. It also has vast natural buffers that  
are preserved by the wetlands, wetland buffer, and 100' residential buffer.

Signed:

\_\_\_\_\_  
Applicant or Authorized Agent



**New Hampshire Natural Heritage Bureau  
NHB DataCheck Results Letter**

---

**To:** Noah Greene  
PO Box 118  
Milford, NH 03055-0118

**From:** NH Natural Heritage Bureau

**Date:** 1/17/2025 (This letter is valid through 1/17/2026)

**Re:** Review by NH Natural Heritage Bureau of request dated 1/17/2025

**Permit Types:** NHDOT DRIVEWAY PERMIT, NHDES SEWER CONNECTION  
Alteration of Terrain Permit  
Stormwater Pollution Prevention  
HUDSON SITE PLAN AND CONDITIONAL USE PERMIT

**NHB ID:** NHB25-0173

**Applicant:** Noah Greene

**Location:** Hudson  
Tax Map: 228, Tax Lot: 7  
Address: 256 Lowell Road

**Proj. Description:** Site plan for TBONES Restaurant and all associated site improvements including but not limited to parking, stormwater management, landscaping, etc.

The NH Natural Heritage database has been checked for records of rare species and exemplary natural communities near the area mapped below. The species considered include those listed as Threatened or Endangered by either the state of New Hampshire or the federal government. We currently have no recorded occurrences for sensitive species near this project area.

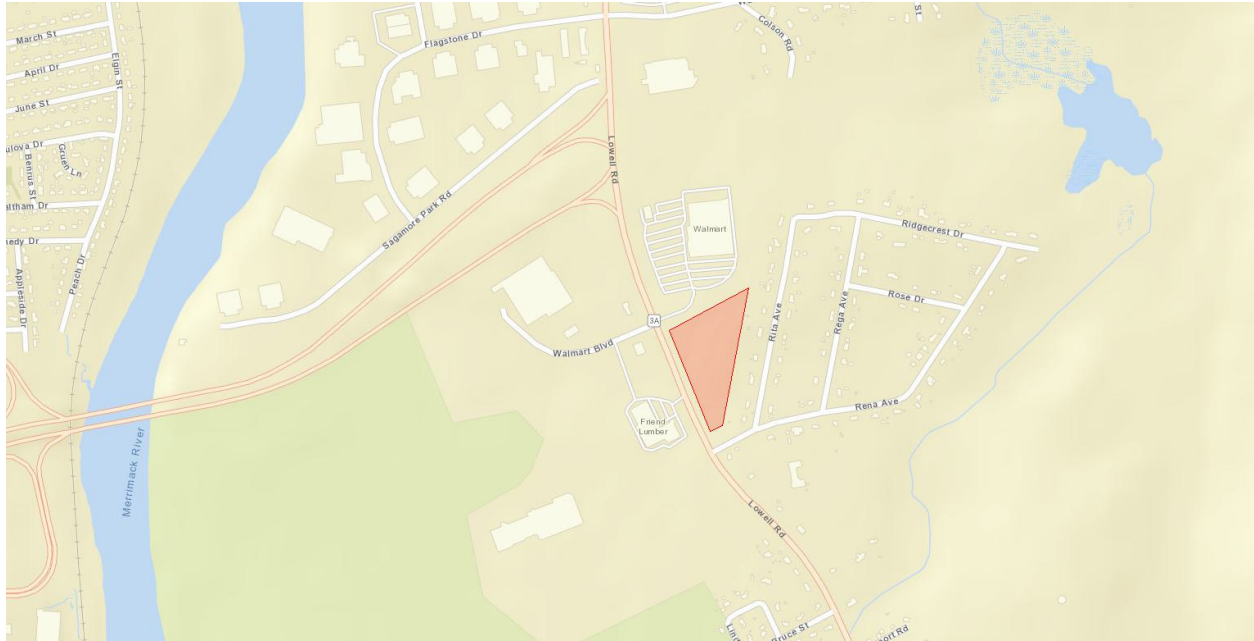
A negative result (no record in our database) does not mean that a sensitive species is not present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

Based on the information submitted, no further consultation with the NH Fish and Game Department pursuant to Fis 1004 is required.

New Hampshire Natural Heritage Bureau  
NHB DataCheck Results Letter

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MAP OF PROJECT BOUNDARIES FOR: NHB25-0173





# MERIDIAN LAND SERVICES, INC.

CIVIL ENGINEERING | LAND SURVEYING | PERMITTING | SOIL & WETLAND MAPPING | SEPTIC DESIGN | ENVIRONMENTAL

## Attachment "A"

Office: 31 Old Nashua Road, Suite 2, Amherst, NH 03031

Mailing: PO Box 118, Milford, NH 03055

Phone: 603-673-1441 \* Fax 603-673-1584

www.MeridianLandServices.com

**Re: T-Bones @ Lowell Rd  
256 Lowell Rd  
Lot 228-7  
Hudson, NH**

**January 21, 2025**

**Site Plan Application**

**Conditional Use Permit Application: Wetland Conservation Overlay District**

## Existing Site Photos







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January 21<sup>st</sup>, 2025  
Page 2 of 6







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January 21<sup>st</sup>, 2025  
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January 21<sup>st</sup>, 2025  
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Re: **T-Bones @ Lowell Rd**  
**256 Lowell Rd**  
**Lot 228-7**  
**Hudson, NH**

**January 21, 2025**

**Site Plan Application**

## Building Signage



**Re: T-Bones @ Lowell Rd  
256 Lowell Rd  
Lot 228-7  
Hudson, NH**

**January 21, 2025**

**Site Plan Application  
Conditional Use Permit Application: Wetland Conservation Overlay District**

## Project Narrative

### I) INTRODUCTION

The applicant, Lowell Rd., LLC, has requested to be heard at the Hudson Planning Board for a review of a Site Plan at Lot 228-7. The project involves constructing a 9,500 +/- square-foot restaurant and other associated site improvements.

### II) EXISTING USE

The property is currently vacant with a variety of ground covers and tree foliage.

### III) SUBDIVISION

No changes to the property boundary are proposed under this application.

### IV) STORMWATER MANAGEMENT

The proposed disturbance being above 100,000 sf will trigger a NHDES Alteration of Terrain stormwater permit; therefore, the site's stormwater has been designed to Env-Wq 1500: Alteration of Terrain and the stormwater ordinance outlined in Chapter 290 of the Town of Hudson Part 1: Administrative Legislation. The proposed plan has one area that will treat the stormwater via an infiltration basin prior to discharging to the onsite wetlands.

### V) SITE ACCESS AND PARKING

The site is proposed to be accessed from the existing signalized access to Walmart. The location of this connection has been dictated by Walmart. Walmart has preliminarily approved the site's connection to their access and an easement plan has been created. Upon approval of this project the easement plan and associated easement will be executed. There is an additional right-in/right-out driveway proposed connecting directly to Lowell Road. This driveway is a requirement of agreements made with Walmart to take pressure off the Walmart driveway. The location of this connection was dictated by connecting to Lowell Road beyond the taper for the existing right turn lane. Both of these connections will require updating the Walmart NHDOT driveway permit and a new NHDOT driveway permit.

The parking lot will be configured to provide 170 +/- paved parking spaces with 6 ADA spaces. This is above the 126 required spaces. T-Bones is a successful restaurant that typically requires more parking than the average restaurant. The additional parking is to make sure the business is not limited by parking. The excess parking allows for a safer site and better circulation by not having visitors wait for parking spaces.

### VI) WETLANDS AND WETLAND BUFFER

The approximately 15,500 sf of wetland buffer proposed to be impacted. These impacts are mostly related for the construction the stormwater management area and the right-in/right-out driveway. Both of these site features are unavoidable. Stormwater runoff travels downhill, and wetlands are located in the lowest portion of the property. The only place to locate the stormwater is partially within the buffer. As stated before, the Right-in/Right-Out

## Attachment "B"

driveway connects to the Lowell Road beyond the taper of the turn lane. This is the least amount of buffer disturbance while providing a safe connection point. To minimize the overall impact to the buffer, the back side of the slopes of the drainage ponds are proposed to be planted with a conservation seed mix and un maintained. This will reestablish about 5,250 sf +/- of buffer area, therefore the permanent buffer impact will be 10,250 sf +/-.

There are no impacts to wetlands.

### VII) UTILITIES

The lot is proposed to be served by municipal water, sewer, and gas.

### VIII) LANDSCAPING

The landscaping has been proposed to meet the town's requirements as reasonably as possible. A waiver has been requested to allow for a reduction in required shrubs.

### IX) SITE LIGHTING

The site lighting is a code compliant lighting plan.

## Dubowik, Brooke

---

**From:** Dhima, Elvis  
**Sent:** Friday, January 24, 2025 3:31 PM  
**To:** Dubowik, Brooke; Gradert Benjamin; Hebert, David; Kirkland, Donald; McElhinney, Steven; Michaud, Jim; Sullivan, Christopher; Malley, Tim; Twardosky, Jason  
**Cc:** Jay Minkarah; Steve Reichert  
**Subject:** T-bones @ Lowell Road

Brooke

Please see below ( this is related to CUP and Site Plan submittal)

1. Applicant shall propose guardrail along the access road and parking area , adjacent to grading exceeding 4 feet in vertical drop
2. Applicant shall provide the slope along access road on Lowell Road
3. Taking in consideration the traffic volume and the speed limit, the proposed access right in / right out on Lowell Road without a slip lane is a bad idea.
4. Applicant shall provide warning signs along Lowell Road about the proposed access curb cut.
5. Applicant shall provide an maintenance sewer manhole, to be located in the grass area, between edge of Walmart access road and edge of parking lot.
6. Applicant shall provide gate valve locations for te wet tap fire service and domestic service
7. Applicant shall revisit the size of the proposed water service, it appears undersized.
8. Applicant shall size the proposed grease trap tank.
9. Applicant shall show snow storage area onsite
10. Applicant shall revisit the layout of the detention basin to minimize impact to the wetland buffer
11. Applicant shall consider drainage system under the parking area instead of an open area detention basin
12. Proposed detention basin appears to be 4 feet deep, which requires a safety perimeter fence
13. Its unclear how drainage runoff crosses the proposes access road on Lower Road, without a culvert in place.
14. Applicant shall provide a wetland scientist stamp on the plans

E

*Elvis Dhima, P.E.*  
*Town Engineer*

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



**CONDITIONAL USE PERMIT APPLICATION**

Date of Application: 1/21/25 Tax Map #: 228 Lot #: 7

Site Address: 256 LOWELL RD, Hudson NH

Name of Project: T-Bones @ Lowell Rd

Zoning District: B-Business General CUP#: 01-25

(For Town Use Only)

Z.B.A. Action: \_\_\_\_\_

PROPERTY OWNER:

Name: 256 LOWELL ROAD, LLC

Address: 9 OLD DERRY RD.,

Address: HUDSON, NH 03051

Telephone # \_\_\_\_\_

Email: \_\_\_\_\_

DEVELOPER:

Lowell RD, LLC

124 Bedford Center Road SB,

Bedford, NH 03110

PROJECT ENGINEER or SURVEYOR:

Name: Sam Foisie, P.E., Meridian Land Services, Inc

Address: 31 Old Nashua RD

Address: Amherst, NH 03055

Telephone # 603-673-1441

Email: SRFoisie@meridianlandservices.com

CERTIFIED WETLANDS SCIENTIST:

Chris Hickey, LLS, Keach-Nordstrom Associates, inc.

10 Commerce Park North, Suite 3

Bedford, NH 03110

(603) 627-2881

chickey@keachnordstrom.com

PURPOSE OF PLAN:

The purpose of the plan is to show the site improvements to construct a t-bones restaurant

(For Town Use Only)

Routing Date: 1/24/25 Deadline Date: 1/31/25 Meeting Date: 2/26/25

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

DRH Title: Fire Marshal Date: 1/27/25  
(Initials)

Department: \_\_\_\_\_

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



# TOWN OF HUDSON

FIRE DEPARTMENT

INSPECTIONAL SERVICES DIVISION



---

12 SCHOOL STREET, HUDSON, NEW HAMPSHIRE 03051

Emergency 911  
Business 603-886-6005  
Fax 603-594-1142

Scott Tice  
Chief of Department

TO: Acting Town Planner

FR: David Hebert  
Fire Marshal

DT: 1/27/2025

RE: 256 Lowell Rd

The following items need to be shown on the site plan

- 1) Show dimensions conforming to NFPA 1, 2021 Edition, Chapter 18 for Fire Department Access. Roadways, Fire Lanes and Parking lot lanes
- 2) Show fire lane markings on the parking lot
- 3) Show apparatus turning radius within the site
- 4) Add two fire hydrants. One on the north end and one on the south end of the site
- 5) Show the fire service size

David Hebert  
Fire Marshal

**SITE PLAN APPLICATION**

Date of Application: 1/21/25 Tax Map #: 228 Lot #: 7

Site Address: 256 LOWELL RD, Hudson NH

Name of Project: T-Bones @Lowell Rd

Zoning District: B - Business General SP#: 01-25  
(For Town Use Only)

Z.B.A. Action: \_\_\_\_\_

**PROPERTY OWNER:**

Name: 256 LOWELL ROAD, LLC

Address: 9 OLD DERRY RD.,

Address: HUDSON, NH 03051

Telephone # \_\_\_\_\_

Email: \_\_\_\_\_

**DEVELOPER:**

Lowell RD, LLC

124 Bedford Center Road SB,

Bedford, NH 03110

**PROJECT ENGINEER:**

Name: Sam Foisie, P.E., Meridian Land Services, Inc

Address: 31 Old Nashua RD

Address: Amherst, NH 03055

Telephone # 603-673-1441

Email: SRFoisie@meridianlandservices.com

**SURVEYOR:**

Chris Hickey, LLS, Keach-Nordstrom Associates, Inc.

10 Commerce Park North, Suite 3

Bedford, NH 03110

(603) 627-2881

chickey@keachnordstrom.com

**PURPOSE OF PLAN:**

The purpose of the plan is to show the site improvements to construct a t-bones restuarant

**(For Town Use Only)**

Routing Date: 1/24/25 Deadline Date: 1/31/25 Meeting Date: 2/26/25

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

CJS Title: Zoning Administrator Date: 1-28-25  
(Initials)

Department: \_\_\_\_\_

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

**Comments – Zoning 1-28-25**

1. On sheet SP3 in the chart the wetland buffer say 50' Commercial Buffers are 75' per Article VII **334-35 (A) 3 Boundaries**
2. Please label the 75' wetland buffer and darken the line.
3. Can you use a line type for property boundaries?



**CONDITIONAL USE PERMIT APPLICATION**

Date of Application: 1/21/25 Tax Map #: 228 Lot #: 7

Site Address: 256 LOWELL RD, Hudson NH

Name of Project: T-Bones @ Lowell Rd

Zoning District: B-Business General CUP#: 01-25  
(For Town Use Only)

Z.B.A. Action: \_\_\_\_\_

**PROPERTY OWNER:**

Name: 256 LOWELL ROAD, LLC

Address: 9 OLD DERRY RD.,

Address: HUDSON, NH 03051

Telephone # \_\_\_\_\_

Email: \_\_\_\_\_

**DEVELOPER:**

Lowell RD, LLC

124 Bedford Center Road SB,

Bedford, NH 03110

**PROJECT ENGINEER or SURVEYOR:**

Name: Sam Foisie, P.E., Meridian Land Services, Inc

Address: 31 Old Nashua RD

Address: Amherst, NH 03055

Telephone # 603-673-1441

Email: SRFoisie@meridianlandservices.com

**CERTIFIED WETLANDS SCIENTIST:**

Chris Hickey, LLS, Keach-Nordstrom Associates, Inc.

10 Commerce Park North, Suite 3

Bedford, NH 03110

(603) 627-2881

chickey@keachnordstrom.com

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(For Town Use Only)

Routing Date: 1/24/25 Deadline Date: 1/31/25 Meeting Date: 2/26/25

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CJS Title: Zoning ADMINISTRATION Date: 1-28-25  
(Initials)

Department: \_\_\_\_\_

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

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Name of Project: T-Bones @Lowell Rd

Zoning District: B - Business General SP#: 01-25  
(For Town Use Only)

Z.B.A. Action: \_\_\_\_\_

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Address: 9 OLD DERRY RD.,

Address: HUDSON, NH 03051

Telephone # \_\_\_\_\_

Email: \_\_\_\_\_

**DEVELOPER:**

Lowell RD, LLC

124 Bedford Center Road SB,

Bedford, NH 03110

**PROJECT ENGINEER:**

Name: Sam Folsie, P.E., Meridian Land Services, Inc

Address: 31 Old Nashua RD

Address: Amherst, NH 03055

Telephone # 603-673-1441

Email: SRFolsie@meridianlandservices.com

**SURVEYOR:**

Chris Hickey, LLS, Keach-Nordstrom Associates, Inc.

10 Commerce Park North, Suite 3

Bedford, NH 03110

(603) 627-2881

chickey@keachnordstrom.com

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**(For Town Use Only)**

Routing Date: 1/24/25 Deadline Date: 1/31/25 Meeting Date: 2/26/25

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

   Title: Chief Assessor Date: 1-27-25  
(Initials)

Department: \_\_\_\_\_

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

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Date of Application: 1/21/25 Tax Map #: 228 Lot #: 7

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Name of Project: T-Bones @ Lowell Rd

Zoning District: B-Business General CUP#: 01-25  
(For Town Use Only)

Z.B.A. Action: \_\_\_\_\_

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Address: 9 OLD DERRY RD.,

Address: HUDSON, NH 03051

Telephone # \_\_\_\_\_

Email: \_\_\_\_\_

DEVELOPER:

Lowell RD, LLC

124 Bedford Center Road SB,

Bedford, NH 03110

PROJECT ENGINEER or SURVEYOR:

Name: Sam Foisie, P.E., Meridian Land Services, Inc

Address: 31 Old Nashua RD

Address: Amherst, NH 03055

Telephone # 603-673-1441

Email: SRFoisie@meridianlandservices.com

CERTIFIED WETLANDS SCIENTIST:

Chris Hickey, LLS, Keach-Nordstrom Associates, Inc.

10 Commerce Park North, Suite 3

Bedford, NH 03110

(603) 627-2881

chickey@keachnordstrom.com

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(For Town Use Only)

Routing Date: 1/24/25 Deadline Date: 1/31/25 Meeting Date: 2/26/25

[Signature] I have no comments \_\_\_\_\_ I have comments (attach to form)

(Initials) Title: Chief Assessor Date: 1-27-25

Department: \_\_\_\_\_

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

SITE PLAN APPLICATION

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Site Address: 256 LOWELL RD, Hudson NH

Name of Project: T-Bones @Lowell Rd

Zoning District: B - Business General SP#: 01-25  
(For Town Use Only)

Z.B.A. Action: \_\_\_\_\_

PROPERTY OWNER:

DEVELOPER:

Name: 256 LOWELL ROAD, LLC

Lowell RD, LLC

Address: 9 OLD DERRY RD.,

124 Bedford Center Road SB,

Address: HUDSON, NH 03051

Bedford, NH 03110

Telephone # \_\_\_\_\_

Email: \_\_\_\_\_

PROJECT ENGINEER:

SURVEYOR:

Name: Sam Foisie, P.E., Meridian Land Services, Inc

Chris Hickey, LLS, Keach-Nordstrom Associates, inc.

Address: 31 Old Nashua RD

10 Commerce Park North, Suite 3

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Routing Date: 1/24/25 Deadline Date: 1/31/25 Meeting Date: 2/26/25

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

SCM Title: Captain Steve McElhinney Date: 01/27/25  
(Initials)

Department: \_\_\_\_\_

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



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PROJECT ENGINEER or SURVEYOR:

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Address: 31 Old Nashua RD

Address: Amherst, NH 03055

Telephone # 603-673-1441

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X I have no comments \_\_\_\_\_ I have comments (attach to form)

SCM Title: Captain Steve McElhinney Date: 01/27/25  
(Initials)

Department: \_\_\_\_\_

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

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**MERIDIAN**  
**LAND SERVICES, INC.**

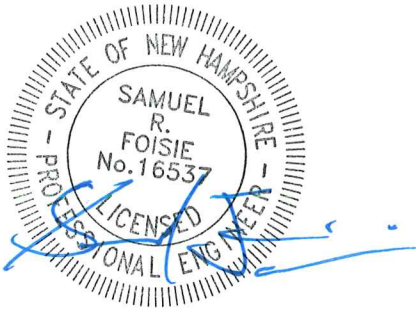
CIVIL ENGINEERING | LAND SURVEYING | PERMITTING | SOIL & WETLAND MAPPING | SEPTIC DESIGN | ENVIRONMENTAL

**PROJECT STORMWATER MANAGEMENT REPORT**

**LOWELL ROAD, LLC**  
256 Lowell Road  
Tax Map 228 Lot 7  
Hudson, New Hampshire 03051

Prepared for:  
Lowell Road, LLC  
124 Bedford Center Road  
Bedford, New Hampshire 03110

Owner of Record:  
256 Lowell Road, LLC  
9 Old Derry Road  
Hudson, New Hampshire 03051



January 21, 2025

Prepared by: Noah C. Greene, EIT  
Reviewed by: Samuel R. Foisie, PE





# MERIDIAN LAND SERVICES, INC.

CIVIL ENGINEERING | LAND SURVEYING | PERMITTING | SOIL & WETLAND MAPPING | SEPTIC DESIGN | ENVIRONMENTAL

## Attachment "D"

Office: 31 Old Nashua Road, Suite 2, Amherst, NH 03031

Mailing: PO Box 118, Milford, NH 03055

Phone: 603-673-1441 \* Fax 603-673-1584

www.MeridianLandServices.com

## LOWELL ROAD, LLC 256 Lowell Road Tax Map 228 Lot 7 Hudson, New Hampshire 03051

January 21, 2025

### I. INTRODUCTION

The following drainage calculations are being provided in support of the proposed site plan located at 256 Lowell Road in Hudson, New Hampshire. The development will include a 9,500 SF restaurant with the associated site improvements including but not limited to parking, drive aisles, utility connections, and associated stormwater management practices. The stormwater management for the site has been designed to comply with the Town of Hudson site plan drainage regulations.

### II. SITE DESCRIPTION

The site is located in the Southwest portion of Hudson with frontage on Lowell Road. The subject parcel is currently vacant.

The existing soil types for the site area was determined using United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Web Soil Survey. The following are existing soil types for the supplemental areas that were determined using USDA NRCS Web Soil Survey:

WdB	Windsor Loamy Sand, 3 to 8 percent slopes	HSG A
DeA	Deerfield Loamy Fine Sand, 0 to 3 percent slopes	HSG A
MoB	Montauk Fine Sandy Loam, 3 to 8 percent slopes	HSG C

### III. DRAINAGE DESIGN

The proposed site will use a closed drainage to convey the stormwater runoff to the infiltration basin located in the south portion of the site. This infiltration basin will utilize an infiltration, an outlet control structure, and riprap spillway to mitigate the runoff rates and volumes from the developed site.





Infiltration Basin 'IB-1' has a bottom area of 574 square feet. This basin utilizes an infiltration rate of 6.50 in/hr that was determined utilizing the KSAT infiltration value for Deerfield Loamy Sand (13 in/hr) with a factor of safety of 2. The outlet control structure for IB-1 is a 48" diameter outlet control structure with two orifices, a 12"x16" orifice at elevation 163.50 and an 18"x4" orifice at elevation 164.50. This then outlets to a 15-inch HDPE culvert. The basin has a 4-foot berm.

The 2-, 10-, 25-, and 50-year storm runoff rate was analyzed in both the Pre-Development and Post-Development conditions in accordance with the Town of Hudson Stormwater Management Requirements.

**IV. METHODOLOGY**

The quantity of runoff and the conveyance of that flow through the site are determined using the software package HydroCAD 10.20-6a by HydroCAD Software Solutions LLC. HydroCAD is a computer aided design program for modeling storm water hydrology based on the Soil Conservation Service (SCS) TR-55 method combined with standard hydraulics calculations.

**V. SUMMARY**

The following tables are included below for the applicable design storms to each observation point.

Peak runoff rates during the 1-inch, 2- and 5- year storms

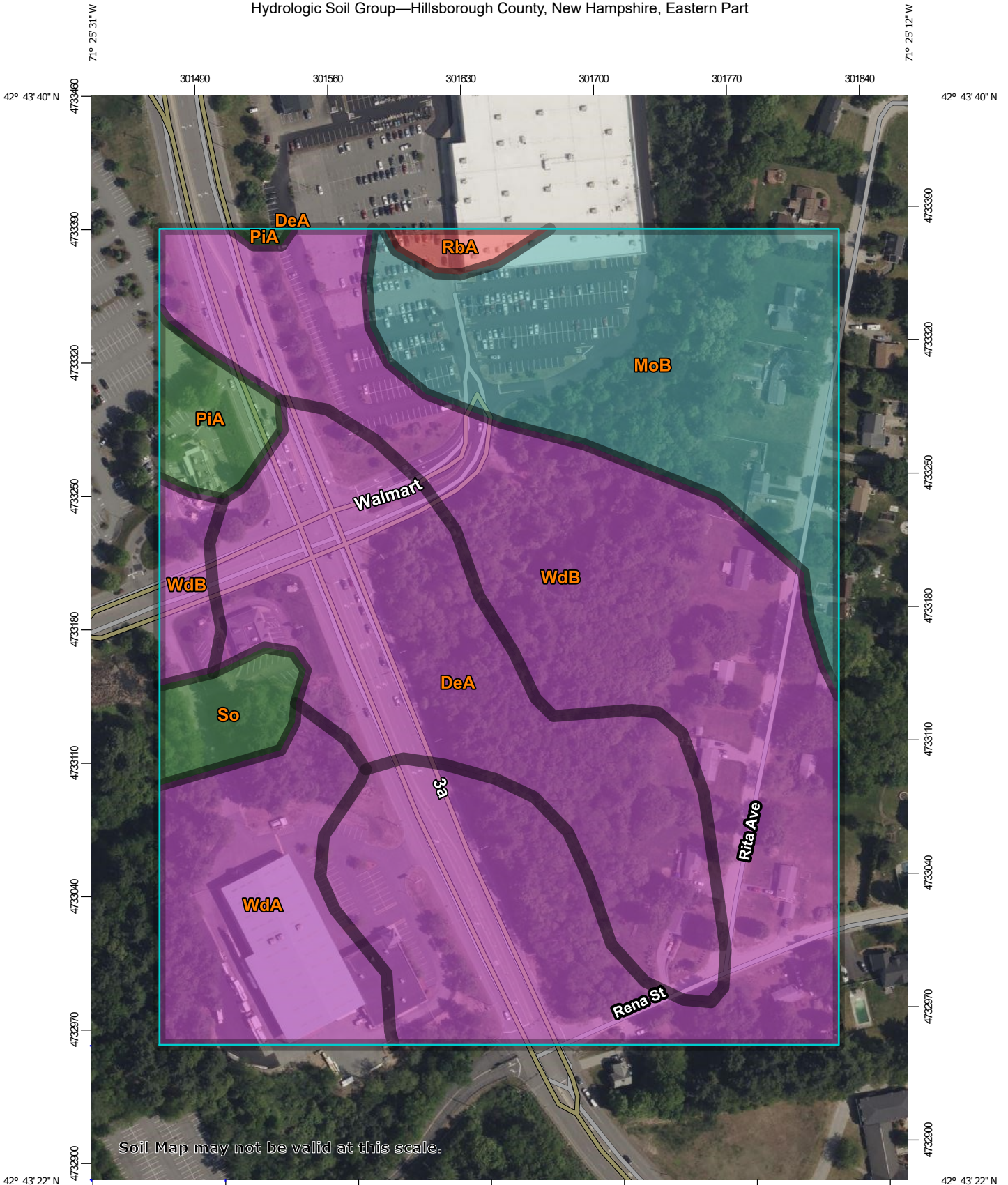
Location	Q2 YR (CFS)			Q10 YR (CFS)		
	Pre	Post	Δ	Pre	Post	Δ
OP-1	0.39	0.01	0.38	2.61	1.93	0.68

Peak runoff rates during the 10-, 25- and 50- year storms

Location	Q25 YR (CFS)			Q50 YR (CFS)		
	Pre	Post	Δ	Pre	Post	Δ
OP-1	5.45	4.73	0.72	8.72	8.20	0.52

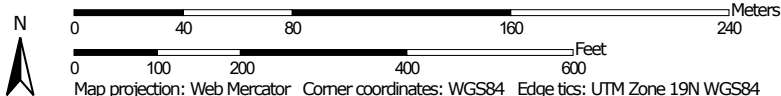
Peak runoff volume during the 2- and 10- year storms

Location	V2 YR (AF)		
	Pre	Post	Δ
OP-1	0.116	0.003	0.113



Soil Map may not be valid at this scale.

Map Scale: 1:2,770 if printed on A portrait (8.5" x 11") sheet.




Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84





## 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
DeA	Deerfield loamy fine sand, 0 to 3 percent slopes	A	7.8	20.5%
MoB	Montauk fine sandy loam, 3 to 8 percent slopes	C	7.3	19.3%
PiA	Pipestone loamy sand, 0 to 3 percent slopes	A/D	1.1	2.8%
RbA	Ridgebury fine sandy loam, 0 to 3 percent slopes	D	0.3	0.9%
So	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	A/D	0.9	2.5%
WdA	Windsor loamy sand, 0 to 3 percent slopes	A	3.9	10.3%
WdB	Windsor loamy sand, 3 to 8 percent slopes	A	16.6	43.8%
<b>Totals for Area of Interest</b>			<b>38.0</b>	<b>100.0%</b>



## 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



# Extreme Precipitation Tables

Northeast Regional Climate Center

Attachment "D"

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

## Metadata for Point

Smoothing	Yes
State	New Hampshire
Location	New Hampshire, United States
Latitude	42.725 degrees North
Longitude	71.422 degrees West
Elevation	50 feet
Date/Time	Wed Dec 04 2024 08:28:39 GMT-0500 (Eastern Standard Time)

## Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
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	2.20	2.63	3.06	3.75	4.37	1yr
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	3.30	2yr	2.63	3.18	3.69	4.41	5.01	2yr
5yr	0.39	0.61	0.77	1.03	1.32	1.68	5yr	1.14	1.53	1.94	2.43	3.02	3.76	4.20	5yr	3.32	4.04	4.67	5.55	6.27	5yr
10yr	0.44	0.70	0.88	1.20	1.56	2.00	10yr	1.35	1.81	2.33	2.91	3.62	4.48	5.04	10yr	3.97	4.84	5.59	6.59	7.43	10yr
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	6.41	25yr	5.02	6.17	7.08	8.29	9.29	25yr
50yr	0.59	0.95	1.22	1.71	2.31	3.02	50yr	1.99	2.68	3.53	4.44	5.51	6.77	7.70	50yr	5.99	7.41	8.48	9.86	11.02	50yr
100yr	0.68	1.10	1.42	2.01	2.74	3.59	100yr	2.36	3.17	4.22	5.31	6.59	8.10	9.25	100yr	7.17	8.90	10.16	11.74	13.07	100yr
200yr	0.78	1.27	1.64	2.35	3.25	4.29	200yr	2.81	3.76	5.05	6.37	7.90	9.68	11.12	200yr	8.57	10.70	12.17	13.98	15.50	200yr
500yr	0.93	1.54	2.00	2.91	4.08	5.43	500yr	3.52	4.72	6.41	8.09	10.03	12.27	14.20	500yr	10.86	13.65	15.47	17.61	19.44	500yr

## Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.23	0.35	0.43	0.57	0.70	0.80	1yr	0.61	0.79	1.07	1.33	1.68	2.31	2.56	1yr	2.04	2.47	2.73	3.02	3.84	1yr
2yr	0.32	0.49	0.60	0.81	1.00	1.21	2yr	0.87	1.18	1.38	1.80	2.31	2.92	3.23	2yr	2.58	3.10	3.60	4.31	4.91	2yr
5yr	0.36	0.56	0.69	0.95	1.21	1.43	5yr	1.04	1.39	1.63	2.12	2.71	3.53	3.93	5yr	3.12	3.78	4.33	5.19	5.89	5yr
10yr	0.40	0.61	0.76	1.06	1.37	1.61	10yr	1.18	1.58	1.83	2.40	3.06	4.07	4.56	10yr	3.61	4.39	4.98	5.96	6.75	10yr
25yr	0.45	0.69	0.86	1.22	1.61	1.88	25yr	1.39	1.84	2.14	2.82	3.56	4.93	5.58	25yr	4.37	5.36	6.00	7.16	8.09	25yr
50yr	0.49	0.75	0.93	1.34	1.80	2.14	50yr	1.56	2.09	2.42	3.21	4.01	5.71	6.50	50yr	5.05	6.25	6.92	8.23	9.26	50yr
100yr	0.54	0.81	1.02	1.47	2.02	2.42	100yr	1.74	2.36	2.73	3.49	4.51	6.57	7.61	100yr	5.82	7.32	7.97	9.46	10.59	100yr
200yr	0.59	0.89	1.13	1.64	2.28	2.74	200yr	1.97	2.68	3.07	3.94	5.12	7.62	8.91	200yr	6.74	8.56	9.20	10.88	12.13	200yr
500yr	0.67	1.00	1.29	1.87	2.66	3.24	500yr	2.30	3.17	3.60	4.63	6.05	9.26	11.02	500yr	8.19	10.60	11.11	13.09	14.51	500yr

## Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.31	0.48	0.58	0.78	0.96	1.13	1yr	0.83	1.10	1.28	1.67	2.11	2.64	2.90	1yr	2.34	2.78	3.40	4.18	4.78	1yr
2yr	0.35	0.55	0.67	0.91	1.12	1.32	2yr	0.97	1.29	1.50	1.94	2.49	3.06	3.40	2yr	2.71	3.27	3.79	4.53	5.16	2yr
5yr	0.44	0.67	0.84	1.15	1.46	1.68	5yr	1.26	1.64	1.91	2.45	3.07	4.03	4.53	5yr	3.56	4.35	5.01	5.93	6.67	5yr
10yr	0.53	0.81	1.00	1.40	1.81	2.05	10yr	1.56	2.01	2.33	2.93	3.65	4.98	5.62	10yr	4.40	5.40	6.20	7.28	8.12	10yr
25yr	0.68	1.03	1.28	1.83	2.41	2.67	25yr	2.08	2.61	3.02	3.72	4.56	6.58	7.47	25yr	5.82	7.19	8.22	9.56	10.59	25yr
50yr	0.82	1.25	1.55	2.23	3.01	3.26	50yr	2.59	3.19	3.68	4.46	5.41	8.12	9.28	50yr	7.19	8.93	10.17	11.74	12.93	50yr
100yr	1.00	1.51	1.89	2.73	3.75	3.98	100yr	3.23	3.90	4.49	5.55	6.42	10.10	11.51	100yr	8.93	11.07	12.60	14.45	15.82	100yr
200yr	1.21	1.83	2.32	3.35	4.68	4.87	200yr	4.03	4.76	5.46	6.68	7.61	12.49	14.28	200yr	11.05	13.73	15.61	17.79	19.36	200yr
500yr	1.58	2.36	3.03	4.40	6.26	6.32	500yr	5.40	6.18	7.11	8.56	9.54	16.55	18.94	500yr	14.64	18.22	20.74	23.42	25.28	500yr



## **Section 1.1: Existing Conditions**

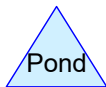
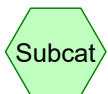
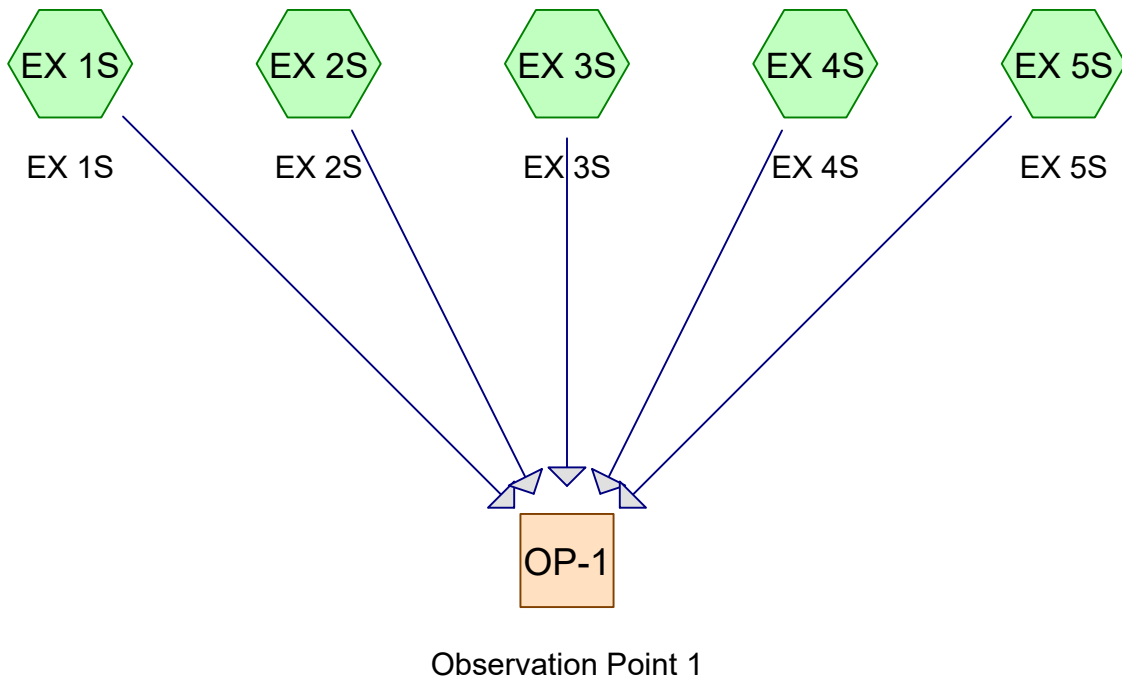
Routing Diagram

Area and Soils Listings

2-, 10-, 25- and 50-year Storm Nodes









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**Area Listing (all nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
0.432	39	>75% Grass cover, Good HSG A (EX 1S, EX 3S, EX 4S, EX 5S)
1.081	74	>75% Grass cover, Good HSG C (EX 1S)
0.039	98	Paved parking HSG A (EX 1S, EX 4S, EX 5S)
0.157	98	Paved parking HSG C (EX 1S)
0.183	98	Roofs HSG C (EX 1S)
5.072	30	Woods, Good HSG A (EX 1S, EX 2S, EX 3S, EX 4S, EX 5S)
2.575	70	Woods, Good HSG C (EX 1S, EX 4S)
0.059	77	Woods, Good HSG D (EX 1S)
<b>9.599</b>	<b>49</b>	<b>TOTAL AREA</b>

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**Soil Listing (all nodes)**

Area (acres)	Soil Group	Subcatchment Numbers
5.543	HSG A	EX 1S, EX 2S, EX 3S, EX 4S, EX 5S
0.000	HSG B	
3.996	HSG C	EX 1S, EX 4S
0.059	HSG D	EX 1S
0.000	Other	
<b>9.599</b>		<b>TOTAL AREA</b>



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Type III 24-hr 2-Year Rainfall=2.98"

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

**Subcatchment EX 1S: EX 1S** Runoff Area=283,254 sf 5.36% Impervious Runoff Depth=0.21"  
Flow Length=1,499' Slope=0.0783 '/' Tc=30.1 min CN=56 Runoff=0.39 cfs 0.116 af

**Subcatchment EX 2S: EX 2S** Runoff Area=34,624 sf 0.00% Impervious Runoff Depth=0.00"  
Flow Length=343' Slope=0.0528 '/' Tc=22.8 min CN=30 Runoff=0.00 cfs 0.000 af

**Subcatchment EX 3S: EX 3S** Runoff Area=26,384 sf 0.00% Impervious Runoff Depth=0.00"  
Flow Length=347' Slope=0.0634 '/' Tc=20.4 min CN=31 Runoff=0.00 cfs 0.000 af

**Subcatchment EX 4S: EX 4S** Runoff Area=54,593 sf 0.85% Impervious Runoff Depth=0.00"  
Flow Length=604' Slope=0.1040 '/' Tc=20.2 min CN=38 Runoff=0.00 cfs 0.000 af

**Subcatchment EX 5S: EX 5S** Runoff Area=19,267 sf 4.50% Impervious Runoff Depth=0.00"  
Flow Length=346' Slope=0.1273 '/' Tc=12.0 min CN=37 Runoff=0.00 cfs 0.000 af

**Reach OP-1: Observation Point 1**

Inflow=0.39 cfs 0.116 af  
Outflow=0.39 cfs 0.116 af

**Total Runoff Area = 9.599 ac Runoff Volume = 0.116 af Average Runoff Depth = 0.15"**  
**96.05% Pervious = 9.219 ac 3.95% Impervious = 0.379 ac**

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Type III 24-hr 10-Year Rainfall=4.48"

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

**Subcatchment EX 1S: EX 1S** Runoff Area=283,254 sf 5.36% Impervious Runoff Depth=0.79"  
Flow Length=1,499' Slope=0.0783 '/' Tc=30.1 min CN=56 Runoff=2.61 cfs 0.426 af

**Subcatchment EX 2S: EX 2S** Runoff Area=34,624 sf 0.00% Impervious Runoff Depth=0.00"  
Flow Length=343' Slope=0.0528 '/' Tc=22.8 min CN=30 Runoff=0.00 cfs 0.000 af

**Subcatchment EX 3S: EX 3S** Runoff Area=26,384 sf 0.00% Impervious Runoff Depth=0.00"  
Flow Length=347' Slope=0.0634 '/' Tc=20.4 min CN=31 Runoff=0.00 cfs 0.000 af

**Subcatchment EX 4S: EX 4S** Runoff Area=54,593 sf 0.85% Impervious Runoff Depth=0.08"  
Flow Length=604' Slope=0.1040 '/' Tc=20.2 min CN=38 Runoff=0.01 cfs 0.009 af

**Subcatchment EX 5S: EX 5S** Runoff Area=19,267 sf 4.50% Impervious Runoff Depth=0.06"  
Flow Length=346' Slope=0.1273 '/' Tc=12.0 min CN=37 Runoff=0.00 cfs 0.002 af

**Reach OP-1: Observation Point 1**

Inflow=2.61 cfs 0.437 af  
Outflow=2.61 cfs 0.437 af

**Total Runoff Area = 9.599 ac Runoff Volume = 0.437 af Average Runoff Depth = 0.55"**  
**96.05% Pervious = 9.219 ac 3.95% Impervious = 0.379 ac**

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Type III 24-hr 25-Year Rainfall=5.67"

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

**Subcatchment EX 1S: EX 1S** Runoff Area=283,254 sf 5.36% Impervious Runoff Depth=1.41"  
Flow Length=1,499' Slope=0.0783 '/' Tc=30.1 min CN=56 Runoff=5.35 cfs 0.761 af

**Subcatchment EX 2S: EX 2S** Runoff Area=34,624 sf 0.00% Impervious Runoff Depth=0.04"  
Flow Length=343' Slope=0.0528 '/' Tc=22.8 min CN=30 Runoff=0.00 cfs 0.003 af

**Subcatchment EX 3S: EX 3S** Runoff Area=26,384 sf 0.00% Impervious Runoff Depth=0.06"  
Flow Length=347' Slope=0.0634 '/' Tc=20.4 min CN=31 Runoff=0.00 cfs 0.003 af

**Subcatchment EX 4S: EX 4S** Runoff Area=54,593 sf 0.85% Impervious Runoff Depth=0.31"  
Flow Length=604' Slope=0.1040 '/' Tc=20.2 min CN=38 Runoff=0.09 cfs 0.032 af

**Subcatchment EX 5S: EX 5S** Runoff Area=19,267 sf 4.50% Impervious Runoff Depth=0.27"  
Flow Length=346' Slope=0.1273 '/' Tc=12.0 min CN=37 Runoff=0.03 cfs 0.010 af

**Reach OP-1: Observation Point 1**

Inflow=5.45 cfs 0.809 af  
Outflow=5.45 cfs 0.809 af

**Total Runoff Area = 9.599 ac Runoff Volume = 0.809 af Average Runoff Depth = 1.01"**  
**96.05% Pervious = 9.219 ac 3.95% Impervious = 0.379 ac**

# Attachment "D"

**12542EX00**

Type III 24-hr 50-Year Rainfall=6.77"

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

**Subcatchment EX 1S: EX 1S** Runoff Area=283,254 sf 5.36% Impervious Runoff Depth=2.07"  
Flow Length=1,499' Slope=0.0783 '/' Tc=30.1 min CN=56 Runoff=8.32 cfs 1.122 af

**Subcatchment EX 2S: EX 2S** Runoff Area=34,624 sf 0.00% Impervious Runoff Depth=0.17"  
Flow Length=343' Slope=0.0528 '/' Tc=22.8 min CN=30 Runoff=0.02 cfs 0.012 af

**Subcatchment EX 3S: EX 3S** Runoff Area=26,384 sf 0.00% Impervious Runoff Depth=0.22"  
Flow Length=347' Slope=0.0634 '/' Tc=20.4 min CN=31 Runoff=0.02 cfs 0.011 af

**Subcatchment EX 4S: EX 4S** Runoff Area=54,593 sf 0.85% Impervious Runoff Depth=0.62"  
Flow Length=604' Slope=0.1040 '/' Tc=20.2 min CN=38 Runoff=0.30 cfs 0.065 af

**Subcatchment EX 5S: EX 5S** Runoff Area=19,267 sf 4.50% Impervious Runoff Depth=0.56"  
Flow Length=346' Slope=0.1273 '/' Tc=12.0 min CN=37 Runoff=0.10 cfs 0.020 af

**Reach OP-1: Observation Point 1**

Inflow=8.72 cfs 1.230 af  
Outflow=8.72 cfs 1.230 af

**Total Runoff Area = 9.599 ac Runoff Volume = 1.230 af Average Runoff Depth = 1.54"**  
**96.05% Pervious = 9.219 ac 3.95% Impervious = 0.379 ac**

## **Section 1.2: Existing Conditions**

25- and 50-year Storm Full Summary





12542EX00

Type III 24-hr 25-Year Rainfall=5.67"

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Page 1

Summary for Subcatchment EX 1S: EX 1S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 5.35 cfs @ 12.48 hrs, Volume= 0.761 af, Depth= 1.41"  
 Routed to Reach OP-1 : Observation Point 1

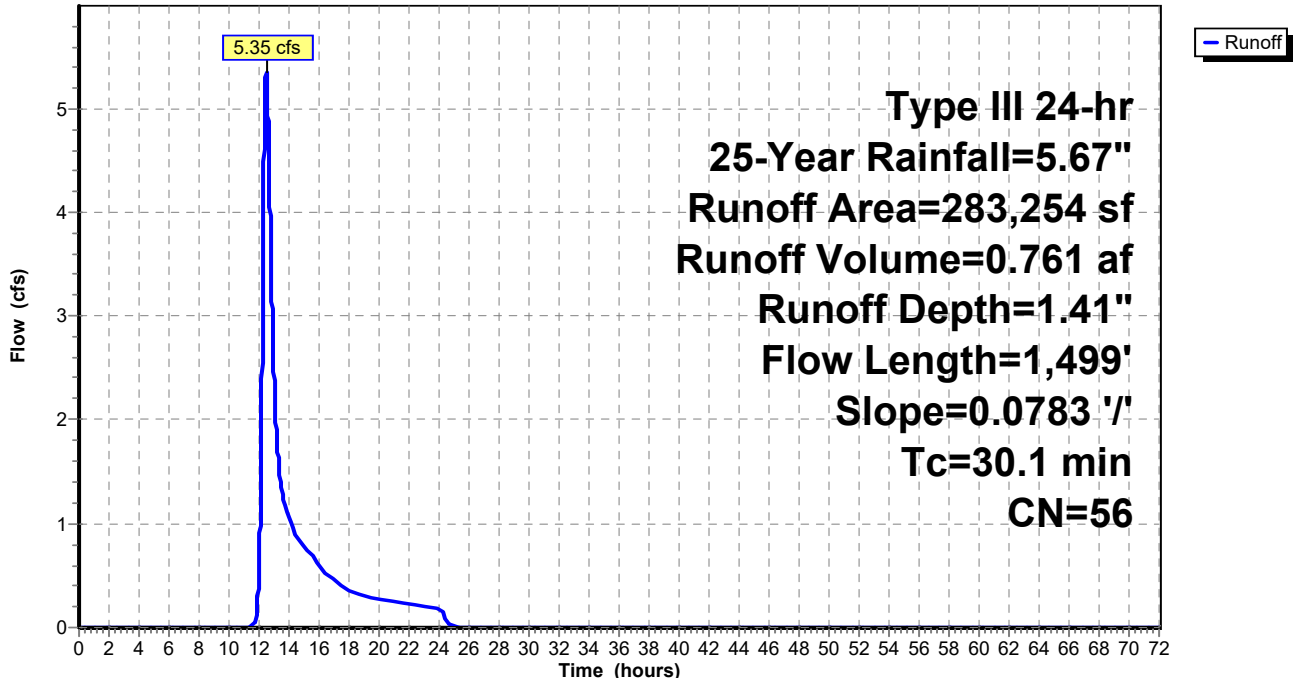
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-Year Rainfall=5.67"

Area (sf)	CN	Description
102,306	70	Woods, Good HSG C
113,027	30	Woods, Good HSG A
2,587	77	Woods, Good HSG D
7,988	98	Roofs HSG C
6,831	98	Paved parking HSG C
372	98	Paved parking HSG A
3,061	39	>75% Grass cover, Good HSG A
47,082	74	>75% Grass cover, Good HSG C
283,254	56	Weighted Average
268,063		94.64% Pervious Area
15,191		5.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.1	1,499	0.0783	0.83		Lag/CN Method,

Subcatchment EX 1S: EX 1S

Hydrograph



**12542EX00**

Type III 24-hr 25-Year Rainfall=5.67"

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## Summary for Subcatchment EX 2S: EX 2S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 0.00 cfs @ 17.35 hrs, Volume= 0.003 af, Depth= 0.04"  
 Routed to Reach OP-1 : Observation Point 1

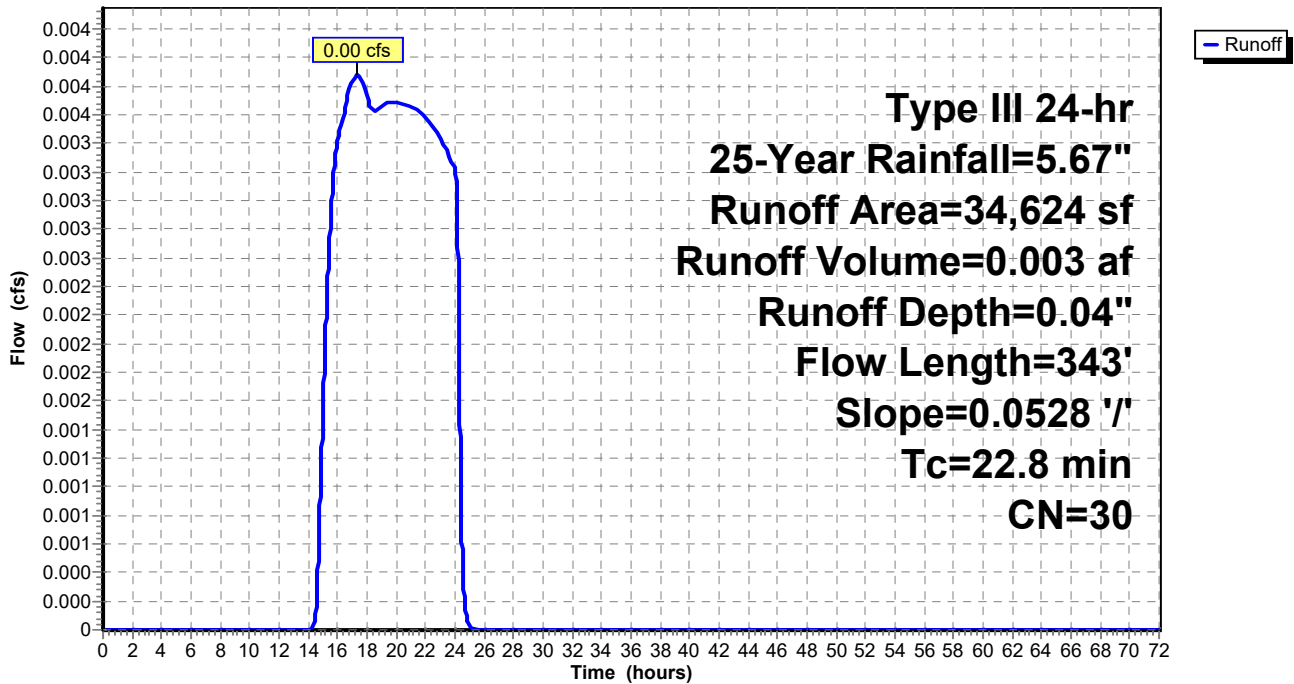
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-Year Rainfall=5.67"

Area (sf)	CN	Description
34,624	30	Woods, Good HSG A
34,624		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	343	0.0528	0.25		Lag/CN Method,

## Subcatchment EX 2S: EX 2S

Hydrograph



12542EX00

Type III 24-hr 25-Year Rainfall=5.67"

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Summary for Subcatchment EX 3S: EX 3S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 0.00 cfs @ 15.80 hrs, Volume= 0.003 af, Depth= 0.06"  
 Routed to Reach OP-1 : Observation Point 1

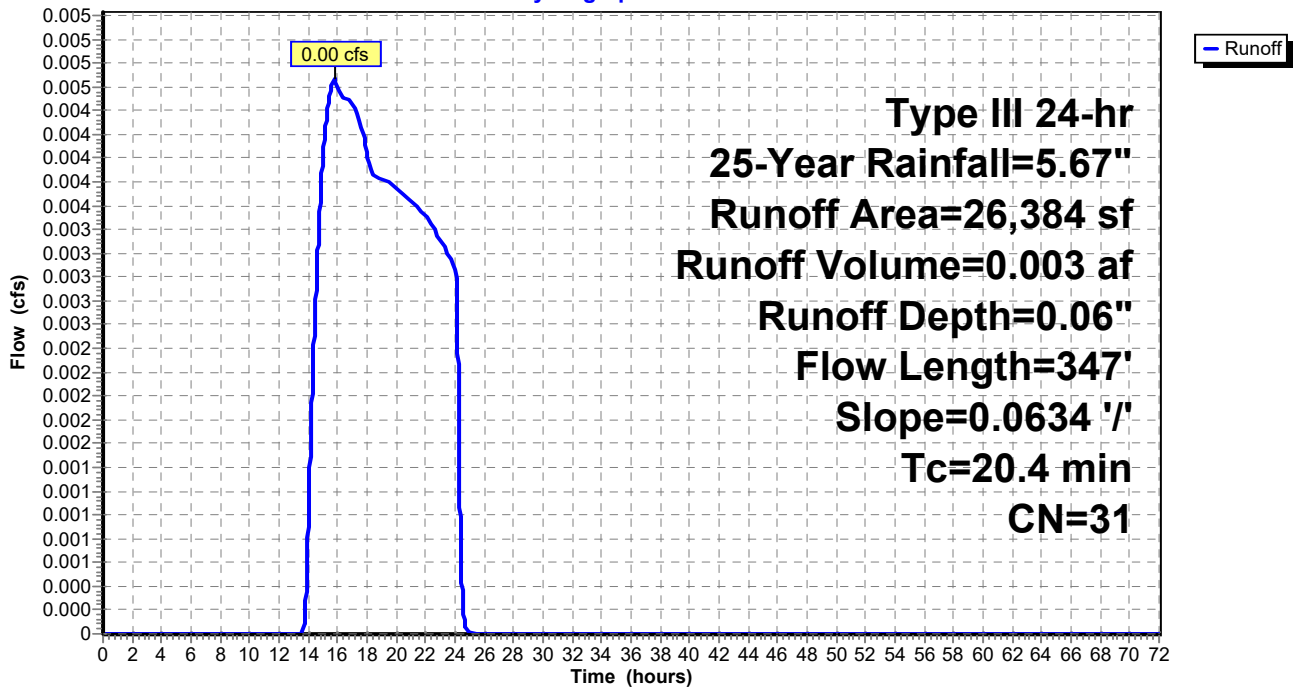
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-Year Rainfall=5.67"

Area (sf)	CN	Description
22,371	30	Woods, Good HSG A
4,013	39	>75% Grass cover, Good HSG A
26,384	31	Weighted Average
26,384		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.4	347	0.0634	0.28		Lag/CN Method,

Subcatchment EX 3S: EX 3S

Hydrograph



**12542EX00**

Type III 24-hr 25-Year Rainfall=5.67"

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## Summary for Subcatchment EX 4S: EX 4S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 0.09 cfs @ 12.63 hrs, Volume= 0.032 af, Depth= 0.31"  
 Routed to Reach OP-1 : Observation Point 1

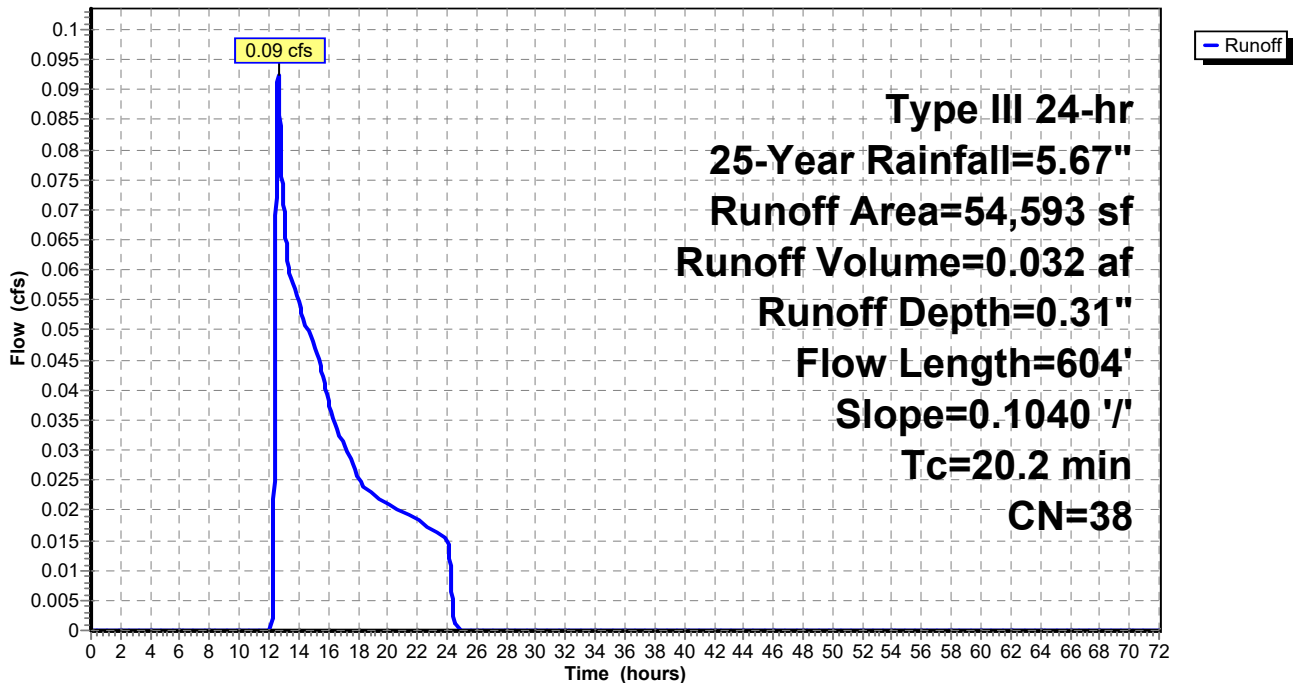
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-Year Rainfall=5.67"

Area (sf)	CN	Description
40,569	30	Woods, Good HSG A
9,867	70	Woods, Good HSG C
462	98	Paved parking HSG A
3,695	39	>75% Grass cover, Good HSG A
54,593	38	Weighted Average
54,131		99.15% Pervious Area
462		0.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	604	0.1040	0.50		Lag/CN Method,

### Subcatchment EX 4S: EX 4S

Hydrograph



**12542EX00**

Type III 24-hr 25-Year Rainfall=5.67"

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## Summary for Subcatchment EX 5S: EX 5S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 0.03 cfs @ 12.53 hrs, Volume= 0.010 af, Depth= 0.27"  
 Routed to Reach OP-1 : Observation Point 1

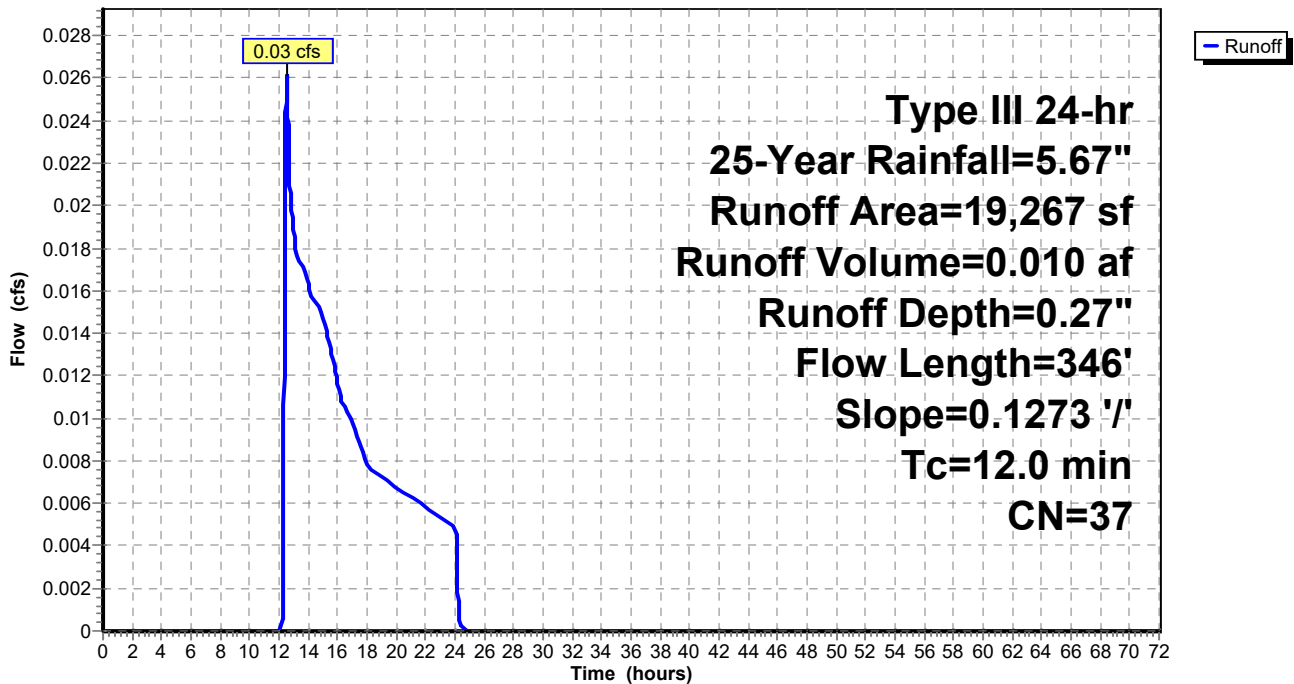
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-Year Rainfall=5.67"

Area (sf)	CN	Description
10,348	30	Woods, Good HSG A
867	98	Paved parking HSG A
8,051	39	>75% Grass cover, Good HSG A
19,267	37	Weighted Average
18,400		95.50% Pervious Area
867		4.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	346	0.1273	0.48		Lag/CN Method,

## Subcatchment EX 5S: EX 5S

Hydrograph





12542EX00

Type III 24-hr 25-Year Rainfall=5.67"

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### Summary for Reach OP-1: Observation Point 1

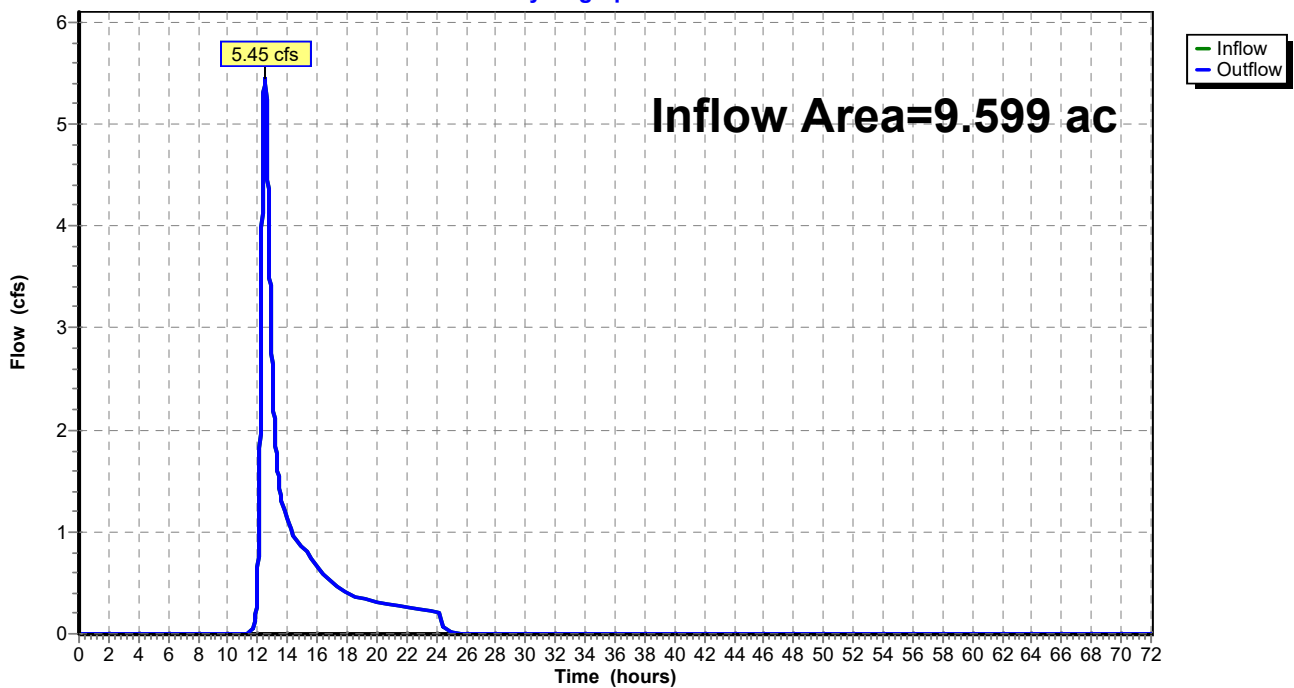
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 9.599 ac, 3.95% Impervious, Inflow Depth = 1.01" for 25-Year event  
Inflow = 5.45 cfs @ 12.48 hrs, Volume= 0.809 af  
Outflow = 5.45 cfs @ 12.48 hrs, Volume= 0.809 af, Atten= 0%, Lag= 0.0 min

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

### Reach OP-1: Observation Point 1

Hydrograph



**12542EX00**

Type III 24-hr 50-Year Rainfall=6.77"

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## Summary for Subcatchment EX 1S: EX 1S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 8.32 cfs @ 12.47 hrs, Volume= 1.122 af, Depth= 2.07"  
 Routed to Reach OP-1 : Observation Point 1

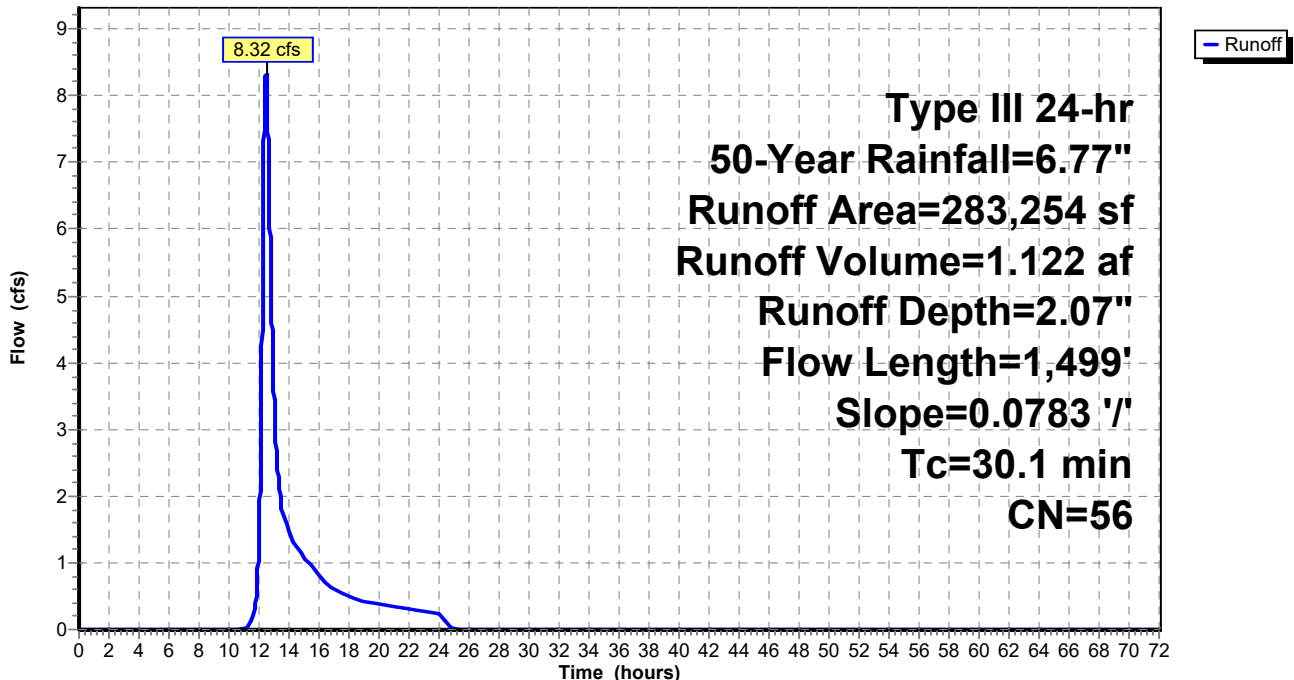
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-Year Rainfall=6.77"

Area (sf)	CN	Description
102,306	70	Woods, Good HSG C
113,027	30	Woods, Good HSG A
2,587	77	Woods, Good HSG D
7,988	98	Roofs HSG C
6,831	98	Paved parking HSG C
372	98	Paved parking HSG A
3,061	39	>75% Grass cover, Good HSG A
47,082	74	>75% Grass cover, Good HSG C
<hr/>		
283,254	56	Weighted Average
268,063		94.64% Pervious Area
15,191		5.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.1	1,499	0.0783	0.83		Lag/CN Method,

## Subcatchment EX 1S: EX 1S

Hydrograph



12542EX00

Type III 24-hr 50-Year Rainfall=6.77"

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Summary for Subcatchment EX 2S: EX 2S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 0.02 cfs @ 14.92 hrs, Volume= 0.012 af, Depth= 0.17"  
 Routed to Reach OP-1 : Observation Point 1

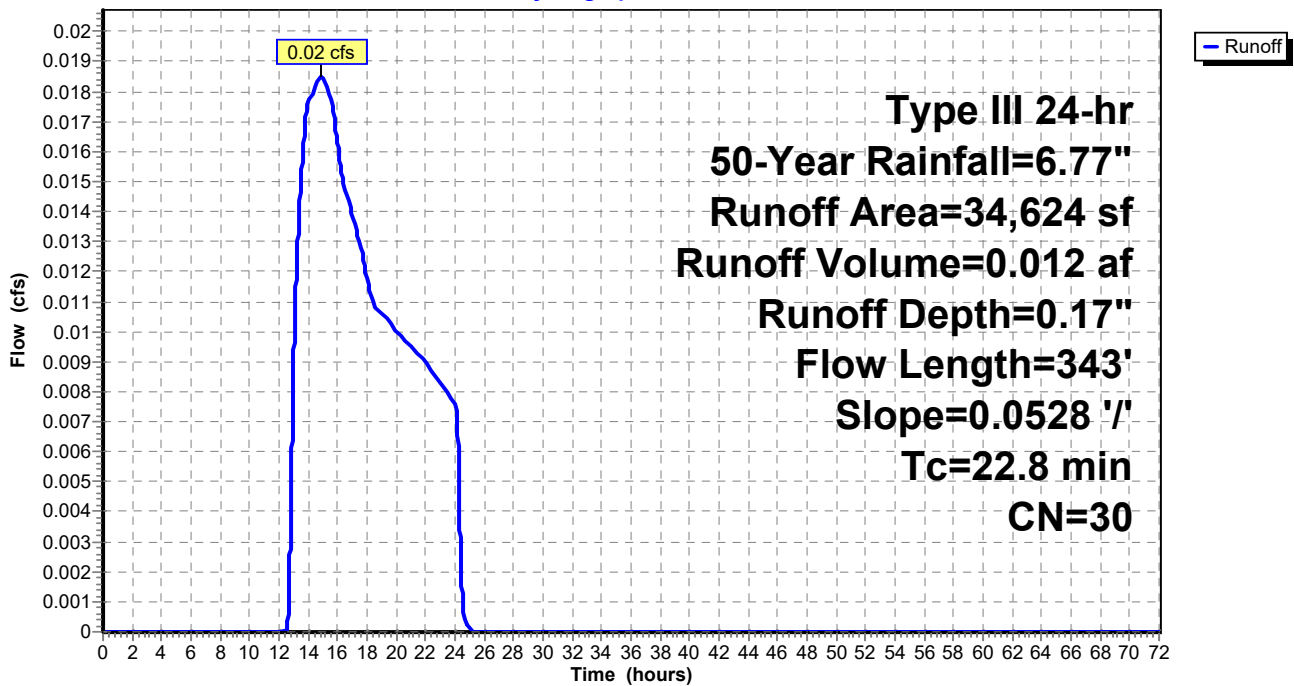
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-Year Rainfall=6.77"

Area (sf)	CN	Description
34,624	30	Woods, Good HSG A
34,624		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	343	0.0528	0.25		Lag/CN Method,

Subcatchment EX 2S: EX 2S

Hydrograph



**12542EX00**

Type III 24-hr 50-Year Rainfall=6.77"

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## Summary for Subcatchment EX 3S: EX 3S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 0.02 cfs @ 13.94 hrs, Volume= 0.011 af, Depth= 0.22"  
 Routed to Reach OP-1 : Observation Point 1

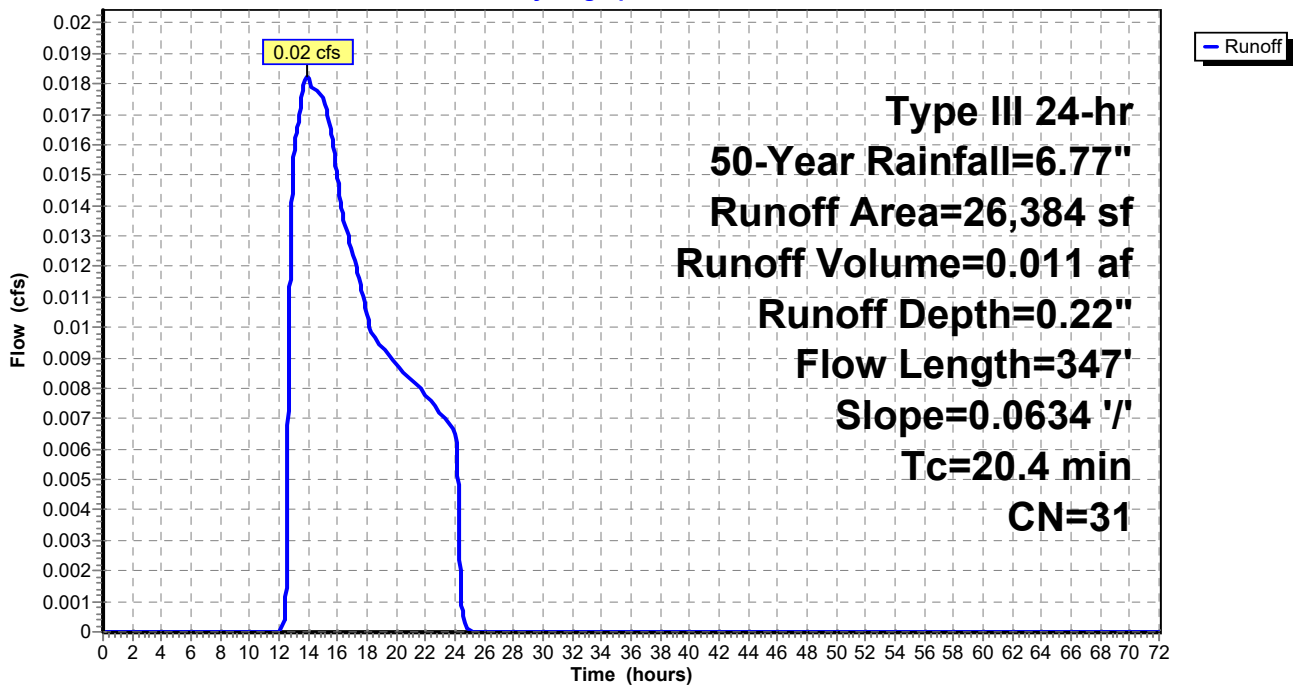
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-Year Rainfall=6.77"

Area (sf)	CN	Description
22,371	30	Woods, Good HSG A
4,013	39	>75% Grass cover, Good HSG A
26,384	31	Weighted Average
26,384		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.4	347	0.0634	0.28		Lag/CN Method,

### Subcatchment EX 3S: EX 3S

Hydrograph



**12542EX00**

Type III 24-hr 50-Year Rainfall=6.77"

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## Summary for Subcatchment EX 4S: EX 4S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 0.30 cfs @ 12.51 hrs, Volume= 0.065 af, Depth= 0.62"  
 Routed to Reach OP-1 : Observation Point 1

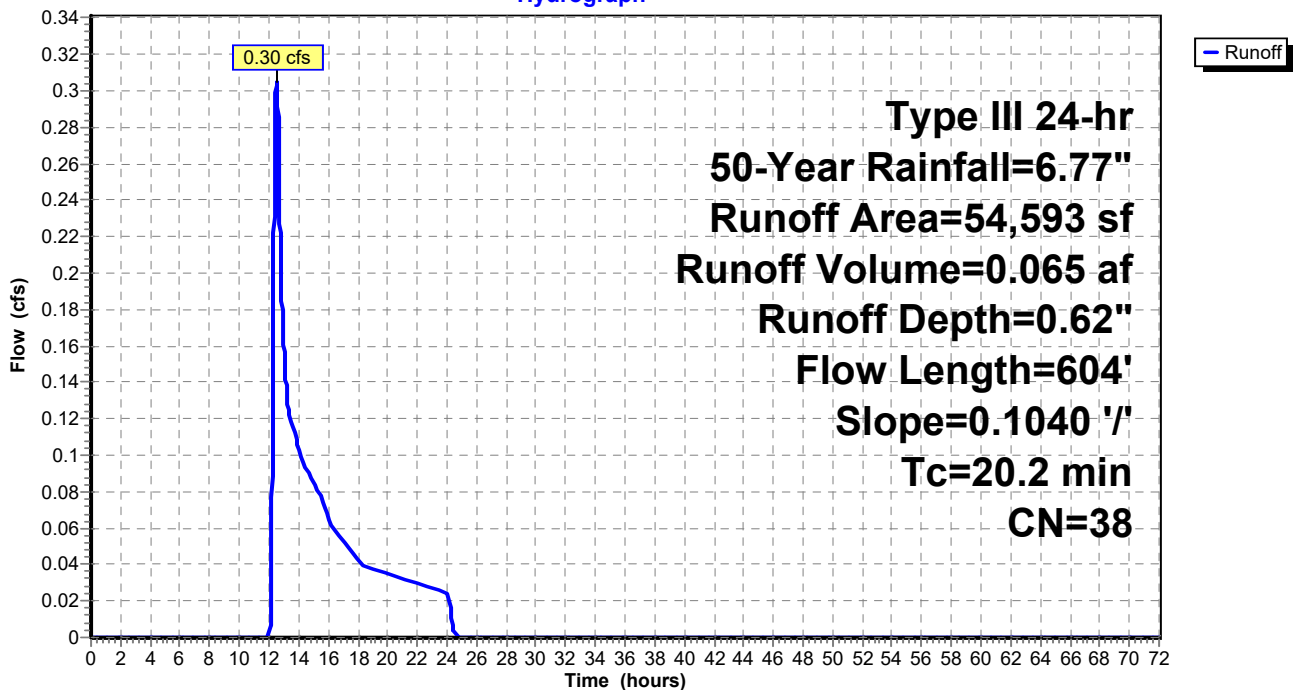
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-Year Rainfall=6.77"

Area (sf)	CN	Description
40,569	30	Woods, Good HSG A
9,867	70	Woods, Good HSG C
462	98	Paved parking HSG A
3,695	39	>75% Grass cover, Good HSG A
<hr/>		
54,593	38	Weighted Average
54,131		99.15% Pervious Area
462		0.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.2	604	0.1040	0.50		Lag/CN Method,

### Subcatchment EX 4S: EX 4S

Hydrograph



**12542EX00**

Type III 24-hr 50-Year Rainfall=6.77"

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## Summary for Subcatchment EX 5S: EX 5S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 0.10 cfs @ 12.42 hrs, Volume= 0.020 af, Depth= 0.56"  
 Routed to Reach OP-1 : Observation Point 1

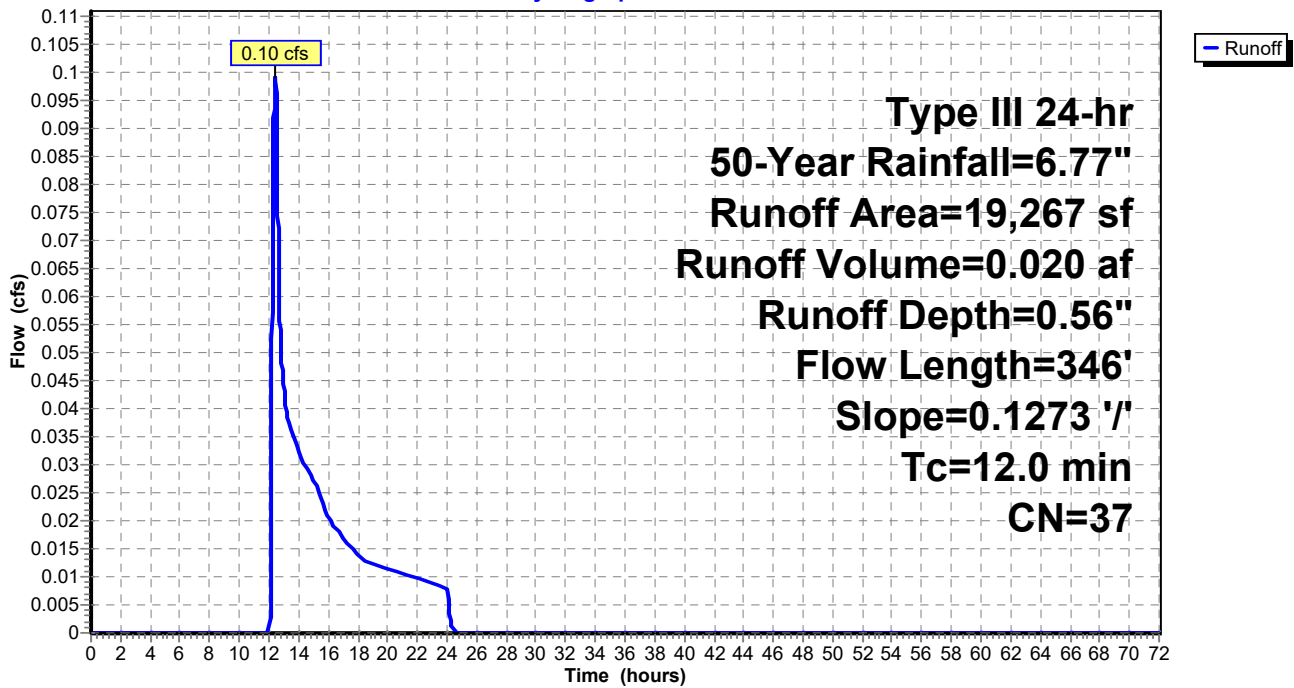
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-Year Rainfall=6.77"

Area (sf)	CN	Description
10,348	30	Woods, Good HSG A
867	98	Paved parking HSG A
8,051	39	>75% Grass cover, Good HSG A
19,267	37	Weighted Average
18,400		95.50% Pervious Area
867		4.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	346	0.1273	0.48		Lag/CN Method,

## Subcatchment EX 5S: EX 5S

Hydrograph





12542EX00

Type III 24-hr 50-Year Rainfall=6.77"

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### Summary for Reach OP-1: Observation Point 1

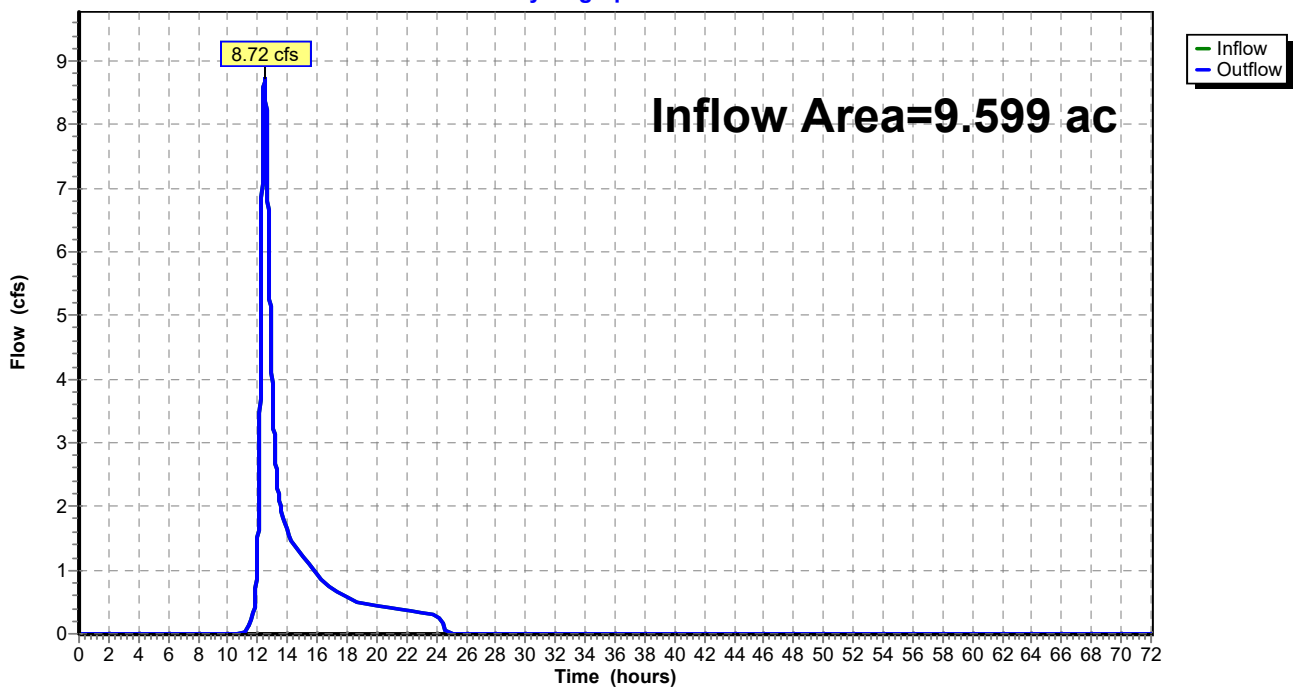
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 9.599 ac, 3.95% Impervious, Inflow Depth = 1.54" for 50-Year event  
Inflow = 8.72 cfs @ 12.47 hrs, Volume= 1.230 af  
Outflow = 8.72 cfs @ 12.47 hrs, Volume= 1.230 af, Atten= 0%, Lag= 0.0 min

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

### Reach OP-1: Observation Point 1

Hydrograph



## **Section 2.1: Developed Conditions**

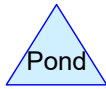
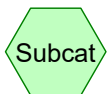
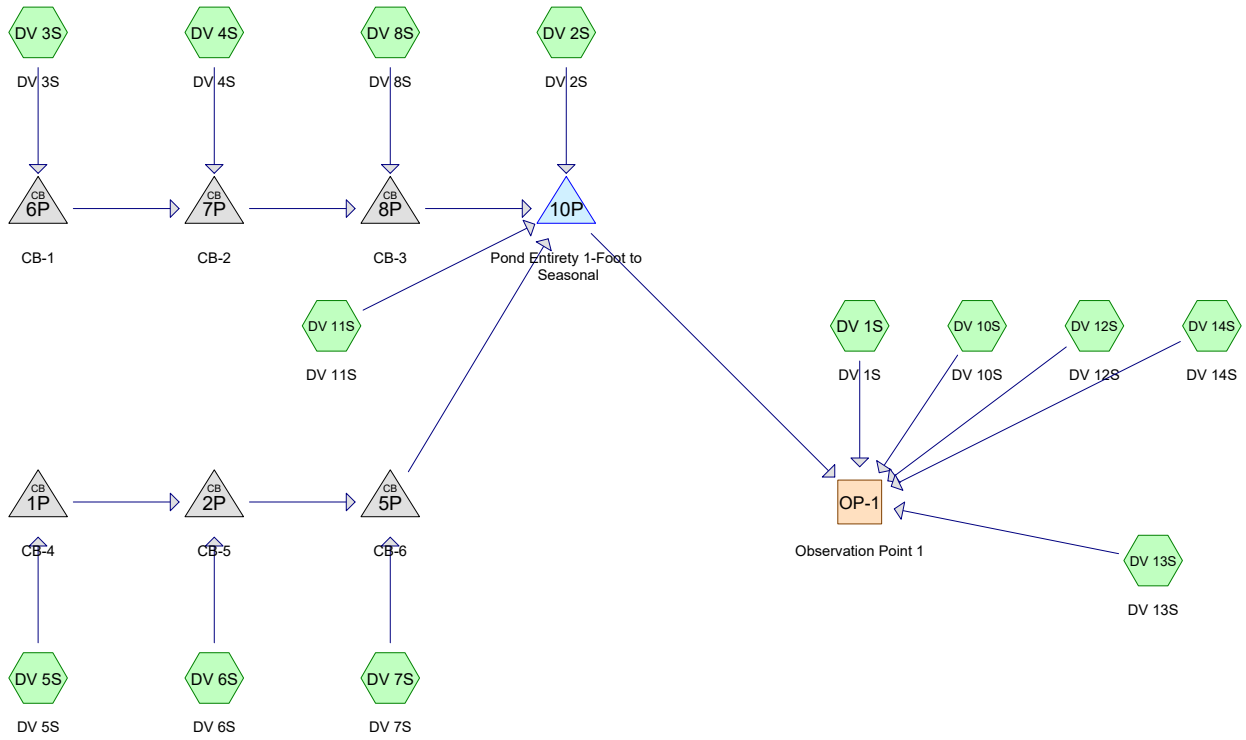
Routing Diagram

Area and Soils Listings

2-, 10-, 25- and 50-year Storm Nodes



# Attachment "D"



**Routing Diagram for 12542DV00**  
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**12542DV00**

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**Area Listing (all nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
1.525	39	>75% Grass cover, Good HSG A (DV 10S, DV 12S, DV 13S, DV 14S, DV 1S, DV 2S, DV 3S, DV 4S, DV 5S, DV 6S, DV 7S, DV 8S)
1.081	74	>75% Grass cover, Good HSG C (DV 4S)
1.562	98	Paved parking HSG A (DV 10S, DV 12S, DV 14S, DV 1S, DV 2S, DV 3S, DV 4S, DV 5S, DV 6S, DV 7S, DV 8S)
0.157	98	Paved parking HSG C (DV 4S)
0.200	98	Roofs HSG A (DV 11S, DV 5S, DV 6S)
0.183	98	Roofs HSG C (DV 4S)
2.257	30	Woods, Good HSG A (DV 10S, DV 12S, DV 13S, DV 1S, DV 2S, DV 3S, DV 4S, DV 8S)
2.575	70	Woods, Good HSG C (DV 3S, DV 4S)
0.059	77	Woods, Good HSG D (DV 4S)
<b>9.599</b>	<b>62</b>	<b>TOTAL AREA</b>



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**Soil Listing (all nodes)**

Area (acres)	Soil Group	Subcatchment Numbers
5.543	HSG A	DV 10S, DV 11S, DV 12S, DV 13S, DV 14S, DV 1S, DV 2S, DV 3S, DV 4S, DV 5S, DV 6S, DV 7S, DV 8S
0.000	HSG B	
3.996	HSG C	DV 3S, DV 4S
0.059	HSG D	DV 4S
0.000	Other	
<b>9.599</b>		<b>TOTAL AREA</b>

12542DV00

Type III 24-hr 2-Year Rainfall=2.98"

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

**Subcatchment DV 10S: DV 10S** Runoff Area=11,877 sf 5.20% Impervious Runoff Depth=0.00"  
 Flow Length=165' Slope=0.2083 '/' Tc=6.0 min CN=41 Runoff=0.00 cfs 0.000 af

**Subcatchment DV 11S: DV 11S** Runoff Area=8,052 sf 100.00% Impervious Runoff Depth=2.75"  
 Flow Length=10' Slope=0.0010 '/' Tc=6.0 min CN=98 Runoff=0.53 cfs 0.042 af

**Subcatchment DV 12S: DV 12S** Runoff Area=17,591 sf 8.33% Impervious Runoff Depth=0.00"  
 Flow Length=346' Slope=0.1651 '/' Tc=9.7 min CN=40 Runoff=0.00 cfs 0.000 af

**Subcatchment DV 13S: DV 13S** Runoff Area=8,457 sf 0.00% Impervious Runoff Depth=0.00"  
 Flow Length=129' Slope=0.2144 '/' Tc=6.0 min CN=36 Runoff=0.00 cfs 0.000 af

**Subcatchment DV 14S: DV 14S** Runoff Area=5,791 sf 30.23% Impervious Runoff Depth=0.24"  
 Slope=0.1757 '/' Tc=0.0 min CN=57 Runoff=0.01 cfs 0.003 af

**Subcatchment DV 1S: DV 1S** Runoff Area=23,922 sf 8.50% Impervious Runoff Depth=0.00"  
 Flow Length=294' Slope=0.1283 '/' Tc=10.2 min CN=38 Runoff=0.00 cfs 0.000 af

**Subcatchment DV 2S: DV 2S** Runoff Area=31,470 sf 4.53% Impervious Runoff Depth=0.00"  
 Flow Length=202' Slope=0.1098 '/' Tc=8.4 min CN=37 Runoff=0.00 cfs 0.000 af

**Subcatchment DV 3S: DV 3S** Runoff Area=58,737 sf 22.32% Impervious Runoff Depth=0.19"  
 Flow Length=295' Slope=0.1026 '/' Tc=7.3 min CN=55 Runoff=0.09 cfs 0.021 af

**Subcatchment DV 4S: DV 4S** Runoff Area=201,737 sf 10.04% Impervious Runoff Depth=0.62"  
 Flow Length=1,253' Slope=0.0891 '/' Tc=17.9 min CN=68 Runoff=1.92 cfs 0.238 af

**Subcatchment DV 5S: DV 5S** Runoff Area=15,232 sf 69.36% Impervious Runoff Depth=1.24"  
 Slope=0.4185 '/' Tc=0.0 min CN=80 Runoff=0.61 cfs 0.036 af

**Subcatchment DV 6S: DV 6S** Runoff Area=9,945 sf 93.50% Impervious Runoff Depth=2.33"  
 Slope=0.6348 '/' Tc=0.0 min CN=94 Runoff=0.73 cfs 0.044 af

**Subcatchment DV 7S: DV 7S** Runoff Area=6,259 sf 98.78% Impervious Runoff Depth=2.64"  
 Slope=0.0399 '/' Tc=0.0 min CN=97 Runoff=0.50 cfs 0.032 af

**Subcatchment DV 8S: DV 8S** Runoff Area=19,066 sf 88.25% Impervious Runoff Depth=2.05"  
 Flow Length=142' Slope=0.0346 '/' Tc=6.0 min CN=91 Runoff=1.04 cfs 0.075 af

**Reach OP-1: Observation Point 1** Inflow=0.01 cfs 0.003 af  
 Outflow=0.01 cfs 0.003 af

**Pond 1P: CB-4** Peak Elev=165.04' Inflow=0.61 cfs 0.036 af  
 15.0" Round Culvert n=0.013 L=167.0' S=0.0051 '/' Outflow=0.61 cfs 0.036 af

**Pond 2P: CB-5** Peak Elev=164.31' Inflow=1.34 cfs 0.080 af  
 15.0" Round Culvert n=0.013 L=132.0' S=0.0053 '/' Outflow=1.34 cfs 0.080 af

# Attachment "D"

**12542DV00**

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Type III 24-hr 2-Year Rainfall=2.98"

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**Pond 5P: CB-6**

Peak Elev=163.62' Inflow=1.84 cfs 0.112 af  
15.0" Round Culvert n=0.013 L=65.0' S=0.0054 '/' Outflow=1.84 cfs 0.112 af

**Pond 6P: CB-1**

Peak Elev=164.46' Inflow=0.09 cfs 0.021 af  
15.0" Round Culvert n=0.013 L=160.0' S=0.0050 '/' Outflow=0.09 cfs 0.021 af

**Pond 7P: CB-2**

Peak Elev=164.21' Inflow=2.00 cfs 0.259 af  
15.0" Round Culvert n=0.013 L=123.0' S=0.0053 '/' Outflow=2.00 cfs 0.259 af

**Pond 8P: CB-3**

Peak Elev=163.55' Inflow=2.44 cfs 0.334 af  
15.0" Round Culvert n=0.013 L=17.6' S=0.0057 '/' Outflow=2.44 cfs 0.334 af

**Pond 10P: Pond Entirety 1-Foot to Seasonal** Peak Elev=163.52' Storage=8,859 cf Inflow=3.26 cfs 0.488 af  
Discarded=0.45 cfs 0.488 af Primary=0.01 cfs 0.000 af Outflow=0.45 cfs 0.488 af

**Total Runoff Area = 9.599 ac Runoff Volume = 0.491 af Average Runoff Depth = 0.61"**  
**78.10% Pervious = 7.497 ac 21.90% Impervious = 2.102 ac**

# Attachment "D"

**12542DV00**

Type III 24-hr 10-Year Rainfall=4.48"

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

**Subcatchment DV 10S: DV 10S** Runoff Area=11,877 sf 5.20% Impervious Runoff Depth=0.16"  
Flow Length=165' Slope=0.2083 '/' Tc=6.0 min CN=41 Runoff=0.01 cfs 0.004 af

**Subcatchment DV 11S: DV 11S** Runoff Area=8,052 sf 100.00% Impervious Runoff Depth=4.24"  
Flow Length=10' Slope=0.0010 '/' Tc=6.0 min CN=98 Runoff=0.81 cfs 0.065 af

**Subcatchment DV 12S: DV 12S** Runoff Area=17,591 sf 8.33% Impervious Runoff Depth=0.13"  
Flow Length=346' Slope=0.1651 '/' Tc=9.7 min CN=40 Runoff=0.01 cfs 0.004 af

**Subcatchment DV 13S: DV 13S** Runoff Area=8,457 sf 0.00% Impervious Runoff Depth=0.05"  
Flow Length=129' Slope=0.2144 '/' Tc=6.0 min CN=36 Runoff=0.00 cfs 0.001 af

**Subcatchment DV 14S: DV 14S** Runoff Area=5,791 sf 30.23% Impervious Runoff Depth=0.84"  
Slope=0.1757 '/' Tc=0.0 min CN=57 Runoff=0.12 cfs 0.009 af

**Subcatchment DV 1S: DV 1S** Runoff Area=23,922 sf 8.50% Impervious Runoff Depth=0.08"  
Flow Length=294' Slope=0.1283 '/' Tc=10.2 min CN=38 Runoff=0.01 cfs 0.004 af

**Subcatchment DV 2S: DV 2S** Runoff Area=31,470 sf 4.53% Impervious Runoff Depth=0.06"  
Flow Length=202' Slope=0.1098 '/' Tc=8.4 min CN=37 Runoff=0.01 cfs 0.004 af

**Subcatchment DV 3S: DV 3S** Runoff Area=58,737 sf 22.32% Impervious Runoff Depth=0.73"  
Flow Length=295' Slope=0.1026 '/' Tc=7.3 min CN=55 Runoff=0.79 cfs 0.082 af

**Subcatchment DV 4S: DV 4S** Runoff Area=201,737 sf 10.04% Impervious Runoff Depth=1.52"  
Flow Length=1,253' Slope=0.0891 '/' Tc=17.9 min CN=68 Runoff=5.52 cfs 0.586 af

**Subcatchment DV 5S: DV 5S** Runoff Area=15,232 sf 69.36% Impervious Runoff Depth=2.44"  
Slope=0.4185 '/' Tc=0.0 min CN=80 Runoff=1.23 cfs 0.071 af

**Subcatchment DV 6S: DV 6S** Runoff Area=9,945 sf 93.50% Impervious Runoff Depth=3.80"  
Slope=0.6348 '/' Tc=0.0 min CN=94 Runoff=1.16 cfs 0.072 af

**Subcatchment DV 7S: DV 7S** Runoff Area=6,259 sf 98.78% Impervious Runoff Depth=4.13"  
Slope=0.0399 '/' Tc=0.0 min CN=97 Runoff=0.76 cfs 0.049 af

**Subcatchment DV 8S: DV 8S** Runoff Area=19,066 sf 88.25% Impervious Runoff Depth=3.48"  
Flow Length=142' Slope=0.0346 '/' Tc=6.0 min CN=91 Runoff=1.72 cfs 0.127 af

**Reach OP-1: Observation Point 1** Inflow=1.93 cfs 0.335 af  
Outflow=1.93 cfs 0.335 af

**Pond 1P: CB-4** Peak Elev=165.27' Inflow=1.23 cfs 0.071 af  
15.0" Round Culvert n=0.013 L=167.0' S=0.0051 '/' Outflow=1.23 cfs 0.071 af

**Pond 2P: CB-5** Peak Elev=164.60' Inflow=2.39 cfs 0.143 af  
15.0" Round Culvert n=0.013 L=132.0' S=0.0053 '/' Outflow=2.39 cfs 0.143 af

# Attachment "D"

**12542DV00**

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Type III 24-hr 10-Year Rainfall=4.48"

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**Pond 5P: CB-6**

Peak Elev=164.38' Inflow=3.15 cfs 0.193 af  
15.0" Round Culvert n=0.013 L=65.0' S=0.0054 '/ Outflow=3.15 cfs 0.193 af

**Pond 6P: CB-1**

Peak Elev=166.94' Inflow=0.79 cfs 0.082 af  
15.0" Round Culvert n=0.013 L=160.0' S=0.0050 '/ Outflow=0.79 cfs 0.082 af

**Pond 7P: CB-2**

Peak Elev=166.92' Inflow=6.11 cfs 0.669 af  
15.0" Round Culvert n=0.013 L=123.0' S=0.0053 '/ Outflow=6.11 cfs 0.669 af

**Pond 8P: CB-3**

Peak Elev=165.28' Inflow=6.91 cfs 0.796 af  
15.0" Round Culvert n=0.013 L=17.6' S=0.0057 '/ Outflow=6.91 cfs 0.796 af

**Pond 10P: Pond Entirety 1-Foot to Seasonal** Peak Elev=164.38' Storage=14,901 cf Inflow=8.30 cfs 1.058 af  
Discarded=1.67 cfs 0.745 af Primary=1.90 cfs 0.312 af Outflow=3.57 cfs 1.058 af

**Total Runoff Area = 9.599 ac Runoff Volume = 1.080 af Average Runoff Depth = 1.35"**  
**78.10% Pervious = 7.497 ac 21.90% Impervious = 2.102 ac**

# Attachment "D"

12542DV00

Type III 24-hr 25-Year Rainfall=5.67"

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

**Subcatchment DV 10S: DV 10S** Runoff Area=11,877 sf 5.20% Impervious Runoff Depth=0.45"  
Flow Length=165' Slope=0.2083 '/ Tc=6.0 min CN=41 Runoff=0.05 cfs 0.010 af

**Subcatchment DV 11S: DV 11S** Runoff Area=8,052 sf 100.00% Impervious Runoff Depth=5.43"  
Flow Length=10' Slope=0.0010 '/ Tc=6.0 min CN=98 Runoff=1.03 cfs 0.084 af

**Subcatchment DV 12S: DV 12S** Runoff Area=17,591 sf 8.33% Impervious Runoff Depth=0.40"  
Flow Length=346' Slope=0.1651 '/ Tc=9.7 min CN=40 Runoff=0.06 cfs 0.014 af

**Subcatchment DV 13S: DV 13S** Runoff Area=8,457 sf 0.00% Impervious Runoff Depth=0.22"  
Flow Length=129' Slope=0.2144 '/ Tc=6.0 min CN=36 Runoff=0.01 cfs 0.004 af

**Subcatchment DV 14S: DV 14S** Runoff Area=5,791 sf 30.23% Impervious Runoff Depth=1.48"  
Slope=0.1757 '/ Tc=0.0 min CN=57 Runoff=0.25 cfs 0.016 af

**Subcatchment DV 1S: DV 1S** Runoff Area=23,922 sf 8.50% Impervious Runoff Depth=0.31"  
Flow Length=294' Slope=0.1283 '/ Tc=10.2 min CN=38 Runoff=0.05 cfs 0.014 af

**Subcatchment DV 2S: DV 2S** Runoff Area=31,470 sf 4.53% Impervious Runoff Depth=0.27"  
Flow Length=202' Slope=0.1098 '/ Tc=8.4 min CN=37 Runoff=0.05 cfs 0.016 af

**Subcatchment DV 3S: DV 3S** Runoff Area=58,737 sf 22.32% Impervious Runoff Depth=1.33"  
Flow Length=295' Slope=0.1026 '/ Tc=7.3 min CN=55 Runoff=1.74 cfs 0.150 af

**Subcatchment DV 4S: DV 4S** Runoff Area=201,737 sf 10.04% Impervious Runoff Depth=2.37"  
Flow Length=1,253' Slope=0.0891 '/ Tc=17.9 min CN=68 Runoff=8.89 cfs 0.915 af

**Subcatchment DV 5S: DV 5S** Runoff Area=15,232 sf 69.36% Impervious Runoff Depth=3.48"  
Slope=0.4185 '/ Tc=0.0 min CN=80 Runoff=1.74 cfs 0.102 af

**Subcatchment DV 6S: DV 6S** Runoff Area=9,945 sf 93.50% Impervious Runoff Depth=4.97"  
Slope=0.6348 '/ Tc=0.0 min CN=94 Runoff=1.50 cfs 0.095 af

**Subcatchment DV 7S: DV 7S** Runoff Area=6,259 sf 98.78% Impervious Runoff Depth=5.32"  
Slope=0.0399 '/ Tc=0.0 min CN=97 Runoff=0.97 cfs 0.064 af

**Subcatchment DV 8S: DV 8S** Runoff Area=19,066 sf 88.25% Impervious Runoff Depth=4.63"  
Flow Length=142' Slope=0.0346 '/ Tc=6.0 min CN=91 Runoff=2.26 cfs 0.169 af

**Reach OP-1: Observation Point 1** Inflow=4.73 cfs 0.723 af  
Outflow=4.73 cfs 0.723 af

**Pond 1P: CB-4** Peak Elev=165.45' Inflow=1.74 cfs 0.102 af  
15.0" Round Culvert n=0.013 L=167.0' S=0.0051 '/ Outflow=1.74 cfs 0.102 af

**Pond 2P: CB-5** Peak Elev=165.18' Inflow=3.24 cfs 0.196 af  
15.0" Round Culvert n=0.013 L=132.0' S=0.0053 '/ Outflow=3.24 cfs 0.196 af



# Attachment "D"

**12542DV00**

*Type III 24-hr 25-Year Rainfall=5.67"*

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**Pond 5P: CB-6**

Peak Elev=165.18' Inflow=4.21 cfs 0.260 af  
15.0" Round Culvert n=0.013 L=65.0' S=0.0054 '/' Outflow=4.21 cfs 0.260 af

**Pond 6P: CB-1**

Peak Elev=172.76' Inflow=1.74 cfs 0.150 af  
15.0" Round Culvert n=0.013 L=160.0' S=0.0050 '/' Outflow=1.74 cfs 0.150 af

**Pond 7P: CB-2**

Peak Elev=172.69' Inflow=10.07 cfs 1.064 af  
15.0" Round Culvert n=0.013 L=123.0' S=0.0053 '/' Outflow=10.07 cfs 1.064 af

**Pond 8P: CB-3**

Peak Elev=168.15' Inflow=11.17 cfs 1.233 af  
15.0" Round Culvert n=0.013 L=17.6' S=0.0057 '/' Outflow=11.17 cfs 1.233 af

**Pond 10P: Pond Entirety 1-Foot to**

Peak Elev=165.17' Storage=21,433 cf Inflow=13.01 cfs 1.593 af  
Discarded=1.83 cfs 0.928 af Primary=4.57 cfs 0.665 af Outflow=6.39 cfs 1.593 af

**Total Runoff Area = 9.599 ac Runoff Volume = 1.651 af Average Runoff Depth = 2.06"**  
**78.10% Pervious = 7.497 ac 21.90% Impervious = 2.102 ac**

12542DV00

Type III 24-hr 50-Year Rainfall=6.77"

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

**Subcatchment DV 10S: DV 10S** Runoff Area=11,877 sf 5.20% Impervious Runoff Depth=0.83"  
 Flow Length=165' Slope=0.2083 '/ Tc=6.0 min CN=41 Runoff=0.15 cfs 0.019 af

**Subcatchment DV 11S: DV 11S** Runoff Area=8,052 sf 100.00% Impervious Runoff Depth=6.53"  
 Flow Length=10' Slope=0.0010 '/ Tc=6.0 min CN=98 Runoff=1.23 cfs 0.101 af

**Subcatchment DV 12S: DV 12S** Runoff Area=17,591 sf 8.33% Impervious Runoff Depth=0.76"  
 Flow Length=346' Slope=0.1651 '/ Tc=9.7 min CN=40 Runoff=0.16 cfs 0.025 af

**Subcatchment DV 13S: DV 13S** Runoff Area=8,457 sf 0.00% Impervious Runoff Depth=0.49"  
 Flow Length=129' Slope=0.2144 '/ Tc=6.0 min CN=36 Runoff=0.04 cfs 0.008 af

**Subcatchment DV 14S: DV 14S** Runoff Area=5,791 sf 30.23% Impervious Runoff Depth=2.16"  
 Slope=0.1757 '/ Tc=0.0 min CN=57 Runoff=0.39 cfs 0.024 af

**Subcatchment DV 1S: DV 1S** Runoff Area=23,922 sf 8.50% Impervious Runoff Depth=0.62"  
 Flow Length=294' Slope=0.1283 '/ Tc=10.2 min CN=38 Runoff=0.15 cfs 0.028 af

**Subcatchment DV 2S: DV 2S** Runoff Area=31,470 sf 4.53% Impervious Runoff Depth=0.56"  
 Flow Length=202' Slope=0.1098 '/ Tc=8.4 min CN=37 Runoff=0.17 cfs 0.033 af

**Subcatchment DV 3S: DV 3S** Runoff Area=58,737 sf 22.32% Impervious Runoff Depth=1.98"  
 Flow Length=295' Slope=0.1026 '/ Tc=7.3 min CN=55 Runoff=2.76 cfs 0.222 af

**Subcatchment DV 4S: DV 4S** Runoff Area=201,737 sf 10.04% Impervious Runoff Depth=3.23"  
 Flow Length=1,253' Slope=0.0891 '/ Tc=17.9 min CN=68 Runoff=12.26 cfs 1.245 af

**Subcatchment DV 5S: DV 5S** Runoff Area=15,232 sf 69.36% Impervious Runoff Depth=4.48"  
 Slope=0.4185 '/ Tc=0.0 min CN=80 Runoff=2.23 cfs 0.131 af

**Subcatchment DV 6S: DV 6S** Runoff Area=9,945 sf 93.50% Impervious Runoff Depth=6.06"  
 Slope=0.6348 '/ Tc=0.0 min CN=94 Runoff=1.81 cfs 0.115 af

**Subcatchment DV 7S: DV 7S** Runoff Area=6,259 sf 98.78% Impervious Runoff Depth=6.41"  
 Slope=0.0399 '/ Tc=0.0 min CN=97 Runoff=1.16 cfs 0.077 af

**Subcatchment DV 8S: DV 8S** Runoff Area=19,066 sf 88.25% Impervious Runoff Depth=5.71"  
 Flow Length=142' Slope=0.0346 '/ Tc=6.0 min CN=91 Runoff=2.75 cfs 0.208 af

**Reach OP-1: Observation Point 1**

Inflow=8.20 cfs 1.176 af  
 Outflow=8.20 cfs 1.176 af

**Pond 1P: CB-4**

Peak Elev=165.93' Inflow=2.23 cfs 0.131 af  
 15.0" Round Culvert n=0.013 L=167.0' S=0.0051 '/ Outflow=2.23 cfs 0.131 af

**Pond 2P: CB-5**

Peak Elev=165.93' Inflow=4.04 cfs 0.246 af  
 15.0" Round Culvert n=0.013 L=132.0' S=0.0053 '/ Outflow=4.04 cfs 0.246 af

# Attachment "D"

**12542DV00**

*Type III 24-hr 50-Year Rainfall=6.77"*

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**Pond 5P: CB-6**

Peak Elev=165.92' Inflow=5.19 cfs 0.323 af  
15.0" Round Culvert n=0.013 L=65.0' S=0.0054 '/' Outflow=5.19 cfs 0.323 af

**Pond 6P: CB-1**

Peak Elev=181.07' Inflow=2.76 cfs 0.222 af  
15.0" Round Culvert n=0.013 L=160.0' S=0.0050 '/' Outflow=2.76 cfs 0.222 af

**Pond 7P: CB-2**

Peak Elev=180.90' Inflow=14.06 cfs 1.467 af  
15.0" Round Culvert n=0.013 L=123.0' S=0.0053 '/' Outflow=14.06 cfs 1.467 af

**Pond 8P: CB-3**

Peak Elev=172.01' Inflow=15.41 cfs 1.675 af  
15.0" Round Culvert n=0.013 L=17.6' S=0.0057 '/' Outflow=15.41 cfs 1.675 af

**Pond 10P: Pond Entirety 1-Foot to**

Peak Elev=165.91' Storage=28,312 cf Inflow=17.83 cfs 2.132 af  
Discarded=1.98 cfs 1.061 af Primary=7.80 cfs 1.071 af Outflow=9.78 cfs 2.132 af

**Total Runoff Area = 9.599 ac Runoff Volume = 2.237 af Average Runoff Depth = 2.80"**  
**78.10% Pervious = 7.497 ac 21.90% Impervious = 2.102 ac**

## **Section 2.2: Developed Conditions**

25- and 50-year Storm Full Summary



**12542DV00**

Type III 24-hr 25-Year Rainfall=5.67"

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## Summary for Subcatchment DV 10S: DV 10S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 0.05 cfs @ 12.33 hrs, Volume= 0.010 af, Depth= 0.45"  
 Routed to Reach OP-1 : Observation Point 1

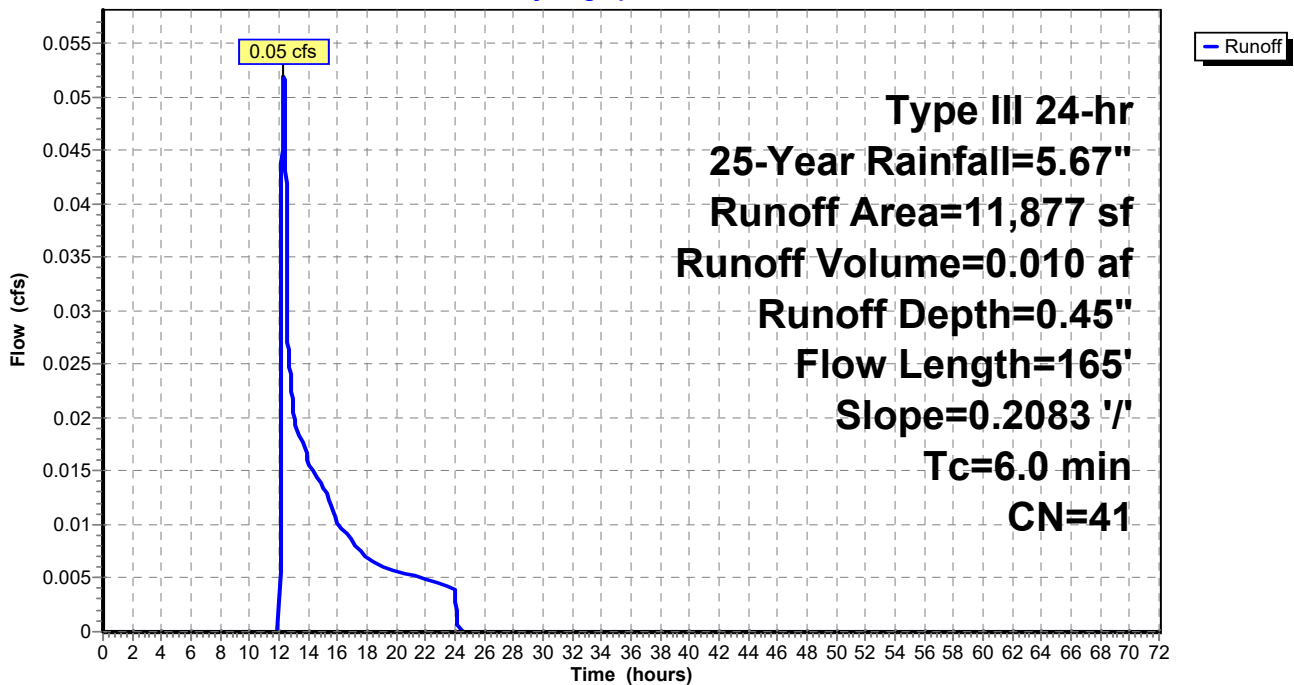
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-Year Rainfall=5.67"

Area (sf)	CN	Description
1,758	30	Woods, Good HSG A
618	98	Paved parking HSG A
9,502	39	>75% Grass cover, Good HSG A
11,877	41	Weighted Average
11,260		94.80% Pervious Area
618		5.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	165	0.2083	0.59		<b>Lag/CN Method,</b>
4.6	165	Total, Increased to minimum Tc = 6.0 min			

## Subcatchment DV 10S: DV 10S

Hydrograph



**12542DV00**

Type III 24-hr 25-Year Rainfall=5.67"

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## Summary for Subcatchment DV 11S: DV 11S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 1.03 cfs @ 12.08 hrs, Volume= 0.084 af, Depth= 5.43"  
 Routed to Pond 10P : Pond Entirety 1-Foot to Seasonal

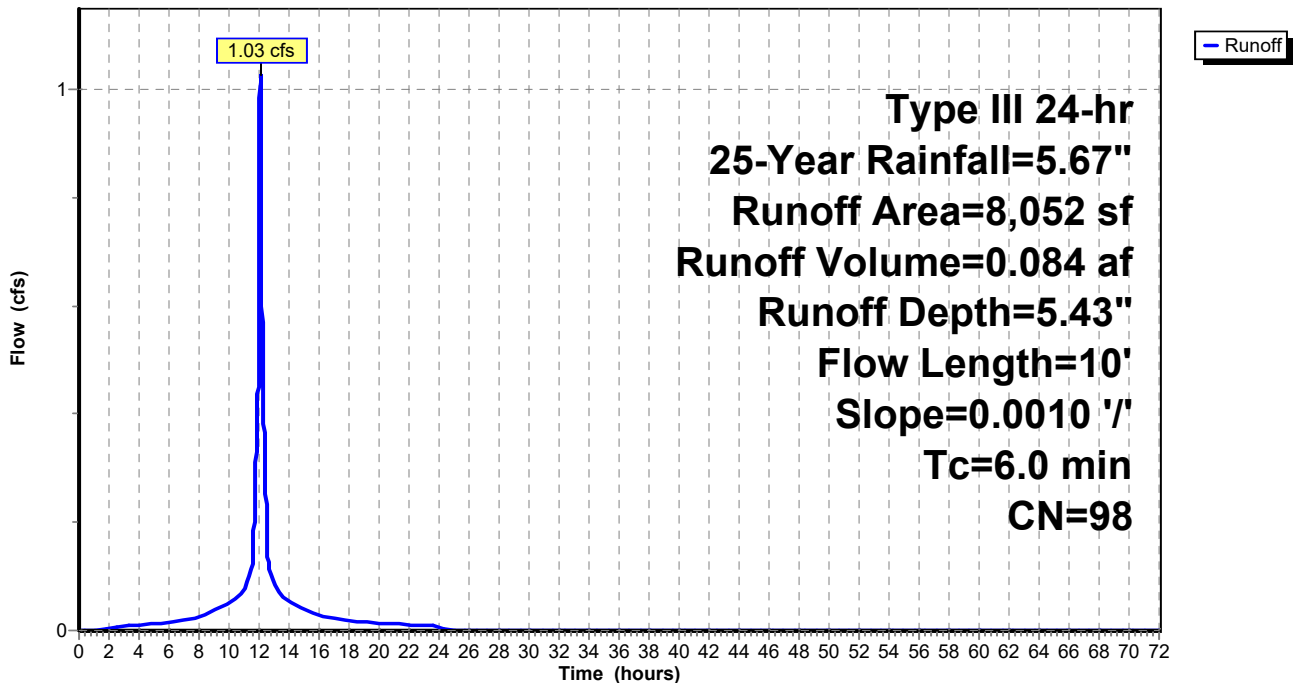
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-Year Rainfall=5.67"

Area (sf)	CN	Description
8,052	98	Roofs HSG A
8,052		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	10	0.0010	0.14		<b>Lag/CN Method,</b>
1.2	10	Total, Increased to minimum Tc = 6.0 min			

## Subcatchment DV 11S: DV 11S

Hydrograph





**12542DV00**

Type III 24-hr 25-Year Rainfall=5.67"

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## Summary for Subcatchment DV 12S: DV 12S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 0.06 cfs @ 12.41 hrs, Volume= 0.014 af, Depth= 0.40"  
 Routed to Reach OP-1 : Observation Point 1

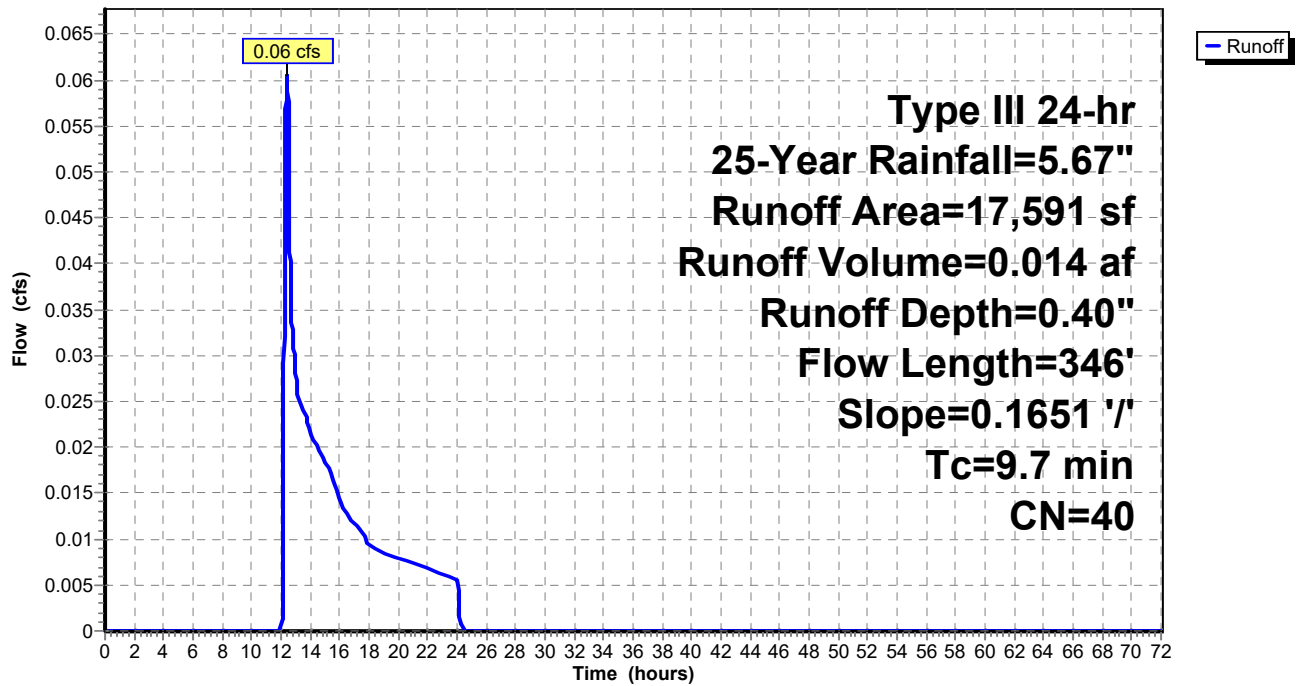
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-Year Rainfall=5.67"

Area (sf)	CN	Description
7,483	30	Woods, Good HSG A
1,465	98	Paved parking HSG A
8,643	39	>75% Grass cover, Good HSG A
17,591	40	Weighted Average
16,126		91.67% Pervious Area
1,465		8.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	346	0.1651	0.60		Lag/CN Method,

## Subcatchment DV 12S: DV 12S

Hydrograph



**12542DV00**

Type III 24-hr 25-Year Rainfall=5.67"

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## Summary for Subcatchment DV 13S: DV 13S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 0.01 cfs @ 12.48 hrs, Volume= 0.004 af, Depth= 0.22"  
 Routed to Reach OP-1 : Observation Point 1

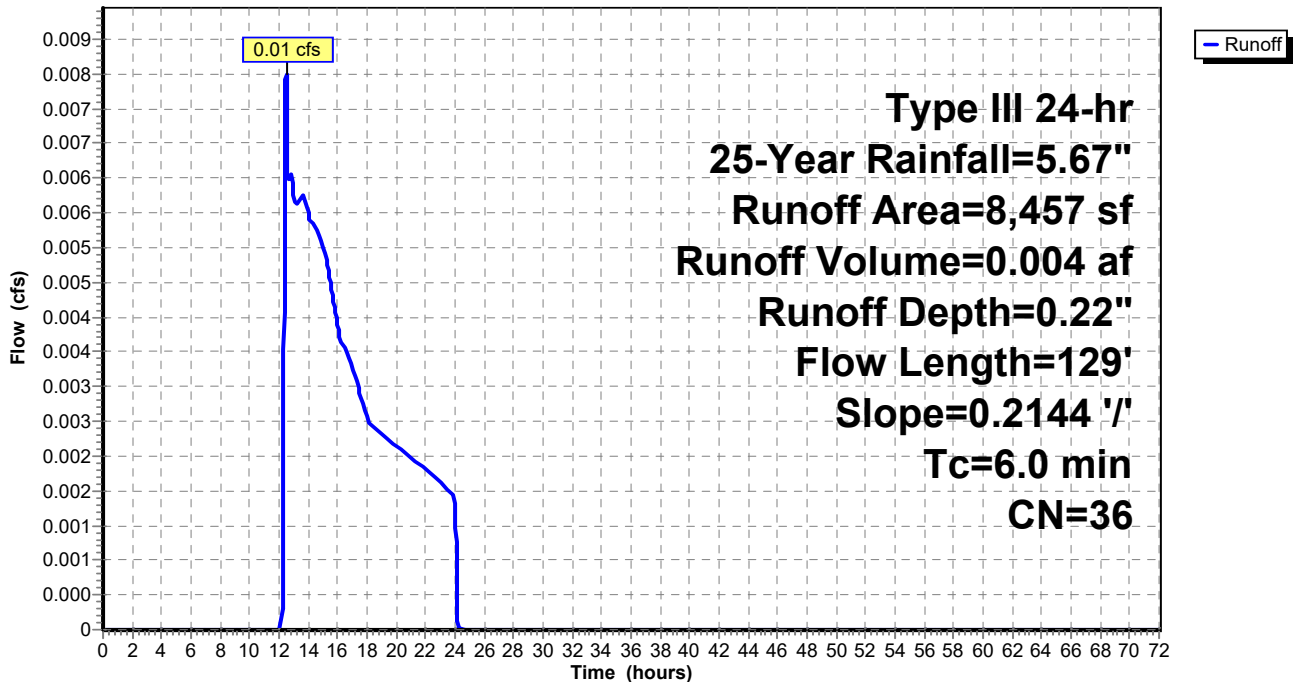
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-Year Rainfall=5.67"

Area (sf)	CN	Description
2,811	30	Woods, Good HSG A
5,645	39	>75% Grass cover, Good HSG A
8,457	36	Weighted Average
8,457		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	129	0.2144	0.50		<b>Lag/CN Method,</b>
4.3	129	Total, Increased to minimum Tc = 6.0 min			

## Subcatchment DV 13S: DV 13S

Hydrograph



12542DV00

Type III 24-hr 25-Year Rainfall=5.67"

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Summary for Subcatchment DV 14S: DV 14S

CarlsonPlanXYPos[0.0000|0.0000|

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.25 cfs @ 12.00 hrs, Volume= 0.016 af, Depth= 1.48"  
 Routed to Reach OP-1 : Observation Point 1

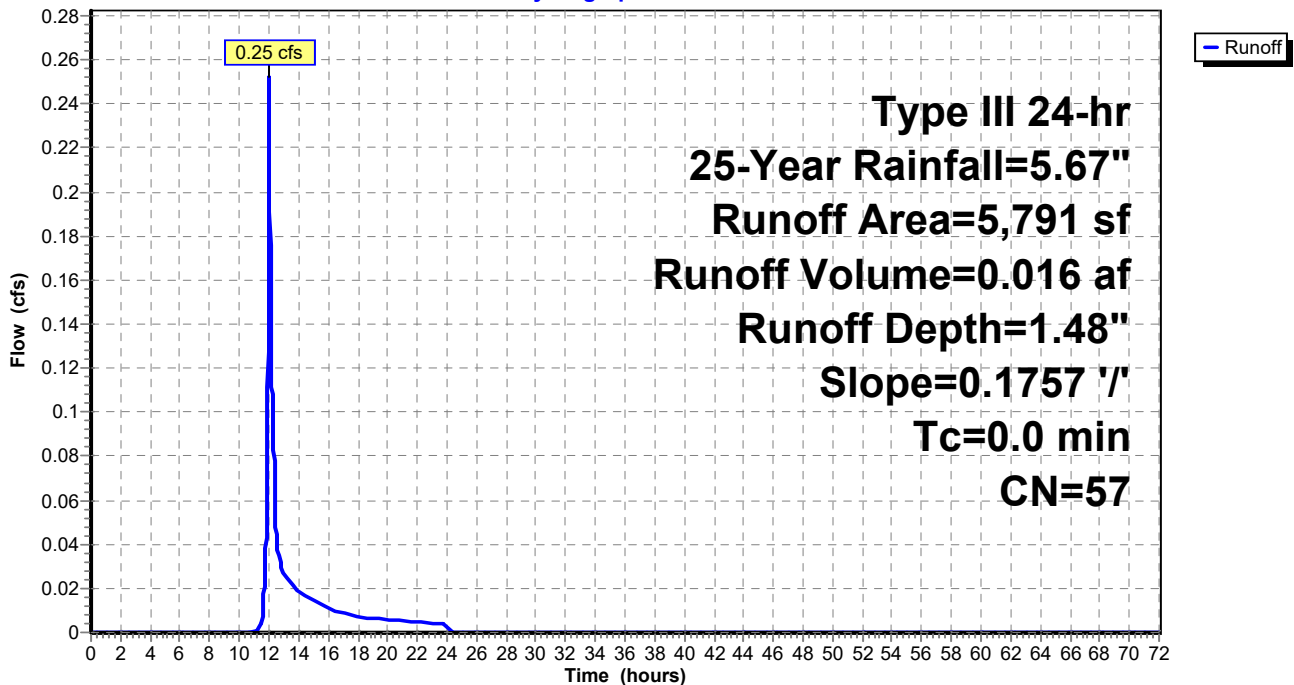
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-Year Rainfall=5.67"

Area (sf)	CN	Description
1,750	98	Paved parking HSG A
4,040	39	>75% Grass cover, Good HSG A
5,791	57	Weighted Average
4,040		69.77% Pervious Area
1,750		30.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.1757			Lag/CN Method,

Subcatchment DV 14S: DV 14S

Hydrograph



**12542DV00**

Type III 24-hr 25-Year Rainfall=5.67"

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## Summary for Subcatchment DV 1S: DV 1S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 0.05 cfs @ 12.48 hrs, Volume= 0.014 af, Depth= 0.31"  
 Routed to Reach OP-1 : Observation Point 1

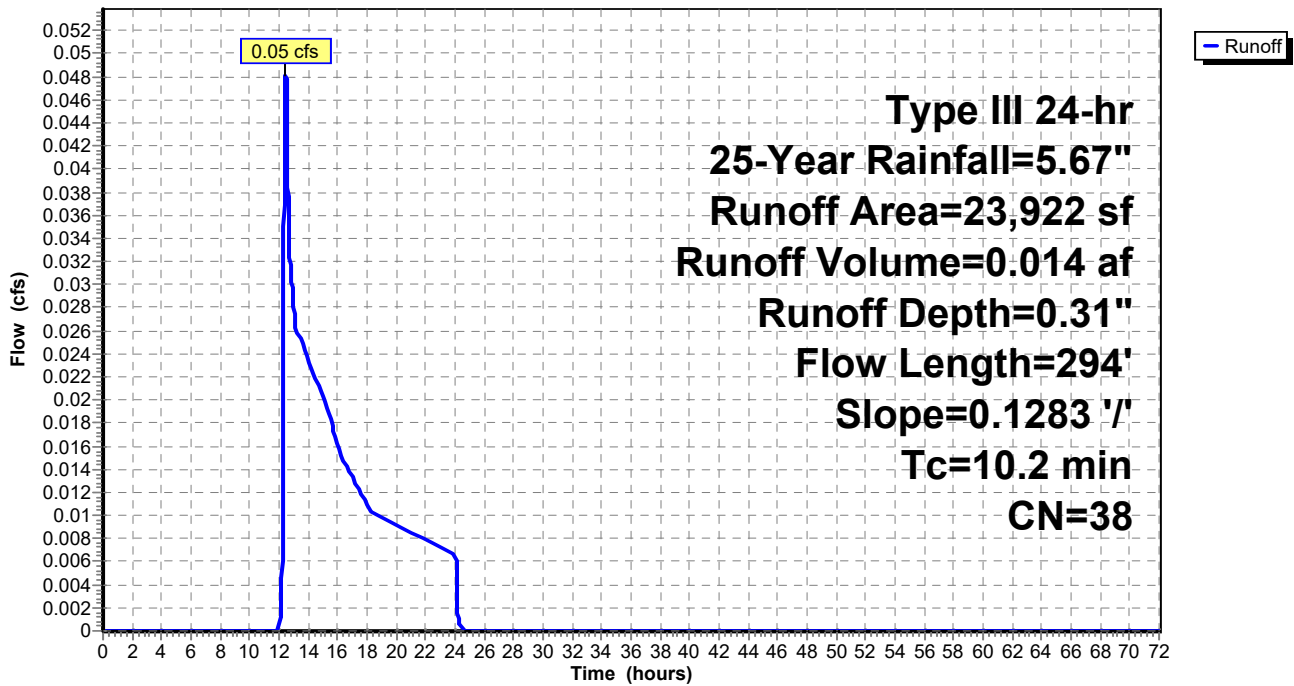
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-Year Rainfall=5.67"

Area (sf)	CN	Description
15,718	30	Woods, Good HSG A
2,034	98	Paved parking HSG A
6,171	39	>75% Grass cover, Good HSG A
23,922	38	Weighted Average
21,889		91.50% Pervious Area
2,034		8.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.2	294	0.1283	0.48		Lag/CN Method,

## Subcatchment DV 1S: DV 1S

Hydrograph



**12542DV00**

Type III 24-hr 25-Year Rainfall=5.67"

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## Summary for Subcatchment DV 2S: DV 2S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 0.05 cfs @ 12.48 hrs, Volume= 0.016 af, Depth= 0.27"  
 Routed to Pond 10P : Pond Entirety 1-Foot to Seasonal

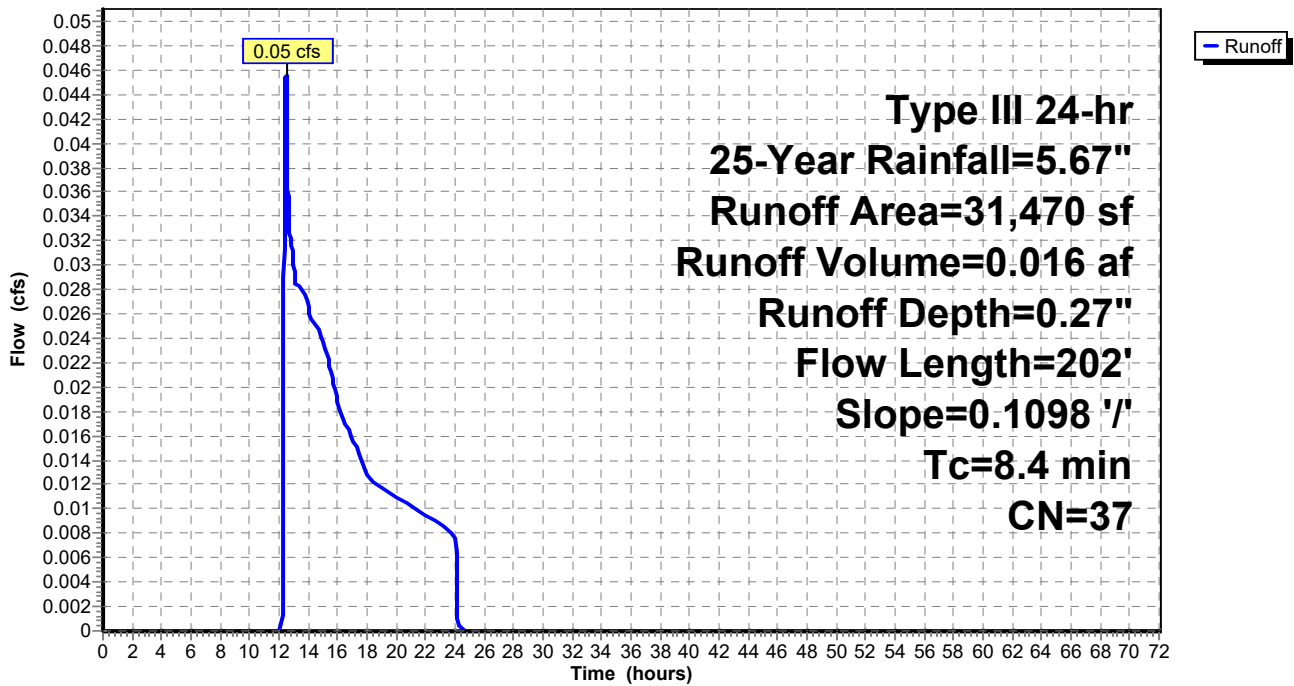
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-Year Rainfall=5.67"

Area (sf)	CN	Description
17,411	30	Woods, Good HSG A
1,426	98	Paved parking HSG A
12,633	39	>75% Grass cover, Good HSG A
31,470	37	Weighted Average
30,045		95.47% Pervious Area
1,426		4.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	202	0.1098	0.40		Lag/CN Method,

## Subcatchment DV 2S: DV 2S

Hydrograph



**12542DV00**

Type III 24-hr 25-Year Rainfall=5.67"

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## Summary for Subcatchment DV 3S: DV 3S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 1.74 cfs @ 12.12 hrs, Volume= 0.150 af, Depth= 1.33"  
 Routed to Pond 6P : CB-1

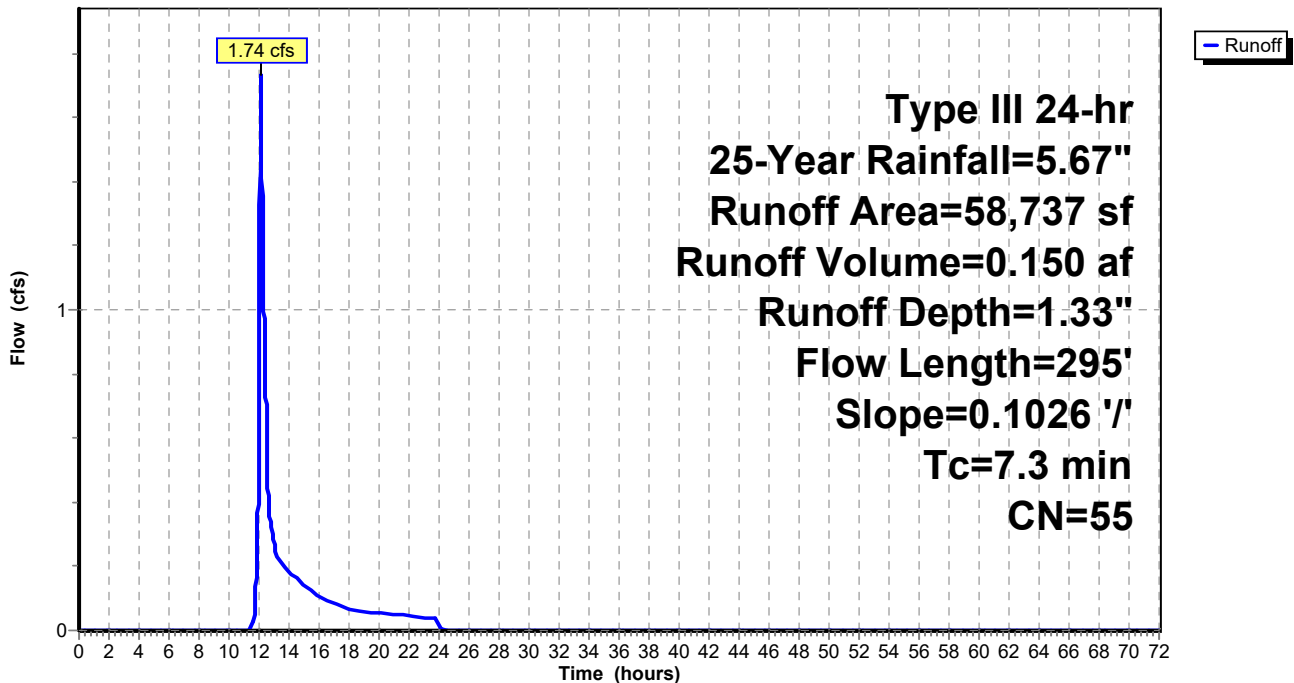
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-Year Rainfall=5.67"

Area (sf)	CN	Description
23,132	30	Woods, Good HSG A
11,819	70	Woods, Good HSG C
13,109	98	Paved parking HSG A
10,677	39	>75% Grass cover, Good HSG A
58,737	55	Weighted Average
45,628		77.68% Pervious Area
13,109		22.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	295	0.1026	0.67		Lag/CN Method,

## Subcatchment DV 3S: DV 3S

Hydrograph



**12542DV00**

Type III 24-hr 25-Year Rainfall=5.67"

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## Summary for Subcatchment DV 4S: DV 4S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 8.89 cfs @ 12.26 hrs, Volume= 0.915 af, Depth= 2.37"  
 Routed to Pond 7P : CB-2

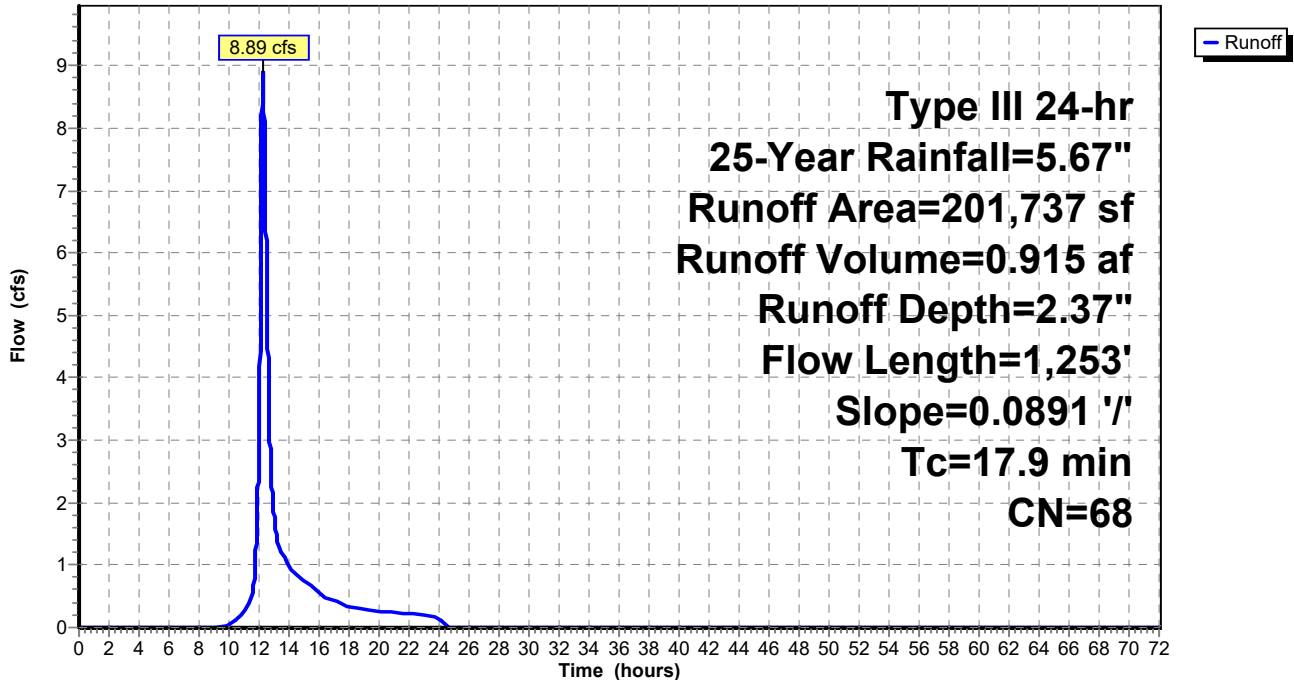
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-Year Rainfall=5.67"

Area (sf)	CN	Description
100,354	70	Woods, Good HSG C
29,998	30	Woods, Good HSG A
2,587	77	Woods, Good HSG D
7,988	98	Roofs HSG C
6,831	98	Paved parking HSG C
5,426	98	Paved parking HSG A
1,471	39	>75% Grass cover, Good HSG A
47,082	74	>75% Grass cover, Good HSG C
<hr/>		
201,737	68	Weighted Average
181,492		89.96% Pervious Area
20,245		10.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9	1,253	0.0891	1.16		Lag/CN Method,

## Subcatchment DV 4S: DV 4S

Hydrograph



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Type III 24-hr 25-Year Rainfall=5.67"

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## Summary for Subcatchment DV 5S: DV 5S

CarlsonPlanXYPos|0.0000|0.0000|

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.74 cfs @ 12.00 hrs, Volume= 0.102 af, Depth= 3.48"  
 Routed to Pond 1P : CB-4

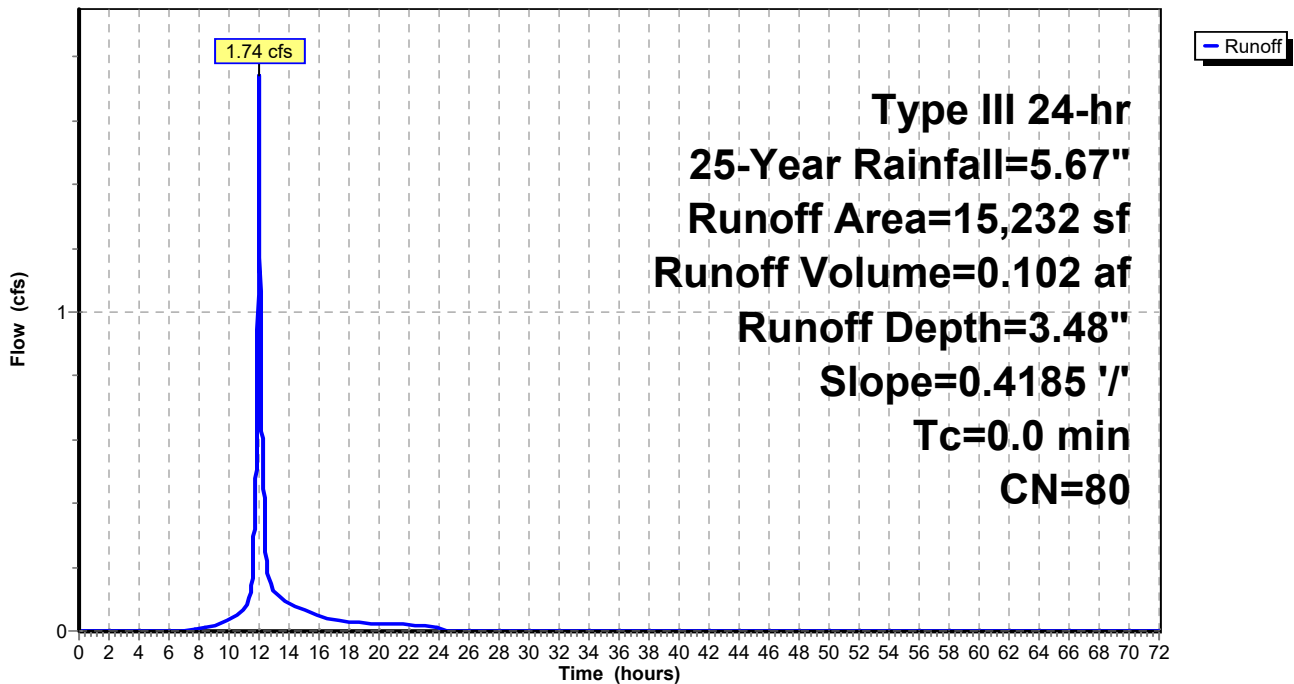
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-Year Rainfall=5.67"

Area (sf)	CN	Description
631	98	Roofs HSG A
9,934	98	Paved parking HSG A
4,667	39	>75% Grass cover, Good HSG A
15,232	80	Weighted Average
4,667		30.64% Pervious Area
10,565		69.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.4185			Lag/CN Method,

## Subcatchment DV 5S: DV 5S

Hydrograph





**12542DV00**

Type III 24-hr 25-Year Rainfall=5.67"

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## Summary for Subcatchment DV 6S: DV 6S

CarlsonPlanXYPos|0.0000|0.0000|

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.50 cfs @ 12.00 hrs, Volume= 0.095 af, Depth= 4.97"  
 Routed to Pond 2P : CB-5

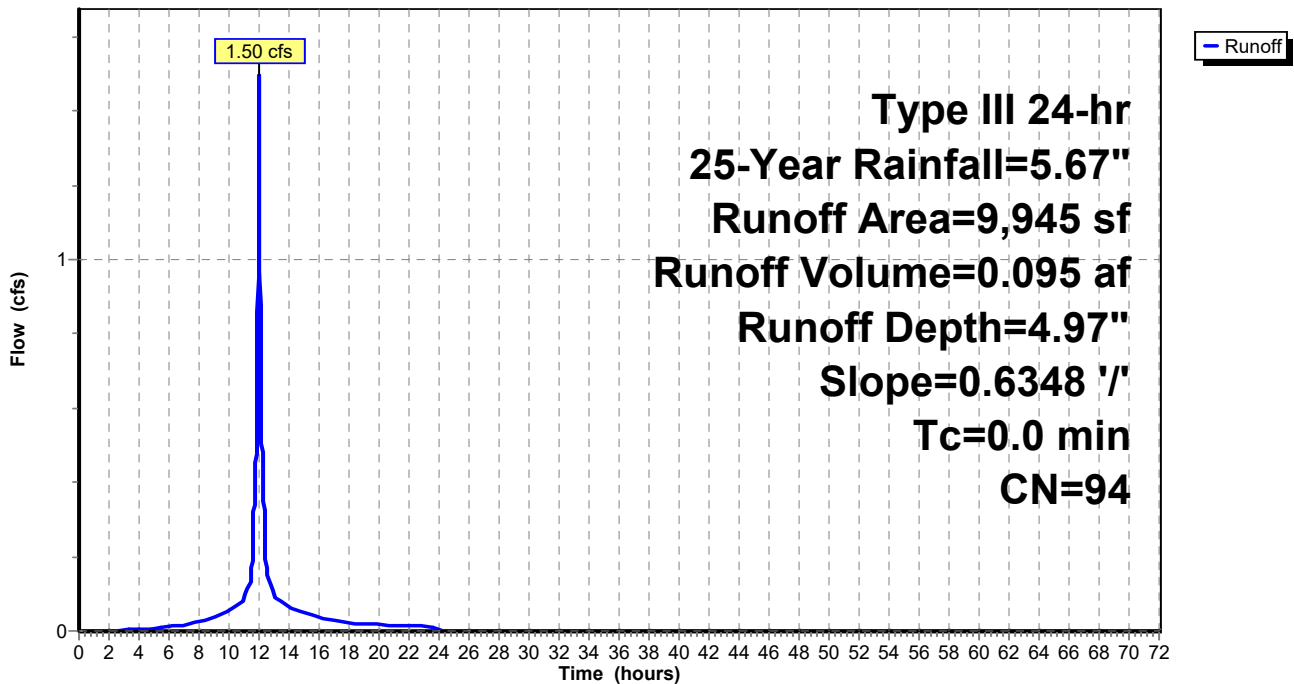
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-Year Rainfall=5.67"

Area (sf)	CN	Description
37	98	Roofs HSG A
9,261	98	Paved parking HSG A
647	39	>75% Grass cover, Good HSG A
9,945	94	Weighted Average
647		6.50% Pervious Area
9,298		93.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.6348			Lag/CN Method,

## Subcatchment DV 6S: DV 6S

Hydrograph



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Type III 24-hr 25-Year Rainfall=5.67"

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## Summary for Subcatchment DV 7S: DV 7S

CarlsonPlanXYPos[0.0000|0.0000|

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.97 cfs @ 12.00 hrs, Volume= 0.064 af, Depth= 5.32"  
 Routed to Pond 5P : CB-6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-Year Rainfall=5.67"

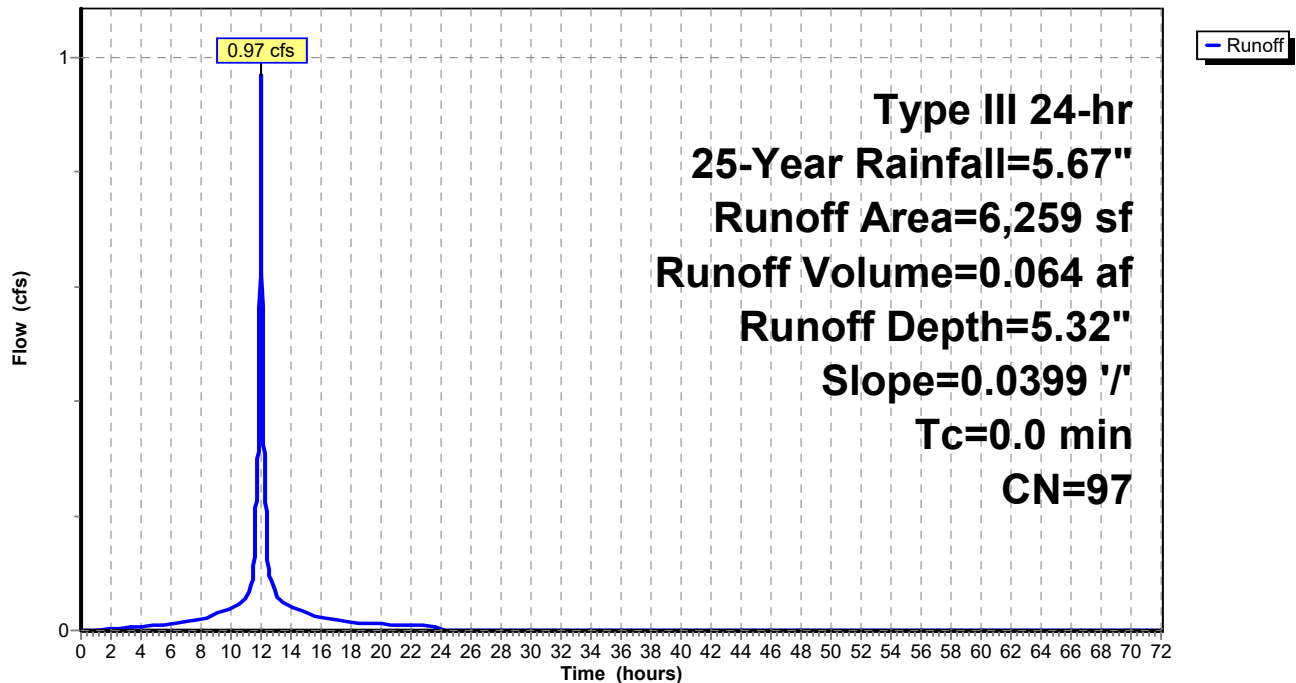
Area (sf)	CN	Description
6,183	98	Paved parking HSG A
76	39	>75% Grass cover, Good HSG A
6,259	97	Weighted Average
76		1.22% Pervious Area
6,183		98.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0399			<b>Lag/CN Method,</b>

## Subcatchment DV 7S: DV 7S

Hydrograph



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Type III 24-hr 25-Year Rainfall=5.67"

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## Summary for Subcatchment DV 8S: DV 8S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 2.26 cfs @ 12.08 hrs, Volume= 0.169 af, Depth= 4.63"  
 Routed to Pond 8P : CB-3

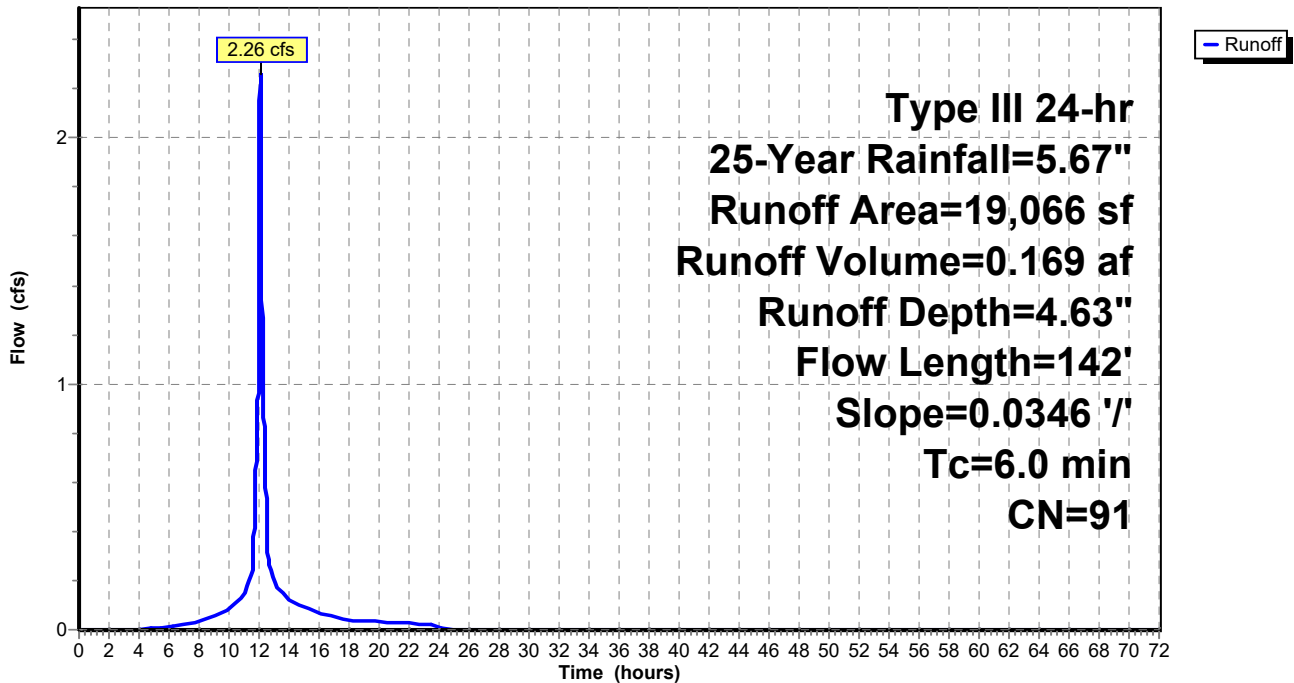
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 25-Year Rainfall=5.67"

Area (sf)	CN	Description
4	30	Woods, Good HSG A
16,826	98	Paved parking HSG A
2,236	39	>75% Grass cover, Good HSG A
19,066	91	Weighted Average
2,240		11.75% Pervious Area
16,826		88.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	142	0.0346	0.98		<b>Lag/CN Method,</b>
2.4	142	Total, Increased to minimum Tc = 6.0 min			

## Subcatchment DV 8S: DV 8S

Hydrograph



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Type III 24-hr 25-Year Rainfall=5.67"

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### Summary for Reach OP-1: Observation Point 1

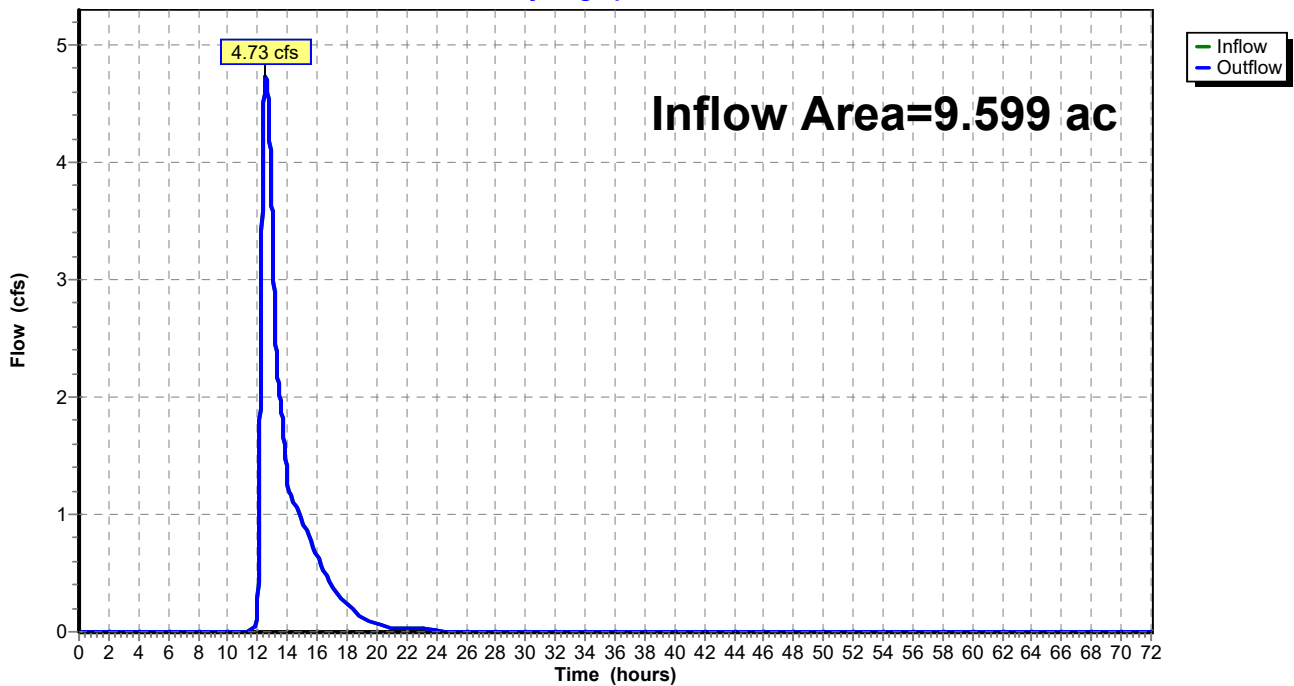
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 9.599 ac, 21.90% Impervious, Inflow Depth = 0.90" for 25-Year event  
Inflow = 4.73 cfs @ 12.55 hrs, Volume= 0.723 af  
Outflow = 4.73 cfs @ 12.55 hrs, Volume= 0.723 af, Atten= 0%, Lag= 0.0 min

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

### Reach OP-1: Observation Point 1

Hydrograph



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Type III 24-hr 25-Year Rainfall=5.67"

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## Summary for Pond 1P: CB-4

[57] Hint: Peaked at 165.45' (Flood elevation advised)

Inflow Area = 0.350 ac, 69.36% Impervious, Inflow Depth = 3.48" for 25-Year event  
 Inflow = 1.74 cfs @ 12.00 hrs, Volume= 0.102 af  
 Outflow = 1.74 cfs @ 12.00 hrs, Volume= 0.102 af, Atten= 0%, Lag= 0.0 min  
 Primary = 1.74 cfs @ 12.00 hrs, Volume= 0.102 af  
 Routed to Pond 2P : CB-5

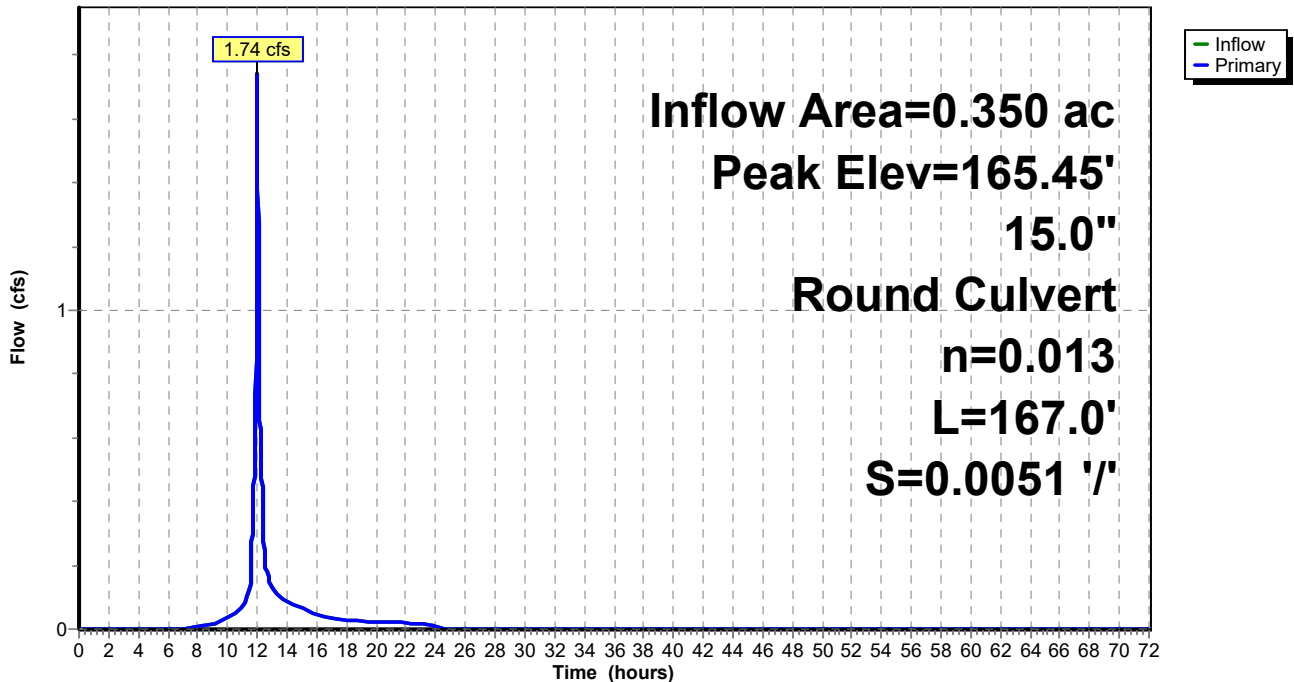
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 165.45' @ 12.01 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	164.60'	<b>15.0" Round Culvert</b> L= 167.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 164.60' / 163.75' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=1.67 cfs @ 12.00 hrs HW=165.44' TW=164.84' (Dynamic Tailwater)  
 ↳ **1=Culvert** (Outlet Controls 1.67 cfs @ 2.69 fps)

### Pond 1P: CB-4

Hydrograph



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Type III 24-hr 25-Year Rainfall=5.67"

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Summary for Pond 2P: CB-5

[57] Hint: Peaked at 165.18' (Flood elevation advised)

Inflow Area = 0.578 ac, 78.90% Impervious, Inflow Depth = 4.07" for 25-Year event  
 Inflow = 3.24 cfs @ 12.00 hrs, Volume= 0.196 af  
 Outflow = 3.24 cfs @ 12.00 hrs, Volume= 0.196 af, Atten= 0%, Lag= 0.0 min  
 Primary = 3.24 cfs @ 12.00 hrs, Volume= 0.196 af  
 Routed to Pond 5P : CB-6

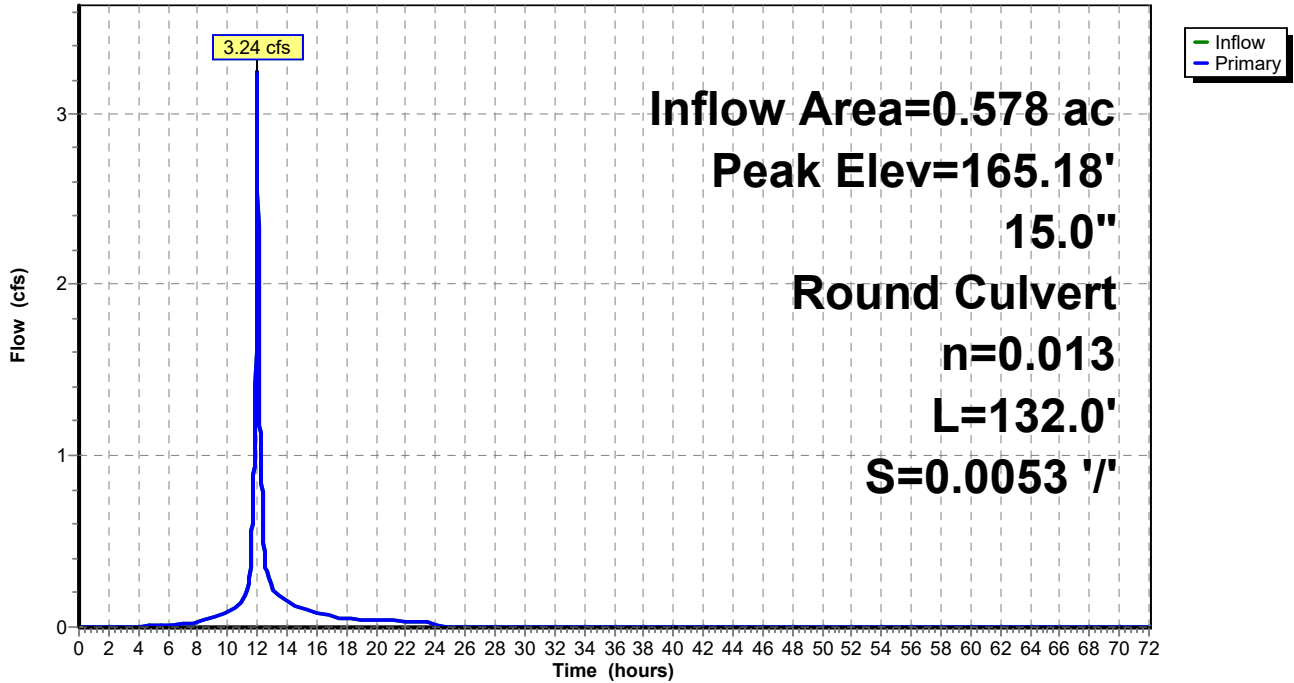
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 165.18' @ 12.58 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	163.65'	<b>15.0" Round Culvert</b> L= 132.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 163.65' / 162.95' S= 0.0053 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=3.13 cfs @ 12.00 hrs HW=164.84' TW=164.16' (Dynamic Tailwater)  
 1=Culvert (Outlet Controls 3.13 cfs @ 3.33 fps)

Pond 2P: CB-5

Hydrograph



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Type III 24-hr 25-Year Rainfall=5.67"

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## Summary for Pond 5P: CB-6

[57] Hint: Peaked at 165.18' (Flood elevation advised)

Inflow Area = 0.722 ac, 82.86% Impervious, Inflow Depth = 4.32" for 25-Year event  
 Inflow = 4.21 cfs @ 12.00 hrs, Volume= 0.260 af  
 Outflow = 4.21 cfs @ 12.00 hrs, Volume= 0.260 af, Atten= 0%, Lag= 0.0 min  
 Primary = 4.21 cfs @ 12.00 hrs, Volume= 0.260 af  
 Routed to Pond 10P : Pond Entirety 1-Foot to Seasonal

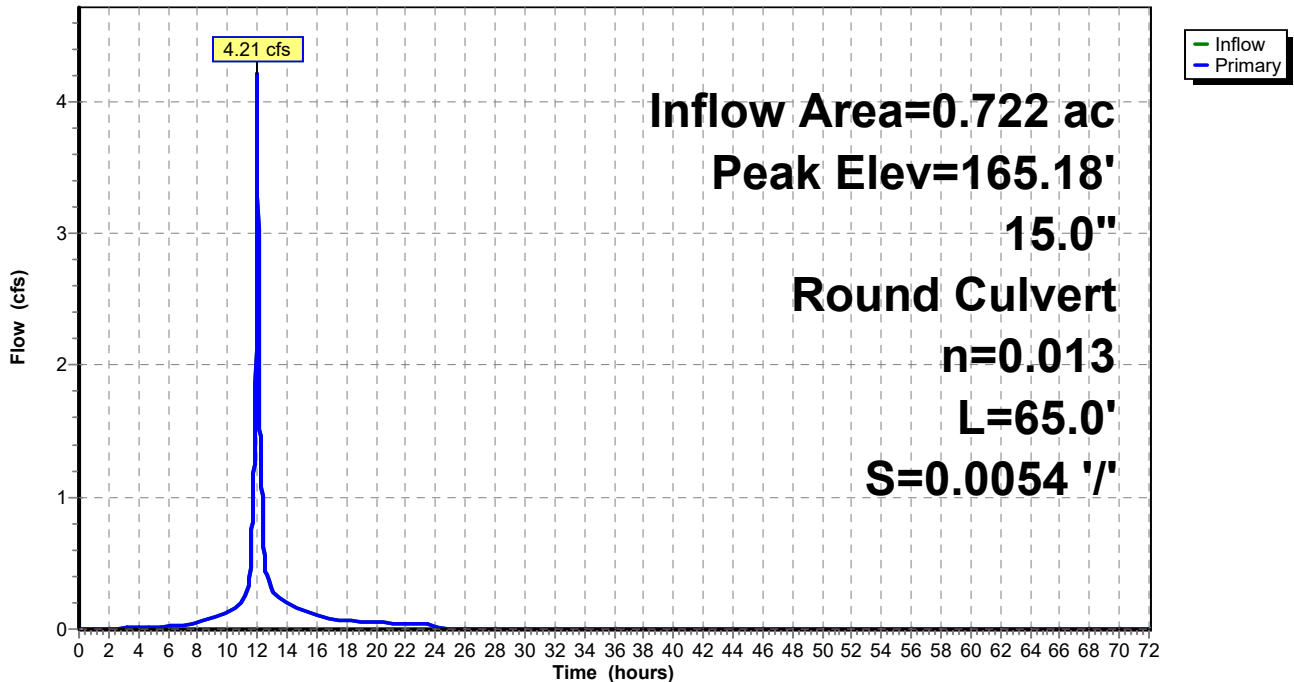
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 165.18' @ 12.57 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	162.85'	<b>15.0" Round Culvert</b> L= 65.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 162.85' / 162.50' S= 0.0054 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=4.20 cfs @ 12.00 hrs HW=164.16' TW=163.43' (Dynamic Tailwater)  
 ↳ **1=Culvert** (Barrel Controls 4.20 cfs @ 4.05 fps)

### Pond 5P: CB-6

Hydrograph



**12542DV00**

Type III 24-hr 25-Year Rainfall=5.67"

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## Summary for Pond 6P: CB-1

[57] Hint: Peaked at 172.76' (Flood elevation advised)

Inflow Area = 1.348 ac, 22.32% Impervious, Inflow Depth = 1.33" for 25-Year event  
 Inflow = 1.74 cfs @ 12.12 hrs, Volume= 0.150 af  
 Outflow = 1.74 cfs @ 12.12 hrs, Volume= 0.150 af, Atten= 0%, Lag= 0.0 min  
 Primary = 1.74 cfs @ 12.12 hrs, Volume= 0.150 af  
 Routed to Pond 7P : CB-2

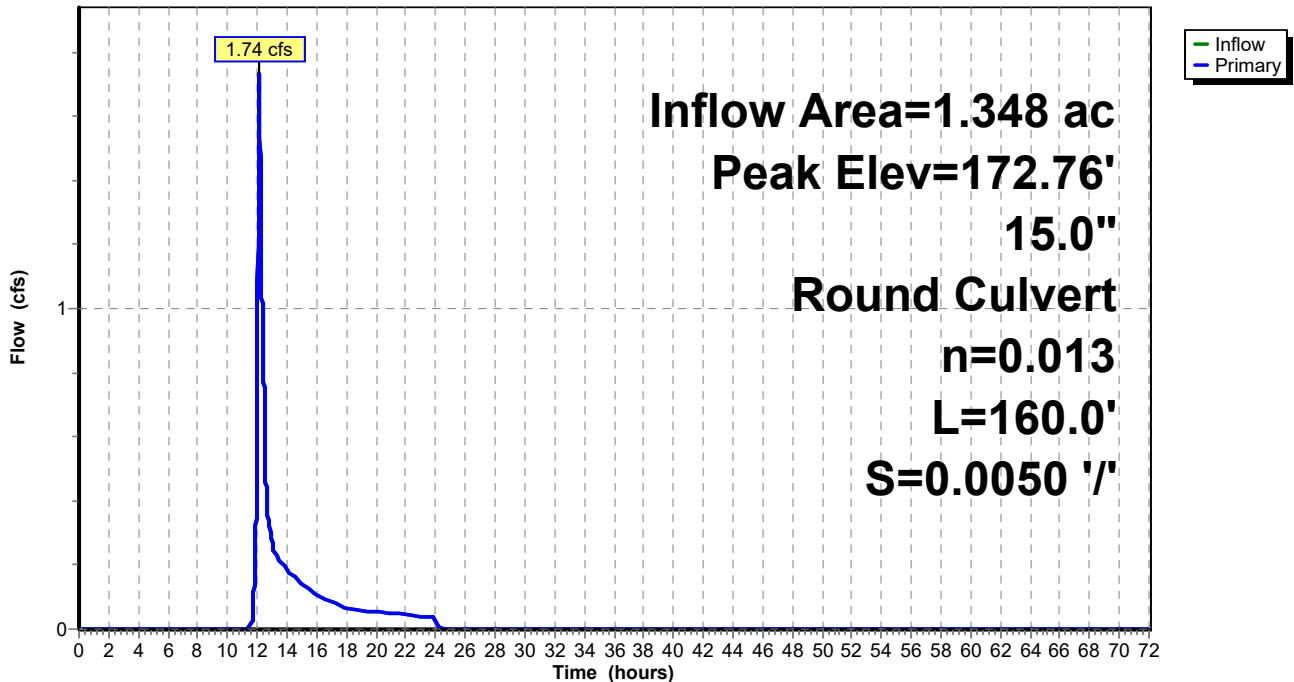
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 172.76' @ 12.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	164.25'	<b>15.0" Round Culvert</b> L= 160.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 164.25' / 163.45' S= 0.0050 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=0.00 cfs @ 12.12 hrs HW=169.04' TW=169.34' (Dynamic Tailwater)  
 ↖ 1=Culvert ( Controls 0.00 cfs)

### Pond 6P: CB-1

Hydrograph





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Type III 24-hr 25-Year Rainfall=5.67"

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## Summary for Pond 7P: CB-2

[57] Hint: Peaked at 172.69' (Flood elevation advised)

[80] Warning: Exceeded Pond 6P by 0.34' @ 12.08 hrs (2.52 cfs 0.036 af)

Inflow Area = 5.980 ac, 12.81% Impervious, Inflow Depth = 2.14" for 25-Year event  
 Inflow = 10.07 cfs @ 12.24 hrs, Volume= 1.064 af  
 Outflow = 10.07 cfs @ 12.24 hrs, Volume= 1.064 af, Atten= 0%, Lag= 0.0 min  
 Primary = 10.07 cfs @ 12.24 hrs, Volume= 1.064 af  
 Routed to Pond 8P : CB-3

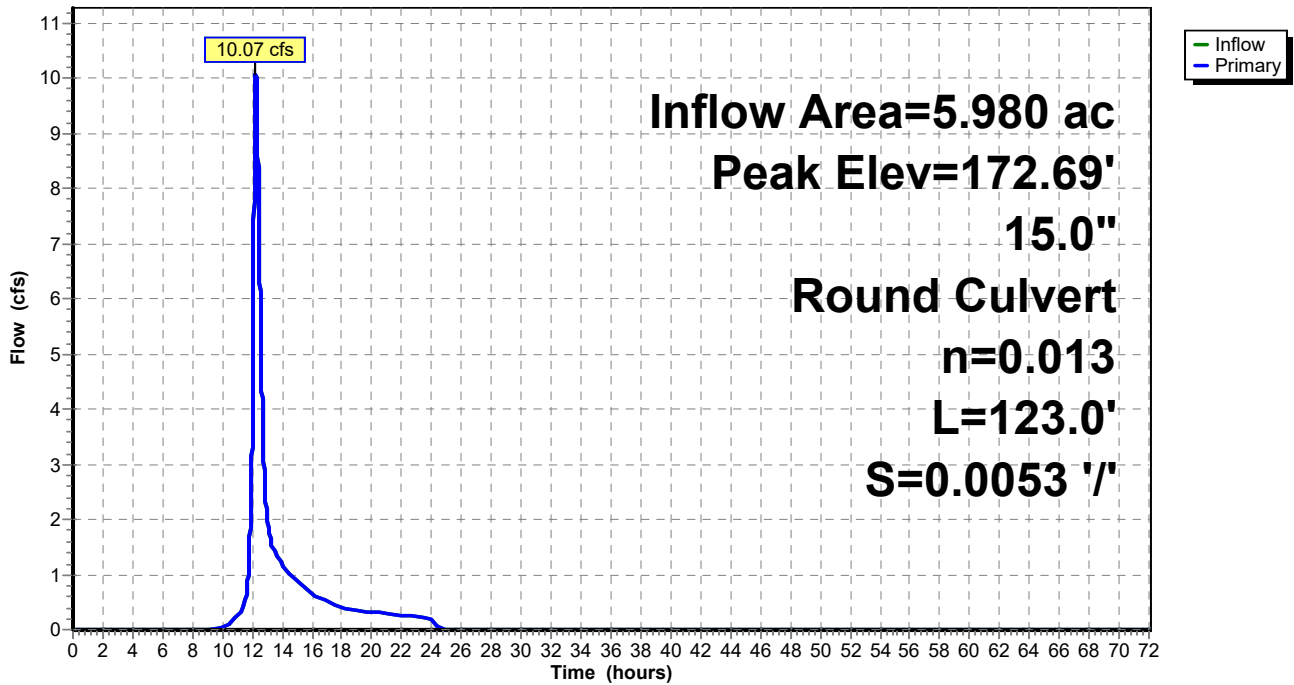
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 172.69' @ 12.25 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	163.35'	<b>15.0" Round Culvert</b> L= 123.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 163.35' / 162.70' S= 0.0053 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=10.04 cfs @ 12.24 hrs HW=172.67' TW=168.13' (Dynamic Tailwater)  
 ↑1=Culvert (Outlet Controls 10.04 cfs @ 8.18 fps)

### Pond 7P: CB-2

Hydrograph



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## Summary for Pond 8P: CB-3

[57] Hint: Peaked at 168.15' (Flood elevation advised)

Inflow Area = 6.417 ac, 17.95% Impervious, Inflow Depth = 2.31" for 25-Year event  
 Inflow = 11.17 cfs @ 12.23 hrs, Volume= 1.233 af  
 Outflow = 11.17 cfs @ 12.23 hrs, Volume= 1.233 af, Atten= 0%, Lag= 0.0 min  
 Primary = 11.17 cfs @ 12.23 hrs, Volume= 1.233 af  
 Routed to Pond 10P : Pond Entirety 1-Foot to Seasonal

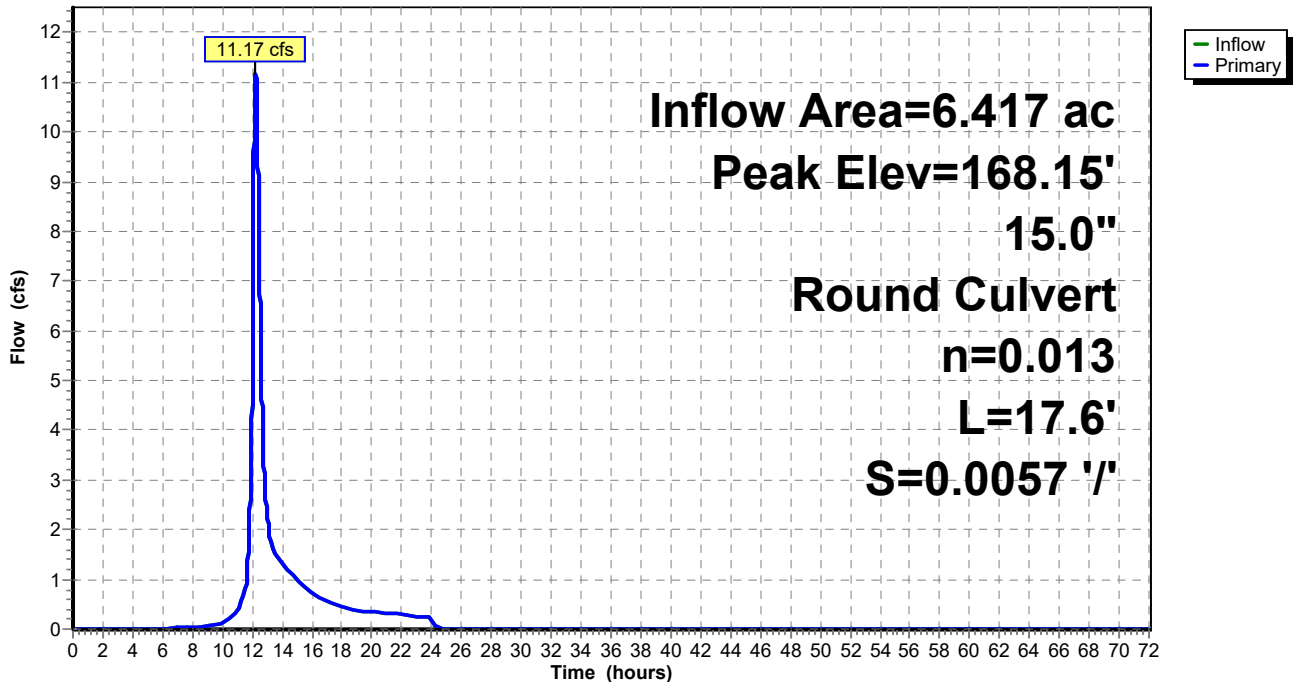
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 168.15' @ 12.26 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	162.60'	<b>15.0" Round Culvert</b> L= 17.6' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 162.60' / 162.50' S= 0.0057 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=11.10 cfs @ 12.23 hrs HW=168.10' TW=164.58' (Dynamic Tailwater)  
 ←1=Culvert (Inlet Controls 11.10 cfs @ 9.04 fps)

### Pond 8P: CB-3

Hydrograph



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**Summary for Pond 10P: Pond Entirety 1-Foot to Seasonal**

[80] Warning: Exceeded Pond 5P by 0.48' @ 24.02 hrs (0.78 cfs 0.016 af)

[80] Warning: Exceeded Pond 8P by 0.52' @ 24.92 hrs (0.87 cfs 0.027 af)

Inflow Area = 8.046 ac, 24.45% Impervious, Inflow Depth = 2.38" for 25-Year event  
 Inflow = 13.01 cfs @ 12.21 hrs, Volume= 1.593 af  
 Outflow = 6.39 cfs @ 12.56 hrs, Volume= 1.593 af, Atten= 51%, Lag= 21.3 min  
 Discarded = 1.83 cfs @ 12.56 hrs, Volume= 0.928 af  
 Primary = 4.57 cfs @ 12.56 hrs, Volume= 0.665 af  
 Routed to Reach OP-1 : Observation Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 165.17' @ 12.56 hrs Surf.Area= 12,131 sf Storage= 21,433 cf

Plug-Flow detention time= 136.0 min calculated for 1.593 af (100% of inflow)  
 Center-of-Mass det. time= 136.0 min ( 970.3 - 834.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	162.00'	977 cf	<b>Sediment Forebay (Irregular)</b> Listed below (Recalc) -Impervious
#2	162.00'	4,666 cf	<b>Sediment Forebay (Irregular)</b> Listed below (Recalc) -Impervious
#3	161.00'	6,399 cf	<b>Pond Bottom (Irregular)</b> Listed below (Recalc)
#4	164.00'	17,132 cf	<b>Pond Storage Above Forebay (Irregular)</b> Listed below (Recalc)
		29,174 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
162.00	272	67.5	0	0	272
164.00	744	102.9	977	977	781

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
162.00	1,836	176.5	0	0	1,836
164.00	2,868	221.5	4,666	4,666	3,316

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
161.00	574	228.0	0	0	574
162.00	1,923	255.4	1,183	1,183	1,655
164.00	3,360	288.9	5,217	6,399	3,205

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
164.00	7,305	412.2	0	0	7,305
166.00	9,892	449.9	17,132	17,132	10,031

**12542DV00**

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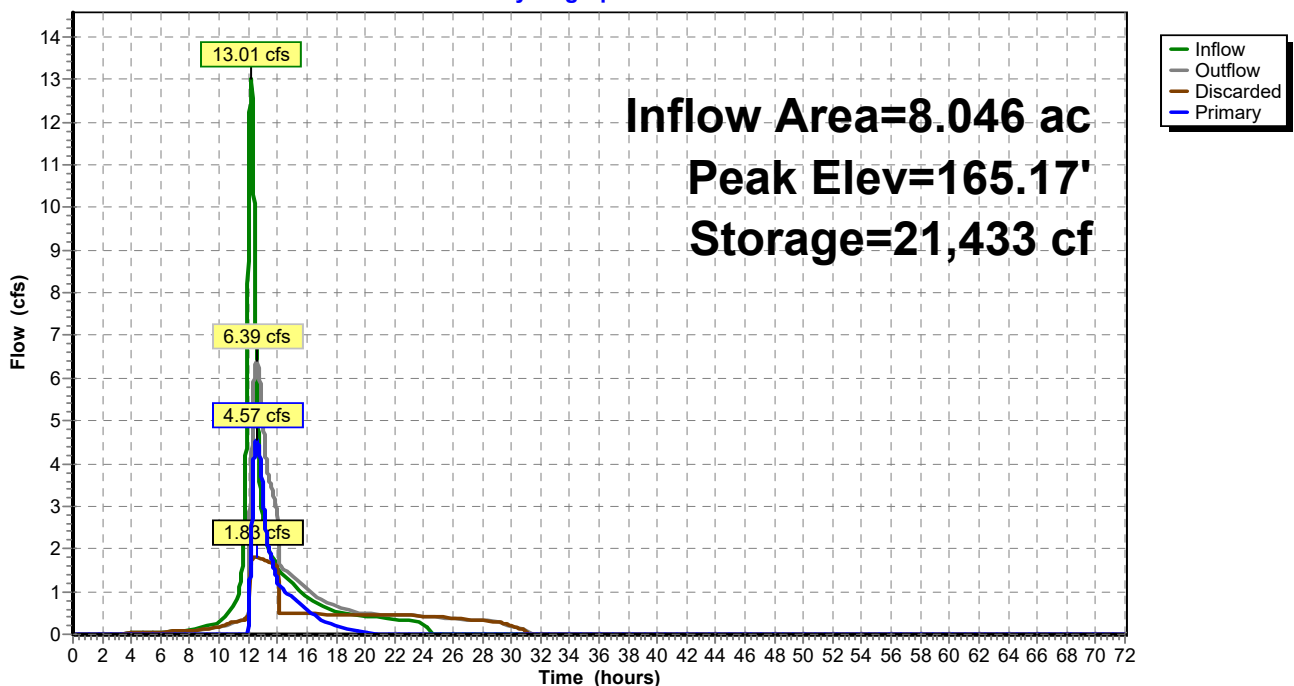
Device	Routing	Invert	Outlet Devices
#1	Primary	165.90'	<b>10.0' long x 10.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Discarded	161.00'	<b>6.500 in/hr Exfiltration Deerfield Loamy Sand (13 in/hr) over Surface area</b> Phase-In= 0.01'
#3	Device 4	165.80'	<b>48.0" Horiz. Outlet Control Structure 48" Gate</b> C= 0.600 Limited to weir flow at low heads
#4	Primary	162.00'	<b>15.0" Round Culvert</b> L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 162.00' / 161.80' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#5	Device 4	163.50'	<b>12.0" W x 6.0" H Vert. 12" x 6" Orifice</b> C= 0.600 Limited to weir flow at low heads
#6	Device 4	164.50'	<b>18.0" W x 4.0" H Vert. 18" x 4" Orifice</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=1.83 cfs @ 12.56 hrs HW=165.17' (Free Discharge)  
 ↳ **2=Exfiltration Deerfield Loamy Sand (13 in/hr)**(Exfiltration Controls 1.83 cfs)

**Primary OutFlow** Max=4.56 cfs @ 12.56 hrs HW=165.17' TW=0.00' (Dynamic Tailwater)  
 ↳ **1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)  
 ↳ **4=Culvert** (Passes 4.56 cfs of 9.43 cfs potential flow)  
 ↳ **3=Outlet Control Structure 48" Gate** ( Controls 0.00 cfs)  
 ↳ **5=12" x 6" Orifice** (Orifice Controls 2.87 cfs @ 5.73 fps)  
 ↳ **6=18" x 4" Orifice** (Orifice Controls 1.70 cfs @ 3.40 fps)

### Pond 10P: Pond Entirety 1-Foot to Seasonal

Hydrograph



**12542DV00**

Type III 24-hr 50-Year Rainfall=6.77"

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## Summary for Subcatchment DV 10S: DV 10S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 0.15 cfs @ 12.13 hrs, Volume= 0.019 af, Depth= 0.83"  
 Routed to Reach OP-1 : Observation Point 1

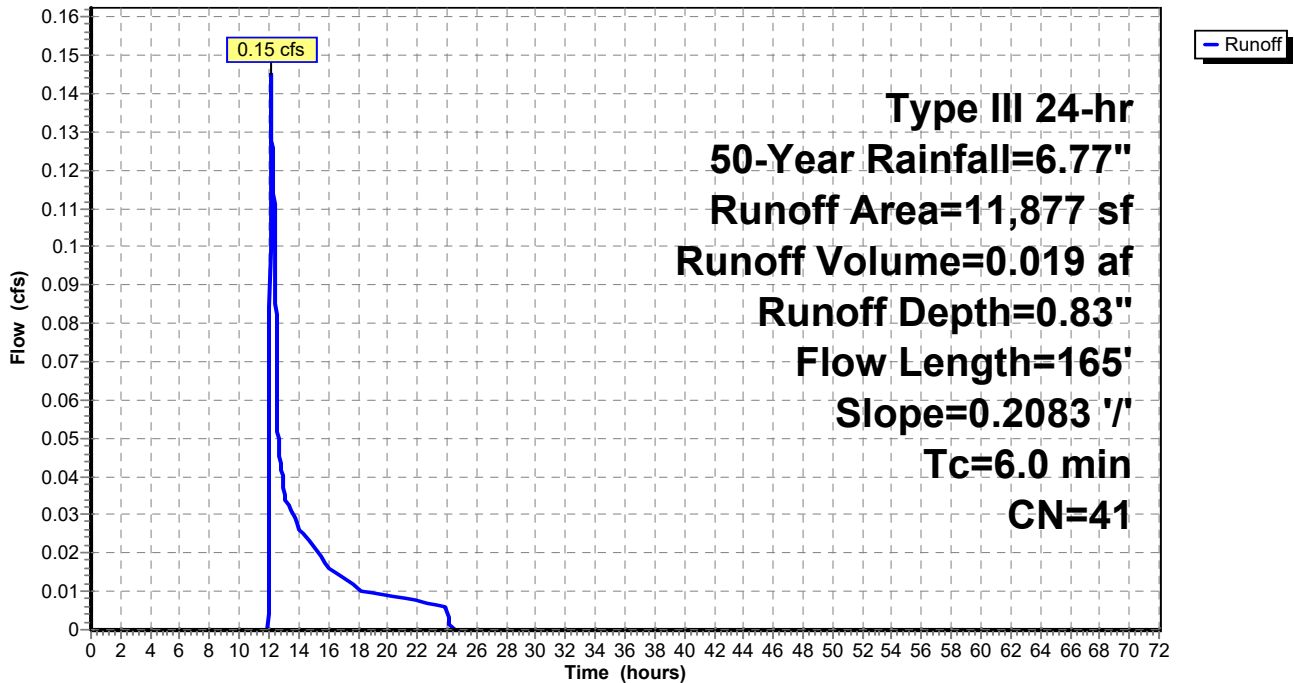
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-Year Rainfall=6.77"

Area (sf)	CN	Description
1,758	30	Woods, Good HSG A
618	98	Paved parking HSG A
9,502	39	>75% Grass cover, Good HSG A
11,877	41	Weighted Average
11,260		94.80% Pervious Area
618		5.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	165	0.2083	0.59		<b>Lag/CN Method,</b>
4.6	165	Total, Increased to minimum Tc = 6.0 min			

## Subcatchment DV 10S: DV 10S

Hydrograph



**12542DV00**

Type III 24-hr 50-Year Rainfall=6.77"

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## Summary for Subcatchment DV 11S: DV 11S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 1.23 cfs @ 12.08 hrs, Volume= 0.101 af, Depth= 6.53"  
 Routed to Pond 10P : Pond Entirety 1-Foot to Seasonal

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-Year Rainfall=6.77"

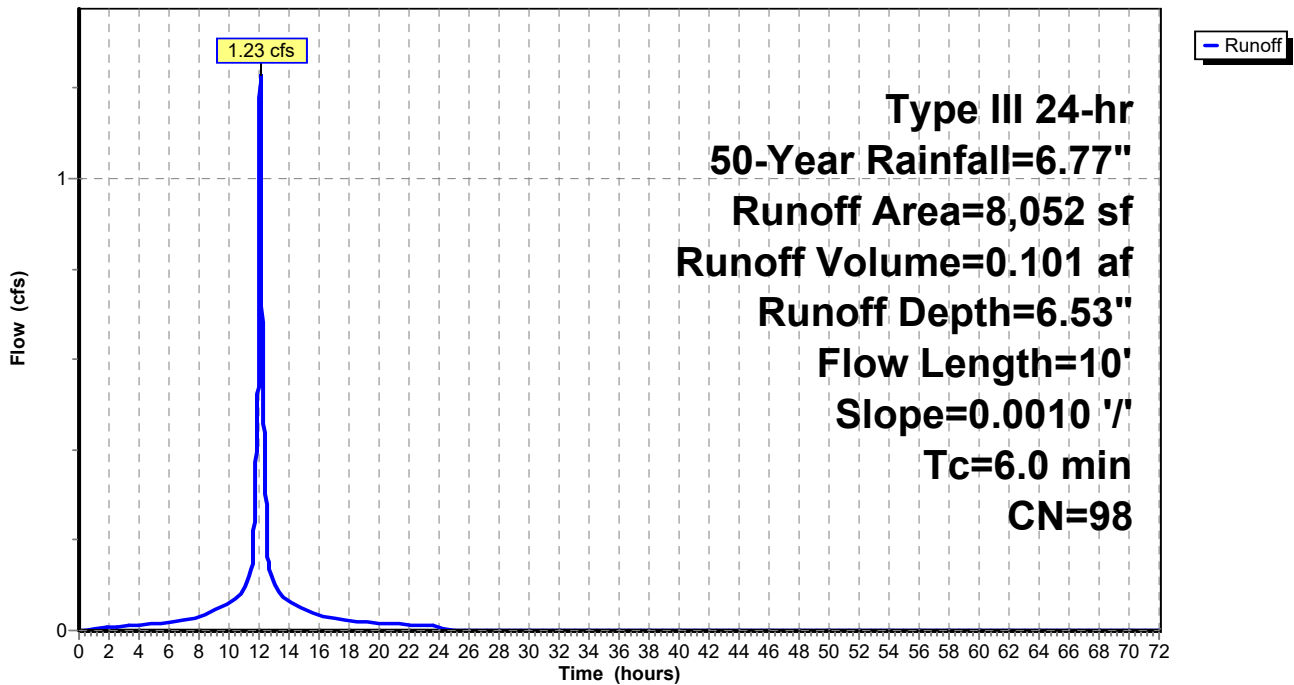
Area (sf)	CN	Description
8,052	98	Roofs HSG A
8,052		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	10	0.0010	0.14		<b>Lag/CN Method,</b>
1.2	10	Total, Increased to minimum Tc = 6.0 min			

## Subcatchment DV 11S: DV 11S

Hydrograph



**12542DV00**

Type III 24-hr 50-Year Rainfall=6.77"

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## Summary for Subcatchment DV 12S: DV 12S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 0.16 cfs @ 12.23 hrs, Volume= 0.025 af, Depth= 0.76"  
 Routed to Reach OP-1 : Observation Point 1

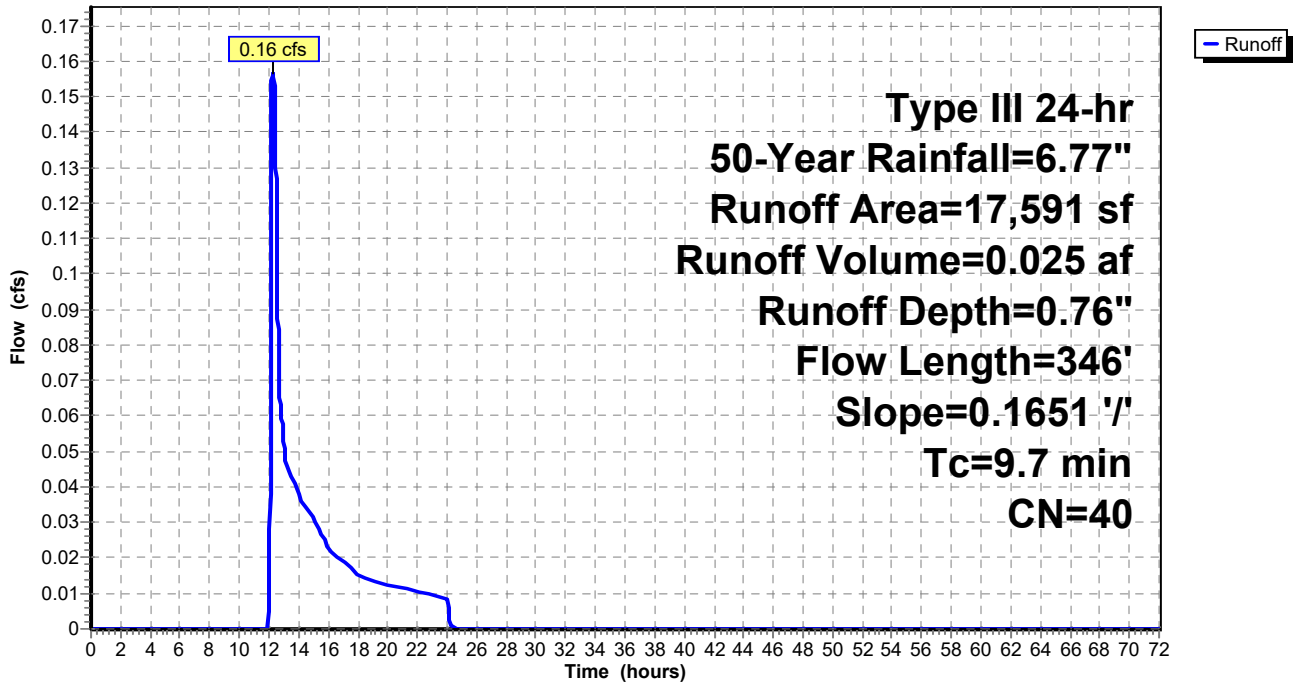
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-Year Rainfall=6.77"

Area (sf)	CN	Description
7,483	30	Woods, Good HSG A
1,465	98	Paved parking HSG A
8,643	39	>75% Grass cover, Good HSG A
17,591	40	Weighted Average
16,126		91.67% Pervious Area
1,465		8.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	346	0.1651	0.60		Lag/CN Method,

## Subcatchment DV 12S: DV 12S

Hydrograph



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Type III 24-hr 50-Year Rainfall=6.77"

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## Summary for Subcatchment DV 13S: DV 13S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 0.04 cfs @ 12.35 hrs, Volume= 0.008 af, Depth= 0.49"  
 Routed to Reach OP-1 : Observation Point 1

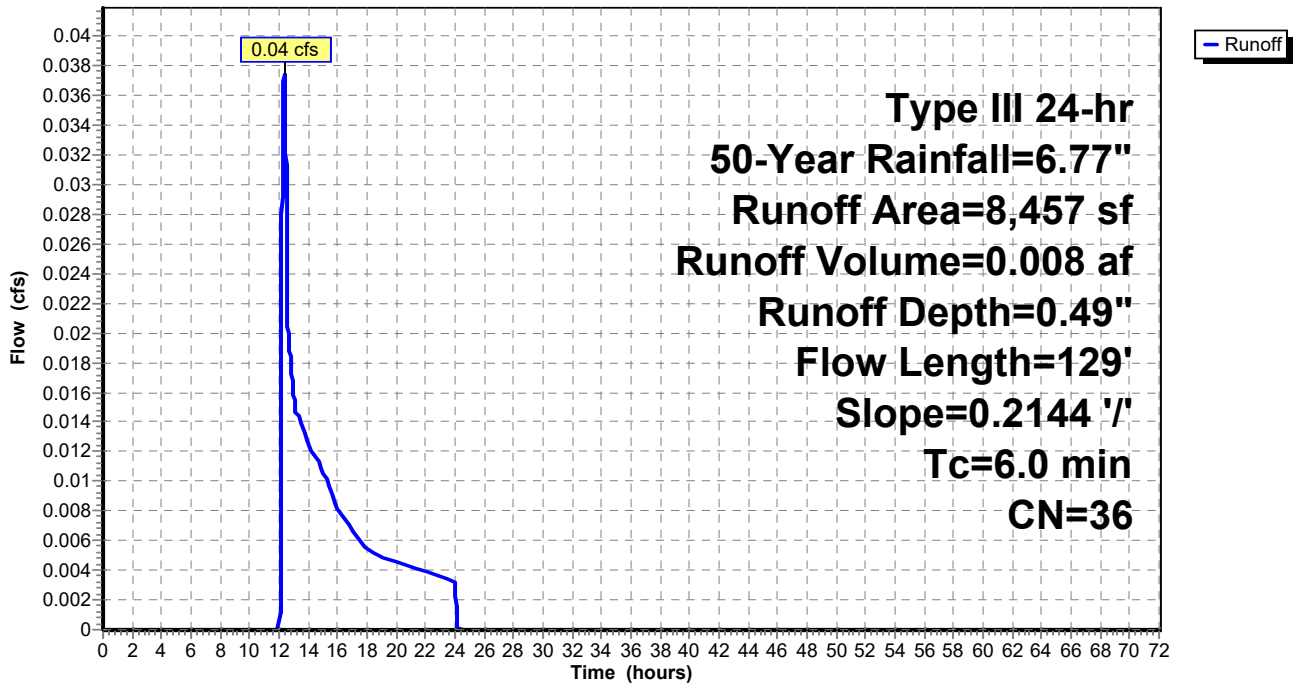
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-Year Rainfall=6.77"

Area (sf)	CN	Description
2,811	30	Woods, Good HSG A
5,645	39	>75% Grass cover, Good HSG A
8,457	36	Weighted Average
8,457		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	129	0.2144	0.50		<b>Lag/CN Method,</b>
4.3	129	Total, Increased to minimum Tc = 6.0 min			

## Subcatchment DV 13S: DV 13S

Hydrograph





12542DV00

Type III 24-hr 50-Year Rainfall=6.77"

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Summary for Subcatchment DV 14S: DV 14S

CarlsonPlanXYPos|0.0000|0.0000|

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.39 cfs @ 12.00 hrs, Volume= 0.024 af, Depth= 2.16"  
 Routed to Reach OP-1 : Observation Point 1

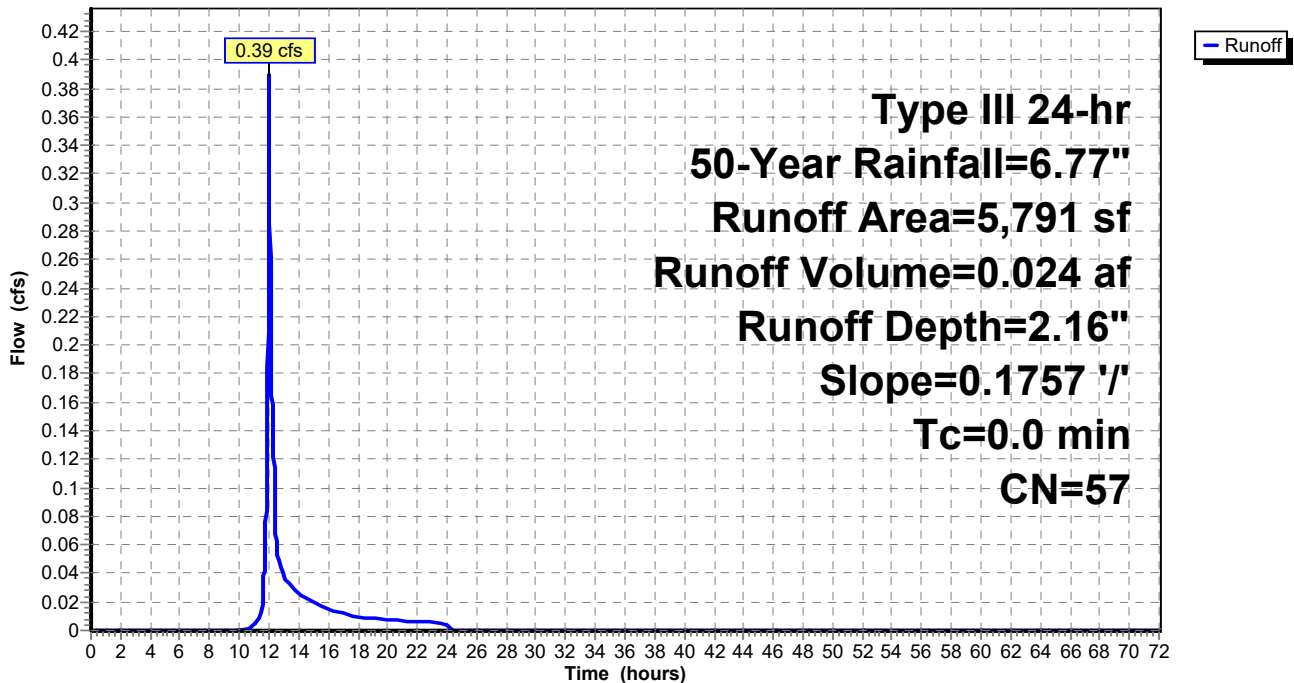
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-Year Rainfall=6.77"

Area (sf)	CN	Description
1,750	98	Paved parking HSG A
4,040	39	>75% Grass cover, Good HSG A
5,791	57	Weighted Average
4,040		69.77% Pervious Area
1,750		30.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.1757			Lag/CN Method,

Subcatchment DV 14S: DV 14S

Hydrograph



**12542DV00**

Type III 24-hr 50-Year Rainfall=6.77"

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## Summary for Subcatchment DV 1S: DV 1S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 0.15 cfs @ 12.36 hrs, Volume= 0.028 af, Depth= 0.62"  
 Routed to Reach OP-1 : Observation Point 1

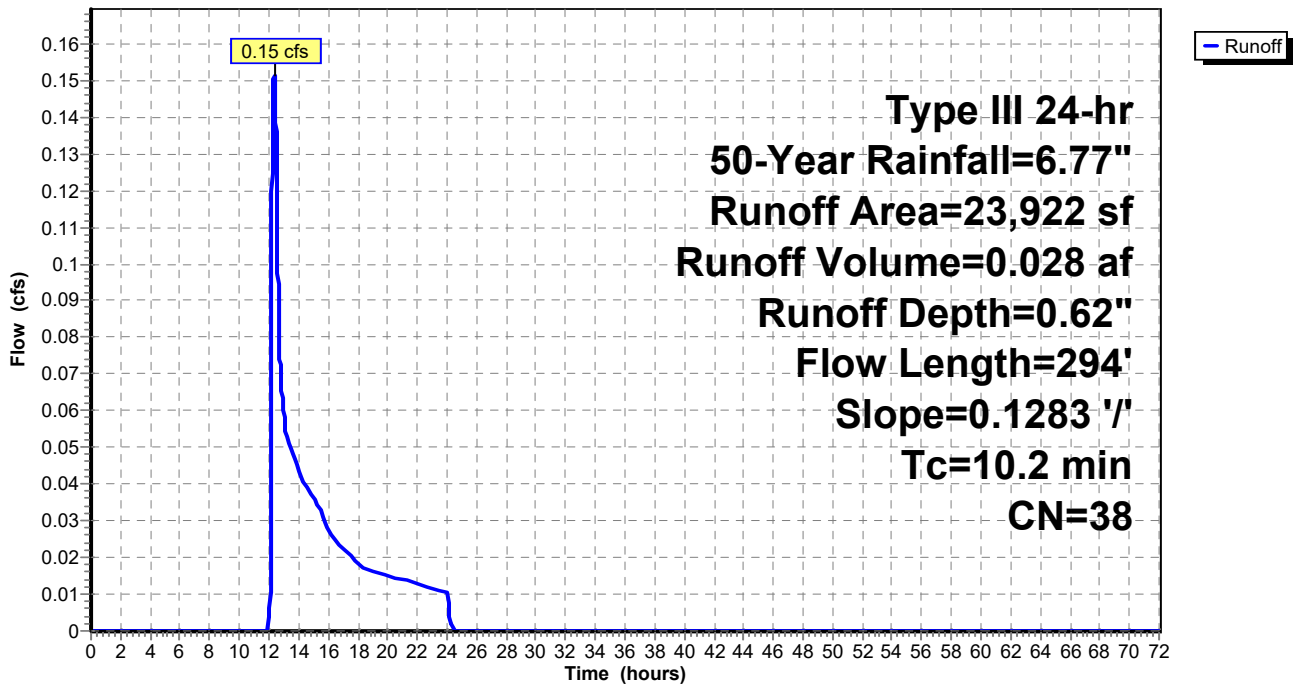
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-Year Rainfall=6.77"

Area (sf)	CN	Description
15,718	30	Woods, Good HSG A
2,034	98	Paved parking HSG A
6,171	39	>75% Grass cover, Good HSG A
23,922	38	Weighted Average
21,889		91.50% Pervious Area
2,034		8.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.2	294	0.1283	0.48		Lag/CN Method,

## Subcatchment DV 1S: DV 1S

Hydrograph



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Type III 24-hr 50-Year Rainfall=6.77"

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## Summary for Subcatchment DV 2S: DV 2S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 0.17 cfs @ 12.36 hrs, Volume= 0.033 af, Depth= 0.56"  
 Routed to Pond 10P : Pond Entirety 1-Foot to Seasonal

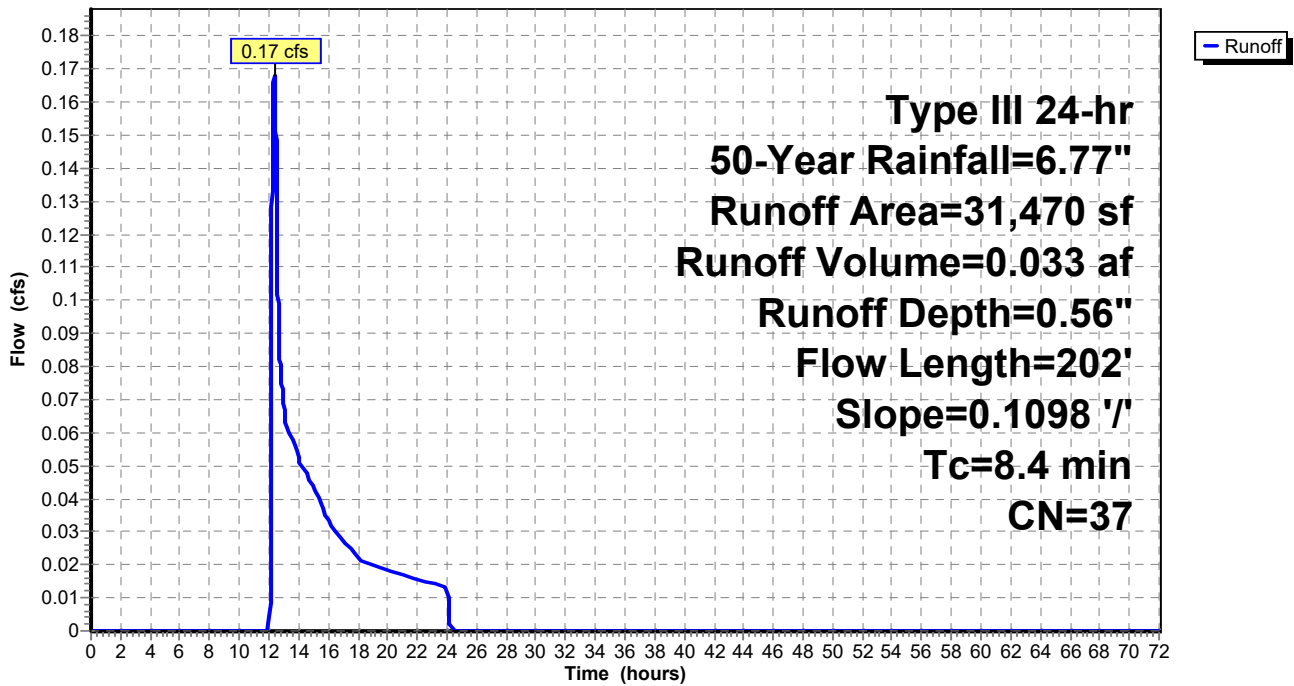
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-Year Rainfall=6.77"

Area (sf)	CN	Description
17,411	30	Woods, Good HSG A
1,426	98	Paved parking HSG A
12,633	39	>75% Grass cover, Good HSG A
31,470	37	Weighted Average
30,045		95.47% Pervious Area
1,426		4.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	202	0.1098	0.40		Lag/CN Method,

## Subcatchment DV 2S: DV 2S

Hydrograph



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Type III 24-hr 50-Year Rainfall=6.77"

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## Summary for Subcatchment DV 3S: DV 3S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 2.76 cfs @ 12.11 hrs, Volume= 0.222 af, Depth= 1.98"  
 Routed to Pond 6P : CB-1

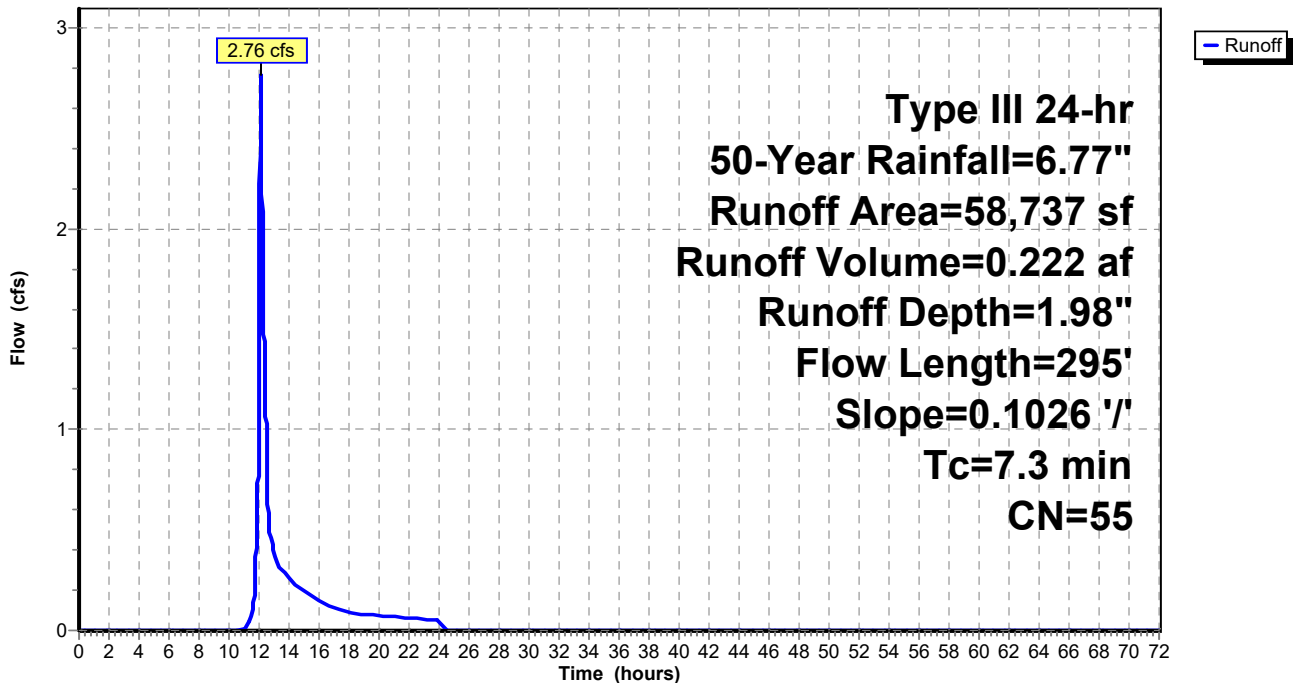
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-Year Rainfall=6.77"

Area (sf)	CN	Description
23,132	30	Woods, Good HSG A
11,819	70	Woods, Good HSG C
13,109	98	Paved parking HSG A
10,677	39	>75% Grass cover, Good HSG A
58,737	55	Weighted Average
45,628		77.68% Pervious Area
13,109		22.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	295	0.1026	0.67		Lag/CN Method,

## Subcatchment DV 3S: DV 3S

Hydrograph



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Type III 24-hr 50-Year Rainfall=6.77"

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## Summary for Subcatchment DV 4S: DV 4S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 12.26 cfs @ 12.25 hrs, Volume= 1.245 af, Depth= 3.23"  
 Routed to Pond 7P : CB-2

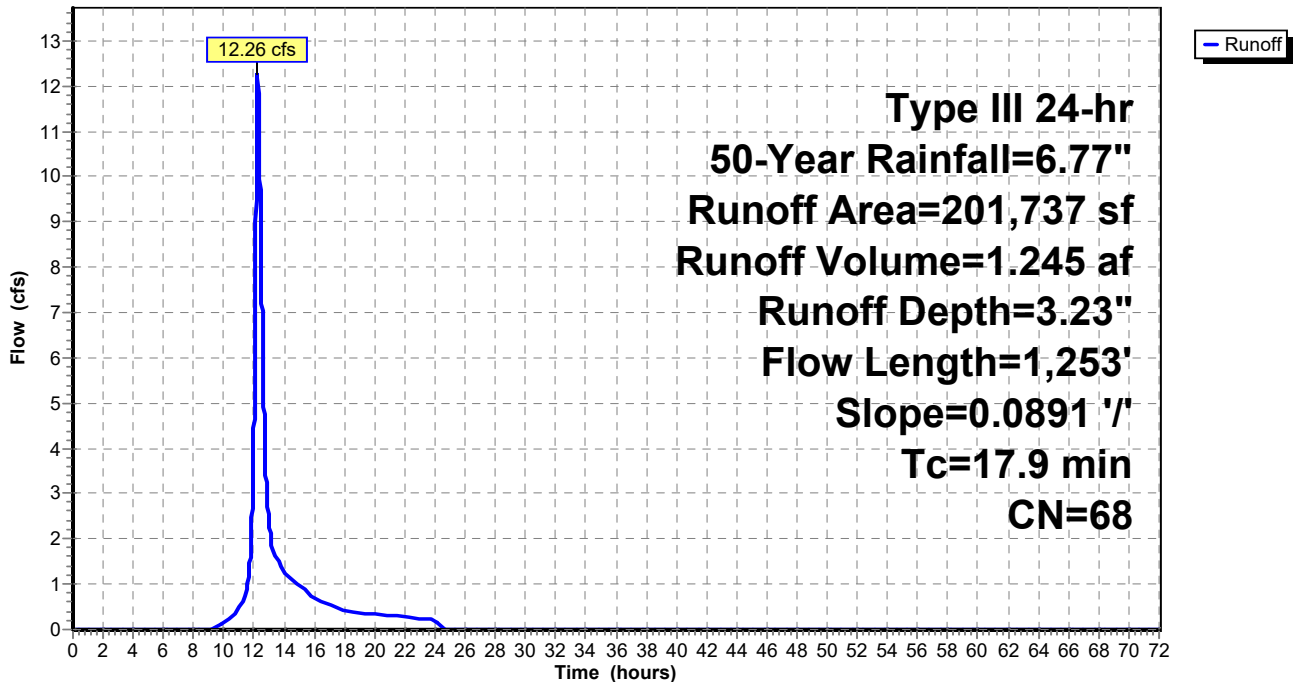
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-Year Rainfall=6.77"

Area (sf)	CN	Description
100,354	70	Woods, Good HSG C
29,998	30	Woods, Good HSG A
2,587	77	Woods, Good HSG D
7,988	98	Roofs HSG C
6,831	98	Paved parking HSG C
5,426	98	Paved parking HSG A
1,471	39	>75% Grass cover, Good HSG A
47,082	74	>75% Grass cover, Good HSG C
<hr/>		
201,737	68	Weighted Average
181,492		89.96% Pervious Area
20,245		10.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9	1,253	0.0891	1.16		Lag/CN Method,

## Subcatchment DV 4S: DV 4S

Hydrograph



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Type III 24-hr 50-Year Rainfall=6.77"

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Summary for Subcatchment DV 5S: DV 5S

CarlsonPlanXYPos|0.0000|0.0000|

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 2.23 cfs @ 12.00 hrs, Volume= 0.131 af, Depth= 4.48"  
 Routed to Pond 1P : CB-4

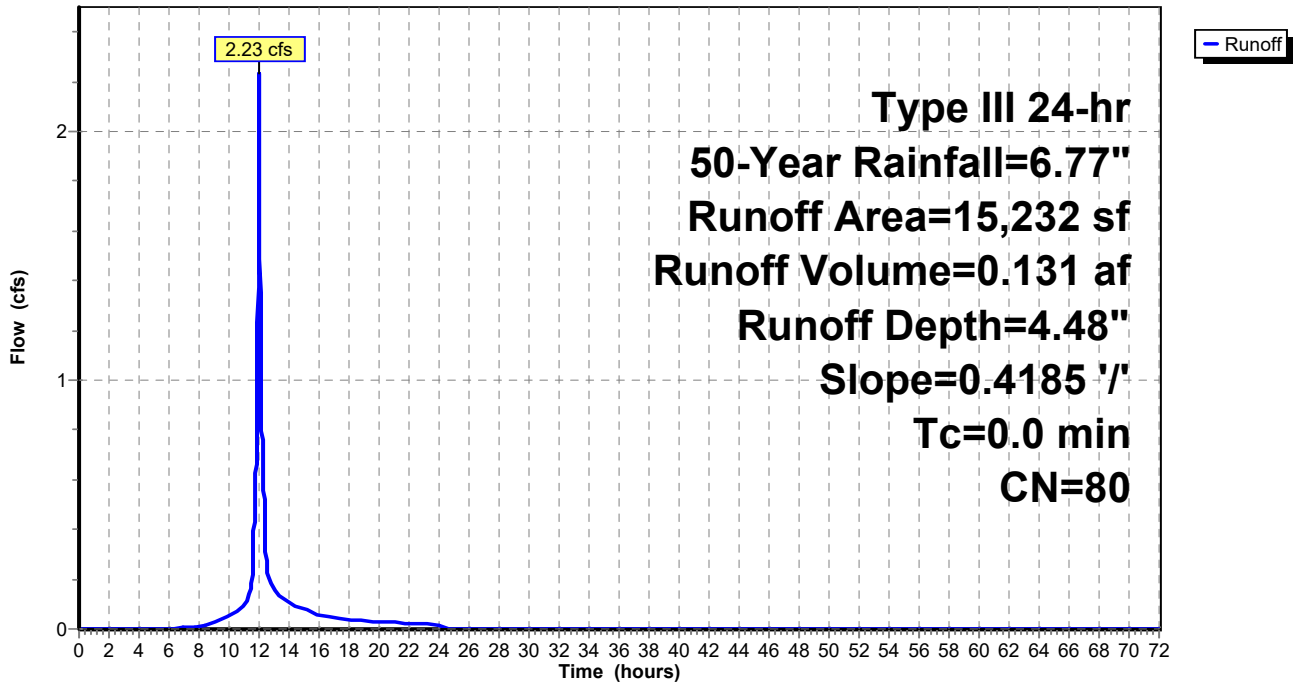
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-Year Rainfall=6.77"

Area (sf)	CN	Description
631	98	Roofs HSG A
9,934	98	Paved parking HSG A
4,667	39	>75% Grass cover, Good HSG A
15,232	80	Weighted Average
4,667		30.64% Pervious Area
10,565		69.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.4185			Lag/CN Method,

Subcatchment DV 5S: DV 5S

Hydrograph



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Type III 24-hr 50-Year Rainfall=6.77"

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Summary for Subcatchment DV 6S: DV 6S

CarlsonPlanXYPos|0.0000|0.0000|

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.81 cfs @ 12.00 hrs, Volume= 0.115 af, Depth= 6.06"  
 Routed to Pond 2P : CB-5

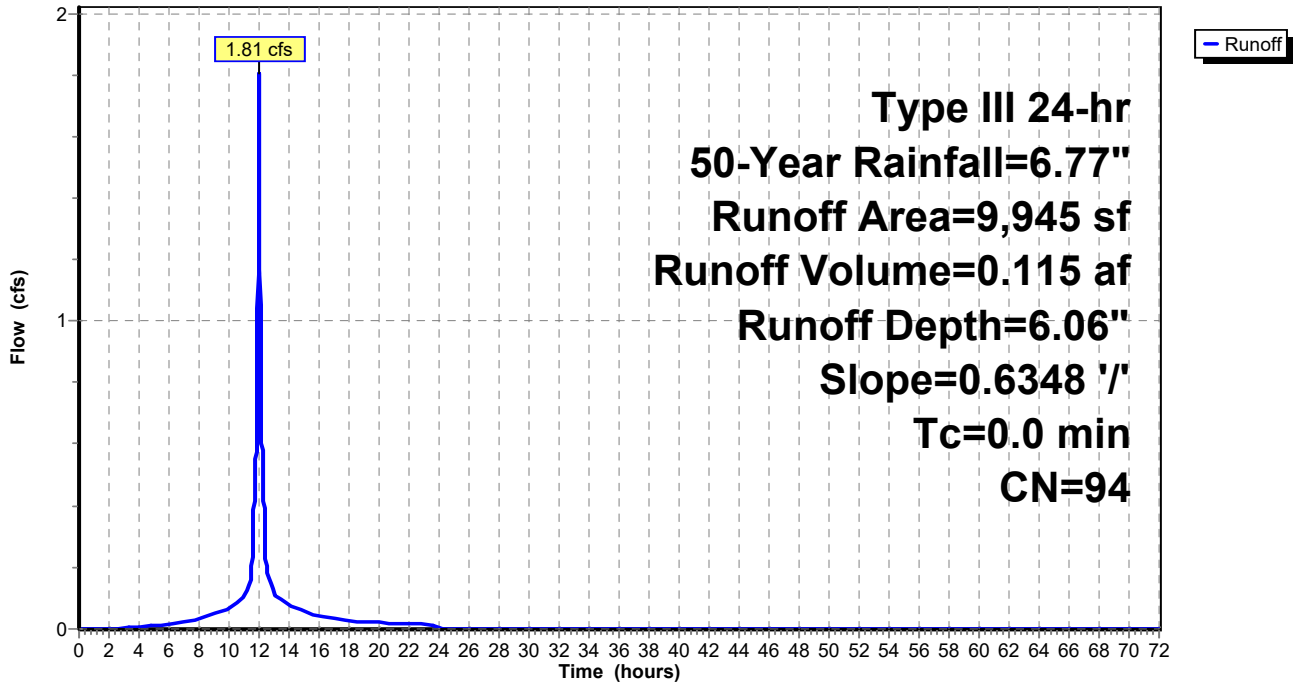
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-Year Rainfall=6.77"

Area (sf)	CN	Description
37	98	Roofs HSG A
9,261	98	Paved parking HSG A
647	39	>75% Grass cover, Good HSG A
9,945	94	Weighted Average
647		6.50% Pervious Area
9,298		93.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.6348			Lag/CN Method,

Subcatchment DV 6S: DV 6S

Hydrograph



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Summary for Subcatchment DV 7S: DV 7S

CarlsonPlanXYPos[0.0000|0.0000|

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.16 cfs @ 12.00 hrs, Volume= 0.077 af, Depth= 6.41"  
 Routed to Pond 5P : CB-6

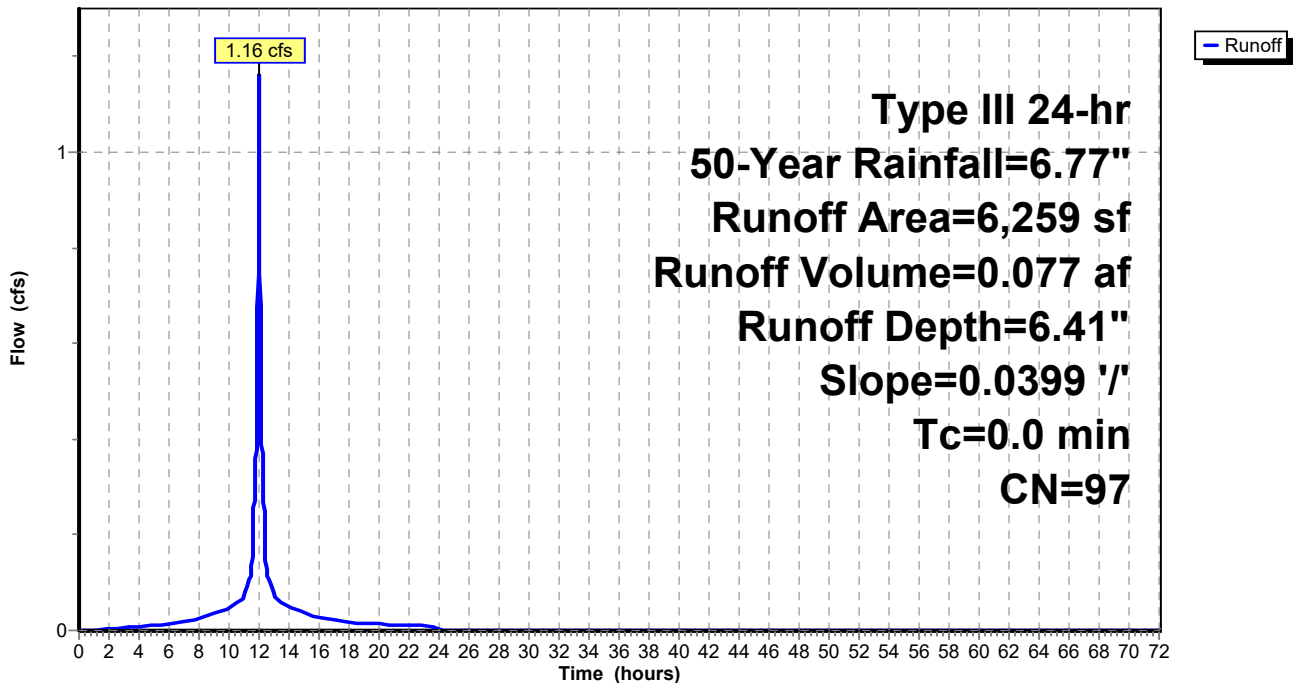
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-Year Rainfall=6.77"

Area (sf)	CN	Description
6,183	98	Paved parking HSG A
76	39	>75% Grass cover, Good HSG A
6,259	97	Weighted Average
76		1.22% Pervious Area
6,183		98.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0		0.0399			Lag/CN Method,

Subcatchment DV 7S: DV 7S

Hydrograph





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Type III 24-hr 50-Year Rainfall=6.77"

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## Summary for Subcatchment DV 8S: DV 8S

CarlsonPlanXYPos|0.0000|0.0000|

Runoff = 2.75 cfs @ 12.08 hrs, Volume= 0.208 af, Depth= 5.71"  
 Routed to Pond 8P : CB-3

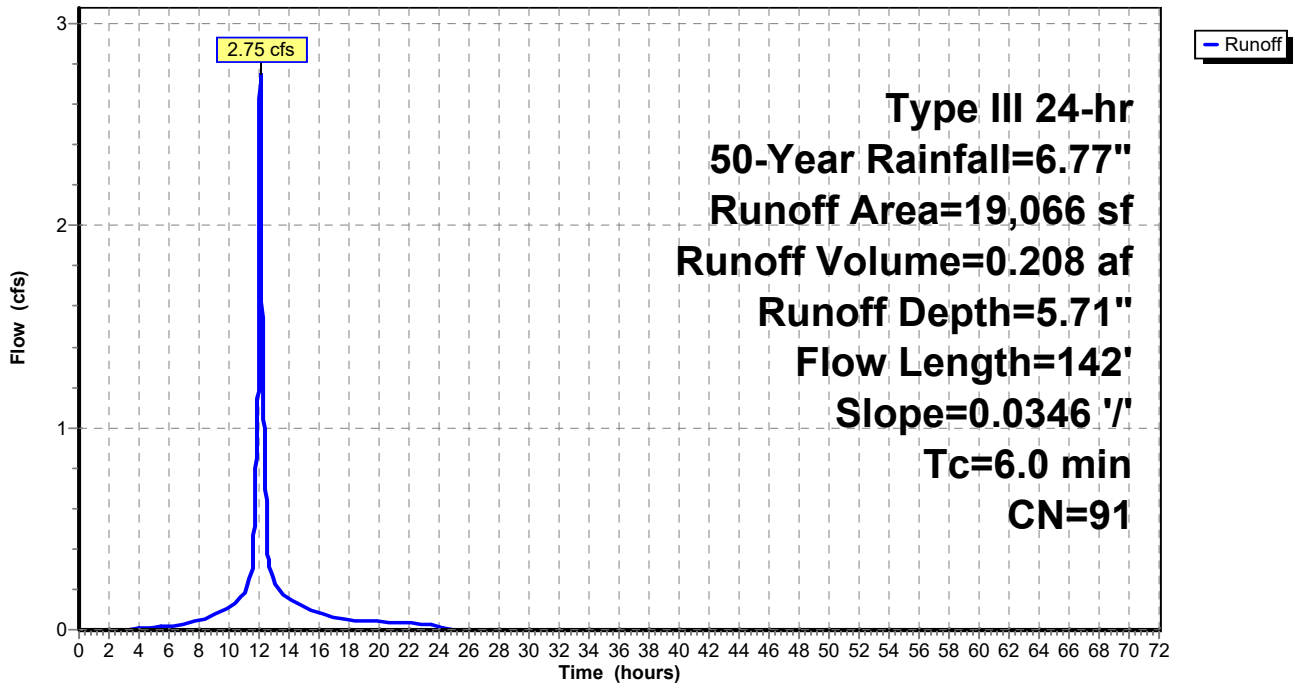
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 50-Year Rainfall=6.77"

Area (sf)	CN	Description
4	30	Woods, Good HSG A
16,826	98	Paved parking HSG A
2,236	39	>75% Grass cover, Good HSG A
19,066	91	Weighted Average
2,240		11.75% Pervious Area
16,826		88.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	142	0.0346	0.98		<b>Lag/CN Method,</b>
2.4	142	Total, Increased to minimum Tc = 6.0 min			

## Subcatchment DV 8S: DV 8S

Hydrograph



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Type III 24-hr 50-Year Rainfall=6.77"

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### Summary for Reach OP-1: Observation Point 1

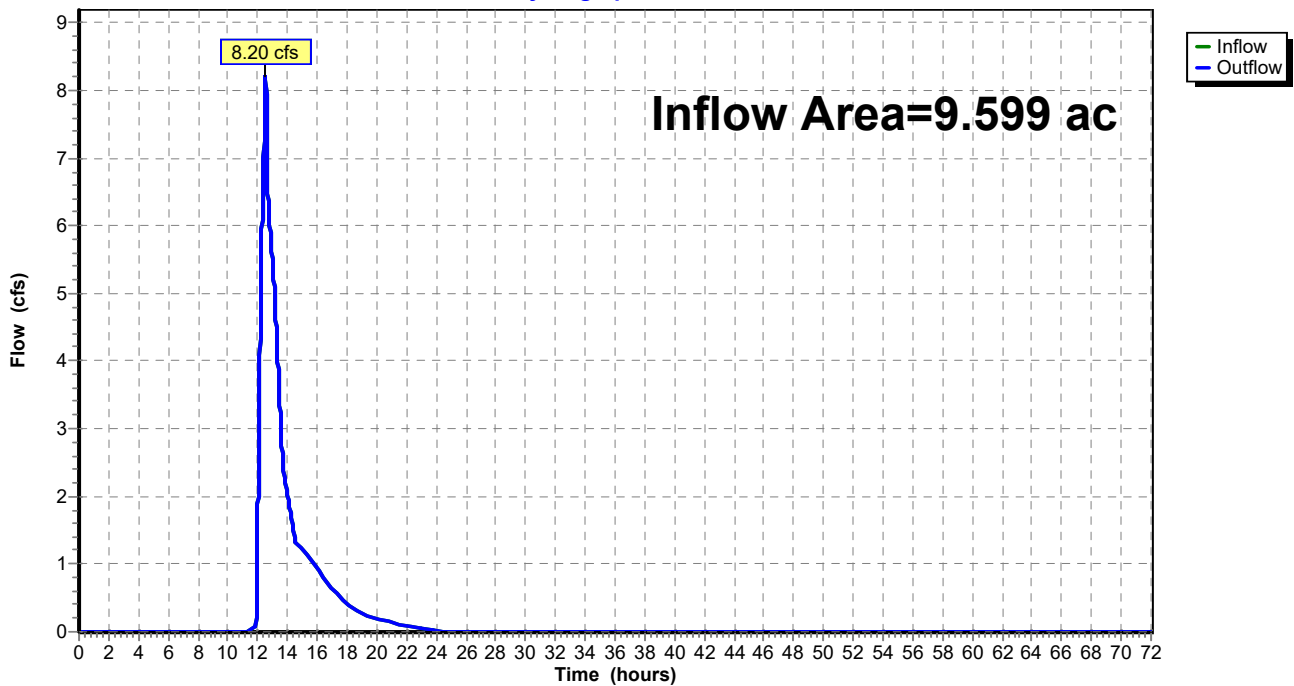
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 9.599 ac, 21.90% Impervious, Inflow Depth = 1.47" for 50-Year event  
Inflow = 8.20 cfs @ 12.51 hrs, Volume= 1.176 af  
Outflow = 8.20 cfs @ 12.51 hrs, Volume= 1.176 af, Atten= 0%, Lag= 0.0 min

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

### Reach OP-1: Observation Point 1

Hydrograph



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Type III 24-hr 50-Year Rainfall=6.77"

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## Summary for Pond 1P: CB-4

[57] Hint: Peaked at 165.93' (Flood elevation advised)

Inflow Area = 0.350 ac, 69.36% Impervious, Inflow Depth = 4.48" for 50-Year event  
 Inflow = 2.23 cfs @ 12.00 hrs, Volume= 0.131 af  
 Outflow = 2.23 cfs @ 12.00 hrs, Volume= 0.131 af, Atten= 0%, Lag= 0.0 min  
 Primary = 2.23 cfs @ 12.00 hrs, Volume= 0.131 af  
 Routed to Pond 2P : CB-5

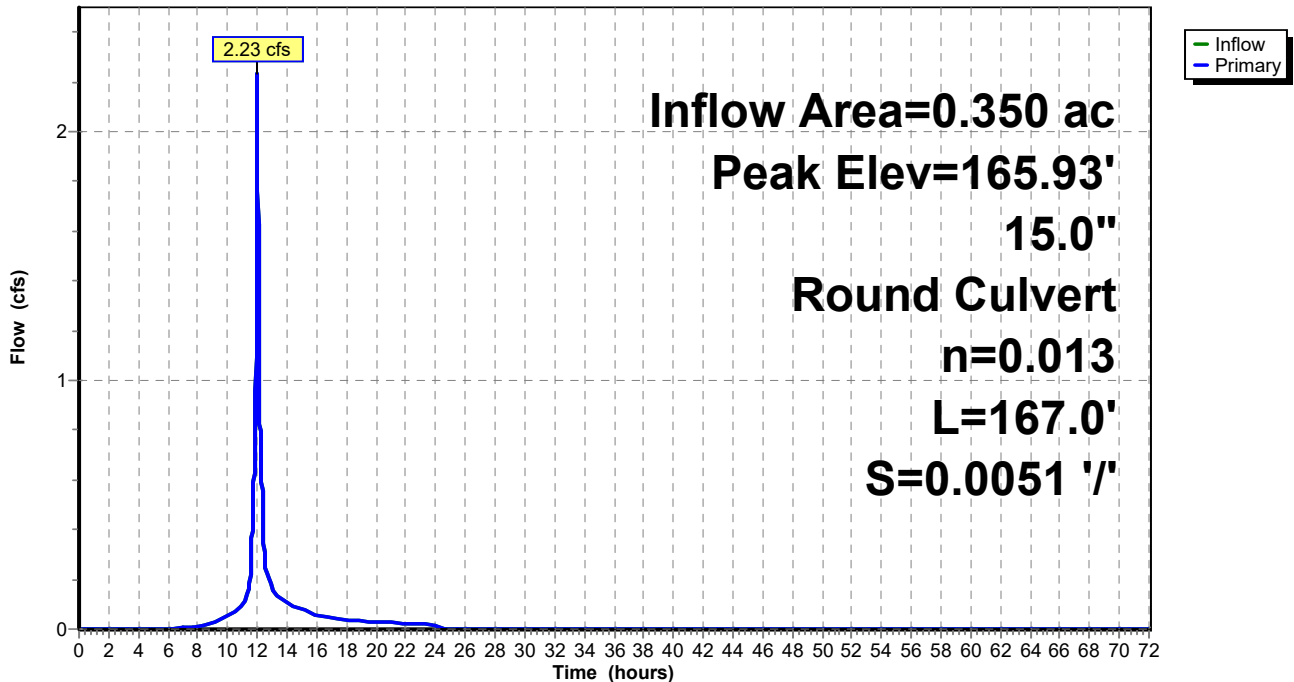
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 165.93' @ 12.54 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	164.60'	<b>15.0" Round Culvert</b> L= 167.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 164.60' / 163.75' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=1.54 cfs @ 12.00 hrs HW=165.70' TW=165.47' (Dynamic Tailwater)  
 ↳ **1=Culvert** (Outlet Controls 1.54 cfs @ 1.79 fps)

### Pond 1P: CB-4

Hydrograph



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Type III 24-hr 50-Year Rainfall=6.77"

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**Summary for Pond 2P: CB-5**

[57] Hint: Peaked at 165.93' (Flood elevation advised)

[80] Warning: Exceeded Pond 1P by 0.01' @ 12.42 hrs (0.27 cfs 0.002 af)

Inflow Area = 0.578 ac, 78.90% Impervious, Inflow Depth = 5.11" for 50-Year event  
 Inflow = 4.04 cfs @ 12.00 hrs, Volume= 0.246 af  
 Outflow = 4.04 cfs @ 12.00 hrs, Volume= 0.246 af, Atten= 0%, Lag= 0.0 min  
 Primary = 4.04 cfs @ 12.00 hrs, Volume= 0.246 af  
 Routed to Pond 5P : CB-6

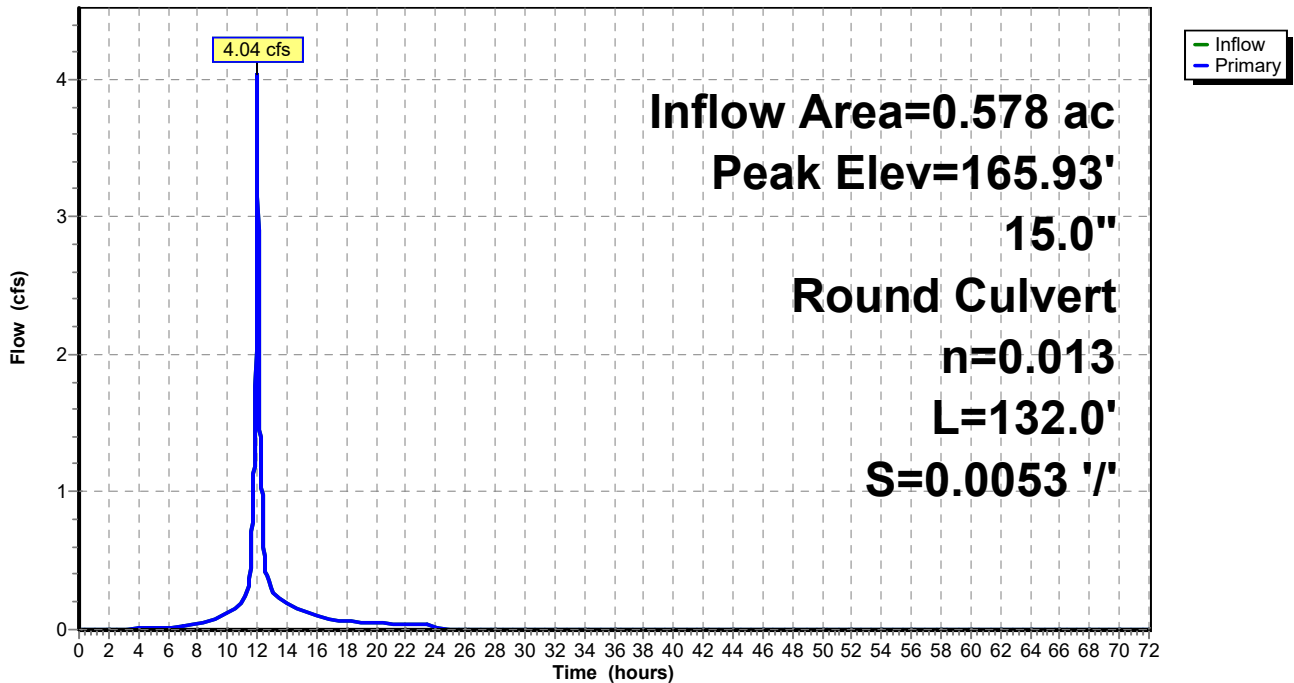
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 165.93' @ 12.53 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	163.65'	<b>15.0" Round Culvert</b> L= 132.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 163.65' / 162.95' S= 0.0053 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=3.67 cfs @ 12.00 hrs HW=165.46' TW=164.83' (Dynamic Tailwater)  
 ↑1=Culvert (Outlet Controls 3.67 cfs @ 2.99 fps)

**Pond 2P: CB-5**

Hydrograph



**12542DV00**

Type III 24-hr 50-Year Rainfall=6.77"

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## Summary for Pond 5P: CB-6

[57] Hint: Peaked at 165.92' (Flood elevation advised)

Inflow Area = 0.722 ac, 82.86% Impervious, Inflow Depth = 5.37" for 50-Year event  
 Inflow = 5.19 cfs @ 12.00 hrs, Volume= 0.323 af  
 Outflow = 5.19 cfs @ 12.00 hrs, Volume= 0.323 af, Atten= 0%, Lag= 0.0 min  
 Primary = 5.19 cfs @ 12.00 hrs, Volume= 0.323 af  
 Routed to Pond 10P : Pond Entirety 1-Foot to Seasonal

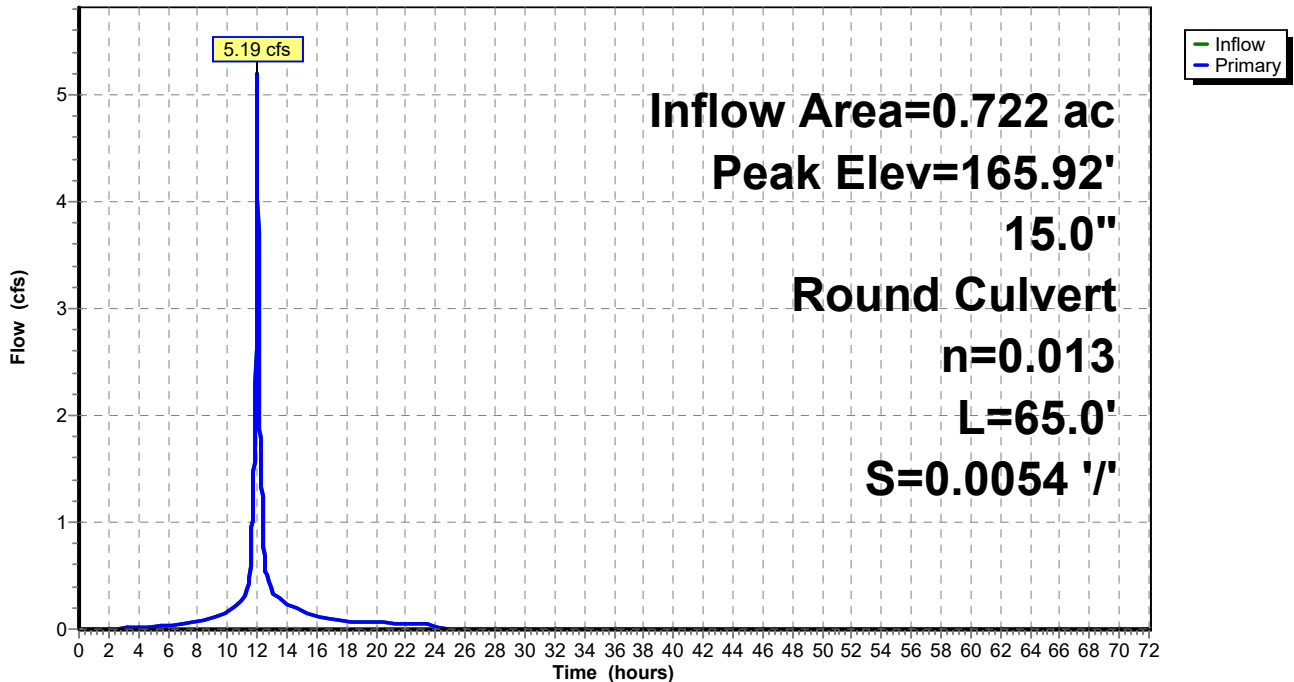
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 165.92' @ 12.53 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	162.85'	<b>15.0" Round Culvert</b> L= 65.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 162.85' / 162.50' S= 0.0054 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=5.02 cfs @ 12.00 hrs HW=164.83' TW=164.05' (Dynamic Tailwater)  
 ↳ **1=Culvert** (Outlet Controls 5.02 cfs @ 4.09 fps)

### Pond 5P: CB-6

Hydrograph



12542DV00

Type III 24-hr 50-Year Rainfall=6.77"

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Summary for Pond 6P: CB-1

[57] Hint: Peaked at 181.07' (Flood elevation advised)

Inflow Area = 1.348 ac, 22.32% Impervious, Inflow Depth = 1.98" for 50-Year event  
 Inflow = 2.76 cfs @ 12.11 hrs, Volume= 0.222 af  
 Outflow = 2.76 cfs @ 12.11 hrs, Volume= 0.222 af, Atten= 0%, Lag= 0.0 min  
 Primary = 2.76 cfs @ 12.11 hrs, Volume= 0.222 af  
 Routed to Pond 7P : CB-2

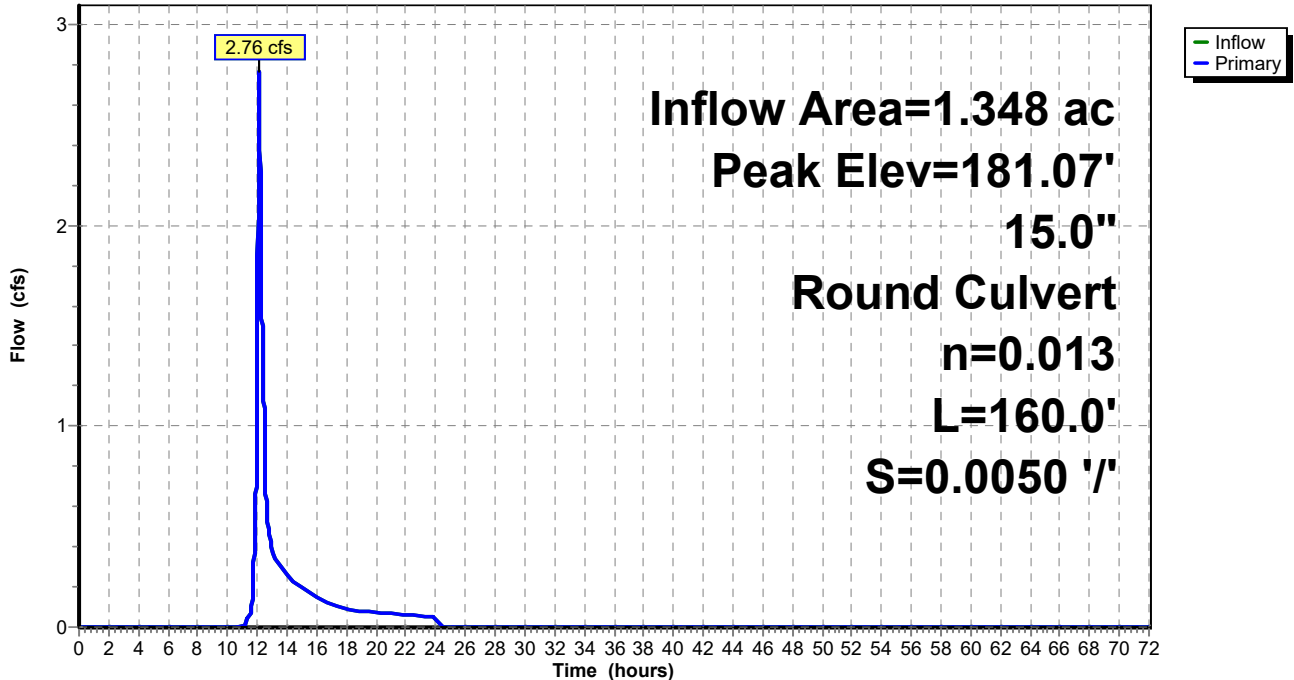
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 181.07' @ 12.25 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	164.25'	<b>15.0" Round Culvert</b> L= 160.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 164.25' / 163.45' S= 0.0050 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.00 cfs @ 12.11 hrs HW=174.67' TW=175.11' (Dynamic Tailwater)  
 1=Culvert ( Controls 0.00 cfs)

Pond 6P: CB-1

Hydrograph



12542DV00

Type III 24-hr 50-Year Rainfall=6.77"

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Summary for Pond 7P: CB-2

[57] Hint: Peaked at 180.90' (Flood elevation advised)

[80] Warning: Exceeded Pond 6P by 0.54' @ 12.07 hrs (3.15 cfs 0.055 af)

Inflow Area = 5.980 ac, 12.81% Impervious, Inflow Depth = 2.94" for 50-Year event  
 Inflow = 14.06 cfs @ 12.23 hrs, Volume= 1.467 af  
 Outflow = 14.06 cfs @ 12.23 hrs, Volume= 1.467 af, Atten= 0%, Lag= 0.0 min  
 Primary = 14.06 cfs @ 12.23 hrs, Volume= 1.467 af  
 Routed to Pond 8P : CB-3

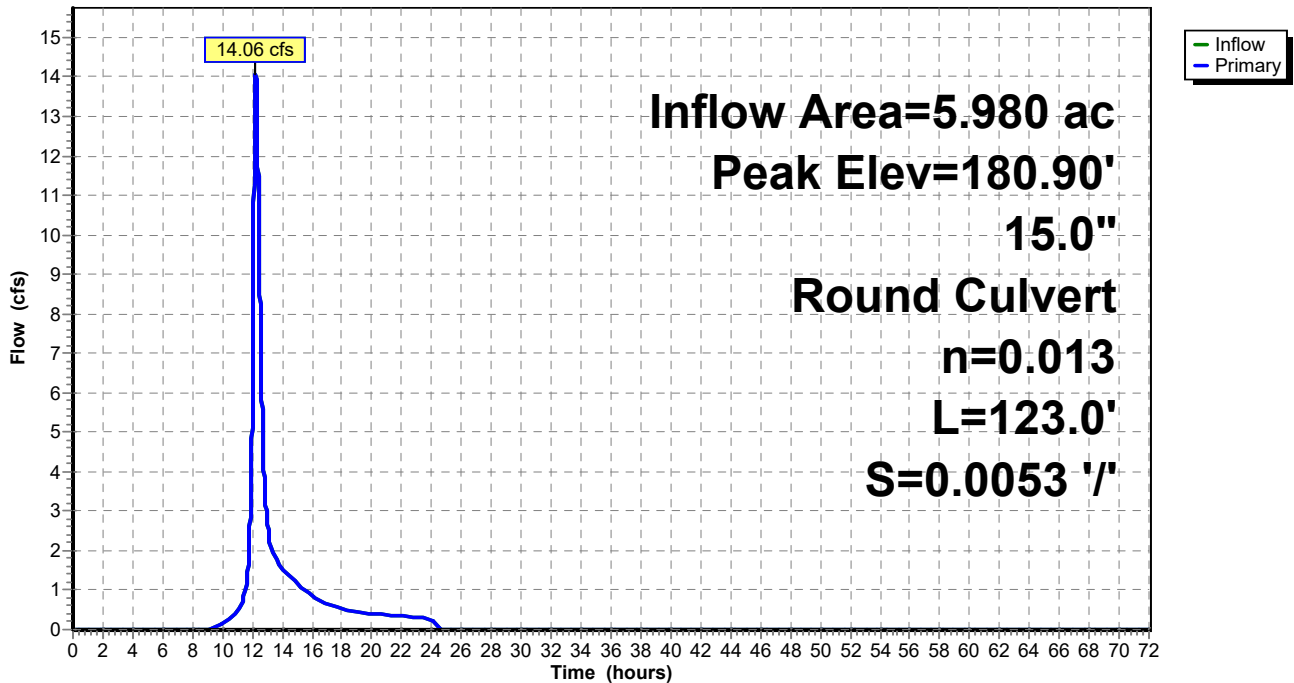
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 180.90' @ 12.24 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	163.35'	<b>15.0" Round Culvert</b> L= 123.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 163.35' / 162.70' S= 0.0053 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=14.02 cfs @ 12.23 hrs HW=180.87' TW=172.01' (Dynamic Tailwater)  
 1=Culvert (Outlet Controls 14.02 cfs @ 11.43 fps)

Pond 7P: CB-2

Hydrograph



12542DV00

Type III 24-hr 50-Year Rainfall=6.77"

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**Summary for Pond 8P: CB-3**

[57] Hint: Peaked at 172.01' (Flood elevation advised)

Inflow Area = 6.417 ac, 17.95% Impervious, Inflow Depth = 3.13" for 50-Year event  
 Inflow = 15.41 cfs @ 12.23 hrs, Volume= 1.675 af  
 Outflow = 15.41 cfs @ 12.23 hrs, Volume= 1.675 af, Atten= 0%, Lag= 0.0 min  
 Primary = 15.41 cfs @ 12.23 hrs, Volume= 1.675 af  
 Routed to Pond 10P : Pond Entirety 1-Foot to Seasonal

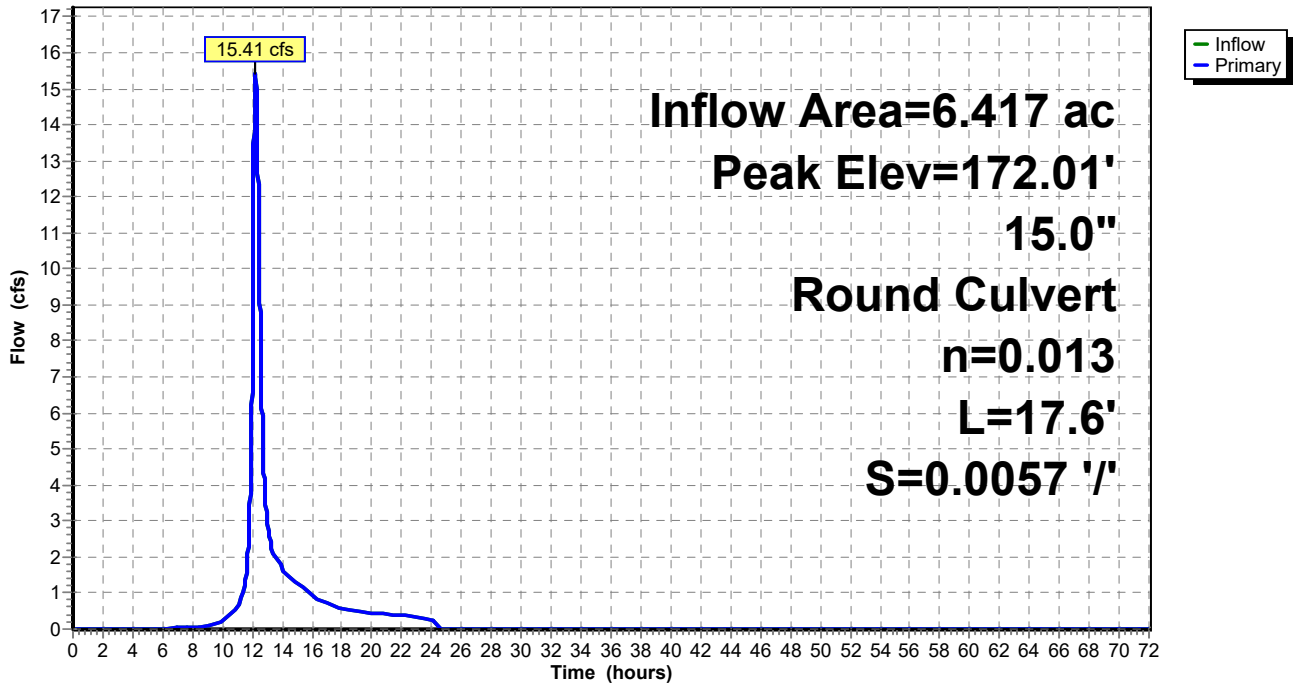
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 172.01' @ 12.24 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	162.60'	<b>15.0" Round Culvert</b> L= 17.6' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 162.60' / 162.50' S= 0.0057 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

**Primary OutFlow** Max=15.36 cfs @ 12.23 hrs HW=172.00' TW=165.24' (Dynamic Tailwater)  
 ←1=Culvert (Inlet Controls 15.36 cfs @ 12.51 fps)

**Pond 8P: CB-3**

Hydrograph





12542DV00

Type III 24-hr 50-Year Rainfall=6.77"

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**Summary for Pond 10P: Pond Entirety 1-Foot to Seasonal**

[80] Warning: Exceeded Pond 5P by 0.64' @ 24.02 hrs (1.34 cfs 0.031 af)

[80] Warning: Exceeded Pond 8P by 0.66' @ 25.05 hrs (1.31 cfs 0.050 af)

Inflow Area = 8.046 ac, 24.45% Impervious, Inflow Depth = 3.18" for 50-Year event  
 Inflow = 17.83 cfs @ 12.20 hrs, Volume= 2.132 af  
 Outflow = 9.78 cfs @ 12.52 hrs, Volume= 2.132 af, Atten= 45%, Lag= 19.1 min  
 Discarded = 1.98 cfs @ 12.52 hrs, Volume= 1.061 af  
 Primary = 7.80 cfs @ 12.52 hrs, Volume= 1.071 af  
 Routed to Reach OP-1 : Observation Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 165.91' @ 12.52 hrs Surf.Area= 13,130 sf Storage= 28,312 cf

Plug-Flow detention time= 117.3 min calculated for 2.132 af (100% of inflow)  
 Center-of-Mass det. time= 117.3 min ( 946.2 - 828.8 )

Volume	Invert	Avail.Storage	Storage Description
#1	162.00'	977 cf	<b>Sediment Forebay (Irregular)</b> Listed below (Recalc) -Impervious
#2	162.00'	4,666 cf	<b>Sediment Forebay (Irregular)</b> Listed below (Recalc) -Impervious
#3	161.00'	6,399 cf	<b>Pond Bottom (Irregular)</b> Listed below (Recalc)
#4	164.00'	17,132 cf	<b>Pond Storage Above Forebay (Irregular)</b> Listed below (Recalc)
		29,174 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
162.00	272	67.5	0	0	272
164.00	744	102.9	977	977	781

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
162.00	1,836	176.5	0	0	1,836
164.00	2,868	221.5	4,666	4,666	3,316

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
161.00	574	228.0	0	0	574
162.00	1,923	255.4	1,183	1,183	1,655
164.00	3,360	288.9	5,217	6,399	3,205

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
164.00	7,305	412.2	0	0	7,305
166.00	9,892	449.9	17,132	17,132	10,031

**12542DV00**

Type III 24-hr 50-Year Rainfall=6.77"

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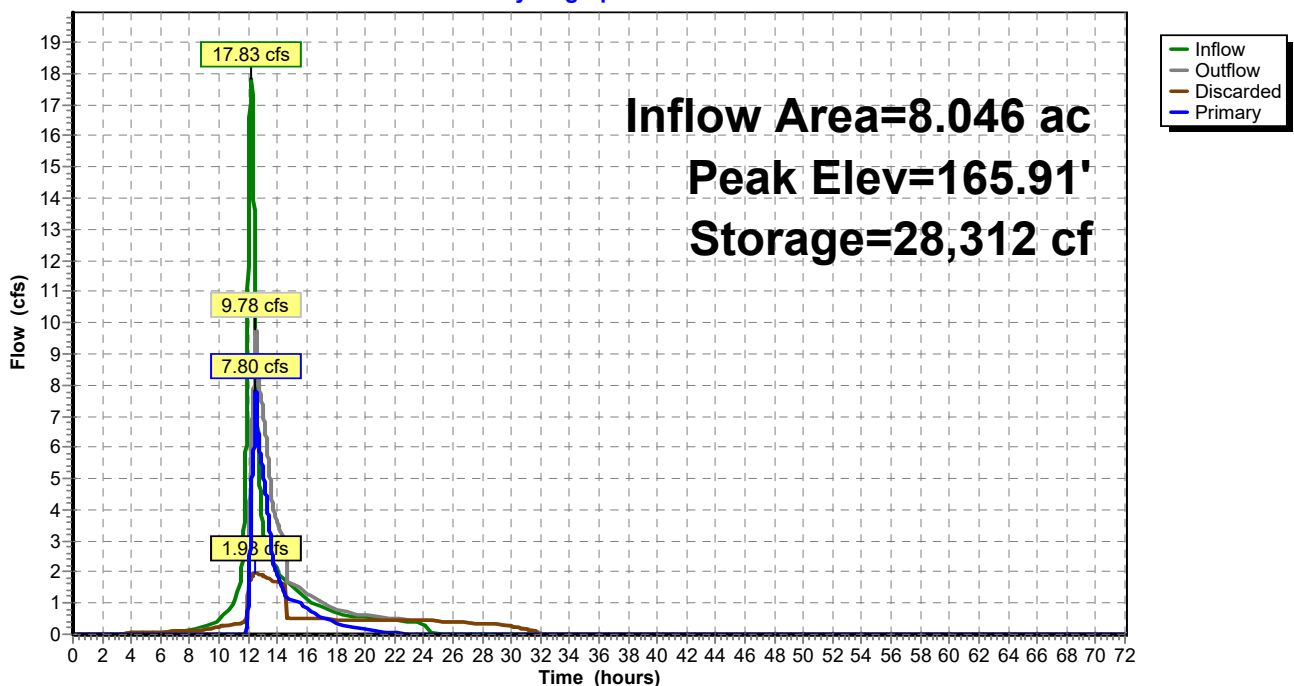
Device	Routing	Invert	Outlet Devices
#1	Primary	165.90'	<b>10.0' long x 10.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Discarded	161.00'	<b>6.500 in/hr Exfiltration Deerfield Loamy Sand (13 in/hr) over Surface area</b> Phase-In= 0.01'
#3	Device 4	165.80'	<b>48.0" Horiz. Outlet Control Structure 48" Grate</b> C= 0.600 Limited to weir flow at low heads
#4	Primary	162.00'	<b>15.0" Round Culvert</b> L= 20.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 162.00' / 161.80' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#5	Device 4	163.50'	<b>12.0" W x 6.0" H Vert. 12" x 6" Orifice</b> C= 0.600 Limited to weir flow at low heads
#6	Device 4	164.50'	<b>18.0" W x 4.0" H Vert. 18" x 4" Orifice</b> C= 0.600 Limited to weir flow at low heads

**Discarded OutFlow** Max=1.98 cfs @ 12.52 hrs HW=165.91' (Free Discharge)  
 ↳ **2=Exfiltration Deerfield Loamy Sand (13 in/hr)**(Exfiltration Controls 1.98 cfs)

**Primary OutFlow** Max=7.80 cfs @ 12.52 hrs HW=165.91' TW=0.00' (Dynamic Tailwater)  
 ↳ **1=Broad-Crested Rectangular Weir** (Weir Controls 0.03 cfs @ 0.28 fps)  
 ↳ **4=Culvert** (Passes 7.77 cfs of 10.71 cfs potential flow)  
 ↳ **3=Outlet Control Structure 48" Grate** (Weir Controls 1.54 cfs @ 1.10 fps)  
 ↳ **5=12" x 6" Orifice** (Orifice Controls 3.54 cfs @ 7.08 fps)  
 ↳ **6=18" x 4" Orifice** (Orifice Controls 2.68 cfs @ 5.37 fps)

### Pond 10P: Pond Entirety 1-Foot to Seasonal

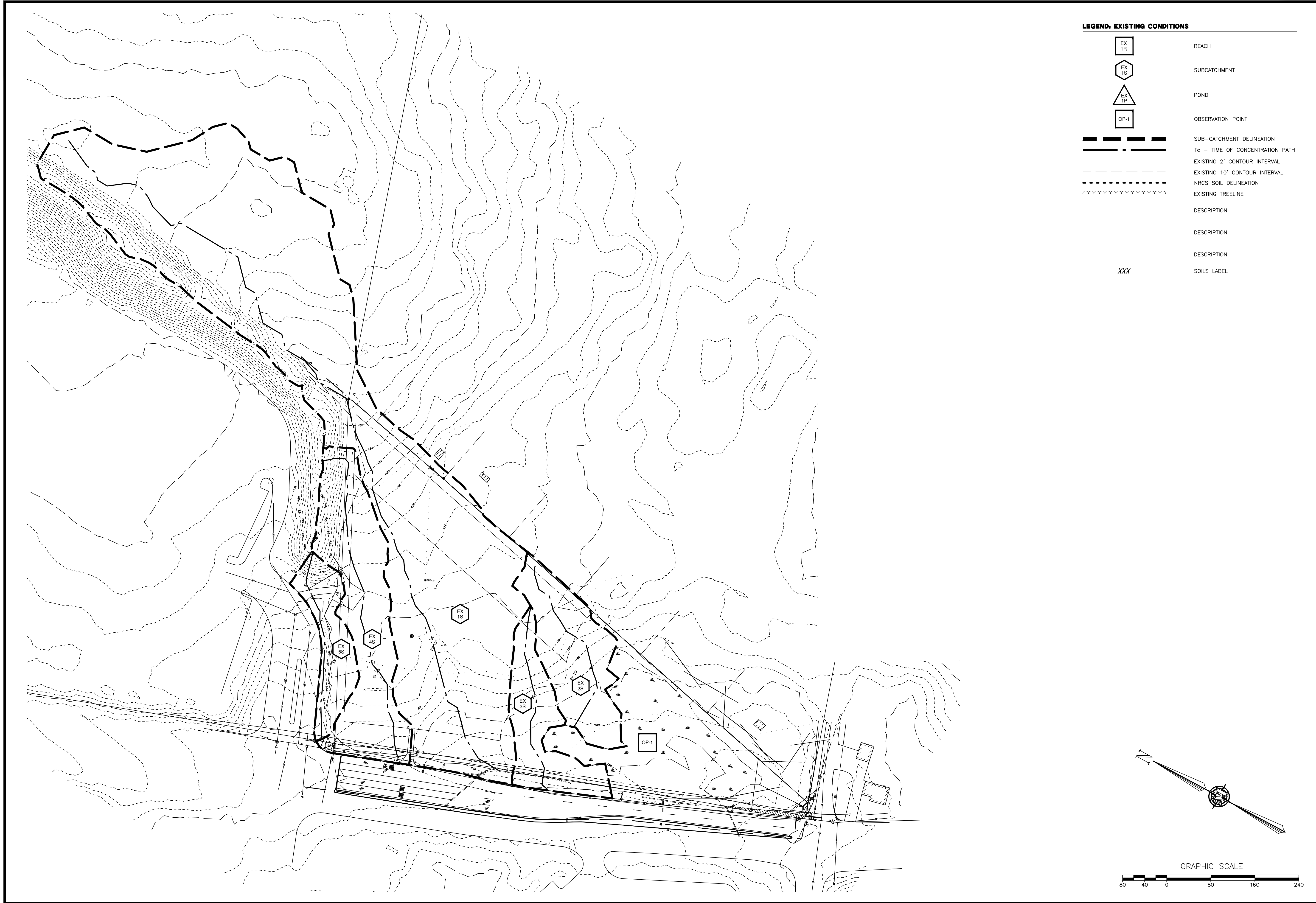
Hydrograph



## **Section 3.1: Drainage Area Plans**

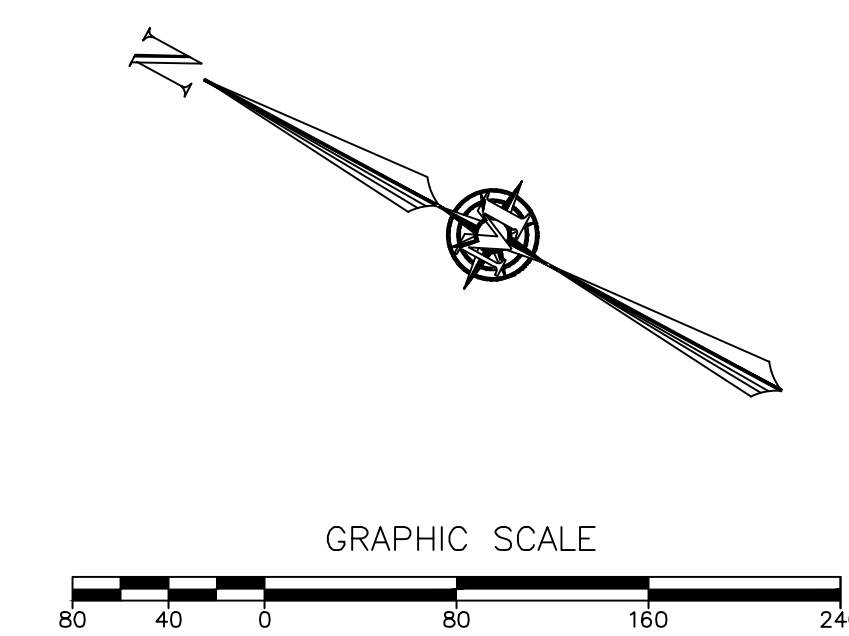
Existing Conditions – Site Design Plan (See attached)

Developed Conditions – Site Design Plan (See attached)

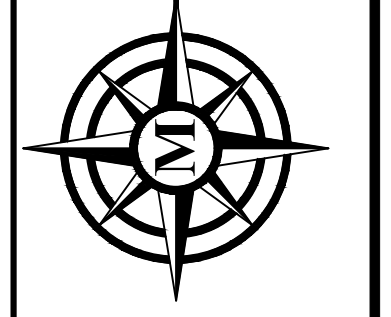


**LEGEND, EXISTING CONDITIONS**

	REACH
	SUBCATCHMENT
	POND
	OBSERVATION POINT
	SUB-CATCHMENT DELINEATION
	T <sub>c</sub> - TIME OF CONCENTRATION PATH
	EXISTING 2' CONTOUR INTERVAL
	EXISTING 10' CONTOUR INTERVAL
	NRCS SOIL DELINEATION
	EXISTING TREELINE
	DESCRIPTION
	DESCRIPTION
	DESCRIPTION
XXX	SOILS LABEL



**MERIDIAN**  
 LAND SERVICES, INC.  
 ENGINEERING | SURVEYING | PERMITTING  
 SOIL & WETLAND MAPPING | SEPTIC DESIGN  
 31 OLD NASHUA ROAD, AMHERST, NH 03051 TEL: 603-673-1441  
 MERIDIANLANDSERVICES.COM FAX: 603-673-1584



REV.	DATE	DESCRIPTION	DR	CK
I				
H				
G				
F				
E				
D				
C				
B				
A				

T-BONES AT LOWELL ROAD  
 EXISTING DRAINAGE PLAN

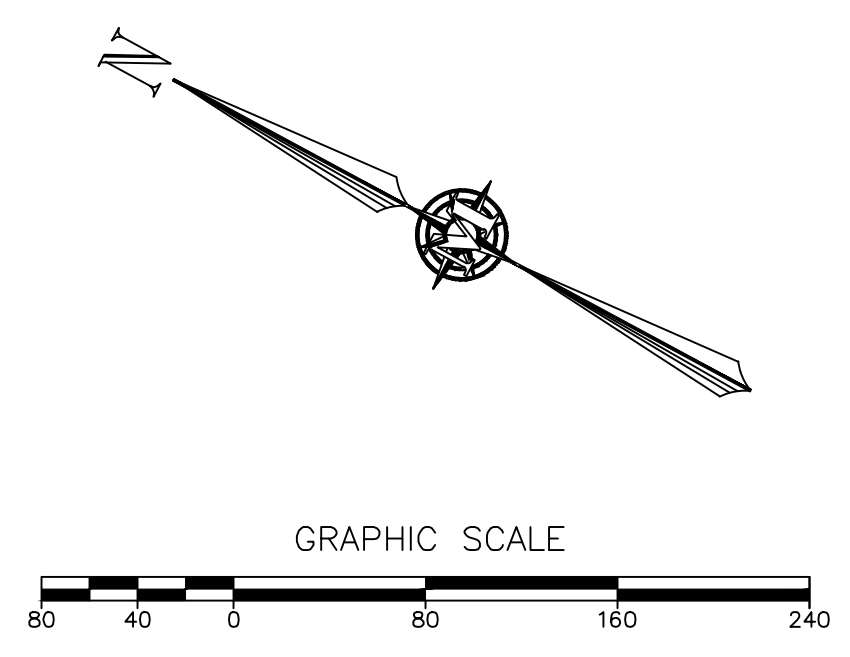
LOWELL ROAD, LLC  
 256 LOWELL ROAD  
 MAP 228 LOT 7  
 HUDSON, NEW HAMPSHIRE

**DRN-EX**  
 SHEET  
 FILE: 12542DRN00.dwg  
 PROJECT 12542.00  
 SHEET NO. 1 OF 2



**LEGEND, DEVELOPED CONDITIONS**

	REACH
	SUBCATCHMENT
	POND
	OBSERVATION POINT
	SUB-CATCHMENT DELINEATION
	T <sub>c</sub> - TIME OF CONCENTRATION PATH
	EXISTING 2' CONTOUR INTERVAL
	EXISTING 10' CONTOUR INTERVAL
	PROPOSED 2'/10' CONTOUR INTERVAL
	NRCS SOIL DELINEATION
	EXISTING TREELINE
	PROPOSED TREELINE
	SOILS LABEL



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**LAND SERVICES, INC.**  
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 31 OLD NASHUA ROAD, AMHERST, NH 03051 TEL: 603-673-1441  
 MERIDIANLANDSERVICES.COM FAX: 603-673-1584

REV.	DATE	DESCRIPTION	DR	CK
A				
B				
C				
D				
E				
F				
G				
H				

T-BONES AT LOWELL ROAD  
 EXISTING DRAINAGE PLAN

LOWELL ROAD, LLC  
 256 LOWELL ROAD  
 MAP 228 LOT 7  
 HUDSON, NEW HAMPSHIRE

**DRN-DV**  
 SHEET  
 FILE: 12542DRN00.dwg  
 PROJECT: 12542.00  
 SHEET NO. 2 OF 2

Plotted: 1/21/2025 11:11 AM By: NCC  
 H:\MLS\12542\0\_Drawings\ENG\12542DRN00.dwg



## MEMORANDUM

**TO:** File

**FROM:** Steven W. Reichert, PE *SWR*

**DATE:** February 10, 2025

**RE:** Town of Hudson Planning Board Review  
T-Bones Site Plan, 256 Lowell Road  
Tax Map 288, Lot 7; Acct. #1350-150  
Fuss & O'Neill Reference No. 20030249.244

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The following list itemizes the set of documents reviewed related to the T-Bones Site Plan project located at 256 Lowell Road in Hudson, New Hampshire.

- Emails between the Town of Hudson and Fuss & O'Neill between January 27 and January 28, 2025.
- Letter from Meridian Land Services, Inc., to Fuss & O'Neill, dated January 28, 2025, and received on January 29, 2025, including the following:
  1. Copy of *Project Narrative*, prepared by Meridian Land Services, Inc., dated January 21, 2025.
  2. Copy of *Site Plan Application*, dated January 21, 2025.
  3. Copy of *Conditional Use Permit Application*, dated January 21, 2025.
  4. Copy of *Town of Hudson Site Plan Review Checklist*, not dated.
  5. Copy of *Wetland Conditional Use Permit Checklist*, not dated.
  6. Copy of *List of Abutters*, prepared by Meridian Land Services, Inc., dated January 13, 2025.
  7. Copy of *New Hampshire Natural Heritage Bureau NHD DataCheck Results Letter*, dated January 17, 2025.
  8. Copy of *Existing Site Photos*, prepared by Meridian Land Services, Inc., dated January 21, 2025.
  9. Copy of *Building Signage Photos*, prepared by Meridian Land Services, Inc., dated January 21, 2025.
  10. Copy of *Proposed Access and Utility (Sewer & Water) Easement Plan*, Sheet 1 of 1, prepared by Meridian Land Services, Inc., dated August 26, 2024, revised August 27, 2024.
  11. Copy of *Traffic Impact Assessment*, prepared by Langan, dated December 2024.
  12. Copy of *Project Stormwater Management Plan*, prepared by Meridian Land Services, Inc., dated January 21, 2025.
  13. Copy of *T-Bones at Lowell Road, Non-Residential Site Plan, Tax Map 288 Lot 7, Hudson, New Hampshire*, prepared by Meridian Land Services, Inc., dated January 21, 2025, with no revisions noted, unless otherwise noted, including the following:
    - a. *Cover*, Sheet 1 of 23.
    - b. *General Notes*, Sheet 2 of 23.
    - c. *Demolition Plan*, Sheet 3 of 23.
    - d. *Erosion & Sedimentation Control Plan*, Sheet 4 of 23.
    - e. *Site Layout Plan*, Sheet 5 of 23.
    - f. *Signage & Marking Plan*, Sheet 6 of 23.

MEMO to FILE  
February 10, 2025  
Page 2 of 2

- g. *Utility Plan*, Sheet 7 of 23.
- h. *Grading & Drainage Plan*, Sheet 8 of 23.
- i. *Water Utility Plan & Profile*, Sheet 9 of 23.
- j. *Sewer Utility Plan & Profile*, Sheet 10 of 23.
- k. *Grading & Drainage Plan*, Sheet 11 of 23.
- l. *Sight Distance Plan & Profile*, Sheet 12 of 23.
- m. *Landscape Plan*, Sheet 13 of 23.
- n. *Lighting Plan*, Sheet 14 of 23.
- o. *Construction Details*, Sheets 15 & 16 of 23.
- p. *Water Utility Details*, Sheet 17 of 23.
- q. *Sewer Utility Details*, Sheet 18 of 23.
- r. *Drainage Details*, Sheet 19 of 23.
- s. *Infiltration Basin Details*, Sheet 20 of 23.
- t. *Erosions & Sedimentation Control Details*, Sheet 21 of 23.
- u. *Erosions & Sedimentation Control Notes*, Sheet 22 of 23.
- v. *Test Pit Data*, Sheet 23 of 23.
- w. *Existing Conditions Plan*, Sheet 1 of 1, prepared by Keach-Nordstrom Associates, Inc., dated August 23, 2024, revised January 14, 2025.
- x. *Boundary Plan of Land*, Sheet 1 of 1, prepared by Keach-Nordstrom Associates, Inc., dated August 23, 2024, revised January 14, 2025.

SWR:elc

cc: Jay Minkarah – Town of Hudson  
Town of Hudson Engineering Division – File



50 Commercial Street, Suite 2S  
Manchester, NH 03101  
603.668.8223  
www.fando.com

February 10, 2025

Mr. Jay Minkarah  
Acting Town Planner  
Town of Hudson  
12 School Street  
Hudson, NH 03051

Re: Town of Hudson Planning Board Review  
T-Bones Site Plan, 256 Lowell Road  
Tax Map 288 Lot 7; Acct. #1350-150  
Reference No. 20030249.244

Dear Mr. Minkarah:

Fuss & O'Neill (F&O) has reviewed the first submission of materials received on January 27, 2024, related to the above-referenced project. Authorization to proceed was received on January 28, 2024. 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 commercial restaurant 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 sewer systems.

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 not proposed adding any sidewalks to the site. There will be a sidewalk along Lowell Road extending north from the Walmart driveway as part of off-site improvements for the Target Distribution Center project. **The applicant should coordinate with the Town for a potential sidewalk connection for the site on the south side of the Walmart driveway along Lowell Road.**
- 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 four-inch water line with a fire service connection to the building. We also note that an existing hydrant is located at the northwest corner of the site.
- c. HR 275-6.T. The applicant is proposing limited off-site improvements that include utility connections and driveway installations. We note a majority of the off-site improvements will be on the Walmart property. The applicant has provided an Access & Utility Easement Plan for this work.
- d. HR 275-8.C.(2)(a) and Zoning Ordinance (ZO) 334-15.A. The applicant has provided parking calculations on the plan set which show that 127 parking spaces are required for the restaurant use. The applicant has proposed 169 spaces which they note is due to the popularity of the restaurant chain and the number of expected users.
- e. HR 275-8.C.(6)(b). The applicant has shown a concrete pad at the back of the building that may be for loading, although it is not labelled as such. **If this is a loading space it does not meet the Hudson regulation requirements.**



- f. HR 275-9.C.(11). The applicant has provided seven handicap accessible parking spaces for the site which exceeds the minimum requirement. **The applicant should revise the Handicap Parking detail to match the space length and width shown on the plan.**
- g. HR 275-9.F. The applicant provided a copy of the proposed easement plan. **No existing or proposed deeds were provided as part of the package received for review. No easements are shown on the Existing Conditions plan or the proposed plans.**

## 2. Administrative Review Codes (HR 276)

- a. HR 276-11.1.B.(6). The applicant should add the owner's signature to the plan set for the final approval copy.
- b. HR 276-11.1.B.(12)(c). The applicant has shown and met the 100-foot setback required on the east side of the site where there are abutting residential uses.
- 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 calculation on the plan. We note the proposed open space number says TBD.**

## 3. Driveway Review Codes (HR 275-6.B/Chapter 193)

- a. HR 193.10.E. The applicant should show the sight line on the profile of the Sight Distance Plan sheet to show sight distance is adequate.
- b. HR 193.10.G. We note that the applicant has proposed two driveways for the site, one that connects to the existing Wal-Mart driveway and one right turn in & right turn out only driveway on Lowell Road. The applicant should review the need for a waiver from the Regulation that .
- c. HR 193.10.I. **We note that the shared driveway with Walmart is not allowed by the Regulation unless approved by the Planning Board.**
- d. The geometry of the proposed Lowell Road driveway does not allow fire truck access without crossing over the proposed median. **The applicant should coordinate with the Hudson Fire Department for fire truck routing to the site.**

## 4. Traffic (HR 275-9.B)

- a. Traffic review comments will be forwarded under separate cover.

## 5. Utility Design/Conflicts

- a. HR 275-9.E & 276-13. The applicant has provided the Town of Hudson's standard water and sewer crossing detail on sheet D-3 with 18" separation between the utilities. We note the proposed sewer main is shown on the sewer profile crossing under the existing water main within the Wal-Mart driveway with less than six inches of clearance between the utilities. The applicant should call out the requirements of Sewer Note #6 from sheet GN-1 on the sewer plan at this location.
- b. Hudson Engineering Technical Guidelines Typical Details (ETGTD) Section 720.8.3 and Detail S-6. The applicant should provide a sewer cleanout on the plan at the property line as required. The plans do include a sewer cleanout detail.
- c. ETGTD Section 720.8.5. The applicant should note on the plans that floor drains, roof drains, sump pumps, or any other non-sanitary sewerage drain cannot be connected to the building's sewer service connection.
- d. ETGTD Details S-1, S-2 & S-3. The applicant has included the Town of Hudson's Sewer Manhole, Standard Manhole – part A, and Internal Drop SMH details in the plans. The plans show a direct connection to the existing sewer main and not a connection through a manhole.

- e. HR 275-9.E & 267-13. The applicant has not included a detail for the proposed grease trap within the plans.
- f. **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.**
- g. HR 275-9.E and 276-13. We have the following comments on water details that are shown on sheet D-3.
  - i. The applicant has included a detail for 1"-2" Service and Valve Box Installation but the proposed water service connection to the site is 4".
  - ii. The applicant has included the Town of Hudson Fire Service Installation with Standard Foundations detail (W-22) but has labelled this as 'Detail Name'.
  - iii. The applicant has included a Water Hydrant Installation detail but has not shown any hydrant installation location.
  - iv. None of the details have a detail number or plan reference number in their title blocks.
- h. The applicant should review the Water and Sewer Utility Plan & Profile sheet titles. We note that Sewer Utility Plan sheet P-2 shows the water plan and profile and the Water Utility Plan sheet P-3 shows the sewer plan and profile.
- i. The applicant should include notes on the plans regarding proposed required hours and traffic accommodations for utility installations that impact the driveway into Walmart and coordination with Walmart for that work.

**6. Drainage Design/Stormwater Management (HR 275-9.A./Chapter 290)**

- a. HR 275-6.F. and 290-5.A.(4). The applicant should provide calculations for groundwater recharge (GRV).
- b. HR 275-9.A.(1). and 290-5.A.(4). The applicant should provide percolation rate data for the test pits. We also note that the test pit data for Test Pits 1-4 is very blurry on the plan.
- c. HR 290-5.A.(1). and 290-5.A.(3). The applicant should provide language in the Drainage Analysis Report, stating how low impact development (LID) strategies for stormwater runoff were evaluated for this project.
- d. HR 275-5.A.(9). The applicant should provide BMP worksheets including separation from ESHWT.
- e. HR 275-5.A.(10). Detail Sheet D-5 illustrates a rip rap scour hole detail that does not coincide with the proposed forebays designed. Applicant should review and update the design or detail accordingly.
- f. HR 275-5.A.(11). The applicant should add spot grades or contour elevations for the berm of the forebays, as well as dimensions of the berm width.
- g. HR 275-5.A.(11). The applicant should provide more information on the use of 1' of separation from ESHWT in the surface infiltration and ensure this meets BMP design criteria per Env-Wq 1500. We note that typically NHDES requires a minimum of 3' separation when infiltration is proposed as treatment.
- h. HR 275-5.A.(11). The applicant should provide top of berm elevations upon the Stormwater Management Pond Detail on Plan Sheet D-6.
- i. HR 275-5.A.(11). The applicant should update the Outlet Control Structure Detail on Plan Sheet D-6 with the appropriate designed elevations and update the notes relative to NH Fish & Game requests.
- j. HR 275-5.A.(12). The applicant should provide an I&M manual for general site maintenance as well as project specific BMPs.
- k. HR 275-5.A.(1).b. The applicant should provide support material or calculations showing the required 80% TSS and 50% TP pollutant removals.
- l. HR 275-6.A.(8). The applicant should ensure the plans note a pre-construction meeting is required with the Town Engineer.
- m. HR 275-7.A.(6). The applicant should provide information as to how the stormwater system is designed to account for frozen ground conditions.

- n. 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.
- o. 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. Including but not limited to drainage design, detailed soil classification, erosion control, etc.
- p. HR 275-10.B. The applicant should ensure the required SWPPP note is upon the plan set.
- q. The plans include a Roof Drain detail to connect the rain leaders to underground piping. The connection of that underground piping to the site drainage system is not shown in the plans.
- r. The plans include a Standard Drainage Manhole detail but not is proposed upon the plans.
- s. The plans do not include a detail for the proposed yard drain YD-1.
- t. The applicant should label the outlet control structure (OCS-1) on the drainage plan.
- u. 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.
- v. 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 334-14. In the zoning notes on sheet Sp-3 the applicant has noted the building height maximum as 50 feet, and the height of the proposed building as less than 50 feet (<50 ft). The maximum height allowed by the ordinance for the project site is 38 feet. The applicant should update the note.
- b. ZO 334-17 & 334-21. The subject parcel is located within the Business (B) zoning district and the applicant has noted this on the plans. The proposed restaurant use is allowed within the district.
- c. 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.
- d. ZO 334-58. The applicant has shown a proposed freestanding sign location on the plans but has not included any size or detail information for that sign other than minimum and maximum requirements.
- e. 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).(a) (b) & (c). The applicant should provide landscaping calculations on the plan showing that these requirements are met.
- b. HR 275-8.C.(d). The applicant has noted on the plan that a waiver has been requested for this requirement.

Mr. Jay Minkarah  
February 10, 2025  
Page 5 of 5

- c. HR 275-8.C.(8). The applicant has proposed to leave 100 feet of existing vegetation between the site and the abutting residential properties to the east.
- d. HR 276-11.1.B.(14). The applicant has provided a lighting plan. The applicant should add lighting types and mounting heights to the plan.
- e. The applicant should review the landscaping plans against the lighting plans as several light pole locations appear to directly conflict with tree plantings.
- f. The applicant should note the hours of operation for the site and the relationship of those hours to the site lighting.

**10. State and Local Permits (HR 275-9.G.)**

- a. HR 275-9.G. The applicant has listed 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. The applicant should revise the name of Sheet 11 to match the Plan Index.
- b. The applicant has not included a retaining wall detail within the plans.
- c. 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 for the Contractors attention.
- d. The applicant included a Pedestrian Crossing detail on sheet D-2 of the plans, but has not shown any locations where this is proposed.

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  
Meridian Land Services, Inc. – SRFoisie@meridianlandservices.com

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

T-Bones Lowell Road Site Plan  
Town of Hudson  
Fuss & O'Neill Reference No. 03-0249.2440  
Reviewed February 10, 2025

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

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

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

Applicant		Staff	
Initials		Initials	
_____	ak) Buffer as required by site plan regulations	<u>Fuss &amp; O'Neill/SWR</u>	
_____	al) Green and open space requirements met with percentages of both types of spaces inscribed on the plan	_____	al) Calculation not provided.
_____	am) Soil types and boundaries, Note: if site contains marginal or questionable soils, a High Intensity Soil Survey (HISS) may be deemed necessary to submit as part of the application. Said HISS, if required, shall be performed by a State of New Hampshire certified Soil Scientist, who shall affix his/her stamp and signature shall be inscribed on the plan.	<u>Fuss &amp; O'Neill/SWR</u>	
_____	an) Wetlands (and poorly-drained and very poorly-drained soils), also identified as Class 5 and Class 6 High Intensity Soil Survey (HISS soils), and permanent and seasonal wetlands shall be identified on the plan by a New Hampshire certified Wetland or Soil Scientist, who shall affix his/her stamp and signature to the respective plan.	<u>Fuss &amp; O'Neill/SWR</u>	
_____	ao) "Valid for one year after approval" statement inscribed on the plan	<u>Fuss &amp; O'Neill/SWR</u>	ao) Two years noted.
_____	ap) Loading bays/docks	_____	ap) No loading spaces shown.
_____	aq) State of New Hampshire engineer's stamp, signature, surveyor's stamp, and signature	<u>Fuss &amp; O'Neill/SWR</u>	
_____	ar) Error of closure (1 in 10,000 or better)	<u>Fuss &amp; O'Neill/SWR</u>	
_____	as) Drafting errors/omissions	_____	as) Not stated.
_____	at) Developer names, addresses, telephone numbers and signatures	_____	at) Signature not provided.
_____	au) Photographs, electronic/digital display or video of site and area	<u>Fuss &amp; O'Neill/SWR</u>	
_____	av) Attach one (1) copy of the building elevations	_____	av) Not provided.
_____	aw) Fiscal impact study	_____	aw) Not provided.
_____	ax) Traffic study	<u>Fuss &amp; O'Neill/SWR</u>	
_____	ay) Noise study	_____	ay) Not provided.

Applicant  
Initials

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

Staff  
Initials

- Fuss & O'Neill/SWR az) Proposed Easement Plan provided.
- \_\_\_\_\_ ba) None provided.
- \_\_\_\_\_ bb) No presentation plan received, requires Town action.
- \_\_\_\_\_ bc) Requires Town action.
- \_\_\_\_\_ bd) Requires Town action.

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

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December 2024

256 Lowell Road, LLC  
9 Old Derry Road  
Hudson, NH 03051**Re: Traffic Impact Assessment  
T-Bones Restaurant  
256 Lowell Road, Hudson, NH  
Langan Project No.: 151055501**

To whom it may concern:

Langan Engineering & Environmental Services, LLC prepared this traffic-impact assessment for the proposed T-Bones restaurant at 256 Lowell Road in the Town of Hudson, NH. The applicant plans to develop the vacant site with a 9,500 square foot (SF) sit-down restaurant with 201 surface level on-site parking spaces with an expected completion date of 2027 or sooner. We prepared a trip generation analysis for the proposed uses and determined that the proposed development is expected to generate no more than 91 net-new peak-hour trips. In addition, we analyzed the traffic impacts at one signalized intersection at Walmart Boulevard and Lowell Road and determined that the intersection is expected to operate at Level of Service (LOS) D or better during the morning and afternoon peak hours in the 2027 build conditions. This letter report includes trip-generation calculations and intersection capacity analysis. **Figure 1** below shows an aerial photograph of the site location.

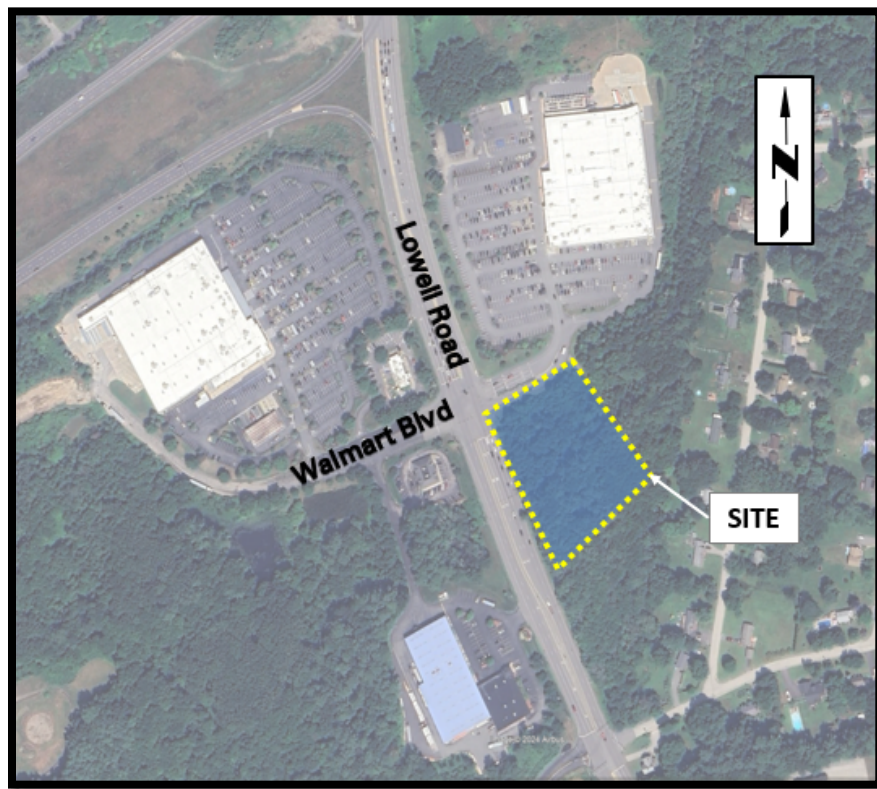


Figure 1: Site Aerial Photograph

**Project Description**

The project proposes to develop the vacant site at 256 Lowell Road in Hudson, NH with a new 9,500 SF sit-down restaurant and 201 surface level on-site parking spaces. The proposed development is expected to be built by 2027. The restaurant will be accessible through two driveways; one full-access driveway located on Walmart Boulevard and a right-turn only ingress/egress driveway located on Lowell Road. Walmart Boulevard is a two-lane local roadway with exclusive left and right turn lanes that travels east-west to provide access to and from Lowell Road. Lowell Road is a four-lane roadway with exclusive left and right turn lanes that travels north-south and serves as the main access to Circumferential Highway. **Attachment A** contains a copy of the site plan that shows the development program and the proposed access for the site.

**Trip Generation Analysis**

We prepared a trip generation for the proposed development and determined that the proposed development is expected to generate 1,018 daily, 91 morning, and 49 afternoon net-new peak hour trips. We prepared daily, morning and afternoon peak hour trip estimates for the proposed development using equations for the 11<sup>th</sup> Edition of the ITE *Trip Generation Manual*. To estimate the morning peak hour trip generation of the High Turnover (Sit-Down) Restaurant (Land Use 932). During the afternoon peak hour, we applied a pass-by rate of 43% based on rates derived from the 11<sup>th</sup> Edition of the ITE *Trip Generation Manual*. **Table 1** summarized the trip-generation estimates for the proposed development. **Attachment B** contains a detailed trip generation table and excerpts from the ITE Manual.

**Table 1 - Trip Generation Estimates**

Use	Size	Daily	Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
			In	Out	Total	In	Out	Total
High Turnover (Sit-Down) Restaurant	9,500 SF	1,018	50	41	91	33	16	49

**Intersection Capacity Analysis (Level of Service)**

We collected traffic volume data at the intersection of Walmart Boulevard and Lowell Road on Tuesday, October 8, 2019, from 7:00 to 9:00 AM and 4:00 to 6:00 PM. We applied a seasonal adjustment factor (1.007) to convert the afternoon peak-hour traffic data into peak season volumes. The seasonal adjustment factor was determined based on our review of data from NHDOT count station 229022, located in Hudson on Sagamore Bridge Road east of the Nashua town line, from October 2016. We concluded from the data that June was the peak month and so we found our seasonal adjustment factor by taking the ratio of June’s evening traffic volume to October’s evening traffic volume. We did not apply a seasonal adjustment factor to the morning peak-hour traffic data because we found a seasonal adjustment factor of 1.00 for the morning using the same ratio. Additionally, we compared the data and determined that the peak hour occurred between 7:15 to 8:15 AM and from 4:30 to 5:30 PM for the study area.

Since the existing data was collected in 2019, we applied a growth rate over a five-year period to derive the 2024 existing traffic volumes. We used historical traffic data from four NHDOT count stations to calculate an area-wide growth rate which yielded a 0.66% growth rate. We applied

the growth rate to the existing 2019 traffic volumes to develop the 2024 baseline existing conditions for the study. **Figure 2** below illustrates the existing weekday morning and afternoon peak hour traffic volumes. **Attachment C** contains the traffic data.

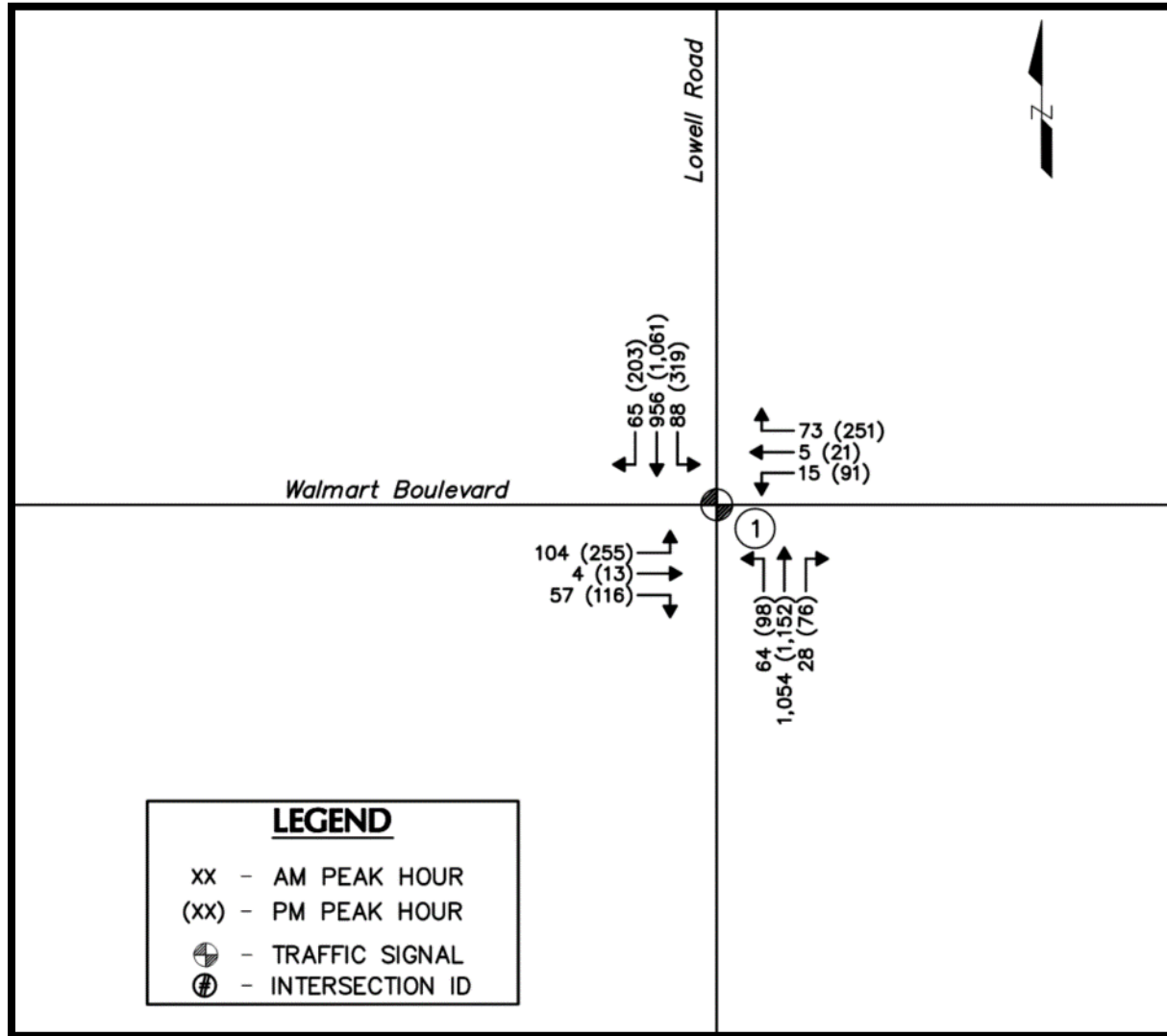


Figure 2: 2024 Existing Peak-Hour Volumes

Similarly, we used the same 0.66% growth rate and applied this to the 2024 existing traffic volumes over a three-year period to develop the 2027 baseline conditions. Additionally, we added project generated traffic from one committed development (Hillwood Hudson Warehouse Development) to the 2027 baseline conditions to develop 2027 no-build volumes. **Figure 3** below illustrates the 2027 no-build traffic volumes.

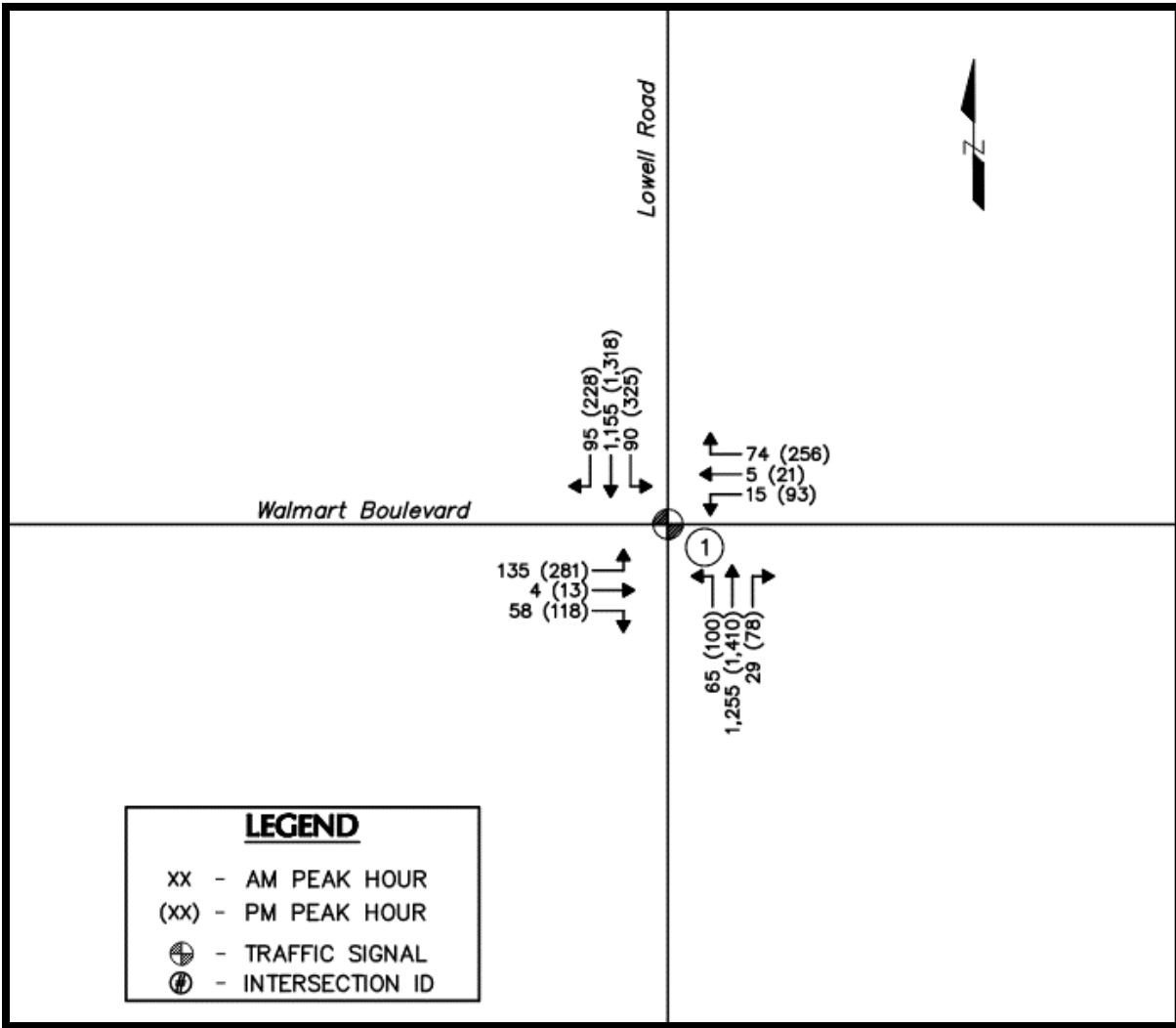


Figure 3: 2027 No Build Peak Hour Volumes

We used census data and the Journey to Work (JTW) Model to determine the directional distribution of site-generated trips. The OnTheMap website, created by the United States Census Bureau, was used to produce a work destination report based on census blocks. The report produces the number of people who commute to the selected work census blocks from home census blocks. Work census blocks were designated as census blocks that are within a 24-mile radius of the project site. A distribution was developed based on the direction of the home census blocks from the work census blocks and the number of employees in each home census block. Preferred routes were then assigned to the existing roadway, originating from the project site that follows the JTW distribution. Accordingly, 71% of the project traffic is expected to access the site from the north and 29% from the south. **Figures 4 and 5** below shows the proposed development's traffic distributions and pass-by traffic distribution, respectively, to the study intersections.

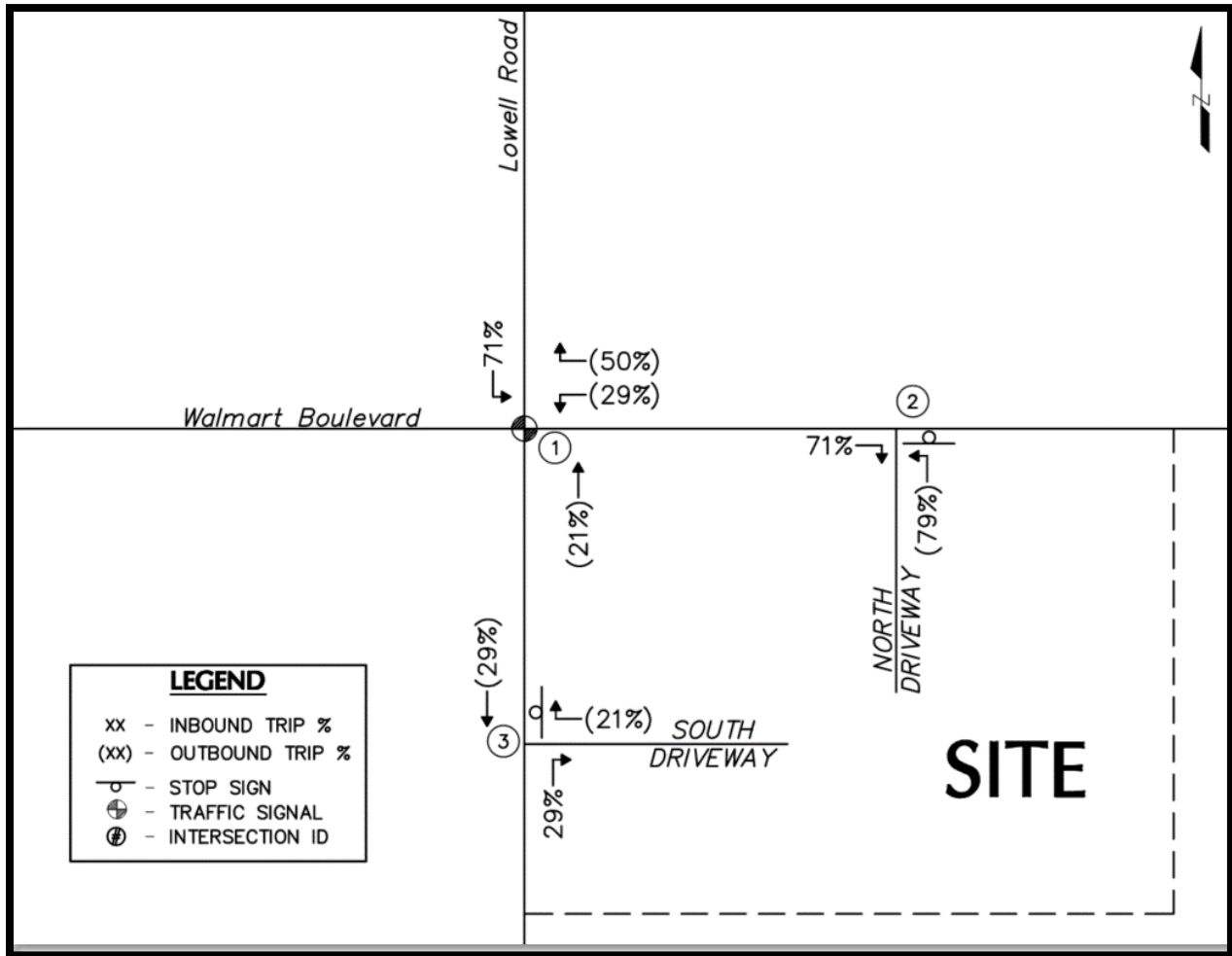


Figure 4: Project Traffic Distribution

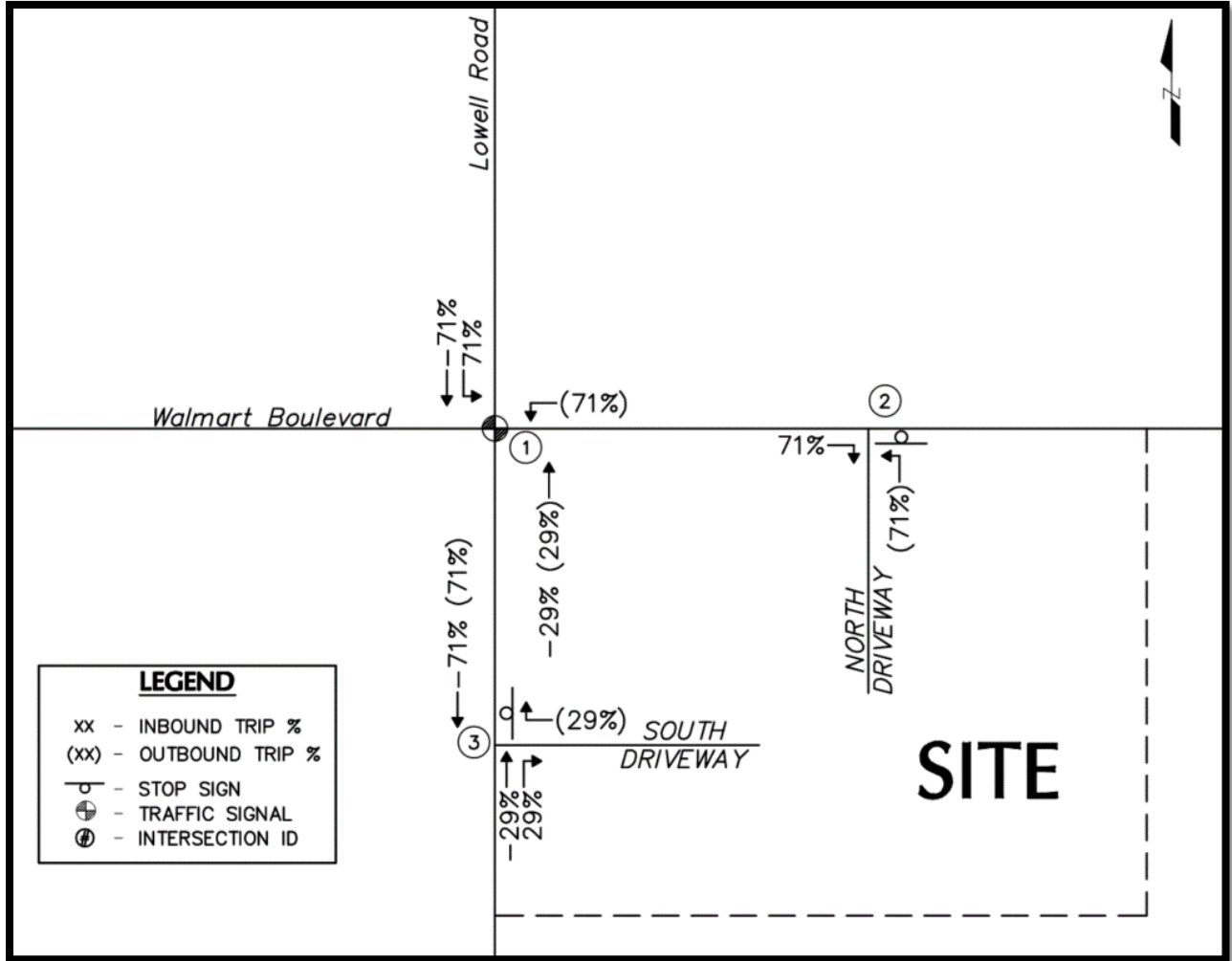


Figure 5: Pass-By Distribution

Figures 6 and 7 below illustrate the morning and afternoon development-traffic assignments and pass-by traffic assignments, respectively, at the study intersections.

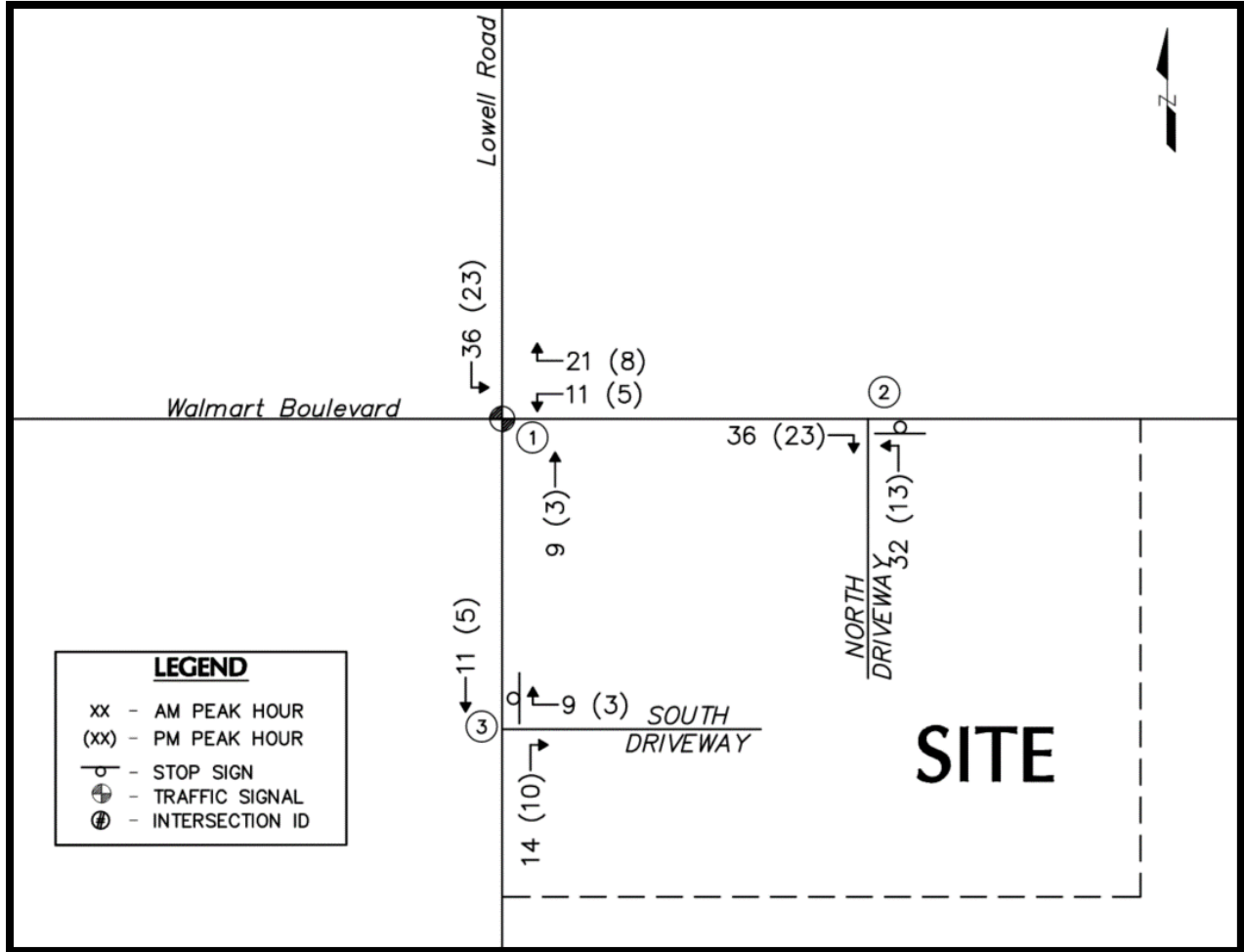


Figure 6: Project Traffic Assignment

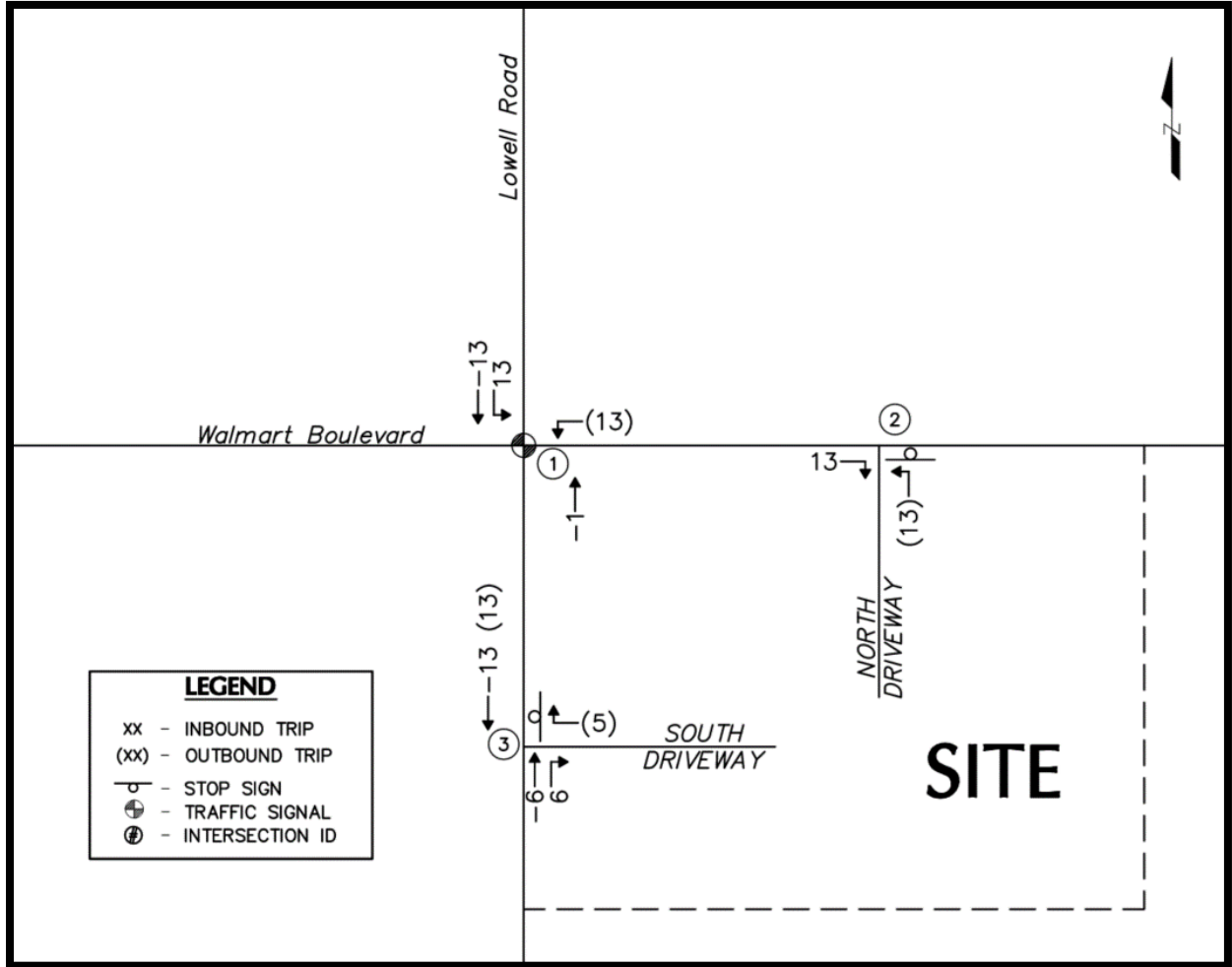


Figure 7: Pass-By Traffic Assignment (Afternoon Peak Hour)

We added the project generated trips to the grown traffic volumes to develop the 2027 build conditions traffic volumes. **Figure 8** below illustrates the 2027 build morning and afternoon peak-hour traffic volumes.



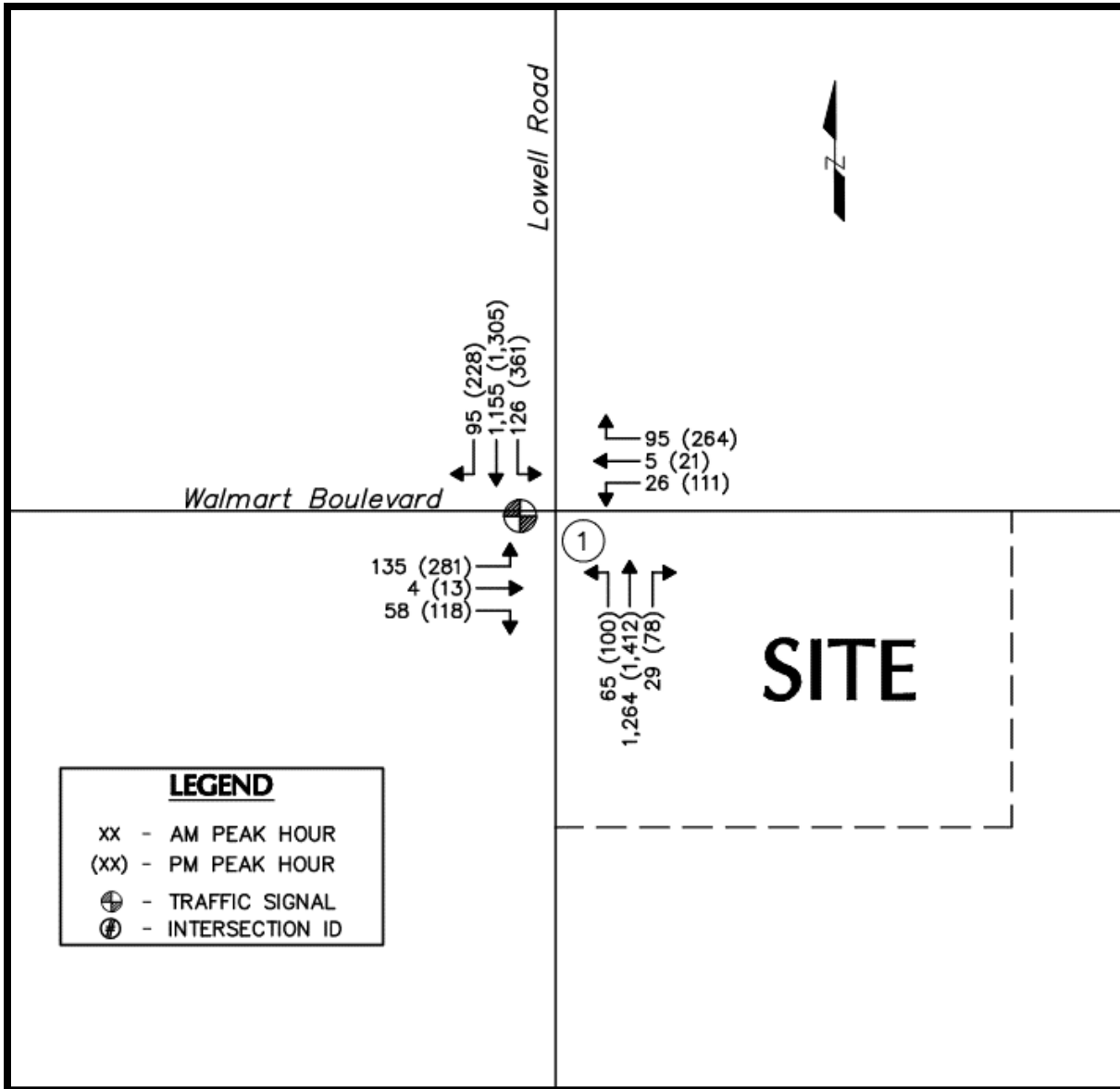


Figure 8: 2027 Build Peak Hour Volumes

We conducted 2024 existing, 2027 no build and 2027 build conditions capacity analyses for the study intersection using Synchro software. We found that the signalized intersection is expected to operate at LOS D or better during the morning and afternoon peak hours during the 2027 build conditions. Additionally, the proposed Hillwood Hudson development has committed to improving the intersection of Lowell Road and Walmart Boulevard by converting the exclusive northbound right turn lane into a shared through and right tur lane, and by constructing an additional southbound through lane. We included these proposed improvements in the no build and build conditions.

**Table 2** summarizes the results of the intersection capacity analyses summary. **Attachment D** contains intersection-volume tables; **Attachment E** contains the capacity-analyses worksheets. **Attachment F** contains an excerpt from the previously approved Hillwood Hudson development outlining the proposed improvements and project generated traffic. Capacity analysis provides an

indication of the adequacy of intersection and roadway facilities to serve traffic demand. The evaluation criteria used to analyze the study intersections is based on the 6<sup>th</sup> Edition of the *Highway Capacity Manual* published by the Transportation Research Board.

**Table 2 - Intersection Capacity Summary**

Location	Traffic Control	Approach	Time Period	2024 Existing Conditions		2027 No Build Conditions		2027 Build Conditions	
				LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
(1) Lowell Road & Walmart Boulevard	Signalized	Overall	AM	B	18.7	B	18.0	B	19.7
			PM	D	47.5	D	45.4	D	47.6

**Driveway Analysis & Turn Lane Analysis**

The proposed development will have two driveways, one full access driveway connection to Walmart Boulevard and one right-turn only ingress/egress driveway to Lowell Road. We determined that both driveways are expected to operate at LOS C or better during the morning and afternoon peak hour conditions. The proposed development is expected to generate at most 36 right turns into the driveway connection to Walmart Boulevard, and at most 16 right turns into the driveway connection to Lowell Road. We analyzed the need for exclusive turn lanes at the proposed driveway connections based on NCHRP 457 and determined the development does not warrant the need for turn lanes. Attachment E contains the exclusive turn lane warrant analysis worksheets. **Figure 9** below shows the site-driveway peak-hour volumes.

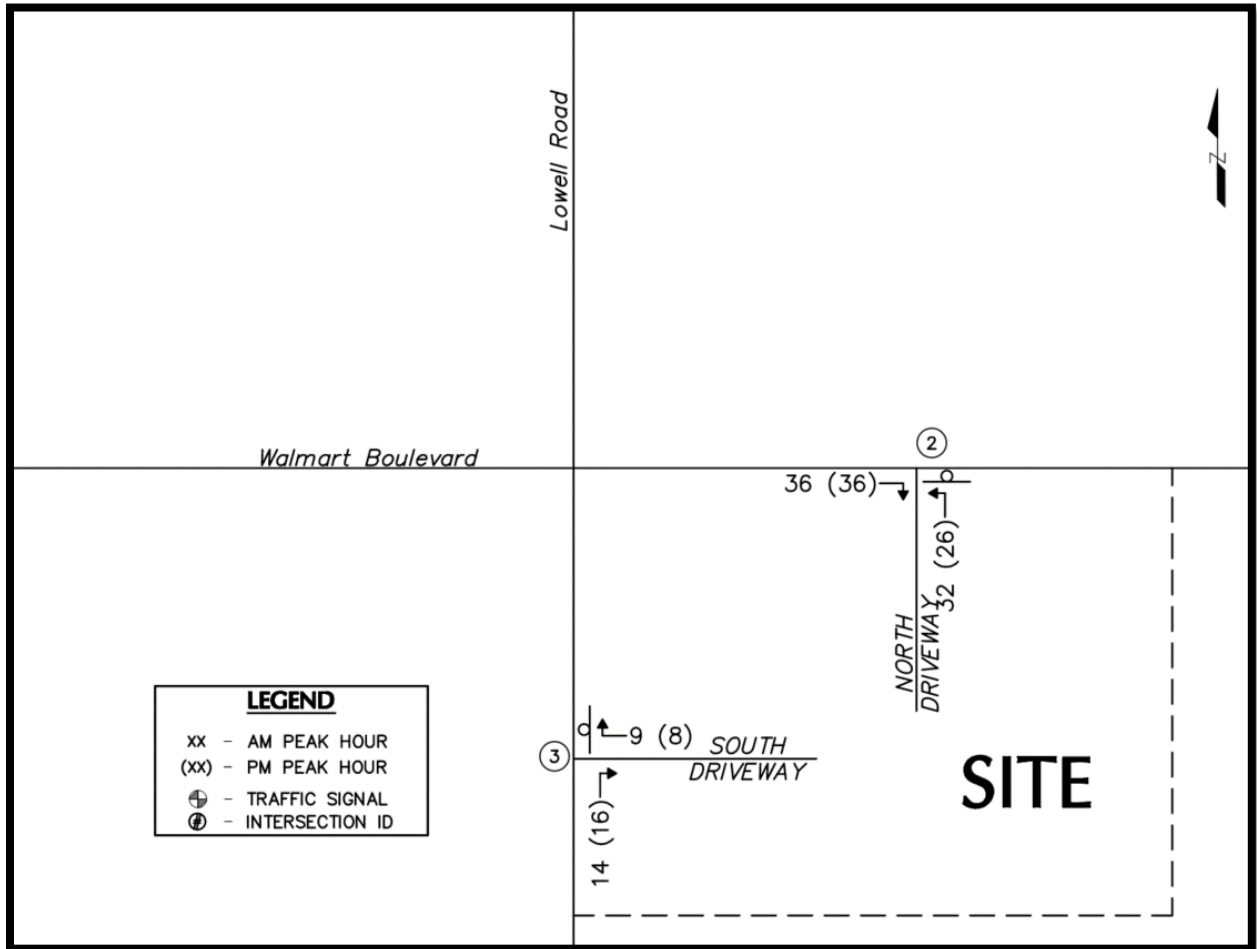


Figure 9: 2027 Peak Hour Driveway Volumes

## Conclusion

We determined that the proposed T-Bones restaurant is not expected to significantly impact the surrounding roadway network. In addition, the intersection capacity analysis demonstrated that the intersection of Walmart Boulevard and Lowell Road has the capacity to accommodate the expected increase in traffic from the proposed development. The expected ingress volumes do not warrant the need for an exclusive turn lane at the proposed connections to Walmart Boulevard and Lowell Road.

Please contact me at (617) 824-9161 with any questions or comments you may have.

Sincerely,

**Langan Engineering and Environmental Services, LLC**



Maximo G. Polanco, P.E.  
Senior Project Manager

MGP:jsp

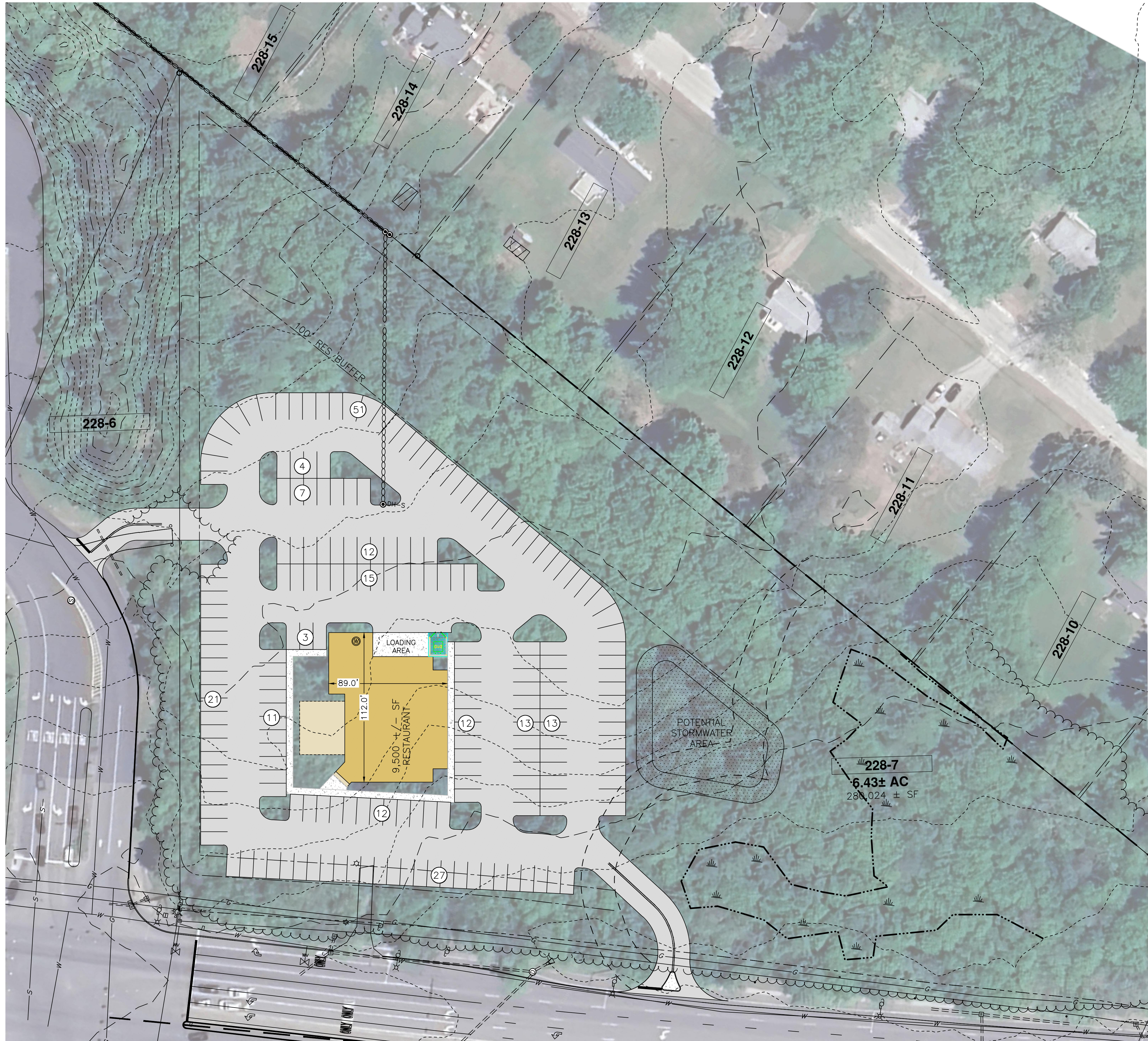
### Attachments:

- Attachment A – Site Plan
- Attachment B – Trip Generation Data
- Attachment C – Count Data, Census Data & Growth Rate
- Attachment D – Intersection Volume Spreadsheet
- Attachment E – Intersection Capacity Analysis
- Attachment F – Committed Improvements

**DRAFT** Attachment "F"

**ATTACHMENT A  
SITE PLAN**





**NOTES:**

1. THE APPLICANT INTENDS TO CONSTRUCT A 9,500 SQUARE FOOT RESTAURANT AND 36 DWELLING UNITS ON MAP 228 LOT 7.
2. OWNER OF RECORD:  
256 LOWELL ROAD, LLC  
9 OLD DERRY ROAD  
HUDSON, NEW HAMPSHIRE 03051  
BK. 9645 PG. 2437
3. REFERENCING THE ZONING MAP OF THE TOWN OF HUDSON, MAP 228 LOT 7 IS LOCATED WITHIN THE BUSINESS (B).
4. THE EXISTING TOPOGRAPHY WAS OBTAINED FROM NEW HAMPSHIRE (NH) GEOGRAPHICALLY REFERENCED ANALYSIS AND INFORMATION TRANSFER SYSTEM (GRANT) LIDAR POINT CLOUD DATA (MERRIMACK CLASSIFIED LAS - PUBLISHED IN 2016). VERTICAL DATUM IS REPORTED TO BE NAVD88.
5. THE EXISTING AREA OF TAX MAP 3D-1 LOT 4 IS 11.4 ACRES (494,391 SF).
6. NO WETLAND INSPECTION/DELINEATION HAS BEEN PERFORMED BY THIS OFFICE.
7. THE EXISTING CONDITIONS DEPICTION WAS OBTAINED FROM VARIOUS SOURCES AND IS TO BE CONSIDERED APPROXIMATE. NO GUARANTEE IS MADE TO THE ACCURACY OF THIS INFORMATION. DATA SOURCES INCLUDE BUT ARE NOT LIMITED TO:  
• AERIAL PHOTOGRAPHY  
• NEW HAMPSHIRE GEOGRAPHICALLY REFERENCED ANALYSIS AND INFORMATION TRANSFER SYSTEM (NH GRANT) GEODATA.

**ZONING NOTES:**

1. REFERENCING THE ZONING MAP OF THE TOWN OF HUDSON, MAP 228 LOT 7 IS LOCATED WITHIN THE BUSINESS (B).
2. DIMENSIONAL REQUIREMENTS FOR THE BUSINESS (B):

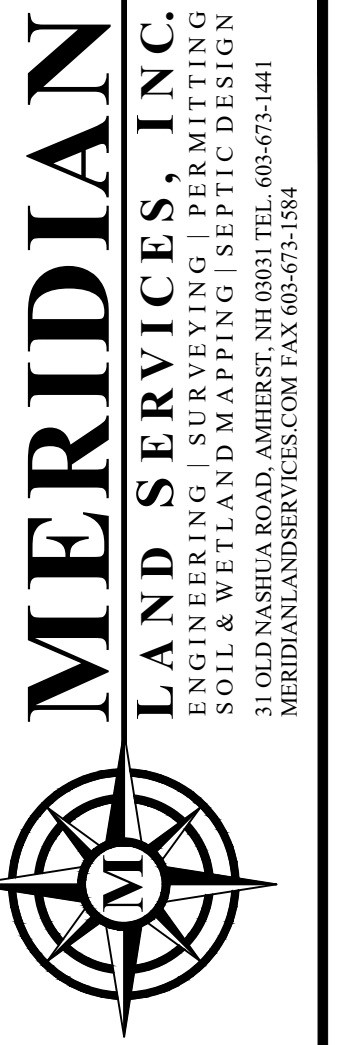
ZONING SUMMARY			
ZONE: BUSINESS (B)			
REQUIREMENT	REQUIRED	EXISTING	PROPOSED
LOT SIZE	43,560 SF	280,024 SF	280,024 SF
LOT SIZE WITH SEWER/WATER	30,000 SF	280,024 SF	280,024 SF
FRONTAGE	150 FT	760 FT	760 FT
FRONT YARD SETBACK	50 FT	NOT APPLICABLE	TBD
REAR YARD SETBACK	15 FT	NOT APPLICABLE	TBD
SIDE YARD SETBACK	15 FT	NOT APPLICABLE	TBD
MAX. BLDG HEIGHT	50 FT	NOT APPLICABLE	TBD
MIN. GREEN SPACE	20 FT *	NOT APPLICABLE	TBD
RESIDENTIAL BUFFER	100 FT **	NOT APPLICABLE	TBD
MAX. BUILDING COVERAGE	NOT APPLICABLE	N/A	N/A
WETLAND BUFFER	50 FT	N/A	TBD

\* A GREEN (I.E., GRASS OR LANDSCAPING) AREA SHALL BE SHOWN BETWEEN THE RIGHT-OF-WAY LINE AND ANY PAVEMENT, GRAVEL OR STRUCTURE (EXCEPTING APPROVED DRIVEWAYS). THE MINIMUM WIDTH SHALL BE 20 FEET WHERE THERE IS A THIRTY-FOOT BUILDING SETBACK LINE OR 35 FEET WHERE THERE IS A FIFTY-FOOT BUILDING SETBACK LINE.

\*\* PER SECTION 276-11.1b(12)(C) IN ALL ZONING DISTRICTS OTHER THAN THE GENERAL (G) AND THE GENERAL-ONE ZONING DISTRICTS, WHERE A COMMERCIAL OR INDUSTRIAL USE OR ZONING DISTRICT ABUTS A RESIDENTIAL USE OR ZONING DISTRICT AND ANY IMPROVED PART OF THE NON-RESIDENTIAL DEVELOPMENT.

DENSITY SUMMARY			
BUILDABLE LOT AREA	RATIO	ALLOWED	PROVIDED
280,024 SF	3 UNITS REQUIRE 53,560 SF EACH ADDITIONAL REQUIRES 5,000 SF	45.3 UNITS	48 UNITS

PARKING SUMMARY			
DESCRIPTION	RATIO	REQUIRED	PROVIDED
RESTAURANT (9,500 SF)	1 SPACE PER 75 SF	126.67 SPACES	201 SPACES

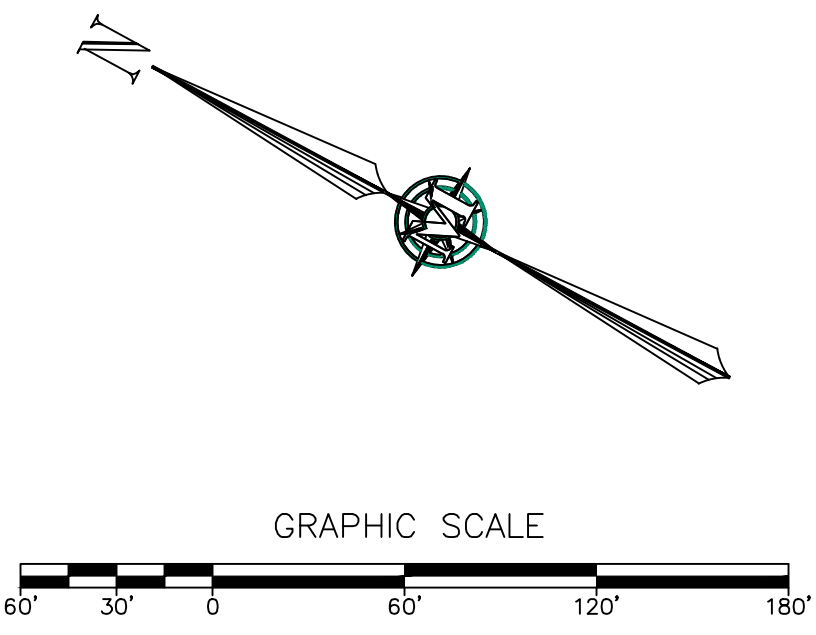


REV.	DATE	DESCRIPTION	DR	CK
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

APRIL 24, 2024

SCALE: 1" = 60'

**Q-1**  
SHEET  
PROJECT: Hudson 241120.dwg  
SHEET NO. 1 OF 1





**DRAFT** Attachment "F"

**ATTACHMENT B  
TRIP GENERATION DATA**

# DRAFT

TRIP GENERATION ANALYSIS  
T-BONES

DAILY

Land Use	ITE Code	Size	Trip Generation Rate	In	Out	Total Trips			Pass-by				Net New Trips		
						In	Out	Total	In	Out	Total	%	In	Out	Total
<u>Proposed Uses</u> High Turnover (Sit-Down) Restaurant	932	9,500 SF	T = 107.20 (X)	50%	50%	509	509	1,018	0	0	0	0%	509	509	1,018

MORNING PEAK HOUR

Land Use	ITE Code	Size	Trip Generation Rate	In	Out	Total Trips			Pass-by				Net New Trips		
						In	Out	Total	In	Out	Total	%	In	Out	Total
<u>Proposed Uses</u> High Turnover (Sit-Down) Restaurant	932	9,500 SF	T = 9.57 (X)	55%	45%	50	41	91	0	0	0	0%	50	41	91

AFTERNOON PEAK HOUR

Land Use	ITE Code	Size	Trip Generation Rate	In	Out	Total Trips			Pass-by				Net New Trips		
						In	Out	Total	In	Out	Total	%	In	Out	Total
<u>Proposed Uses</u> High Turnover (Sit-Down) Restaurant	932	9,500 SF	T = 9.05 (X)	61%	39%	52	34	86	19	18	37	43%	33	16	49



DRAFT Attachment "F"

## High-Turnover (Sit-Down) Restaurant (932)

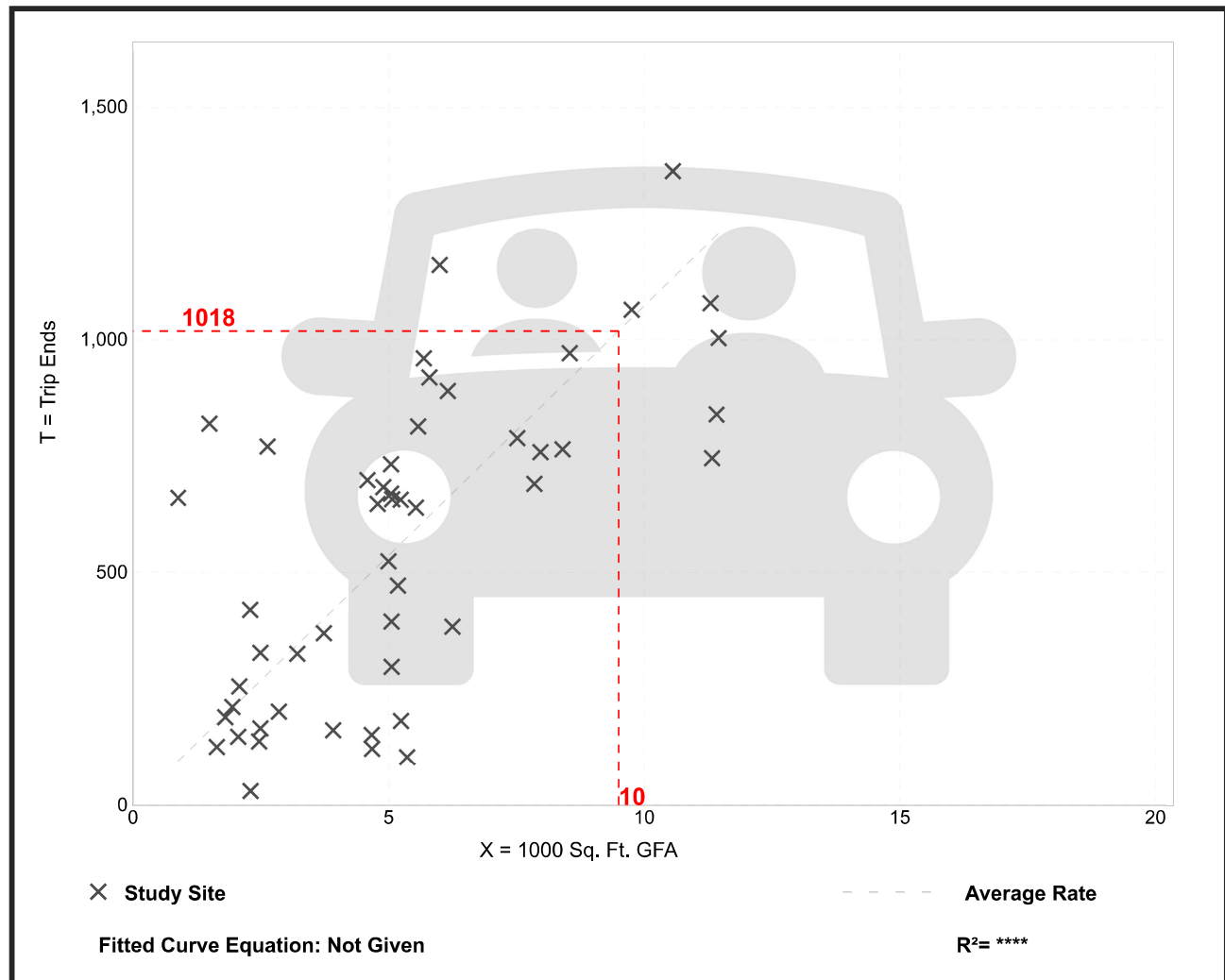
**Vehicle Trip Ends vs: 1000 Sq. Ft. GFA**  
**On a: Weekday**

**Setting/Location: General Urban/Suburban**  
Number of Studies: 50  
Avg. 1000 Sq. Ft. GFA: 5  
Directional Distribution: 50% entering, 50% exiting

### Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
107.20	13.04 - 742.41	66.72

### Data Plot and Equation



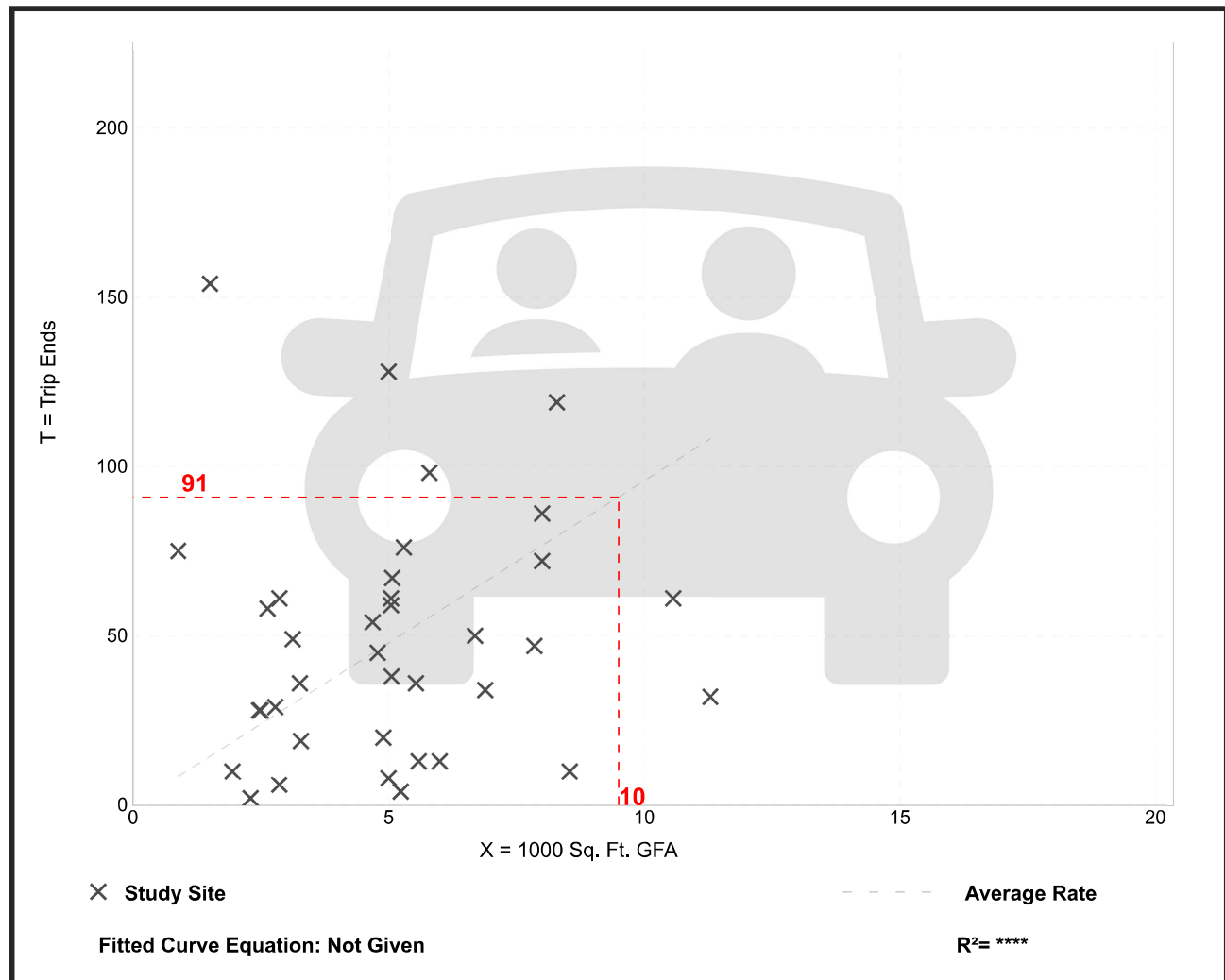
## High-Turnover (Sit-Down) Restaurant (932)

**Vehicle Trip Ends vs:** 1000 Sq. Ft. GFA  
**On a:** Weekday,  
**Peak Hour of Adjacent Street Traffic,**  
**One Hour Between 7 and 9 a.m.**  
**Setting/Location:** General Urban/Suburban  
 Number of Studies: 37  
 Avg. 1000 Sq. Ft. GFA: 5  
 Directional Distribution: 55% entering, 45% exiting

### Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
9.57	0.76 - 102.39	11.61

### Data Plot and Equation



# DRAFT Attachment "F"

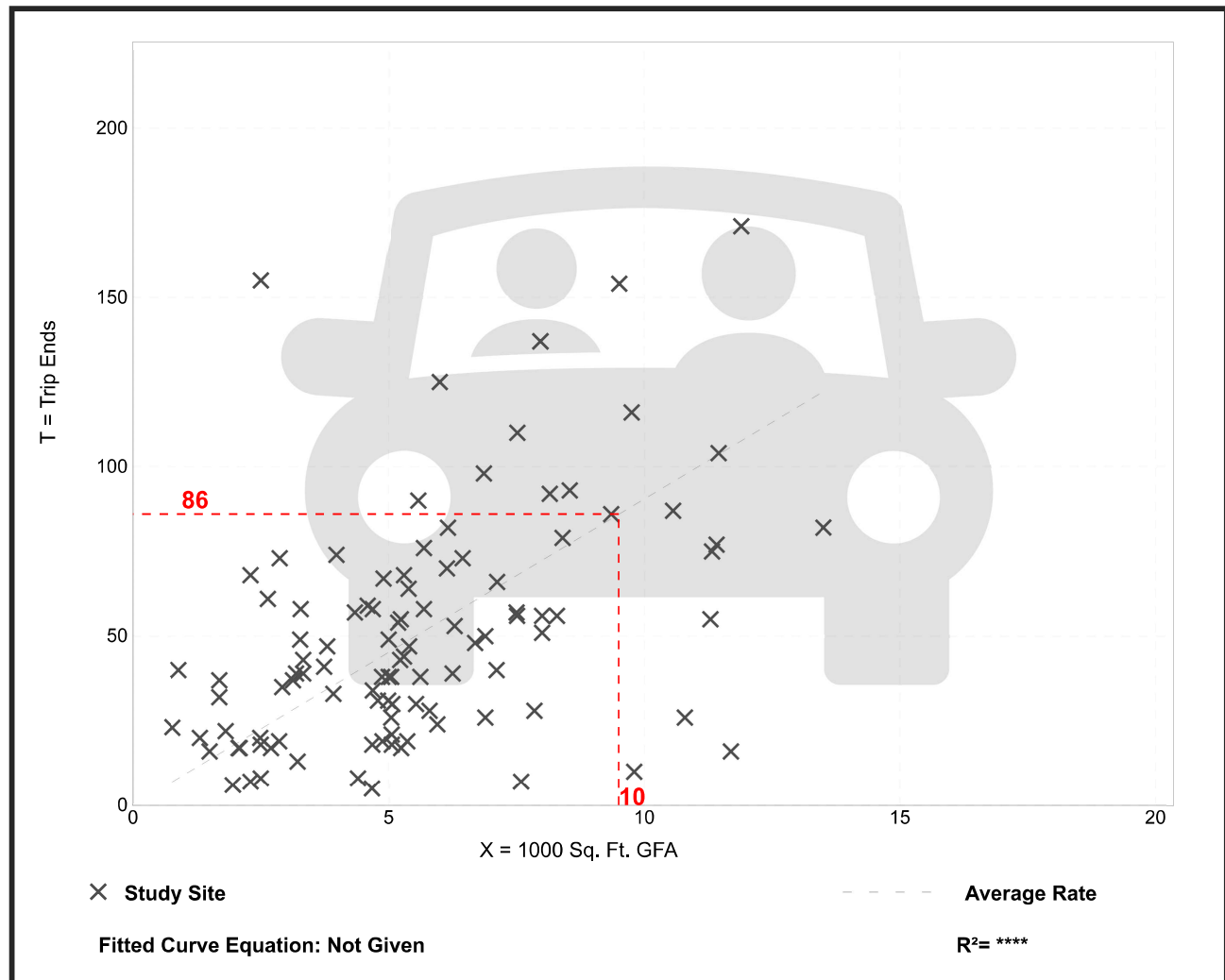
## High-Turnover (Sit-Down) Restaurant (932)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA  
On a: Weekday,  
Peak Hour of Adjacent Street Traffic,  
One Hour Between 4 and 6 p.m.  
Setting/Location: General Urban/Suburban  
Number of Studies: 104  
Avg. 1000 Sq. Ft. GFA: 6  
Directional Distribution: 61% entering, 39% exiting

### Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
9.05	0.92 - 62.00	6.18

### Data Plot and Equation





**DRAFT** Attachment "F"

**ATTACHMENT C  
COUNT DATA, CENSUS DATA & GROWTH RATE**

Accurate Counts

978-664-2565

Attachment "F"

File Name : 10101008

Site Code : 10101008

Start Date : 10/8/2019

Page No : 1

DRAFT

N/S Street : Lowell Road  
 E/W Street: Walmart / Sams Club  
 City/State : Hudson, NH  
 Weather : Cloudy

Groups Printed- Cars - Trucks

Start Time	Lowell Road From North				Walmart From East			Lowell Road From South				Sams Club From West			Int. Total
	Left	Thru	Right	U-TR	Left	Thru	Right	Left	Thru	Right	U-TR	Left	Thru	Right	
06:00 AM	11	105	3	0	2	0	3	4	73	2	0	3	0	6	212
06:15 AM	5	128	3	0	1	0	10	2	122	6	1	6	3	2	289
06:30 AM	9	163	5	0	1	1	11	11	137	3	1	10	1	6	359
06:45 AM	17	222	13	0	9	1	9	9	227	7	0	14	0	8	536
Total	42	618	24	0	13	2	33	26	559	18	2	33	4	22	1396
07:00 AM	15	218	10	1	3	1	15	13	190	7	1	15	0	6	495
07:15 AM	18	235	18	1	4	3	13	11	257	5	1	30	1	12	609
07:30 AM	20	240	18	3	3	0	19	20	293	6	0	23	1	17	663
07:45 AM	17	250	10	2	4	1	21	13	251	9	0	28	1	14	621
Total	70	943	56	7	14	5	68	57	991	27	2	96	3	49	2388
08:00 AM	23	203	17	1	4	1	18	17	222	7	0	20	1	12	546
08:15 AM	30	207	17	0	5	1	12	13	197	11	0	21	0	10	524
08:30 AM	29	164	31	1	8	0	15	11	176	11	0	24	7	17	494
08:45 AM	30	144	23	0	7	2	30	10	191	12	0	21	3	13	486
Total	112	718	88	2	24	4	75	51	786	41	0	86	11	52	2050
Grand Total	224	2279	168	9	51	11	176	134	2336	86	4	215	18	123	5834
Aprch %	8.4	85	6.3	0.3	21.4	4.6	73.9	5.2	91.2	3.4	0.2	60.4	5.1	34.6	
Total %	3.8	39.1	2.9	0.2	0.9	0.2	3	2.3	40	1.5	0.1	3.7	0.3	2.1	
Cars	219	2247	164	9	51	11	168	133	2302	84	4	212	17	119	5740
% Cars	97.8	98.6	97.6	100	100	100	95.5	99.3	98.5	97.7	100	98.6	94.4	96.7	98.4
Trucks	5	32	4	0	0	0	8	1	34	2	0	3	1	4	94
% Trucks	2.2	1.4	2.4	0	0	0	4.5	0.7	1.5	2.3	0	1.4	5.6	3.3	1.6

Accurate Counts

978-664-2565

DRAFT

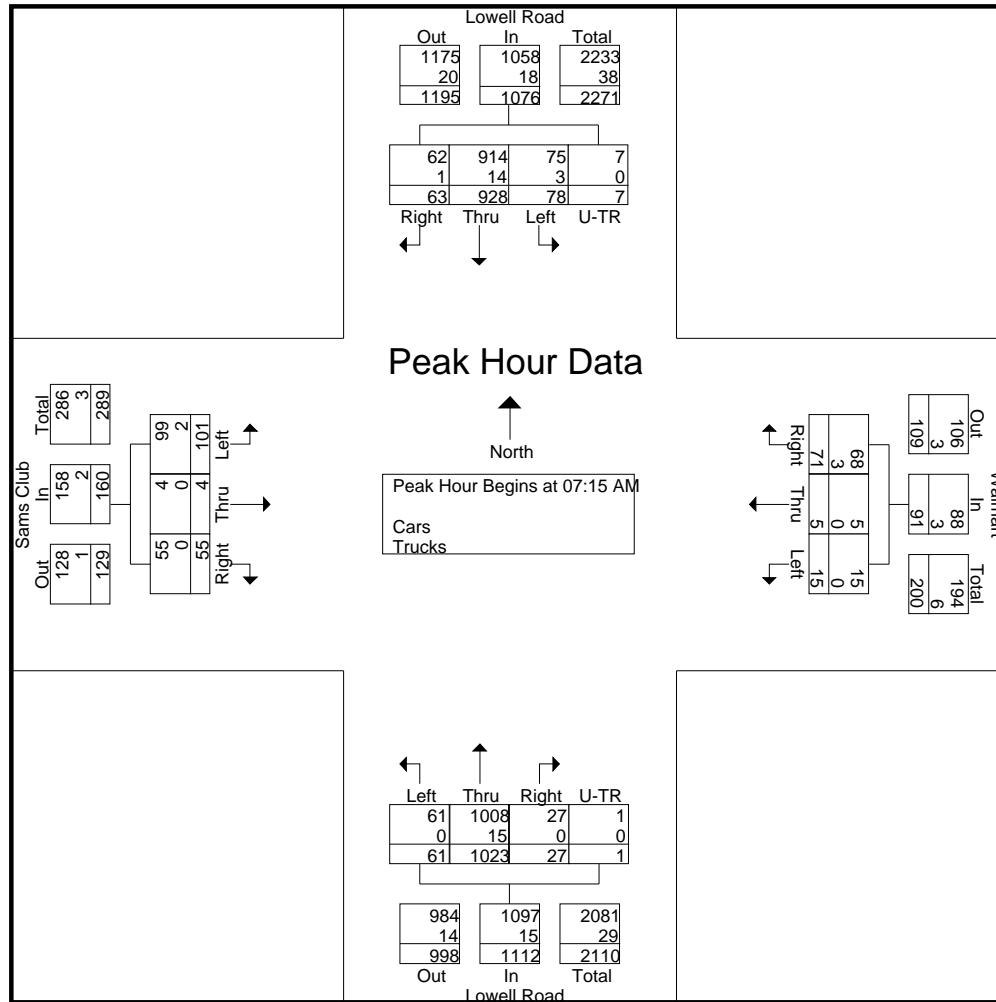
Attachment "F"

File Name : 10101008  
 Site Code : 10101008  
 Start Date : 10/8/2019  
 Page No : 2

N/S Street : Lowell Road  
 E/W Street: Walmart / Sams Club  
 City/State : Hudson, NH  
 Weather : Cloudy

Start Time	Lowell Road From North					Walmart From East				Lowell Road From South					Sams Club From West				Int. Total
	Left	Thru	Right	U-TR	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	U-TR	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 07:15 AM																			
07:15 AM	18	235	<b>18</b>	1	272	<b>4</b>	<b>3</b>	13	20	11	257	5	<b>1</b>	274	<b>30</b>	<b>1</b>	12	<b>43</b>	609
07:30 AM	20	240	18	<b>3</b>	<b>281</b>	3	0	19	22	<b>20</b>	<b>293</b>	6	0	<b>319</b>	23	1	<b>17</b>	41	<b>663</b>
07:45 AM	17	<b>250</b>	10	2	279	4	1	<b>21</b>	<b>26</b>	13	251	<b>9</b>	0	273	28	1	14	43	621
08:00 AM	<b>23</b>	203	17	1	244	4	1	18	23	17	222	7	0	246	20	1	12	33	546
Total Volume	78	928	63	7	1076	15	5	71	91	61	1023	27	1	1112	101	4	55	160	2439
% App. Total	7.2	86.2	5.9	0.7		16.5	5.5	78		5.5	92	2.4	0.1		63.1	2.5	34.4		
PHF	.848	.928	.875	.583	.957	.938	.417	.845	.875	.763	.873	.750	.250	.871	.842	1.00	.809	.930	.920
Cars	75	914	62	7	1058	15	5	68	88	61	1008	27	1	1097	99	4	55	158	2401
% Cars	96.2	98.5	98.4	100	98.3	100	100	95.8	96.7	100	98.5	100	100	98.7	98.0	100	100	98.8	98.4
Trucks	3	14	1	0	18	0	0	3	3	0	15	0	0	15	2	0	0	2	38
% Trucks	3.8	1.5	1.6	0	1.7	0	0	4.2	3.3	0	1.5	0	0	1.3	2.0	0	0	1.3	1.6

N/S Street : Lowell Road  
E/W Street: Walmart / Sams Club  
City/State : Hudson, NH  
Weather : Cloudy



Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1  
Peak Hour for Each Approach Begins at:

	07:00 AM					08:00 AM					07:15 AM					07:15 AM				
+0 mins.	15	218	10	1	244	4	1	18	23	11	257	5	1	274	30	1	12	43		
+15 mins.	18	235	18	1	272	5	1	12	18	20	293	6	0	319	23	1	17	41		
+30 mins.	20	240	18	3	281	8	0	15	23	13	251	9	0	273	28	1	14	43		
+45 mins.	17	250	10	2	279	7	2	30	39	17	222	7	0	246	20	1	12	33		
Total Volume	70	943	56	7	1076	24	4	75	103	61	1023	27	1	1112	101	4	55	160		
% App. Total	6.5	87.6	5.2	0.7		23.3	3.9	72.8		5.5	92	2.4	0.1		63.1	2.5	34.4			
PHF	.875	.943	.778	.583	.957	.750	.500	.625	.660	.763	.873	.750	.250	.871	.842	1.000	.809	.930		

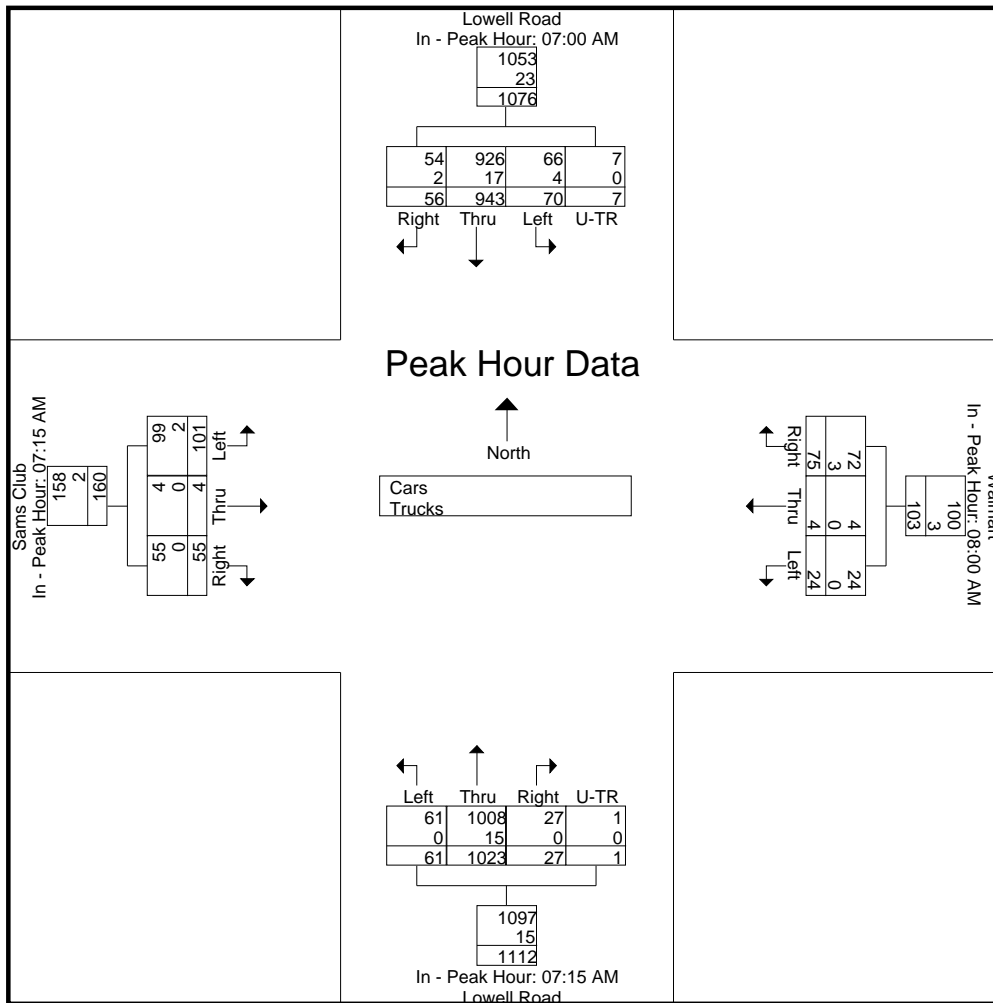


# Accurate Counts

978-664-2565

# Attachment "F"

Cars	66	926	54	7	1053	24	4	72	100	61	1008	27	1	1097	99	4	55	158
% Cars	94.3	98.2	96.4	100	97.9	100	100	96	97.1	100	98.5	100	100	98.7	98	100	100	98.8
Trucks	4	17	2	0	23	0	0	3	3	0	15	0	0	15	2	0	0	2
% Trucks	5.7	1.8	3.6	0	2.1	0	0	4	2.9	0	1.5	0	0	1.3	2	0	0	1.2



Accurate Counts

978-664-2565

Attachment "F"

File Name : 10101008

Site Code : 10101008

Start Date : 10/8/2019

Page No : 1

DRAFT

N/S Street : Lowell Road  
 E/W Street: Walmart / Sams Club  
 City/State : Hudson, NH  
 Weather : Cloudy

Groups Printed- Cars

Start Time	Lowell Road From North				Walmart From East			Lowell Road From South				Sams Club From West			Int. Total
	Left	Thru	Right	U-TR	Left	Thru	Right	Left	Thru	Right	U-TR	Left	Thru	Right	
06:00 AM	11	104	3	0	2	0	3	4	72	2	0	3	0	5	209
06:15 AM	5	126	3	0	1	0	10	2	120	6	1	6	2	2	284
06:30 AM	9	159	5	0	1	1	10	11	136	3	1	10	1	5	352
06:45 AM	17	220	12	0	9	1	9	9	223	7	0	14	0	8	529
Total	42	609	23	0	13	2	32	26	551	18	2	33	3	20	1374
07:00 AM	14	213	9	1	3	1	13	13	188	6	1	15	0	6	483
07:15 AM	16	228	18	1	4	3	13	11	252	5	1	29	1	12	594
07:30 AM	20	239	17	3	3	0	19	20	291	6	0	22	1	17	658
07:45 AM	16	246	10	2	4	1	19	13	246	9	0	28	1	14	609
Total	66	926	54	7	14	5	64	57	977	26	2	94	3	49	2344
08:00 AM	23	201	17	1	4	1	17	17	219	7	0	20	1	12	540
08:15 AM	29	205	16	0	5	1	12	12	192	11	0	20	0	10	513
08:30 AM	29	163	31	1	8	0	14	11	173	10	0	24	7	17	488
08:45 AM	30	143	23	0	7	2	29	10	190	12	0	21	3	11	481
Total	111	712	87	2	24	4	72	50	774	40	0	85	11	50	2022
Grand Total	219	2247	164	9	51	11	168	133	2302	84	4	212	17	119	5740
Aprrch %	8.3	85.1	6.2	0.3	22.2	4.8	73	5.3	91.2	3.3	0.2	60.9	4.9	34.2	
Total %	3.8	39.1	2.9	0.2	0.9	0.2	2.9	2.3	40.1	1.5	0.1	3.7	0.3	2.1	

Accurate Counts

978-664-2565

DRAFT

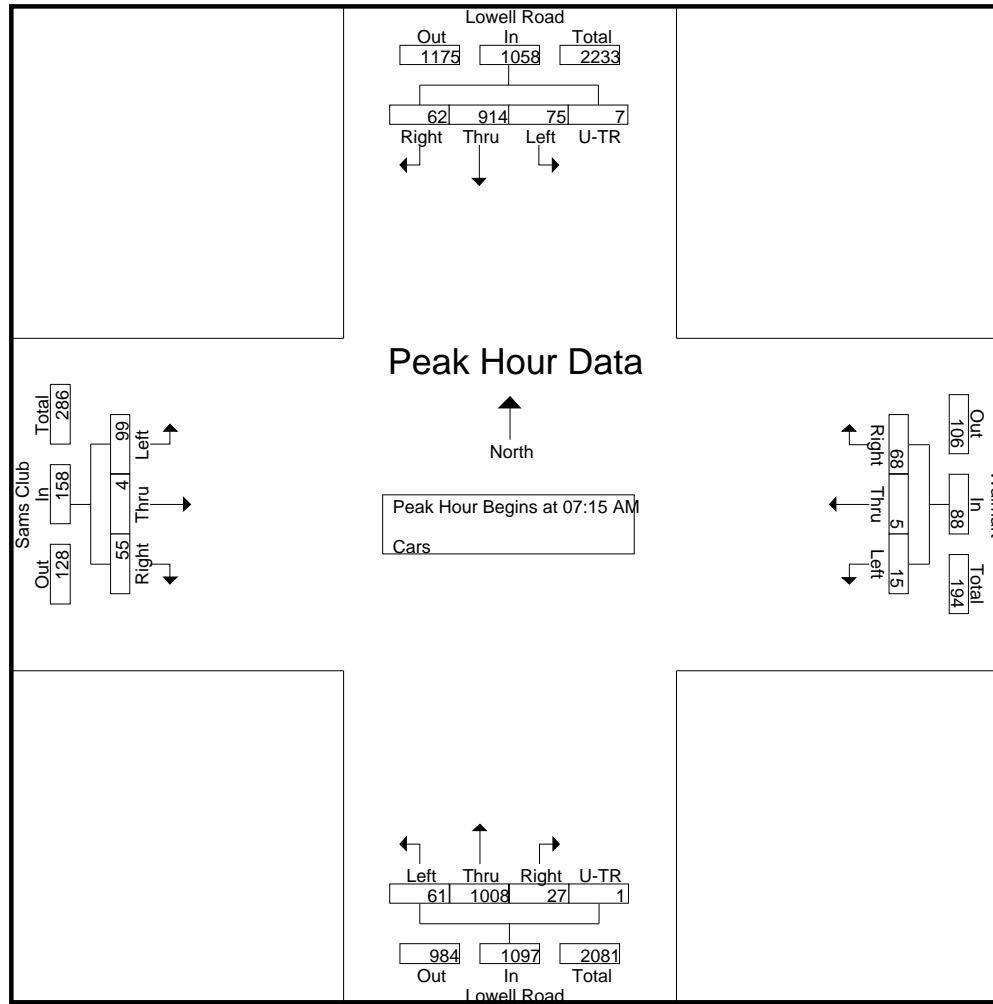
Attachment "F"

File Name : 10101008  
 Site Code : 10101008  
 Start Date : 10/8/2019  
 Page No : 2

N/S Street : Lowell Road  
 E/W Street: Walmart / Sams Club  
 City/State : Hudson, NH  
 Weather : Cloudy

Start Time	Lowell Road From North					Walmart From East				Lowell Road From South					Sams Club From West				Int. Total
	Left	Thru	Right	U-TR	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	U-TR	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 07:15 AM																			
07:15 AM	16	228	<b>18</b>	1	263	<b>4</b>	<b>3</b>	13	20	11	252	5	<b>1</b>	269	<b>29</b>	<b>1</b>	12	42	594
07:30 AM	20	239	17	<b>3</b>	<b>279</b>	3	0	<b>19</b>	22	<b>20</b>	<b>291</b>	6	0	<b>317</b>	22	1	<b>17</b>	40	<b>658</b>
07:45 AM	16	<b>246</b>	10	2	274	4	1	19	<b>24</b>	13	246	<b>9</b>	0	268	28	1	14	<b>43</b>	609
08:00 AM	<b>23</b>	201	17	1	242	4	1	17	22	17	219	7	0	243	20	1	12	33	540
Total Volume	75	914	62	7	1058	15	5	68	88	61	1008	27	1	1097	99	4	55	158	2401
% App. Total	7.1	86.4	5.9	0.7		17	5.7	77.3		5.6	91.9	2.5	0.1		62.7	2.5	34.8		
PHF	.815	.929	.861	.583	.948	.938	.417	.895	.917	.763	.866	.750	.250	.865	.853	1.00	.809	.919	.912

N/S Street : Lowell Road  
E/W Street: Walmart / Sams Club  
City/State : Hudson, NH  
Weather : Cloudy



Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	07:15 AM					08:00 AM					07:15 AM					07:15 AM				
+0 mins.	16	228	<b>18</b>	1	263	4	1	17	22	11	252	5	<b>1</b>	269	<b>29</b>	<b>1</b>	12	42		
+15 mins.	20	239	17	<b>3</b>	<b>279</b>	5	1	12	18	<b>20</b>	<b>291</b>	6	0	<b>317</b>	22	1	<b>17</b>	40		
+30 mins.	16	<b>246</b>	10	2	274	<b>8</b>	0	14	22	13	246	<b>9</b>	0	268	28	1	14	<b>43</b>		
+45 mins.	<b>23</b>	201	17	1	242	7	<b>2</b>	<b>29</b>	<b>38</b>	17	219	7	0	243	20	1	12	33		
Total Volume	75	914	62	7	1058	24	4	72	100	61	1008	27	1	1097	99	4	55	158		
% App. Total	7.1	86.4	5.9	0.7		24	4	72		5.6	91.9	2.5	0.1		62.7	2.5	34.8			
PHF	.815	.929	.861	.583	.948	.750	.500	.621	.658	.763	.866	.750	.250	.865	.853	1.000	.809	.919		

# DRAFT

**Accurate Counts**

978-664-2565

**Attachment "F"**

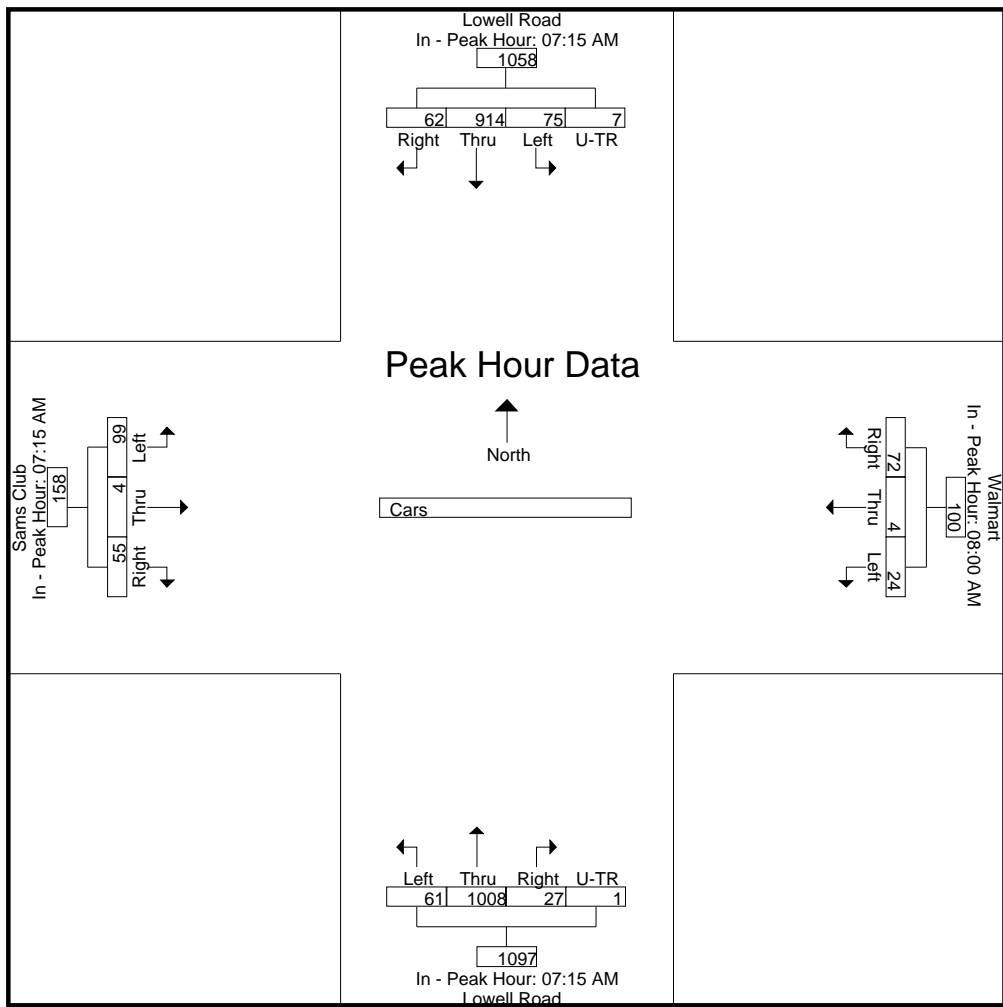
File Name : 10101008

Site Code : 10101008

Start Date : 10/8/2019

Page No : 4

N/S Street : Lowell Road  
 E/W Street: Walmart / Sams Club  
 City/State : Hudson, NH  
 Weather : Cloudy



Accurate Counts

978-664-2565

Attachment "F"

File Name : 10101008

Site Code : 10101008

Start Date : 10/8/2019

Page No : 1

DRAFT

N/S Street : Lowell Road  
 E/W Street: Walmart / Sams Club  
 City/State : Hudson, NH  
 Weather : Cloudy

Groups Printed- Trucks

Start Time	Lowell Road From North				Walmart From East			Lowell Road From South				Sams Club From West			Int. Total
	Left	Thru	Right	U-TR	Left	Thru	Right	Left	Thru	Right	U-TR	Left	Thru	Right	
06:00 AM	0	1	0	0	0	0	0	0	1	0	0	0	0	1	3
06:15 AM	0	2	0	0	0	0	0	0	2	0	0	0	1	0	5
06:30 AM	0	4	0	0	0	0	1	0	1	0	0	0	0	1	7
06:45 AM	0	2	1	0	0	0	0	0	4	0	0	0	0	0	7
Total	0	9	1	0	0	0	1	0	8	0	0	0	1	2	22
07:00 AM	1	5	1	0	0	0	2	0	2	1	0	0	0	0	12
07:15 AM	2	7	0	0	0	0	0	0	5	0	0	1	0	0	15
07:30 AM	0	1	1	0	0	0	0	0	2	0	0	1	0	0	5
07:45 AM	1	4	0	0	0	0	2	0	5	0	0	0	0	0	12
Total	4	17	2	0	0	0	4	0	14	1	0	2	0	0	44
08:00 AM	0	2	0	0	0	0	1	0	3	0	0	0	0	0	6
08:15 AM	1	2	1	0	0	0	0	1	5	0	0	1	0	0	11
08:30 AM	0	1	0	0	0	0	1	0	3	1	0	0	0	0	6
08:45 AM	0	1	0	0	0	0	1	0	1	0	0	0	0	2	5
Total	1	6	1	0	0	0	3	1	12	1	0	1	0	2	28
Grand Total	5	32	4	0	0	0	8	1	34	2	0	3	1	4	94
Apprch %	12.2	78	9.8	0	0	0	100	2.7	91.9	5.4	0	37.5	12.5	50	
Total %	5.3	34	4.3	0	0	0	8.5	1.1	36.2	2.1	0	3.2	1.1	4.3	

Accurate Counts

978-664-2565

DRAFT

Attachment "F"

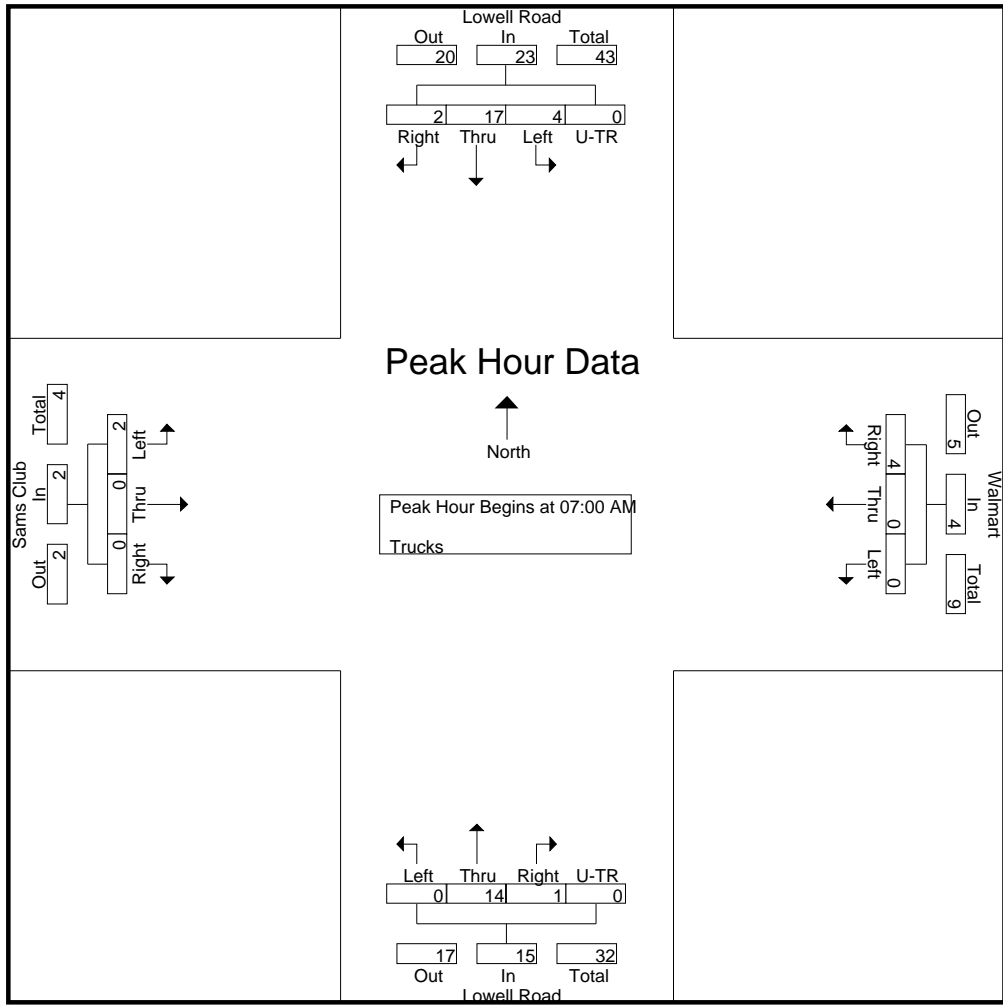
N/S Street : Lowell Road  
 E/W Street: Walmart / Sams Club  
 City/State : Hudson, NH  
 Weather : Cloudy

File Name : 10101008  
 Site Code : 10101008  
 Start Date : 10/8/2019  
 Page No : 2

Start Time	Lowell Road From North					Walmart From East				Lowell Road From South					Sams Club From West				Int. Total
	Left	Thru	Right	U-TR	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	U-TR	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 07:00 AM																			
07:00 AM	1	5	1	0	7	0	0	2	2	0	2	1	0	3	0	0	0	0	12
07:15 AM	2	7	0	0	9	0	0	0	0	0	5	0	0	5	1	0	0	1	15
07:30 AM	0	1	1	0	2	0	0	0	0	0	2	0	0	2	1	0	0	1	5
07:45 AM	1	4	0	0	5	0	0	2	2	0	5	0	0	5	0	0	0	0	12
Total Volume	4	17	2	0	23	0	0	4	4	0	14	1	0	15	2	0	0	2	44
% App. Total	17.4	73.9	8.7	0		0	0	100		0	93.3	6.7	0		100	0	0		
PHF	.500	.607	.500	.000	.639	.000	.000	.500	.500	.000	.700	.250	.000	.750	.500	.000	.000	.500	.733



N/S Street : Lowell Road  
E/W Street: Walmart / Sams Club  
City/State : Hudson, NH  
Weather : Cloudy

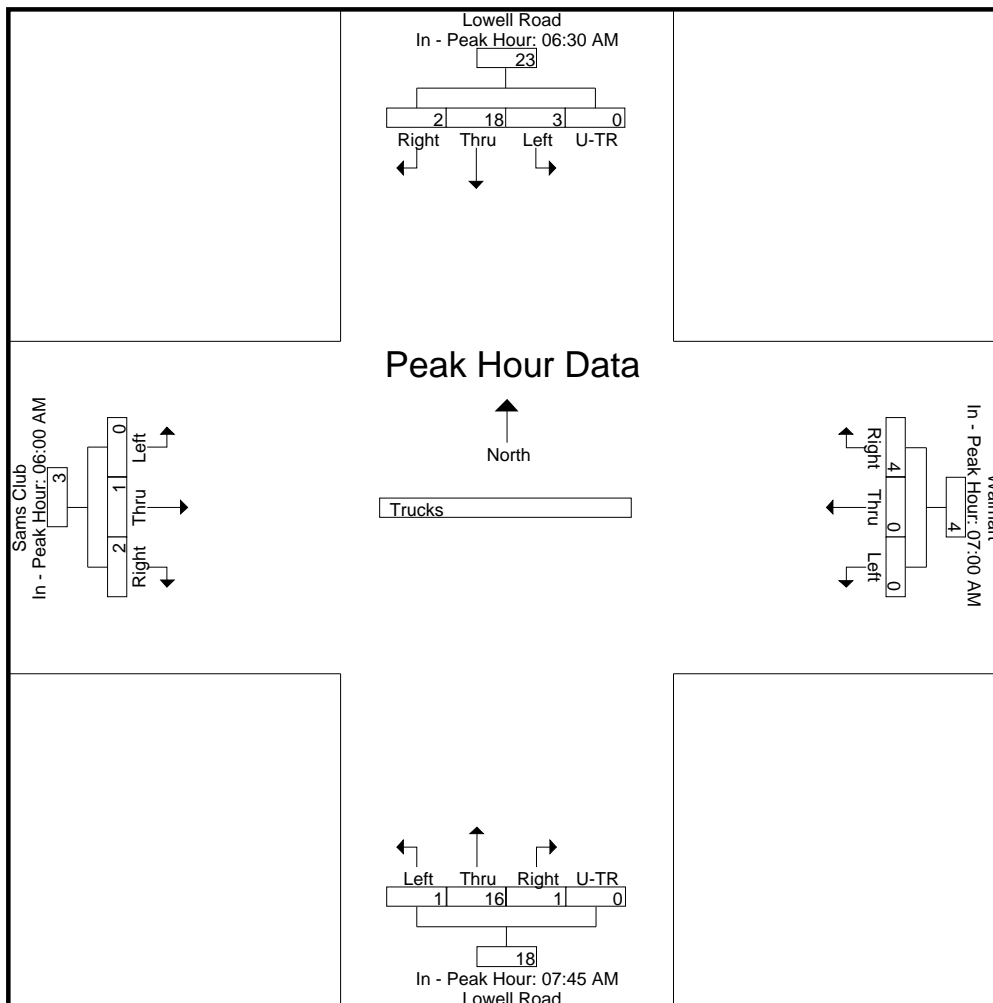


Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1  
Peak Hour for Each Approach Begins at:

	06:30 AM					07:00 AM					07:45 AM					06:00 AM				
+0 mins.	0	4	0	0	4	0	0	2	2	0	5	0	0	5	0	0	1	1		
+15 mins.	0	2	1	0	3	0	0	0	0	0	3	0	0	3	0	1	0	1		
+30 mins.	1	5	1	0	7	0	0	0	0	1	5	0	0	6	0	0	1	1		
+45 mins.	2	7	0	0	9	0	0	2	2	0	3	1	0	4	0	0	0	0		
Total Volume	3	18	2	0	23	0	0	4	4	1	16	1	0	18	0	1	2	3		
% App. Total	13	78.3	8.7	0		0	0	100		5.6	88.9	5.6	0		0	33.3	66.7			
PHF	.375	.643	.500	.000	.639	.000	.000	.500	.500	.250	.800	.250	.000	.750	.000	.250	.500	.750		

DRAFT

N/S Street : Lowell Road  
E/W Street: Walmart / Sams Club  
City/State : Hudson, NH  
Weather : Cloudy



# DRAFT

## Accurate Counts

978-664-2565

## Attachment "F"

File Name : 10101008

Site Code : 10101008

Start Date : 10/8/2019

Page No : 1

N/S Street : Lowell Road  
 E/W Street: Walmart / Sams Club  
 City/State : Hudson, NH  
 Weather : Cloudy

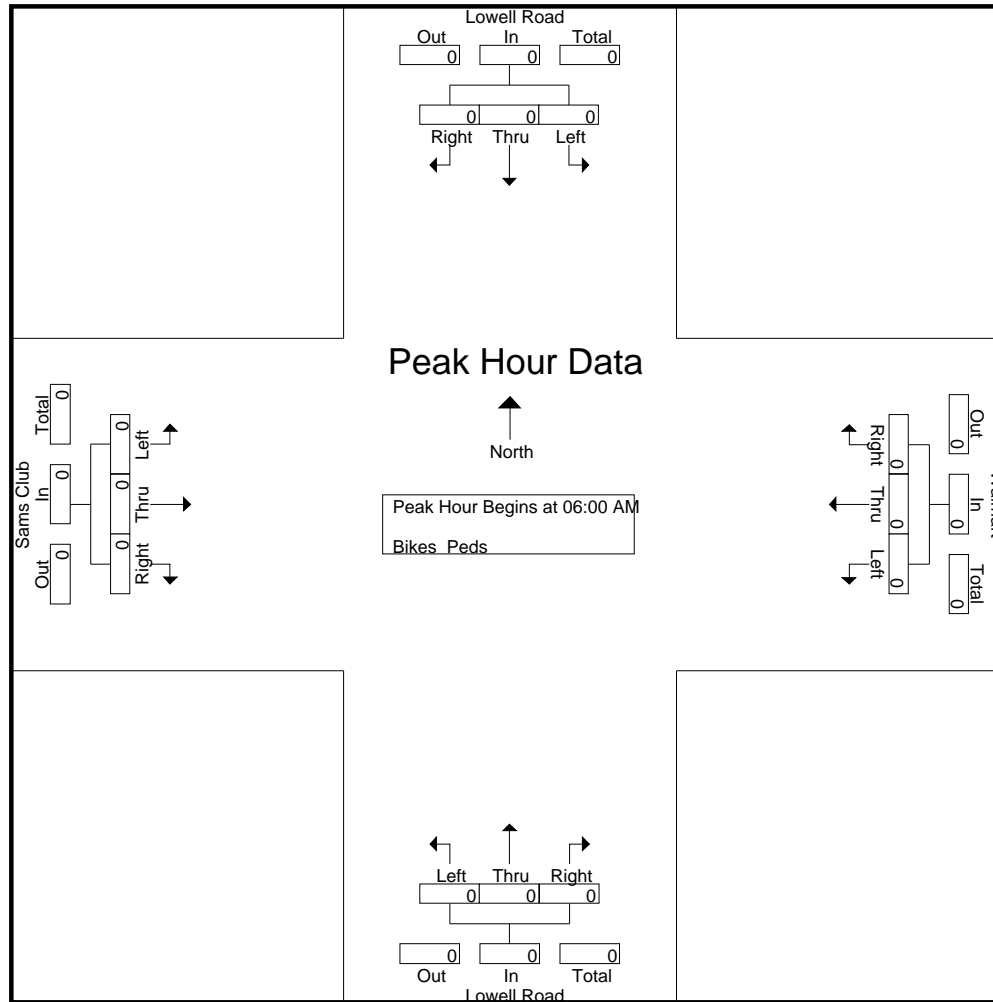
Groups Printed- Bikes Peds

Start Time	Lowell Road From North				Walmart From East				Lowell Road From South				Sams Club From West				Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds			
06:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 AM	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
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	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
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	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	1	0	0	0	0	0	0	0	0	1	0	1
Grand Total	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1
Apprch %	0	0	0		0	0	0		0	0	0		0	0	0				
Total %																	100	0	



DRAFT

N/S Street : Lowell Road  
 E/W Street: Walmart / Sams Club  
 City/State : Hudson, NH  
 Weather : Cloudy



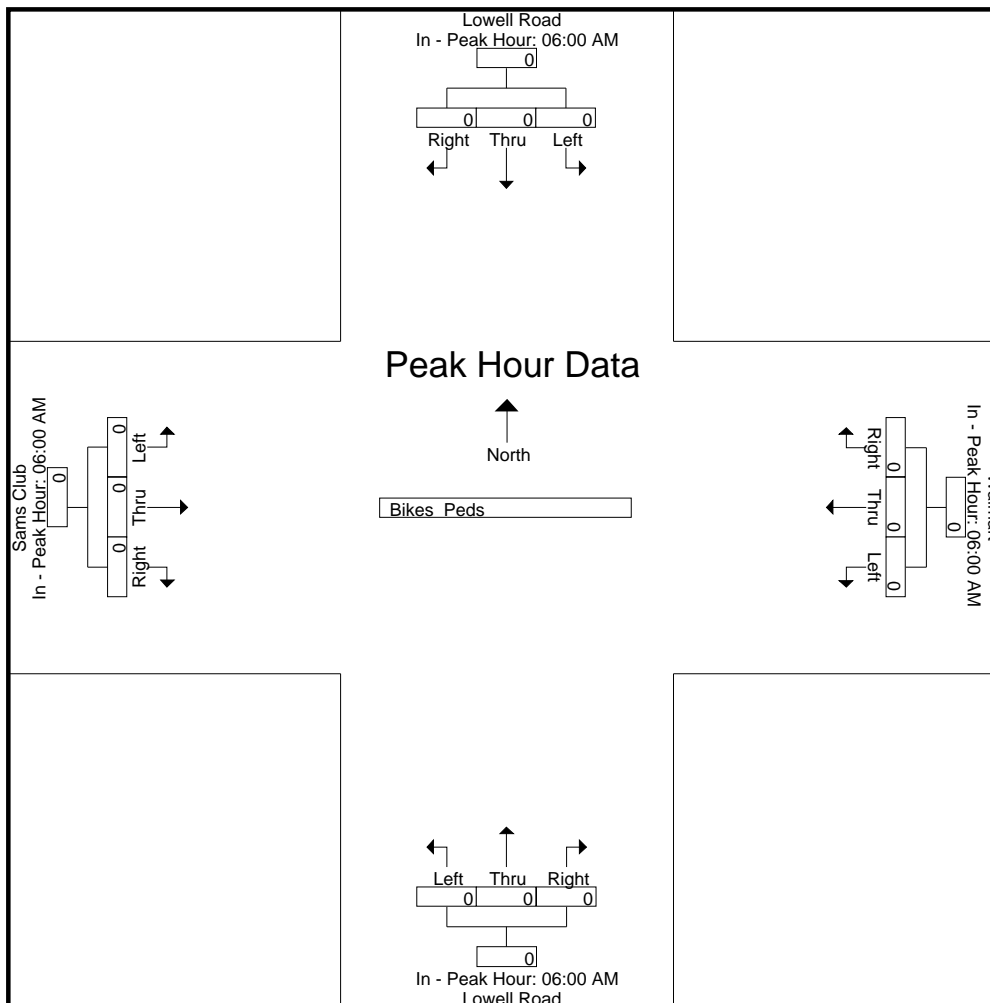
Peak Hour Analysis From 06:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	06:00 AM				06:00 AM				06:00 AM				06:00 AM			
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+45 mins.	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
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

DRAFT

N/S Street : Lowell Road  
E/W Street: Walmart / Sams Club  
City/State : Hudson, NH  
Weather : Cloudy



Accurate Counts

978-664-2565

Attachment "F"

File Name : 10101008

Site Code : 10101008

Start Date : 10/8/2019

Page No : 1

DRAFT

N/S Street : Lowell Road  
 E/W Street: Walmart / Sams Club  
 City/State : Hudson, NH  
 Weather : Cloudy

Groups Printed- Cars - Trucks

Start Time	Lowell Road From North				Walmart From East			Lowell Road From South				Sams Club From West			Int. Total
	Left	Thru	Right	U-TR	Left	Thru	Right	Left	Thru	Right	U-TR	Left	Thru	Right	
04:00 PM	49	236	45	9	11	5	64	17	300	25	0	49	4	25	839
04:15 PM	48	238	50	8	12	6	68	16	202	24	1	57	3	32	765
04:30 PM	55	237	59	8	18	6	67	31	316	11	1	71	2	32	914
04:45 PM	59	224	54	19	18	9	74	25	248	19	0	69	3	27	848
Total	211	935	208	44	59	26	273	89	1066	79	2	246	12	116	3366
05:00 PM	59	280	40	13	27	2	36	11	282	24	0	48	2	34	858
05:15 PM	69	282	43	26	24	3	65	26	264	19	0	58	6	19	904
05:30 PM	48	233	46	18	15	6	60	17	286	29	0	69	2	22	851
05:45 PM	55	213	35	6	20	4	61	24	245	23	0	50	8	16	760
Total	231	1008	164	63	86	15	222	78	1077	95	0	225	18	91	3373
06:00 PM	51	188	38	1	20	3	64	11	235	24	0	38	5	22	700
06:15 PM	47	181	34	0	24	4	69	17	176	16	0	52	4	24	648
06:30 PM	56	159	38	0	16	1	46	12	197	16	0	35	4	19	599
06:45 PM	46	166	26	1	19	3	52	13	155	9	0	43	1	19	553
Total	200	694	136	2	79	11	231	53	763	65	0	168	14	84	2500
Grand Total	642	2637	508	109	224	52	726	220	2906	239	2	639	44	291	9239
Aprch %	16.5	67.7	13	2.8	22.4	5.2	72.5	6.5	86.3	7.1	0.1	65.6	4.5	29.9	
Total %	6.9	28.5	5.5	1.2	2.4	0.6	7.9	2.4	31.5	2.6	0	6.9	0.5	3.1	
Cars	641	2623	508	109	224	52	724	219	2896	239	2	637	44	291	9209
% Cars	99.8	99.5	100	100	100	100	99.7	99.5	99.7	100	100	99.7	100	100	99.7
Trucks	1	14	0	0	0	0	2	1	10	0	0	2	0	0	30
% Trucks	0.2	0.5	0	0	0	0	0.3	0.5	0.3	0	0	0.3	0	0	0.3

Accurate Counts

978-664-2565

DRAFT

Attachment "F"

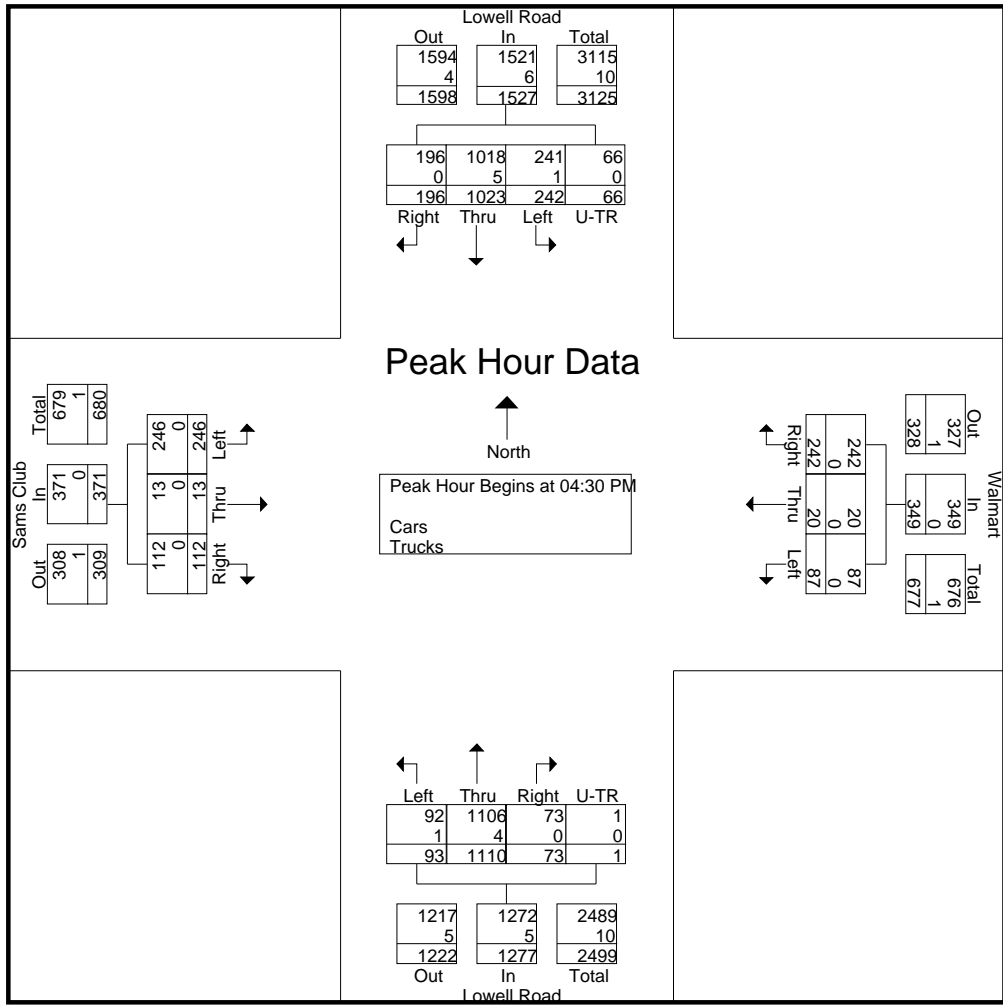
File Name : 10101008  
 Site Code : 10101008  
 Start Date : 10/8/2019  
 Page No : 2

N/S Street : Lowell Road  
 E/W Street: Walmart / Sams Club  
 City/State : Hudson, NH  
 Weather : Cloudy

Start Time	Lowell Road From North					Walmart From East				Lowell Road From South					Sams Club From West				Int. Total
	Left	Thru	Right	U-TR	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	U-TR	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 04:30 PM																			
04:30 PM	55	237	<b>59</b>	8	359	18	6	67	91	<b>31</b>	<b>316</b>	11	<b>1</b>	<b>359</b>	<b>71</b>	2	32	<b>105</b>	<b>914</b>
04:45 PM	59	224	54	19	356	18	<b>9</b>	<b>74</b>	<b>101</b>	25	248	19	0	292	69	3	27	99	848
05:00 PM	59	280	40	13	392	<b>27</b>	2	36	65	11	282	<b>24</b>	0	317	48	2	<b>34</b>	84	858
05:15 PM	<b>69</b>	<b>282</b>	43	<b>26</b>	<b>420</b>	24	3	65	92	26	264	19	0	309	58	<b>6</b>	19	83	904
Total Volume	242	1023	196	66	1527	87	20	242	349	93	1110	73	1	1277	246	13	112	371	3524
% App. Total	15.8	67	12.8	4.3		24.9	5.7	69.3		7.3	86.9	5.7	0.1		66.3	3.5	30.2		
PHF	.877	.907	.831	.635	.909	.806	.556	.818	.864	.750	.878	.760	.250	.889	.866	.542	.824	.883	.964
Cars	241	1018	196	66	1521	87	20	242	349	92	1106	73	1	1272	246	13	112	371	3513
% Cars	99.6	99.5	100	100	99.6	100	100	100	100	98.9	99.6	100	100	99.6	100	100	100	100	99.7
Trucks	1	5	0	0	6	0	0	0	0	1	4	0	0	5	0	0	0	0	11
% Trucks	0.4	0.5	0	0	0.4	0	0	0	0	1.1	0.4	0	0	0.4	0	0	0	0	0.3



N/S Street : Lowell Road  
E/W Street: Walmart / Sams Club  
City/State : Hudson, NH  
Weather : Cloudy



Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

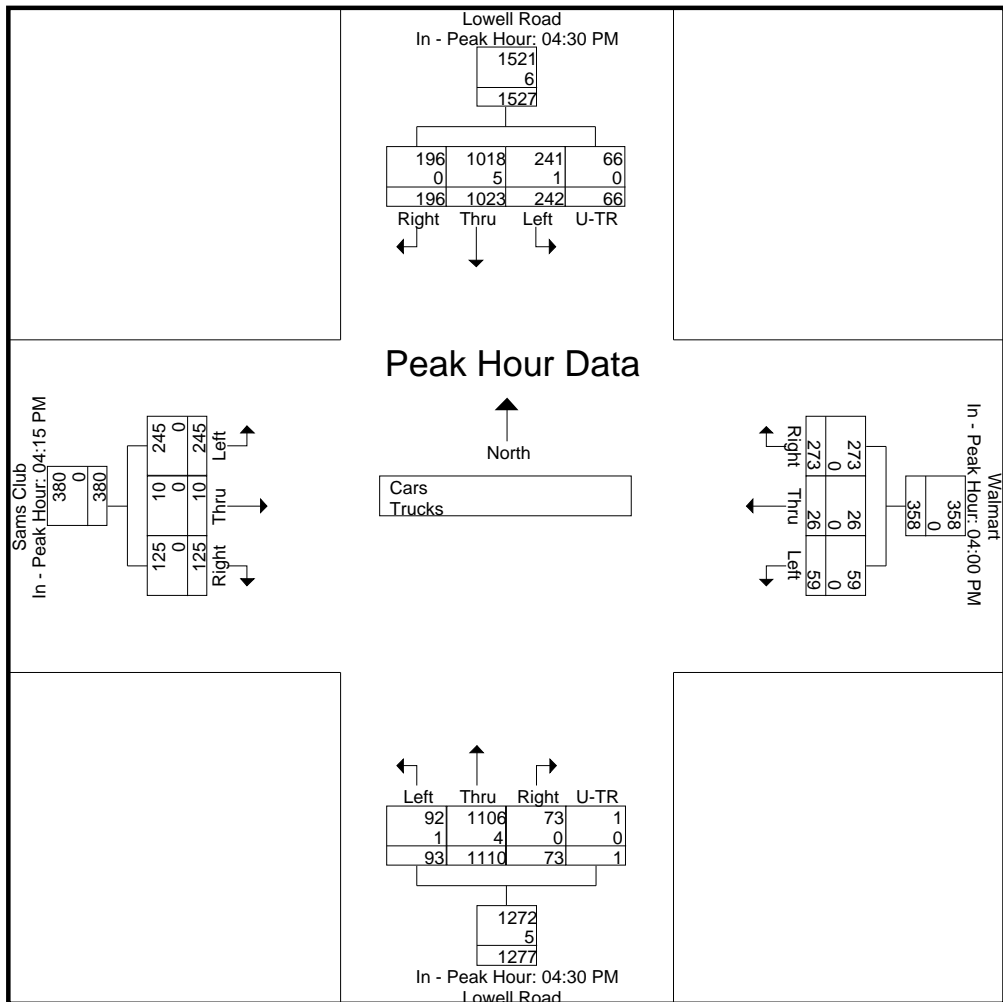
	04:30 PM					04:00 PM					04:30 PM					04:15 PM				
+0 mins.	55	237	<b>59</b>	8	359	11	5	64	80	<b>31</b>	<b>316</b>	11	<b>1</b>	<b>359</b>	57	<b>3</b>	32	92		
+15 mins.	59	224	54	19	356	12	6	68	86	25	248	19	0	292	<b>71</b>	2	32	<b>105</b>		
+30 mins.	59	280	40	13	392	<b>18</b>	6	67	91	11	282	<b>24</b>	0	317	69	3	27	99		
+45 mins.	<b>69</b>	<b>282</b>	43	<b>26</b>	<b>420</b>	18	<b>9</b>	<b>74</b>	<b>101</b>	26	264	19	0	309	48	2	<b>34</b>	84		
Total Volume	242	1023	196	66	1527	59	26	273	358	93	1110	73	1	1277	245	10	125	380		
% App. Total	15.8	67	12.8	4.3		16.5	7.3	76.3		7.3	86.9	5.7	0.1		64.5	2.6	32.9			
PHF	.877	.907	.831	.635	.909	.819	.722	.922	.886	.750	.878	.760	.250	.889	.863	.833	.919	.905		

# Accurate Counts

978-664-2565

# Attachment "F"

Cars	241	1018	196	66	1521	59	26	273	358	92	1106	73	1	1272	245	10	125	380
% Cars	99.6	99.5	100	100	99.6	100	100	100	100	98.9	99.6	100	100	99.6	100	100	100	100
Trucks	1	5	0	0	6	0	0	0	0	1	4	0	0	5	0	0	0	0
% Trucks	0.4	0.5	0	0	0.4	0	0	0	0	1.1	0.4	0	0	0.4	0	0	0	0



Accurate Counts

978-664-2565

Attachment "F"

File Name : 10101008

Site Code : 10101008

Start Date : 10/8/2019

Page No : 1

DRAFT

N/S Street : Lowell Road  
 E/W Street: Walmart / Sams Club  
 City/State : Hudson, NH  
 Weather : Cloudy

Groups Printed- Cars

Start Time	Lowell Road From North				Walmart From East			Lowell Road From South				Sams Club From West			Int. Total
	Left	Thru	Right	U-TR	Left	Thru	Right	Left	Thru	Right	U-TR	Left	Thru	Right	
04:00 PM	49	234	45	9	11	5	64	17	299	25	0	48	4	25	835
04:15 PM	48	233	50	8	12	6	68	16	202	24	1	57	3	32	760
04:30 PM	54	235	59	8	18	6	67	31	314	11	1	71	2	32	909
04:45 PM	59	224	54	19	18	9	74	25	248	19	0	69	3	27	848
Total	210	926	208	44	59	26	273	89	1063	79	2	245	12	116	3352
05:00 PM	59	279	40	13	27	2	36	10	282	24	0	48	2	34	856
05:15 PM	69	280	43	26	24	3	65	26	262	19	0	58	6	19	900
05:30 PM	48	232	46	18	15	6	58	17	286	29	0	68	2	22	847
05:45 PM	55	212	35	6	20	4	61	24	244	23	0	50	8	16	758
Total	231	1003	164	63	86	15	220	77	1074	95	0	224	18	91	3361
06:00 PM	51	188	38	1	20	3	64	11	234	24	0	38	5	22	699
06:15 PM	47	181	34	0	24	4	69	17	174	16	0	52	4	24	646
06:30 PM	56	159	38	0	16	1	46	12	196	16	0	35	4	19	598
06:45 PM	46	166	26	1	19	3	52	13	155	9	0	43	1	19	553
Total	200	694	136	2	79	11	231	53	759	65	0	168	14	84	2496
Grand Total	641	2623	508	109	224	52	724	219	2896	239	2	637	44	291	9209
Apprch %	16.5	67.6	13.1	2.8	22.4	5.2	72.4	6.5	86.3	7.1	0.1	65.5	4.5	29.9	
Total %	7	28.5	5.5	1.2	2.4	0.6	7.9	2.4	31.4	2.6	0	6.9	0.5	3.2	

Accurate Counts

978-664-2565

Attachment "F"

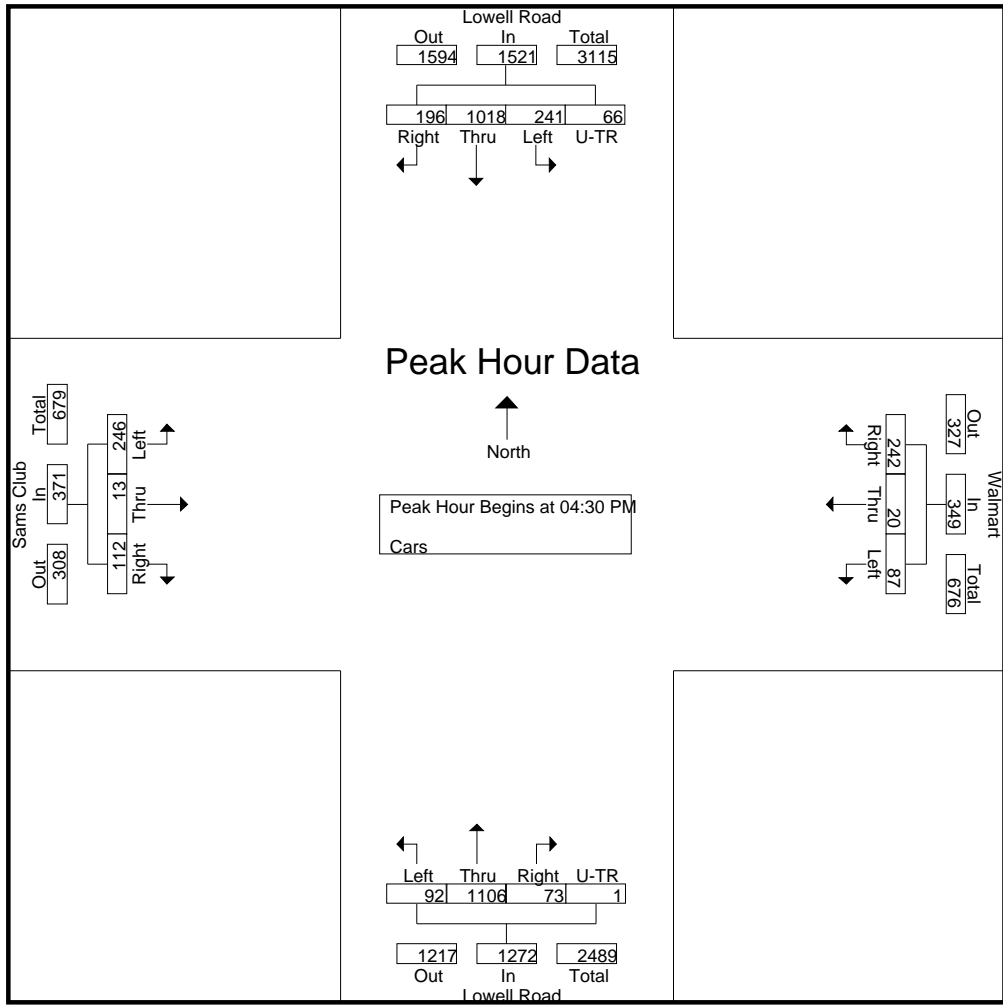
File Name : 10101008  
 Site Code : 10101008  
 Start Date : 10/8/2019  
 Page No : 2

DRAFT

N/S Street : Lowell Road  
 E/W Street: Walmart / Sams Club  
 City/State : Hudson, NH  
 Weather : Cloudy

Start Time	Lowell Road From North					Walmart From East				Lowell Road From South					Sams Club From West				Int. Total
	Left	Thru	Right	U-TR	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	U-TR	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 04:30 PM																			
04:30 PM	54	235	<b>59</b>	8	356	18	6	67	91	<b>31</b>	<b>314</b>	11	<b>1</b>	<b>357</b>	<b>71</b>	2	32	<b>105</b>	<b>909</b>
04:45 PM	59	224	54	19	356	18	<b>9</b>	<b>74</b>	<b>101</b>	25	248	19	0	292	69	3	27	99	848
05:00 PM	59	279	40	13	391	<b>27</b>	2	36	65	10	282	<b>24</b>	0	316	48	2	<b>34</b>	84	856
05:15 PM	<b>69</b>	<b>280</b>	43	<b>26</b>	<b>418</b>	24	3	65	92	26	262	19	0	307	58	<b>6</b>	19	83	900
Total Volume	241	1018	196	66	1521	87	20	242	349	92	1106	73	1	1272	246	13	112	371	3513
% App. Total	15.8	66.9	12.9	4.3		24.9	5.7	69.3		7.2	86.9	5.7	0.1		66.3	3.5	30.2		
PHF	.873	.909	.831	.635	.910	.806	.556	.818	.864	.742	.881	.760	.250	.891	.866	.542	.824	.883	.966

N/S Street : Lowell Road  
E/W Street: Walmart / Sams Club  
City/State : Hudson, NH  
Weather : Cloudy

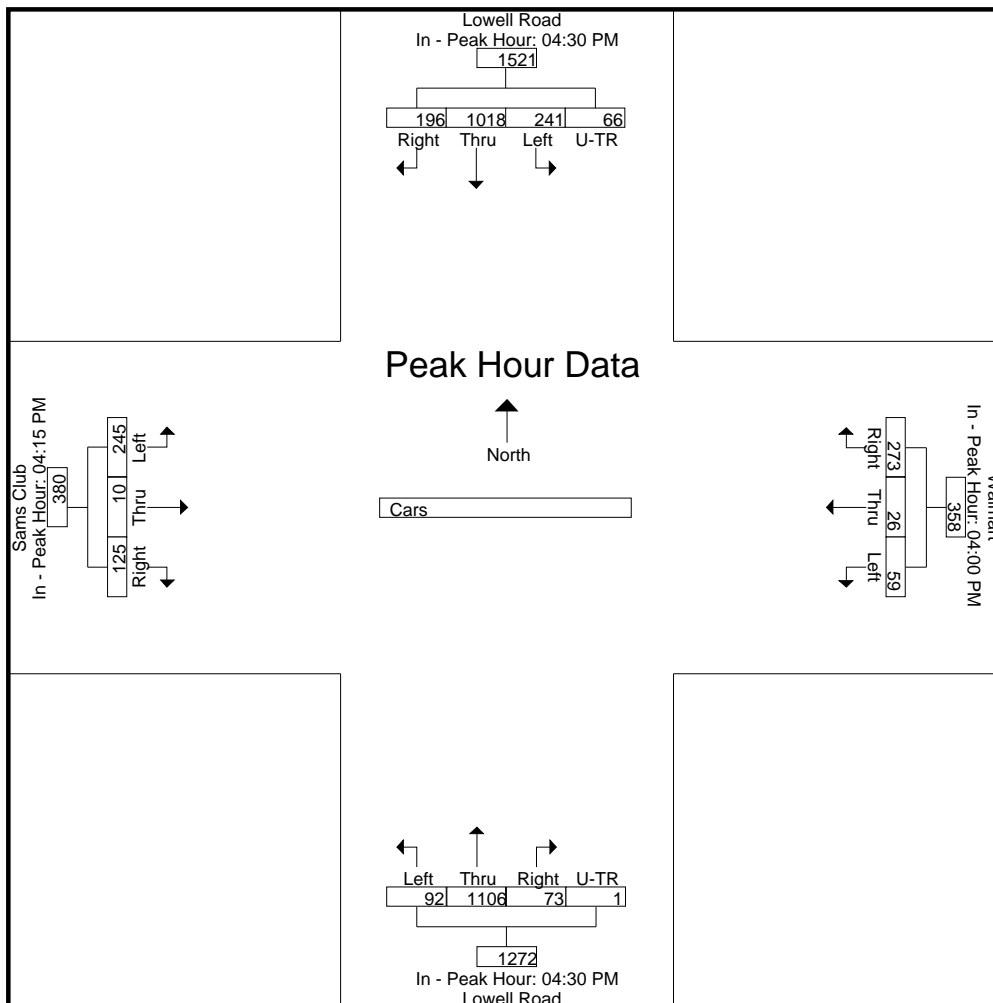


Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1  
Peak Hour for Each Approach Begins at:

	04:30 PM					04:00 PM					04:30 PM					04:15 PM				
+0 mins.	54	235	<b>59</b>	8	356	11	5	64	80	<b>31</b>	<b>314</b>	11	<b>1</b>	<b>357</b>	57	<b>3</b>	32	92		
+15 mins.	59	224	54	19	356	12	6	68	86	25	248	19	0	292	<b>71</b>	2	32	<b>105</b>		
+30 mins.	59	279	40	13	391	<b>18</b>	6	67	91	10	282	<b>24</b>	0	316	69	3	27	99		
+45 mins.	<b>69</b>	<b>280</b>	43	<b>26</b>	<b>418</b>	18	<b>9</b>	<b>74</b>	<b>101</b>	26	262	19	0	307	48	2	<b>34</b>	84		
Total Volume	241	1018	196	66	1521	59	26	273	358	92	1106	73	1	1272	245	10	125	380		
% App. Total	15.8	66.9	12.9	4.3		16.5	7.3	76.3		7.2	86.9	5.7	0.1		64.5	2.6	32.9			
PHF	.873	.909	.831	.635	.910	.819	.722	.922	.886	.742	.881	.760	.250	.891	.863	.833	.919	.905		

DRAFT

N/S Street : Lowell Road  
E/W Street: Walmart / Sams Club  
City/State : Hudson, NH  
Weather : Cloudy



Accurate Counts

978-664-2565

Attachment "F"

File Name : 10101008

Site Code : 10101008

Start Date : 10/8/2019

Page No : 1

DRAFT

N/S Street : Lowell Road  
 E/W Street: Walmart / Sams Club  
 City/State : Hudson, NH  
 Weather : Cloudy

Groups Printed- Trucks

Start Time	Lowell Road From North				Walmart From East			Lowell Road From South				Sams Club From West			Int. Total
	Left	Thru	Right	U-TR	Left	Thru	Right	Left	Thru	Right	U-TR	Left	Thru	Right	
04:00 PM	0	2	0	0	0	0	0	0	1	0	0	1	0	0	4
04:15 PM	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5
04:30 PM	1	2	0	0	0	0	0	0	2	0	0	0	0	0	5
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	9	0	0	0	0	0	0	3	0	0	1	0	0	14
05:00 PM	0	1	0	0	0	0	0	1	0	0	0	0	0	0	2
05:15 PM	0	2	0	0	0	0	0	0	2	0	0	0	0	0	4
05:30 PM	0	1	0	0	0	0	2	0	0	0	0	1	0	0	4
05:45 PM	0	1	0	0	0	0	0	0	1	0	0	0	0	0	2
Total	0	5	0	0	0	0	2	1	3	0	0	1	0	0	12
06:00 PM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
06:15 PM	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
06:30 PM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
06:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	4	0	0	0	0	0	4
Grand Total	1	14	0	0	0	0	2	1	10	0	0	2	0	0	30
Aprch %	6.7	93.3	0	0	0	0	100	9.1	90.9	0	0	100	0	0	
Total %	3.3	46.7	0	0	0	0	6.7	3.3	33.3	0	0	6.7	0	0	

Accurate Counts

978-664-2565

DRAFT

Attachment "F"

File Name : 10101008

Site Code : 10101008

Start Date : 10/8/2019

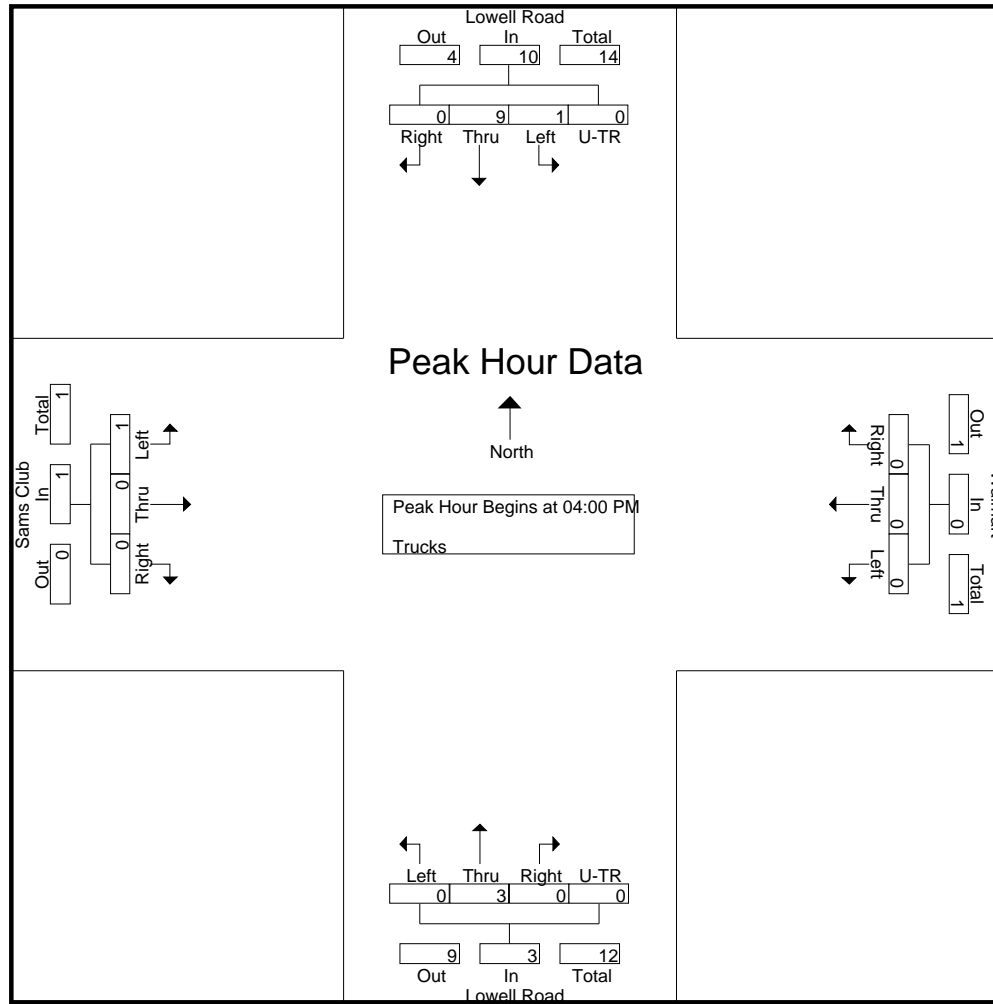
Page No : 2

N/S Street : Lowell Road  
 E/W Street: Walmart / Sams Club  
 City/State : Hudson, NH  
 Weather : Cloudy

Start Time	Lowell Road From North					Walmart From East				Lowell Road From South					Sams Club From West				Int. Total
	Left	Thru	Right	U-TR	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	U-TR	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 04:00 PM																			
04:00 PM	0	2	0	0	2	0	0	0	0	0	1	0	0	1	1	0	0	1	4
04:15 PM	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5
04:30 PM	1	2	0	0	3	0	0	0	0	0	2	0	0	2	0	0	0	0	5
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	1	9	0	0	10	0	0	0	0	0	3	0	0	3	1	0	0	1	14
% App. Total	10	90	0	0		0	0	0		0	100	0	0		100	0	0		
PHF	.250	.450	.000	.000	.500	.000	.000	.000	.000	.000	.375	.000	.000	.375	.250	.000	.000	.250	.700



N/S Street : Lowell Road  
E/W Street: Walmart / Sams Club  
City/State : Hudson, NH  
Weather : Cloudy



Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1  
Peak Hour for Each Approach Begins at:

	04:00 PM					04:45 PM					04:30 PM					04:00 PM				
+0 mins.	0	2	0	0	2	0	0	0	0	0	2	0	0	2	1	0	0	1		
+15 mins.	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0		
+30 mins.	1	2	0	0	3	0	0	0	0	1	0	0	0	1	0	0	0	0		
+45 mins.	0	0	0	0	0	0	0	2	2	0	2	0	0	2	0	0	0	0		
Total Volume	1	9	0	0	10	0	0	2	2	1	4	0	0	5	1	0	0	1		
% App. Total	10	90	0	0		0	0	100		20	80	0	0		100	0	0			
PHF	.250	.450	.000	.000	.500	.000	.000	.250	.250	.250	.500	.000	.000	.625	.250	.000	.000	.250		

# DRAFT

**Accurate Counts**

978-664-2565

**Attachment "F"**

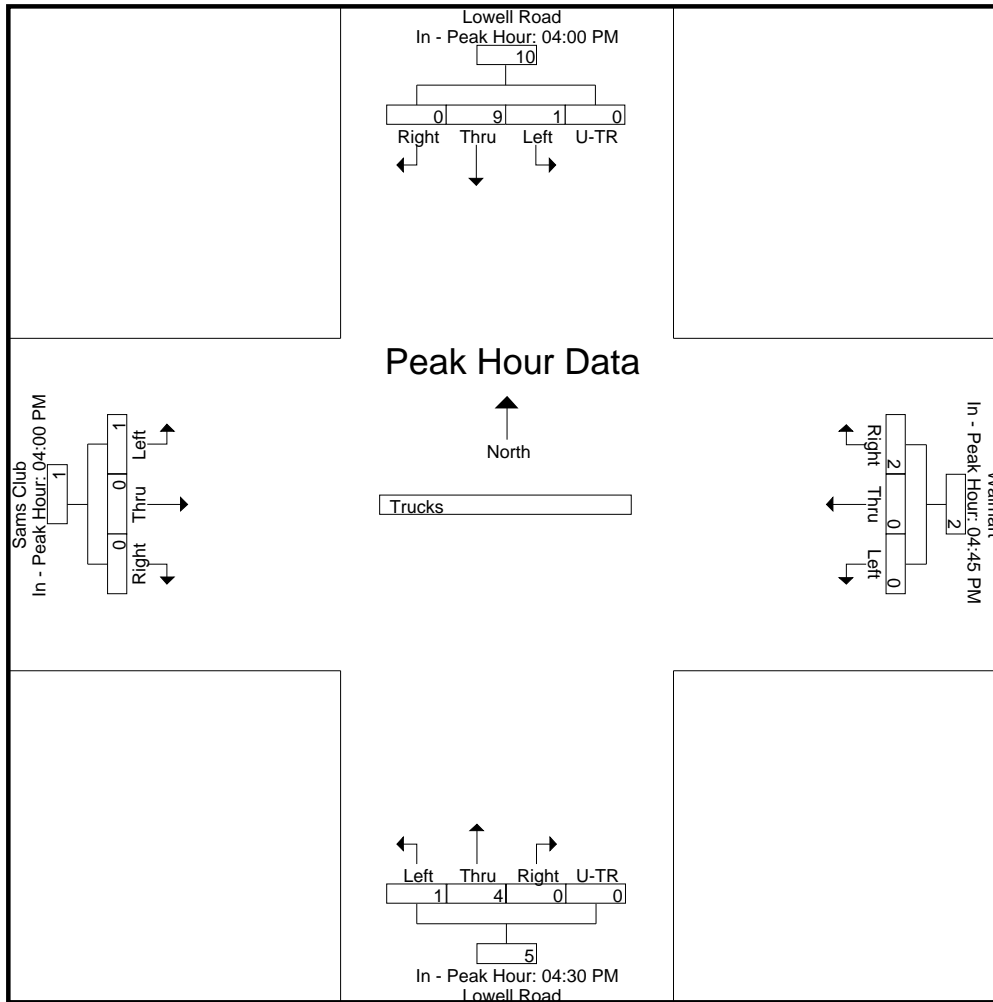
File Name : 10101008

Site Code : 10101008

Start Date : 10/8/2019

Page No : 4

N/S Street : Lowell Road  
 E/W Street: Walmart / Sams Club  
 City/State : Hudson, NH  
 Weather : Cloudy



# DRAFT

**Accurate Counts**  
978-664-2565

## Attachment "F"

N/S Street : Lowell Road  
E/W Street: Walmart / Sams Club  
City/State : Hudson, NH  
Weather : Cloudy

File Name : 10101008  
Site Code : 10101008  
Start Date : 10/8/2019  
Page No : 1

Groups Printed- Bikes Peds

Start Time	Lowell Road From North				Walmart From East				Lowell Road From South				Sams Club From West				Exclu. Total	Inclu. Total	Int. Total
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds			
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Grand Total</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Apprch %	0	0	0		0	0	0		0	0	0		0	0	100				
Total %	0	0	0		0	0	0		0	0	0		0	0	100		0	100	

Accurate Counts

978-664-2565

DRAFT

Attachment "F"

File Name : 10101008

Site Code : 10101008

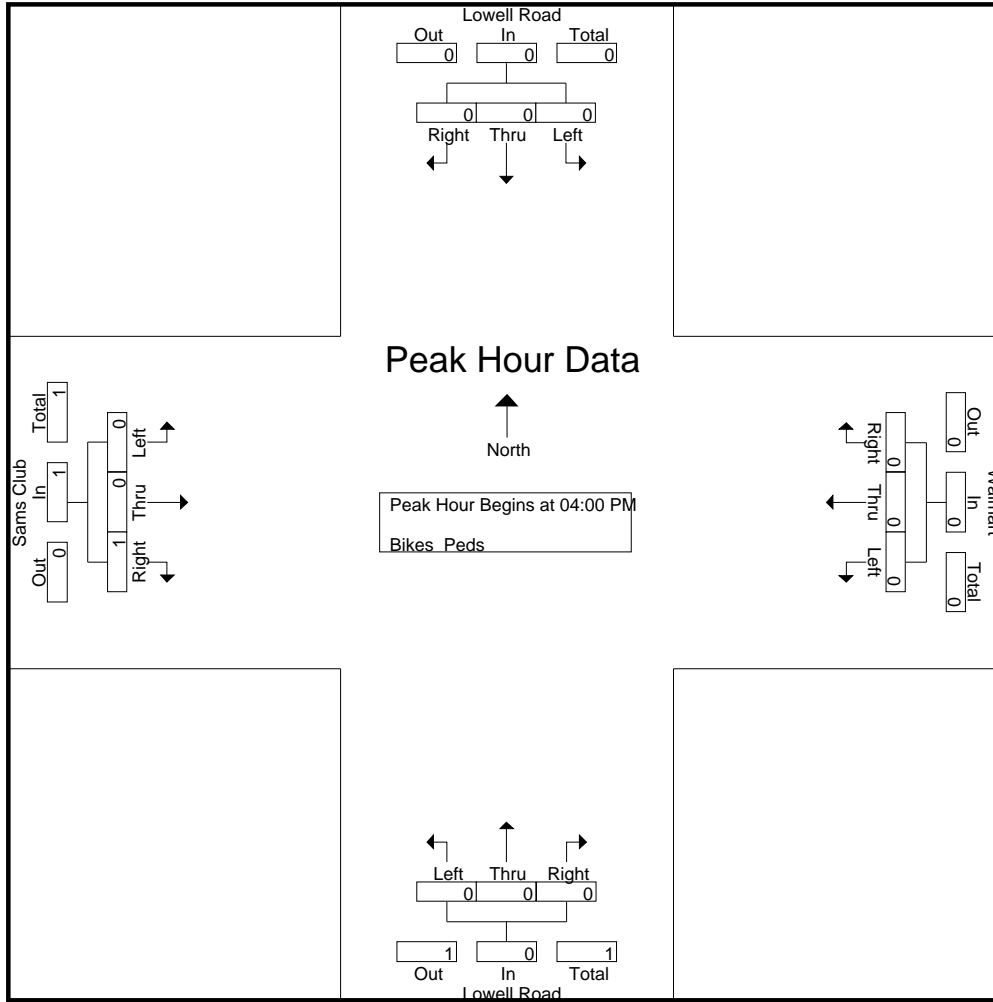
Start Date : 10/8/2019

Page No : 2

N/S Street : Lowell Road  
 E/W Street: Walmart / Sams Club  
 City/State : Hudson, NH  
 Weather : Cloudy

Start Time	Lowell Road From North				Walmart From East				Lowell Road From South				Sams Club From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
04:45 PM	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	1	1	1
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.250

N/S Street : Lowell Road  
E/W Street: Walmart / Sams Club  
City/State : Hudson, NH  
Weather : Cloudy

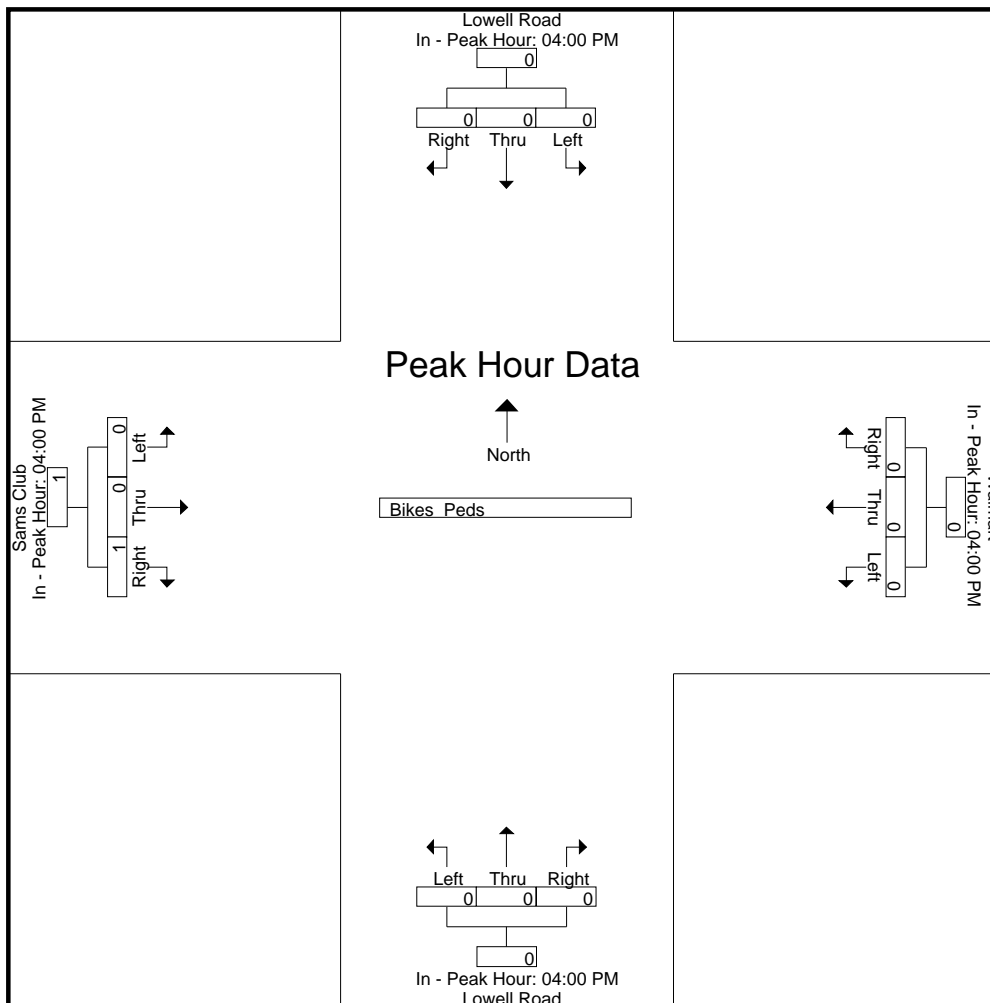


Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1  
Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:00 PM				04:00 PM			
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
+45 mins.	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	1	1
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	100
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250

DRAFT

N/S Street : Lowell Road  
E/W Street: Walmart / Sams Club  
City/State : Hudson, NH  
Weather : Cloudy



# DRAFT Attachment "F"

## Distance/Direction Analysis

Workers: Employed in the Custom Area  
Showing: Residential locations

### Job Counts in Home Blocks by Distance Only

	2022	
	Count	Share
Total All Jobs	16,663	100.0%
Less than 10 miles	7,240	43.4%
10 to 24 miles	5,805	34.8%
25 to 50 miles	2,455	14.7%
Greater than 50 miles	1,163	7.0%

### Job Counts in Home Blocks to the North of Work Blocks by Distance

	2022	
	Count	Share
Total All Jobs	4,616	100.0%
Less than 10 miles	1,636	35.4%
10 to 24 miles	2,108	45.7%
25 to 50 miles	529	11.5%
Greater than 50 miles	343	7.4%

### Job Counts in Home Blocks to the Northeast of Work Blocks by Distance

	2022	
	Count	Share
Total All Jobs	2,525	100.0%
Less than 10 miles	594	23.5%
10 to 24 miles	973	38.5%
25 to 50 miles	826	32.7%
Greater than 50 miles	132	5.2%

### Job Counts in Home Blocks to the East of Work Blocks by Distance

	2022	
	Count	Share
Total All Jobs	1,374	100.0%
Less than 10 miles	528	38.4%
10 to 24 miles	754	54.9%
25 to 50 miles	92	6.7%
Greater than 50 miles	0	0.0%

### Job Counts in Home Blocks to the Southeast of Work Blocks by Distance

	2022	
	Count	Share
Total All Jobs	1,883	100.0%
Less than 10 miles	1,066	56.6%
10 to 24 miles	415	22.0%
25 to 50 miles	351	18.6%
Greater than 50 miles	51	2.7%

### Job Counts in Home Blocks to the South of Work Blocks by Distance

	2022	
	Count	Share
Total All Jobs	879	100.0%
Less than 10 miles	441	50.2%
10 to 24 miles	211	24.0%
25 to 50 miles	133	15.1%
Greater than 50 miles	94	10.7%

# DRAFT Attachment "F"

## Distance/Direction Analysis

Workers: Employed in the Custom Area  
Showing: Residential locations

### Job Counts in Home Blocks to the Southwest of Work Blocks by Distance

	2022	
	Count	Share
Total All Jobs	791	100.0%
Less than 10 miles	294	37.2%
10 to 24 miles	208	26.3%
25 to 50 miles	88	11.1%
Greater than 50 miles	201	25.4%

### Job Counts in Home Blocks to the West of Work Blocks by Distance

	2022	
	Count	Share
Total All Jobs	1,322	100.0%
Less than 10 miles	713	53.9%
10 to 24 miles	322	24.4%
25 to 50 miles	179	13.5%
Greater than 50 miles	108	8.2%

### Job Counts in Home Blocks to the Northwest of Work Blocks by Distance

	2022	
	Count	Share
Total All Jobs	3,273	100.0%
Less than 10 miles	1,968	60.1%
10 to 24 miles	814	24.9%
25 to 50 miles	257	7.9%
Greater than 50 miles	234	7.1%



# DRAFT

GROWTH RATE CALCULATION  
T-BONES

Roadway	NHDOT Site	5 Year Linear Trend	5 Year Exponential Trend	5 Year Decaying Trend
DANIEL WEBSTER HIGHWAY AT AUTUMN LEAF DRIVE	82315031	3.30%	3.30%	2.34%
SPIT BROOK ROAD AT NEWCASTLE DRIVE	82315063	-0.43%	-0.22%	-1.60%
DANIEL WEBSTER HIGHWAY AT GRAHAM DRIVE	82315180	-0.71%	-0.54%	-1.77%
LOWELL ROAD AT RENA AVENUE	82229049	0.00%	0.11%	-0.22%
<b>Average Annual Growth Rate</b>		<b>0.54%</b>	<b>0.66%</b>	<b>-0.31%</b>

Attachment "F"

Home Locate Locate All Email This Auto-Locate:

List View All DIRs

Record	1	of 1	Goto Record	go
Location ID	82315063	MPO ID		
Type	SPOT	HPMS ID		
On NHS	No	On HPMS	Yes	
LRS ID	L3151056	LRS Loc Pt.		
SF Group	04 (2023)	Route Type		
AF Group	04 (2023)	Route		
GF Group	E (2023)	Active	Yes	
Class Dist Grp	Default (2023)	Category	3	
Seas Class Grp	Default (2023)			
WIM Group	Default (2023)			
QC Group	Default			
Funct'l Class	Minor Arterial	Milepost		
Located On	Spit Brook Rd			
Loc On Alias	SPIT BROOK RD WEST OF NEWCASTLE DR (EB-WB) (81315226-81315227)			

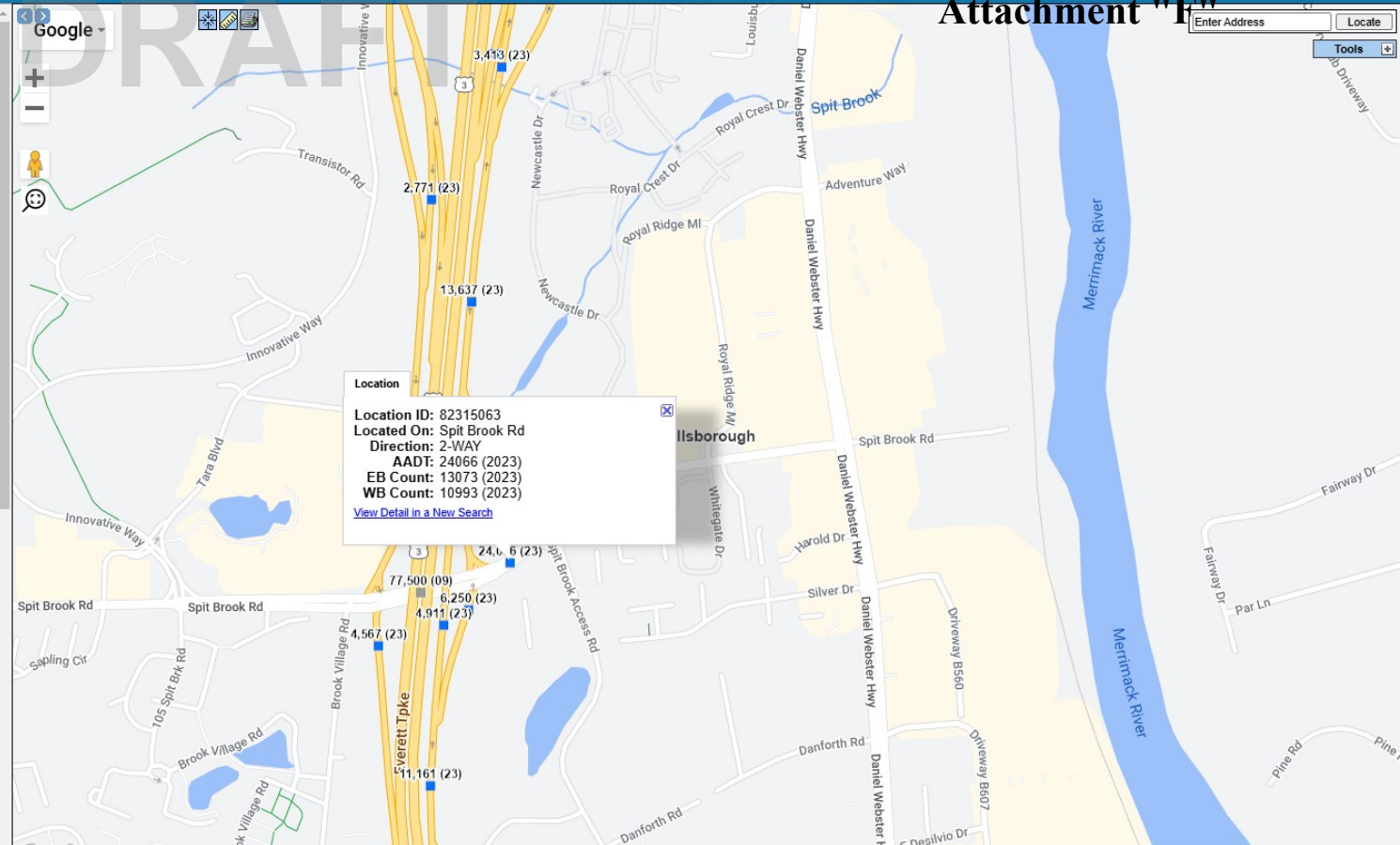
STATION DATA  
 Directions: 2-WAY EB WB  
 1 2 1 2 3

Year	AADT	DHV-30	K %	D %	PA	BC	Src
2023	24,066	2,430	10	50	23,742 (99%)	324 (1%)	
2022	22,790 <sup>3</sup>		11	53	21,353 (94%)	1,437 (6%)	Grown from 2021
2021	22,365 <sup>3</sup>		11	53	20,330 (91%)	2,035 (9%)	Grown from 2020
2020	20,167	2,228	11	53	18,353 (91%)	1,814 (9%)	
2019	25,933 <sup>3</sup>		10	52	23,753 (92%)	2,180 (8%)	Grown from 2018

Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV
------------	------------	--------	--------	--------	--------	--------	--------	--------	--------

Date	Int	Total
Thu 8/3/2023	15	27,878
Wed 8/2/2023	15	27,058
Tue 8/1/2023	15	27,570
Fri 8/14/2020	60	24,575

Year	Annual Growth
2023	6%
2022	2%
2021	11%
2020	-22%



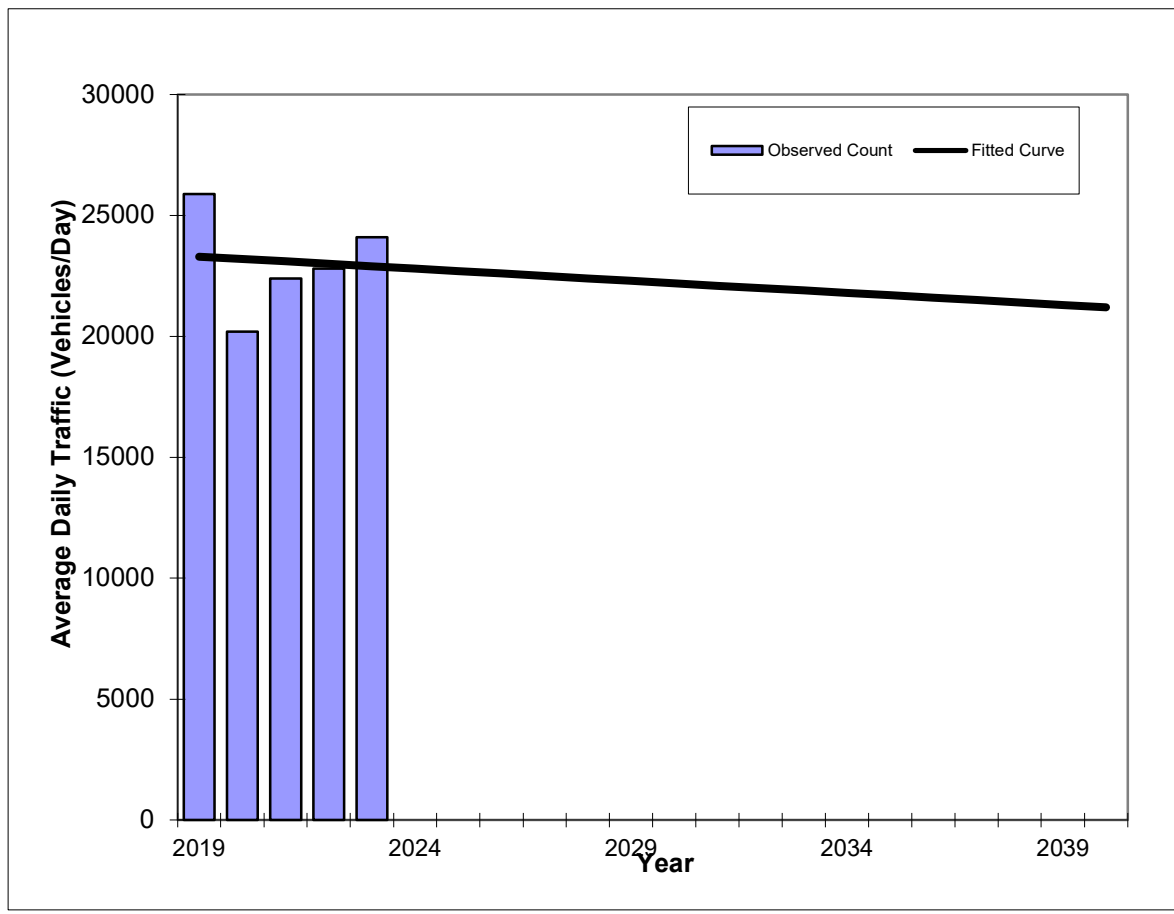
1-5 of 24

### Traffic Trends - V3.0

#### SPIT BROOK ROAD -- SPIT BROOK ROAD AT NEWCASTLE DRIVE

FIN#	0
Location	1

<b>County:</b>	Hillsborough (10)
<b>Station #:</b>	82315063
<b>Highway:</b>	SPIT BROOK ROAD



Year	Traffic (ADT/AADT)	
	Count*	Trend**
2019	25900	23300
2020	20200	23200
2021	22400	23100
2022	22800	23000
2023	24100	22900
<b>2030 Opening Year Trend</b>		
2030	N/A	22200
<b>2035 Mid-Year Trend</b>		
2035	N/A	21700
<b>2040 Design Year Trend</b>		
2040	N/A	21200
<b>TRANPLAN Forecasts/Trends</b>		

<b>** Annual Trend Increase:</b>	-100
<b>Trend R-squared:</b>	0.56%
<b>Trend Annual Historic Growth Rate:</b>	-0.43%
<b>Trend Growth Rate (2023 to Design Year):</b>	-0.44%
<b>Printed:</b>	19-Nov-24
<b>Straight Line Growth Option</b>	

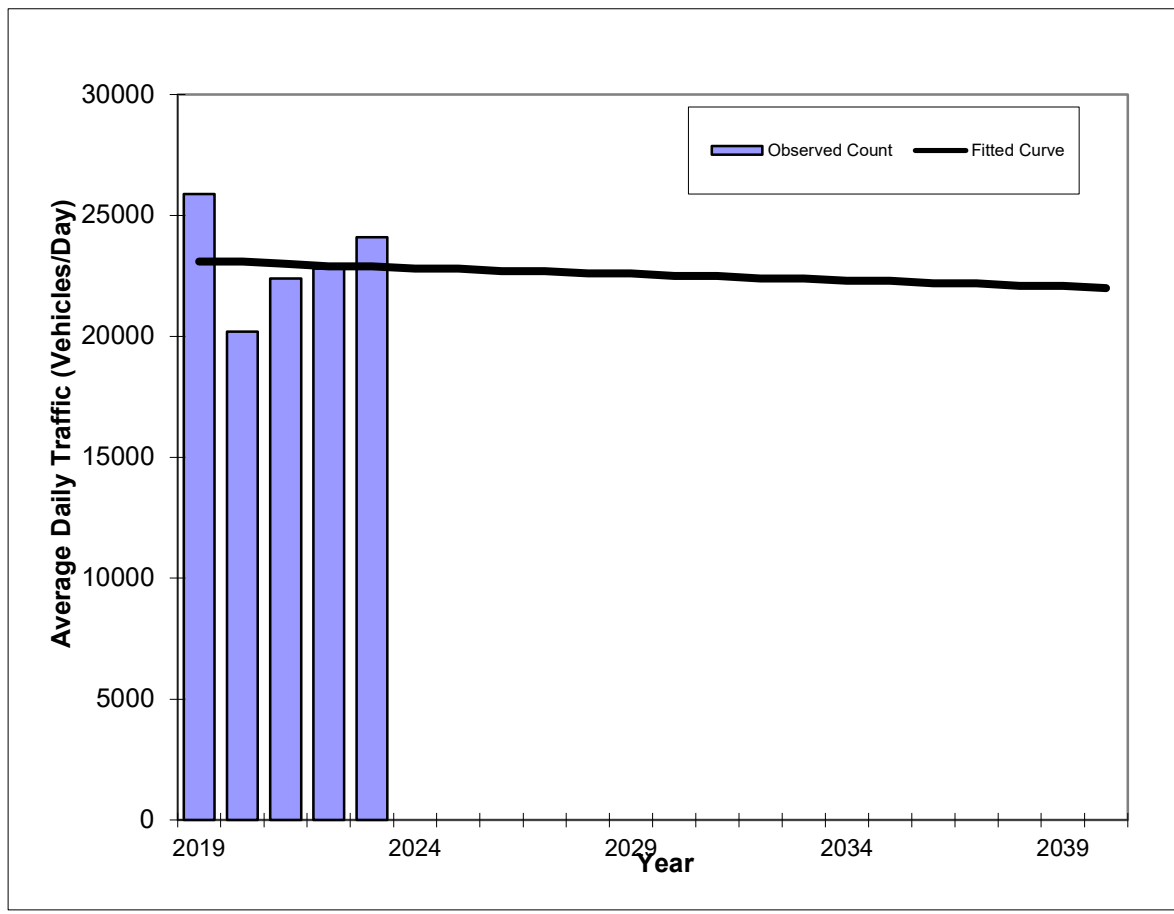
\*Axle-Adjusted

### Traffic Trends - V3.0

#### SPIT BROOK ROAD -- SPIT BROOK ROAD AT NEWCASTLE DRIVE

FIN#	0
Location	1

<b>County:</b>	Hillsborough (10)
<b>Station #:</b>	82315063
<b>Highway:</b>	SPIT BROOK ROAD



Year	Traffic (ADT/AADT)	
	Count*	Trend**
2019	25900	23100
2020	20200	23100
2021	22400	23000
2022	22800	22900
2023	24100	22900
<b>2030 Opening Year Trend</b>		
2030	N/A	22500
<b>2035 Mid-Year Trend</b>		
2035	N/A	22300
<b>2040 Design Year Trend</b>		
2040	N/A	22000
<b>TRANPLAN Forecasts/Trends</b>		

Trend R-squared:	0.16%
Compounded Annual Historic Growth Rate:	-0.22%
Compounded Growth Rate (2023 to Design Year):	-0.24%
Printed:	19-Nov-24
<b>Exponential Growth Option</b>	

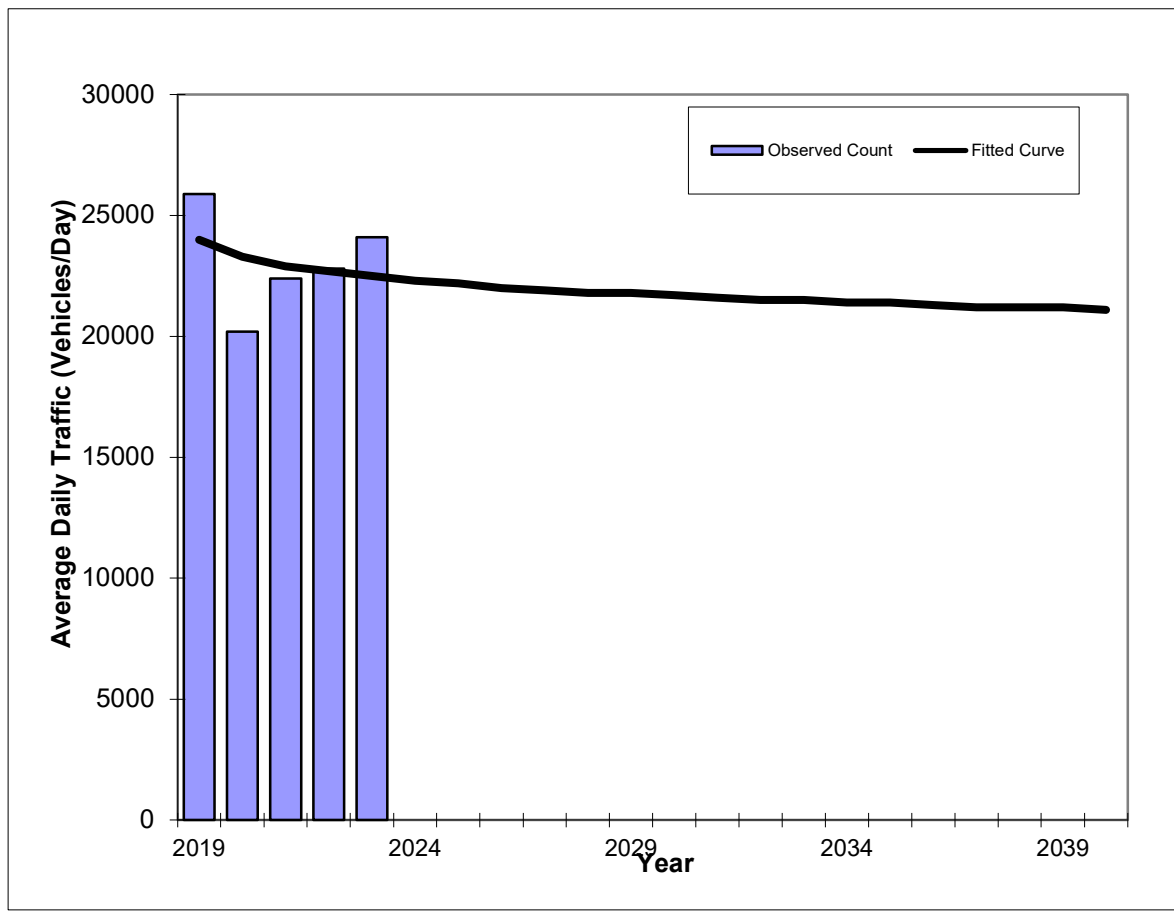
\*Axle-Adjusted

### Traffic Trends - V3.0

#### SPIT BROOK ROAD -- SPIT BROOK ROAD AT NEWCASTLE DRIVE

FIN#	0
Location	1

<b>County:</b>	Hillsborough (10)
<b>Station #:</b>	82315063
<b>Highway:</b>	SPIT BROOK ROAD



Year	Traffic (ADT/AADT)	
	Count*	Trend**
2019	25900	24000
2020	20200	23300
2021	22400	22900
2022	22800	22700
2023	24100	22500
<b>2030 Opening Year Trend</b>		
2030	N/A	21700
<b>2035 Mid-Year Trend</b>		
2035	N/A	21400
<b>2040 Design Year Trend</b>		
2040	N/A	21100
<b>TRANPLAN Forecasts/Trends</b>		

Trend R-squared:	7.71%
Compounded Annual Historic Growth Rate:	-1.60%
Compounded Growth Rate (2023 to Design Year):	-0.38%
Printed:	19-Nov-24
<b>Decaying Exponential Growth Option</b>	

\*Axle-Adjusted



Location ID	82315180	MPO ID	
Type	SPOT	HPMS ID	
On NHS	No	On HPMS	Yes
LRS ID	N3150008	LRS Loc Pt.	
SF Group	04 (2023)	Route Type	
AF Group	04 (2023)	Route	
GF Group	E (2023)	Active	Yes
Class Dist Grp	Default (2023)	Category	3
Seas Class Grp	Default (2023)		
WIM Group	Default (2023)		
QC Group	Default		
Funct'l Class	Minor Arterial	Milepost	
Located On	Daniel Webster Hwy		
Loc On Alias	DW HWY NORTH OF GRAHAM DR (SB-NB) (81315191-81315192)		

More Detail [▶](#)

**STATION DATA**

Directions: **2-WAY** NB SB [?](#)  
1 2 1 2

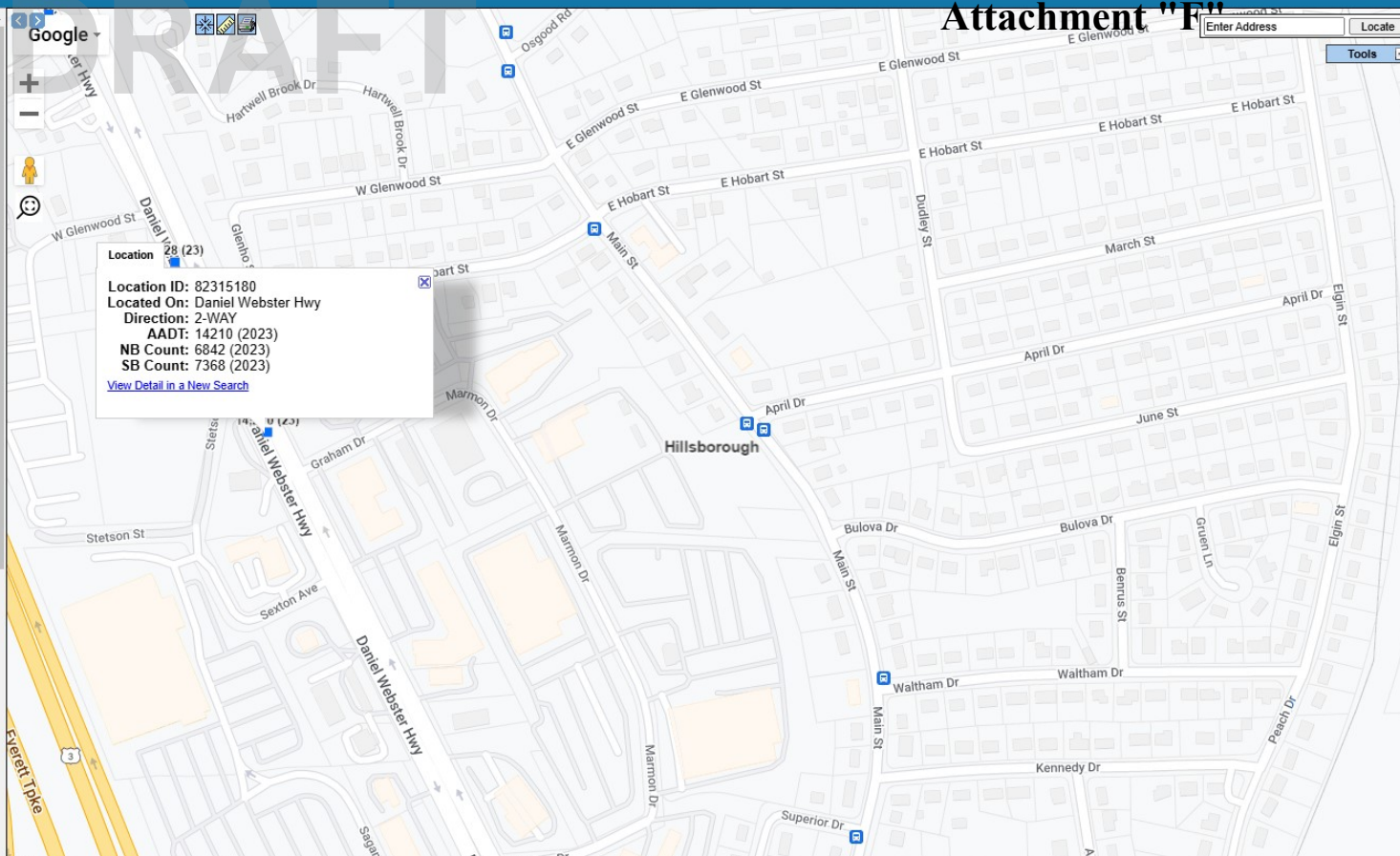
AADT <a href="#">?</a>							
Year	AADT	DHV-30	K %	D %	PA	BC	Src
2023	14,210	1,383	10	51	13,938 (98%)	272 (2%)	
2022	13,876 <sup>3</sup>		10	52	13,002 (94%)	874 (6%)	Grown from 2021
2021	13,617 <sup>3</sup>		10	52	12,378 (91%)	1,239 (9%)	Grown from 2020
2020	12,279	1,268	10	52	11,173 (91%)	1,106 (9%)	
2019	15,516 <sup>3</sup>		10	52	14,213 (92%)	1,303 (8%)	Grown from 2018

1-5 of 19

Travel Demand Model									
Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV

VOLUME COUNT			
Date	Int	Total	
Thu 8/3/2023	15	16,595	
Wed 8/2/2023	15	16,014	
Tue 8/1/2023	15	16,114	
Thu 10/29/2020	60	14,312	

VOLUME TREND <a href="#">?</a>	
Year	Annual Growth
2023	2%
2022	2%
2021	11%
2020	-21%



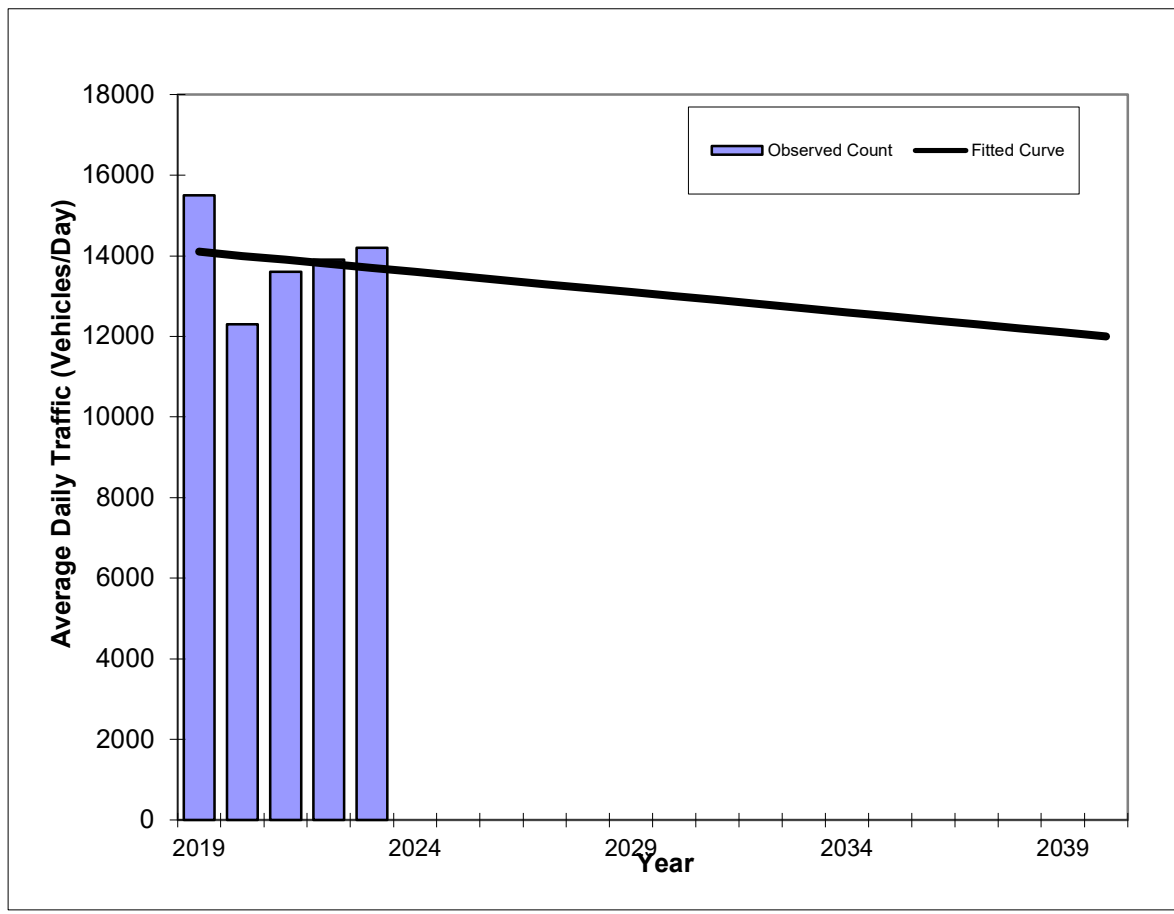
Attachment "F"

### Traffic Trends - V3.0

**NIEL WEBSTER HIGHWAY -- DANIEL WEBSTER HIGHWAY AT GRAHAM DR**

FIN#	0
Location	1

County:	Hillsborough (10)
Station #:	82315180
Highway:	DANIEL WEBSTER HIGHWAY



Year	Traffic (ADT/AADT)	
	Count*	Trend**
2019	15500	14100
2020	12300	14000
2021	13600	13900
2022	13900	13800
2023	14200	13700
2030 Opening Year Trend		
2030	N/A	13000
2035 Mid-Year Trend		
2035	N/A	12500
2040 Design Year Trend		
2040	N/A	12000
TRANPLAN Forecasts/Trends		

** Annual Trend Increase:	-100
Trend R-squared:	1.89%
Trend Annual Historic Growth Rate:	-0.71%
Trend Growth Rate (2023 to Design Year):	-0.73%
Printed:	19-Nov-24
Straight Line Growth Option	

\*Axle-Adjusted

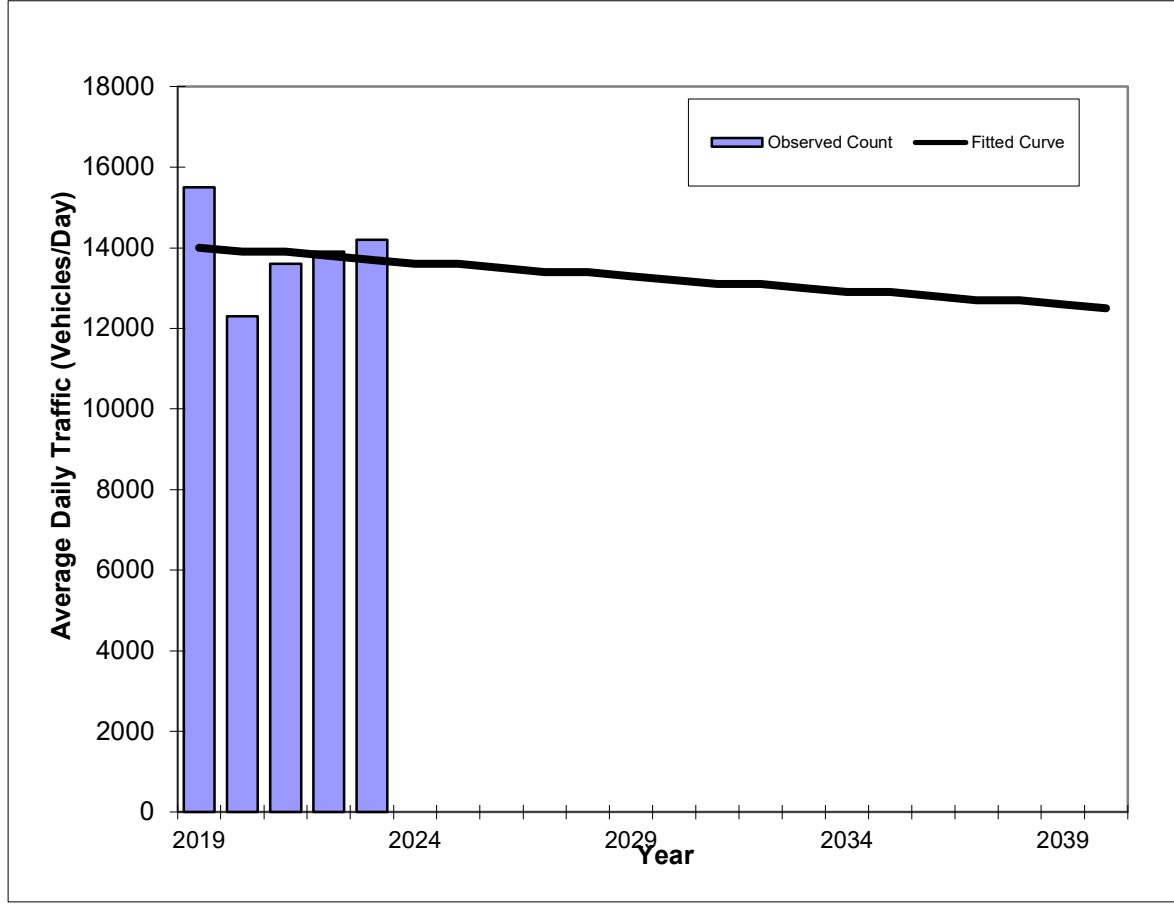


### Traffic Trends - V3.0

**NIEL WEBSTER HIGHWAY -- DANIEL WEBSTER HIGHWAY AT GRAHAM DR**

FIN#	0
Location	1

County:	Hillsborough (10)
Station #:	82315180
Highway:	DANIEL WEBSTER HIGHWAY



Year	Traffic (ADT/AADT)	
	Count*	Trend**
2019	15500	14000
2020	12300	13900
2021	13600	13900
2022	13900	13800
2023	14200	13700
<b>2030 Opening Year Trend</b>		
2030	N/A	13200
<b>2035 Mid-Year Trend</b>		
2035	N/A	12900
<b>2040 Design Year Trend</b>		
2040	N/A	12500
<b>TRANPLAN Forecasts/Trends</b>		

Trend R-squared:	1.01%
Compounded Annual Historic Growth Rate:	-0.54%
Compounded Growth Rate (2023 to Design Year):	-0.54%
Printed:	19-Nov-24
<b>Exponential Growth Option</b>	

\*Axle-Adjusted

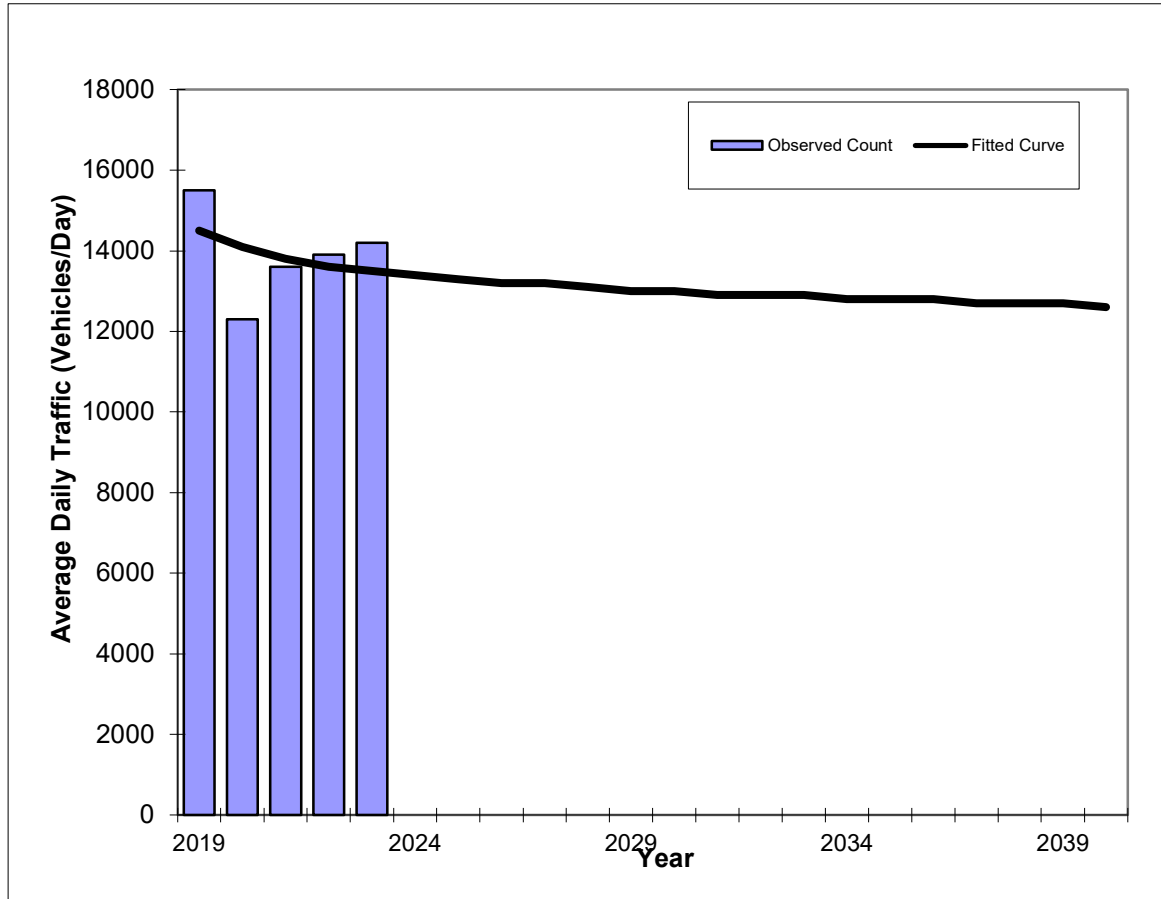


### Traffic Trends - V3.0

**NIEL WEBSTER HIGHWAY -- DANIEL WEBSTER HIGHWAY AT GRAHAM DR**

FIN#	0
Location	1

County:	Hillsborough (10)
Station #:	82315180
Highway:	DANIEL WEBSTER HIGHWAY



Year	Traffic (ADT/AADT)	
	Count*	Trend**
2019	15500	14500
2020	12300	14100
2021	13600	13800
2022	13900	13600
2023	14200	13500
<b>2030 Opening Year Trend</b>		
2030	N/A	13000
<b>2035 Mid-Year Trend</b>		
2035	N/A	12800
<b>2040 Design Year Trend</b>		
2040	N/A	12600
<b>TRANPLAN Forecasts/Trends</b>		

Trend R-squared:	10.67%
Compounded Annual Historic Growth Rate:	-1.77%
Compounded Growth Rate (2023 to Design Year):	-0.41%
Printed:	19-Nov-24
<b>Decaying Exponential Growth Option</b>	

\*Axle-Adjusted



Home Locate Locate All Email This Auto-Locate:

Attachment "F"

Enter Address

List View All DIRs

Record 1 of 1 Goto Record

Location ID	82229049	MPO ID	
Type	SPOT	HPMS ID	
On NHS	No	On HPMS	Yes
LRS ID	S0000003A_	LRS Loc Pt.	
SF Group	04 (2023)	Route Type	
AF Group	04 (2023)	Route	NH 3A
GF Group	E (2023)	Active	Yes
Class Dist Grp	Default (2023)	Category	3
Seas Class Grp	Default (2023)		
WIM Group	Default (2023)		
QC Group	Default		
Funct1 Class	Minor Arterial	Milepost	
Located On	Lowell Rd		
Loc On Alias	NH 3A (LOWELL RD) SOUTH OF RENA AVE		

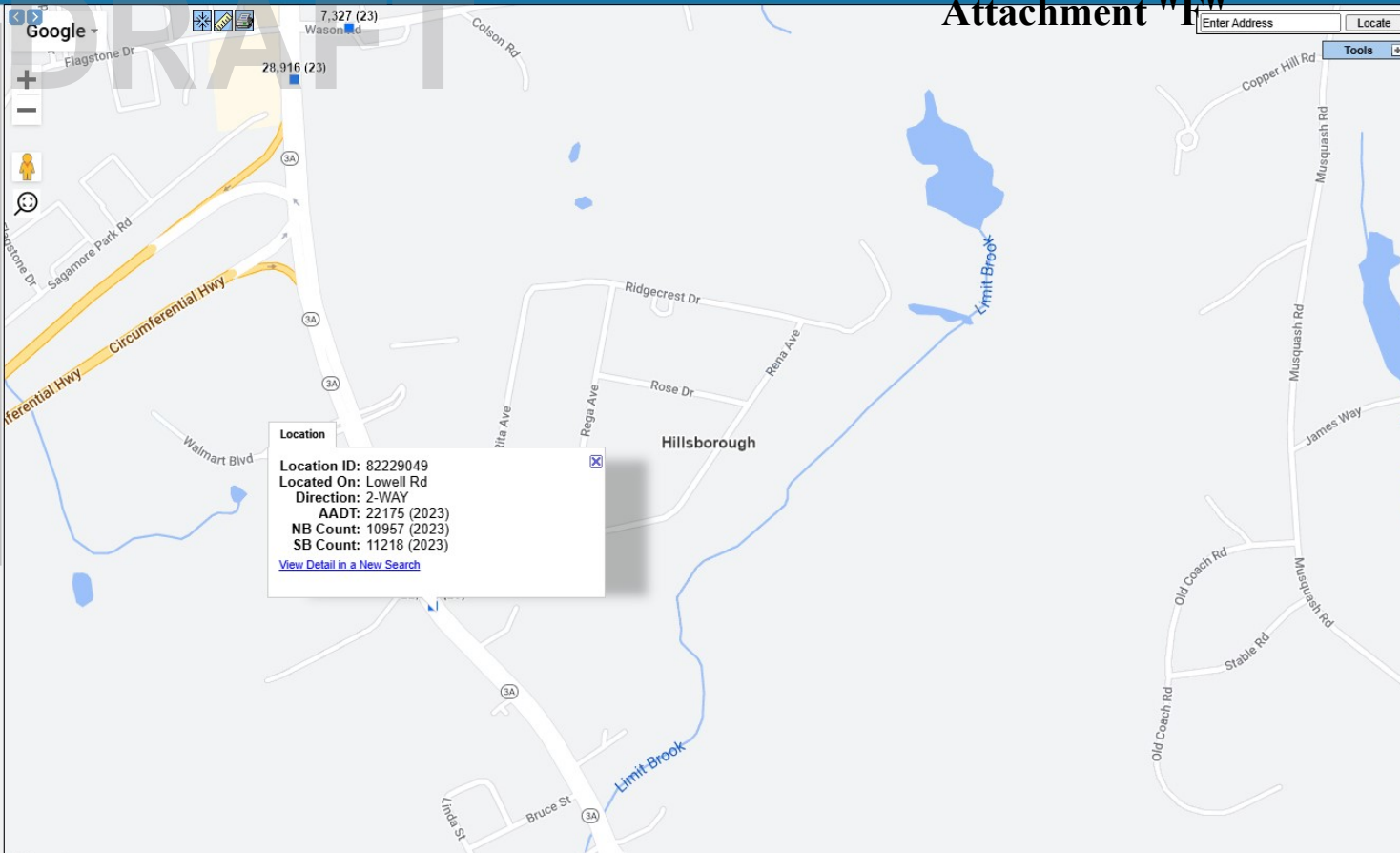
STATION DATA

Directions: 2-WAY NB SB  
1 2 1 2

Year	AADT	DHV-30	K %	D %	PA	BC	Src
2023	22,175	2,325	10	51	21,607 (97%)	568 (3%)	
2022	23,261 <sup>3</sup>		11	51	21,794 (94%)	1,467 (6%)	Grown from 2021
2021	22,827 <sup>3</sup>		11	51	20,750 (91%)	2,077 (9%)	Grown from 2020
2020	20,583	2,183	11	51	18,731 (91%)	1,852 (9%)	
2019	23,508 <sup>3</sup>		10	52	21,533 (92%)	1,975 (8%)	Grown from 2018

Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV
------------	------------	--------	--------	--------	--------	--------	--------	--------	--------

VOLUME COUNT				VOLUME TREND	
Date	Int	Total	Year	Annual Growth	
Thu 8/24/2023	15	25,392	2023	-5%	
Wed 8/23/2023	15	25,364	2022	2%	
Tue 8/22/2023	15	25,262	2021	11%	
Sun 8/16/2020	60	19,046	2020	-12%	

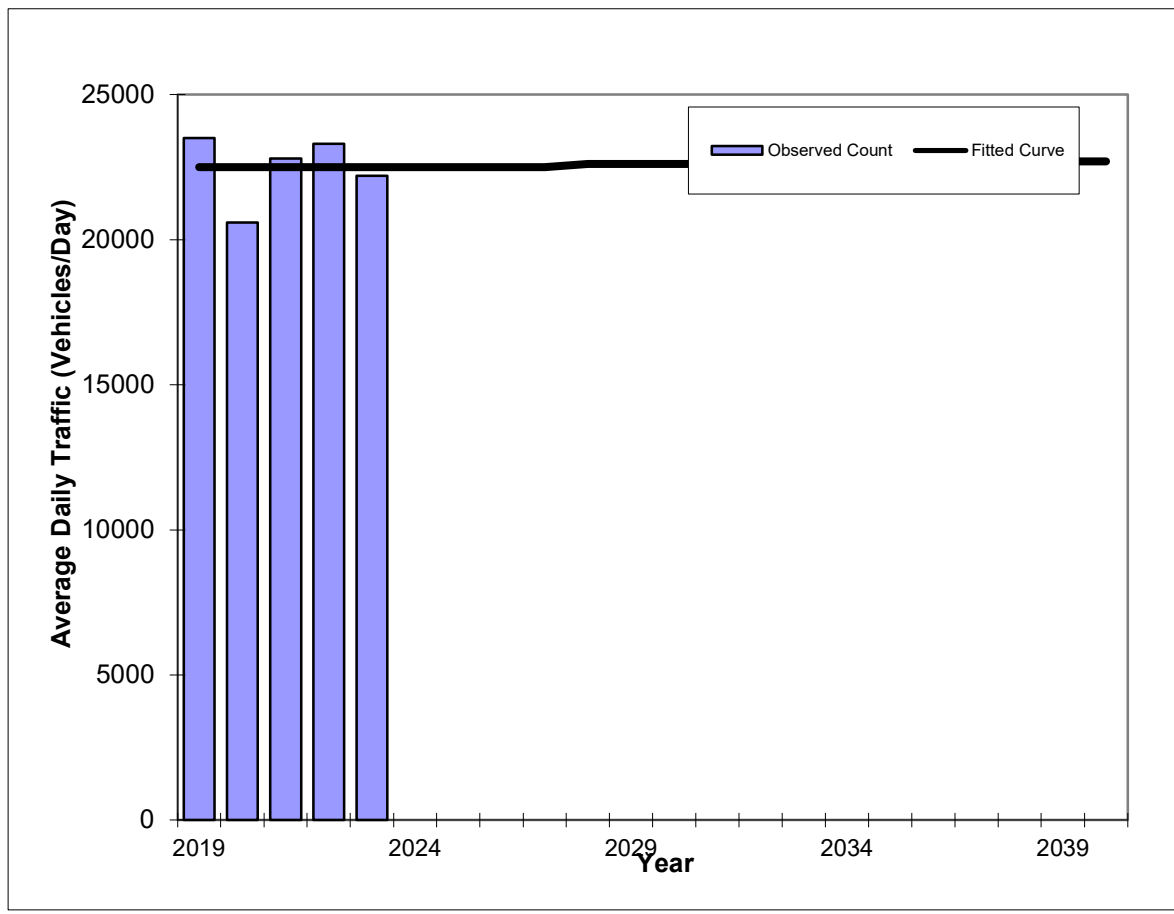


### Traffic Trends - V3.0

#### LOWELL ROAD -- LOWELL ROAD AT RENA AVENUE

FIN#	0
Location	1

<b>County:</b>	Hillsborough (10)
<b>Station #:</b>	82229049
<b>Highway:</b>	LOWELL ROAD



Year	Traffic (ADT/AADT)	
	Count*	Trend**
2019	23500	22500
2020	20600	22500
2021	22800	22500
2022	23300	22500
2023	22200	22500
<b>2030 Opening Year Trend</b>		
2030	N/A	22600
<b>2035 Mid-Year Trend</b>		
2035	N/A	22600
<b>2040 Design Year Trend</b>		
2040	N/A	22700
<b>TRANPLAN Forecasts/Trends</b>		

<b>** Annual Trend Increase:</b>	10
<b>Trend R-squared:</b>	0.02%
<b>Trend Annual Historic Growth Rate:</b>	0.00%
<b>Trend Growth Rate (2023 to Design Year):</b>	0.05%
<b>Printed:</b>	19-Nov-24
<b>Straight Line Growth Option</b>	

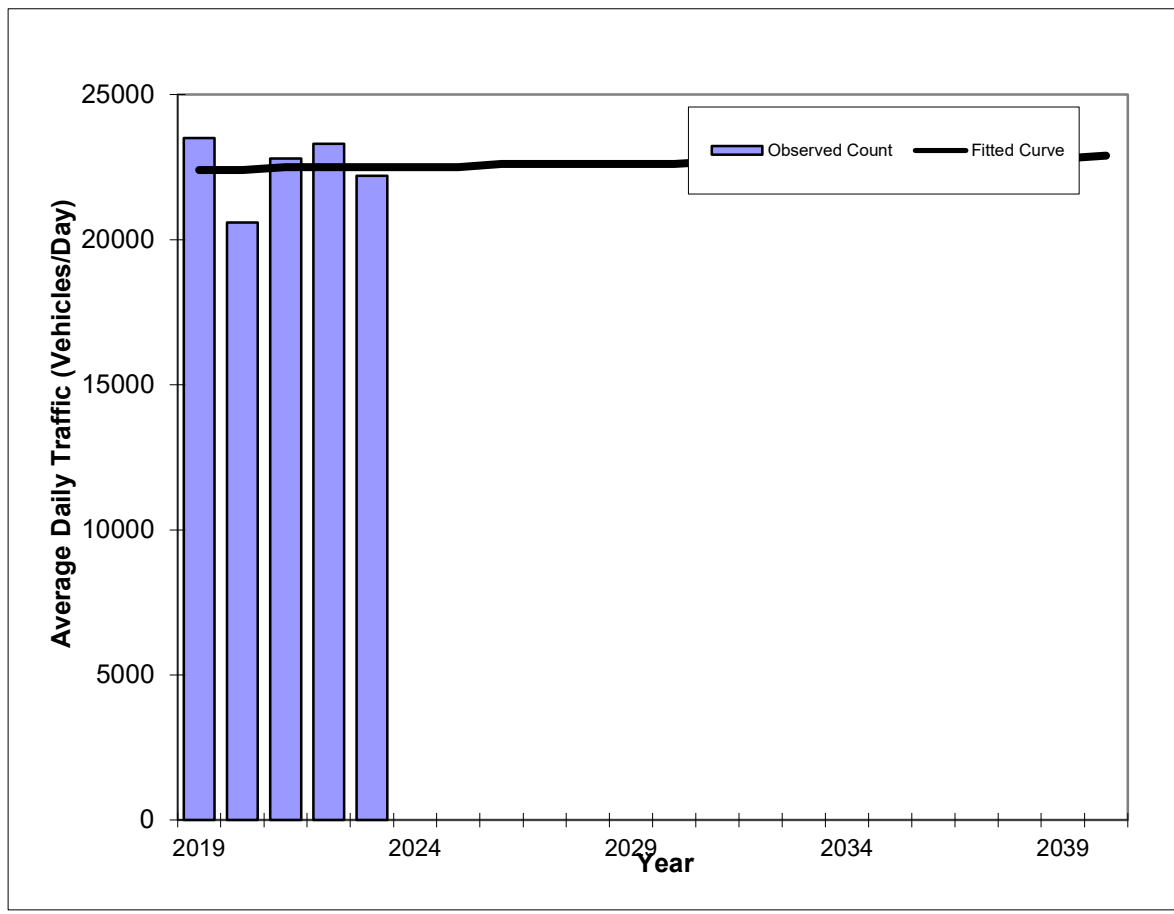
\*Axle-Adjusted

### Traffic Trends - V3.0

#### LOWELL ROAD -- LOWELL ROAD AT RENA AVENUE

FIN#	0
Location	1

<b>County:</b>	Hillsborough (10)
<b>Station #:</b>	82229049
<b>Highway:</b>	LOWELL ROAD



Year	Traffic (ADT/AADT)	
	Count*	Trend**
2019	23500	22400
2020	20600	22400
2021	22800	22500
2022	23300	22500
2023	22200	22500
<b>2030 Opening Year Trend</b>		
2030	N/A	22600
<b>2035 Mid-Year Trend</b>		
2035	N/A	22800
<b>2040 Design Year Trend</b>		
2040	N/A	22900
<b>TRANPLAN Forecasts/Trends</b>		

Trend R-squared:	0.08%
Compounded Annual Historic Growth Rate:	0.11%
Compounded Growth Rate (2023 to Design Year):	0.10%
Printed:	19-Nov-24
<b>Exponential Growth Option</b>	

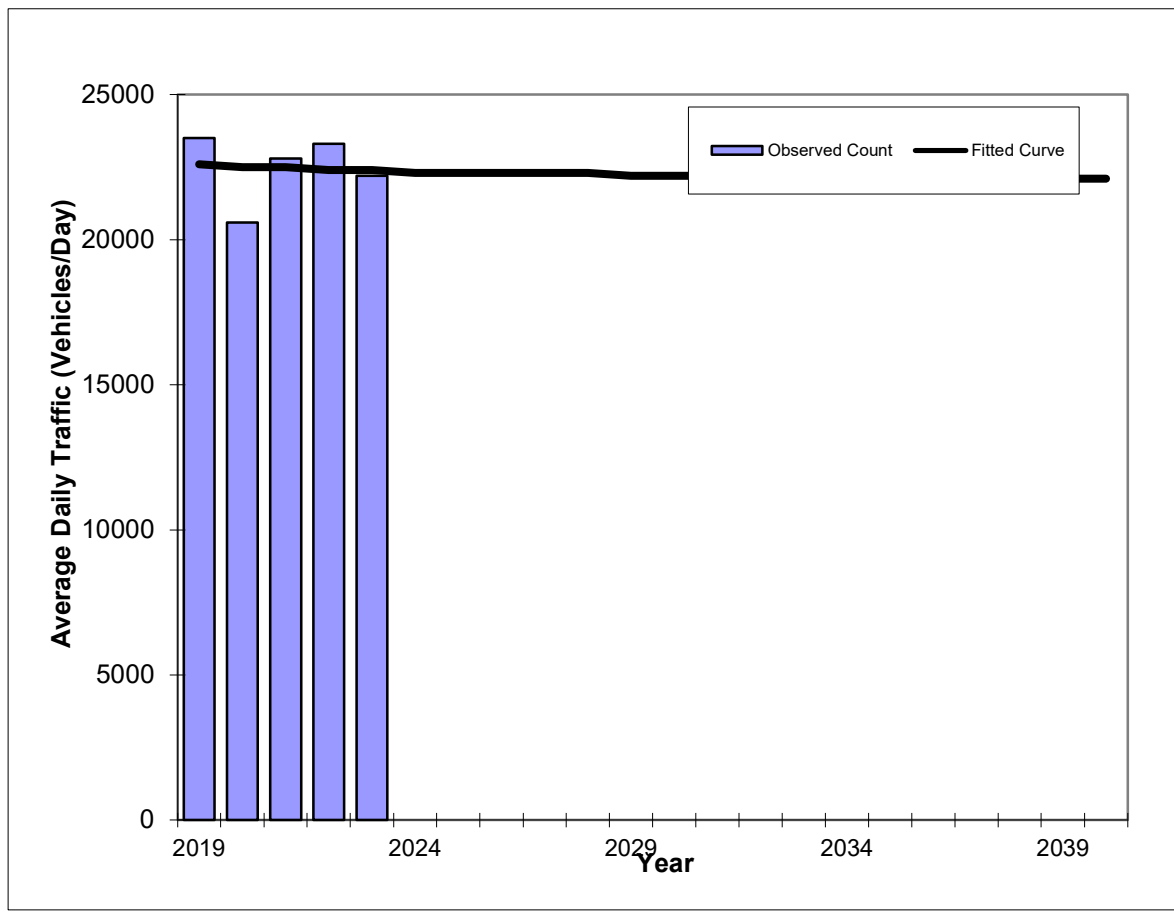
\*Axle-Adjusted

### Traffic Trends - V3.0

#### LOWELL ROAD -- LOWELL ROAD AT RENA AVENUE

FIN#	0
Location	1

<b>County:</b>	Hillsborough (10)
<b>Station #:</b>	82229049
<b>Highway:</b>	LOWELL ROAD



Year	Traffic (ADT/AADT)	
	Count*	Trend**
2019	23500	22600
2020	20600	22500
2021	22800	22500
2022	23300	22400
2023	22200	22400
<b>2030 Opening Year Trend</b>		
2030	N/A	22200
<b>2035 Mid-Year Trend</b>		
2035	N/A	22200
<b>2040 Design Year Trend</b>		
2040	N/A	22100
<b>TRANPLAN Forecasts/Trends</b>		

Trend R-squared:	0.80%
Compounded Annual Historic Growth Rate:	-0.22%
Compounded Growth Rate (2023 to Design Year):	-0.08%
Printed:	19-Nov-24
<b>Decaying Exponential Growth Option</b>	

\*Axle-Adjusted



Home Locate Locate All Email This Auto-Locate:

Attachment "F"

Enter Address

List View All DIRs

Record 1 of 1 Goto Record go

Location ID	82315031	MPO ID	
Type	SPOT	HPMS ID	
On NHS	No	On HPMS	Yes
LRS ID	N3150008	LRS Loc PL	
SF Group	04 (2023)	Route Type	
AF Group	04 (2023)	Route	
GF Group	E (2023)	Active	Yes
Class Dist Grp	Default (2023)	Category	3
Seas Class Grp	Default (2023)		
WIM Group	Default (2023)		
QC Group	Default		
Functl Class	Minor Arterial	Milepost	
Located On	Daniel Webster Hwy		
Loc On Alias	DANIEL WEBSTER HWY NORTH OF AUTUMN LEAF DR (SB-NB) (81315031-81315032)		

More Detail

STATION DATA

Directions: **2-WAY** NB SB

1 2 1 2

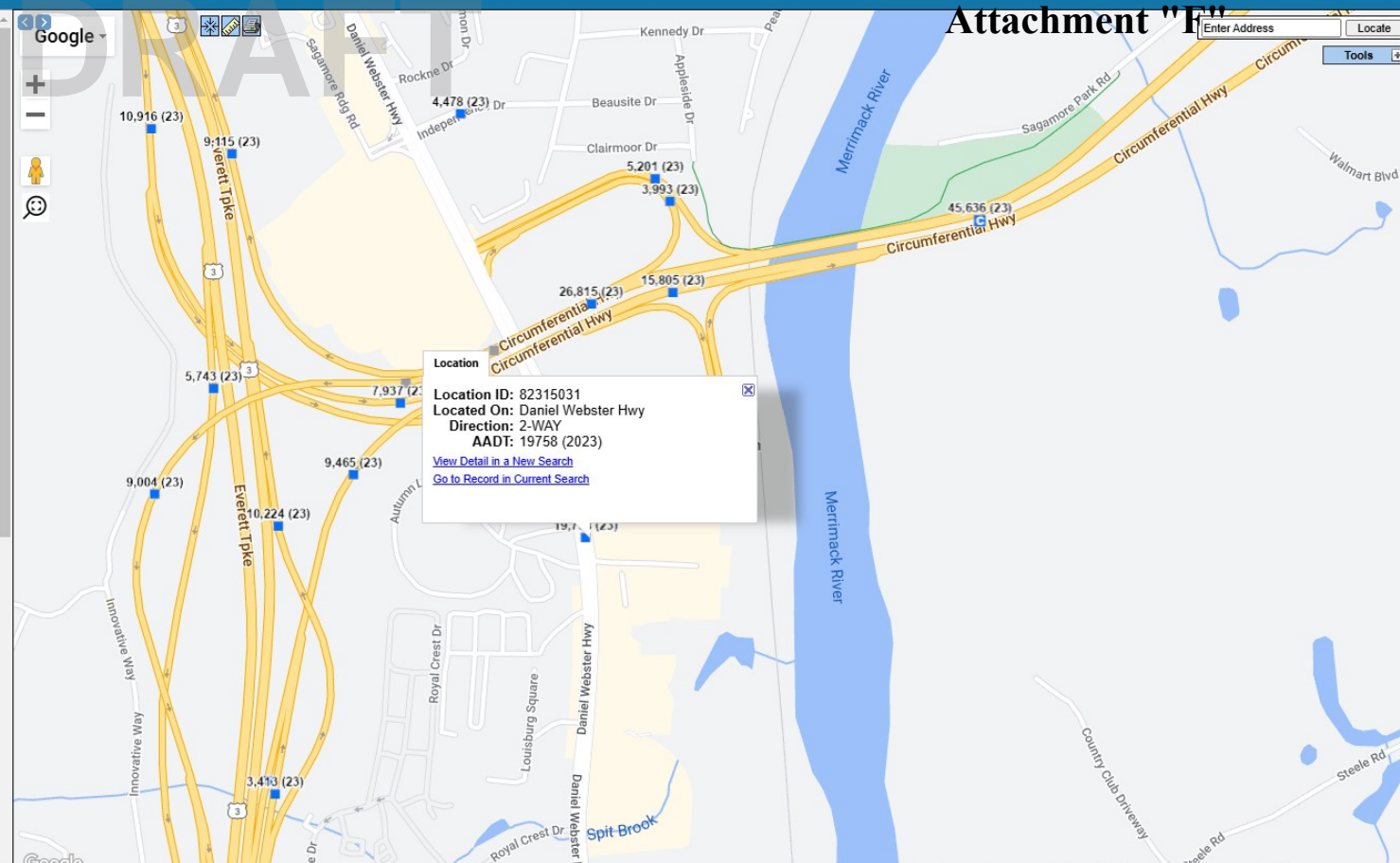
AADT							
Year	AADT	DHV-30	K %	D %	PA	BC	Src
2023	19,758 <sup>3</sup>		11	51	18,353 (93%)	1,405 (7%)	Grown from 2022
2022	19,314 <sup>3</sup>		11	51	18,096 (94%)	1,218 (6%)	Grown from 2021
2021	18,954	2,132	11	51	17,228 (91%)	1,726 (9%)	
2020	15,815 <sup>3</sup>		10	55	14,390 (91%)	1,425 (9%)	Grown from 2019
2019	18,738 <sup>3</sup>		10	55	17,166 (92%)	1,572 (8%)	Grown from 2018

1-5 of 22

Travel Demand Model

Model Year	Model AADT	AM PHV	AM PPV	MD PHV	MD PPV	PM PHV	PM PPV	NT PHV	NT PPV
------------	------------	--------	--------	--------	--------	--------	--------	--------	--------

VOLUME COUNT			VOLUME TREND	
Date	Int	Total	Year	Annual Growth
Thu 7/11/2024	15	21,228	2023	2%
Wed 7/10/2024	15	21,332	2022	2%
Tue 7/9/2024	15	20,356	2021	20%
Fri 10/29/2021	60	25,201	2020	-16%

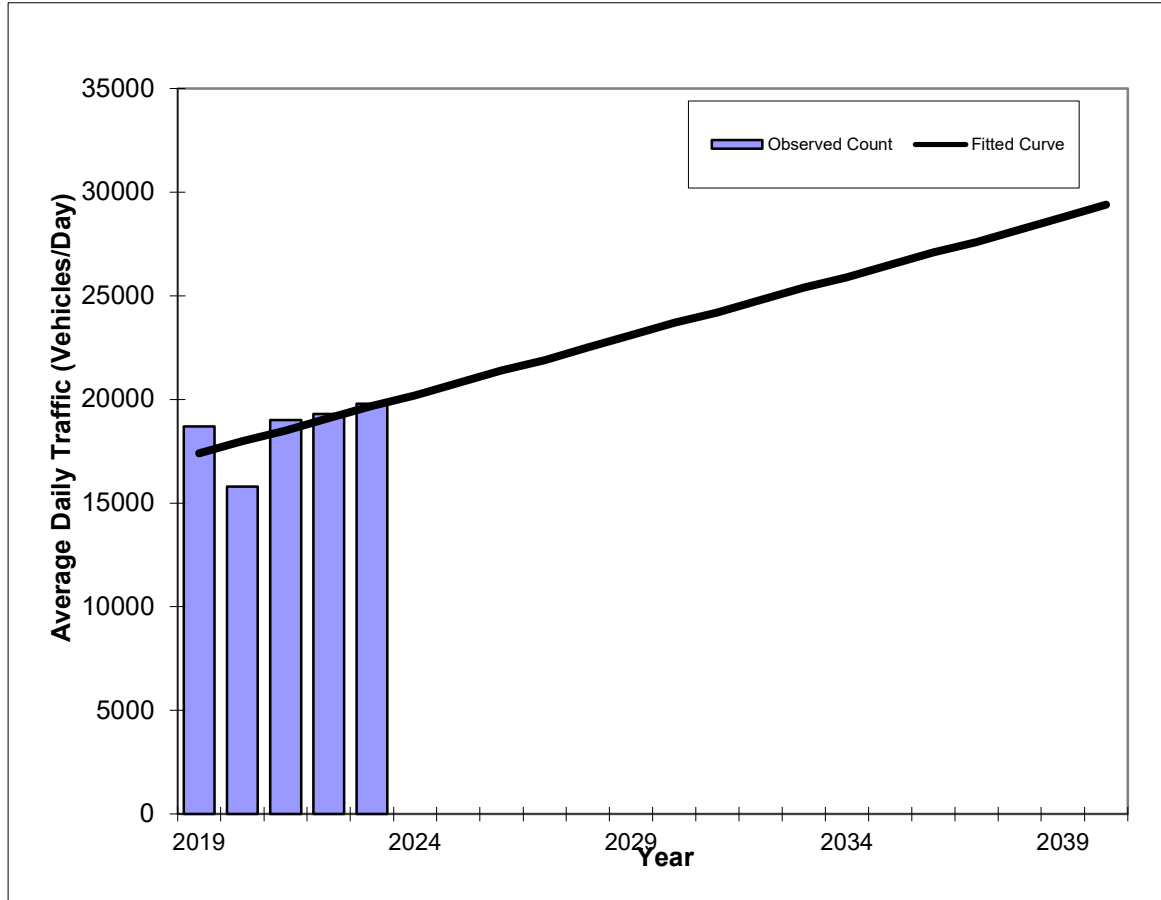


### Traffic Trends - V3.0

**WILSON WEBSTER HIGHWAY -- DANIEL WEBSTER HIGHWAY AT AUTUMN LEAF**

FIN#	0
Location	1

<b>County:</b>	Hillsborough (10)
<b>Station #:</b>	82315031
<b>Highway:</b>	DANIEL WEBSTER HIGHWAY



Year	Traffic (ADT/AADT)	
	Count*	Trend**
2019	18700	17400
2020	15800	18000
2021	19000	18500
2022	19300	19100
2023	19800	19700
2030 Opening Year Trend		
2030	N/A	23700
2035 Mid-Year Trend		
2035	N/A	26500
2040 Design Year Trend		
2040	N/A	29400
TRANPLAN Forecasts/Trends		

<b>** Annual Trend Increase:</b>	570
<b>Trend R-squared:</b>	32.79%
<b>Trend Annual Historic Growth Rate:</b>	3.30%
<b>Trend Growth Rate (2023 to Design Year):</b>	2.90%
<b>Printed:</b>	19-Nov-24
Straight Line Growth Option	

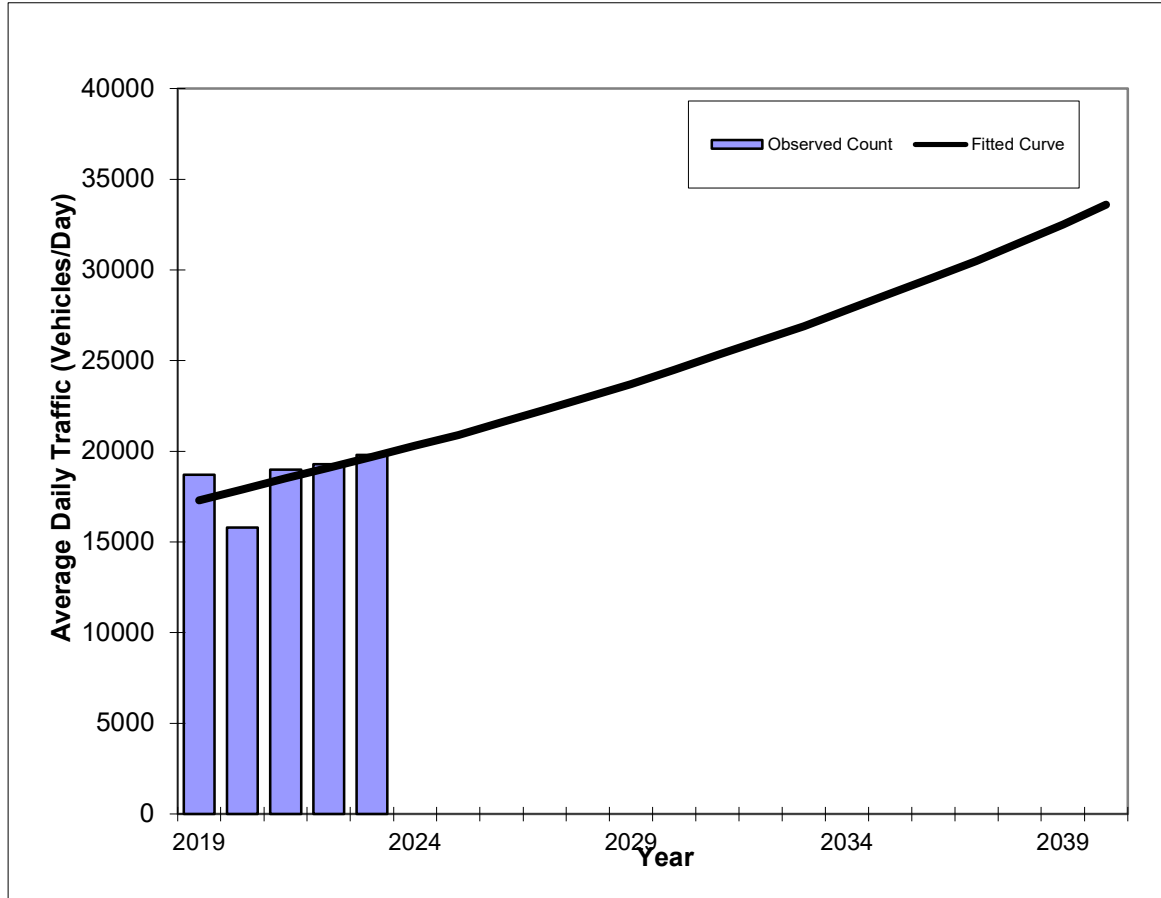
\*Axle-Adjusted

### Traffic Trends - V3.0

**WILSON WEBSTER HIGHWAY -- DANIEL WEBSTER HIGHWAY AT AUTUMN LEAF**

FIN#	0
Location	1

County:	Hillsborough (10)
Station #:	82315031
Highway:	DANIEL WEBSTER HIGHWAY



Year	Traffic (ADT/AADT)	
	Count*	Trend**
2019	18700	17300
2020	15800	17900
2021	19000	18500
2022	19300	19100
2023	19800	19700
<b>2030 Opening Year Trend</b>		
2030	N/A	24500
<b>2035 Mid-Year Trend</b>		
2035	N/A	28700
<b>2040 Design Year Trend</b>		
2040	N/A	33600
<b>TRANPLAN Forecasts/Trends</b>		

Trend R-squared:	30.80%
Compounded Annual Historic Growth Rate:	3.30%
Compounded Growth Rate (2023 to Design Year):	3.19%
Printed:	19-Nov-24
<b>Exponential Growth Option</b>	

\*Axle-Adjusted

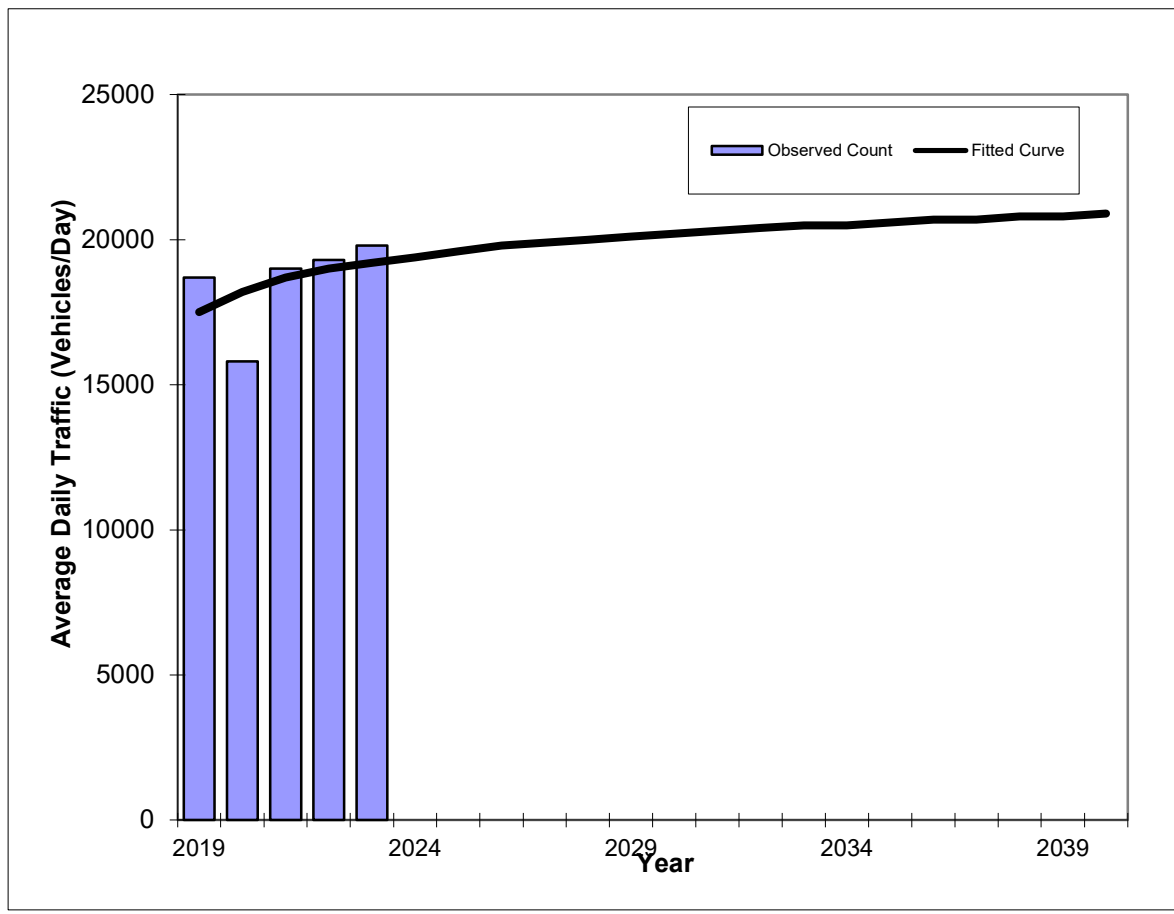


### Traffic Trends - V3.0

**WILSON WEBSTER HIGHWAY -- DANIEL WEBSTER HIGHWAY AT AUTUMN LEAF**

FIN#	0
Location	1

<b>County:</b>	Hillsborough (10)
<b>Station #:</b>	82315031
<b>Highway:</b>	DANIEL WEBSTER HIGHWAY



Year	Traffic (ADT/AADT)	
	Count*	Trend**
2019	18700	17500
2020	15800	18200
2021	19000	18700
2022	19300	19000
2023	19800	19200
<b>2030 Opening Year Trend</b>		
2030	N/A	20200
<b>2035 Mid-Year Trend</b>		
2035	N/A	20600
<b>2040 Design Year Trend</b>		
2040	N/A	20900
<b>TRANPLAN Forecasts/Trends</b>		

Trend R-squared:	19.87%
Compounded Annual Historic Growth Rate:	2.34%
Compounded Growth Rate (2023 to Design Year):	0.50%
Printed:	19-Nov-24
<b>Decaying Exponential Growth Option</b>	

\*Axle-Adjusted

**DRAFT** Attachment "F"

**ATTACHMENT D  
INTERSECTION VOLUME SPREADSHEET**

# DRAFT

## AM (PM) Volumes

Direction	Movement	2024 Existing Peak Hour Traffic Volumes	2027 No Build Peak Hour Traffic Volumes	Project Traffic Distributions	Project Traffic Trips	Pass-By Project Traffic Distributions	Pass-By Project Traffic Trips
Eastbound	EBL	104 (255)	135 (281)				
	EBT	4 (13)	4 (13)				
	EBR	57 (116)	58 (118)				
	Approach	165 (384)	197 (412)				
Westbound	WBL	15 (91)	15 (93)	(29%)	11 (5)		0 (13)
	WBT	5 (21)	5 (21)				
	WBR	73 (251)	74 (256)	(50%)	21 (8)		
	Approach	93 (363)	94 (370)	(79%)	32 (13)		0 (13)
Northbound	NBL	64 (98)	65 (100)				
	NBT	1,054 (1,152)	1,255 (1,410)	(21%)	9 (3)		0 (-1)
	NBR	28 (76)	29 (78)				
	Approach	1,146 (1,326)	1,349 (1,588)	(21%)	9 (3)		0 (-1)
Southbound	SBL	88 (319)	90 (325)	71%	36 (23)		0 (13)
	SBT	956 (1,061)	1,155 (1,318)				0 (-13)
	SBR	65 (203)	95 (228)				
	Approach	1,109 (1,583)	1,340 (1,871)	71%	36 (23)		

**DRAFT** Attachment "F"

**ATTACHMENT E  
INTERSECTION CAPACITY ANALYSIS**

**EXISTING CONDITIONS**

**Table 1.1 -2024 Existing Intersection Capacity Analysis Summary**

Location	Time	Level of Service <sup>[1]</sup>	
		(1) Lowell Road & Walmart Boulevard	
		Signalized	
		LOS	Delay
EBL	AM	D	46.4
	PM	E	58.0
EBT	AM	D	36.2
	PM	D	41.5
EBR	AM	D	39.5
	PM	D	46.2
EB Approach	AM	D	43.8
	PM	D	53.9
WBL	AM	D	46.6
	PM	E	62.1
WBT	AM	D	39.2
	PM	D	47.7
WBR	AM	D	51.6
	PM	F	248.3
WB Approach	AM	D	50.1
	PM	F	189.8
NBL	AM	D	44.6
	PM	E	62.2
NBT	AM	B	14.2
	PM	C	29.1
NBR	AM	A	9.0
	PM	B	18.4
NB Approach	AM	B	15.8
	PM	C	30.9
SBL	AM	D	45.6
	PM	E	59.0
SBT	AM	B	13.1
	PM	C	20.1
SBR	AM	A	9.1
	PM	B	15.6
SB Approach	AM	B	15.5
	PM	C	27.3
Overall	AM	B	18.7
	PM	D	47.5

[1] Delay is average delay per vehicle in seconds

**Table 1.2 -2024 Existing Intersection Queue Lengths Summary**

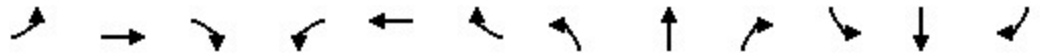
Location	Time	95th Percentile Queue Lengths (ft)															
		EBL		EBR		WBL		WBR		NBL		NBR		SBL		SBR	
		Storage (ft)	95 <sup>th</sup> %tile	Storage (ft)	95 <sup>th</sup> %tile	Storage (ft)	95 <sup>th</sup> %tile	Storage (ft)	95 <sup>th</sup> %tile	Storage (ft)	95 <sup>th</sup> %tile	Storage (ft)	95 <sup>th</sup> %tile	Storage (ft)	95 <sup>th</sup> %tile	Storage (ft)	95 <sup>th</sup> %tile
(1) Lowell Road & Walmart Boulevard	AM	175	56	175	0	150	14	200	0	350	39	175	0	350	48	[N/A]	
	PM		141		41		63		88		67		4		172		

### T-Bones

2024 Existing Conditions

### 1: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑	↔	↔↔	↑	↔	↔↔	↑↑	↔	↔↔	↑↑	↔
Traffic Volume (vph)	104	4	57	15	5	73	64	1054	28	88	956	65
Future Volume (vph)	104	4	57	15	5	73	64	1054	28	88	956	65
Lane Group Flow (vph)	113	4	62	16	5	79	70	1146	30	96	1039	71
Turn Type	Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot
Protected Phases	7	4	4	3	8	8	1	6	6	5	2	2
Permitted Phases												
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	16.0	11.0	16.0	16.0
Total Split (s)	17.0	16.0	16.0	17.0	16.0	16.0	16.0	41.0	41.0	16.0	41.0	41.0
Total Split (%)	18.9%	17.8%	17.8%	18.9%	17.8%	17.8%	17.8%	45.6%	45.6%	17.8%	45.6%	45.6%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
v/c Ratio	0.33	0.01	0.14	0.06	0.04	0.27	0.23	0.59	0.03	0.29	0.53	0.07
Control Delay (s/veh)	39.7	31.0	0.7	38.7	38.8	2.3	39.3	19.9	0.1	39.4	18.2	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	39.7	31.0	0.7	38.7	38.8	2.3	39.3	19.9	0.1	39.4	18.2	0.2
Queue Length 50th (ft)	31	2	0	4	3	0	19	266	0	26	227	0
Queue Length 95th (ft)	56	12	0	14	13	0	39	379	0	48	324	0
Internal Link Dist (ft)		321			369			1261			512	
Turn Bay Length (ft)	175		175	150		200	350		175	350		
Base Capacity (vph)	415	357	449	415	205	338	377	1946	951	384	1969	961
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.01	0.14	0.04	0.02	0.23	0.19	0.59	0.03	0.25	0.53	0.07

#### Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 51 (57%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

#### Splits and Phases: 1: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

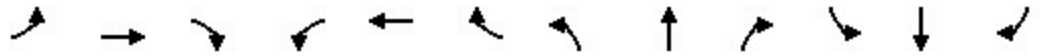
↙ Ø1 16 s	↓ Ø2 (R) 41 s	↘ Ø3 17 s	→ Ø4 16 s
↘ Ø5 16 s	↑ Ø6 (R) 41 s	↙ Ø7 17 s	← Ø8 16 s

### T-Bones

### 2024 Existing Conditions

### 1: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑	↔	↔↔	↑	↔	↔↔	↑↑	↔	↔↔	↑↑	↔
Traffic Volume (veh/h)	104	4	57	15	5	73	64	1054	28	88	956	65
Future Volume (veh/h)	104	4	57	15	5	73	64	1054	28	88	956	65
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.04	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.00	1.00
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1884	1856	1856	1856	1899	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	113	4	62	16	5	79	70	1146	30	96	1039	71
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, %	3	6	3	3	3	5	3	3	3	3	3	3
Cap, veh/h	183	198	166	63	130	113	157	1972	879	173	1988	887
Arrive On Green	0.05	0.11	0.11	0.02	0.07	0.07	0.05	0.56	0.56	0.05	0.56	0.56
Sat Flow, veh/h	3428	1884	1572	3428	1856	1609	3428	3526	1572	3428	3526	1572
Grp Volume(v), veh/h	113	4	62	16	5	79	70	1146	30	96	1039	71
Grp Sat Flow(s),veh/h/ln	1714	1884	1572	1714	1856	1609	1714	1763	1572	1714	1763	1572
Q Serve(g_s), s	2.9	0.2	3.3	0.4	0.2	4.3	1.8	19.1	0.8	2.5	16.4	1.9
Cycle Q Clear(g_c), s	2.9	0.2	3.3	0.4	0.2	4.3	1.8	19.1	0.8	2.5	16.4	1.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	183	198	166	63	130	113	157	1972	879	173	1988	887
V/C Ratio(X)	0.62	0.02	0.37	0.25	0.04	0.70	0.44	0.58	0.03	0.55	0.52	0.08
Avail Cap(c_a), veh/h	419	209	175	419	206	179	381	1972	879	381	1988	887
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.7	36.1	37.5	43.6	39.0	40.9	41.8	13.0	8.9	41.7	12.1	9.0
Incr Delay (d2), s/veh	4.7	0.1	2.0	3.0	0.2	10.6	2.8	1.3	0.1	3.9	1.0	0.2
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	1.3	0.1	1.4	0.2	0.1	2.0	0.8	7.1	0.3	1.1	6.0	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	46.4	36.2	39.5	46.6	39.2	51.6	44.6	14.2	9.0	45.6	13.1	9.1
LnGrp LOS	D	D	D	D	D	D	D	B	A	D	B	A
Approach Vol, veh/h	179				100			1246			1206	
Approach Delay, s/veh	43.8				50.1			15.8			15.5	
Approach LOS	D				D			B			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.1	56.7	7.6	15.5	10.5	56.3	10.8	12.3				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	10.0	35.0	11.0	10.0	10.0	35.0	11.0	10.0				
Max Q Clear Time (g_c+I1), s	3.8	18.4	2.4	5.3	4.5	21.1	4.9	6.3				
Green Ext Time (p_c), s	0.1	12.2	0.0	0.1	0.2	11.0	0.2	0.1				
<b>Intersection Summary</b>												
HCM 7th Control Delay, s/veh			18.7									
HCM 7th LOS			B									

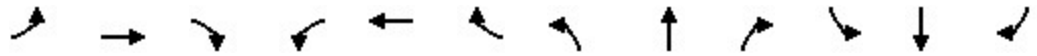


### T-Bones

2024 Existing Conditions

### 1: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	255	13	116	91	21	251	98	1152	76	319	1061	203
Future Volume (vph)	255	13	116	91	21	251	98	1152	76	319	1061	203
Lane Group Flow (vph)	266	14	121	95	22	261	102	1200	79	332	1105	211
Turn Type	Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot
Protected Phases	7	4	4	3	8	8	1	6	6	5	2	2
Permitted Phases												
Detector Phase	7	4	4	3	8	8	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	16.0	11.0	16.0	16.0
Total Split (s)	26.0	20.0	20.0	26.0	20.0	20.0	21.0	48.0	48.0	26.0	53.0	53.0
Total Split (%)	21.7%	16.7%	16.7%	21.7%	16.7%	16.7%	17.5%	40.0%	40.0%	21.7%	44.2%	44.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
v/c Ratio	0.60	0.06	0.38	0.35	0.15	0.73	0.36	0.77	0.10	0.68	0.62	0.24
Control Delay (s/veh)	54.9	43.8	9.0	55.2	52.2	19.5	55.3	33.5	0.6	55.7	24.5	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	54.9	43.8	9.0	55.2	52.2	19.5	55.3	33.5	0.6	55.7	24.5	4.2
Queue Length 50th (ft)	101	10	0	36	16	7	39	394	0	126	302	5
Queue Length 95th (ft)	141	28	41	63	41	88	67	#634	4	172	465	53
Internal Link Dist (ft)		321			369			1261			512	
Turn Bay Length (ft)	175		175	150		200	350		175	350		
Base Capacity (vph)	566	259	331	566	216	412	425	1567	776	566	1785	895
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.05	0.37	0.17	0.10	0.63	0.24	0.77	0.10	0.59	0.62	0.24

#### Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 64 (53%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow

Natural Cycle: 75

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

#### Splits and Phases: 1: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

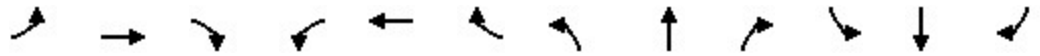


### T-Bones

2024 Existing Conditions

### 1: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↑	↖	↖↗	↑	↖	↖↗	↑↑	↖	↖↗	↑↑	↖
Traffic Volume (veh/h)	255	13	116	91	21	251	98	1152	76	319	1061	203
Future Volume (veh/h)	255	13	116	91	21	251	98	1152	76	319	1061	203
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.04	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.00	1.00
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1930	1856	1856	1856	1930	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	266	14	121	95	22	261	102	1200	79	332	1105	211
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	343	332	270	153	216	191	159	1637	730	408	1893	844
Arrive On Green	0.10	0.17	0.17	0.04	0.12	0.12	0.05	0.46	0.46	0.12	0.54	0.54
Sat Flow, veh/h	3428	1930	1572	3428	1856	1635	3428	3526	1572	3428	3526	1572
Grp Volume(v), veh/h	266	14	121	95	22	261	102	1200	79	332	1105	211
Grp Sat Flow(s),veh/h/ln	1714	1930	1572	1714	1856	1635	1714	1763	1572	1714	1763	1572
Q Serve(g_s), s	9.1	0.7	8.3	3.3	1.3	14.0	3.5	33.2	3.4	11.3	25.4	8.6
Cycle Q Clear(g_c), s	9.1	0.7	8.3	3.3	1.3	14.0	3.5	33.2	3.4	11.3	25.4	8.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	343	332	270	153	216	191	159	1637	730	408	1893	844
V/C Ratio(X)	0.78	0.04	0.45	0.62	0.10	1.37	0.64	0.73	0.11	0.81	0.58	0.25
Avail Cap(c_a), veh/h	571	332	270	571	216	191	429	1637	730	571	1893	844
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.7	41.4	44.6	56.3	47.4	53.0	56.2	26.1	18.1	51.6	18.7	14.9
Incr Delay (d2), s/veh	5.3	0.1	1.6	5.7	0.3	195.3	6.0	2.9	0.3	7.4	1.3	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	4.2	0.4	3.4	1.5	0.6	16.1	1.6	14.1	1.3	5.2	10.3	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	58.0	41.5	46.2	62.1	47.7	248.3	62.2	29.1	18.4	59.0	20.1	15.6
LnGrp LOS	E	D	D	E	D	F	E	C	B	E	C	B
Approach Vol, veh/h		401			378			1381			1648	
Approach Delay, s/veh		53.9			189.8			30.9			27.3	
Approach LOS		D			F			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.6	70.4	11.4	26.6	20.3	61.7	18.0	20.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	15.0	47.0	20.0	14.0	20.0	42.0	20.0	14.0				
Max Q Clear Time (g_c+I1), s	5.5	27.4	5.3	10.3	13.3	35.2	11.1	16.0				
Green Ext Time (p_c), s	0.3	15.3	0.3	0.2	1.0	6.0	0.9	0.0				
<b>Intersection Summary</b>												
HCM 7th Control Delay, s/veh			47.5									
HCM 7th LOS			D									

**FUTURE NO BUILD CONDITIONS**

**Table 2.1 - 2027 No Build Intersection Capacity Analysis Summary**

Location	Time	Level of Service <sup>[1]</sup>	
		(1) Lowell Road & Walmart Boulevard	
		Signalized	
		LOS	Delay
EBL	AM	D	45.6
	PM	E	57.9
EBT	AM	D	35.1
	PM	D	40.8
EBR	AM	D	38.0
	PM	D	45.4
EB Approach	AM	D	43.2
	PM	D	53.7
WBL	AM	D	46.6
	PM	E	62.0
WBT	AM	D	39.1
	PM	D	47.7
WBR	AM	D	51.5
	PM	F	261.3
WB Approach	AM	D	50.1
	PM	F	199.0
NBL	AM	D	44.6
	PM	E	62.2
NBT	AM	B	13.6
	PM	C	27.7
NBR	AM	B	14.4
	PM	C	29.6
NB Approach	AM	B	15.3
	PM	C	30.5
SBL	AM	D	45.8
	PM	E	59.2
SBT	AM	B	12.6
	PM	B	19.0
SBR	AM	A	10.0
	PM	B	16.6
SB Approach	AM	B	14.6
	PM	C	25.7
Overall	AM	B	18.0
	PM	D	45.4

[1] Delay is average delay per vehicle in seconds

**Table 2.2 -2027 No Build Intersection Queue Lengths Summary**

Location	Time	95th Percentile Queue Lengths (ft)													
		EBL		EBR		WBL		WBR		NBL		SBL		SBR	
		Storage (ft)	95 <sup>th</sup> %tile	Storage (ft)	95 <sup>th</sup> %tile	Storage (ft)	95 <sup>th</sup> %tile	Storage (ft)	95 <sup>th</sup> %tile	Storage (ft)	95 <sup>th</sup> %tile	Storage (ft)	95 <sup>th</sup> %tile	Storage (ft)	95 <sup>th</sup> %tile
(1) Lowell Road & Walmart Boulevard	AM	175	69	175	0	150	14	200	0	350	39	350	50	400	2
	PM		153		43		63		105		67		176		48

### T-Bones

2027 No Build Condition

### 1: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations	↶↷	↑	↶	↶↷	↑	↶	↶↷	↶↷↶	↶↷	↶↷↶	↶
Traffic Volume (vph)	135	4	58	15	5	74	65	1255	90	1155	95
Future Volume (vph)	135	4	58	15	5	74	65	1255	90	1155	95
Lane Group Flow (vph)	147	4	63	16	5	80	71	1396	98	1255	103
Turn Type	Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot	NA	Prot
Protected Phases	7	4	4	3	8	8	1	6	5	2	2
Permitted Phases											
Detector Phase	7	4	4	3	8	8	1	6	5	2	2
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	16.0	16.0
Total Split (s)	17.0	16.0	16.0	17.0	16.0	16.0	16.0	41.0	16.0	41.0	41.0
Total Split (%)	18.9%	17.8%	17.8%	18.9%	17.8%	17.8%	17.8%	45.6%	17.8%	45.6%	45.6%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	None	C-Min	C-Min
v/c Ratio	0.40	0.01	0.14	0.06	0.04	0.28	0.23	0.55	0.29	0.49	0.12
Control Delay (s/veh)	40.3	30.8	0.7	38.7	38.8	2.4	39.2	18.6	39.4	17.3	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	40.3	30.8	0.7	38.7	38.8	2.4	39.2	18.6	39.4	17.3	0.4
Queue Length 50th (ft)	40	2	0	4	3	0	19	215	27	183	0
Queue Length 95th (ft)	69	12	0	14	13	0	39	284	50	243	2
Internal Link Dist (ft)		321			369			1261		512	
Turn Bay Length (ft)	175		175	150		200	350		350		400
Base Capacity (vph)	415	367	457	415	205	338	377	2539	385	2579	891
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.01	0.14	0.04	0.02	0.24	0.19	0.55	0.25	0.49	0.12

#### Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 51 (57%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

#### Splits and Phases: 1: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

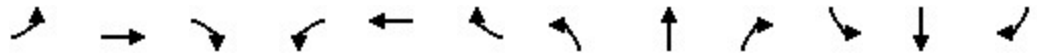


### T-Bones

2027 No Build Condition

### 1: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↑	↖	↖↗	↑	↖	↖↗	↑↑↑		↖↗	↑↑↑	↖
Traffic Volume (veh/h)	135	4	58	15	5	74	65	1255	29	90	1155	95
Future Volume (veh/h)	135	4	58	15	5	74	65	1255	29	90	1155	95
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.04	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.00	1.00
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1884	1856	1856	1856	1899	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	147	4	63	16	5	80	71	1364	32	98	1255	103
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, %	3	6	3	3	3	5	3	3	3	3	3	3
Cap, veh/h	224	222	185	63	131	114	158	2782	65	174	2791	866
Arrive On Green	0.07	0.12	0.12	0.02	0.07	0.07	0.05	0.55	0.55	0.05	0.55	0.55
Sat Flow, veh/h	3428	1884	1572	3428	1856	1609	3428	5092	119	3428	5066	1572
Grp Volume(v), veh/h	147	4	63	16	5	80	71	905	491	98	1255	103
Grp Sat Flow(s),veh/h/ln	1714	1884	1572	1714	1856	1609	1714	1689	1834	1714	1689	1572
Q Serve(g_s), s	3.8	0.2	3.3	0.4	0.2	4.4	1.8	14.9	14.9	2.5	13.3	2.8
Cycle Q Clear(g_c), s	3.8	0.2	3.3	0.4	0.2	4.4	1.8	14.9	14.9	2.5	13.3	2.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	224	222	185	63	131	114	158	1845	1002	174	2791	866
V/C Ratio(X)	0.65	0.02	0.34	0.25	0.04	0.70	0.45	0.49	0.49	0.56	0.45	0.12
Avail Cap(c_a), veh/h	419	222	185	419	206	179	381	1845	1002	381	2791	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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.1	35.1	36.5	43.6	39.0	40.9	41.8	12.6	12.6	41.7	12.1	9.7
Incr Delay (d2), s/veh	4.6	0.0	1.5	3.0	0.2	10.7	2.8	0.9	1.7	4.0	0.5	0.3
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	1.7	0.1	1.3	0.2	0.1	2.1	0.8	5.3	6.0	1.1	4.7	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	45.6	35.1	38.0	46.6	39.1	51.5	44.6	13.6	14.4	45.8	12.6	10.0
LnGrp LOS	D	D	D	D	D	D	D	B	B	D	B	A
Approach Vol, veh/h	214			101			1467			1456		
Approach Delay, s/veh	43.2			50.1			15.3			14.6		
Approach LOS	D			D			B			B		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.2	55.6	7.6	16.6	10.6	55.2	11.9	12.4				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	10.0	35.0	11.0	10.0	10.0	35.0	11.0	10.0				
Max Q Clear Time (g_c+I1), s	3.8	15.3	2.4	5.3	4.5	16.9	5.8	6.4				
Green Ext Time (p_c), s	0.1	15.6	0.0	0.1	0.2	14.9	0.3	0.1				
<b>Intersection Summary</b>												
HCM 7th Control Delay, s/veh			18.0									
HCM 7th LOS			B									

### T-Bones

2027 No Build Condition

### 1: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	281	13	118	93	21	256	100	1410	325	1318	228
Future Volume (vph)	281	13	118	93	21	256	100	1410	325	1318	228
Lane Group Flow (vph)	293	14	123	97	22	267	104	1550	339	1373	238
Turn Type	Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot	NA	Prot
Protected Phases	7	4	4	3	8	8	1	6	5	2	2
Permitted Phases											
Detector Phase	7	4	4	3	8	8	1	6	5	2	2
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	16.0	16.0
Total Split (s)	26.0	20.0	20.0	26.0	20.0	20.0	21.0	48.0	26.0	53.0	53.0
Total Split (%)	21.7%	16.7%	16.7%	21.7%	16.7%	16.7%	17.5%	40.0%	21.7%	44.2%	44.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	None	C-Min	C-Min
v/c Ratio	0.63	0.05	0.37	0.35	0.15	0.76	0.37	0.71	0.68	0.55	0.26
Control Delay (s/veh)	55.1	42.8	8.9	55.2	51.7	23.2	55.2	31.1	55.8	22.9	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	55.1	42.8	8.9	55.2	51.7	23.2	55.2	31.1	55.8	22.9	3.4
Queue Length 50th (ft)	111	10	0	37	16	19	40	347	129	255	0
Queue Length 95th (ft)	153	28	43	63	42	105	67	475	176	362	48
Internal Link Dist (ft)		321			369			1261		512	
Turn Bay Length (ft)	175		175	150		200	350		350		400
Base Capacity (vph)	566	270	339	566	215	402	425	2185	566	2514	901
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.05	0.36	0.17	0.10	0.66	0.24	0.71	0.60	0.55	0.26

#### Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 64 (53%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow

Natural Cycle: 65

Control Type: Actuated-Coordinated

#### Splits and Phases: 1: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

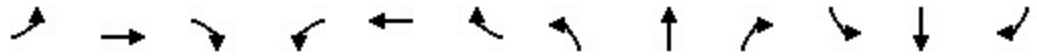


### T-Bones

2027 No Build Condition

### 1: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑	↔	↔↔	↑	↔	↔↔	↑↑↑		↔↔	↑↑↑	↔
Traffic Volume (veh/h)	281	13	118	93	21	256	100	1410	78	325	1318	228
Future Volume (veh/h)	281	13	118	93	21	256	100	1410	78	325	1318	228
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.04	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.00	1.00
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1930	1856	1856	1856	1930	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	293	14	123	97	22	267	104	1469	81	339	1373	238
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	370	346	282	156	216	191	162	2232	123	415	2676	831
Arrive On Green	0.11	0.18	0.18	0.05	0.12	0.12	0.05	0.45	0.45	0.12	0.53	0.53
Sat Flow, veh/h	3428	1930	1572	3428	1856	1635	3428	4913	271	3428	5066	1572
Grp Volume(v), veh/h	293	14	123	97	22	267	104	1010	540	339	1373	238
Grp Sat Flow(s),veh/h/ln	1714	1930	1572	1714	1856	1635	1714	1689	1807	1714	1689	1572
Q Serve(g_s), s	10.0	0.7	8.4	3.3	1.3	14.0	3.6	27.9	27.9	11.6	21.1	10.1
Cycle Q Clear(g_c), s	10.0	0.7	8.4	3.3	1.3	14.0	3.6	27.9	27.9	11.6	21.1	10.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.15	1.00		1.00
Lane Grp Cap(c), veh/h	370	346	282	156	216	191	162	1534	821	415	2676	831
V/C Ratio(X)	0.79	0.04	0.44	0.62	0.10	1.40	0.64	0.66	0.66	0.82	0.51	0.29
Avail Cap(c_a), veh/h	571	346	282	571	216	191	429	1534	821	571	2676	831
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.2	40.7	43.8	56.3	47.4	53.0	56.2	25.5	25.5	51.4	18.3	15.7
Incr Delay (d2), s/veh	5.7	0.1	1.5	5.7	0.3	208.3	6.0	2.2	4.1	7.7	0.7	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	4.6	0.4	3.4	1.6	0.6	16.8	1.7	11.3	12.6	5.4	8.1	3.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	57.9	40.8	45.4	62.0	47.7	261.3	62.2	27.7	29.6	59.2	19.0	16.6
LnGrp LOS	E	D	D	E	D	F	E	C	C	E	B	B
Approach Vol, veh/h	430			386			1654			1950		
Approach Delay, s/veh	53.7			199.0			30.5			25.7		
Approach LOS	D			F			C			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.7	69.4	11.4	27.5	20.5	60.5	19.0	20.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	15.0	47.0	20.0	14.0	20.0	42.0	20.0	14.0				
Max Q Clear Time (g_c+I1), s	5.6	23.1	5.3	10.4	13.6	29.9	12.0	16.0				
Green Ext Time (p_c), s	0.3	20.1	0.3	0.2	1.0	10.8	1.0	0.0				
<b>Intersection Summary</b>												
HCM 7th Control Delay, s/veh			45.4									
HCM 7th LOS			D									



**FUTURE BUILD CONDITIONS**

**Table 5.1 - 2027 Build Intersection Capacity Analysis Summary**

Location	Time	Level of Service <sup>[1]</sup>	
		(1) Lowell Road & Walmart Boulevard	
		Signalized	
		LOS	Delay
EBL	AM	D	45.6
	PM	E	57.9
EBT	AM	C	34.7
	PM	D	41.5
EBR	AM	D	37.5
	PM	D	46.3
EB Approach	AM	D	43.0
	PM	D	54.0
WBL	AM	D	45.2
	PM	E	61.3
WBT	AM	D	37.9
	PM	D	47.7
WBR	AM	D	54.7
	PM	F	278.7
WB Approach	AM	D	52.2
	PM	F	205.3
NBL	AM	D	44.6
	PM	E	62.2
NBT	AM	B	15.2
	PM	C	28.9
NBR	AM	B	16.1
	PM	C	31.0
NB Approach	AM	B	16.9
	PM	C	31.7
SBL	AM	D	46.0
	PM	E	60.3
SBT	AM	B	13.4
	PM	B	18.9
SBR	AM	B	10.6
	PM	B	16.6
SB Approach	AM	B	16.2
	PM	C	26.5
Overall	AM	B	19.7
	PM	D	47.6

[1] Delay is average delay per vehicle in seconds

[2] Optimized signal timing without changing cycle length

**Table 5.2 -2027 Build Intersection Queue Lengths Summary**

Location	Time	95th Percentile Queue Lengths (ft)													
		EBL		EBR		WBL		WBR		NBL		SBL		SBR	
		Storage (ft)	95 <sup>th</sup> %tile	Storage (ft)	95 <sup>th</sup> %tile	Storage (ft)	95 <sup>th</sup> %tile	Storage (ft)	95 <sup>th</sup> %tile	Storage (ft)	95 <sup>th</sup> %tile	Storage (ft)	95 <sup>th</sup> %tile	Storage (ft)	95 <sup>th</sup> %tile
(1) Lowell Road & Walmart Boulevard	AM	175	69	175	0	150	20	200	3	350	39	350	64	400	2
	PM		153		44		73		114		67		195		48

### T-Bones

2027 Build Condition

### 1: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

AM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations	↶↷	↑	↶	↶↷	↑	↶	↶↷	↶↷↶	↶↷	↶↷↶	↶
Traffic Volume (vph)	135	4	58	26	5	95	65	1264	126	1155	95
Future Volume (vph)	135	4	58	26	5	95	65	1264	126	1155	95
Lane Group Flow (vph)	147	4	63	28	5	103	71	1406	137	1255	103
Turn Type	Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot	NA	Prot
Protected Phases	7	4	4	3	8	8	1	6	5	2	2
Permitted Phases											
Detector Phase	7	4	4	3	8	8	1	6	5	2	2
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	16.0	16.0
Total Split (s)	17.0	16.0	16.0	17.0	16.0	16.0	16.0	41.0	16.0	41.0	41.0
Total Split (%)	18.9%	17.8%	17.8%	18.9%	17.8%	17.8%	17.8%	45.6%	17.8%	45.6%	45.6%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	None	C-Min	C-Min
v/c Ratio	0.40	0.01	0.16	0.10	0.04	0.36	0.23	0.60	0.37	0.49	0.12
Control Delay (s/veh)	40.3	34.5	0.8	38.9	38.8	3.7	39.2	20.5	39.5	17.3	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	40.3	34.5	0.8	38.9	38.8	3.7	39.2	20.5	39.5	17.3	0.4
Queue Length 50th (ft)	40	2	0	7	3	0	19	221	38	183	0
Queue Length 95th (ft)	69	12	0	20	13	3	39	295	64	243	2
Internal Link Dist (ft)		321			369			1261		512	
Turn Bay Length (ft)	175		175	150		200	350		350		400
Base Capacity (vph)	415	309	414	415	205	338	377	2342	401	2579	891
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.01	0.15	0.07	0.02	0.30	0.19	0.60	0.34	0.49	0.12

#### Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 51 (57%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

#### Splits and Phases: 1: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

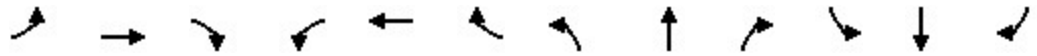


### T-Bones

2027 Build Condition

### 1: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↑	↖	↖↗	↑	↖	↖↗	↑↑↑		↖↗	↑↑↑	↖
Traffic Volume (veh/h)	135	4	58	26	5	95	65	1264	29	126	1155	95
Future Volume (veh/h)	135	4	58	26	5	95	65	1264	29	126	1155	95
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.04	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.00	1.00
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1884	1856	1856	1856	1899	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	147	4	63	28	5	103	71	1374	32	137	1255	103
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, %	3	6	3	3	3	5	3	3	3	3	3	3
Cap, veh/h	224	231	193	96	158	137	158	2654	62	211	2718	844
Arrive On Green	0.07	0.12	0.12	0.03	0.09	0.09	0.05	0.52	0.52	0.06	0.54	0.54
Sat Flow, veh/h	3428	1884	1572	3428	1856	1609	3428	5093	119	3428	5066	1572
Grp Volume(v), veh/h	147	4	63	28	5	103	71	911	495	137	1255	103
Grp Sat Flow(s),veh/h/ln	1714	1884	1572	1714	1856	1609	1714	1689	1834	1714	1689	1572
Q Serve(g_s), s	3.8	0.2	3.3	0.7	0.2	5.6	1.8	15.9	15.9	3.5	13.7	2.9
Cycle Q Clear(g_c), s	3.8	0.2	3.3	0.7	0.2	5.6	1.8	15.9	15.9	3.5	13.7	2.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	224	231	193	96	158	137	158	1760	956	211	2718	844
V/C Ratio(X)	0.65	0.02	0.33	0.29	0.03	0.75	0.45	0.52	0.52	0.65	0.46	0.12
Avail Cap(c_a), veh/h	419	231	193	419	206	179	381	1760	956	381	2718	844
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.1	34.7	36.1	42.9	37.8	40.2	41.8	14.1	14.1	41.3	12.9	10.3
Incr Delay (d2), s/veh	4.6	0.0	1.4	2.4	0.1	14.5	2.8	1.1	2.0	4.7	0.6	0.3
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	1.7	0.1	1.3	0.3	0.1	2.8	0.8	5.8	6.6	1.6	4.9	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	45.6	34.7	37.5	45.2	37.9	54.7	44.6	15.2	16.1	46.0	13.4	10.6
LnGrp LOS	D	C	D	D	D	D	D	B	B	D	B	B
Approach Vol, veh/h	214				136			1477			1495	
Approach Delay, s/veh	43.0				52.2			16.9			16.2	
Approach LOS	D				D			B			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.2	54.3	8.5	17.0	11.5	52.9	11.9	13.7				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	10.0	35.0	11.0	10.0	10.0	35.0	11.0	10.0				
Max Q Clear Time (g_c+I1), s	3.8	15.7	2.7	5.3	5.5	17.9	5.8	7.6				
Green Ext Time (p_c), s	0.1	15.4	0.0	0.1	0.2	14.2	0.3	0.1				
<b>Intersection Summary</b>												
HCM 7th Control Delay, s/veh			19.7									
HCM 7th LOS			B									

### T-Bones

2027 Build Condition

### 1: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

PM Peak Hour



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	281	13	118	111	21	264	100	1412	361	1305	228
Future Volume (vph)	281	13	118	111	21	264	100	1412	361	1305	228
Lane Group Flow (vph)	293	14	123	116	22	275	104	1552	376	1359	238
Turn Type	Prot	NA	Prot	Prot	NA	Prot	Prot	NA	Prot	NA	Prot
Protected Phases	7	4	4	3	8	8	1	6	5	2	2
Permitted Phases											
Detector Phase	7	4	4	3	8	8	1	6	5	2	2
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	11.0	16.0	16.0
Total Split (s)	26.0	20.0	20.0	26.0	20.0	20.0	21.0	48.0	26.0	53.0	53.0
Total Split (%)	21.7%	16.7%	16.7%	21.7%	16.7%	16.7%	17.5%	40.0%	21.7%	44.2%	44.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	None	C-Min	C-Min
v/c Ratio	0.63	0.06	0.38	0.39	0.14	0.77	0.37	0.73	0.72	0.54	0.26
Control Delay (s/veh)	55.1	43.3	9.1	55.3	51.2	24.8	55.2	32.4	56.3	23.0	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	55.1	43.3	9.1	55.3	51.2	24.8	55.2	32.4	56.3	23.0	3.5
Queue Length 50th (ft)	111	10	0	44	16	25	40	358	143	254	0
Queue Length 95th (ft)	153	28	44	73	42	114	67	476	195	357	48
Internal Link Dist (ft)		321			369			1261		512	
Turn Bay Length (ft)	175		175	150		200	350		350		400
Base Capacity (vph)	566	267	337	566	215	402	425	2132	573	2502	899
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.05	0.36	0.20	0.10	0.68	0.24	0.73	0.66	0.54	0.26

#### Intersection Summary

Cycle Length: 120

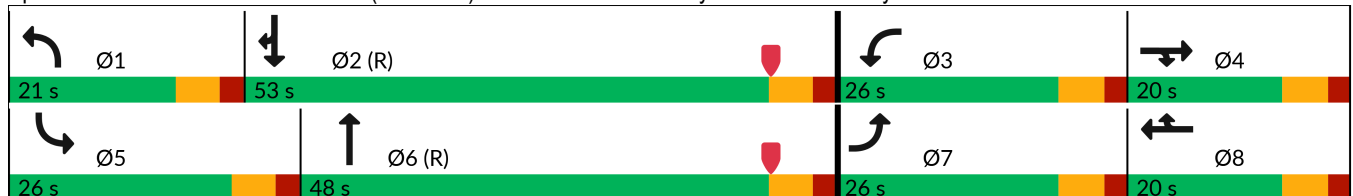
Actuated Cycle Length: 120

Offset: 64 (53%), Referenced to phase 2:SBT and 6:NBT, Start of Yellow

Natural Cycle: 75

Control Type: Actuated-Coordinated

#### Splits and Phases: 1: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

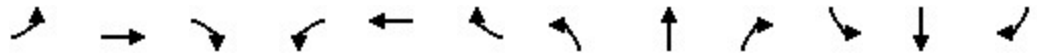


### T-Bones

2027 Build Condition

### 1: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway

PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑	↔	↔↔	↑	↔	↔↔	↑↑↑		↔↔	↑↑↑	↔
Traffic Volume (veh/h)	281	13	118	111	21	264	100	1412	78	361	1305	228
Future Volume (veh/h)	281	13	118	111	21	264	100	1412	78	361	1305	228
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.04	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.00	1.00
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1930	1856	1856	1856	1930	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	293	14	123	116	22	275	104	1471	81	376	1359	238
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	370	333	271	179	216	191	162	2181	120	450	2676	831
Arrive On Green	0.11	0.17	0.17	0.05	0.12	0.12	0.05	0.44	0.44	0.13	0.53	0.53
Sat Flow, veh/h	3428	1930	1572	3428	1856	1635	3428	4913	271	3428	5066	1572
Grp Volume(v), veh/h	293	14	123	116	22	275	104	1011	541	376	1359	238
Grp Sat Flow(s),veh/h/ln	1714	1930	1572	1714	1856	1635	1714	1689	1807	1714	1689	1572
Q Serve(g_s), s	10.0	0.7	8.4	4.0	1.3	14.0	3.6	28.5	28.5	12.8	20.8	10.1
Cycle Q Clear(g_c), s	10.0	0.7	8.4	4.0	1.3	14.0	3.6	28.5	28.5	12.8	20.8	10.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.15	1.00		1.00
Lane Grp Cap(c), veh/h	370	333	271	179	216	191	162	1499	802	450	2676	831
V/C Ratio(X)	0.79	0.04	0.45	0.65	0.10	1.44	0.64	0.67	0.67	0.83	0.51	0.29
Avail Cap(c_a), veh/h	571	333	271	571	216	191	429	1499	802	571	2676	831
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.2	41.4	44.6	55.8	47.4	53.0	56.2	26.5	26.5	50.8	18.3	15.7
Incr Delay (d2), s/veh	5.7	0.1	1.7	5.5	0.3	225.7	6.0	2.4	4.5	9.4	0.7	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	4.6	0.4	3.5	1.9	0.6	17.7	1.7	11.6	12.9	6.0	8.0	3.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	57.9	41.5	46.3	61.3	47.7	278.7	62.2	28.9	31.0	60.3	18.9	16.6
LnGrp LOS	E	D	D	E	D	F	E	C	C	E	B	B
Approach Vol, veh/h	430			413			1656			1973		
Approach Delay, s/veh	54.0			205.3			31.7			26.5		
Approach LOS	D			F			C			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.7	69.4	12.3	26.7	21.8	59.3	19.0	20.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	15.0	47.0	20.0	14.0	20.0	42.0	20.0	14.0				
Max Q Clear Time (g_c+I1), s	5.6	22.8	6.0	10.4	14.8	30.5	12.0	16.0				
Green Ext Time (p_c), s	0.3	20.3	0.4	0.2	0.9	10.4	1.0	0.0				
<b>Intersection Summary</b>												
HCM 7th Control Delay, s/veh			47.6									
HCM 7th LOS			D									

**DRIVEWAYS**

### T-Bones 2: Walmart Boulevard & North Driveway

2027 Build Condition + Driveways  
AM Peak Hour

Intersection						
Int Delay, s/veh	1.1					
Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations	↑	↗		↖	↘	
Traffic Vol, veh/h	123	36	0	94	32	0
Future Vol, veh/h	123	36	0	94	32	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	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	134	39	0	102	35	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	173
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	1404
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1404
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	NB	SB	NW
HCM Control Delay, s/v	0	0	10.02
HCM LOS			B

Minor Lane/Major Mvmt	NBT	NBRNWLn1	SBL	SBT
Capacity (veh/h)	-	-	752	1404
HCM Lane V/C Ratio	-	-	0.046	-
HCM Control Delay (s/veh)	-	-	10	0
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0



### T-Bones 3: Lowell Road (Route 3A) & South Driveway

2027 Build Condition + Driveways  
AM Peak Hour

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↕			↕
Traffic Vol, veh/h	0	9	1349	14	0	1239
Future Vol, veh/h	0	9	1349	14	0	1239
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	10	1466	15	0	1347

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	-	741	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	6.94	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.32	-
Pot Cap-1 Maneuver	0	359	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	-	359	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v15.31		0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBT
Capacity (veh/h)	-	-	359
HCM Lane V/C Ratio	-	-	0.027
HCM Control Delay (s/veh)	-	-	15.3
HCM Lane LOS	-	-	C
HCM 95th %tile Q(veh)	-	-	0.1

**T-Bones**  
**2: Walmart Boulevard & North Driveway**

2027 Build Condition + Driveways  
 PM Peak Hour

**Intersection**

Int Delay, s/veh      0.4

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations	↑	↗		↖↑	↘	
Traffic Vol, veh/h	416	36	0	370	26	0
Future Vol, veh/h	416	36	0	370	26	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	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	452	39	0	402	28	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	491
Stage 1	-	-	452
Stage 2	-	-	201
Critical Hdwy	-	4.13	6.63
Critical Hdwy Stg 1	-	-	5.43
Critical Hdwy Stg 2	-	-	5.83
Follow-up Hdwy	-	2.219	3.519
Pot Cap-1 Maneuver	-	1070	416
Stage 1	-	-	640
Stage 2	-	-	814
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	1070	416
Mov Cap-2 Maneuver	-	-	416
Stage 1	-	-	640
Stage 2	-	-	814

Approach	NB	SB	NW
HCM Control Delay, s/v	0	0	14.29
HCM LOS			B

Minor Lane/Major Mvmt	NBT	NBRNWLn1	SBL	SBT
Capacity (veh/h)	-	-	416	1070
HCM Lane V/C Ratio	-	-	0.068	-
HCM Control Delay (s/veh)	-	-	14.3	0
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.2	0

**Intersection**

Int Delay, s/veh            0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↕			↕
Traffic Vol, veh/h	0	8	1582	16	0	1534
Future Vol, veh/h	0	8	1582	16	0	1534
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	9	1720	17	0	1667

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	-	868	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	6.94	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.32	-
Pot Cap-1 Maneuver	0	295	-
Stage 1	0	-	-
Stage 2	0	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	-	295	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v17.56		0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBT
Capacity (veh/h)	-	-	295
HCM Lane V/C Ratio	-	-	0.029
HCM Control Delay (s/veh)	-	-	17.6
HCM Lane LOS	-	-	C
HCM 95th %tile Q(veh)	-	-	0.1

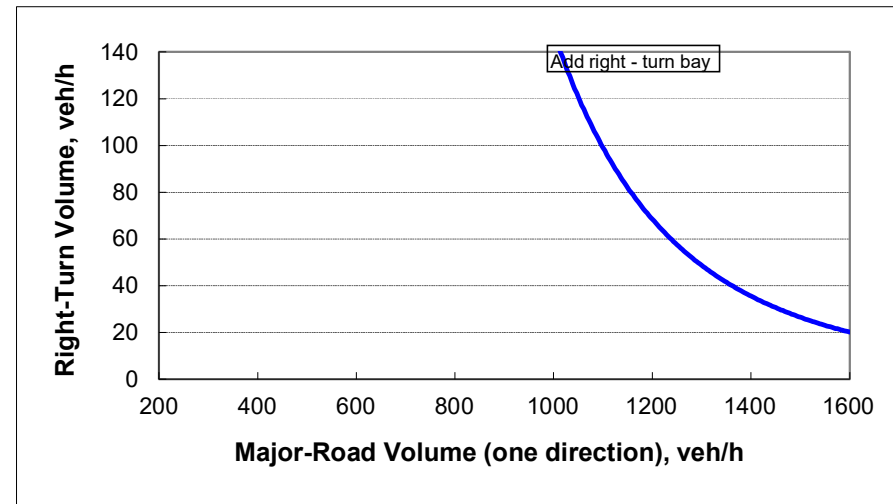
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	4-lane roadway	
	Variable	Value
Major-road speed, mph:		25
Major-road volume (one direction), veh/h:		159
Right-turn volume, veh/h:		36

OUTPUT

	Variable	Value
Limiting right-turn volume, veh/h:		367505
<b>Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:</b>		
<b>Do NOT add right-turn bay.</b>		



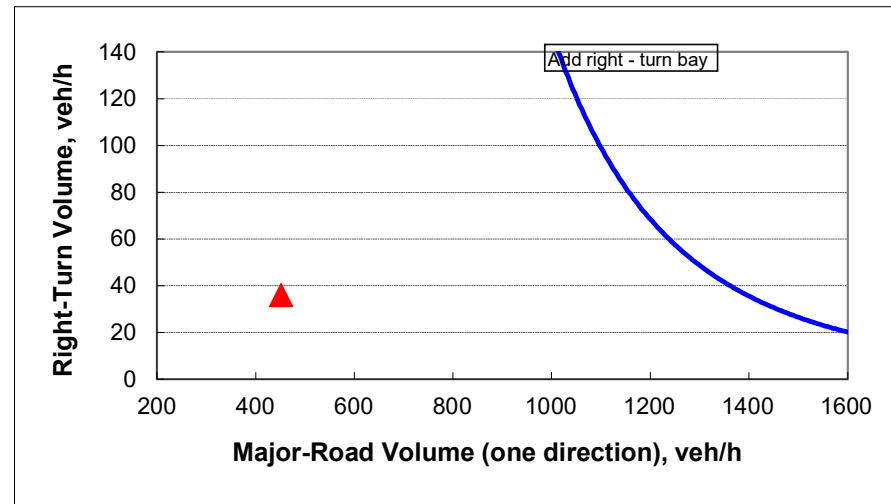
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	4-lane roadway	
	Variable	Value
Major-road speed, mph:		25
Major-road volume (one direction), veh/h:		452
Right-turn volume, veh/h:		36

OUTPUT

	Variable	Value
Limiting right-turn volume, veh/h:		4336
<b>Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:</b>		
<b>Do NOT add right-turn bay.</b>		



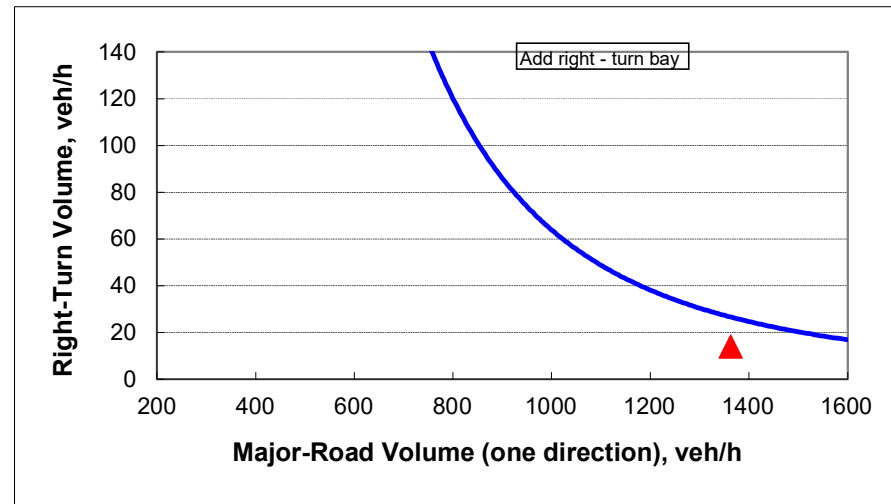
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	35
Major-road volume (one direction), veh/h:	1363
Right-turn volume, veh/h:	14

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	27
<b>Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:</b>	
Do NOT add right-turn bay.	



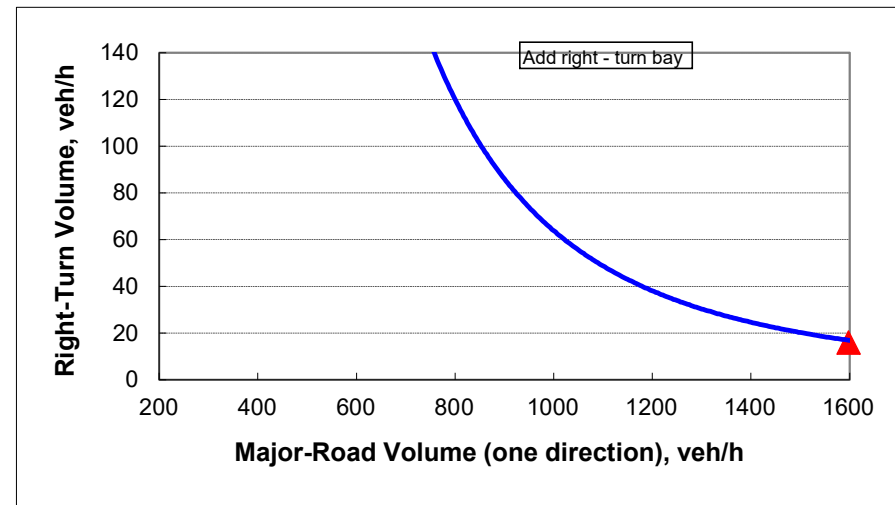
**Figure 2 - 6. Guideline for determining the need for a major-road right-turn bay at a two-way stop-controlled intersection.**

INPUT

Roadway geometry:	4-lane roadway
Variable	Value
Major-road speed, mph:	35
Major-road volume (one direction), veh/h:	1598
Right-turn volume, veh/h:	16

OUTPUT

Variable	Value
Limiting right-turn volume, veh/h:	17
<b>Guidance for determining the need for a major-road right-turn bay for a 4-lane roadway:</b>	
Do NOT add right-turn bay.	



**DRAFT** Attachment "F"

**ATTACHMENT F  
COMMITTED IMPROVEMENTS**



**TRAFFIC IMPACT STUDY**  
**for**

**Hudson Logistics Center  
43 Lowell Road  
Hudson, New Hampshire**

*Prepared for:*

**Hillwood Enterprises, L.P.  
5050 W. Tilghman Street, Suite 435  
Allentown, PA 181104**



*Prepared By:*

**Langan Engineering & Environmental Services, Inc.  
100 Cambridge Street, Suite 1310  
Boston, MA 02114**

**Maximo Polanco**

**John D. Plante, P.E.**

**New Hampshire Licensed Professional Engineer No. 14072**

**LANGAN**

September 2022  
Langan Project. 151010101

### Recommended Improvements Summary

A review of the analysis shows that the majority of the development traffic impacts are on the southern Lowell Road (Route 3A) corridor, generally at the intersections of Lowell Road from the intersection with Sagamore Bridge Road south to the new Green Meadow Drive. We propose a number roadway improvements to improve existing operating conditions and to mitigate the project related traffic impacts. These improvements would be constructed by the developer and completed prior to the opening of the development.

We anticipate that approximately 15% of the total site-generated traffic will enter from and exit to the Lowell Road (Route 3A) corridor north of Sagamore Bridge Road. Some of these intersections perform unsatisfactorily in the no-build scenarios and do not typically degrade further in the build scenarios (2024 and 2034). The base improvements listed below at the intersections north of Flagstone Drive/Wason Road are limited to signal timing optimization and minor re-striping within existing pavement widths where feasible. However, the town of Hudson and NHDOT should continue to explore further options to further improve existing and no-build traffic operations.

### Proposed Improvements

Based on our analyses, the following improvements are proposed to improve existing operating conditions and mitigate the potential traffic impacts associated with the proposed development:

- Installation of new adaptive traffic signal controllers at the following intersections under the existing town control system. Adaptive signal control will allow timing optimization real-time, through video detection, which will allow for seasonal and time-of-day variations in traffic. The industry standard capacity analysis software is unable to calculate the value of adaptive signal technology and capture the efficiency this system provides. We have optimized and coordinated the signal timings in the capacity analyses at the intersections noted below to try to capture the benefits of these improvements, however, we expect the intersections to operate better than indicated in the analysis. We recommend that these signals be incorporated into the town of Hudson system. Note that the intersection of Lowell Road & Wason Road/Flagstone Road is already incorporated into the town's control system.
  - Lowell Road (Route 3A) & Wason Road/Flagstone Drive
  - Lowell Road (Route 3A) & Sagamore Bridge Road
  - Lowell Road (Route 3A) & Wal-Mart Boulevard
  - Lowell Road (Route 3A) & Green Meadow Drive/Rena Avenue
  - Lowell Road (Route 3A)/River Road/Dracut Road/Steele Road

- Signal timing optimization at the following intersections during 2034 conditions
  - Lowell Road (Route 3A) & Executive Drive
  - Lowell Road (Route 3A) & Fox Hollow Drive
  - Lowell Road (Route 3A) & Pelham Road
- Construction of the following improvements at the intersection of Lowell Road and Dracut Road /Steele Road:
  - Restripe one of the southbound thru lanes to a second exclusive left-turn lane onto Dracut Road and widen Dracut Road south of the intersection to accept a second receiving lane, which would transition back down to a single lane with a lane drop
  - Replace the stormwater drainage culvert under Lowell Road
- Construction of the following improvements at the intersection of Lowell Road and Rena Avenue/Mercury Systems driveway
  - Reconfigure the Mercury Systems driveway (Green Meadow Drive) as a private driveway serving both Mercury Systems and the proposed development, intersecting with Rena Avenue at the existing traffic signal
  - Provide two left-turn lanes and a shared thru/right-turn lane on the eastbound approach
  - Widen the west side of Lowell Road to provide a southbound exclusive left-turn lane, two thru lanes and a shared thru/right-turn lane.
  - Adjust the existing median island north of the intersection to allow for turning movements from Green Meadow Drive
- Reconstruction the intersection of Lowell Road and Wal-Mart Boulevard
  - Construct a southbound exclusive right turn lane with approximately 315 feet of storage by modifying the existing median north of Wal-Mart Boulevard and restripe the northbound existing lanes.
  - Convert the existing northbound exclusive right turn lane to a shared thru/right-turn lane and restripe/widen on the north side of the intersection to receive the additional thru lane.
- Reconstruction of the intersection of Lowell Road and Sagamore Bridge Road
  - Construction of a third northbound left turn lane
  - Widen/restripe a segment of Lowell Road (Route 3A) to provide three northbound travel lanes from Rena Avenue to Walmart Boulevard
  - Reconfigure the channelization island on Lowell Road
- Reconstruction of the intersection of Lowell Road and Wason Road/Flagstone Road
  - Construction of a second northbound right turn lane
  - Construction of an additional receiving lane on Wason Road eastbound to accept the two right-turning lanes from Lowell Road northbound
  - Provide a lane drop approximately 700 feet east of Lowell Road to meet existing Wason Road eastbound geometry

- Restriping at the intersection of Lowell Road and Fox Hollow Drive of the northbound right-turn-only lane to a shared thru/right-turn lane. Two northbound thru receiving lanes currently exist.

Tables 4 through 7 compare the capacity analysis for the 2024 and 2034 build conditions based on the proposed outlined above. Appendix H and Appendix I provide detailed reports for the 2024 Build with Improvements and 2034 Build with Improvements conditions. Detailed roadway improvement plans depicting the above-referenced improvements are provided in Appendix A. These plans have been approved by the town for the previous development and have been reviewed and approved by the NHDOT.

#### Potential Future Improvements

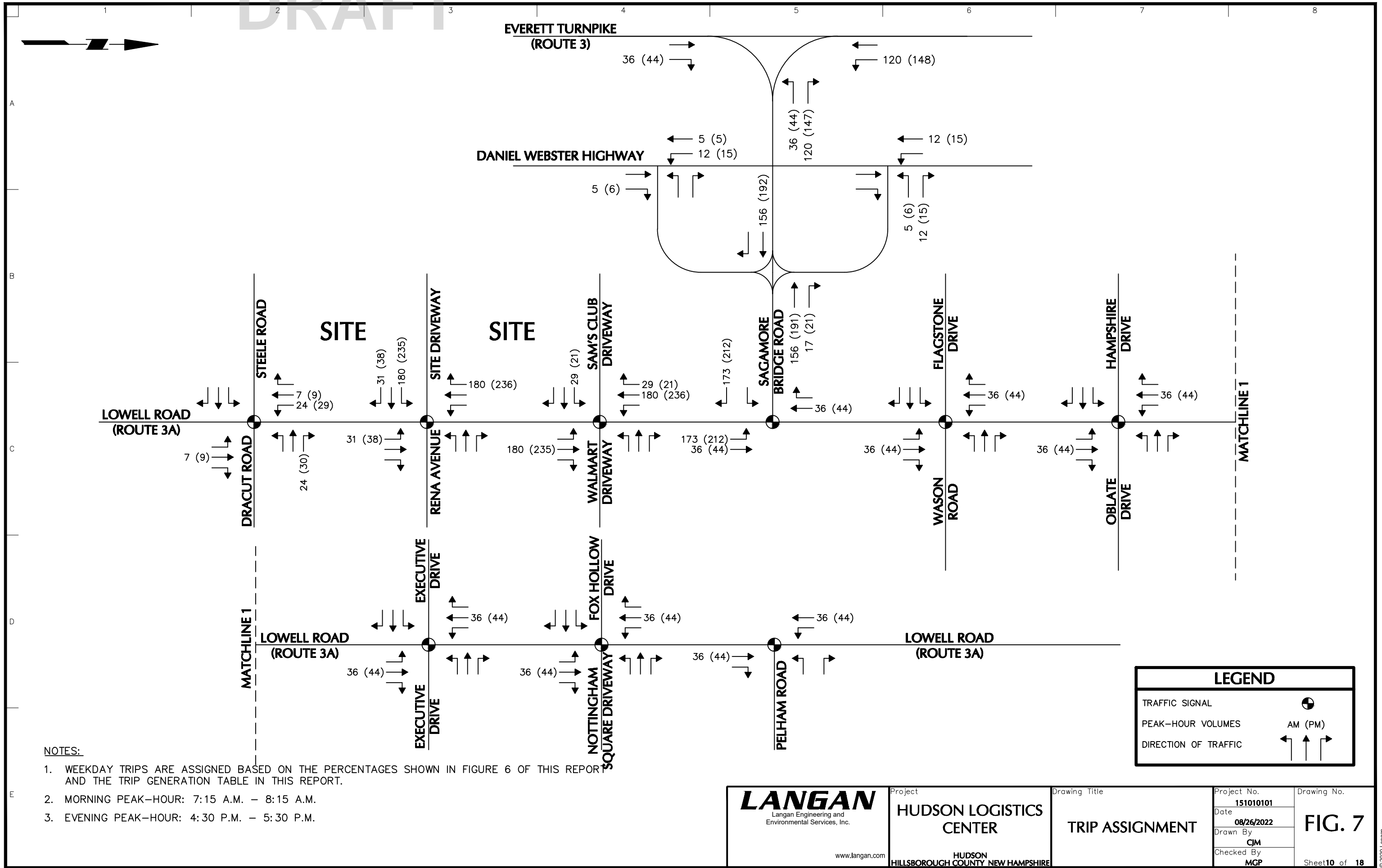
In addition to the proposed noted above, unrelated to mitigating the traffic impacts of the development, we have identified additional potential future improvements at the intersection of Lowell Road and Flagstone Drive/Wason Road that would further improve traffic operating conditions at this location. These improvements would require right-of-way acquisitions from private property owners, which would need to be pursued by the town of Hudson. The developer has committed a set amount to fund the improvements, if the town pursues this improvement. These potential future improvements include the following:

- Widen the northbound approach to provide an exclusive left-turn lane, three thru lanes and two exclusive right-turn lanes
- Widen the eastbound approach to provide a shared left-turn/thru lane and two exclusive right-turn lanes
- Widen to provide an additional northbound receiving lane on the north side of the intersection that becomes an exclusive right-turn lane into the Market Basket plaza
- Install variable lane usage signing/controls for the northbound approach to allow for two exclusive left-turn lanes, two thru lanes and two exclusive right-turn lanes during the weekday morning commuter peak to account for the high volume of left-turning traffic onto Flagstone Drive

### **5.5 Step Five: Investigate the safety conditions within the area roadway network.**

#### Accidents

The most recent three years of accident data were requested via the town of Hudson Police Department in order to conduct an accident analysis for the study area intersections. Table 9 through Table 11 provide details of the accident history.



**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.

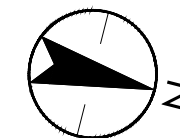
LEGEND	
TRAFFIC SIGNAL	
PEAK-HOUR VOLUMES	AM (PM)
DIRECTION OF TRAFFIC	

<p>LANGAN Langan Engineering and Environmental Services, Inc. www.langan.com</p>	Project <b>HUDSON LOGISTICS CENTER</b> HUDSON HILLSBOROUGH COUNTY NEW HAMPSHIRE	Drawing Title <b>TRIP ASSIGNMENT</b>	Project No. 151010101	Drawing No. <b>FIG. 7</b>
	Date 08/26/2022	Drawn By CJM	Checked By MGP	Sheet 10 of 18



# DRAFT

Attachment "F"



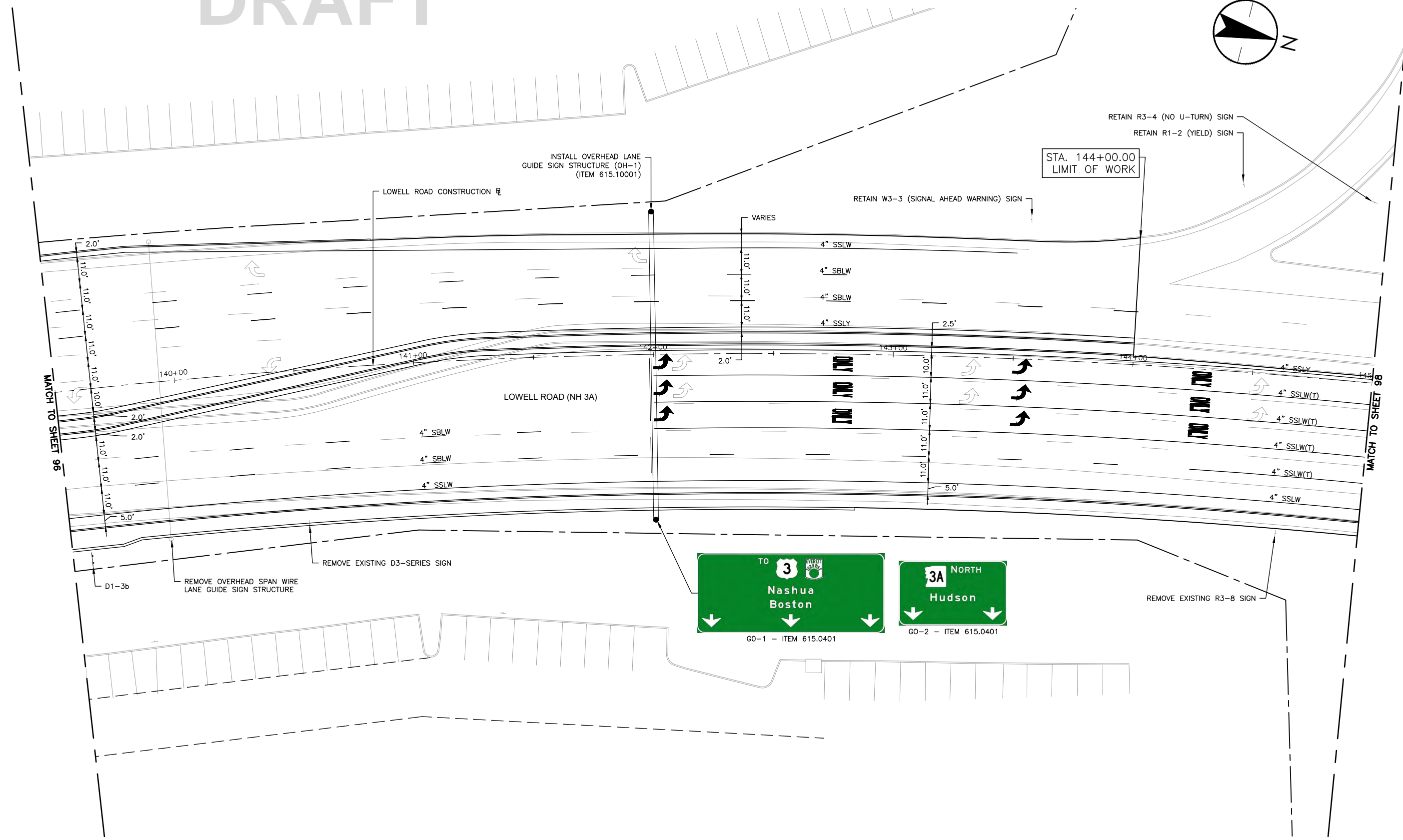
SDR PROCESSED	DATE	08/21
	TJG	DEM
NEW DESIGN	DATE	08/21
SHEET CHECKED	DATE	08/21
AS BUILT DETAILS	DATE	

REVISIONS AFTER PROPOSAL	STATION	DESCRIPTION
NUMBER	DATE	

NOTEBOOKS	PAGE
BOOK	PAGE
BOOK	PAGE



STATE OF NEW HAMPSHIRE			
DEPARTMENT OF TRANSPORTATION • BUREAU OF HIGHWAY DESIGN			
<b>PAVEMENT MARKING &amp; SIGNING PLAN</b>			
FEDERAL PROJECT NO.	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
-	-	97	209



50 Commercial Street, Suite 2S  
Manchester, NH 03101  
603.668.8223  
www.fando.com

February 11, 2025

Mr. Jay Minkarah  
Acting Town Planner  
Town of Hudson  
12 School Street  
Hudson, NH 03051

Re: Town of Hudson Planning Board Review  
T-Bones Site Plan, 256 Lowell Road  
Tax Map 288 Lot 7; Acct. #1350-150  
Reference No. 20030249.244

Dear Mr. Minkarah:

#### 4. Traffic (HR 275-9.B)

We have reviewed the Traffic Impact Assessment (TIA) prepared by Langan Engineering & Environmental Services, LLC, dated December 2024, for the proposed T-Bones restaurant development to be located at 256 Lowell Road in Hudson, New Hampshire. The site is currently vacant. The proposed site is a 9,500 square foot (SF) sit-down restaurant with an expected completion date of 2027 or sooner is planned to be developed.

We note that the TIA details 201 surface level on-site parking spaces in the introduction and project description whereas the current project site plan only shows 169. The site plan included in the report apparently is an older version of the plan developed by Meridian Land Services, LLC. Also, the TIA is stamped DRAFT on multiple pages of the report. These should be removed.

It is our understanding that a Traffic Scoping meeting was not held with the Town prior to the traffic report developed by LANGAN. The scoping meeting provides an opportunity for the developer's traffic consultant and the Town to agree upon parameters to apply to the study, since every Town is a little unique. Items usually discussed include the following:

- Appropriate background growth rate for the area of Town where the site is located.
- Appropriate peak hours to include in the analysis.
- Appropriate intersections to be included in the analysis.
- Any approved site developments not yet built to incorporate into the No-Build traffic volumes.
- Appropriate analysis years – typically Opening Year is provided by the developer, and Future Year is 10 years later or as determined by the Town.

For Hudson most studies provide a projected background growth rate of 1%. We feel that it would be appropriate for this study to be updated with a 1% background growth rate rather than the 0.66% provided, as this local area of Lowell Road is growing faster than the NHDOT roadway segments outside the local area provided in the analysis. Please refer to the LANGAN Traffic Impact Study for the Hudson Logistics Center, Revised October 2022 Report, as that report also used a 1% background growth rate.



Mr. Jay Minkarah  
February 11, 2025  
Page 2 of 2

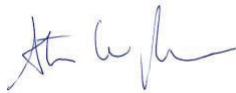
This traffic study analyzes AM and PM Peak, however other T-Bones restaurants including the existing restaurant located at 77 Lowell Road in Hudson only serve lunch and dinner. Their hours of operations are from 11:30 am to 10:00 pm. Unless this T-Bones location plans to serve breakfast there is no need to provide trip generation for an AM peak. Since this is a busy shopping area, Saturday mid-day peak might be more appropriate than AM peak. This should be confirmed with the Town.

It is customary to include an analysis of a Future Year condition. This is typically 10 years from the opening year, with the opening year the anticipated year that construction of the site would be complete. Again, refer to the LANGAN Traffic Impact Study for Hudson Logistics Center, as the Revised October 2022 Report includes documentation on how the Future Year was determined for that report. Since the T-Bones report states that 2027 would be the Opening Year, the Future Year for analysis would be 2037. Please update the study to include a 1% background growth to 2037 and provide analysis for No-Build and Build for the Peak hours.

We suggest that the applicant confirm with the Town regarding the parameters discussed above, and that the Traffic Study be revised and resubmitted.

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  
Meridian Land Services, Inc. – SRFoisie@meridianlandservices.com



# TOWN OF HUDSON

## Planning Department



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

### CAP FEE WORKSHEET - 2025

Date: 02/18/25 Zone # 2 Map/Lot: 228-007-000  
256 Lowell Road

Project Name: T-Bones Restaurant Site Plan

Proposed ITE Use #1: Quality Restaurant

Proposed Building Area (square footage): 9,500 sq. ft.

**CAP FEES: (ONE CHECK NEEDED)**

1.	(Account)	(\$8.47 x 9,500 sq. ft.)	
	2070-702	Traffic Improvement (Zone 2)	\$ <u>80,465.00</u>
		<b>Total CAP Fee</b>	\$ <u>80,465.00</u>

\*\*\* This CAP Fee amount is based on the 2025 CAP FEE ASSESSMENT \*\*\*

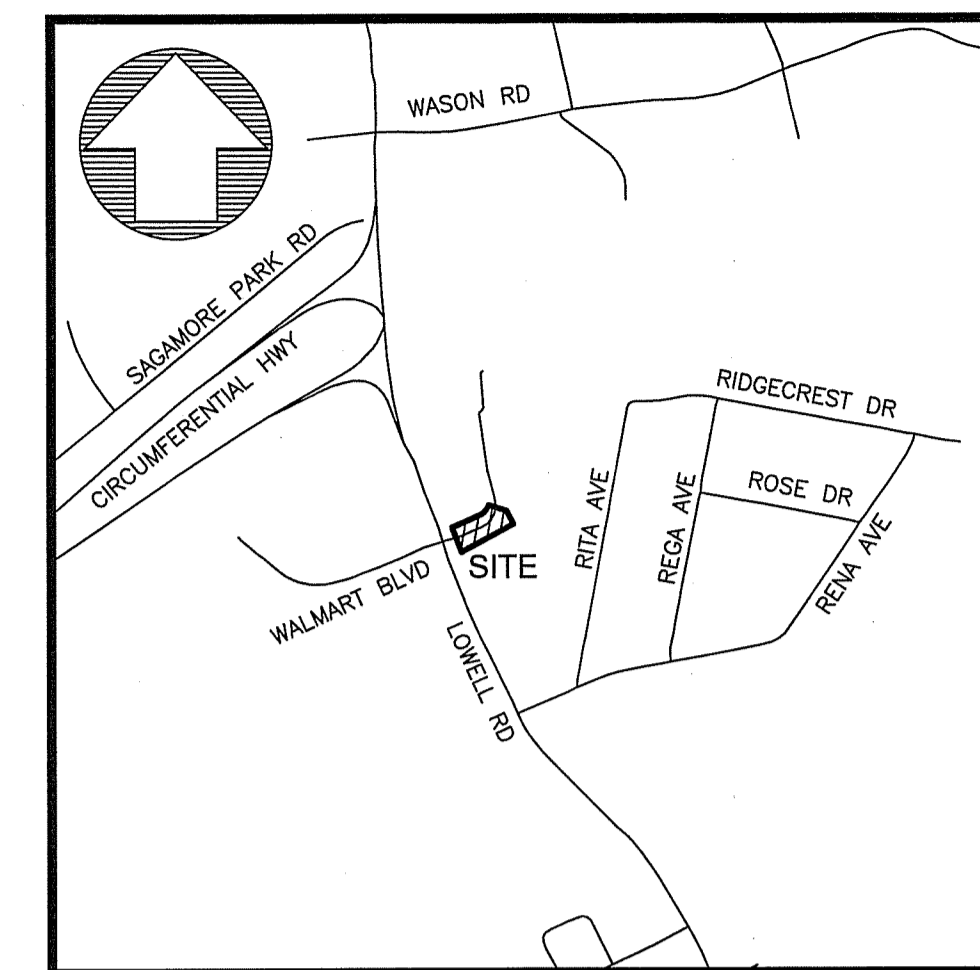
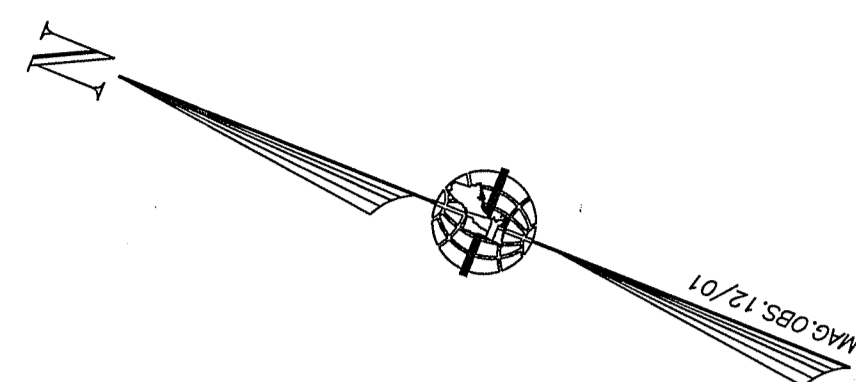
CAP FEE to be paid prior to Certificate of Occupancy application.

Check should be made payable to the Town of Hudson

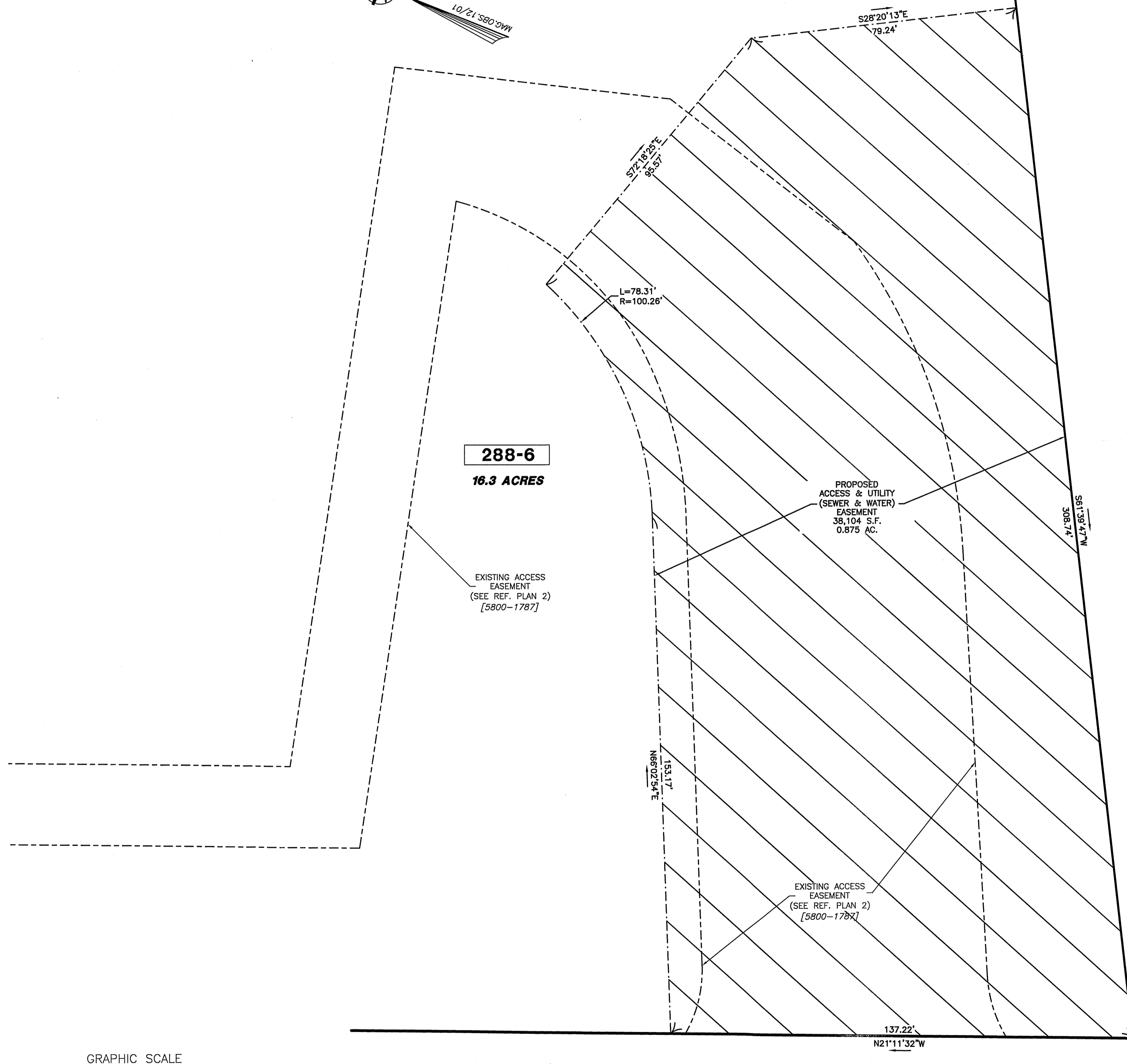
Thank you,

*Brooke Dubowik*

Planning Administrative Aide II



LOCUS MAP:  
SCALE: 1"=1,000'±



228-7

**288-6**  
16.3 ACRES

PROPOSED ACCESS & UTILITY (SEWER & WATER) EASEMENT  
38,104 S.F.  
0.875 AC.

EXISTING ACCESS EASEMENT (SEE REF. PLAN 2) [5800-1787]

EXISTING ACCESS EASEMENT (SEE REF. PLAN 2) [5800-1787]

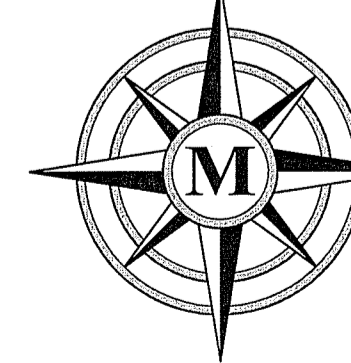
**CERTIFICATION:**  
"I HEREBY CERTIFY THAT THIS SURVEY PLAT IS NOT A SUBDIVISION PURSUANT TO THIS TITLE AND THAT THE LINES OF STREETS OR WAYS SHOWN ARE THOSE OF PUBLIC OR PRIVATE STREETS OR WAYS ALREADY ESTABLISHED AND THAT NO NEW WAYS ARE SHOWN (RSA 676:18 iii & 672:14)."

- REFERENCE PLANS:**
- "SITE PLAN - WAL-MART STORES, INC. - HUDSON, NH" - MAP 7 - LOT 43, SCALE: 1"=50, DATED 1/10/92, REVISED THROUGH 9/16/92 BY HOLDEN ENGINEERING & SURVEY, INC., HCDR PLAN #26014.
  - "TAX MAP 7 LOT 43-3 - 250 LOWELL RD., HUDSON, N.H. - MONROE MUFFLER/BRAKE - PROPOSED ACCESS EASEMENT PLAN - SCALE: 1"=40', DATED 10/14/96, BY JONES & BEACH ENGINEERS, INC., HCDR PLAN #28490.

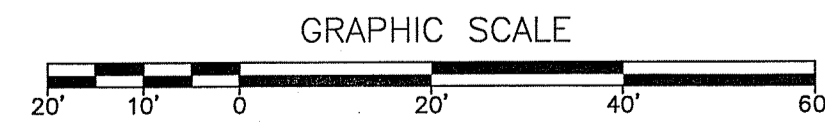
- NOTES:**
- THE PURPOSE OF THIS PLAN IS TO DEFINE AN ACCESS AND UTILITY EASEMENT ON TAX MAP 228 LOT 6 FOR THE BENEFIT OF MAP 228 LOT 7, AS SHOWN.
  - OWNER OF RECORD OF TAX MAP 228 LOT 6:  
WAL-MART STORES, INC. C/O WAL-MART PROPERTY TAX DEPT., P.O. BOX 8050 MS 0555 BENTONVILLE, AR 72716-8050 PG. 1153, BK. 5354 PG. 1154 AND BK. 5800 PG. 1780.
  - REFERENCING THE ZONING MAP OF THE TOWN OF HUDSON, MAP 228 LOT 6 IS LOCATED WITHIN THE BUSINESS (B).
  - THE EXISTING AREA OF TAX MAP 3D-1 LOT 4 IS 11.4 ACRES (494,391 S.F.).
  - THE EXISTING CONDITIONS DEPICTION WAS OBTAINED FROM VARIOUS SOURCES AND IS TO BE CONSIDERED APPROXIMATE. NO GUARANTEE IS MADE TO THE ACCURACY OF THIS INFORMATION. DATA SOURCES INCLUDE BUT ARE NOT LIMITED TO:

**PROPOSED ACCESS AND UTILITY (SEWER & WATER) EASEMENT PLAN ON TAX MAP 288 LOT 6 FOR THE BENEFIT OF TAX MAP 288 LOT 7 LAND OF WAL-MART STORES, INC. PREPARED FOR HUDSON T-BONES 254 LOWELL ROAD HUDSON, NEW HAMPSHIRE**

SCALE: 1" = 20' AUGUST 26, 2024



**MERIDIAN**  
LAND SERVICES, INC.  
ENGINEERING | SURVEYING | PERMITTING  
SOIL & WETLAND MAPPING | SEPTIC DESIGN  
31 OLD NASHUA ROAD, AMHERST, NH 03031 TEL. 603-673-1441  
MERIDIANLANDSERVICES.COM FAX 603-673-1584



**LOWELL ROAD, aka NH RTE. 3A**

REV.	DATE	DESCRIPTION	C/O	DR	CK
D	--	--	--	--	--
C	--	--	--	--	--
B	--	--	--	--	--
A	8-27-24	UPDATE CERT & ANNO	SRF	RAH	SRF

Plotted: 8/27/2024 10:39 AM By: RAH  
H:\MIS\12542\_0\_Drawings\SURV\12542D00A.dwg