## Tuesday, May 10, 2022 Medway Planning and Economic Development Board 155 Village Street Medway, MA 02053

Members	Bob	Tom	Matt	Rich	Jessica	Sarah
	Tucker	Gay	Hayes	Di Iulio	Chabot	Raposa
Attendance	Х	Absent with Notice	X	Х	Х	X

#### **ALSO PRESENT:**

Susy Affleck-Childs, Planning and Economic Development Coordinator

The meeting was opened at 6:30 pm.

#### **EXECUTIVE SESSION:**

On a motion made by Bob Tucker, seconded by Rich Di Iulio, the Board voted by roll call vote to enter into executive session under G.L. c.30A, Section 21(a)(3) to discuss strategy with respect to litigation if an open meeting may have a detrimental effect on the litigating position of the public body and the Chair so declares (Medway Realty LLC V. Medway Planning and Economic Development Board and the Town of Medway with the Board returning to open session at the conclusion of the executive session.

The Chairman declared an executive session is warranted.

Roll Call Vote:Bob TuckerayeRich Di IulioayeSarah RaposaayeJessica ChabotayeMatthew Hayesaye

After the executive session was concluded, the regular meeting was reconvened at 7:47 pm.

#### **PRESENT VIA ZOOM:**

Steve Bouley, P.E., Tetra Tech

#### **PUBLIC COMMENTS:**

Resident Maria Walzer, 11 Green Valley Rd.

Ms. Walzer was present at the meeting. She is concerned about the marijuana smell coming from CommCan (2 Marc Road). She was asking about when the filtering device will be installed. She was under the impression that it was to be installed in March. She is also concerned about the effects of the odor on the children at the bus stop on Coffee Street. Ms. Walzer was informed by Susy Affleck-Childs that project engineer Dan Merrikin had reported that they expected the equipment will be

Medway Planning and Economic Development Board Minutes of the May 10, 2022 Meeting APPROVED – May 24, 2022

installed by the end of the month. The resident was also wondering if fines will be enforced if this does not get mitigated. The business owner is working with the Town to remedy the situation.

## **BOUNDARY LANE SUBDIVISION - Plan Review Fee:**

The Board is in receipt of the following plan review fee estimate for review of the Boundary Lane Definitive Subdivision Plan (See Attached)

• Tetra Tech estimate dared 5-5-22 (\$4,269)

On a motion made by Bob Tucker, seconded by Rich Di Iulio, the Board voted unanimously to approve the peer review fee of \$4,269.00.

#### **APPROVAL OF MINUTES:**

#### April 20, 2022 Special Meeting

On a motion made by Rich Di Iulio, seconded by Sarah Raposa, the Board voted unanimously to approve the minutes from the April 20, 2022 meeting as written.

#### April 26, 2022 Regular Meeting

On a motion made by Rich Di Iulio, seconded by Sarah Raposa, the Board voted unanimously to approve the minutes from April 26, 2022 as written.

#### **MASTER PLAN DISCUSSION:**

The next meeting of the MP Committee is Thursday, May 12, 2022 at 6:30 pm via Zoom. The Committee will review the feedback received during March and April on various draft implementation strategies. The MP Committee will have a table at PRIDE Day on May 21, 2022. There will be a joint meeting of the Master Plan Committee with the PEDB and Select Board on June 13, 2022 on Phase 3.

## PUBLIC BRIEFING - CASSIDY FIELD PARKING IMPROVEMENTS MINOR SITE PLAN AND LAND DISTURBANCE PERMIT:

The Chairman opened the Public Briefing.

The Board is in receipt of the following documents: (See Attached)

- Public Briefing Notice
- Minor Site Plan Application
- Land Disturbance Permit Application
- Project Narrative
- Requests for Waivers from Site Plan Rules and Regulations
- Cassidy Field Parking Improvements site plan dated April 7, 2022 by Tetra Tech
- Review noted from Susy Affleck-Childs dated May 1, 2022

NOTE - DPW Director Pete Pelletier was present.

Project engineer Steve Bouley briefing the Board that the proposed work consists of the demolition and redevelopment of the existing parking lot at the north side of the site adjacent to the baseball fields. There will be a total of 93 paved parking spaces and five are handicap accessible. The parking spaces will be clearly delineated to increase capacity and improve circulation. There will be Medway Planning and Economic Development Board Minutes of the May 10, 2022 Meeting APPROVED – May 24, 2022

infrastructure installed to accommodate 9 parking spaces to charge electric vehicles in the future. No additional lighting is proposed. Paved walkways will be provided to improve access from the fields and parking. The stormwater will be treated in the infiltration chamber system using a dumpsump.

There will be a decision drafted for the next meeting.

## <u>PUBLIC HEARING - MILFORD REGIONAL HOSPITAL FACILTY MAJOR</u> <u>SITE PLAN AND GROUNDWATER PROTECTION SPECIAL PERMIT</u>

The Chairman opened the public hearing.

# On a motion made by Bob Tucker, seconded by Jessica Chabot, the Board voted unanimously to waive the reading of the public hearing notice.

The Board is in receipt of the following documents: (See Attached)

- Public Hearing Notice
- Site Plan Application
- Groundwater Protection Special Permit Application
- Project Narrative
- Site Plan prepared by Guerriere & Halnon
- Requests for Waivers from Site Plan Rules and Regulations
- Review comments from Community and Economic Development Director Barbara Saint Andre dated 4-27-22
- Traffic Impact Assessment Report dated April 2022 by Vanasse & Associates, Inc.
- Design Review Committee project review letter dated 5/10/22
- Email memo from Fire Chief Jeff Lynch dated 5/9/22
- Memo dated 5/10/22 from Sergeant Jeff Watson
- Susy Affleck -Childs review notes dated 5/9/22

The applicant's designated representative Amanda Cavaliere from Guerriere and Halnon was present along with applicant Kevin Lobisser, G & H engineer Mike Hassett, and property owner David Cassidy.

The project site plan was displayed using Share Screen.

The proposed facility is located at 86 Holliston Street. The project is for the construction one-story, 21,900 sq. ft. medical building to be accessed from the existing curb cut on Main Street for Walgreens. The facility will consist of pediatric care, women's health, wellness, emergency care, lab, and x-ray services. A total of 102 parking spaces are proposed. There will be a path which will be ADA compliant. The applicant will be in front of the Conservation Commission this week (Order of Conditions and Land Disturbance permit).

Consultant Bouley was present and explained that he is still reviewing the site plan and will provide a letter. (Note – Tetra Tech is also reviewing the traffic study.) The urgent care part of the facility may be open until 8:00 pm. The applicant will have a long-term lease for the property from the Cassidy family. There is a stream on the property that is being used for drainage; there may need to be an easement for it. The site will have amenities such as picnic tables and bike racks. The snow removal area was shown on Sheet 5. There will be outdoor spaces for employees. Medway Planning and Economic Development Board Minutes of the May 10, 2022 Meeting APPROVED – May 24, 2022

The site will have six electrical charging stations when the requirement is only for four. There will be sidewalks extending to Rt 109 which will encourage pedestrian accessibility. All of the HVAC equipment on the roof will be shielded. There were concerns brought up about the sound. There could be some noise mitigation provided. There will be ground mounted generators for emergency situations. The lighting plan needs to be looked at for spillage onto abutting properties. If there is spillage, shields can be added.

The Board was informed that the applicant met with the Design Review Committee on May 2, 2022. There was a letter provided which the Board has received. This letter references that the project should not include any "false" windows. They would also like to have renderings provided. There was also a comment about including more architectural details to ensure that the lengthy building façades are broken up. There should be more detail on the north facing façade. There should also be a retaining wall at the southwest corner.

There was an email dated 5-9-22 from Fire Chief Jeff Lynch. He asked that the applicant prepare a turn analysis to determine whether the Town's largest fire apparatus will be able to maneuver around the building. The fire hydrants need to be shown on a plan.

There was also an email dated 5-10-22 from Sergeant Jeff Watson with an attached intersection safety audit report from March of 2022. Sergeant Watson strongly recommends against allowing a left hand turn into the front parking area from the driveway.

The hearing was opened to comments from the public:

#### **Resident Nicholas Fair, 3 Howe Street:**

Mr. Fair had several questions about the waiver request and some which provided no reasoning. Mr. Fair noted that he is a member of the Medway Energy and Sustainability Committee. He would like the Board to not waive the requirement for a certified landscape architect to prepare the landscape plan. He was also questioned the waiver on installation of shade trees, and he does not think 6 trees are viable in the noted location. It was explained that the waivers will be discussed at a later hearing date. He is also concerned about the proposed location for a generator and there is a conflict with this and landscaping for this area noted on another plan sheet. He would like to see a noise study completed. Another concern is that the snow storage is proposed to be in the wetland buffer area.

#### Resident Jessica Collins, 9 Robin Circle:

The concern is the headlights from the vehicles coming into the site. She would like a stockade fence. She is also concerned with sirens coming and going to site. It was explained that there will be no sirens except for those occasions when an ambulance would leave the site to head to hospital.

The dumpsters were next discussed. There needs to be explanation of when they will be emptied. This could be written into the decision.

#### Resident Robin ??? (street name not stated)

She is concerned that her view will be gone.

It was recommended that there be trees installed which will grow quick. There is a concern that the proposed white pines will provide no visual buffer as they grow. The white pine is not part of the preferred tree list.

The construction period for this project will be 9 to 10 months.

The Engineer communicated that the landscape designer for this plan has been with the company for 35 years and is confident that the team can work with the Board on a suitable landscape plan.

Susy Affleck-Childs noted the following items which need to be addressed:

- Provide an updated Project Narrative
- Provide Development Impact statement or seek waiver
- Need Earth removal calculations or seek waiver
- Provide color renderings or seek waiver
- Include site amenities on plans (ex. Benches)
- Explain how development meets the general special permit criteria in Section 3.4 and criteria in Section 5.6.3 Groundwater Protection
- Provide details on retaining wall with material
- Determine how this building type is categorized. This may need a special permit.

It was recommended that the traffic be discussed at the next hearing and have Vanesse and Associates, the applicant's traffic engineer be present.

# On a motion made by Bob Tucker, seconded by Jessica Chabot, the Board voted unanimously to continue the hearing to June 14, 2022 at 7:45 pm.

## **CONSTRUCTION REPORTS:**

#### Medway Mill:

- April summary report project engineer Guerriere and Halnon
- Tetra Tech field report #11 dated 4-25-22

The project is moving along and is on track. There will be the final paving and completion of the landscaping. Consultant Bouley will check on the status of the bridge. He reported that developer John Green had indicated they may not undertake the bridge work due to costs.

#### **Evergreen Village:**

• April summary report from engineer Rob Tiberi

#### **Rocky's Hardware:**

- Tetra Tech field report #1 dated 4-18-22
- Tetra Tech field report #2 dated 4-25-22

The Board was informed that the fencing has been completed. There continues to be work on the sidewalk area. The work is progressing.

#### William Wallace Village:

• April monthly report from project engineer Dan Merrikin

#### **Cutler Place:**

April summary report from project engineer Ron Tiberi.

#### Salmon Cottages:

There will be a Zoom call this week with the developer and the Town representatives to discuss downsizing the footprints of the cottages. This will need to go to DRC for further review. This may be handled as a field change.

## **ZBA PETITION:**

The Board is in receipt of an application from Shaw's for an outdoor display special permit. This property is located at 65 Main Street.

The Board would like a letter drafted and provided to the ZBA with recommendations:

- Encourage the planter boxes instead of metal racks.
- Clear and maintained access
- Clear sidewalk area
- No empty pallets or storage racks on site.
- No vending machines or red box on site.
- Keep sidewalk areas open

## **FUTURE MEETING:**

• May 24, 2022

#### **ADJOURN:**

# On a motion made by Sarah Raposa, seconded Jessica Chabot, by the Board voted unanimously to adjourn the meeting.

The meeting was adjourned at 10:26 pm.

Prepared by, Amy Sutherland Recording Secretary

Reviewed and edited by, Susan E. Affleck-Childs Planning and Economic Development Coordinator



# Medway Planning and Economic Development Board Meeting Tuesday, May 10, 2022

# Boundary Lane Subdivision (67R & 69 Summer Street) Plan Review Fee Estimate

• Tetra Tech estimate dated 5-5-22 for \$4,269



May 5, 2022

Ms. Susan E. Affleck-Childs Medway Planning and Economic Development Coordinator 155 Village Street Medway, MA 02053

#### Re: Peer Review Proposal Boundary Lane - Definitive Subdivision Review 67R/69 Summer Street Medway, Massachusetts

Dear Ms. Affleck-Childs:

We are pleased to submit this Proposal to the Town of Medway Planning and Economic Development Board (the Client) for professional engineering services associated with the above-referenced Project (the Project). The objective of our services is to provide technical review and general assistance to the Board during its review of the above-referenced Project for compliance with the following Regulations and Standards:

 Town of Medway Planning & Economic Development Board Rules and Regulations, Chapter 100 – Land Subdivision, Rules & Regulations for the Review and Approval of Land Subdivisions (Adopted April 26, 2005)

The Plans and supporting documentation will also be reviewed for general subdivision planning design and sound engineering practice. We have excluded from our scope, the review of the application package as it relates to Town of Medway Zoning Bylaws and stormwater. The stormwater design has been reviewed by the Conservation Commission.

#### SCOPE OF SERVICES

The following specifically describes the Scope of Services to be completed:

#### Task 1Design Review

A. Review the permit Application, and supporting documentation, and incorporate comments into review letter in Item 1.C below.

٠	Budget Assumption:	1 hour @ \$167/hr = \$167
		<u>1 hour @ \$120/hr = \$120</u>
		Total = \$287

B. Review one (1) set of proposed Plans against the above-mentioned Regulations and Bylaws and sound engineering practice and incorporate comments into review letter in Item 1.C below.

٠	Budget Assumption:	4 hours @ \$167/hr = \$668
		<u>4 hours @ \$120/hr = \$480</u>
		Total = \$1,148

C. Prepare one (1) letter summarizing findings for presentation to the Town of Medway PEDB.

•	Budget Assumption:	2 hours @ \$167/hr = \$334
	2 .	<u>4 hours @ \$120/hr = \$480</u>
		Total = \$814

D. Coordinate with Applicant to address items in initial review letter and issue one (1) revised letter upon receipt of modifications. This task is limited to minor changes in the Plans which directly address comments from our initial review letter. Major changes to the Plans will require additional budget.

•	Budget Assumption:	2 hours @ \$167/hr = \$334
		<u>4 hours @ \$120/hr = \$480</u>
		Total = \$814

Infrastructure Northeast Marlborough Technology Park, 100 Nickerson Road, Marlborough, MA 01752 Tel 508.786.2200 Fax 508.786.2201 tetratech.com

#### Task 2 Meetings

- A. Participate in three (3) hearings/meetings with the Town of Medway PEDB by video conference, including preparation time for each meeting.
  - Budget Assumption:
- <u>6 hours @ \$167/hr = \$1,002</u> Total = \$1,002

#### BUDGET

The fee for the work outlined in this proposal will be billed on a Time and Expenses basis according to Tetra Tech's and Medway's then current contract rates. Reimbursable expenses budget for execution of the tasks included in this scope of work are limited to mileage, field equipment, internal-use printing costs and hard-copy production of deliverables for submission and are billed at a fixed fee of five (5) percent of labor costs. We suggest that you establish a budget as summarized below, which will not be exceeded without your approval.

Please be advised that this estimate is for initial review of submitted materials, is based on our current understanding of the Project needs and is for budget purposes only. The total actual cost of our services will largely depend on the number and complexity of revisions and resubmittals, quality and completeness of the information submitted by the applicant and the depth to which specific issues are explored. Cost for each task is based on a comparison with other similarly sized projects we have reviewed. Please be advised, additional funding will be required if additional or revised materials are submitted, if additional subject areas require review or additional coordination is required beyond what is specifically described above.

The breakdown of this fee by task is as follows:

Task	Task Description		Budget
Task 1	Design Review		\$3,063
Task 2	Meetings		\$1,002
	Labor Subtotal		\$4,065
	Expenses (5%)		\$204
		Total	\$4,269

#### SCHEDULE AND CONDITIONS

We recognize that timely performance of these services is an important element of this proposal and will put forth our best effort, consistent with accepted professional practices to complete the work described within the Client's schedule. We are not responsible for delays in performance caused by circumstances beyond our control or that could not have been anticipated or prevented.

To signify your acceptance of this Agreement, please sign and return one copy and the retainer to us along with the attachments. When signed by representatives of both parties, this Proposal will become an agreement between Tetra Tech, Inc. (ENGINEER) and Town of Medway (CLIENT). The Agreement is subject to the existing contract Terms and Conditions between the Engineer and Client. The price is valid for 60 days from the date of this letter.

We appreciate the opportunity to provide these services, and we look forward to working with you. Please contact us if you have any questions or require additional information.

Very truly yours,

Steven M. Bouley, P.E. Project Manager

Certified by:

Authorized Representative Town of Medway

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Sean P. Reardon, P.E. Vice President

Date



# Medway Planning and Economic Development Board Meeting Tuesday, May 10, 2022

# Cassidy Field Parking Improvements Minor Site Plan & Land Disturbance Permit

- Public Briefing Notice
- Minor Site Plan Application
- Land Disturbance Permit Application
- Project Narrative
- Requests for Waivers from *Site Plan Rules and Regulations*
- Cassidy Fields Parking Improvements site plan dated April 7, 2022, Tetra Tech
- Stormwater Management Report Cassidy Field Parking Improvements, dated April 7, 2022 by Steve Bouley, Tetra Tech including Long-Term Pollution Prevention and Stormwater Operation and Maintenance Plan
- Review notes from Susy Affleck-Childs dated 5-5-22

NOTE - Tetra Tech prepared this site plan and stormwater report for the Medway DPW. We did not have it reviewed by another consulting firm. The project is not subject to Conservation review.

#### **Board Members**

Matthew J. Hayes, P.E., Chair Robert Tucker, Vice Chair Richard Di Iulio, Clerk Jessica Chabot, Member Sarah Raposa, A.I.C.P. Member Thomas A. Gay, Associate Member



Medway Town Hall 155 Village Street Medway, MA 02053 Phone (508) 533-3291 Fax (508) 321-4987 Email: planningboard @townofmedway.org www.townofmedway.or

TOWN OF MEDWAY Commonwealth of Massachusetts

# PLANNING AND ECONOMIC DEVELOPMENT BOARD

April 21, 2022

# **NOTICE OF PUBLIC BRIEFING**

#### Minor Site Plan and Land Disturbance Permit for Cassidy Field Parking Improvements – 11R Winthrop Street

In accordance with the *Medway Zoning Bylaw*, Section 3.5 Site Plan Review and the provisions of Chapter 40A, Massachusetts General Laws, and Medway General Bylaws, ARTICLE XXVI Stormwater Management and Land Disturbance, notice is given that the *Medway Planning and Economic Development Board will hold a public briefing on Tuesday, May 10, 2022 at 7:15 p.m. to consider the application of the Town of Medway Department of Public Works for approval of a minor site plan and a land disturbance permit for proposed site improvement work at the Cassidy Field recreation complex located at 11R Winthrop Street.* The meeting will be held live in Sanford Hall at Town Hall, 155 Village Street. The meeting will also be available for remote participation by the public via the Zoom online meeting platform.

The proposed work consists of the demolition and redevelopment of the existing parking lot at the north side of the site adjacent to the baseball fields. A total of 93 paved parking spaces are planned of which 5 will be accessible. Parking spaces will be clearly delineated to increase capacity and improve circulation efficiency. Infrastructure will be installed to accommodate 9 future parking spaces to charge electric vehicles; such charging stations will be installed as funding becomes available. No additional lighting is proposed. Paved walkways will be provided to improve access from the parking lot to the existing snack shack (concession stand). Stormwater runoff from the fields and parking area will be collected, treated and infiltrated using dump-sump catch basins and 2 subsurface infiltration chamber systems in accordance with MA Department of Environmental Protection Stormwater Management Standards. Landscaping improvements are also planned.

The subject site (Medway Assessor's Map 39, Parcels 74 and 78) is owned by the Town of Medway. The property is located within the Agricultural Residential I zoning district

The proposed site improvements are shown on a plan titled *Cassidy Field Parking Improvements*, prepared by Tetra Tech, Inc. of Marlborough, MA, dated March 25, 2022.

The applications, the above noted site plan, and associated documents are on file at the offices of the Town Clerk and the Planning and Economic Development Board at Medway Town Hall, 155 Village Street and may be reviewed during regular business hours. The site plan and

application materials have been posted at the Board's web page and are available for viewing at: <u>https://www.townofmedway.org/planning-economic-development-board/pages/current-applications-pedb-0</u>.

Interested persons are invited to review the applications, attend the public briefing either in person or via Zoom, and express their views. Questions should be directed to the Planning and Economic Development office at 508-533-3291. Written comments are encouraged and may be forwarded to: <u>planningboard@townofmedway.org</u>. All comments will be entered into the record during the public briefing.

Matthew J. Hayes, Chair



# Planning & Economic Development Board - Town of Medway, MA SITE PLAN REVIEW

# Application for Minor Site Plan Approval

**INSTRUCTIONS TO APPLICANT/OWNER** 

This Application is made pursuant to the *Medway Zoning Bylaw* and the Board's *Rules and Regulations for the Submission and Review of Site Plans* 

The Town's Planning and Engineering Consultants will review the Application and the proposed Site Plan and provide review letters to the Planning and Economic Development Board. A copy of those review letters will be provided to you in advance of the meeting.

You and/or your duly authorized Agent/Official Representative are expected to attend the Board meetings at which your Application will be considered to answer any questions and/or submit such additional information as the Board may request. Your absence at hearings may result in a delay in the Board's review of the site plan.

	, 20
APPLICANT INFORMATION	
Applicant's Name:	
Mailing Address:	
Name of Primary Contact:	
Telephone: Office:	Cell:
Email address:	
Please check here if the Applicant is the equ	itable owner (purchaser on a purchase and sales agreement.)

Development N	Development Name:				
Plan Title:					
Plan Date:					
Prepared by: Name:					
Firm:					
Phone	#:				
Email:					

MINOR SITE PLAN INFORMATION

## **PROPERTY INFORMATION**

Location Add	Iress:
The land sho	wn on the plan is shown on Medway Assessor's Map # as Parcel #
Total Acreag	e of Land Area:
General Des	cription of Property:
Medway Zon	ing District Classification:
Current Use	of Property:
Length of Exi	isting Frontage: On what street?
Setbacks for	Existing Structure (if applicable)
Front	: Side:
Back:	Side:
Scenic Road Does	any portion of this property have frontage on a Medway Scenic Road?
Historic Distri Is any	ict / portion of this property located within a Medway National Register Historic District?
	Yes - Rabbit Hill Yes - Medway Village
Wetlands Is any	/ portion of the property within a Wetland Resource Area? Yes No
Groundwater Is any	<pre>Protection protection protection of the property within a Groundwater Protection District?Yes No</pre>
Flood Plain Is any	/ portion of the property within a Designated Flood Plain? Yes No
PROPOSE	D DEVELOPMENT PROJECT INFORMATION
Development	t Name:
Minor Site Pla	an Review applies to the following. Please check all that apply.
a.	New construction or any alteration, reconstruction, renovation, and/or change in use of any multi-family, commercial, industrial, institutional, or municipal building use which is not subject to Major Site Plan Review but which involves one or more of the following:
	i. the addition of 1,000 to 2,4999 sq. ft. of gross floor area; or

ii. the addition of ten or more but less than twenty new parking spaces

b	. The redesign, alteration, expansion or modification of an existing parking area involving the addition of ten or more but less than twenty new parking spaces
C.	. The redesign of the layout/configuration of an existing parking area of twenty to thirty-nine parking spaces
d	. Any use or structure or expansion thereof exempt under Massachusetts G.L. c. 40A, $\S$ 3 only to the extent allowed by law.
е	. Removal, disturbance, and/or alteration of 10,000 to 19,999 square feet of impervious surface.
SPECIAI Appeals?	PERMIT - Will this project also require a variance or special permit from the <i>Zoning Board of</i>
E	xplanation:
SPECIAI Developn – E	L PERMIT – Will this project also require a special permit from the <i>Planning and Economic</i> ment Board? YesNo xplanation:
PROPE	RTY OWNER INFORMATION (if not applicant)
Property	Owner's Name:
Mailing A	Address:
Primary (	Contact:
Telephor C	ne: )ffice: Cell:
Email ad	dress:
The own from: dated Book Land Co	er's title to the land that is the subject matter of this application is derived under deed toto
Volume_	, Page
CONSU	ILTANT INFORMATION
ENGINE	ER:
Mailing A	Address:
Primary (	Contact:
Telephor C	ne: )ffice: Cell:

Email address:	
Registered P.E. Licen	se #:
<u>SURVEYOR</u> :	
Mailing Address:	
Primary Contact:	
Telephone: Office:	Cell:
Email Address:	
Registered P.L.S. Lice	ense #:
<u>ARCHITECT</u> :	
Mailing Address:	
Primary Contact:	
Telephone: Office:	Cell:
Email address:	
Registered Architect I	_icense #:
LANDSCAPE ARCHI	TECT/DESIGNER:
Mailing Address:	
Primary Contact:	
Telephone: Office:	Cell:
Email address:	
Registered Landscap	e Architect License #:
<u>ATTORNEY</u> :	
Mailing Address:	
Primary Contact:	
Telephone: Office:	Cell:
Email address:	

5

#### DESIGNATED REPRESENTATIVE INFORMATION

Name:		
Address:		
Telephone: Office:	Cell:	
Email address:		

#### SIGNATURES

The undersigned, being the Applicant for approval of a Minor Site Plan Project, herewith submits this application and Site Plan to the Medway Planning and Economic Development Board for review and approval. I hereby certify, under the pains and penalties of perjury, that the information contained in this application is a true, complete and accurate representation of the facts regarding the property and proposed development under consideration.

If applicable, I hereby authorize \_\_\_\_\_\_\_to serve as my Designated Representative to represent my interests before the Medway Planning & Economic Development Board with respect to this application.

In submitting this application, I authorize the Board, its consultants and agents, Town staff, and members of the Design Review Committee to access the site during the plan review process.

I understand that pursuant to MGL 53G, the Medway Planning and Economic Development Board may retain outside professional consultants to review this application and that I am responsible for the costs associated with such reviews.

I understand that the Planning and Economic Development Board, its agents, staff, consultants, and other Town staff and committees may request additional information which I am responsible for providing to assist them in reviewing the proposed development.

Signature of Applicant (if other than Property Owner)

Signature of Property Owner

Signature of Agent/Official Representative

# MINOR SITE PLAN FEES

## Application/Filing Fee

\$350 plus \$ .25/sq. ft. of gross floor area (Gross floor area includes the existing building and proposed addition if any, and/or any proposed new building)

#### Advance on Plan Review Fee

\$500 deposit.

Submit 2 separate checks each made payable to: Town of Medway

Date

Date

Date

# MINOR SITE PLAN APPLICATION CHECKLIST

 Minor Site Plan Application (2 signed originals – one for Town Clerk and one for Planning and Economic Development Board)
 Three (3) full size (24" x 36") copies of the Site Plan prepared in accordance with Sections 204-4 and 204-5 of the <i>Medway Site Plan Rules and Regulations</i> – one for the Town Clerk and two for the Planning and Economic Development Board.
 One (1) ledger size (11" x 17") copy of the Site Plan for the Planning and Economic Development Board
 Electronic version of the Site Plan and ALL associated application documents. Provide disk or flash drive or email.
 Certified Abutters List and labels from the Medway Assessor's office – for 300 feet around the subject property
 One (1) copy of a <i>Project Description</i> as described in Section 204 - 3, 6) of the <i>Medway Site Plan Rules and Regulations</i> . This description should also include a narrative on how the proposed project meets the requirements of the <i>Medway Zoning Bylaw</i> for parking (Section 7.1.1) and outdoor lighting (Section 7.1.2)
 Request for Waivers from the <i>Medway Site Plan Rules and Regulations.</i> Use Form Q.
 Two (2) copies of a Stormwater Drainage Evaluation
 Two (2) copies of a traffic study, depending on the size and scope of the proposed development project.
 One (1) copy of all relevant approvals received to date from other Town boards/ committees/departments
 Proof of present or pending ownership of all land within the proposed development site.
 Minor Site Plan Filing Fee – Payable to Town of Medway
 Advance of Plan Review Fee – Payable to Town of Medway



# Town of Medway, MA Community and Economic Development Department LAND DISTURBANCE PERMIT APPLICATION

# **INSTRUCTIONS TO APPLICANT/OWNER**

This Application is made pursuant to the *Medway General Bylaws – ARTICLE XXVI - Stormwater Management and Land Disturbance.* The Bylaw is posted at:

https://www.townofmedway.org/sites/g/files/vyhlif866/f/uploads/sw bylaw clean voted at june 8 2020 t m\_final\_bjs.pdf

Depending on the scope and location of the planned land disturbance and what other permits are required, this application shall be acted upon by the Medway Conservation Commission, the Medway Planning and Economic Development Board, or the Department's Administrative Team.

This application must be filed at the same time as the associated land use permit applications are filed with the Conservation Commission and/or the Planning and Economic Development Board.

The Town's Engineering Consultant may be asked to review the Application and associated plans and provide a review letter. A copy of any review letter will be provided to you.

You and/or your duly authorized Agent/Designated Representative are expected to attend the Board or Commission meetings at which your Application will be considered to answer any questions and/or submit such additional information as the Board or Commission may request. Your absence at the hearings may result in a delay in review and action.

Please see APPENDIX at the end of this form for definitions of key terms used throughout this application form.

	April 7, 20	22
APPLICANT INFOR	RMATION	
Applicant's Name:	Medway Department of Public Works	
Mailing Address:	45B Holliston Street	
inaling / laar oool	Medway, MA	
Name of Primary Cont	tact: Peter Pelletier	
Telephone: Office:	(508) 533-3275 Cell: (774) 277-5712	
Email address: _ppelle Please check here	etier@townofmedway.org	nt.)
SITE INFORMATIO	DN	
Location Address:	11R Winthrop Street/1 Choate Park Road	
The land shown on the	e plan is shown on Medway Assessor's Map #_ <sup>_39/39</sup> as Parcel(s) #_ <sup>07</sup>	8/074
Total Acreage of Land	Area: 14.4 Acres	

Description of Property and Existing Conditions (or provide and reference an existing conditions plan): The portion of the property under development is currently used as a parking area for the adjacent sports complex.

Medway Zoning District Classification: AR-1

Current Use of Property: \_\_\_\_\_

Site presently includes the following EXISTING stormwater management components. Check all that apply.

- \_\_\_\_\_ Surface stormwater basin (detention, retention, rain garden)
- \_\_\_\_\_ Sub-surface detention or infiltration systems (e.g. Cultec, Stormcepter units)
- \_\_\_\_ Roof drains
- Perimeter drains discharging to:
- Previously approved stormwater connection to the Medway MS4. (*Provide*
- documentation of such approval from the Medway Department of Public Works)
- X Unauthorized and/or Illicit stormwater connection to the Medway MS4. (Identify location and describe type of connection): Sheet/shallow concentrated flow to Winthrop Street.

Unauthorized illicit discharge to the Medway MS4. (*Identify location of discharge and describe what is being discharged.*):

\_\_\_\_ Other (Please describe) \_\_\_\_\_

NOTE – All of the above listed existing stormwater management components must be shown on the Erosion and Sediment Control Plan to be submitted with this application.

#### **PROPOSED DEVELOPMENT PROJECT INFORMATION**

Provide a description of the proposed project that will result in a land disturbance. Attach an additional sheet if needed:

Type of Project - Check all that apply. NOTE - A project may include both New Development & Redevelopment.

New Development (See definition in Appendix)	<b>Redevelopment</b> (See definition in Appendix)
Single family dwelling Residential Subdivision (# of lots)	Single family dwelling expansion
Two family dwelling	Two family dwelling expansion
Multi-family development	Multi-family development expansion
Commercial, industrial, office development	Commercial, industrial, office development expansion
Site improvements (e.g., pool, patio, athletic court, landscaping, parking, etc.)	X Site improvements (e.g. pool, patio, athletic court, landscaping, parking, etc.)
Grading and/or site work without a building or structure	X Grading and/or site work without a building or structure
Accessory structure(s) (e.g., garage, barn, pavilion, storage facility, accessory family dwelling unit, etc.)	Accessory structure(s) (e.g. garage, barn, pavilion, storage facility, accessory family dwelling unit, etc.)

Estimated Total Size of Land Disturbance (ft<sup>2</sup>) (Limit of Work): <u>50,550 sf</u>

Area (ft<sup>2</sup>) of Impervious Surface (building footprint(s), pavement, parking, roofs, decks, patios, etc.). Complete table below.

Existing	Proposed Additional	Total Proposed Impervious
Impervious	Impervious	Surface Area (ft <sup>2</sup> )
Surface Area (ft <sup>2</sup> )	Surface Area (ft <sup>2</sup> )	Post Construction

Have you or will you apply for any of the following other permits for this project? Attach a copy of any permits received to date for this project.

Planning & Economic Development Board	Conservation Commission	Zoning Board of Appeals	Department of Public Works
Subdivision	ORAD (Order of Resource Area Delineation)	Special Permit	MS4 Connection and Discharge Permit
X_Site Plan	RDA (Request for Determination of Applicability)	Variance	
Special Permit	Notice of Intent/Order of Conditions	Comprehensive Permit (40B)	

NOTE - Please attach copies of any of the above permits already received to this application.

**EROSION AND SEDIMENT CONTROL PLAN INFORMATION** – To be prepared in accordance with Medway General Bylaws, ARTICLE XXVI, Section 26.5.6. The plan must show all existing stormwater management facilities.

Development N	Name: <u>Cassidy Field Parking Improver</u>	nents	
Plan Title:	Erosion and Sediment Control Plan		
Plan Date:	March 25, 2022		
Prepared by: Name:	Steven M. Bouley, P.E.		
Firm:	Tetra Tech Inc.		
Phone		Email:	
PROPERTY OWNER INFORMATION (if not applicant)			
_	Town of Medway		

Property Owner's Nam	ie:	lay		
Mailing Address:	155 Village Stree	et		
-	Medway, MA 020	053		
Primary Contact:	Peter Pelletier, D	PW Director		
Telephone: Office:	(508) 533-3275		Cell:	(774) 277-5712
Email address:	ppelletier@towno	ofmedway.org		
The owner's title to the from: Booth, John P and	e land that is the s d Patricia C/Hodgs	subject matter son, Lillian M.	r of this to	s application is derived under deed Town of Medway/Medway Park Associatior
dated January 16, 1974	l/May 1, 1914	and rec	orded	in Norfolk County Registry of Deeds,
Book 5011/1287 F	Page 687/167	or Land	Court	Certificate of Title Number,
Land Court Case Num	ber	_, registered i	in the l	Norfolk County Land Registry District
Volume, Page(	(s)			

## **CONSULTANT & DESIGNATED REPRESENTATIVE INFORMATION**

#### ENGINEER

Name of Firm:	Tetra Tech Inc.		
Mailing Address:	100 Nickerson Road, Suite 200		
0	Marlborough, MA 0175		
Primary Contact:	Steven M. Bouley,. P.E.		
Telephone: Office:	(508) 786-2382	Cell: _(401) 692-1818	
Email address:	n.bouley@tetratech.com		
Registered P.E. Licens	se #:		
-			

#### SURVEYOR

Name of Firm:	CivilView, Inc. (Property Bou	ndary by Otte & Dwyer, Inc.		
Mailing Address:	30 River Street			
C C	Methuen, MA 01844			
Primary Contact:	Andrew Street, PE (Property	Survey by David Dwyer, Otte & Dwyer)		
Telephone: Office: (9)	78) 416-0203	_ Cell:		
Email Address:	t@civilviewinc.com			
Registered P.L.S. Lice	ense #: A. Street: PE# 4851	0/D. Dwyer: PLS# 46707		

#### WETLANDS SCIENTIST

Name of Firm:		
Mailing Address:		
Primary Contact:		
Telephone: Office:	Cell:	
Email Address:		

#### DESIGNATED REPRESENTATIVE (if not applicant)

Name of Firm:	Same as Engineer		
Mailing Address:			
-			
Talanhana, Offica,		Colly	
relephone: Office:			
Email address:			

#### SIGNATURES

The undersigned, being the Applicant for approval of a Land Disturbance Permit, herewith submits this application to the Medway Community and Economic Development Department. I certify, under the pains and penalties of perjury, that the information contained in this application is a true, complete and accurate representation of the facts regarding the property and proposed development under consideration.

(If applicable, I hereby authorize <u>Steven M. Bouley, P.E., Tetra Tech Inc.</u> to serve as my Agent/Designated Representative to represent my interests before the Medway Community and Economic Development Department with respect to this application.)

In submitting this application, I authorize Town staff, its consultants and agents, and members of the Conservation Commission and Planning and Economic Development Board to enter the subject property to access the site during the plan review, permitting and enforcement process.

I understand that pursuant to MGL. c.44, s. 53G, the Department, Board and Commission may retain outside professional consultants to review this application and that I am responsible for the costs associated with such reviews.

I understand that Town staff, its consultants and agents, and members of the Commission and Board may request additional information which I am responsible for providing to assist them in reviewing the proposed development.

Signature of Property OwnerDateSignature of Applicant (if other than Property Owner)DateSignature of Agent/Designated RepresentativeDate

## LAND DISTURBANCE PERMIT APPLICATION CHECKLIST

Submit 3 copies of each of the following documents to the Medway Community and Economic Development Department. Incomplete applications will not be accepted.

Also provide a flash drive or email all documents.

#### This application must be filed at the same time as the corresponding application(s) (Notice of Intent and/or Site Plan Review or Subdivision Approval) are filed with the Conservation Commission and/or the Planning and Economic Development Board.

 Land Disturbance Permit Application Form with original signatures of applicant, owner and designated representative
 Erosion and Sediment Control Plan and associated documents prepared as specified in Medway General Bylaws, ARTICLE XXVI, Section 26.5.6
 Drainage Calculations in compliance with the most current Massachusetts Stormwater Management Standards and the NOAA Atlas 14 precipitation rates
 Narrative on how the project meets the most current Massachusetts Stormwater Management Standards
 Construction sequencing/phasing plan
 Stormwater Operations and Maintenance Plan for Construction
 Post-Construction Stormwater Management Plan as specified in Medway General Bylaws, ARTICLE XXVI, Section 26.5.8
 Post-Construction Long Term Stormwater Operations and Maintenance Plan as specified in Medway General Bylaws, ARTICLE XXVI, Section 26.5.9
 Other permits already received for the project
 If necessary, Request(s) for Waivers from the provisions of Medway General Bylaws, ARTICLE XXVI, Section 26.5

\_\_\_\_\_ Application/filing fee when applicable

**APPENDIX OF KEY TERMS** – Definitions include those taken from Medway General Bylaws, ARTICLE XXVI – Stormwater Management and Land Disturbance

**ILLICIT CONNECTION** – A direct or indirect connection, which allows an illicit discharge into the MS4, including without limitation sewage, process wastewater, or wash water and any connections from indoor drains, sinks, or toilets, regardless of whether said connection was previously allowed or approved before the effective date of this Bylaw.

**ILLICIT DISCHARGE –** Any discharge to a MS4 that is not composed entirely of stormwater except discharges pursuant to a NPDES permit (other than NPDES permit for discharges from the MS4) and discharges from firefighting activities.

**IMPERVIOUS SURFACE** - Any surface that prevents or significantly impedes the infiltration of water into the underlying soil. This can include, but is not limited to: roads, driveways, parking areas and other areas created using non porous material; buildings, rooftops, structures, artificial turf and compacted gravel or soil.

**LAND DISTURBANCE –** An action to alter the existing vegetation and/or underlying soil of a site, such as demolition, clearing, grading, site preparation (e.g., excavating, cutting and filling), soil compaction, construction, and movement and stockpiling of top soils.

**LIMIT OF WORK** – The boundaries of the full extent of the area of land to be altered or disturbed during a construction project. The boundary beyond which no construction work will take place. Includes but is not limited to the areas where trees and other vegetation will be cleared, where the sod layer and other earth materials will be removed, where excavation and grading will occur, where buildings and infrastructure will be constructed, and areas to be used for truck parking, equipment storage, and material storage during construction. Limit of Work is also known as the area encompassed by erosion controls.

**MS4 (Municipal Separate Storm Sewer System)** – A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, getters, ditches, manmade channels, or storm drains):

- a) Owned and operated by the Town that discharges to waters of the United States
- b) Designated or used for collection or conveyance stormwater

**NEW DEVELOPMENT** – Any construction activities or land alteration resulting in total land disturbances greater than one acre (or activities that are part of a larger common plan of development disturbing greater than one acre) on an area that has previously been developed which will now include impervious cover (post construction)

**NOAA** – National Oceanic and Atmospheric Administration. A federal agency within the U.S. Department of Commerce. See <u>https://hdsc.nws.noaa.gov/hdsc/pfds/pfds map cont.html</u> for most current precipitation data.

**NPDES –** National Pollution Discharge Elimination System

**POLLUTANT** – Dredged spoil, solid waste, incineration residue, filter backwash, sewage, garbage, sewer sludge, munitions, chemical wastes, biological materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal and agriculture waste discharged into water.

**REDEVELOPMENT** – Any construction, land alteration, or improvement of impervious surfaces resulting in total disturbances greater than one acre (or activities that are part of a large common plan of development disturbing greater than one acre) that does not meet the definition of New Development.

**UNAUTHORIZED CONNECTION** – A connection that discharges to the Town's MS4 without written permit from the Town.

# **Project Narrative Cassidy Field Parking Improvements**

11R Winthrop Street Medway, Massachusetts

Submitted to:

Town of Medway DPW April 7, 2022

# TABLE OF CONTENTS

1.0 INTRODUCTION	
2.0 SITE DESCRIPTION 1	
3.0 PROJECT DESCRIPTION	

## **1.0 INTRODUCTION**

On behalf of the Town of Medway Department of Public Works we have provided this Project Narrative to describe the Project and give background and a design basis for the proposed conditions. All proposed work is shown on the Plans titled *"Medway Department of Public Works, Cassidy Field improvements, Winthrop Street, Medway, MA"* 

# 2.0 SITE DESCRIPTION

#### Zoning

The Site lies within the Agricultural Residential 1 (AR-1) zoning district as displayed on the most recent Town of Medway, MA Zoning Map dated December 27, 2019.

#### **Project Site**

The Project Site (Site) is located at the existing parking facilities for the existing Cassidy Fields Sports Complex at 11R Winthrop Street and 1 Choate Park Road with vehicular access to the site from Winthrop Street and pedestrian access from the adjacent Choate Park complex via recently completed walking trails. The two parcels total approximately 14.4 acres of which the Project area is approximately one (1) acre. The existing area within the project limits consists of degraded asphalt and gravel and an island containing mature trees which are to remain. A portion of the existing gravel parking extends into the riverfront area located on the northern end of the project limits. Stormwater runoff flows from high points in the adjacent fields towards Winthrop Street where it flows across the parking area, down the Site driveway and into the abutting properties prior to discharge to Winthrop Street.

## **3.0 PROJECT DESCRIPTION**

#### **Development Scope**

The Project will consist of rehabilitation of the existing parking lot and improvements to access to the existing snack shack located proximate the middle of the site between the ball fields. The basis of design was to attempt to provide the town with a quality project on a limited budget as is typical of most municipal Projects. We also investigated potential Low Impact Development (LID) techniques such as pervious pavement, grass pavers and gravel to help reduce stormwater impact but those items proved to be too costly as compared to available budget for the Project and not preferred by Medway Youth Baseball and Parks Department.

#### Parking

The main purpose of this Project is to formalize the parking arrangement at the site to maximize the currently available area. The existing parking is scarcely marked which causes circulation and capacity issues. Parking capacity is an issue in larger events as overflow parking is then directed to the lower grass fields which is not an ideal situation as vehicular traffic is directed along the existing gravel path which runs along abutting residential properties. This Project should alleviate the frequency of the overflow parking occurrences but may still occur during large events.

The Project proposes a total of 93 parking spaces of which five (5) are accessible spaces and nine (9) have been set aside as Electric Vehicle (EV) parking spaces with infrastructure to be installed in the future as funding becomes available.

#### Traffic

Traffic will remain consistent with existing conditions since the use of the site will not change as a result of the proposed improvements. However, the Project will increase circulation efficiency since parking spaces and islands will be clearly delineated.

#### Stormwater

As stated prior, stormwater from the site flows from the west across the fields and existing parking area and out to Winthrop Street. The Project will capture "off-site" tributary flow from the fields and proposed parking area and direct it to two (2) Subsurface Infiltration Chamber Systems as described in detail in the Stormwater Report.

#### **Utilities**

Existing utilities will remain and are not proposed to be altered as part of the Project. Existing lighting has been deemed sufficient by DPW personnel and no additional lighting is proposed as part of this project. We proposed a sleeve to be installed under the proposed walkway location to ensure EV parking infrastructure can be installed along the spaces in the future.

#### Hours of Operation

The Site is used mainly during the warmer months of the year and the fields are not used during the winter months. The hours of use will remain consistent with existing conditions.

#### **Project Timeline**

We anticipate the Town will bid the project once required permits are received with anticipated completion of the Project by the fall of 2022.

#### **Additional Permitting**

We do not anticipate any additional permits are required for this Project. We have consulted with the Town Conservation Agent since work is proposed within the riverfront area for adjacent Chicken Brook. It was determined that an Order of Conditions will not be required since work is taking place within currently degraded area and no additional clearing of vegetation is proposed. The Conservation agent recommended informal conditions like maximizing native landscaping in pervious areas outside of the parking, prohibiting snow removal for the northern portion of the proposed lot and capturing and treating stormwater consistent with required Regulations.

# Medway Planning and Economic Development Board Request for Waiver from Site Plan Rules and Regulations

Complete 1 form for each waiver request

Project Name			
Property Location			
Type of Permit			
Identify the number and title of the relevant section of the <i>Site</i> <i>Plan Rules and Regulations</i> from which a waiver is sought.			
Summarize the text of the relevant section of the <i>Rules and Regulations</i> from which a waiver is requested.			
What aspect of the <i>Rule and Regulation</i> do you propose be waived?			
What do you propose as an alternative to the standard?			
Explanation/justification for the waiver request. How does the particular rule/regulation not apply to the site or situation under review?			
Explanation/justification. How would approval of this waiver request not be significantly detrimental to achieving the purposes of site plan review?			
Explanation/justification. How would approval of this waiver request result in a superior design or provide a clear and significant improvement to the quality of this development?			
What is the impact on the development if this waiver request is denied?			
What mitigation measures do you propose to offset not complying with the particular Rule/Regulation?			
Waiver Request Prepared By:			
Date:			
Questions?? -	Questions?? - Please contact the Medway PEDB office at 508-533-3291.		

2/7/2022

# Medway Planning and Economic Development Board Request for Waiver from Site Plan Rules and Regulations

Complete 1 form for each waiver request

Project Name			
Property Location			
Type of Permit			
Identify the number and title of the relevant section of the <i>Site</i> <i>Plan Rules and Regulations</i> from which a waiver is sought.			
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What mitigation measures do you propose to offset not complying with the particular Rule/Regulation?			
Waiver Request Prepared By:			
Date:			
Questions?? -	Questions?? - Please contact the Medway PEDB office at 508-533-3291.		

2/7/2022

# Medway Department of Public Works Cassidy Fields Parking Improvements Winthrop Street, Medway, MA





100 Nickerson Road

Marlborough, MA 01752

Phone: (508) 786-2200 Fax: (508) 786-2201



www.tetratech.com

PROJECT LOCATION: Winthrop Street, Medway, MA 02053

CLIENT INFORMATION: Medway Department of Public Works 45B Holliston Street, Medway, MA 02053

CLIENT PROJECT No.:

Tt PROJECT No.: 143-21583-21012

# PROJECT DESCRIPTION / NOTES:

Assessor's Map & Parcel number: 39-074; 39-078 Zoning District: AR-1

# **ISSUED**:

APRIL 7, 2022: MINOR SITE PLAN

# WAIVER REQUESTS:

207-12.H.1 - PERIMETER OF PARKING LOT BOUNDED BY CURB/BERM 207-19.C.1 - INTERMEDIARY LANDSCAPED ISLANDS

# VICINITY MAP:










/2022 1:57:49 PM - P:\21583\143-21583-21012 (DPW CASSIDY FIELD)\CAD\SHEETFILES\MINOR SITE PLAN\C-101 EROSION CONTROLS.DWG - PARADEE, TUCK









#### NOTES:

- 1. PREFABRICATED COMPOST FILTER SOCK SHALL BE FILTREXX SOXX OR APPROVED EQUAL
- 2. MATERIAL FOR SOCKS SHALL CONSIST OF SANITIZED MATURE COMPOST, FREE OF VIABLE WEED SEEDS AND FOREIGN DEBRIS SUCH AS GLASS AND PLASTIC. COMPOST SHALL BE IN SHREDDED OR GRANULAR FORM AND FREE FROM HARD LUMPS. IN ADDITION, NO KILN-DRIED WOOD OR CONSTRUCTION DEBRIS SHALL BE ALLOWED. CONTRACTOR SHALL REFER TO MASSDOT SPECIFICATIONS M1.06.0 FOR MATERIAL SPECIFICATIONS.
- 3. SOCK SHALL CONSIST OF JUTE MESH OR OTHER APPROVED BIODEGRADABLE MATERIAL
- PRACTICE: COMPOST FILTER SOCK. A COMPOST FILTER SOCK IS A TYPE OF CONTAINED COMPOST FILTER BERM CONSISTING OF A MESH TUBE FILLED WITH COMPOSTED MATERIAL THAT IS PLACED PERPENDICULAR TO SHEET-FLOW RUNOFF TO RETAIN SEDIMENT FROM DISTURBED AREAS. THE COMPOST FILTER SOCK ACTS AS A FILTER TO RETAIN SEDIMENT AND OTHER POLLUTANTS (E.G., SUSPENDED SOLIDS, NUTRIENTS) WHILE ALLOWING THE WATER TO FLOW THROUGH IT. COMPOST QUALITY MUST MEET AASHTO 2010 SPECIFICATIONS.

INSTALLATION: ONCE THE FILTER SOCK IS FILLED AND PUT IN PLACE, IT SHOULD BE ANCHORED TO THE SLOPE BY STAKES THROUGH THE CENTER OR OUTER EDGE OF THE SOCK AT REGULAR INTERVALS; ALTERNATIVELY, STAKES CAN BE PLACED ON THE DOWNSTREAM SIDE OF THE SOCK. THE ENDS OF THE FILTER SOCK SHOULD BE DIRECTED UPSLOPE, TO PREVENT STORMWATER FROM RUNNING AROUND THE END OF THE TUBE. THERE SHOULD BE NO GAPS BETWEEN SEGMENTS AND THE SOCK ENDS MUST OVERLAP A MINIMUM OF 6 INCHES.

MAINTENANCE: SOCKS MUST BE INSPECTED FOR SEDIMENT ACCUMULATION. IF THERE IS EXCESSIVE PONDING BEHIND THE FILTER SOCK OR ACCUMULATED SEDIMENT REACHES THE TOP OF THE SOCK, AN ADDITIONAL SOCK SHOULD BE ADDED ON TOP OR IN FRONT OF THE EXISTING FILTER SOCK IN THESE AREAS. AN ADEQUATE RESERVE OF SOCKS MUST BE KEPT ON SITE AT ALL TIMES FOR EMERGENCY AND/OR ROUTINE REPLACEMENT. SOCKS SHALL BE REMOVED ONLY AFTER EXPOSED SOILS IN THE CONTRIBUTING DRAINAGE AREA ACHIEVE FINAL STABILIZATION. SEDIMENT ACCUMULATION MUST BE REMOVED ONCE IT HAS REACHED ½ OF THE EXPOSED HEIGHT OF THE SOCK.



# NOTES:

THE TREE'S BRANCHES TO THE GROUND.

- 1. TREE PROTECTION BARRIERS MUST BE PLACED AROUND TREES TO BE RETAINED WITHIN AN AREA WHERE LAND ALTERATION AND CONSTRUCTION ACTIVITIES WILL OCCUR.
- 2. TREE PROTECTION BARRIER MUST REMAIN IN PLACE UNTIL GRADING AND CONSTRUCTION ACTIVITY IS COMPLETE OR UNTIL COMMENCEMENT OF FINISH GRADING AND SODDING.
- 3. BARRIERS SHALL BE PLACED AROUND TREES AT THE DRIPLINE EXCEPT WHERE LAND ALTERATION OR CONSTRUCTION ACTIVITIES ARE APPROVED WITHIN THE DRIPLINE.
- 4. THE DRIPLINE OF A TREE IS THE IMAGINARY VERTICAL LINE THAT EXTENDS DOWNWARD FROM THE OUTERMOST TIPS OF
- 5. AREAS SURROUNDED BY THE TREE PROTECTION BARRIERS SHALL BE PROTECTED FROM VEGETATION REMOVAL,
- PLACEMENT OF SOIL, DEBRIS, SOLVENTS, CONSTRUCTION MATERIAL, MACHINERY OR OTHER EQUIPMENT OF ANY KIND.
- 6. ALL TREE ROOTS WITHIN AREA TO BE GRADED AND ORIGINATING FROM A PROTECTED TREE SHALL BE SEVERED CLEANLY AT THE LIMITS OF THE PROTECTED AREA.
- 7. ALL TREE PRUNING AND TRIMMING ON ANY TREE TO BE RETAINED SHALL BE PERFORMED BY AN ARBORIST CERTIFIED BY THE AMERICAN SOCIETY OF ARBORICULTURE (ASA).
- 8. 2'x2' TREE PROTECTION SIGNS SPACED A MINIMUM OF ONE SIGN EVERY 300' SHALL CONTAIN THE WORDING "TREE PROTECTION ZONE - KEEP OUT".

#### TREE PROTECTION BARRIER / ORANGE CONSTRUCTION FENCE NOT TO SCALE



# NOTES

- 1. CONSTRUCTION SITE NOTICES MUST BE POSTED.
- 2. POSTING IS TO BE AT JOB SITE ENTRANCE WHERE IT WILL BE VISIBLE AND LEGIBLE FROM THE PUBLIC WAY.
- 3. POSTING IS REQUIRED FROM THE DAY CONSTRUCTION ACTIVITIES START UNTIL THE NOTICE OF TERMINATION (NOT) IS FILED.

# JOB SITE PERMIT POSTING DETAIL NOT TO SCALE

# SEEDING

	SEEDING R	ATES	
SPECIES	LBS/1000 S.F.	LBS/ACRE	RECOMMENDED SEEDING DATES
ANNUAL RYEGRASS	1	40	APRIL 1 TO JUNE 1 AUG 1 TO SEPT 15
FOXTAIL MILLET	0.7	30	MAY 1 TO JUNE 30
OATS	2	80	APRIL 1 TO JULY 1 AUG 15 TO SEPT 15
WINTER RYE	3	120	AUG 15 TO OCT 15

#### MULCHING

MULCH APPLICATION RATES:

HAY OR STRAW MULCH SHALL BE AIR-DRIED, FREE OF UNDESIRABLE SEEDS AND COARSE MATERIALS. APPLICATION RATE MUST BE 2 BALES (70-90 LBS) PER 1,000 SQUARE FEET OR 1.5 TO 2 TONS PER ACRE. NO BARE SPOTS SHOWING AND SHALL ONLY BE APPLIED TO SLOPES 3:1 OR FLATTER. ANCHORING METHODS INCLUDING NETTING WITH JUTE, WOOD FIBER OR PLASTIC; OR APPLY MULCH AND TRACK SURFACE UP AND DOWN THE SLOPE SO CLEAT MARKS ARE PARALLEL TO THE CONTOURS. FOR OVERWINTER APPLICATION, THE RATE SHALL BE 150 LBS PER 1,000 SQUARE FEET OR 3 TONS/ACRE. MULCH SHALL NOT BE SPREAD ON TOP OF SNOW; SNOW MUST BE REMOVED DOWN TO A ONE-INCH DEPTH OR LESS PRIOR TO APPLICATION.

PRACTICE MULCHING: MULCHING IS AN EROSION CONTROL PRACTICE THAT INVOLVES USING MATERIALS SUCH AS STRAW MULCH DERIVED FROM WHEAT, RICE OR BARLEY OR WOOD MULCH CONSISTING OF SHREDDED OR CHIPPED WOOD, BARK OR COMPOST. MULCHING IS HIGHLY EFFECTIVE, AND WHEN APPLIED CORRECTLY PROVIDES A LEVEL OF PROTECTION COMPARABLE TO DENSE VEGETATIVE COVER. MULCH IS ALSO VERY BENEFICIAL FOR RECENTLY PLANTED AREAS HOLDING SEEDS, FERTILIZERS, AND TOPSOIL IN PLACE, RETAINING MOISTURE, AND INSULATING PLANT ROOTS AGAINST EXTREME TEMPERATURES.

INSTALLATION: MULCH MUST BE APPLIED UNIFORMLY TO THE SOIL AND PROPERLY ANCHORED (USING STUDDED ROLLERS, TACKIFIERS OR AN ANCHORING TOOL). MULCH SHOULD NOT BE APPLIED ON SLOPES STEEPER THAN 3:1 AND SHOULD NOT BE USED IN AREAS OF CONCENTRATED FLOWS. AREA SHOULD BE ROUGHENED OR TRACKED PRIOR TO APPLICATION. AVOID APPLYING MULCH DURING OR IMMEDIATELY BEFORE RAINFALL. THERE SHOULD BE NO BARE SPOTS SHOWING EXPOSED SOILS.

\*\* HYDRAULICALLY APPLIED MULCHES SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.

MAINTENANCE: MULCH SHALL BE REAPPLIED TO ANY BARE SPOTS. MAINTAIN AN UNBROKEN GROUND COVER AND REPAIR ANY DAMAGED GROUND COVER AND RE-MULCH EXPOSED AREAS. INSPECT AFTER EACH RAINFALL EVENT TO MAKE SURE THE MULCH IS NOT DISLODGED OR CAUSING EROSION.

# **TEMPORARY STABILIZATION MULCHING & SEEDING**

					)	www.tetratech.com	100 Nickerson Road	Marlborough, MA 01752	Phone: (508) 786-2200 Fax: (508) 786-2201
ВҮ	SMB								
ESCRIPTION	MINOR SITE PLAN								
DATE D	4/7/22								
MARK	0								
Medway Department of Public Works		Cassidy Field Parking Improvements	Winthrop Street, Medway, MA				CONSILUCIION DETAILS		
PR DE DF		l: 1: N: D:		143 2	<u>3-2</u>	158 0	3-2	210 BN BN SN	12 1P 1B



Bar Measures 1 inch, otherwise drawing not to scale



Bar Measures 1 inch, otherwise drawing not to scale





	LOCUS MAP (SCALE: 1:1,000)		<b>TETRA TECH</b> <b>IDD IDD IDDD IDD IDD IDD IDD IDD IDD IDD IDD IDD IDDD IDDD IDDD IDDD </b>
	LEGEND PROPERTY LINE ABUTTERS PROPERTY LINE EDGE OF PAVEMENT EDGE OF GRAVEL		
	CDNTOUR		
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# **Stormwater Management Report Cassidy Field Parking Improvements**

Cassidy Field 11R Winthrop Street Medway, Massachusetts

#### Submitted to:

Town of Medway Planning & Economic Development Board April 7, 2022

#### **Prepared For:**

Medway Department of Public Works 45B Holliston Street Medway, MA 02053

#### Prepared By:

Tetra Tech, Inc. 100 Nickerson Road Marlborough, MA 01752



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#### **1.0 INTRODUCTION**

This Stormwater Management Report, prepared in accordance with Massachusetts Department of Environmental Protection (MA DEP) Stormwater Standards, is submitted on behalf of the applicant, Medway Department of Public Works (DPW). The report summarizes the drainage analysis and Stormwater Management Plan for the proposed Cassidy Field Parking Improvements located at 13 Winthrop Street in Medway, Massachusetts. **See Figure 1, USGS Locus Map**.

The purpose of the Stormwater Management Plan is to provide a comprehensive framework for the longterm protection of natural resources in and around the Site from degradation as a result of stormwater discharges. This is achieved through the use of a variety of water quality and quantity control measures designed to decrease the amount of pollutants discharged from the Site and control discharge rates and volumes.

The following sections describe the regulations pertinent to stormwater management and the specific components of the Stormwater Management Plan to be implemented at the Site.

#### **1.1 EXISTING CONDITIONS**

The project site is located on Winthrop Street in Medway, MA in the AR-1 (Agricultural Residential 1) Zoning District. The Site is approximately 21.8 acres and contains recreational space (baseball fields, playgrounds, and walking trails) and appurtenant amenities for guests such as concession stand, public bathrooms, and parking. A paved driveway from Winthrop Street provides access to the parking lot at the baseball fields, with gravel paths to access the remainder of the property. The existing parking lot contains both paved (in poor condition) and gravel surfaces with little to no parking designations. The site is primarily developed for youth-league sporting events, with mixed hardwood/pine wooded areas to the west and southwest. Bordering vegetated wetlands (BVW) and riverfront areas are located in the western portions of the site with contiguous areas of upland scattered throughout. The site contains Park Pond, located in the center of the Site, and is in FEMA Flood Zone AE (1% annual chance flood event) and FEMA Zone AE Floodway (Chicken Brook) along the west and center of the site. No development is proposed within those areas.

#### **1.2 PROPOSED CONDITIONS**

The proposed Project includes the demolition and redevelopment of the existing parking lot at the north side of the site adjacent to the baseball fields. The proposed parking lot will contain a fully paved parking area with designated parking stalls, as well as designated parking spaces for the future installation of electric vehicle charging stations. Paved walkways from the parking lot to the concession stand will also be provided. The design intent of the proposed site grading and stormwater management system is to collect, treat and infiltrate runoff from proposed impervious areas. The proposed stormwater management system will consist of deep-sump catch basins and subsurface infiltration systems with isolator rows to emphasize the Project's goal of implementing Low Impact Development guidelines when feasible throughout the site.

The proposed stormwater system has been designed in accordance with DEP Stormwater Management Standards as well as the Stormwater Design Requirements set forth in the Town's Stormwater Management and Land Disturbance Bylaw. The Project's stormwater management design reduces the rate of stormwater runoff, provides improved stormwater quality, and maintains groundwater recharge volumes.

#### **1.3 GROUND COVER**

The overall hydrologic study area for the proposed development is 2.5 acres and includes land area from both on and off the project site. Table 1, below, summarizes the ground cover distribution for the hydrologic study area for existing and proposed conditions. There is an increase of approximately 0.38 acres in impervious area within the Project. Gravel parking areas present on site are proposed to be removed and paved with the rest of the parking lot.

Ground Cover Type	Existing Conditions (acres)	Proposed Conditions (acres)
Impervious	0.54	0.92
Gravel	0.24	0.00
Pervious	1.69	1.63
Total	2.47	2.55

# 2.0 STORMWATER MANAGEMENT

#### 2.1 METHOD OF CALCULATIONS

The hydrologic model created to analyze the hydrology of the site was developed using the Soil Conservation Service (SCS) Technical Release No. 20 (SCS unit hydrograph procedures) and SCS Technical Release No. 55 (for Times of Concentration and Runoff Curve Numbers). The stormwater facilities were modeled using the Storage-Indication Routing Method.

The hydrologic model was created and calculated with HydroCAD, Version 10.0 software, developed by Applied Microcomputer Systems. Runoff from the sub-drainage areas (HydroCAD subcatchments) is calculated based on rainfall and the watershed characteristics, and a runoff hydrograph (a runoff rate versus time curve) is developed. The stage-storage-discharge curve for a specific detention area (i.e., a detention basin) is used to compute an outflow hydrograph by hydraulically routing an inflow hydrograph through the detention facilities. This procedure calculates the relationship of the inflow hydrograph with the characteristics of the detention basin systems to determine the outflow, stage, and storage capacity of the detention systems for a given time during the specified storm event. The HydroCAD models for pre- and post-development are included in **Appendix B**.

Existing watershed boundaries for the analysis were determined based on the topography of the site which was obtained through an aerial survey performed by CivilView, Inc. in December of 2016.

# 2.2 RAINFALL DEPTHS

In accordance with Medway Stormwater Management and Land Disturbance Bylaw, the 2-, 10-, and 100year, 24-hour storm events were analyzed. The rainfall depths summarized in Table 2 are based on the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 precipitation rates as required by the Town's Stormwater Management and Land Disturbance Bylaw.

#### Table 2Rainfall Depths

Storm Event	24-Hour Rainfall Depth (inches)
2-year	3.37
10-year	5.27
100-year	8.28

#### 2.3 SOIL CONDITIONS

Natural Resources Conservation Service (NRCS) Norfolk and Suffolk County Soil Survey indicates that soils onsite consist of the following Hydrologic Soil Groups (HSG):

- 70A Ridgebury fine sandy loam, 0-3% slopes, HSG D
- 71B Ridgebury fine sandy loam, 3-8% slopes, extremely stony, HSG D
- 254B Merrimac fine sandy loam, 3-8% slopes, HSG A
- 317B Scituate fine sandy loam, 3-8% slopes, extremely stony, HSG C
- 420B Canton fine sandy loam, 3-8% slopes, HSG B
- 422B Canton fine sandy loam, 0-8% slopes, extremely stony, HSG B
- 653 Udorthents, sandy, HSG A

Subsurface exploration has been performed around the property and at proposed stormwater mitigation locations and generally confirmed the information gathered from the NRCS Soil Survey. Based on subsurface explorations, soil conditions at these locations consist of sandy loam and loamy sand categorized as HSG B and HSG A soils, respectively. The NRCS Web Soil Survey and subsurface exploration data is provided in **Appendix F**.

#### 2.4 EXISTING STORMWATER MANAGEMENT

#### 2.4.1 Existing Watershed

Under existing conditions, the site is divided into two (2) Subcatchment areas, Subcatchments E1 and E2 which are tributary to the Design Point described below and shown on attached **Figure 2**, **Pre-Development Watershed Map**.

There is one (1) Design Point for the site:

- Design Point 1 (DP-1) Winthrop Street
  - Subcatchment E1: Consists of a mix of wooded area, gravel parking area, and paved parking on the north portion of the study area.
  - Subcatchment E2: Consists of primarily grassed and dirt areas from the existing baseball field to the west, as well as the paved driveway and parking lot on the south portion of the study area.

#### 2.5 PROPOSED STORMWATER MANAGEMENT

The proposed project incorporates a stormwater management system that meets the guidelines in the 2008 MA DEP Stormwater Management Standards and the Town's Stormwater Management and Land Disturbance Bylaw. Stormwater quality and quantity on the Site will be managed by implementing a series of best management practices (BMPs) that will include street sweeping, deep sump hooded catch basins, manholes and subsurface Infiltration systems with isolator rows. The proposed BMPs will remove a minimum 80 percent of total suspended solids from stormwater runoff, maintain or decrease peak rates of stormwater runoff, and maintain recharge rates to groundwater, as described in the MA DEP Stormwater Standards section of this report.

Runoff from the proposed site will be intercepted by the proposed catch basins located at the low points of the paved parking areas and discharge to subsurface infiltration systems. The subsurface infiltration systems will be sized to meet the requirements of the MA DEP Stormwater Standards and meet the requirements of the Town's Stormwater Management and Land Disturbance Bylaw. All discharge from the site flows to Winthrop Street.

#### 2.5.1 Proposed Watershed

Under proposed conditions, the site is divided into four (4) Subcatchment areas discharging to the Design Point. Under proposed conditions, the following Subcatchments flow to the designated Design Point and a description of each is provided below and shown on attached **Figure 3**, **Post-Development Watershed Map**.

#### • Design Point 1 (DP-1) – Winthrop Street

- Subcatchment P1a: Consists of primarily a mix of wooded area, lawn, and landscape areas. Stormwater from this Subcatchment is routed to the existing swale along the Cassidy Field driveway and ultimately travels into the drainage system within Winthrop Street.
- Subcatchment P1b: Consists primarily of the north component of the proposed impervious parking area, and existing lawn and gravel from the upgradient baseball field. Stormwater travels into the proposed catch basin within the parking lot and enters the subsurface infiltration system (Pond 1P). Overflow discharge from Pond 1P will enter the existing swale along the Cassidy Field driveway and enter the drainage system within Winthrop Street.
- Subcatchment P1c: Consists of primarily a mix of wooded area, the existing paved driveway, and lawn. Stormwater from this Subcatchment is routed directly to Design Point 1 (DP-1).
- Subcatchment P1d: Consists of primarily lawn, landscape areas and the south component of the proposed impervious parking area. Stormwater travels into the proposed catch basin within the parking lot and enters the subsurface infiltration system (Pond 2P). Overflow discharge from Pond 2P during large storms (greater than the 10-year storm) will travel down the existing driveway and enter the drainage system within Winthrop Street.

# 3.0 DEP STORMWATER STANDARDS

The ten (10) MA DEP Stormwater Management Standards provided in the Stormwater Management Policy and Massachusetts Wetlands Protection Act relate to the protection of wetlands and water bodies, control of water quantity, recharge to groundwater, water quality and protection of critical areas, erosion/sedimentation control and stormwater maintenance. The MA DEP Checklist for Stormwater Report is provided in **Appendix A**, and the following sections summarize the Project's compliance with the Stormwater Management Standards.



#### 3.1 STANDARD 1 – NO NEW UNTREATED DISCHARGES

The Project complies with Standard 1. No new point source discharges of untreated stormwater to or causing erosion in resource areas are proposed as part of the Project. Stormwater discharge velocities are minimal and are mitigated by a level spreader located at the downstream end of pipe outfalls.

#### 3.2 STANDARD 2 – PEAK RATE ATTENUATION

The Project complies with Standard 2. The Project's stormwater management systems are designed to meet the redevelopment standards for a mix of new and redevelopment at the site so that post-development peak discharge rates do not exceed pre-development discharge rates for the 2-year and 10-year, 24-hour storm event, and so that there will be no increased flooding impacts off-site for the 100-year, 24-hour storm event.

To determine the peak rate of discharge for existing and proposed conditions, runoff hydrographs were generated for the storm events using the SCS TR-20 method. HydroCAD input/output data for predevelopment and post-development conditions are provided in **Appendix B**. Table 3 summarizes the preand post-development peak runoff discharge rates determined in the hydrologic/hydraulic analyses performed for the Project Site.

#### Table 3 Comparison of Peak Runoff Rates

Point of Analysis	2-Year Even	ear Storm 10-Year Storm 100- vent (cfs) Event (cfs) Ev		10-Year Storm Event (cfs)		ar Storm nt (cfs)
	Pre	Post	Pre	Post	Pre	Post
DP-1	1.88	0.48	4.68	1.42	9.75	8.10
Δ	-1.	40	-:	3.26	-1	.65

# 3.3 STANDARD 3 - RECHARGE TO GROUNDWATER

The Project complies with Standard 3. The proposed stormwater management system incorporates the use of two (2) Subsurface Infiltration Systems (SIS) to provide groundwater recharge for impervious surfaces associated with the proposed site improvements.

The proposed recharge BMPs are located in soils capable of absorbing the recharge volume within 72 hours and there is a minimum 2-foot separation between the bottom of the infiltration structures and the estimated seasonal high groundwater (ESHGW) table. SIS 1 is located within four (4) feet of the ESHGW table and a mounding analysis has been provided to show the groundwater mound beneath the BMP does not extend into the basin. Calculations have been provided for the SIS to demonstrate that they drain within the required 72 hours. Refer to **Appendix C** for Groundwater Recharge Calculations.

# 3.4 STANDARD 4 – WATER QUALITY

The Project complies with Standard 4. The incorporation of the following stormwater best management practices (BMPs) will achieve a cumulative Total Suspended Solids (TSS) removal rate greater than 80%. Additionally, the Project must meet the 44% pre-treatment requirements since the infiltration BMP's are located in rapidly infiltrating soils. Refer to **Appendix D** for Water Quality Calculations and **Appendix F** for a copy of the Long-Term Pollution Prevention and Stormwater Operation & Maintenance Plan.



#### 3.4.1 Street Sweeping

The proposed design incorporates street sweeping as a BMP to control the amount of sediment that enters the stormwater management system. Street sweeping will be conducted on a quarterly average and be primarily scheduled in the spring and fall. In accordance with MA DEP Standards a 5% TSS removal rate is credited for this BMP.

# 3.4.2 Deep Sump/Hooded Catch Basins

All proposed catch basins will be deep sump/hooded catch basins, which will serve to trap sediment and floatables before entering the stormwater management system. Sumps will be four-feet deep. Catch basins will be inspected quarterly and, if necessary, cleaned when sediment reaches half full sump depth to ensure that the catch basins are working in their intended fashion and that they are free of debris. Sediments and hydrocarbons shall be properly handled and disposed of, in accordance with local, state, and federal requirements. In accordance with MA DEP Standards a 25% TSS removal rate is credited for this BMP.

# 3.4.3 Subsurface Infiltration Systems (Isolator Row)

The proposed design incorporates two Stormtech SIS with isolator rows which act as sediment forebays at the inlets of each system. The pavement runoff is directed through the catch basins and isolator rows prior to entering the remaining infiltration systems. Subsurface infiltration systems will be inspected twice in the first year, and annually thereafter. Additionally, inspections will be conducted following one major rainfall event (>0.5") each year to verify that the systems drain within 72 hours. Isolator rows shall be cleaned and vacuumed when sediment reaches a depth of 3". In accordance with MA DEP Standards an 80% TSS removal rate is credited for this BMP.

# 3.5 STANDARD 5 – LAND USES WITH HIGHER POTENTIAL POLLUTANT LOADS (LUHPPL)

Standard 5 is not applicable to this Project. The Project does not meet any of the criteria for being considered a LUHPPL.

#### 3.6 STANDARD 6 - CRITICAL AREAS

Standard 6 is not applicable to this Project. The Project does not discharge stormwater within the Zone II or Interim Wellhead Protection Area of a public water supply, or near or to a Critical Area as defined in the Massachusetts Stormwater Handbook.

#### 3.7 STANDARD 7 - REDEVELOPMENT PROJECTS

Standard 7 is applicable to the Project. The Project proposes to redevelop the existing parking area which is currently a mix of degraded paved surface and gravel area with no existing stormwater mitigation. The Project will install new pavement throughout the current limit of the parking area and includes two (2) SIS to mitigate stormwater runoff from the development area using the latest NOAA Atlas-14 rainfall data. The SIS in the north will mitigate up to the 100-year event and will fully meet the Stormwater Standards. The southern SIS is located within the current paved area and will mitigate up to the 10-year storm event which is an improvement on existing conditions. The Project complies with Standard 7.



#### 3.8 STANDARD 8 – CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL

This Project complies with Standard 8. The Project will result in the disturbance of greater than one (1) acre of land and requires coverage under the U.S. EPA National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Construction Activities (CGP). In support of coverage, a project-specific Storm Water Pollution Prevention Plan (SWPPP) will be prepared and a Notice of Intent will be submitted to the EPA prior to commencement of construction activities.

The SWPPP will be prepared describing the specific practices, installation methods and inspection requirements for temporary and permanent erosion prevention and sediment control practices. At a minimum, the SWPPP will include the following measures:

- Minimize the extent and time of disturbed area and exposed soils;
- Provide perimeter sedimentation control;
- Minimize sediment track out with stabilized construction exits;
- Control discharges from soil stockpiles;
- Minimize dust and soil compaction;
- Temporary and permanent stabilization requirements including seeding, mulching and matting;
- Good housekeeping pollution prevention measures;
- Maintenance requirements; and
- Inspection, recordkeeping, and reporting requirements.

Refer to the project's Erosion and Sediment Control Plan and associated Erosion Control Details for information pertaining to the project's construction-term maintenance requirements, construction sequence, and inspection frequencies.

#### 3.9 STANDARD 9 – OPERATION AND MAINTENANCE PLAN

The Project complies with Standard 9. Refer to **Appendix E** for the Project's Long-Term Pollution Prevention and Stormwater Operation and Maintenance Plan.

# 3.10 STANDARD 10 – PROHIBITION OF ILLICIT DISCHARGE

The Project complies with Standard 10. There are no known or designed illicit discharges on the Project Site. An Illicit Discharge Compliance Statement is provided in **Appendix F**.

#### 4.0 CONCLUSION

The Stormwater Management Plan addresses both the quantity and quality of stormwater runoff from the Project Site and conforms to the ten (10) MA DEP Stormwater Management Standards and Town of Medway Stormwater Management and Land Disturbance Bylaw. The Project will not have a negative impact on the surrounding areas, will be constructed in compliance with the U.S. EPA NPDES CGP, and will implement stormwater BMPs to mitigate peak runoff rates while providing adequate recharge and treatment of stormwater runoff.

Figures



3/11/2022 4:07:45 PM - P:/21583/143-21583-21012 (DPW CASSIDY FIELD)/CAD\SUPPORTFILES\FIGURE 1 - SITE LOCUS.DWG - PICARD, BRAD

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Appendix A

MA DEP Checklist for Stormwater Report



# Massachusetts Department of Environmental Protection Bureau of Resource Protection - Wetlands Program Checklist for Stormwater Report

# A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.<sup>1</sup> This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8<sup>2</sup>
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

<sup>&</sup>lt;sup>1</sup> The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

<sup>&</sup>lt;sup>2</sup> For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.



#### **B. Stormwater Checklist and Certification**

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

*Note:* Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

#### **Registered Professional Engineer's Certification**

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Longterm Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



Signature and Date

#### Checklist

**Project Type:** Is the application for new development, redevelopment, or a mix of new and redevelopment?

New development

Redevelopment

Mix of New Development and Redevelopment



**LID Measures:** Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

$\boxtimes$	No disturbance to any Wetland Resource Areas
	Site Design Practices (e.g. clustered development, reduced frontage setbacks)
	Reduced Impervious Area (Redevelopment Only)
$\boxtimes$	Minimizing disturbance to existing trees and shrubs
	LID Site Design Credit Requested:
	Credit 1
	Credit 2
	Credit 3
	Use of "country drainage" versus curb and gutter conveyance and pipe
	Bioretention Cells (includes Rain Gardens)
	Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
	Treebox Filter
	Water Quality Swale
	Grass Channel
	Green Roof
	Other (describe):

#### **Standard 1: No New Untreated Discharges**

No new untreated discharges

- Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



#### Standard 2: Peak Rate Attenuation

- Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

Calculations provided to show that post-development peak discharge rates do not exceed predevelopment rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24hour storm.

#### Standard 3: Recharge

🖂 Soil Analysis provided
--------------------------

- Required Recharge Volume calculation provided.
- Required Recharge volume reduced through use of the LID site Design Credits.
- Sizing the infiltration, BMPs is based on the following method: Check the method used.

🛛 Static	Simple Dynamic
----------	----------------

Dynamic Field<sup>1</sup>

- Runoff from all impervious areas at the site discharging to the infiltration BMP.
- Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

	<b>Recharge BMPs</b>	have been	sized to infiltrate	the Required	Recharge Volume.
--	----------------------	-----------	---------------------	--------------	------------------

- Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
  - Site is comprised solely of C and D soils and/or bedrock at the land surface
  - M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
  - Solid Waste Landfill pursuant to 310 CMR 19.000
  - Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

Property	includes a	a M.G.L. d	c. 21E site o	or a solid	waste land	fill and a	moundina	analvsis	is included.
								,	

<sup>&</sup>lt;sup>1</sup> 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



#### Standard 3: Recharge (continued)

The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

#### **Standard 4: Water Quality**

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
- Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
  - is within the Zone II or Interim Wellhead Protection Area
  - is near or to other critical areas
  - is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
  - involves runoff from land uses with higher potential pollutant loads.
- The Required Water Quality Volume is reduced through use of the LID site Design Credits.
- Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



Sta	undard 4: Water Quality (continued)
$\boxtimes$	The BMP is sized (and calculations provided) based on:
	The ½" or 1" Water Quality Volume or
	The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
	The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
	A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.
Sta	indard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)
	The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report. The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted <i>prior</i> <i>to</i> the discharge of stormwater to the post-construction stormwater BMPs.
$\boxtimes$	The NPDES Multi-Sector General Permit does <i>not</i> cover the land use.
	LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
	All exposure has been eliminated.
	All exposure has <i>not</i> been eliminated and all BMPs selected are on MassDEP LUHPPL list.
	The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.
Sta	Indard 6: Critical Areas
	The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

Critical areas and BMPs are identified in the Stormwater Report.


# Checklist (continued)

# Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

- The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
  - Limited Project
  - Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
  - Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
  - Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
  - Bike Path and/or Foot Path
  - Redevelopment Project
  - Redevelopment portion of mix of new and redevelopment.
- Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

#### Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



# Checklist (continued)

# **Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control** (continued)

- ☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has *not* been included in the Stormwater Report but will be submitted *before* land disturbance begins.
- The project is *not* covered by a NPDES Construction General Permit.
- The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

#### **Standard 9: Operation and Maintenance Plan**

- The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
  - Name of the stormwater management system owners;
  - Party responsible for operation and maintenance;
  - Schedule for implementation of routine and non-routine maintenance tasks;
  - Plan showing the location of all stormwater BMPs maintenance access areas;
  - Description and delineation of public safety features;
  - Estimated operation and maintenance budget; and
  - Operation and Maintenance Log Form.
- The responsible party is *not* the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
  - A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
  - A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

#### Standard 10: Prohibition of Illicit Discharges

- The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- An Illicit Discharge Compliance Statement is attached;
- NO Illicit Discharge Compliance Statement is attached but will be submitted *prior to* the discharge of any stormwater to post-construction BMPs.

Appendix B

HydroCAD Reports



HydroCAD_Pre-Dev		Type III 24-hr 2-Year Rainfall=3.37"						
Prepared by Tetra Tech Inc				Printed	4/5/2022			
HydroCAD® 10.00-24 s/n 01603 © 2018 Hydro(	CAD Software S	olutions LLC			Page 2			
Time span=0.00-7 Runoff by SCS TR-2 Reach routing by Stor-Ind+Tra	72.00 hrs, dt=0. 20 method, UH ns method - P	05 hrs, 1441   =SCS, Weigh Pond routing b	ooints ted-CN y Stor-Ind n	nethod				
Subcatchment E1: Pre-Development North	Runoff Area=1 ow Length=550'	1.037 ac 6.94 Tc=20.9 min	% Imperviou CN=68 Rι	s Runoff Dep inoff=0.58 cfs	oth=0.83" 0.071 af			
Subcatchment E2: Pre-Development South	Runoff Area=1. w Length=687'	434 ac 32.64 Tc=16.3 min	% Imperviou CN=74 Rι	s Runoff Dei inoff=1.34 cfs	oth=1.15" 0.138 af			
Reach 1R: North Discharge			In Out	flow=0.58 cfs flow=0.58 cfs	0.071 af 0.071 af			
Reach 2R: South Discharge			In Out	flow=1.34 cfs flow=1.34 cfs	0.138 af 0.138 af			
Link 1L: Winthrop Street			In Prir	flow=1.88 cfs nary=1.88 cfs	0.209 af 0.209 af			
Total Runoff Area = 2.471 ac 7	c Runoff Volu 78.15% Perviou	me = 0.209 at is = 1.931 ac	Average 21.85% Ir	Runoff Dept npervious =	h = 1.01" 0.540 ac			

#### Summary for Subcatchment E1: Pre-Development North

Runoff = 0.58 cfs @ 12.33 hrs, Volume= 0.071 af, Depth= 0.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Type III 24-hr 2-Year Rainfall=3.37"

	Area	(ac) C	N Des	cription						
	0.	160 6	61 >75	% Grass c	over, Good	, HSG B				
	0.	072 9	98 Pav	ed parking	, HSG B					
	0.	229 9	96 Grav	vel surface	, HSG B					
_	0.	576 క	55 Woo	ods, Good,	HSG B					
	1.037 68 Weighted Average									
	0.965 93.06% Pervious Area									
	0.	072	6.94	% Impervi	ous Area					
	Tc	Length	Slope	Velocity	Capacity	Description				
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)					
	12.5	50	0.0200	0.07		Sheet Flow,				
						Woods: Light underbrush n= 0.400 P2= 3.10"				
	1.4	190	0.0200	2.28		Shallow Concentrated Flow,				
						Unpaved Kv= 16.1 fps				
	7.0	310	0.0220	0.74		Shallow Concentrated Flow,				
_						Woodland Kv= 5.0 fps				

20.9 550 Total

#### Subcatchment E1: Pre-Development North



#### Summary for Subcatchment E2: Pre-Development South

Runoff = 1.34 cfs @ 12.24 hrs, Volume= 0.138 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Type III 24-hr 2-Year Rainfall=3.37"

_	Area	(ac) C	CN Des	scription		
	0.	767	61 >75	% Grass c	over, Good	, HSG B
	0.4	468	98 Pav	ed parking	, HSG B	
	0.	013	96 Gra	vel surface	, HSG B	
	0.	090	55 Wo	ods, Good,	HSG B	
_	0.	096	82 Dirt	roads, HS	G B	
	1.4	434	74 We	ighted Avei	rage	
	0.	966	67.3	36% Pervio	us Area	
	0.4	468	32.0	64% Imperv	vious Area	
	Tc	Length	Slope	Velocity	Capacity	Description
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	9.3	50	0.0060	0.09		Sheet Flow,
						Grass: Short n= 0.150 P2= 3.10"
	4.8	210	0.0110	0.73		Shallow Concentrated Flow,
						Short Grass Pasture Kv= 7.0 fps
	2.2	427	0.0250	3.21		Shallow Concentrated Flow,
_						Paved Kv= 20.3 fps
	16.3	687	Total			

#### Subcatchment E2: Pre-Development South



# Summary for Reach 1R: North Discharge

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

Inflow Area	a =	1.037 ac,	6.94% Impervious,	Inflow Depth = 0.	83" for 2-Year event
Inflow	=	0.58 cfs @	12.33 hrs, Volume	= 0.071 af	
Outflow	=	0.58 cfs @	12.33 hrs, Volume	= 0.071 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



# Reach 1R: North Discharge

#### Summary for Reach 2R: South Discharge

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

Inflow Area	a =	1.434 ac, 3	82.64% Imp	ervious,	Inflow Dep	oth = 1	.15" fo	r 2-Y	'ear event	
Inflow	=	1.34 cfs @	12.24 hrs,	Volume	= (	).138 af				
Outflow	=	1.34 cfs @	12.24 hrs,	Volume	= (	).138 af	, Atten=	0%,	Lag= 0.0 mi	n

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



# Reach 2R: South Discharge

#### Summary for Link 1L: Winthrop Street

Inflow Area	a =	2.471 ac, 2	1.85% Impe	rvious, Inflov	w Depth = 1.	.01" for 2-`	Year event
Inflow	=	1.88 cfs @	12.27 hrs,	Volume=	0.209 af		
Primary	=	1.88 cfs @	12.27 hrs,	Volume=	0.209 af,	, Atten= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

# Hydrograph

#### Link 1L: Winthrop Street

HydroCAD_Pre-Dev		Type I	ll 24-hr	10-Year Raint	fall=5.27"
Prepared by Tetra Tech Inc				Printed	4/5/2022
HydroCAD® 10.00-24 s/n 01603 © 2018 HydroC	CAD Software S	olutions LLC			Page 8
Time span=0.00-7 Runoff by SCS TR-2 Reach routing by Stor-Ind+Tra	2.00 hrs, dt=0. 20 method, UH ns method - P	05 hrs, 1441 g =SCS, Weigh Pond routing b	ooints ted-CN y Stor-In	nd method	
Subcatchment E1: Pre-Development North	Runoff Area=1 w Length=550'	1.037 ac 6.94 Tc=20.9 min	% Imperv CN=68	vious Runoff De Runoff=1.62 cfs	epth=2.07" s_0.179 af
Subcatchment E2: Pre-Development South	Runoff Area=1. w Length=687'	434 ac 32.64 Tc=16.3 min	% Imper\ CN=74	vious Runoff De Runoff=3.14 cfs	epth=2.58" s_0.308 af
Reach 1R: North Discharge				Inflow=1.62 cfs Outflow=1.62 cfs	s 0.179 af s 0.179 af
Reach 2R: South Discharge				Inflow=3.14 cfs Outflow=3.14 cfs	s  0.308 af s  0.308 af
Link 1L: Winthrop Street				Inflow=4.68 cfs Primary=4.68 cfs	s  0.488 af s  0.488 af
Total Runoff Area = 2.471 ac 7	c Runoff Volu 78.15% Perviou	me = 0.488 al ıs = 1.931 ac	f Avera 21.85%	ge Runoff Dep % Impervious =	th = 2.37" • 0.540 ac

#### Summary for Subcatchment E1: Pre-Development North

Runoff = 1.62 cfs @ 12.31 hrs, Volume= 0.179 af, Depth= 2.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.27"

_	Area	(ac) C	N Des	cription						
	0.	160	61 >75	% Grass c	over, Good	, HSG B				
	0.	072	98 Pav	ed parking	, HSG B					
	0.	229	96 Gra	vel surface, HSG B						
_	0.	576	55 Woo	ods, Good,	HSG B					
	1.037 68 Weighted Average									
	0.965 93.06% Pervious Area									
	0.	072	6.94	% Impervi	ous Area					
	Тс	Length	Slope	Velocity	Capacity	Description				
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)					
	12.5	50	0.0200	0.07		Sheet Flow,				
						Woods: Light underbrush n= 0.400 P2= 3.10"				
	1.4	190	0.0200	2.28		Shallow Concentrated Flow,				
						Unpaved Kv= 16.1 fps				
	7.0	310	0.0220	0.74		Shallow Concentrated Flow,				
_						Woodland Kv= 5.0 fps				

20.9 550 Total

#### Subcatchment E1: Pre-Development North



#### Summary for Subcatchment E2: Pre-Development South

Runoff = 3.14 cfs @ 12.23 hrs, Volume= 0.308 af, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Type III 24-hr 10-Year Rainfall=5.27"

Area	(ac)	CN [	Desc	cription				
0	.767	61 >	>759	% Grass co	over, Good,	, HSG B		
0	.468	98 F	Pave	ed parking,	, HSG B			
0	.013	96 (	Grav	el surface	, HSG B			
0	.090	55 \	Woods, Good, HSG B					
0	.096	82 E	Dirt ı	roads, HS0	G B			
1	.434	74 \	Neig	ghted Aver	age			
0.966 67.36% Pervious Area								
0	.468	3	32.6	4% Imperv	∕ious Area			
Тс	Length	n Slo	pe	Velocity	Capacity	Description		
(min)	(feet)	) (ft	/ft)	(ft/sec)	(cfs)			
9.3	50	0.00	)60	0.09		Sheet Flow,		
						Grass: Short n= 0.150 P2= 3.10"		
4.8	210	0.01	10	0.73		Shallow Concentrated Flow,		
						Short Grass Pasture Kv= 7.0 fps		
2.2	427	0.02	250	3.21		Shallow Concentrated Flow,		
						Paved Kv= 20.3 fps		
16.3	687	′ Tota	al					

#### Subcatchment E2: Pre-Development South



#### Summary for Reach 1R: North Discharge

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

Inflow Area	a =	1.037 ac,	6.94% Impervious,	Inflow Depth = 2.0	07" for 10-Year event
Inflow	=	1.62 cfs @	12.31 hrs, Volume	= 0.179 af	
Outflow	=	1.62 cfs @	12.31 hrs, Volume	= 0.179 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



# **Reach 1R: North Discharge**

## Summary for Reach 2R: South Discharge

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

Inflow Area	a =	1.434 ac, 3	2.64% Impe	ervious,	Inflow Dep	oth = 2.	58" for 10	)-Year event
Inflow	=	3.14 cfs @	12.23 hrs,	Volume	= (	).308 af		
Outflow	=	3.14 cfs @	12.23 hrs,	Volume	= (	0.308 af,	Atten= 0%	, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



Reach 2R: South Discharge

#### Summary for Link 1L: Winthrop Street

Inflow Area	a =	2.471 ac, 2	1.85% Impervious	s, Inflow Depth =	2.37"	for 10-Year event
Inflow	=	4.68 cfs @	12.25 hrs, Volun	ne= 0.488	8 af	
Primary	=	4.68 cfs @	12.25 hrs, Volun	ne= 0.488	8 af, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



## Link 1L: Winthrop Street

HydroCAD_Pre-Dev		Type III	24-hr 100	-Year Rainfa	all=8.28"
Prepared by Tetra Tech Inc				Printed	4/5/2022
HydroCAD® 10.00-24 s/n 01603 © 2018 Hydro	CAD Software Se	olutions LLC			<u>Page 14</u>
Time span=0.00-7 Runoff by SCS TR-2 Reach routing by Stor-Ind+Tra	72.00 hrs, dt=0.0 20 method, UH ns method - P	05 hrs, 1441 g =SCS, Weigh Pond routing b	ooints ted-CN y Stor-Ind r	nethod	
Subcatchment E1: Pre-Development North	Runoff Area=1 w Length=550'	1.037 ac 6.94 Tc=20.9 min	% Imperviou CN=68 Rเ	ıs Runoff Dej unoff=3.59 cfs	oth=4.47" 0.386 af
Subcatchment E2: Pre-Development South	Runoff Area=1. w Length=687'	434 ac 32.64 Tc=16.3 min	% Imperviou CN=74 Rเ	ıs Runoff Dej unoff=6.35 cfs	oth=5.18" 0.619 af
Reach 1R: North Discharge			lr Ou	nflow=3.59 cfs tflow=3.59 cfs	0.386 af 0.386 af
Reach 2R: South Discharge			lr Ou	nflow=6.35 cfs tflow=6.35 cfs	0.619 af 0.619 af
Link 1L: Winthrop Street			lr Prii	nflow=9.75 cfs mary=9.75 cfs	1.005 af 1.005 af
Total Runoff Area = 2.471 ac 7	c Runoff Volu 78.15% Perviou	me = 1.005 af is = 1.931 ac	Average 21.85% li	Runoff Dept mpervious =	h = 4.88" 0.540 ac

#### Summary for Subcatchment E1: Pre-Development North

Runoff = 3.59 cfs @ 12.29 hrs, Volume= 0.386 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Type III 24-hr 100-Year Rainfall=8.28"

	Area	(ac) C	N Des	cription						
_	0.	160	61 >75	5% Grass cover, Good, HSG B						
	0.	072	98 Pav	ed parking	, HSG B					
	0.	229	96 Gra	vel surface	, HSG B					
_	0.	576	55 Wo	ods, Good,	HSG B					
	1.	037	68 We	ighted Avei	rage					
	0.	965	93.0	06% Pervio	us Area					
	0.	072	6.94	1% Impervi	ous Area					
	Tc	Length	Slope	Velocity	Capacity	Description				
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)					
	12.5	50	0.0200	0.07		Sheet Flow,				
						Woods: Light underbrush n= 0.400 P2= 3.10"				
	1.4	190	0.0200	2.28		Shallow Concentrated Flow,				
						Unpaved Kv= 16.1 fps				
	7.0	310	0.0220	0.74		Shallow Concentrated Flow,				
						Woodland Kv= 5.0 fps				

20.9 550 Total

#### Subcatchment E1: Pre-Development North



#### Summary for Subcatchment E2: Pre-Development South

Runoff = 6.35 cfs @ 12.22 hrs, Volume= 0.619 af, Depth= 5.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs Type III 24-hr 100-Year Rainfall=8.28"

 Area	(ac)	CN	Desc	cription							
0.	767	61	>75%	′5% Grass cover, Good, HSG B							
0.4	468	98	Pave	ed parking,	, HSG B						
0.	013	96	Grav	el surface	, HSG B						
0.	090	55	Woo	ds, Good,	HSG B						
 0.	096	82	Dirt r	oads, HS	G B						
1.	434	74	Weig	ghted Aver	age						
0.	966		67.30	6% Pervio	us Area						
0.	468		32.64	4% Imperv	∕ious Area						
_		_				<b>-</b>					
IC	Length		Slope	Velocity	Capacity	Description					
 min)	(feet	)	(ft/ft)	(ft/sec)	(cfs)						
9.3	50	0.0	0060	0.09		Sheet Flow,					
						Grass: Short n= 0.150 P2= 3.10"					
4.8	210	0.0	0110	0.73		Shallow Concentrated Flow,					
						Short Grass Pasture Kv= 7.0 fps					
2.2	427	<b>'</b> 0.0	0250	3.21		Shallow Concentrated Flow,					
						Paved Kv= 20.3 fps					
16.3	687	' To	otal								

#### Subcatchment E2: Pre-Development South



# Summary for Reach 1R: North Discharge

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

Inflow Area	a =	1.037 ac,	6.94% Impe	ervious,	Inflow De	pth =	4.4	7" for 10	0-Year event
Inflow	=	3.59 cfs @	12.29 hrs,	Volume	=	0.386 a	af		
Outflow	=	3.59 cfs @	12.29 hrs,	Volume	=	0.386 a	af, .	Atten= 0%,	Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



# **Reach 1R: North Discharge**

# Summary for Reach 2R: South Discharge

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

Inflow Area	a =	1.434 ac, 3	2.64% Impe	ervious,	Inflow Dept	h= 5.′	18" for 100	0-Year event
Inflow	=	6.35 cfs @	12.22 hrs,	Volume	= 0.0	619 af		
Outflow	=	6.35 cfs @	12.22 hrs,	Volume	= 0.0	619 af,	Atten= 0%,	Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



# Reach 2R: South Discharge

#### Summary for Link 1L: Winthrop Street

Inflow Area	a =	2.471 ac, 2	1.85% Imperviou	s, Inflow Depth	= 4.88	3" for 100	-Year event
Inflow	=	9.75 cfs @	12.25 hrs, Volur	ne= 1.0	05 af		
Primary	=	9.75 cfs @	12.25 hrs, Volur	ne= 1.0	05 af, <i>I</i>	Atten= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



#### Link 1L: Winthrop Street



# Area Listing (all nodes)

Area	CN	Description
(acres)		(subcatchment-numbers)
0.906	61	>75% Grass cover, Good, HSG B (P1a, P1b, P1c, P1d)
0.107	82	Dirt roads, HSG B (P1b, P1d)
0.005	85	Gravel roads, HSG B (P1d)
0.910	98	Paved parking, HSG B (P1b, P1c, P1d)
0.621	60	Woods, Fair, HSG B (P1a, P1c, P1d)
2.549	75	TOTAL AREA

# Soil Listing (all nodes)

(acres) Group Numbers	
0.000 HSG A	
2.549 HSG B P1a, P1b, P1c, P	1d
0.000 HSG C	
0.000 HSG D	
0.000 Other	
2.549 TOTAL AREA	

# HydroCAD\_Post-Dev

Prepared by Tetra Tech Inc	
HydroCAD® 10.00-24 s/n 01603	© 2018 HydroCAD Software Solutions LLC

			Рір	e Listing	(all noo	es)			
Line#	Node	In-Invert	Out-Invert	Length	Slope	n	Diam/Width	Height	Inside-Fill
	Number	(feet)	(feet)	(feet)	(ft/ft)		(inches)	(inches)	(inches)
1	1P	206.60	206.00	125.0	0.0048	0.013	10.0	0.0	0.0

# Pipe Listing (all nodes)

HydroCAD_Post-Dev Prepared by Tetra Tech Inc HydroCAD® 10.00-24 s/n 01603	© 2018 HydroCAD Software So	Type III 24-hr	2-Year Rainfall=3.37" Printed 4/6/2022 Page 5
Time	e span=0.00-48.00 hrs, dt=0.0	)1 hrs, 4801 points	nd method
Runol	f by SCS TR-20 method, UH=	=SCS, Weighted-CN	
Reach routing by	v Stor-Ind+Trans method - Pe	ond routing by Stor-Ir	
SubcatchmentP1a: Untreated	I North Runoff Area=0	0.747 ac 0.00% Imper	vious Runoff Depth=0.48"
	Flow Length=334'	Tc=18.6 min CN=60	Runoff=0.19 cfs 0.030 af
SubcatchmentP1b: North Sul	<b>catchment</b> Runoff Area=0.	955 ac 37.59% Imper	vious Runoff Depth=1.33"
	Flow Length=334'	Tc=18.6 min CN=77	Runoff=1.01 cfs 0.106 af
SubcatchmentP1c: Untreated	I South Runoff Area=0.	236 ac 54.24% Imper	vious Runoff Depth=1.60"
	Flow Length=334'	Tc=18.6 min CN=81	Runoff=0.31 cfs 0.032 af
Subcatchment P1d: South Su	<b>bcatchment</b> Runoff Area=0.	611 ac 69.23% Imper	vious Runoff Depth=2.07"
	Flow Length=334'	Tc=18.6 min CN=87	Runoff=1.03 cfs 0.105 af
Reach 1R: North Discharge			Inflow=0.19 cfs 0.030 af Outflow=0.19 cfs 0.030 af
Reach 2R: South Discharge			Inflow=0.31 cfs 0.032 af Outflow=0.31 cfs 0.032 af
Pond 1P: Stormtech 1	Peak Elev=20	6.55' Storage=1,693 c	f Inflow=1.01 cfs 0.106 af
	carded=0.15 cfs 0.106 af Prima	ary=0.00 cfs  0.000 af	Outflow=0.15 cfs 0.106 af
Pond 2P: Stormtech 2	Peak Elev=20	3.79' Storage=2,441 c	f Inflow=1.03 cfs 0.105 af
	carded=0.06 cfs 0.105 af Prima	ary=0.00 cfs  0.000 af	Outflow=0.06 cfs 0.105 af
Pond ISO1: Isolator Row 1		Pea	k Elev=0.00' Storage=0 cf
Pond ISO2: Isolator Row 2		Pea	ik Elev=0.00' Storage=0 cf
Link 1L: Winthrop Street			Inflow=0.48 cfs 0.061 af Primary=0.48 cfs 0.061 af

Total Runoff Area = 2.549 acRunoff Volume = 0.273 afAverage Runoff Depth = 1.28"64.30% Pervious = 1.639 ac35.70% Impervious = 0.910 ac

#### Summary for Subcatchment P1a: Untreated North (Existing)

Runoff = 0.19 cfs @ 12.37 hrs, Volume= 0.030 af, Depth= 0.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs Type III 24-hr 2-Year Rainfall=3.37"

Area (a	ac) C	N Dese	cription		
0.5	63 6	0 Woo	ds, Fair, H	SG B	
0.1	84 6	1 >759	% Grass co	over, Good,	HSG B
0.7	47 6	0 Weig	ghted Aver	age	
0.7	47	100.	00% Pervi	ous Area	
Tc I (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0400	0.05	(0.0)	Sheet Flow.
4.0	140	0.0400	0.00		Woods: Dense underbrush n= 0.800 P2= 3.10"
1.2	142	0.0160	2.04		Shallow Concentrated Flow,
0.9	142	0.0160	2.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
18.6	334	Total			

# Subcatchment P1a: Untreated North (Existing)



#### Summary for Subcatchment P1b: North Subcatchment

Runoff = 1.01 cfs @ 12.26 hrs, Volume= 0.106 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs Type III 24-hr 2-Year Rainfall=3.37"

	Area	(ac) (	CN De	scription		
	0.	000	60 Wo	ods, Fair, F	ISG B	
	0.	494	61 >75	5% Grass c	over, Good	, HSG B
	0.	359	98 Pa	/ed parking	, HSG B	
	0.	102	82 Dir	t roads, HS	G B	
	0.	955	77 We	ighted Ave	rage	
	0.	596	62.	41% Pervio	us Area	
	0.	359	37.	59% Imperv	vious Area	
	Тс	Length	Slope	e Velocity	Capacity	Description
_	(min)	(feet)	(ft/ft	) (ft/sec)	(cfs)	
	16.5	50	0.0400	0.05		Sheet Flow,
						Woods: Dense underbrush n= 0.800 P2= 3.10"
	1.2	142	0.0160	2.04		Shallow Concentrated Flow,
						Unpaved Kv= 16.1 fps
	0.9	142	0.0160	2.57		Shallow Concentrated Flow,
_						Paved Kv= 20.3 fps
	10.0	004	<b>T</b> ' '			

18.6 334 Total

# Subcatchment P1b: North Subcatchment



#### Summary for Subcatchment P1c: Untreated South (Existing)

Runoff = 0.31 cfs @ 12.26 hrs, Volume= 0.032 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs Type III 24-hr 2-Year Rainfall=3.37"

Area (	(ac) C	CN Des	cription			
0.0	035	60 Woo	ods, Fair, H	ISG B		
0.0	073	61 >75	% Grass co	over, Good	, HSG B	
0.	128	98 Pav	ed parking	, HSG B		
0.236 81 Weighted Average						
0.	108	45.7	6% Pervio	us Area		
0.	128	54.2	4% Imperv	∕ious Area		
_				_		
Tc	Length	Slope	Velocity	Capacity	Description	
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)		
16.5	50	0.0400	0.05		Sheet Flow,	
					Woods: Dense underbrush n= 0.800 P2= 3.10"	
1.2	142	0.0160	2.04		Shallow Concentrated Flow,	
					Unpaved Kv= 16.1 fps	
0.9	142	0.0160	2.57		Shallow Concentrated Flow,	
					Paved Kv= 20.3 fps	
18.6	334	Total				

# Subcatchment P1c: Untreated South (Existing)



#### Summary for Subcatchment P1d: South Subcatchment

Runoff = 1.03 cfs @ 12.25 hrs, Volume= 0.105 af, Depth= 2.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs Type III 24-hr 2-Year Rainfall=3.37"

 Area (	(ac) C	CN Des	cription		
0.0	023	60 Wo	ods, Fair, F	ISG B	
0.	155	61 >75	% Grass c	over, Good	, HSG B
0.4	423	98 Pav	ed parking	, HSG B	
0.0	005	85 Gra	vel roads, l	HSG B	
 0.	005	82 Dirt	roads, HS	G B	
0.0	611	87 We	ghted Aver	rage	
0.	188	30.7	77% Pervio	us Area	
0.4	423	69.2	23% Imperv	vious Area	
Тс	Length	Slope	Velocity	Capacity	Description
 (min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
16.5	50	0.0400	0.05		Sheet Flow,
					Woods: Dense underbrush n= 0.800 P2= 3.10"
1.2	142	0.0160	2.04		Shallow Concentrated Flow,
					Unpaved Kv= 16.1 fps
0.9	142	0.0160	2.57		Shallow Concentrated Flow,
					Paved Kv= 20.3 fps
18.6	334	Total			

#### Subcatchment P1d: South Subcatchment



# Summary for Reach 1R: North Discharge

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

Inflow Area	a =	1.702 ac, 2	1.09% Imp	ervious,	Inflow De	pth = 0	.21" foi	r 2-Y	ear event	
Inflow	=	0.19 cfs @	12.37 hrs,	Volume	=	0.030 at	F			
Outflow	=	0.19 cfs @	12.37 hrs,	Volume	=	0.030 at	f, Atten=	0%,	Lag= 0.0 mi	n

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs



# Reach 1R: North Discharge

# Summary for Reach 2R: South Discharge

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

Inflow Are	a =	0.847 ac, 6	65.05% Impe	ervious,	Inflow De	epth =	0.45	5" for 2-Y	ear event
Inflow	=	0.31 cfs @	12.26 hrs,	Volume	=	0.032 a	af		
Outflow	=	0.31 cfs @	12.26 hrs,	Volume	=	0.032 a	af, A	Atten= 0%,	Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs



# Reach 2R: South Discharge

#### Summary for Pond 1P: Stormtech 1

Inflow Area	a =	0.955 ac, 3	7.59% Imp	ervious,	Inflow Depth	n = 1.	33" for	2-Ye	ar event	
Inflow	=	1.01 cfs @	12.26 hrs,	Volume	= 0.1	106 af				
Outflow	=	0.15 cfs @	11.88 hrs,	Volume	= 0.1	106 af,	Atten=	86%,	Lag= 0.0 n	nin
Discarded	=	0.15 cfs @	11.88 hrs,	Volume	= 0.1	106 af			-	
Primary	=	0.00 cfs @	0.00 hrs,	Volume	= 0.0	)00 af				

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 7 Peak Elev= 206.55' @ 13.44 hrs Surf.Area= 2,600 sf Storage= 1,693 cf

Plug-Flow detention time= 105.1 min calculated for 0.106 af (100% of inflow) Center-of-Mass det. time= 105.1 min (966.3 - 861.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	205.50'	2,354 cf	34.75'W x 74.82'L x 3.50'H Field A
			9,100 cf Overall - 3,216 cf Embedded = 5,884 cf x 40.0% Voids
#2A	206.00'	3,216 cf	ADS_StormTech SC-740 +Cap x 70 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			70 Chambers in 7 Rows
		5 560 cf	Total Available Storage

5,569 cf I otal Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	205.50'	2.410 in/hr Exfiltration over Surface area
#2	Primary	206.60'	10.0" Round Culvert
			L= 125.0' CPP, mitered to conform to fill, Ke= 0.700
			Inlet / Outlet Invert= 206.60' / 206.00' S= 0.0048 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#3	Device 2	208.00'	5.0' long Sharp-Crested Rectangular Weir 0 End Contraction(s)
#4	Device 2	207.50'	4.0" Vert. Orifice/Grate C= 0.600
#5	Device 2	206.70'	4.0" Vert. Orifice/Grate C= 0.600

**Discarded OutFlow** Max=0.15 cfs @ 11.88 hrs HW=205.54' (Free Discharge) -1=Exfiltration (Exfiltration Controls 0.15 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=205.50' (Free Discharge)

-2=Culvert (Controls 0.00 cfs)

-3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

-4=Orifice/Grate (Controls 0.00 cfs)

-5=Orifice/Grate (Controls 0.00 cfs)

#### Pond 1P: Stormtech 1 - Chamber Wizard Field A

#### Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

10 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 72.82' Row Length +12.0" End Stone x 2 = 74.82' Base Length 7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

70 Chambers x 45.9 cf = 3,215.8 cf Chamber Storage

9,099.6 cf Field - 3,215.8 cf Chambers = 5,883.8 cf Stone x 40.0% Voids = 2,353.5 cf Stone Storage

Chamber Storage + Stone Storage = 5,569.3 cf = 0.128 afOverall Storage Efficiency = 61.2%Overall System Size =  $74.82' \times 34.75' \times 3.50'$ 

70 Chambers 337.0 cy Field 217.9 cy Stone




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## Summary for Pond 2P: Stormtech 2

Inflow Area	=	0.611 ac, 6	9.23% Imp	ervious,	Inflow Dept	th = 2	2.07" fo	r 2-Ye	ar event	
Inflow	=	1.03 cfs @	12.25 hrs,	Volume	= 0.	.105 a	f			
Outflow	=	0.06 cfs @	11.09 hrs,	Volume	= 0.	.105 a	f, Atten=	94%,	Lag= 0.0 mi	n
Discarded	=	0.06 cfs @	11.09 hrs,	Volume	= 0.	.105 a	f		-	
Primary	=	0.00 cfs @	0.00 hrs,	Volume	= 0.	.000 a	f			

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 7 Peak Elev= 203.79' @ 15.56 hrs Surf.Area= 2,619 sf Storage= 2,441 cf

Plug-Flow detention time= 386.2 min calculated for 0.105 af (99% of inflow) Center-of-Mass det. time= 382.8 min (1,211.2 - 828.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.40'	2,381 cf	49.00'W x 53.46'L x 3.50'H Field A
			9,168 cf Overall - 3,216 cf Embedded = 5,952 cf x 40.0% Voids
#2A	202.90'	3,216 cf	ADS_StormTech SC-740 +Cap x 70 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			70 Chambers in 10 Rows
#3	200.30'	85 cf	4.00'D x 6.75'H Vertical Cone/Cylinder-Impervious
		5,681 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.40'	1.020 in/hr Exfiltration over Surface area
#2	Primary	206.80'	8.0' long Sharp-Crested Rectangular Weir 1 End Contraction(s)

**Discarded OutFlow** Max=0.06 cfs @ 11.09 hrs HW=202.40' (Free Discharge) **1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=200.30' (Free Discharge) 2=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

## Pond 2P: Stormtech 2 - Chamber Wizard Field A

#### Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length 10 Rows x 51.0" Wide + 6.0" Spacing x 9 + 12.0" Side Stone x 2 = 49.00' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

70 Chambers x 45.9 cf = 3,215.8 cf Chamber Storage

9,167.8 cf Field - 3,215.8 cf Chambers = 5,952.0 cf Stone x 40.0% Voids = 2,380.8 cf Stone Storage

Chamber Storage + Stone Storage = 5,596.6 cf = 0.128 afOverall Storage Efficiency = 61.0%Overall System Size =  $53.46' \times 49.00' \times 3.50'$ 

70 Chambers 339.5 cy Field 220.4 cy Stone





Pond 2P: Stormtech 2



# Summary for Pond ISO1: Isolator Row 1

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1A	205.50'	471 cf	6.25'W x 74.82'L x 3.50'H Field A
			1,637 cf Overall - 459 cf Embedded = 1,177 cf x 40.0% Voids
#2A	206.00'	459 cf	ADS_StormTech SC-740 +Cap x 10 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		930 cf	Total Available Storage

Storage Group A created with Chamber Wizard

## Pond ISO1: Isolator Row 1 - Chamber Wizard Field A

#### Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

10 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 72.82' Row Length +12.0" End Stone x 2 = 74.82' Base Length 1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

10 Chambers x 45.9 cf = 459.4 cf Chamber Storage

1,636.6 cf Field - 459.4 cf Chambers = 1,177.2 cf Stone x 40.0% Voids = 470.9 cf Stone Storage

Chamber Storage + Stone Storage = 930.3 cf = 0.021 af Overall Storage Efficiency = 56.8% Overall System Size = 74.82' x 6.25' x 3.50'

10 Chambers 60.6 cy Field 43.6 cy Stone



# Summary for Pond ISO2: Isolator Row 2

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.40'	339 cf	6.25'W x 53.46'L x 3.50'H Field A
			1,169 cf Overall - 322 cf Embedded = 848 cf x 40.0% Voids
#2A	202.90'	322 cf	ADS_StormTech SC-740 +Cap x 7 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		661 cf	Total Available Storage

Storage Group A created with Chamber Wizard

## Pond ISO2: Isolator Row 2 - Chamber Wizard Field A

#### Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length 1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

7 Chambers x 45.9 cf = 321.6 cf Chamber Storage

1,169.4 cf Field - 321.6 cf Chambers = 847.8 cf Stone x 40.0% Voids = 339.1 cf Stone Storage

Chamber Storage + Stone Storage = 660.7 cf = 0.015 af Overall Storage Efficiency = 56.5% Overall System Size = 53.46' x 6.25' x 3.50'

7 Chambers 43.3 cy Field 31.4 cy Stone





## Summary for Link 1L: Winthrop Street

Inflow /	Area	=	2.549 ac, 3	35.70% Impe	ervious,	Inflow Depth =	0.2	29" for 2-`	Year event
Inflow	=	=	0.48 cfs @	12.30 hrs,	Volume	= 0.06	1 af		
Primary	y =	=	0.48 cfs @	12.30 hrs,	Volume	= 0.06	1 af,	Atten= 0%	, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs



## Link 1L: Winthrop Street

HydroCAD_Post-Dev	las		Type II	l 24-hr 1	10-Year Rai	nfall=5.27"
HvdroCAD® 10.00-24 s/n 01	INC 603 © 2018 HvdroC	AD Software So	lutions LLC		Printe	Page 23
Reach routir	Time span=0.00-48 Runoff by SCS TR-2 ng by Stor-Ind+Trar	3.00 hrs, dt=0.0 0 method, UH: is method - P	01 hrs, 4801 =SCS, Weigh ond routing b	points ited-CN by Stor-In	d method	<u> </u>
SubcatchmentP1a: Untre	eated North Flo	Runoff Area=0 w Length=334'	0.747 ac 0.00 Tc=18.6 min	)% Imperv CN=60	vious Runoff Runoff=0.80	Depth=1.46" cfs 0.091 af
SubcatchmentP1b: North	n Subcatchment Flo	Runoff Area=0. w Length=334'	955 ac 37.59 Tc=18.6 min	9% Imperv CN=77	vious Runoff Runoff=2.22	Depth=2.85" cfs 0.227 af
SubcatchmentP1c: Untre	eated South Flo	Runoff Area=0. w Length=334'	236 ac 54.24 Tc=18.6 min	Imperv CN=81	vious Runoff Runoff=0.62	Depth=3.23" cfs 0.063 af
SubcatchmentP1d: Sout	h Subcatchment Flo	Runoff Area=0. w Length=334'	611 ac 69.23 Tc=18.6 min	3% Imperv CN=87	vious Runoff Runoff=1.87	Depth=3.82" cfs 0.195 af
Reach 1R: North Dischar	ge				Inflow=0.90 Outflow=0.90	cfs 0.158 af cfs 0.158 af
Reach 2R: South Dischar	ge				Inflow=0.62 Outflow=0.62	cfs 0.063 af cfs 0.063 af
Pond 1P: Stormtech 1	Discarded=0.15 cfs	Peak Elev=20 0.160 af Prima	7.58' Storage ary=0.37 cfs(	=3,710 cf ).067 af (	Inflow=2.22 Outflow=0.52	cfs 0.227 af cfs 0.227 af
Pond 2P: Stormtech 2	Discarded=0.06 cfs	Peak Elev=20 0.194 af Prima	5.73' Storage ary=0.00 cfs(	=5,483 cf ).000 af (	Inflow=1.87 Outflow=0.06	cfs 0.195 af cfs 0.194 af
Pond ISO1: Isolator Row	1			Peal	k Elev=0.00'	Storage=0 cf
Pond ISO2: Isolator Row	2			Peal	k Elev=0.00'	Storage=0 cf
Link 1L: Winthrop Street				I	Inflow=1.42 Primary=1.42	cfs 0.221 af cfs 0.221 af
Tatal Dura	£ A	Due off Males		£		

Total Runoff Area = 2.549 acRunoff Volume = 0.576 afAverage Runoff Depth = 2.71"64.30% Pervious = 1.639 ac35.70% Impervious = 0.910 ac

## Summary for Subcatchment P1a: Untreated North (Existing)

Runoff = 0.80 cfs @ 12.29 hrs, Volume= 0.091 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs Type III 24-hr 10-Year Rainfall=5.27"

Area (a	ac) C	N Dese	cription		
0.563 60		0 Woo	ds, Fair, H	SG B	
0.1	84 6	1 >759	% Grass co	over, Good,	HSG B
0.7	47 6	0 Weig	ghted Aver	age	
0.7	47	100.	00% Pervi	ous Area	
Tc I (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0400	0.05	(0.0)	Sheet Flow.
4.0	140	0.0400	0.00		Woods: Dense underbrush n= 0.800 P2= 3.10"
1.2	142	0.0160	2.04		Shallow Concentrated Flow,
0.9	142	0.0160	2.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
18.6	334	Total			

## Subcatchment P1a: Untreated North (Existing)



### Summary for Subcatchment P1b: North Subcatchment

Runoff = 2.22 cfs @ 12.26 hrs, Volume= 0.227 af, Depth= 2.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs Type III 24-hr 10-Year Rainfall=5.27"

_	Area	(ac) (	CN Des	cription						
	0.	000	60 Wo	ods, Fair, ⊢	ISG B					
	0.	494	61 >75	% Grass co	over, Good	, HSG B				
	0.	359	98 Pav	ed parking	, HSG B					
	0.	102	82 Dirt	roads, HS	GΒ					
	0.955 77 Weighted Average									
	0.	596	62.4	11% Pervio	us Area					
	0.359 37.59% Impervious Area									
	Тс	Length	Slope	Velocity	Capacity	Description				
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)					
	16.5	50	0.0400	0.05		Sheet Flow,				
						Woods: Dense underbrush n= 0.800 P2= 3.10"				
	1.2	142	0.0160	2.04		Shallow Concentrated Flow,				
						Unpaved Kv= 16.1 fps				
	0.9	142	0.0160	2.57		Shallow Concentrated Flow,				
						Paved Kv= 20.3 fps				

18.6 334 Total

### Subcatchment P1b: North Subcatchment



## Summary for Subcatchment P1c: Untreated South (Existing)

Runoff = 0.62 cfs @ 12.25 hrs, Volume= 0.063 af, Depth= 3.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs Type III 24-hr 10-Year Rainfall=5.27"

Area	(ac) C	N Des	cription						
0.	0.035 60 Woods, Fair, HSG B								
0.073 61 >75% Grass cover, Good, HSG B									
0.128 98 Paved parking, HSG B									
0.236 81 Weighted Average									
0.	108	45.7	6% Pervio	us Area					
0.	128	54.2	4% Imperv	ious Area					
Tc	Length	Slope	Velocity	Capacity	Description				
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)					
16.5	50	0.0400	0.05		Sheet Flow,				
					Woods: Dense underbrush n= 0.800 P2= 3.10"				
1.2	142	0.0160	2.04		Shallow Concentrated Flow,				
					Unpaved Kv= 16.1 fps				
0.9	142	0.0160	2.57		Shallow Concentrated Flow,				
					Paved Kv= 20.3 fps				
18.6	334	Total							

### Subcatchment P1c: Untreated South (Existing)



### Summary for Subcatchment P1d: South Subcatchment

Runoff = 1.87 cfs @ 12.25 hrs, Volume= 0.195 af, Depth= 3.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs Type III 24-hr 10-Year Rainfall=5.27"

A	Area (	ac) (	CN	Desc	ription					
	0.0	)23	60	Woo	ds, Fair, H	SG B				
	0.155 61 >75% Grass cover, Good, HSG B									
	0.4	123	98	Pave	ed parking,	HSG B				
	0.0	005	85	Grav	el roads, ł	ISG B				
	0.0	)05	82	Dirt r	oads, HSC	ЭB				
	0.611 87 Weighted Average									
	0.1	188		30.77	7% Pervio	us Area				
	0.4	123		69.23	3% Imperv	vious Area				
	_									
	IC	Length	SI	ope	Velocity	Capacity	Description			
(n	nin)	(feet)	(1	ft/ft)	(ft/sec)	(cfs)				
1	6.5	50	0.0	400	0.05		Sheet Flow,			
							Woods: Dense underbrush n= 0.800 P2= 3.10"			
	1.2	142	0.0	160	2.04		Shallow Concentrated Flow,			
							Unpaved Kv= 16.1 fps			
	0.9	142	0.0	160	2.57		Shallow Concentrated Flow,			
							Paved Kv= 20.3 fps			
1	8.6	334	Tot	al						

### Subcatchment P1d: South Subcatchment



# Summary for Reach 1R: North Discharge

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

Inflow Are	a =	1.702 ac, 2	1.09% Impe	ervious,	Inflow Dept	th = 1.1	11" for 10-	Year event
Inflow	=	0.90 cfs @	12.41 hrs,	Volume	= 0	.158 af		
Outflow	=	0.90 cfs @	12.41 hrs,	Volume	= 0	.158 af,	Atten= 0%,	Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs



# Reach 1R: North Discharge

# Summary for Reach 2R: South Discharge

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

Inflow Are	a =	0.847 ac, 6	65.05% Impe	ervious,	Inflow De	pth = (	0.90	)" for 10	-Year event	
Inflow	=	0.62 cfs @	12.25 hrs,	Volume	=	0.063 a	ıf			
Outflow	=	0.62 cfs @	12.25 hrs,	Volume	=	0.063 a	ıf, A	Atten= 0%,	Lag= 0.0 mi	n

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs



# Reach 2R: South Discharge

### Summary for Pond 1P: Stormtech 1

Inflow Area = 0.955 ac, 37.59% Impervious, Inflow Depth = 2.85" for 10-Year event Inflow 2.22 cfs @ 12.26 hrs, Volume= 0.227 af = 0.52 cfs @ 12.87 hrs, Volume= Outflow = 0.227 af, Atten= 77%, Lag= 36.6 min 0.15 cfs @ 11.40 hrs, Volume= Discarded = 0.160 af 0.37 cfs @ 12.87 hrs, Volume= Primary 0.067 af =

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 7 Peak Elev= 207.58' @ 12.87 hrs Surf.Area= 2,600 sf Storage= 3,710 cf

Plug-Flow detention time= 126.9 min calculated for 0.227 af (100% of inflow) Center-of-Mass det. time= 126.9 min (965.9 - 839.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	205.50'	2,354 cf	34.75'W x 74.82'L x 3.50'H Field A
			9,100 cf Overall - 3,216 cf Embedded = 5,884 cf x 40.0% Voids
#2A	206.00'	3,216 cf	ADS_StormTech SC-740 +Cap x 70 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			70 Chambers in 7 Rows
		5 560 of	Total Available Storage

5,569 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	205.50'	2.410 in/hr Exfiltration over Surface area
#2	Primary	206.60'	10.0" Round Culvert
			L= 125.0' CPP, mitered to conform to fill, Ke= 0.700
			Inlet / Outlet Invert= 206.60' / 206.00' S= 0.0048 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#3	Device 2	208.00'	5.0' long Sharp-Crested Rectangular Weir 0 End Contraction(s)
#4	Device 2	207.50'	4.0" Vert. Orifice/Grate C= 0.600
#5	Device 2	206.70'	4.0" Vert. Orifice/Grate C= 0.600

**Discarded OutFlow** Max=0.15 cfs @ 11.40 hrs HW=205.54' (Free Discharge) **1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=0.37 cfs @ 12.87 hrs HW=207.58' (Free Discharge) 2=Culvert (Passes 0.37 cfs of 1.59 cfs potential flow) -3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs) -4=Orifice/Grate (Orifice Controls 0.02 cfs @ 0.98 fps) -5=Orifice/Grate (Orifice Controls 0.36 cfs @ 4.08 fps)

## Pond 1P: Stormtech 1 - Chamber Wizard Field A

#### Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

10 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 72.82' Row Length +12.0" End Stone x 2 = 74.82' Base Length 7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

70 Chambers x 45.9 cf = 3,215.8 cf Chamber Storage

9,099.6 cf Field - 3,215.8 cf Chambers = 5,883.8 cf Stone x 40.0% Voids = 2,353.5 cf Stone Storage

Chamber Storage + Stone Storage = 5,569.3 cf = 0.128 afOverall Storage Efficiency = 61.2%Overall System Size =  $74.82' \times 34.75' \times 3.50'$ 

70 Chambers 337.0 cy Field 217.9 cy Stone





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Pond 1P: Stormtech 1



## Summary for Pond 2P: Stormtech 2

Inflow Area	=	0.611 ac, 69	9.23% Impervious,	Inflow Depth =	3.82" for	10-Year event
Inflow	=	1.87 cfs @	12.25 hrs, Volume	= 0.195 a	af	
Outflow	=	0.06 cfs @	9.63 hrs, Volume	= 0.194 a	af, Atten=	97%, Lag= 0.0 min
Discarded	=	0.06 cfs @	9.63 hrs, Volume	= 0.194 a	af	-
Primary	=	0.00 cfs @	0.00 hrs, Volume	= 0.000 a	af	

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 7 Peak Elev= 205.73' @ 17.43 hrs Surf.Area= 2,619 sf Storage= 5,483 cf

Plug-Flow detention time= 828.0 min calculated for 0.194 af (100% of inflow) Center-of-Mass det. time= 826.0 min (1,637.0 - 811.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.40'	2,381 cf	49.00'W x 53.46'L x 3.50'H Field A
			9,168 cf Overall - 3,216 cf Embedded = 5,952 cf x 40.0% Voids
#2A	202.90'	3,216 cf	ADS_StormTech SC-740 +Cap x 70 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			70 Chambers in 10 Rows
#3	200.30'	85 cf	4.00'D x 6.75'H Vertical Cone/Cylinder-Impervious
		5,681 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.40'	1.020 in/hr Exfiltration over Surface area
#2	Primary	206.80'	8.0' long Sharp-Crested Rectangular Weir 1 End Contraction(s)

**Discarded OutFlow** Max=0.06 cfs @ 9.63 hrs HW=202.40' (Free Discharge) **1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=200.30' (Free Discharge) 2=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

## Pond 2P: Stormtech 2 - Chamber Wizard Field A

#### Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length 10 Rows x 51.0" Wide + 6.0" Spacing x 9 + 12.0" Side Stone x 2 = 49.00' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

70 Chambers x 45.9 cf = 3,215.8 cf Chamber Storage

9,167.8 cf Field - 3,215.8 cf Chambers = 5,952.0 cf Stone x 40.0% Voids = 2,380.8 cf Stone Storage

Chamber Storage + Stone Storage = 5,596.6 cf = 0.128 afOverall Storage Efficiency = 61.0%Overall System Size =  $53.46' \times 49.00' \times 3.50'$ 

70 Chambers 339.5 cy Field 220.4 cy Stone





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Pond 2P: Stormtech 2



# Summary for Pond ISO1: Isolator Row 1

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1A	205.50'	471 cf	6.25'W x 74.82'L x 3.50'H Field A
			1,637 cf Overall - 459 cf Embedded = 1,177 cf x 40.0% Voids
#2A	206.00'	459 cf	ADS_StormTech SC-740 +Cap x 10 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		930 cf	Total Available Storage

Storage Group A created with Chamber Wizard

## Pond ISO1: Isolator Row 1 - Chamber Wizard Field A

#### Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

10 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 72.82' Row Length +12.0" End Stone x 2 = 74.82' Base Length 1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

10 Chambers x 45.9 cf = 459.4 cf Chamber Storage

1,636.6 cf Field - 459.4 cf Chambers = 1,177.2 cf Stone x 40.0% Voids = 470.9 cf Stone Storage

Chamber Storage + Stone Storage = 930.3 cf = 0.021 af Overall Storage Efficiency = 56.8% Overall System Size = 74.82' x 6.25' x 3.50'

10 Chambers 60.6 cy Field 43.6 cy Stone



# Summary for Pond ISO2: Isolator Row 2

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.40'	339 cf	6.25'W x 53.46'L x 3.50'H Field A
			1,169 cf Overall - 322 cf Embedded = 848 cf x 40.0% Voids
#2A	202.90'	322 cf	ADS_StormTech SC-740 +Cap x 7 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		661 cf	Total Available Storage

Storage Group A created with Chamber Wizard

## Pond ISO2: Isolator Row 2 - Chamber Wizard Field A

#### Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length 1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

7 Chambers x 45.9 cf = 321.6 cf Chamber Storage

1,169.4 cf Field - 321.6 cf Chambers = 847.8 cf Stone x 40.0% Voids = 339.1 cf Stone Storage

Chamber Storage + Stone Storage = 660.7 cf = 0.015 af Overall Storage Efficiency = 56.5% Overall System Size = 53.46' x 6.25' x 3.50'

7 Chambers 43.3 cy Field 31.4 cy Stone





## Summary for Link 1L: Winthrop Street

Inflow A	Area =	2.549 ac, 35.70% Impervious, Inflow	Depth = $1.04$ " for 10-Year e	event
Inflow	=	1.42 cfs @ 12.27 hrs, Volume=	0.221 af	
Primary	y =	1.42 cfs @ 12.27 hrs, Volume=	0.221 af, Atten= 0%, Lag=	0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs



# Link 1L: Winthrop Street

HydroCAD_Post-Dev			Type III	24-hr 1	00-Yea	r Rainfal	//=8.28"
Prepared by Letra Lech HydroCAD® 10.00-24 s/n 01	INC 603 © 2018 HydroC	AD Software So	olutions LLC		ŀ	Printed 4	/6/2022 Page 41
							age + I
Reach routir	Time span=0.00-48 Runoff by SCS TR-2 ng by Stor-Ind+Trar	3.00 hrs, dt=0. 0 method, UH 1s method - F	01 hrs, 4801 =SCS, Weig Pond routing	points hted-CN by Stor-Ir	nd metho	bc	
SubcatchmentP1a: Untre	eated North Flo	Runoff Area= w Length=334'	0.747 ac   0.0 Tc=18.6 mii	0% Imper ר CN=60	vious R Runoff=	unoff Dep =2.12 cfs	th=3.54" 0.221 af
SubcatchmentP1b: North	n Subcatchment Flo	Runoff Area=0 w Length=334'	.955 ac   37.5 Tc=18.6 mii	i9% Imper າ CN=77	vious R Runoff=	unoff Dep =4.28 cfs	th=5.53" 0.440 af
SubcatchmentP1c: Untre	eated South Flo	Runoff Area=0 w Length=334'	.236 ac 54.2 Tc=18.6 mii	4% Imper ר CN=81	vious R Runoff=	unoff Dep =1.14 cfs	th=6.01" 0.118 af
SubcatchmentP1d: Sout	h Subcatchment Flo	Runoff Area=0 w Length=334'	.611 ac 69.2 Tc=18.6 mir	3% Imper ר CN=87	vious R Runoff=	unoff Dep =3.21 cfs	th=6.72" 0.342 af
Reach 1R: North Dischar	ge				Inflow= Outflow=	=4.16 cfs =4.16 cfs	0.454 af 0.454 af
Reach 2R: South Dischar	ge				Inflow= Outflow=	=3.96 cfs =3.96 cfs	0.242 af 0.242 af
Pond 1P: Stormtech 1	Discarded=0.15 cfs	Peak Elev=20 0.207 af Prim	)8.90' Storag ary=2.43 cfs	e=5,462 cf 0.234 af	f Inflow= Outflow=	=4.28 cfs =2.57 cfs	0.440 af 0.440 af
Pond 2P: Stormtech 2	Discarded=0.06 cfs	Peak Elev=20 0.212 af Prim	)7.02' Storag ary=3.00 cfs	e=5,681 cf 0.124 af	f Inflow= Outflow=	=3.21 cfs =3.06 cfs	0.342 af 0.336 af
Pond ISO1: Isolator Row	1			Pea	ik Elev=0	).00' Stora	age=0 cf
Pond ISO2: Isolator Row	2			Pea	ık Elev=0	).00' Stora	age=0 cf
Link 1L: Winthrop Street					Inflow= Primary=	=8.10 cfs =8.10 cfs	0.696 af 0.696 af
					_	~ -	

Total Runoff Area = 2.549 acRunoff Volume = 1.121 afAverage Runoff Depth = 5.28"64.30% Pervious = 1.639 ac35.70% Impervious = 0.910 ac

## Summary for Subcatchment P1a: Untreated North (Existing)

Runoff = 2.12 cfs @ 12.26 hrs, Volume= 0.221 af, Depth= 3.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs Type III 24-hr 100-Year Rainfall=8.28"

Area (a	c) C	N Dese	cription		
0.56	63 6	0 Woo	ds, Fair, H	ISG B	
0.18	<u> </u>	51 <b>&gt;</b> 759	% Grass co	over, Good	, HSG B
0.74	47 6	0 Weig	ghted Aver	age	
0.74	47	100.	00% Pervi	ous Area	
Tc L (min)	_ength (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0400	0.05		Sheet Flow,
1.2	142	0.0160	2.04		Woods: Dense underbrush n= 0.800 P2= 3.10" Shallow Concentrated Flow,
0.9	142	0.0160	2.57		Shallow Concentrated Flow, Paved Kv= 20.3 fps
18.6	334	Total			

## Subcatchment P1a: Untreated North (Existing)



#### Summary for Subcatchment P1b: North Subcatchment

Runoff = 4.28 cfs @ 12.25 hrs, Volume= 0.440 af, Depth= 5.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs Type III 24-hr 100-Year Rainfall=8.28"

	Area	(ac) (	CN Des	cription		
	0.	000	60 Wo	ods, Fair, F	ISG B	
	0	494	61 >75	% Grass c	over, Good	, HSG B
	0.	359	98 Pav	ed parking	, HSG B	
	0.	102	82 Dirt	roads, HS	G B	
	0.	955	77 Wei	ghted Aver	age	
	0.	596	62.4	11% Pervio	us Area	
	0.	359	37.5	59% Imperv	vious Area	
	Tc	Length	Slope	Velocity	Capacity	Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	16.5	50	0.0400	0.05		Sheet Flow,
						Woods: Dense underbrush n= 0.800 P2= 3.10"
	1.2	142	0.0160	2.04		Shallow Concentrated Flow,
						Unpaved Kv= 16.1 fps
	0.9	142	0.0160	2.57		Shallow Concentrated Flow,
_						Paved Kv= 20.3 fps

18.6 334 Total

## Subcatchment P1b: North Subcatchment



## Summary for Subcatchment P1c: Untreated South (Existing)

Runoff = 1.14 cfs @ 12.25 hrs, Volume= 0.118 af, Depth= 6.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs Type III 24-hr 100-Year Rainfall=8.28"

Area	(ac) C	N Des	cription					
0.	0.035 60 Woods, Fair, HSG B							
0.	073 (	61 >75°	% Grass co	over, Good	, HSG B			
0.	128 9	98 Pave	ed parking,	, HSG B				
0.1	236 8	31 Weig	Weighted Average					
0.	108	45.7	6% Pervio	us Area				
0.	128	54.2	4% Imperv	ious Area				
Tc	Length	Slope	Velocity	Capacity	Description			
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)				
16.5	50	0.0400	0.05		Sheet Flow,			
					Woods: Dense underbrush n= 0.800 P2= 3.10"			
1.2	142	0.0160	2.04		Shallow Concentrated Flow,			
					Unpaved Kv= 16.1 fps			
0.9	142	0.0160	2.57		Shallow Concentrated Flow,			
					Paved Kv= 20.3 fps			
18.6	334	Total						

## Subcatchment P1c: Untreated South (Existing)



### Summary for Subcatchment P1d: South Subcatchment

Runoff = 3.21 cfs @ 12.25 hrs, Volume= 0.342 af, Depth= 6.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs Type III 24-hr 100-Year Rainfall=8.28"

Area	(ac) (	CN De	scription		
0	.023	60 Wo	ods, Fair, F	ISG B	
0	.155	61 >7	5% Grass c	over, Good	, HSG B
0	.423	98 Pa	ved parking	, HSG B	
0	.005	85 Gr	avel roads,	HSG B	
0	.005	82 Dir	t roads, HS	G B	
0	.611	87 We	eighted Ave	rage	
0	.188	30	77% Pervic	ous Area	
0	.423	69	23% Imperv	vious Area	
Tc	Length	Slope	e Velocity	Capacity	Description
(min)	(feet)	(ft/ft	) (ft/sec)	(cfs)	
16.5	50	0.040	0.05		Sheet Flow,
					Woods: Dense underbrush n= 0.800 P2= 3.10"
1.2	142	0.016	) 2.04		Shallow Concentrated Flow,
					Unpaved Kv= 16.1 fps
0.9	142	0.016	) 2.57		Shallow Concentrated Flow,
					Paved Kv= 20.3 fps
18.6	334	Total			

### Subcatchment P1d: South Subcatchment



# Summary for Reach 1R: North Discharge

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

Inflow Area	a =	1.702 ac, 2	1.09% Impe	ervious,	Inflow Dep	oth = 3	8.20" fo	or 100	)-Year event
Inflow	=	4.16 cfs @	12.34 hrs,	Volume	= (	).454 at	f		
Outflow	=	4.16 cfs @	12.34 hrs,	Volume	= (	).454 at	f, Atten=	= 0%,	Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs



# **Reach 1R: North Discharge**

# Summary for Reach 2R: South Discharge

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

Inflow Are	a =	0.847 ac, 6	5.05% Impe	ervious,	Inflow Dept	:h = 3.4	43" for 10	00-Year event
Inflow	=	3.96 cfs @	12.36 hrs,	Volume	= 0.	.242 af		
Outflow	=	3.96 cfs @	12.36 hrs,	Volume	= 0.	.242 af,	Atten= 0%	, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs



# Reach 2R: South Discharge

### Summary for Pond 1P: Stormtech 1

Inflow Area = 0.955 ac, 37.59% Impervious, Inflow Depth = 5.53" for 100-Year event Inflow 4.28 cfs @ 12.25 hrs, Volume= 0.440 af = 2.57 cfs @ 12.51 hrs, Volume= Outflow = 0.440 af, Atten= 40%, Lag= 15.4 min 0.15 cfs @ 10.08 hrs, Volume= Discarded = 0.207 af Primary = 2.43 cfs @ 12.51 hrs, Volume= 0.234 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 7 Peak Elev= 208.90' @ 12.51 hrs Surf.Area= 2,600 sf Storage= 5,462 cf

Plug-Flow detention time= 100.0 min calculated for 0.440 af (100% of inflow) Center-of-Mass det. time= 100.0 min ( 920.1 - 820.1 )

Volume	Invert	Avail.Storage	Storage Description
#1A	205.50'	2,354 cf	34.75'W x 74.82'L x 3.50'H Field A
			9,100 cf Overall - 3,216 cf Embedded = 5,884 cf x 40.0% Voids
#2A	206.00'	3,216 cf	ADS_StormTech SC-740 +Cap x 70 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			70 Chambers in 7 Rows
		5 560 cf	Total Available Storage

5,569 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	205.50'	2.410 in/hr Exfiltration over Surface area
#2	Primary	206.60'	10.0" Round Culvert
			L= 125.0' CPP, mitered to conform to fill, Ke= 0.700
			Inlet / Outlet Invert= 206.60' / 206.00' S= 0.0048 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#3	Device 2	208.00'	5.0' long Sharp-Crested Rectangular Weir 0 End Contraction(s)
#4	Device 2	207.50'	4.0" Vert. Orifice/Grate C= 0.600
#5	Device 2	206.70'	4.0" Vert. Orifice/Grate C= 0.600

**Discarded OutFlow** Max=0.15 cfs @ 10.08 hrs HW=205.54' (Free Discharge) **1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=2.43 cfs @ 12.51 hrs HW=208.90' (Free Discharge) 2=Culvert (Barrel Controls 2.43 cfs @ 4.45 fps) -3=Sharp-Crested Rectangular Weir (Passes < 13.88 cfs potential flow) -4=Orifice/Grate (Passes < 0.47 cfs potential flow) -5=Orifice/Grate (Passes < 0.60 cfs potential flow)

## Pond 1P: Stormtech 1 - Chamber Wizard Field A

#### Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

10 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 72.82' Row Length +12.0" End Stone x 2 = 74.82' Base Length 7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

70 Chambers x 45.9 cf = 3,215.8 cf Chamber Storage

9,099.6 cf Field - 3,215.8 cf Chambers = 5,883.8 cf Stone x 40.0% Voids = 2,353.5 cf Stone Storage

Chamber Storage + Stone Storage = 5,569.3 cf = 0.128 afOverall Storage Efficiency = 61.2%Overall System Size =  $74.82' \times 34.75' \times 3.50'$ 

70 Chambers 337.0 cy Field 217.9 cy Stone




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Pond 1P: Stormtech 1



#### Summary for Pond 2P: Stormtech 2

Inflow Area	=	0.611 ac, 6	9.23% Imp	ervious,	Inflow D	)epth =	6.72	2" for	100-	Year e	event
Inflow	=	3.21 cfs @	12.25 hrs,	Volume=	=	0.342	af				
Outflow	=	3.06 cfs @	12.36 hrs,	Volume=	=	0.336	af, /	Atten= 5	5%,	Lag= 7	.0 min
Discarded	=	0.06 cfs @	8.05 hrs,	Volume=	=	0.212	af			-	
Primary	=	3.00 cfs @	12.36 hrs,	Volume=	=	0.124	af				

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 7 Peak Elev= 207.02' @ 12.36 hrs Surf.Area= 2,619 sf Storage= 5,681 cf

Plug-Flow detention time= 547.7 min calculated for 0.336 af (98% of inflow) Center-of-Mass det. time= 536.3 min (1,331.9 - 795.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.40'	2,381 cf	49.00'W x 53.46'L x 3.50'H Field A
			9,168 cf Overall - 3,216 cf Embedded = 5,952 cf x 40.0% Voids
#2A	202.90'	3,216 cf	ADS_StormTech SC-740 +Cap x 70 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			70 Chambers in 10 Rows
#3	200.30'	85 cf	4.00'D x 6.75'H Vertical Cone/Cylinder-Impervious
		5,681 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.40'	1.020 in/hr Exfiltration over Surface area
#2	Primary	206.80'	8.0' long Sharp-Crested Rectangular Weir 1 End Contraction(s)

**Discarded OutFlow** Max=0.06 cfs @ 8.05 hrs HW=202.40' (Free Discharge) **1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=2.63 cfs @ 12.36 hrs HW=207.02' (Free Discharge) 2=Sharp-Crested Rectangular Weir (Weir Controls 2.63 cfs @ 1.52 fps)

#### Pond 2P: Stormtech 2 - Chamber Wizard Field A

#### Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length 10 Rows x 51.0" Wide + 6.0" Spacing x 9 + 12.0" Side Stone x 2 = 49.00' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

70 Chambers x 45.9 cf = 3,215.8 cf Chamber Storage

9,167.8 cf Field - 3,215.8 cf Chambers = 5,952.0 cf Stone x 40.0% Voids = 2,380.8 cf Stone Storage

Chamber Storage + Stone Storage = 5,596.6 cf = 0.128 afOverall Storage Efficiency = 61.0%Overall System Size =  $53.46' \times 49.00' \times 3.50'$ 

70 Chambers 339.5 cy Field 220.4 cy Stone





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Pond 2P: Stormtech 2



### Summary for Pond ISO1: Isolator Row 1

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1A	205.50'	471 cf	6.25'W x 74.82'L x 3.50'H Field A
			1,637 cf Overall - 459 cf Embedded = 1,177 cf x 40.0% Voids
#2A	206.00'	459 cf	ADS_StormTech SC-740 +Cap x 10 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		930 cf	Total Available Storage

Storage Group A created with Chamber Wizard

#### Pond ISO1: Isolator Row 1 - Chamber Wizard Field A

#### Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

10 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 72.82' Row Length +12.0" End Stone x 2 = 74.82' Base Length 1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

10 Chambers x 45.9 cf = 459.4 cf Chamber Storage

1,636.6 cf Field - 459.4 cf Chambers = 1,177.2 cf Stone x 40.0% Voids = 470.9 cf Stone Storage

Chamber Storage + Stone Storage = 930.3 cf = 0.021 af Overall Storage Efficiency = 56.8% Overall System Size = 74.82' x 6.25' x 3.50'

10 Chambers 60.6 cy Field 43.6 cy Stone



#### Summary for Pond ISO2: Isolator Row 2

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.40'	339 cf	6.25'W x 53.46'L x 3.50'H Field A
			1,169 cf Overall - 322 cf Embedded = 848 cf x 40.0% Voids
#2A	202.90'	322 cf	ADS_StormTech SC-740 +Cap x 7 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		661 cf	Total Available Storage

Storage Group A created with Chamber Wizard

#### Pond ISO2: Isolator Row 2 - Chamber Wizard Field A

#### Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length 1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

7 Chambers x 45.9 cf = 321.6 cf Chamber Storage

1,169.4 cf Field - 321.6 cf Chambers = 847.8 cf Stone x 40.0% Voids = 339.1 cf Stone Storage

Chamber Storage + Stone Storage = 660.7 cf = 0.015 af Overall Storage Efficiency = 56.5% Overall System Size = 53.46' x 6.25' x 3.50'

7 Chambers 43.3 cy Field 31.4 cy Stone





#### Summary for Link 1L: Winthrop Street

Inflow A	Area	=	2.549 ac,	35.70% Impe	ervious,	Inflow Depth =	3.2	28" for 10	0-Year event
Inflow	:	=	8.10 cfs @	12.36 hrs,	Volume	= 0.696	af		
Primary	y :	=	8.10 cfs @	12.36 hrs,	Volume	= 0.696	af,	Atten= 0%	, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs



#### Link 1L: Winthrop Street

Appendix C

Groundwater Recharge Calculations



Cassidy Field Medway, MA

#### MassDEP Standard No. 3 - Groundwater Recharge Calculations

Minimum Required Recharge Volume									
(if 100% of impervious area discharging to recharge BMP)									
		Target		Required Recharge					
NRCS	Approx.	Depth	Impervious	Volume (Rv)					
Hydrologic	Soil	Factor	Factor Area						
Soil Type	Texture	(inches)	(acres)	(ac-ft)	(cf)				
А	sand	0.60	0.00	0.000	0				
В	loam	0.35	1.01	0.029	1,283				
С	silty loam	0.25	0.00	0.000	0				
D	clay	0.10	0.00	0.000	0				
	Totals = 1.01 0.029 1,283								

Adjusted Minimum Required Recharge Volume (if less than 100% of impervious area discharging to recharge BMP)							
Total Impervious Area	Impervious Area Draining to Recharge BMP		Ratio of Impervious	Required Recharge Volume (Rv)			
(acres)	acres	%	Area	(ac-ft)	(cf)		
1.01	1.01	100.0%	1.00	0.029	1,283		

Rv = F x impervious area x ratio of impervious area

Where:Rv = required recharge volume (acre-feet)F = target depth factor associated with each hydrologic soil group (feet)Impervious Area = pavement and rooftop area on site (acres)Ratio of Impervious Area = total impervious area / impervious area discharging to recharge BMP

Notes:

- 1.) A minimum of 65% of impervious area is required to drain to recharge BMP.
- 2.) Refer to the 2008 Massachusetts Stormwater Handbook Volume 3, Chapter 1, pages 27-28 for required recharge requirement.



Cassidy Field Medway, MA

#### MassDEP Standard No. 3 - Groundwater Recharge Calculations

_			Total
Recharge BMP	SIS 1	SIS 2	Storage
Subsurface Infiltration			
System	1,793	5,569	7,362
Total	1,793	5,569	7,362

\*Represents the maximum static storage volume

Notes:

1.) Static storage volume equals storage volume below outlet invert.



**Cassidy Field** Medway, MA

#### **MassDEP Standard No. 3 - Groundwater Recharge Calculations**

#### Drawdown Time

Time<sub>drawdown</sub> = Rv (K) (Bottom Area)

Where: Time<sub>drawdown</sub> = time it takes the basin to drain completely (hours)

Rv = storage volume (cubic feet)

K = saturated hydraulic conductivity (feet/hour)

Bottom Area = bottom area of recharge structure (square feet)

Recharge BMP	Rv (cf)	K (in/br)	K (ft/br)	Bottom Area (sf)	Drawdown Time (hr)
Recharge Divin		(,	(10/11)	(31)	(11)
SIS 1	1,793	2.41	0.20083	2,600	3.4
SIS 2	5,569	2.41	0.20083	2,600	10.7

\*Rv provided represents the maximum static storage volume

Notes:

- 1.) Per the 2008 Massachusetts Stormwater Handbook Volume 1, Chapter 1, page 7, infiltration structures must be able to drain fully within 72 hours.
- 2.) Refer to Volume 3, Chapter 1, page 25 of the 2008 Massachusetts Stormwater Handbook for drawdown analysis guidelines.

Appendix D

Water Quality Calculations

#### INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu

2. Select BMP from Drop Down Menu

3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location:	Cassidy Field, Winthrop Stre			
В	C	D Otartin a TOO	E	F
1	ISS Removal	Starting 188	Amount	Remaining
BMP'	Rate'	Load*	Removed (C*D)	Load (D-E)
Street Sweeping - 5%	0.05	1.00	0.05	0.95
Deep Sump and Hooded Catch Basin	0.25	0.95	0.24	0.71
Sediment Forebay	0.25	0.71	0.18	0.53
	0.00	0.53	0.00	0.53
	0.00	0.53	0.00	0.53
	Total T	47%	Separate Form Needs to be Completed for Each Outlet or BMP Train	
Project:	Cassidy Field (Pre-Infiltration)			
Prepared By:	Bradley M. Picard, EIT		*Equals remaining load from	n previous BMP (E)
Date:	4-Apr-22		which enters the BMP	
	Elecation: B BMP <sup>1</sup> Street Sweeping - 5% Deep Sump and Hooded Catch Basin Sediment Forebay	Location: Cassidy Field, Winthrop Street   B C   TSS Removal   BMP <sup>1</sup> Rate <sup>1</sup> Street Sweeping - 5% 0.05   Deep Sump and Hooded 0.25   Sediment Forebay 0.25   Sediment Forebay 0.25   Deep Sump and Hooded 0.00   Catch Basin 0.25   Sediment Forebay 0.25   Deep Sump and Hooded 0.00   Catch Basin 0.25   Sediment Forebay 0.25   Deep Sump and Hooded 0.00   Sediment Forebay 0.25   Brope Sump and Hooded 0.00   Date: Cassidy Field (Pre-Infiltration)   Prepared By: Bradley M. Picard, EIT   Date: 4-Apr-22	Location: Cassidy Field, Winthrop Street, Medway, MA   B C D   TSS Removal Starting TSS   BMP <sup>1</sup> Rate <sup>1</sup> Load*   Street Sweeping - 5% 0.05 1.00   Deep Sump and Hooded 0.25 0.95   Sediment Forebay 0.25 0.71   Sediment Forebay 0.00 0.53   Deep Sump and Hooded 0.00 0.53   Sediment Forebay 0.25 0.71   Deep Sump and Hooded 0.00 0.53   Sediment Forebay 0.25 0.71   Deep Sump and Hooded 0.00 0.53   Sediment Forebay 0.00 0.53   Project: Cassidy Field (Pre-Infiltration) Prepared By:   Prepared By: Bradley M. Picard, EIT Date: 4-Apr-22	Location: Cassidy Field, Winthrop Street, Medway, MA   B C D E   TSS Removal Starting TSS Amount   BMP <sup>1</sup> Rate <sup>1</sup> Load* Removed (C*D)   Street Sweeping - 5% 0.05 1.00 0.05   Deep Sump and Hooded 0.25 0.95 0.24   Sediment Forebay 0.25 0.71 0.18   Sediment Forebay 0.25 0.71 0.18   0.00 0.53 0.00 0.53   Project: Cassidy Field (Pre-infiltration) Project: 47%   Project: Cassidy Field (Pre-infiltration) *Equals remaining load from which enters the BMP

Version 1, Automated: Mar. 4, 2008

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Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed 1. From MassDEP Stormwater Handbook Vol. 1

#### INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu

2. Select BMP from Drop Down Menu

must be used if Proprietary BMP Proposed 1. From MassDEP Stormwater Handbook Vol. 1

3. After BMP is selected, TSS Removal and other Columns are automatically completed.

	Location:	Cassidy Field, Winthrop Stre	eet, Medway, MA (SIS 1)		
	В	С	D	Е	F
		TSS Removal	Starting TSS	Amount	Remaining
	BMP <sup>1</sup>	Rate <sup>1</sup>	Load*	Removed (C*D)	Load (D-E)
*					
	Street Sweeping - 5%	0.05	1.00	0.05	0.95
oval	Deep Sump and Hooded Catch Basin	0.25	0.95	0.24	0.71
Rem W	Subsurface Infiltration Structure	0.80	0.71	0.57	0.14
TSS		0.00	0.14	0.00	0.14
		0.00	0.14	0.00	0.14
		Total T	SS Removal =	86%	Separate Form Needs to be Completed for Each Outlet or BMP Train
	Project:	Cassidy Field			-
	Prepared By:	Bradley M. Picard, EIT		*Equals remaining load from	n previous BMP (E)
	Date:	4-Apr-22		which enters the BMP	
Non-auton	nated TSS Calculation Sheet				

Version 1, Automated: Mar. 4, 2008

#### INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu

2. Select BMP from Drop Down Menu

must be used if Proprietary BMP Proposed 1. From MassDEP Stormwater Handbook Vol. 1

3. After BMP is selected, TSS Removal and other Columns are automatically completed.

	Location:	Cassidy Field, Winthrop Stre			
	В	С	D	Е	F
		TSS Removal	Starting TSS	Amount	Remaining
	BMP <sup>1</sup>	Rate <sup>1</sup>	Load*	Removed (C*D)	Load (D-E)
heet	Street Sweeping - 5%	0.05	1.00	0.05	0.95
oval	Deep Sump and Hooded Catch Basin	0.25	0.95	0.24	0.71
Rem N M	Subsurface Infiltration Structure	0.80	0.71	0.57	0.14
TSS		0.00	0.14	0.00	0.14
Cal		0.00	0.14	0.00	0.14
		Total T	SS Removal =	86%	Separate Form Needs to be Completed for Each Outlet or BMP Train
	Project:	Cassidy Field	-		-
	Prepared By:	Bradley M. Picard, EIT		*Equals remaining load fron	n previous BMP (E)
	Date:	4-Apr-22		which enters the BMP	
Non-autom	ated TSS Calculation Sheet				

Version 1, Automated: Mar. 4, 2008

Cassidy Field Parking Improvements Winthrop Street Medway, Massachusetts							
BMP Forebay Volume and Water Quality Volume Calculations Summary							
	Impervious	Forebay	Required	Provided			
	Tributary	Runoff	Forebay	Forebay	WQ Runoff	Required WQ	Provided WQ
	Area	Depth*	Volume	Volume	Depth**	Volume	Volume
Description	(acres)	(inches)	(cubic feet)	(cubic feet)	(inches)	(cubic feet)	(cubic feet)
BMP #1 - Subsurface Infiltration System 1	0.36	-	-	-	1.0	1,303	1,793
BMP #1 -Isolator Row	0.36	0.10	130	265	-	-	-
BMP #2 - Subsurface Infiltration System 2	0.42	-	-	-	1.0	1,535	5,654
BMP #2 -Isolator Row	0.42	0.10	154	188	-	-	-

Notes:

\* Required Forebay Storage Volume = 0.10 inch per acre (Refer to Massachusetts Stormwater Handbook Volume 2, Chapter 2, Page 14 dated February 2008)

\*\* Required Water Quality Volume = 1.0 inch of runoff times the total impervious area of the post-development project site (Refer to Massachusetts Stormwater Handbook Volume 1, Chapter 1, Page 9 dated Feruary 2008)

 $V_{WQ}$  = ( $D_{WQ}$  / 12 inches/foot) \* ( $A_{IMP}$  \* 43,560 square feet/acre)

Where:  $V_{WQ}$  = Water Quality Volume (in cubic feet)  $D_{WQ}$  = Water Quality Depth (in inches)  $A_{IMP}$  = Impervious Area ( in acres)





### Isolator Row 1 Isolator Row 2





Link

Routing Diagram for HydroCAD\_Post-Dev\_SMB Prepared by Tetra Tech Inc, Printed 4/4/2022 HydroCAD® 10.00-17 s/n 01603 © 2016 HydroCAD Software Solutions LLC

### Summary for Pond ISO1: Isolator Row 1

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1A	205.50'	471 cf	6.25'W x 74.82'L x 3.50'H Field A
			1,637 cf Overall - 459 cf Embedded = 1,177 cf x 40.0% Voids
#2A	206.00'	459 cf	ADS_StormTech SC-740 +Cap x 10 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		930 cf	Total Available Storage

Storage Group A created with Chamber Wizard

#### Pond ISO1: Isolator Row 1 - Chamber Wizard Field A

#### Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

10 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 72.82' Row Length +12.0" End Stone x 2 = 74.82' Base Length 1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

10 Chambers x 45.9 cf = 459.4 cf Chamber Storage

1,636.6 cf Field - 459.4 cf Chambers = 1,177.2 cf Stone x 40.0% Voids = 470.9 cf Stone Storage

Chamber Storage + Stone Storage = 930.3 cf = 0.021 af Overall Storage Efficiency = 56.8% Overall System Size = 74.82' x 6.25' x 3.50'

10 Chambers 60.6 cy Field 43.6 cy Stone



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#### Stage-Area-Storage for Pond ISO1: Isolator Row 1

Elevation	Storage	Elevation	Storage
(feet)	(cubic-feet)	(feet)	(cubic-feet)
205.50	0	208.15	764
205.55	9	208.20	775
205.60	19	208.25	787
205.65	28	208.30	/9/
205.70	37	208.35	808
205.75	47	208.40	818
205.60	50 65	200.40	027
205.05	75	208.50	846
205.95	84	208.60	855
206.00	94	208.65	865
206.05	111	208.70	874
206.10	128	208.75	884
206.15	145	208.80	893
206.20	163	208.85	902
206.25	180	208.90	912
206.30	197	208.95	921
206.35	214	209.00	930
200.40	231		
206.50	265		
206.55	282		
206.60	298		
206.65	315		
206.70	332		
206.75	348		
206.80	365		
206.85	381		
206.90	398		
200.95	414		
207.00	430		
207.00	462		
207.15	478		
207.20	494		
207.25	509		
207.30	525		
207.35	540		
207.40	555		
207.45	570		
207.50	202		
207.55	615		
207.65	630		
207.70	644		
207.75	658		
207.80	672		
207.85	686		
207.90	700		
207.95	713		
208.00	/26		
208.05	139 751		
200.10	751		

### Summary for Pond ISO2: Isolator Row 2

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.40'	471 cf	6.25'W x 74.82'L x 3.50'H Field A
			1,637 cf Overall - 459 cf Embedded = 1,177 cf x 40.0% Voids
#2A	202.90'	459 cf	ADS_StormTech SC-740 +Cap x 10 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		930 cf	Total Available Storage

Storage Group A created with Chamber Wizard

#### Pond ISO2: Isolator Row 2 - Chamber Wizard Field A

#### Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

10 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 72.82' Row Length +12.0" End Stone x 2 = 74.82' Base Length 1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

10 Chambers x 45.9 cf = 459.4 cf Chamber Storage

1,636.6 cf Field - 459.4 cf Chambers = 1,177.2 cf Stone x 40.0% Voids = 470.9 cf Stone Storage

Chamber Storage + Stone Storage = 930.3 cf = 0.021 af Overall Storage Efficiency = 56.8% Overall System Size = 74.82' x 6.25' x 3.50'

10 Chambers 60.6 cy Field 43.6 cy Stone



# HydroCAD\_Post-Dev\_SMBType III 2Prepared by Tetra Tech IncHydroCAD® 10.00-17 s/n 01603 © 2016 HydroCAD Software Solutions LLC

#### Stage-Area-Storage for Pond ISO2: Isolator Row 2

Elevation	Storage	Elevation	Storage
(feet)	(cubic-feet)	(feet)	(cubic-feet)
202.40	0	205.05	764
202.45	9	205.10	775
202.50	19	205.15	787
202.55	28	205.20	797
202.60	37	205.25	808
202.65	47	205.30	818
202.70	56	205.35	827
202.75	65	205.40	837
202.80	/5	205.45	846
202.85	84	205.50	855
202.90	94 111	205.55	874
202.95	128	205.00	884
203.00	145	205.00	893
203.10	163	205.75	902
203.15	180	205.80	912
203.20	197	205.85	921
203.25	214	205.90	930
203.30	231		
203.35	248		
203.40	265		
203.45	282		
203.50	298		
203.00	310		
203.00	348		
203.00	365		
203.75	381		
203.80	398		
203.85	414		
203.90	430		
203.95	446		
204.00	462		
204.05	478		
204.10	494		
204.15	509		
204.20	525		
204.25	555		
204.35	570		
204.40	585		
204.45	600		
204.50	615		
204.55	630		
204.60	644		
204.65	658		
204.70	672		
204.75	000 700		
204.00	700		
204.00	726		
204.95	739		
205.00	751		
		l	



#### Summary for Pond 1P: Stormtech 1

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1A	205.50'	2,354 cf	34.75'W x 74.82'L x 3.50'H Field A
			9,100 cf Overall - 3,216 cf Embedded = 5,884 cf x 40.0% Voids
#2A	206.00'	3,216 cf	ADS_StormTech SC-740 +Cap x 70 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			7 Rows of 10 Chambers
		5,569 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	205.50'	2.410 in/hr Exfiltration over Surface area
#2	Primary	206.60'	10.0" Round Culvert
			L= 125.0' CPP, mitered to conform to fill, Ke= 0.700
			Inlet / Outlet Invert= 206.60' / 206.00' S= 0.0048 '/' Cc= 0.900
			n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#3	Device 2	208.00'	5.0' long Sharp-Crested Rectangular Weir 0 End Contraction(s)
#4	Device 2	207.50'	4.0" Vert. Orifice/Grate C= 0.600
#5	Device 2	206.70'	4.0" Vert. Orifice/Grate C= 0.600

**Discarded OutFlow** Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge) **1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)

**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

-4=Orifice/Grate (Controls 0.00 cfs)

-5=Orifice/Grate (Controls 0.00 cfs)

#### Pond 1P: Stormtech 1 - Chamber Wizard Field A

#### Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

10 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 72.82' Row Length +12.0" End Stone x 2 = 74.82' Base Length 7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

70 Chambers x 45.9 cf = 3,215.8 cf Chamber Storage

9,099.6 cf Field - 3,215.8 cf Chambers = 5,883.8 cf Stone x 40.0% Voids = 2,353.5 cf Stone Storage

Chamber Storage + Stone Storage = 5,569.3 cf = 0.128 afOverall Storage Efficiency = 61.2%Overall System Size =  $74.82' \times 34.75' \times 3.50'$ 

70 Chambers 337.0 cy Field 217.9 cy Stone





#### Stage-Area-Storage for Pond 1P: Stormtech 1

Elevation	Surface	Storage	Elevation	Surface	Storage
	<u>(sq-π)</u>	(cubic-reet)		(sq-tt)	(cubic-feet)
205.50	2,600	0	208.15	2,600	4,632
205.55	2,600	52	208.20	2,600	4,701
205.60	2,600	104	208.25	2,600	4,766
205.65	2,600	156	208.30	2,600	4,827
205.70	2,600	208	208.35	2,600	4,886
205.75	2,600	260	208.40	2,600	4,942
205.80	2,600	312	208.45	2,600	4,996
205.85	2,600	364	208.50	2,600	5,049
205.90	2,600	416	208.55	2,600	5,101
205.95	2,600	468	208.60	2,600	5,153
206.00	2,600	520	208.65	2,600	5,205
206.05	2,600	628	208.70	2,600	5,257
206.10	2,600	735	208.75	2,600	5,309
206.15	2,600	842	208.80	2,600	5,361
206.20	2,600	950	208.85	2,600	5,413
206.25	2,600	1,056	208.90	2,600	5,465
206.30	2,600	1,163	208.95	2,600	5,517
206.35	2,600	1,269	209.00	2,600	5,569
206.40	2,600	1,375			
206.45	2,600	1,480			
206.50	2,600	1,585			
206.55	2,600	1,689			
206.60	2,600	1,793			
206.65	2,600	1,897			
206.70	2,600	1,999			
206.75	2,600	2,102			
206.80	2,600	2,204			
206.85	2,600	2,305			
206.90	2,600	2,406			
206.95	2,600	2,506			
207.00	2,600	2,606			
207.05	2,600	2,705			
207.10	2,600	2,803			
207.15	2,600	2,900			
207.20	2,600	2,997			
207.25	2,600	3,093			
207.30	2,600	3,188			
207.35	2,600	3,282			
207.40	2,600	3,375			
207.45	2,600	3,468			
207.50	2,600	3,560			
207.55	2,600	3,650			
207.60	2,600	3,740			
207.65	2,600	3,828			
207.70	2,600	3,915			
207.75	2,600	4,001			
207.00	2,000	4,085			
207.00	2,000	4,100			
207.90	2,000	4,20U			
201.90	2,000	4,000			
200.00 208.05	2,000	4,409 1 105			
200.00	2,000	4,400			
200.10	2,000	4,000			

#### Summary for Pond 2P: Stormtech 2

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1A	202.40'	2,354 cf	34.75'W x 74.82'L x 3.50'H Field A
			9,100 cf Overall - 3,216 cf Embedded = 5,884 cf x 40.0% Voids
#2A	202.90'	3,216 cf	ADS_StormTech SC-740 +Cap x 70 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			7 Rows of 10 Chambers
#3	200.30'	85 cf	4.00'D x 6.75'H Vertical Cone/Cylinder-Impervious
		5,654 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	202.40'	1.020 in/hr Exfiltration over Surface area
#2	Primary	206.80	8.0' long Sharp-Crested Rectangular Weir 1 End Contraction(s)

**Discarded OutFlow** Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge) **1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)

#### Pond 2P: Stormtech 2 - Chamber Wizard Field A

#### Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

10 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 72.82' Row Length +12.0" End Stone x 2 = 74.82' Base Length 7 Rows x 51.0" Wide + 6.0" Spacing x 6 + 12.0" Side Stone x 2 = 34.75' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

70 Chambers x 45.9 cf = 3,215.8 cf Chamber Storage

9,099.6 cf Field - 3,215.8 cf Chambers = 5,883.8 cf Stone x 40.0% Voids = 2,353.5 cf Stone Storage

Chamber Storage + Stone Storage = 5,569.3 cf = 0.128 afOverall Storage Efficiency = 61.2%Overall System Size =  $74.82' \times 34.75' \times 3.50'$ 

70 Chambers 337.0 cy Field 217.9 cy Stone





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Elevation	Surface	Storage	Elevation	Surface	Storage
(feet)	(sq-ft)	(cubic-feet)	(feet)	(sq-ft)	(cubic-feet)
200.30	0	0	205.60	2,600	5,324
200.40	0	1	205.70	2,600	5,429
200.50	0	3	205.80	2,600	5,534
200.60	0	4	205.90	2,600	5,640
200.70	0	5	206.00	2,600	5,641
200.80	0	6	206.10	2,600	5,642
200.90	0	8	206.20	2,600	5,643
201.00	0	9	206.30	2,600	5,645
201.10	0	10	206.40	2,600	5,646
201.20	0	11	206.50	2,600	5,647
201.30	0	13	206.60	2,600	5,648
201.40	0	14	206.70	2,600	5,650
201.50	0	15	206.80	2,600	5,651
201.60	0	16	206.90	2,600	5,652
201.70	0	18	207.00	2,600	5,654
201.80	0	19			
201.90	0	20			
202.00	0	21			
202.10	0	23			
202.20	0	24			
202.30	2 600	20			
202.40	2,600	20 122			
202.00	2,000	132			
202.00	2,000	237			
202.70	2,000	54Z 1/17			
202.00	2,000	553			
202.30	2,000	769			
203.00	2,000	985			
203.20	2,000	1 199			
203.30	2,000	1 412			
203.40	2,600	1.624			
203.50	2.600	1.833			
203.60	2,600	2,041			
203.70	2,600	2,246			
203.80	2,600	2,450			
203.90	2,600	2,651			
204.00	2,600	2,849			
204.10	2,600	3,045			
204.20	2,600	3,237			
204.30	2,600	3,426			
204.40	2,600	3,611			
204.50	2,600	3,793			
204.60	2,600	3,969			
204.70	2,600	4,141			
204.80	2,600	4,307			
204.90	2,600	4,467			
205.00	2,600	4,619			
205.10	2,600	4,761			
205.20	2,600	4,889			
205.30	2,000	5,005			
203.40	2,000	5,113			
203.50	2,000	5,219			

#### Stage-Area-Storage for Pond 2P: Stormtech 2
Appendix E

Long-Term Pollution Prevention and Stormwater Operations & Maintenance Plan

# Long-Term Pollution Prevention and Stormwater Operation & Maintenance Plan

Cassidy Field Winthrop Street Medway, Massachusetts

Prepared For: Medway Department of Public Works 45B Holliston Street Medway, MA 02053

Prepared By: Tetra Tech, Inc. 100 Nickerson Road Marlborough, MA 01752

<u>Date:</u> April 7, 2022

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## LIST OF ATTACHMENTS

Attachment A Operation and Maintenance Log Form

## **1.0 INTRODUCTION**

The Long-Term Pollution Prevention (LTPP) and Stormwater Operation and Maintenance (O&M) Plan, filed with the Town of Medway, shall be implemented at Cassidy Field located on Winthrop Street to ensure long-term functioning of the stormwater management system (System), and to provide suitable practices for source control of pollutants.

The System has been designed in accordance with the ten (10) MassDEP Stormwater Management Standards provided in the Stormwater Management Policy and Massachusetts Wetlands Protection Act, which relate to the protection of wetlands and water bodies, control of water quantity, recharge to groundwater, water quality and protection of critical areas, erosion/sedimentation control and stormwater maintenance. Preventative maintenance of the System is essential in the protection of these interests.

## **1.1 RESPONSIBILITY**

The Medway Department of Public Works (DPW) possesses the primary responsibility for overseeing and implementing the LTPP and Stormwater O&M Plan. When necessary, Medway DPW shall designate responsibility to a professional engineer or other technical professional with expertise and experience with stormwater management facilities for the proper operation and maintenance of the System. In case of transfer of property ownership, future property owners shall be notified of the presence of the stormwater management system and the requirements for proper implementation of the LTPP and Stormwater O&M Plan.

#### **Operator Name and Address:**

Medway Department of Public Works 45B Holliston Street Medway, MA 02053

## **1.2 TRAINING**

Medway DPW will coordinate an annual in-house training session with qualified staff to discuss the LTPP and Stormwater O&M Plan. Annual training will include the following:

- Discuss the Stormwater Operations and Maintenance Plan
  - Explain the general operations of the stormwater management system and its Best Management Practices (BMP's).
  - Identify potential sources of stormwater pollution and measures/methods of reducing or eliminating that pollution.
  - Emphasize good housekeeping measures.
- Discuss the Spill Prevention and Response Plan
  - Explain the process in the event of a spill.
  - Identify potential sources of spills and the procedures for clean-up and/or reporting and notification.
  - Complete a yearly inventory of Materials Safety Data Sheets of all tenants and confirm that no potentially harmful chemicals are in use.

## 1.3 REFERENCES

The LTPP and Stormwater O&M Plan references the following documents:

#### Site Plans:

Plans titled "Cassidy Field Parking Improvements" dated April 6, 2022 (or as amended), prepared by Tetra Tech, Inc.

#### Stormwater Management Report:

Report titled "Stormwater Management Report, Cassidy Field, Winthrop Street, Medway MA" dated April 6, 2022 (or as amended), prepared by Tetra Tech, Inc.

## **1.4 PUBLIC SAFETY FEATURES**

The following measures have been incorporated into the stormwater management system to promote the safety of the public:

- Drain manholes and catch basins have been provided with heavy duty covers and/or grates and designed to withstand H20 loading.
- Treatment of stormwater runoff from paved surfaces has been designed to remove 80% TSS.
- Reduction in peak rates of runoff from the site under post-development conditions.
- Development and implementation of an Operations and Maintenance Plan to promote the proper functioning of the stormwater management system.
- Development and implementation of good housekeeping practices identifying potential pollution sources and suitable practices to control them from impacting the environment and/or the public's health and safety.

## 2.0 PRACTICES FOR LONG-TERM POLLUTION PREVENTION

Medway DPW shall employ the use of good housekeeping practices by adhering to the maintenance schedules and procedures described in this Report. In general, the Project is not expected to generate significant amounts of hazardous waste nor will there be any outdoor storage of petroleum products or chemicals.

## 2.1 GOOD HOUSEKEEPING MEASURES

The designated responsible party shall implement the following good housekeeping measures to ensure long-term pollution prevention and provide suitable practices for source control of pollutants.

## 2.1.1 Storage of Materials and Waste

The storage of hazardous materials and waste is not anticipated at this site.

## 2.1.2 Vehicle Washing Controls

Commercial or non-routine washing of vehicles is not anticipated at this site.

### 2.1.3 Routine Inspection and Maintenance of Stormwater BMPs

Conduct inspection and maintenance of the stormwater BMPs in accordance with the Stormwater O&M Plan discussed in Section 3.0.

## 2.1.4 Spill Prevention and Response Plans

There is limited risk of a large spill requiring action at this site due to its use. Spills requiring action will most likely be associated with motor vehicle activity. The following good housekeeping practices shall be followed to reduce the risk of spills or other accidental exposure of hazardous materials to the stormwater management system:

- Store quantities of materials only required for the facility and not more.
- Store materials indoors or under cover in appropriate labeled containers.
- Follow manufactures recommendations for proper use and disposal of material.

A spill of greater than 10 gallons of oil or a spill of any quantity that has reached a surface water, into a sewer, storm drain, ditch, or culvert leading to a surface water, shall be immediately reported to one or more municipal, state, or federal authority. In the event of a hazardous waste spill on-site the following protocol should be followed.

- If it is safe to do so, employees (or on-site property manager) detecting an oil spill should immediately stop the release and use available materials to prevent the spread of oil, particularly trying to discharge to catch basins.
- If there is a potentially flammable, toxic, or explosive condition, evacuate the vicinity of the spill.
- If is believed that a reportable or dangerous condition exists, immediately call your local Fire Department to notify them of the release.

If is believed that a reportable condition exists, immediately call the Massachusetts Department of Environmental Protection (DEP) to notify them of the release. Call the DEP Emergency Response Section toll free statewide number, 1-888-304-1133. Be prepared to provide the following information to the DEP and the Fire Department:

- Identity of the caller
- Contact phone number
- Location of the spill
- Type of product spilled
- Approximate quantity or product spilled
- Extent of actual and/or potential water pollution
- Date and time of spill
- Cause of spill

Contact a Licensed Site Professional (LSP) to assist in further handling of the material(s) and DEP.

## 2.1.5 Maintenance of Landscaped Areas

Routine mowing shall be conducted on a consistent basis with grass cut to adequate height to maintain a healthy vegetative cover. Bare areas, areas of sparse growth, and signs of erosion shall be addressed in accordance with the Stormwater O&M Plan discussed in Section 3.0.

## 2.1.6 Storage and Use of Fertilizers, Herbicides, and Pesticides

Fertilizers, herbicides, and pesticides shall be stored in their original containers with the original labels in legible condition. These substances will be stored in covered, dry areas. Application and disposal of such materials will be completed in accordance with manufacturer's instructions. The use of fertilizers, herbicides, and pesticides will be minimized to the maximum extent practicable. If fertilizers must be used, only slow-release organic low-phosphorous fertilizers will be used in any landscaped areas to limit the amount of nutrients that could enter the stormwater system.

## 2.1.7 Pet Waste Management

Pet waste management involves using a combination of pet waste collection programs, pet awareness education to inform residents of the proper disposal techniques for pet droppings. Medway DPW will establish rules requiring residents to properly collect and dispose of pet waste.

## **2.1.8 Winter Maintenance**

Medway DPW will be responsible for snow removal/winter conditions management to treat the paved parking and walking areas within the project site for safe access during winter conditions. It must be noted that snow removal shall not occur on the northern half of the parking area within the riverfront area. However, snow shall be cleared for proper access to proposed accessible parking spaces. Medway DPW is responsible to minimize de-icing applications while ensuring safe vehicle and pedestrian access throughout the site.

Snow piles shall be located adjacent to or on pervious surfaces in upland areas. In no case shall snow be disposed of or stored in resource areas (i.e. riverfront area, wetlands, floodplains, streams or other water bodies). If necessary stockpiled snow will be removed from the site and disposed of at an off-site location in accordance with all local, state and federal regulations.

## 2.1.9 Winter Road Salt/Sand Use and Storage Restrictions

It is not anticipated that salt or sand will be maintained on the property. Salting and sanding operationsa shall not occur within the riverfront area located in the northern portion of the project limits. Should salt or sand stockpiles be maintained on the property they shall be contained and stabilized to prevent the discharge of salt and sand to the wetlands and covered. De-icing chemicals shall be stored indoors or under cover.

## 2.1.10 Prevention of Illicit Discharges

Illicit discharges to the stormwater management system are discharges that are not entirely comprised of stormwater. No chemicals, trash, or other materials shall be dumped into or otherwise allowed to enter the stormwater management system. To the best of the engineer's knowledge there are no known or proposed illicit connections associated with the Project, however if a potential illicit discharge is detected it shall be investigated to determine the nature and source of the discharge, and if required action shall be taken to eliminate the illicit discharge.

## **2.1.11 Emergency Contacts**

Name: Address:	Medway Fire Department 44 Milford Street
City, State:	Medway, MA 02053
Contact:	Jeffrey P. Lynch, Fire Chief
Telephone:	911 or 508-533-3211
Name:	Medway Police Department
Address:	315 Village Street
City, State:	Medway, MA 02053
Contact:	Allen Tingley, Police Chief
l elepnone:	911 or 508-533-3212
Name:	Medway Conservation Commission
Address:	Medway Town Hall, 155 Village Street
City, State:	Medway, MA 02053
Telephone:	508-533-3292
Name:	Medway Board of Health
Address:	Medway Town Hall, 155 Village Street
City, State:	Medway, MA 02053
Telephone:	508-533-3206
Name:	MassDEP Northeast Regional Office
Address:	205B Lowell Street
City, State:	Wilmington, MA 01887
l elephone:	978-694-3200
Emergency:	888-304-1133 (24-nour statewide number to report a spill of oil or hazardous material)

## **3.0 STORMWATER OPERATIONS AND MAINTENANCE PROGRAM**

Medway DPW or designated responsible party shall conduct the Stormwater O&M Program set forth in this document, ensure that inspections and record keeping are timely and accurate, and that cleaning and maintenance are performed in accordance with the recommended frequency for each System component. Medway DPW or designated responsible party shall also maintain all System components to function as they were designed to. Estimated annual cost of the Maintenance Program is \$2,000 to \$4,000.

## **3.1 DOCUMENTATION**

Inspection and Maintenance Log Forms shall include the date on which each inspection or maintenance task was performed, date and the amount of the last storm event in excess of 0.1 inches of rain in a 24-hour period, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. Inspection findings shall include items such as physical conditions of the System components, depth of sediment in structures, evidence of overtopping or debris blockage, and maintenance required for each System component. If a maintenance task requires the clean-out of any sediments or debris, the location where the sediment and debris was disposed after removal will be indicated. O&M Logs will be kept on file for a minimum of three years and copies will be

available to the Town of Medway upon request. Refer to **Attachment A**, Inspection and Maintenance Log Form for a sample form.

## **3.2 STORMWATER MANAGEMENT ACCESS**

The proposed on-site stormwater management system consists of catch basins, manholes, drainpipes, and subsurface infiltration systems with isolator rows and shall be inspected and maintained by Medway DPW.

## **3.3 INSPECTION AND MAINTENANCE FREQUENCY**

The following areas, facilities, and measures will be inspected/performed by Medway DPW or designated responsible party and maintained as specified below. Identified deficiencies will be corrected. Accumulated sediments and debris will be properly handled and disposed of off-site, in accordance with local, state, and federal guidelines and regulations. Refer to the Grading and Drainage Plans included with the Minor Site Plan Application for the components of the stormwater management system. A sample Operation and Maintenance Log form is included in **Appendix A**.

## 3.3.1 Street Sweeping

Accumulations of sand and debris will be cleared from parking lots and site access drives through street sweeping to control the amount of sediment that enters the drainage system. Street sweeping will be conducted quarterly, but primarily in late spring and the early fall seasons. Street sweeping will also occur after winter snowmelt when road sand and other sediments have accumulated.

## **3.3.2 Vegetated Areas**

Inspect slopes and embankments early in the growing season to identify active or potential erosion problems. Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

## 3.3.3 Catch Basins

Catch basins will be inspected quarterly and cleaned when sediment reaches ½ full depth from the invert of the pipe to ensure that the catch basins are working in their intended fashion and that they are free of debris. Sediments and hydrocarbons will be properly handled and disposed of off-site, in accordance with local, state, and federal guidelines and regulations. The method of sediment removal will be by vacuum, and disposal must be documented. Any structural damage to the catch basins or to castings must be repaired upon discovery.

## 3.3.4 Subsurface Infiltration Systems (Isolator Rows)

Subsurface infiltration systems and isolator rows will be inspected twice in the first year, and annually thereafter. Additionally, inspections will be conducted following one major rainfall event (>0.5") each year to verify that the systems drain within 72 hours. Isolator rows shall be cleaned and vacuumed when sediment reaches a depth of 3". In accordance with MA DEP Standards an 80% TSS removal rate is credited for this BMP.

Attachment A

#### Operation and Maintenance Log Cassidy Field, Medway, MA

Inspector's Name: \_\_\_\_\_

Date:\_\_\_\_\_

Maintenance:

Routine

□ Response to Rainfall Event \_\_\_\_\_ inches

□ Other \_\_\_\_\_

BMP	Inspection Frequency	Description of Inspection Findings	Depth of Sediment	Description of Maintenance Completed
Vegetated Areas	Annually			
Deep Sump/Hooded Catch Basins	Monthly Inspections			
	Quarterly Cleaning			
Subsurface Infiltration Systems	Semi-Annual Inspections			
	Maintenance as required			
Misc.	Monthly Inspections			
	Maintenance as required			

\*\* This is a rolling log in which the responsible party records all operation and maintenance activities for the past three years.

Appendix F

Supporting Documentation



United States Department of Agriculture

Natural Resources Conservation

Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

# Custom Soil Resource Report for Norfolk and Suffolk Counties, Massachusetts



## Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/? cid=nrcs142p2\_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

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## **How Soil Surveys Are Made**

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.



	MAP LEGEND			MAP INFORMATION
Area of Inte	erest (AOI) Area of Interest (AOI)	8	Spoil Area Stony Spot	The soil surveys that comprise your AOI were mapped at 1:25,000.
Soils	Soil Map Unit Polygons Soil Map Unit Lines Soil Map Unit Points Point Features Blowout Borrow Pit Clay Spot Closed Depression Gravel Pit	Ø ♥ ✓ Water Fea Transport + +	Very Stony Spot Wet Spot Other Special Line Features tures Streams and Canals ation Rails Interstate Highways	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
2 ÷ ◎ ∧ 4 ∞ 0 0 × +	Gravelly Spot Landfill Lava Flow Marsh or swamp Mine or Quarry Miscellaneous Water Perennial Water Rock Outcrop Saline Spot	Backgrou	US Routes Major Roads Local Roads <b>nd</b> Aerial Photography	<ul> <li>Web Soil Survey URL: Coordinate System: Web Mercator (EPSG:3857)</li> <li>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.</li> <li>This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.</li> <li>Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts Survey Area Data: Version 17, Sep 3, 2021</li> </ul>
⊤ ⇔ ≬ ∅	Sandy Spot Severely Eroded Spot Sinkhole Slide or Slip Sodic Spot			Soil map units are labeled (as space allows) for map scales 1:50,000 or larger. Date(s) aerial images were photographed: Aug 31, 2020—Oct 22, 2020 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.

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI		
1	Water	4.2	12.9%		
70A	Ridgebury fine sandy loam, 0 to 3 percent slopes	2.3	7.1%		
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	15.2%			
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	16.8	52.1%		
317B	Scituate fine sandy loam, 3 to 8 percent slopes, extremely stony	0.6	1.8%		
420B	Canton fine sandy loam, 3 to 8 percent slopes	2.9	9.0%		
422B	Canton fine sandy loam, 0 to 8 percent slopes, extremely stony	0.3	0.9%		
653	Udorthents, sandy	0.3	1.0%		
Totals for Area of Interest		32.3	100.0%		

## Map Unit Legend

## **Map Unit Descriptions**

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas

are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

## Norfolk and Suffolk Counties, Massachusetts

#### 1—Water

#### Map Unit Setting

National map unit symbol: vkyp Mean annual precipitation: 32 to 50 inches Mean annual air temperature: 45 to 50 degrees F Frost-free period: 120 to 200 days Farmland classification: Not prime farmland

#### **Map Unit Composition**

*Water:* 100 percent *Estimates are based on observations, descriptions, and transects of the mapunit.* 

#### 70A—Ridgebury fine sandy loam, 0 to 3 percent slopes

#### **Map Unit Setting**

National map unit symbol: 2w69f Elevation: 0 to 1,480 feet Mean annual precipitation: 36 to 71 inches Mean annual air temperature: 39 to 55 degrees F Frost-free period: 140 to 240 days Farmland classification: Not prime farmland

#### **Map Unit Composition**

Ridgebury and similar soils: 85 percent Minor components: 15 percent Estimates are based on observations, descriptions, and transects of the mapunit.

#### **Description of Ridgebury**

#### Setting

Landform: Ground moraines, hills, drumlins, depressions, drainageways Landform position (two-dimensional): Footslope, toeslope Landform position (three-dimensional): Head slope, base slope Down-slope shape: Concave Across-slope shape: Concave Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

#### **Typical profile**

Oe - 0 to 1 inches: moderately decomposed plant material

- A 1 to 6 inches: fine sandy loam
- Bw 6 to 10 inches: sandy loam
- Bg 10 to 19 inches: gravelly sandy loam
- Cd 19 to 66 inches: gravelly sandy loam

#### **Properties and qualities**

*Slope:* 0 to 3 percent *Depth to restrictive feature:* 15 to 35 inches to densic material *Drainage class:* Poorly drained Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr) Depth to water table: About 0 to 6 inches Frequency of flooding: None Frequency of ponding: None Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm) Available water supply, 0 to 60 inches: Low (about 3.0 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified Land capability classification (nonirrigated): 4w Hydrologic Soil Group: D Ecological site: F144AY009CT - Wet Till Depressions Hydric soil rating: Yes

#### **Minor Components**

#### Woodbridge

Percent of map unit: 9 percent Landform: Ground moraines, hills, drumlins Landform position (two-dimensional): Summit, footslope Landform position (three-dimensional): Base slope, crest Down-slope shape: Convex Across-slope shape: Linear Hydric soil rating: No

#### Whitman

Percent of map unit: 5 percent Landform: Hills, drainageways, drumlins, ground moraines, depressions Landform position (two-dimensional): Toeslope Landform position (three-dimensional): Base slope Down-slope shape: Concave Across-slope shape: Concave Hydric soil rating: Yes

#### Leicester

Percent of map unit: 1 percent Landform: Ground moraines, hills, drainageways, depressions Landform position (two-dimensional): Footslope, toeslope Landform position (three-dimensional): Base slope Down-slope shape: Concave, linear Across-slope shape: Concave Hydric soil rating: Yes

#### 71B—Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony

#### Map Unit Setting

National map unit symbol: 2w69c Elevation: 0 to 1,290 feet Mean annual precipitation: 36 to 71 inches *Mean annual air temperature:* 39 to 55 degrees F *Frost-free period:* 140 to 240 days *Farmland classification:* Not prime farmland

#### Map Unit Composition

*Ridgebury, extremely stony, and similar soils:* 80 percent *Minor components:* 20 percent *Estimates are based on observations, descriptions, and transects of the mapunit.* 

#### Description of Ridgebury, Extremely Stony

#### Setting

Landform: Drumlins, depressions, ground moraines, hills, drainageways Landform position (two-dimensional): Footslope, toeslope Landform position (three-dimensional): Head slope, base slope Down-slope shape: Concave Across-slope shape: Concave Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

#### **Typical profile**

- Oe 0 to 1 inches: moderately decomposed plant material
- A 1 to 6 inches: fine sandy loam
- Bw 6 to 10 inches: sandy loam
- Bg 10 to 19 inches: gravelly sandy loam
- Cd 19 to 66 inches: gravelly sandy loam

#### Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 15 to 35 inches to densic material
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified Land capability classification (nonirrigated): 7s Hydrologic Soil Group: D Ecological site: F144AY009CT - Wet Till Depressions Hydric soil rating: Yes

#### Minor Components

#### Woodbridge, extremely stony

Percent of map unit: 10 percent Landform: Ground moraines, hills, drumlins Landform position (two-dimensional): Summit, backslope, footslope Landform position (three-dimensional): Side slope, crest Down-slope shape: Convex Across-slope shape: Linear Hydric soil rating: No

#### Whitman, extremely stony

Percent of map unit: 8 percent Landform: Depressions Down-slope shape: Concave Across-slope shape: Concave Hydric soil rating: Yes

#### Paxton, extremely stony

Percent of map unit: 2 percent Landform: Ground moraines, hills, drumlins Landform position (two-dimensional): Summit, shoulder, backslope Landform position (three-dimensional): Side slope, crest Down-slope shape: Convex, linear Across-slope shape: Linear, convex Hydric soil rating: No

#### 254B—Merrimac fine sandy loam, 3 to 8 percent slopes

#### Map Unit Setting

National map unit symbol: 2tyqs Elevation: 0 to 1,290 feet Mean annual precipitation: 36 to 71 inches Mean annual air temperature: 39 to 55 degrees F Frost-free period: 140 to 240 days Farmland classification: All areas are prime farmland

#### **Map Unit Composition**

*Merrimac and similar soils:* 85 percent *Minor components:* 15 percent *Estimates are based on observations, descriptions, and transects of the mapunit.* 

#### **Description of Merrimac**

#### Setting

Landform: Outwash plains, outwash terraces, moraines, eskers, kames Landform position (two-dimensional): Summit, shoulder, backslope, footslope Landform position (three-dimensional): Crest, side slope, riser, tread Down-slope shape: Convex Across-slope shape: Convex

*Parent material:* Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

#### **Typical profile**

Ap - 0 to 10 inches: fine sandy loam

*Bw1 - 10 to 22 inches:* fine sandy loam

Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand

2C - 26 to 65 inches: stratified gravel to very gravelly sand

#### **Properties and qualities**

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified Land capability classification (nonirrigated): 2s Hydrologic Soil Group: A Ecological site: F145XY008MA - Dry Outwash Hydric soil rating: No

#### **Minor Components**

#### Hinckley

Percent of map unit: 5 percent Landform: Deltas, kames, eskers, outwash plains Landform position (two-dimensional): Summit, shoulder, backslope Landform position (three-dimensional): Head slope, nose slope, crest, side slope, rise Down-slope shape: Convex Across-slope shape: Convex, linear Hydric soil rating: No

#### Sudbury

Percent of map unit: 5 percent Landform: Deltas, terraces, outwash plains Landform position (two-dimensional): Footslope Landform position (three-dimensional): Tread, dip Down-slope shape: Concave Across-slope shape: Linear Hydric soil rating: No

#### Windsor

Percent of map unit: 3 percent Landform: Outwash terraces, dunes, deltas, outwash plains Landform position (two-dimensional): Shoulder Landform position (three-dimensional): Tread, riser Down-slope shape: Linear, convex Across-slope shape: Linear, convex Hydric soil rating: No

#### Agawam

Percent of map unit: 2 percent Landform: Outwash plains, outwash terraces, moraines, stream terraces, eskers, kames Landform position (three-dimensional): Rise Down-slope shape: Convex Across-slope shape: Convex Hydric soil rating: No

#### 317B—Scituate fine sandy loam, 3 to 8 percent slopes, extremely stony

#### **Map Unit Setting**

National map unit symbol: vky2 Elevation: 20 to 360 feet Mean annual precipitation: 45 to 54 inches Mean annual air temperature: 43 to 54 degrees F Frost-free period: 145 to 240 days Farmland classification: Not prime farmland

#### Map Unit Composition

Scituate and similar soils: 85 percent Minor components: 15 percent Estimates are based on observations, descriptions, and transects of the mapunit.

#### **Description of Scituate**

#### Setting

Landform: Drumlins Landform position (two-dimensional): Footslope Landform position (three-dimensional): Side slope Down-slope shape: Linear Across-slope shape: Concave Parent material: Friable coarse-loamy eolian deposits over dense sandy lodgment till derived from granite and gneiss

#### **Typical profile**

H1 - 0 to 4 inches: fine sandy loam H2 - 4 to 24 inches: sandy loam H3 - 24 to 60 inches: loamy sand

#### **Properties and qualities**

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 18 to 34 inches to densic material
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.5 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s Hydrologic Soil Group: C Ecological site: F144AY037MA - Moist Dense Till Uplands Hydric soil rating: No

### **Minor Components**

### Woodbridge

Percent of map unit: 7 percent Hydric soil rating: No

### Montauk

Percent of map unit: 5 percent Hydric soil rating: No

#### Ridgebury

Percent of map unit: 3 percent Landform: Depressions Hydric soil rating: Yes

### 420B—Canton fine sandy loam, 3 to 8 percent slopes

### Map Unit Setting

National map unit symbol: 2w81b Elevation: 0 to 1,180 feet Mean annual precipitation: 36 to 71 inches Mean annual air temperature: 39 to 55 degrees F Frost-free period: 140 to 240 days Farmland classification: All areas are prime farmland

### **Map Unit Composition**

*Canton and similar soils:* 80 percent *Minor components:* 20 percent *Estimates are based on observations, descriptions, and transects of the mapunit.* 

### **Description of Canton**

### Setting

Landform: Hills, moraines, ridges Landform position (two-dimensional): Summit, shoulder, backslope Landform position (three-dimensional): Nose slope, side slope, crest Down-slope shape: Convex, linear Across-slope shape: Convex Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

### **Typical profile**

*Ap - 0 to 7 inches:* fine sandy loam *Bw1 - 7 to 15 inches:* fine sandy loam *Bw2 - 15 to 26 inches:* gravelly fine sandy loam *2C - 26 to 65 inches:* gravelly loamy sand

### **Properties and qualities**

Slope: 3 to 8 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

### Interpretive groups

Land capability classification (irrigated): None specified Land capability classification (nonirrigated): 2s Hydrologic Soil Group: B Ecological site: F144AY034CT - Well Drained Till Uplands Hydric soil rating: No

### **Minor Components**

### Scituate

Percent of map unit: 10 percent Landform: Hills, drumlins, ground moraines Landform position (two-dimensional): Summit, backslope, footslope Landform position (three-dimensional): Side slope, crest Down-slope shape: Convex, linear Across-slope shape: Convex Hydric soil rating: No

#### Montauk

Percent of map unit: 5 percent Landform: Moraines, ground moraines, hills, drumlins Landform position (two-dimensional): Summit, shoulder, backslope Landform position (three-dimensional): Side slope, crest Down-slope shape: Convex, linear Across-slope shape: Convex Hydric soil rating: No

### Charlton

Percent of map unit: 4 percent Landform: Ridges, ground moraines, hills Landform position (two-dimensional): Summit, shoulder, backslope Landform position (three-dimensional): Side slope, crest Down-slope shape: Convex, linear Across-slope shape: Convex Hydric soil rating: No

#### Swansea

Percent of map unit: 1 percent Landform: Marshes, depressions, bogs, swamps, kettles Down-slope shape: Concave Across-slope shape: Concave Hydric soil rating: Yes

### 422B—Canton fine sandy loam, 0 to 8 percent slopes, extremely stony

### **Map Unit Setting**

National map unit symbol: 2w818 Elevation: 0 to 1,180 feet Mean annual precipitation: 36 to 71 inches Mean annual air temperature: 39 to 55 degrees F Frost-free period: 145 to 240 days Farmland classification: Not prime farmland

### Map Unit Composition

*Canton, extremely stony, and similar soils:* 80 percent *Minor components:* 20 percent *Estimates are based on observations, descriptions, and transects of the mapunit.* 

### **Description of Canton, Extremely Stony**

### Setting

Landform: Moraines, hills, ridges Landform position (two-dimensional): Summit, shoulder, backslope Landform position (three-dimensional): Nose slope, side slope, crest Down-slope shape: Convex, linear Across-slope shape: Convex Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

### **Typical profile**

*Oi - 0 to 2 inches:* slightly decomposed plant material *A - 2 to 5 inches:* fine sandy loam *Bw1 - 5 to 16 inches:* fine sandy loam *Bw2 - 16 to 22 inches:* gravelly fine sandy loam *2C - 22 to 67 inches:* gravelly loamy sand

### Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

### Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s Hydrologic Soil Group: B Ecological site: F144AY034CT - Well Drained Till Uplands Hydric soil rating: No

### **Minor Components**

### Charlton, extremely stony

Percent of map unit: 6 percent Landform: Ridges, ground moraines, hills Landform position (two-dimensional): Summit, shoulder, backslope Landform position (three-dimensional): Side slope, crest Down-slope shape: Convex, linear Across-slope shape: Convex Hydric soil rating: No

### Scituate, extremely stony

Percent of map unit: 6 percent Landform: Hills, ground moraines, drumlins Landform position (two-dimensional): Summit, backslope, footslope Landform position (three-dimensional): Side slope, crest Down-slope shape: Convex, linear Across-slope shape: Convex Hydric soil rating: No

#### Swansea

Percent of map unit: 4 percent Landform: Marshes, depressions, bogs, swamps, kettles Down-slope shape: Concave Across-slope shape: Concave Hydric soil rating: Yes

### Montauk, extremely stony

Percent of map unit: 4 percent Landform: Recessionial moraines, ground moraines, hills, drumlins Landform position (two-dimensional): Summit, shoulder, backslope Landform position (three-dimensional): Side slope, crest Down-slope shape: Convex, linear Across-slope shape: Convex Hydric soil rating: No

### 653—Udorthents, sandy

### Map Unit Setting

National map unit symbol: vky8 Elevation: 0 to 3,000 feet Mean annual precipitation: 45 to 54 inches Mean annual air temperature: 43 to 54 degrees F Frost-free period: 145 to 240 days Farmland classification: Not prime farmland

### **Map Unit Composition**

*Udorthents and similar soils:* 85 percent *Minor components:* 15 percent *Estimates are based on observations, descriptions, and transects of the mapunit.* 

### **Description of Udorthents**

### Setting

Landform position (two-dimensional): Summit, shoulder Landform position (three-dimensional): Tread, riser Down-slope shape: Linear, convex Across-slope shape: Linear, convex Parent material: Excavated and filled sandy glaciofluvial deposits

### **Typical profile**

H1 - 0 to 6 inches: variable H2 - 6 to 60 inches: variable

### **Properties and qualities**

Slope: 0 to 25 percent
Depth to restrictive feature: More than 80 inches
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

### Interpretive groups

Land capability classification (irrigated): None specified Land capability classification (nonirrigated): 6s Hydrologic Soil Group: A Hydric soil rating: Unranked

### **Minor Components**

### Udorthents

Percent of map unit: 8 percent Hydric soil rating: Unranked

### Urban land

Percent of map unit: 5 percent Hydric soil rating: Unranked

#### Swansea

Percent of map unit: 2 percent Landform: Bogs Hydric soil rating: Yes

## References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/ nrcs/detail/national/soils/?cid=nrcs142p2\_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2\_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ home/?cid=nrcs142p2 053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/ detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/ nrcs/detail/soils/scientists/?cid=nrcs142p2\_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/? cid=nrcs142p2\_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE\_DOCUMENTS/nrcs142p2\_052290.pdf

						TEST PIT NUMBER _1
T	TET	RA TECH				Page 1 of 3
						DBO JECT NAME Cossidy Field Parking Improvements
PROJ	ECT NL	JMBER	143-21583-	21012		PROJECT LOCATION Winthrop Street. Medway. MA
			7/04/0004			
EXCA			7/21/2021			_ SURFACE ELEVATION
EXCA	VATIO		)	Excavator		GROUNDWATER SYMBOLS
LOGG	ED BY		Chris Stant	on		${oxed \Sigma}$ ESTIMATED SEASONAL HIGH GROUNDWATER
WEAT	HER		75 Degrees	3		
)ЕРТН (ft)	AMPLE UMBER	REM	IARKS	SOIL TEXTURE		SUBSURFACE DESCRIPTION
0.0	ωΞ					
				-	0.25	Asphalt Millings
				SL	0.75	SANDY LOAM, HSG B. 10YR 5/6
				GrLS	2 90	GRAVELLY LOAMY SAND, HSG A. 10YR 6/6
				S	4 00	SAND, HSG A. 10YR 6/4
					4.00	
5.0						
				FLS		GRAVELLY LOAMY SAND, HSG A. 10YR 6/3
					8.00	
					0.00	Test pit terminated approximately 96" below ground
						surface.
10.0						
10.0						
15.0						

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T	E TET	'RA TECH				IEST PIT NUMBER _2 Page 2 of 3				
	IT Mec	lway DPW	143-21583-	21012		PROJECT NAME Cassidy Field Parking Improvements PROJECT LOCATION Winthrop Street Medway MA				
DATE			7/21/2021			SURFACE ELEVATION 210.80				
EXCA			CTOR	Executor		GROUNDWATER ELEVATION 203.50				
LOGG	SED BY		Chris Stante	on		$\square$ GROUNDWATER STMBOLS $\square$ ESTIMATED SEASONAL HIGH GROUNDWATER				
WEAT	HER		75 Degrees							
DEPTH (ft)	SAMPLE NUMBER	REM	IARKS	SOIL TEXTURE (USDA)		SUBSURFACE DESCRIPTION				
0.0					0.25	Asphalt Millings				
				SL	0.92	SANDY LOAM, HSG B. 10YR 6/6				
 				GrLS	5.00	GRAVELLY LOAMY SAND, HSG A. 10YR 6/6				
	$\nabla$	ESHWT		FLS	7 33	FINE LOAMY SAND, HSG A. 10YR 6/6				
		ut 00			8.50	surface. No weeping.				
   15.0						Test pit terminated approximately 102" below ground surface.				

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T	TET	RA TECH				TEST PIT NUMBER _3 Page 3 of 3			
CLIEN PROJ	IT <u>Med</u> ECT NI	lway DPW JMBER	143-21583	-21012		PROJECT NAME         Cassidy Field Parking Improvements           PROJECT LOCATION         Winthrop Street, Medway, MA			
DATE 7/21/2021 EXCAVATION CONTRACTOR EXCAVATION METHOD Excavator LOGGED BY Chris Stanton WEATHER 75 Degrees						SURFACE ELEVATION GROUNDWATER ELEVATION GROUNDWATER SYMBOLS SESTIMATED SEASONAL HIGH GROUNDWATER GROUNDWATER GROUNDWATER			
O DEPTH O (ft)	SAMPLE NUMBER	REM	IARKS	SOIL TEXTURE (USDA)		SUBSURFACE DESCRIPTION			
				-	0.30	Asphalt Millings			
				SL	3 75	SANDY LOAM, HSG B. 10YR 4/4			
50					5.00	SANDY LOAM, HSG B. 10YR 6/8			
				GrLS	9.00	GRAVELLY LOAMY SAND, HSG A. 10YR 7/4			
<u>    10.0</u> <u> </u>						Test pit terminated approximately 108" below ground surface.			

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This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.

Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet &	days or inches & hours)

		use consistent units (e.g. feet & days or inches & hours)	Conve	rsion Table	e
Input Values			inch/h	our fee	et/day
4.8200	R	Recharge (infiltration) rate (feet/day)		0.67	1.33
0.350	Sy	Specific yield, Sy (dimensionless, between 0 and 1)			
60.00	к	Horizontal hydraulic conductivity, Kh (feet/day)*		2.00	4.00 In the report accompanying this spreadsheet
17.370	х	1/2 length of basin (x direction, in feet)			(USGS SIR 2010-5102), vertical soil permeability
37.410	У	1/2 width of basin (y direction, in feet)	hours	day	<b>ys</b> (ft/d) is assumed to be one-tenth horizontal
1.000	t	duration of infiltration period (days)		36	1.50 hydraulic conductivity (ft/d).
30.000	hi(0)	initial thickness of saturated zone (feet)			

maximum thickness of saturated zone (beneath center of basin at end of infiltration period) maximum groundwater mounding (beneath center of basin at end of infiltration period)



h(max)

Δh(max)

Distance from center of basin

31.884 1.884

Ground-

water

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Precipitation Frequency Data Server



NOAA Atlas 14, Volume 10, Version 3 Location name: Medway, Massachusetts, USA\* Latitude: 42.1491°, Longitude: -71.4281° Elevation: 197.08 ft\*\* \* source: ESRI Maps \*\* source: USGS



#### POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

### PF\_tabular | PF\_graphical | Maps\_&\_aerials

### **PF** tabular

PDS-I	PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) <sup>1</sup>									
Duration				Average i	recurrence	interval (ye	ears)			
Duration	1	2	5	10	25	50	100	200	500	1000
5-min	<b>0.329</b>	<b>0.397</b>	<b>0.508</b>	<b>0.601</b>	<b>0.728</b>	<b>0.824</b>	<b>0.924</b>	<b>1.03</b>	<b>1.19</b>	<b>1.32</b>
	(0.251-0.429)	(0.303-0.518)	(0.387-0.666)	(0.455-0.792)	(0.536-1.00)	(0.596-1.16)	(0.650-1.34)	(0.693-1.54)	(0.771-1.84)	(0.835-2.07)
10-min	<b>0.466</b>	<b>0.562</b>	<b>0.720</b>	<b>0.851</b>	<b>1.03</b>	<b>1.17</b>	<b>1.31</b>	<b>1.47</b>	<b>1.69</b>	<b>1.87</b>
	(0.356-0.608)	(0.430-0.734)	(0.549-0.943)	(0.645-1.12)	(0.759-1.42)	(0.843-1.64)	(0.921-1.90)	(0.982-2.18)	(1.09-2.60)	(1.18-2.94)
15-min	<b>0.548</b>	<b>0.662</b>	<b>0.848</b>	<b>1.00</b>	<b>1.21</b>	<b>1.37</b>	<b>1.54</b>	<b>1.73</b>	<b>1.99</b>	<b>2.20</b>
	(0.419-0.715)	(0.505-0.864)	(0.646-1.11)	(0.760-1.32)	(0.893-1.67)	(0.992-1.93)	(1.08-2.24)	(1.16-2.57)	(1.29-3.06)	(1.39-3.45)
30-min	<b>0.750</b> (0.573-0.978)	<b>0.906</b> (0.692-1.18)	<b>1.16</b> (0.884-1.52)	<b>1.37</b> (1.04-1.81)	<b>1.66</b> (1.22-2.29)	<b>1.88</b> (1.36-2.64)	<b>2.11</b> (1.49-3.07)	<b>2.37</b> (1.59-3.52)	<b>2.72</b> (1.76-4.20)	<b>3.01</b> (1.91-4.73)
60-min	<b>0.952</b>	<b>1.15</b>	<b>1.48</b>	<b>1.74</b>	<b>2.12</b>	<b>2.40</b>	<b>2.69</b>	<b>3.01</b>	<b>3.46</b>	<b>3.83</b>
	(0.728-1.24)	(0.879-1.50)	(1.12-1.93)	(1.32-2.30)	(1.56-2.91)	(1.73-3.36)	(1.89-3.90)	(2.02-4.48)	(2.24-5.33)	(2.42-6.01)
2-hr	<b>1.22</b>	<b>1.48</b>	<b>1.91</b>	<b>2.26</b>	<b>2.75</b>	<b>3.11</b>	<b>3.50</b>	<b>3.96</b>	<b>4.65</b>	<b>5.23</b>
	(0.940-1.59)	(1.14-1.93)	(1.46-2.48)	(1.72-2.96)	(2.04-3.77)	(2.26-4.36)	(2.49-5.11)	(2.66-5.86)	(3.01-7.12)	(3.32-8.17)
3-hr	<b>1.41</b>	<b>1.72</b>	<b>2.21</b>	<b>2.63</b>	<b>3.19</b>	<b>3.61</b>	<b>4.07</b>	<b>4.62</b>	<b>5.47</b>	<b>6.20</b>
	(1.09-1.83)	(1.32-2.22)	(1.70-2.87)	(2.01-3.43)	(2.38-4.37)	(2.64-5.06)	(2.91-5.94)	(3.11-6.82)	(3.55-8.35)	(3.94-9.65)
6-hr	<b>1.81</b>	<b>2.20</b>	<b>2.84</b>	<b>3.37</b>	<b>4.10</b>	<b>4.64</b>	<b>5.23</b>	<b>5.96</b>	<b>7.09</b>	<b>8.07</b>
	(1.40-2.33)	(1.70-2.83)	(2.19-3.66)	(2.59-4.37)	(3.07-5.59)	(3.41-6.48)	(3.77-7.62)	(4.02-8.74)	(4.62-10.8)	(5.15-12.5)
12-hr	<b>2.29</b>	<b>2.79</b>	<b>3.60</b>	<b>4.28</b>	<b>5.21</b>	<b>5.89</b>	<b>6.64</b>	<b>7.57</b>	<b>8.99</b>	<b>10.2</b>
	(1.78-2.92)	(2.17-3.56)	(2.79-4.62)	(3.30-5.51)	(3.91-7.05)	(4.35-8.17)	(4.80-9.61)	(5.12-11.0)	(5.88-13.6)	(6.55-15.7)
24-hr	<b>2.74</b>	<b>3.37</b>	<b>4.41</b>	<b>5.27</b>	<b>6.45</b>	<b>7.32</b>	<b>8.28</b>	<b>9.47</b>	<b>11.3</b>	<b>13.0</b>
	(2.14-3.47)	(2.63-4.28)	(3.43-5.61)	(4.08-6.75)	(4.87-8.69)	(5.44-10.1)	(6.02-11.9)	(6.44-13.7)	(7.43-17.0)	(8.32-19.8)
2-day	<b>3.11</b>	<b>3.89</b>	<b>5.18</b>	<b>6.24</b>	<b>7.71</b>	<b>8.77</b>	<b>9.96</b>	<b>11.5</b>	<b>13.9</b>	<b>16.1</b>
	(2.44-3.92)	(3.05-4.91)	(4.05-6.55)	(4.85-7.94)	(5.85-10.3)	(6.56-12.1)	(7.32-14.4)	(7.83-16.6)	(9.16-20.8)	(10.4-24.5)
3-day	<b>3.40</b> (2.68-4.26)	<b>4.24</b> (3.34-5.33)	<b>5.62</b> (4.41-7.09)	<b>6.77</b> (5.28-8.58)	<b>8.35</b> (6.36-11.2)	<b>9.50</b> (7.12-13.0)	<b>10.8</b> (7.94-15.5)	<b>12.4</b> (8.49-17.9)	<b>15.1</b> (9.94-22.4)	<b>17.4</b> (11.3-26.4)
4-day	<b>3.67</b> (2.89-4.59)	<b>4.54</b> (3.58-5.69)	<b>5.97</b> (4.69-7.51)	<b>7.16</b> (5.60-9.05)	<b>8.80</b> (6.71-11.7)	<b>9.99</b> (7.50-13.7)	<b>11.3</b> (8.34-16.2)	<b>13.0</b> (8.91-18.7)	<b>15.8</b> (10.4-23.4)	<b>18.2</b> (11.7-27.4)
7-day	<b>4.41</b> (3.49-5.49)	<b>5.34</b> (4.22-6.65)	<b>6.85</b> (5.40-8.57)	<b>8.11</b> (6.36-10.2)	<b>9.84</b> (7.52-13.0)	<b>11.1</b> (8.35-15.1)	<b>12.5</b> (9.19-17.7)	<b>14.3</b> (9.78-20.3)	<b>17.0</b> (11.2-25.0)	<b>19.4</b> (12.5-29.1)
10-day	<b>5.12</b> (4.07-6.36)	<b>6.08</b> (4.82-7.55)	<b>7.64</b> (6.04-9.52)	<b>8.94</b> (7.03-11.2)	<b>10.7</b> (8.20-14.1)	<b>12.0</b> (9.05-16.2)	<b>13.5</b> (9.88-18.9)	<b>15.2</b> (10.5-21.6)	<b>17.9</b> (11.9-26.3)	<b>20.2</b> (13.1-30.2)
20-day	<b>7.23</b> (5.77-8.91)	<b>8.26</b> (6.58-10.2)	<b>9.93</b> (7.89-12.3)	<b>11.3</b> (8.94-14.1)	<b>13.2</b> (10.1-17.1)	<b>14.7</b> (11.0-19.4)	<b>16.2</b> (11.8-22.2)	<b>17.8</b> (12.3-25.1)	<b>20.2</b> (13.5-29.5)	<b>22.2</b> (14.4-33.0)
30-day	<b>8.98</b>	<b>10.0</b>	<b>11.8</b>	<b>13.2</b>	<b>15.2</b>	<b>16.8</b>	<b>18.3</b>	<b>19.9</b>	<b>22.1</b>	<b>23.8</b>
	(7.18-11.0)	(8.03-12.3)	(9.39-14.5)	(10.5-16.4)	(11.7-19.6)	(12.6-22.0)	(13.3-24.8)	(13.8-27.9)	(14.8-32.0)	(15.5-35.2)
45-day	<b>11.1</b> (8.94-13.6)	<b>12.3</b> (9.83-15.0)	<b>14.1</b> (11.2-17.3)	<b>15.6</b> (12.4-19.3)	<b>17.7</b> (13.6-22.6)	<b>19.3</b> (14.5-25.1)	<b>20.9</b> (15.1-28.0)	<b>22.4</b> (15.6-31.2)	<b>24.3</b> (16.3-35.1)	<b>25.7</b> (16.8-37.9)
60-day	<b>13.0</b> (10.4-15.8)	<b>14.1</b> (11.3-17.2)	<b>16.0</b> (12.8-19.6)	<b>17.5</b> (14.0-21.6)	<b>19.7</b> (15.1-25.0)	<b>21.4</b> (16.0-27.7)	<b>23.0</b> (16.6-30.6)	<b>24.4</b> (17.1-34.0)	<b>26.2</b> (17.6-37.7)	<b>27.3</b> (17.9-40.2)

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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### **PF** graphical







NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Mon Mar 7 15:41:55 2022

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### Maps & aerials

Small scale terrain

Precipitation Frequency Data Server



### Large scale terrain

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Large scale aerial

Precipitation Frequency Data Server



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US Department of Commerce National Oceanic and Atmospheric Administration National Weather Service National Water Center 1325 East West Highway Silver Spring, MD 20910 Questions?: <u>HDSC.Questions@noaa.gov</u>

**Disclaimer** 



### ILLICIT DISCHARGE COMPLIANCE STATEMENT

**Owner Name:** Medway Department of Public Works

Site Address: Cassidy Field, Winthrop Street, Medway, MA 02053

**Date:** April 7, 2022

This statement is provided in accordance with the provisions of Massachusetts Stormwater Management Standards (the Standards), Standard 10, and the Massachusetts Stormwater Handbook.

To the best of the Owners and Engineers knowledge, no illicit discharges exist on the Project Site and no illicit discharges are proposed as part of the Project. The facility's Operation & Maintenance Plans are designed to prevent non-stormwater discharge to on-site stormwater Best Management Practices. Any illicit discharges identified during or after construction will be immediately disconnected in accordance with the Standards.

then

Signed:

Steven M. Bouley, P.E. Project Manager

Susan E. Affleck-Childs

Planning and Economic Development Coordinator



Medway Town Hall 155 Village Street Medway, MA 02053 Phone (508) 533-3291 Fax (508) 321-4987 Email: sachilds@ townofmedway.org www.townofmedway.org

## TOWN OF MEDWAY Commonwealth of Massachusetts

## PLANNING AND ECONOMIC DEVELOPMENT OFFICE

## MEMORANDUM

May 5, 2022

TO:Planning and Economic Development BoardFROM:Susy Affleck-Childs, Planning and Economic Development CoordinatorRE:NOTES for review of Cassidy Field site planSITE PLAN RULES AND REGULATIONS

## Site Plan Submittals - All required items have been provided

- Site Plan application
- Land Disturbance application
- Project Narrative
- Site Plan
- Stormwater Report
- Requests for Waivers

## Site Plan Development Standards

## 207-9 Pedestrian and Bicycle Access and Sidewalks

- Sidewalks along driveway from Winthrop Street?
- Bicycle racks?

## 207-10 Paving

Is the driveway being paved or just the parking area?

## 207-11 Traffic and Vehicular Circulation

- Is there sufficient room at the end of the long parking area for vehicles in the last spaces to have room to back out and turn around?
- Has Fire Department reviewed?

## 207-12 Parking

• WAIVER REQUEST – RE: Curbing around perimeter of the parking lot (207-12 H. 1))

## 207-17 Solid Waste Removal

• Dumpster detail. What type of enclosure?

### 207-18 Outdoor Lighting

• Confirm that no new lighting is being added.

### 207-19 Landscaping

- WAIVER REQUEST RE: installation of intermediary landscaped islands within the parking lot (207-19 C, 1) c))
- Is 1 deciduous tree provided for every 6 parking spaces? (207-19 C. 1) d)
- No landscaping is proposed along southern edge of the parking area, but regulations require it. (207-19, C. 2))
- Are the landscaping materials all non-invasive, natives? (207-19 F. and J)
- Is irrigation planned? (207-19 K.)
- Are any trees being removed as part of the project? (207-19 H.)

### 207-20 Site Amenities – Any plans for bike racks?

- Detail for the 4 picnic tables?
- 1 park bench is noted. Detail?

### NOTES for review of Cassidy Field site plan

### SITE PLAN RULES AND REGULATIONS

### Submittals – all required items have been provided

- Site plan application
- Land disturbance application
- Project narrative
- Site plan
- Stormwater report
- Requests for waivers

### **Development Standards**

### 207-9 Pedestrian and Bicycle Access and Sidewalks

- Sidewalks along driveway from Winthrop Street?
- Bicycle racks?

### 207-10 Paving

• Is the driveway being paved or just the parking area?

### 207-11 Traffic and Vehicular Circulation

• Is there sufficient room at the end of the long parking area for vehicles in the last spaces to have room to back out and turn

### 207-12 Parking

• WAIVER REQUEST - Curbing around perimeter of the parking lot 207-12 H. 1.

### 207-17 Solid Waste Removal

• Dumpster detail. What type of enclosure?

### 207-18 Outdoor Lighting

• Is anything being added?

### 207-19 Landscaping

- WAIVER REQUEST RE: installation of intermediary landscaped islands within the parking lot (207-19 C, 1) c))
- Is 1 deciduous tree provided for every 6 parking spaces? (207-19 C. 1) d)
- No landscaping is proposed along southern edge of the parking area. (207-19, C. 2))
- Are the landscaping materials all non-invasive, natives? (207-19 F. and J)
- Is irrigation planned? (207-19 K.)
- Are any trees being removed as part of the project? (207-19 H.)



## Medway Planning and Economic Development Board Meeting Tuesday, May 10, 2022

# Milford Regional Hospital Facility Major Site Plan and Groundwater Protection Special Permit Public Hearing

- Public Hearing Notice
- Site Plan Application
- Groundwater Protection Special Permit Application
- Project Narrative
- Site Plan prepared by Guerriere and Halnon
- Requests for waivers from the *Site Plan Rules and Regulations*
- Review comments from Community and Economic Development Director Barbara Saint Andre dated 4-27-22
- Traffic Impact Assessment report dated April 2022 by Vanasse & Associates, Inc.

**NOTES** – This will be the first night of the public hearing process for this project and will be geared to a general overview of the project, questions from you and abutters.

Please note this is the first project to come in under the new Central Business District zoning provisions.

Tetra Tech is currently reviewing the plan and associated application materials.

This project is also under the jurisdiction of the Conservation Commission for an Order of Conditions and Land Disturbance Permit.

Town of Medway department managers were briefed on the project at a pre-application, inter-departmental review meeting. Specific review comments are expected from the Fire Department and Police Department.

The applicant met with the Design Review Committee on May 2 and review comments from the DRC are forthcoming.

The Board should plan to discuss the traffic assessment report another evening when the applicant's traffic consultant and Tetra Tech's traffic consultant will attend. **Board Members** 

Matthew J. Hayes, P.E., Chair Robert Tucker, Vice Chair Richard Di Iulio, Clerk Jessica Chabot, Member Sarah Raposa, A.I.C.P., Member Thomas A. Gay, Associate Member



TOWN OF MEDWAY Commonwealth of Massachusetts

## PLANNING AND ECONOMIC DEVELOPMENT BOARD

April 21, 2022

## Public Hearing Notice Milford Regional Medical Center Site Plan & Groundwater Special Permit 86 Holliston Street

In accordance with the Medway Zoning Bylaw, Section 3.5 Site Plan Review and Section 5.6.3 Groundwater Protection District and certain provisions of Chapter 40A, Massachusetts General Laws, notice is given that the Medway Planning and Economic Development Board will conduct a public hearing on the applications of Lobisser Companies of Hopedale, MA for approval of a major site plan and a groundwater protection district special permit for the construction of a medical office facility at 86 Holliston Street. The hearing will begin at 8:00 p.m. on Tuesday, May 10, 2022 in Sanford Hall at Medway Town Hall, 155 Village Street, Medway, MA. The meeting room is accessible via elevator for individuals with physical disabilities. The hearing will also be available via the Zoom online meeting platform for public participation. Zoom access details will be included on the agenda for the May 10<sup>th</sup> meeting.

The subject property, shown on the Medway Assessors Map 41 as Parcel 8, is 8.027 acres in size. It is located in the Central Business zoning district and is owned by Friel Realty II, LLC of Medway, MA. It is bounded on the north by a residential subdivision, on the east by property occupied by Walgreens, and on the south by Main Street. The site is under the jurisdiction of the Medway Conservation Commission. The project must also secure a land disturbance permit from the Conservation Commission.

The proposed facility is to be located on approximately 2.2 acres on the eastern end of the subject property and includes construction of a one-story, 21,900 sq. ft. medical building to be accessed from the existing curb cut on Main Street for Walgreens. Other planned improvements include driveways, parking, utilities, grading, lighting, and landscaping. The facility will consist of pediatric care, women's health, wellness, emergency care, lab and x-ray services. A total of 102 parking spaces are proposed. The planned improvements are shown on *Site Plan, 86 Holliston Street, Medway, MA* dated April 14, 2022, prepared by Guerriere & Halnon, Inc. of Franklin, MA.

The application materials are on file with the Medway Town Clerk and the Planning and Economic Development office at Medway Town Hall, 155 Village Street, Medway, MA and may be reviewed during regular office hours. The documents are posted to the Board's web page at: <u>https://www.townofmedway.org/planning-economic-developmentboard/pages/current-applications-pedb-0</u>

Medway Town Hall 155 Village Street Medway, MA 02053 Phone (508) 533-3291 Fax (508) 321-4987 Email: planningboard @townofmedway.org www.townofmedway.org

> RECEIVED TOWN CLERK APR 25 '22 PM3:11

Interested persons or parties are invited to review the site plan, attend the hearing, and express their views at the designated time and place. Written comments are encouraged and may be forwarded to <u>planningboard@townofmedway.org</u>. All comments will be entered into the record during the public hearing. Any questions should be directed to the Planning and Economic Development office at 508-533-3291.

Matthew J. Hayes, Chair



## Planning & Economic Development Board - Town of Medway, MA SITE PLAN REVIEW

## Application for Major Site Plan Approval

**INSTRUCTIONS TO APPLICANT/OWNER** 

This Application is made pursuant to the Medway Zoning Bylaw and the Board's Rules and Regulations for the Submission and Review of Site Plans

The Town's Planning and Engineering Consultants will review the Application and the proposed Site Plan and provide review letters to the Planning and Economic Development Board. A copy of those review letters will be provided to you in advance of the meeting.

You and/or your duly authorized Agent/Official Representative are expected to attend the Board meetings at which your Application will be considered to answer any questions and/or submit such additional information as the Board may request. Your absence at hearings may result in a delay in the Board's review of the site plan.

for1 ,2022

### APPLICANT INFORMATION

V

Applicant's Name:	Lobisser Companies					
Mailing Address:	1 Charlesview Road					
	Hopedale, MA 01747					
Name of Primary Co	tact: Kevin Lobisser					
Telephone: Office: 508-478	Cell: 508-294-3177					
Email address:	kevin@lobissercompanies.com					
Please check h	re if the Applicant is the equitable owner (purchaser on a purchase and sales agreeme	ent.)				
MAJOR SITE PLA	INFORMATION					
Development Name:	Milford Begional Medical Center	-				
Plan Title:	v					
Plan Date:						
Prepared by: Name: <sup>Amanda</sup>	Cavaliere					
Firm: Guerrie	& Halnon, Inc.					
Phone #: 508-	28-3221					
Email: acavalier	gandhengineering.com					

PROPERTY INFORMATION					
Location Address: 86 Holliston Street					
The land shown on the plan is shown on Medway Assessor's Map $\#^{41}_{}$ as Parcel $\#^{8}_{}$ Total Acreage of Land Area: 8.027+/- Acres					
General Description of Property: see attached					
Medway Zoning District Classification: Central Business District					
Current Use of Property:					
Length of Existing Frontage: On what street?					
Setbacks for Existing Structure (if applicable)					
Front: Side:					
Back: Side:					
Scenic Road Does any portion of this property have frontage on a Medway Scenic Road? Yes V No If yes, please name street:					
Historic District Is any portion of this property located within a Medway National Register Historic Distric Yes - Rabbit Hill Yes - Medway Village					
Wetlands Is any portion of the property within a Wetland Resource Area? Ves No					
Groundwater Protection Is any portion of the property within a Groundwater Protection District?					
Flood Plain Is any portion of the property within a Designated Flood Plain? Yes 🖌 No					
PROPOSED DEVELOPMENT PROJECT INFORMATION					
Development Name:					
Major Site Plan Review applies to the following. Please check all that apply.					

New construction or any alteration, reconstruction, renovation, and/or change in use of any multi-family, commercial, industrial, institutional, or municipal building or use which involves one or more of the following: i.

- the addition of 2,500 square feet or more of gross floor area; or the addition of twenty or more new parking spaces
- ii.

b.

.

The redesign, alteration, expansion or modification of an existing parking area involving the addition of twenty or more new parking spaces

	С.	The redesign of the layout/configuration of an existing parking area of forty or more parking spaces
	d.	Construction of ground mounted solar photovoltaic installations of any size in any zoning district including solar canopy type systems in parking areas
	e.	Removal, disturbance, and/or alteration of 20,000 sq. ft. or more of existing impervious surface
SPEC Appea	IAL PE i/s?  Explar	RMIT - Will this project also require a variance or special permit from the <i>Zoning Board of</i> Yes <u>×</u> No nation:
SPEC Develo	IAL PE pp <u>ment l</u> ✓ Explar	RMIT – Will this project also require a special permit from the <i>Planning and Economic</i> Board? Yes No nation: _ <sup>Rendering greater than 15% impervious within a Groundwater Protection District</sup>
PROI	PERTY	OWNER INFORMATION (if not applicant)
Prope	rty Owr	ner's Name:
Mailin	g Addre	ess: 86 Holliston Street
		Medway MA 02053
Prima	ry Cont	act: David/JoAnne Cassidy
Telepl	hone: ′ Office	508-533-8939 Cell: 508-493-8939
Email	addres	S: dcassidy518@gmail.com joannec22@comcast.net
The ov from:	Wner's f	title to the land that is the subject matter of this application is derived under deed ussidy and Joanne M. Cassidy of Freil Realty Trust to Freil Realty II LLC
dated	August 12	and recorded in Norfolk County Registry of Deeds,
Book _	27992	Page 300 or Land Court Certificate of Title Number,
Land (	Court C	ase Number, registered in the Norfolk County Land Registry District
volum	ne	, Page
CONS	SULTA	NT INFORMATION
<u>ENGII</u>	NEER:	Guerriere & Halnon, Inc.
Mailing	g Addre	ess: 55 West Central Street
		Franklin, MA 02038
Prima	ry Conta	act: Amanda Cavaliere
Telepł	hone: Office	: 508-528-3221 Cell:
Email	addres	S: acavaliere@gandhengineering.com
Regist	tered P.	E. License #: Robert J. Duff PE #40707

	SURVEYOR:	Guerriere & Halnon, Inc.
	Mailing Address:	55 West Central Street
		Franklin, MA 02038
	Primary Contact:	Robert E. Constantine II
	Telephone: Office: 508-5	528-3221 Cell:
	Email Address:	stantine@gandhengineering.com
	Registered P.L.S. Lic	ense #:49611
V	ARCHITECT:	HPA Design
	Mailing Address:	35 Main St.
		Millord, MA 01757
	Primary Contact:	Henry Arnquedo
	Telephone:	08-384-8838 Cell:
	Email address:	henry@hpadesign.com
	Registered Architect	License #:
V	LANDSCAPE ARCHI	TECTIDESIGNER: GUERTURE + Halnon Pre
	Mailing Address:	55 West Central St.
(mill)		Manklin MA. 02038
	Primary Contact:	- Ananda Cavallere
	Telephone: Office: <u>5</u>	08-528-3221 Cell:
	Email address:	acavaller @gandhengineering.com
	Registered Landscap	e Architect License #:
V	ATTORNEY:	Gleenwald + Gleenwald LLP
	Mailing Address:	Hog tortune Blud
		Milton Ma 01757
	Primary Contact:	Steren Greenwald
	Telephone:	08-478-8611 Cell:
	Email address:	Sqlaw Sq @ gglaw 409. Com

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Name:	Guerriere & Halnon, Ir	nc Amanda Cavaliere	
Address:	55 West Central Stree	et	
	Franklin, MA 02038		
Telephone: Office:	508-528-3221	Cell:	
Email address	acavaliere@gandhe	ngineering.com	1

### SIGNATURES

The undersigned, being the Applicant for approval of a Major Site Plan Project, herewith submits this application and Site Plan to the Medway Planning and Economic Development Board for review and approval. I hereby certify, under the pains and penalties of perjury, that the information contained in this application is a true, complete and accurate representation of the facts regarding the property and proposed development under consideration.

(If applicable, I hereby authorize <u>Guerriere & Halnon, Inc.</u> to serve as my Agent/Official Representative to represent my interests before the Medway Planning & Economic Development Board with respect to this application.)

In submitting this application, I authorize the Board, its consultants and agents, Town staff, and members of the Design Review Committee to access the site during the plan review process.

I understand that pursuant to MGL 53G, the Medway Planning and Economic Development Board may retain outside professional consultants to review this application and that I am responsible for the costs associated with such reviews.

I understand that the Planning and Economic Development Board, its agents, staff, consultants, and other Town staff and committees may request additional information which I am responsible for providing to assist them in reviewing the proposed development.

Signature of Property Owner Date Presion Signature of Applicant (if other than Property Owner) Masle Signature of Agent/Official Representative Date MAJOR SITE PLAN FEES Filing Fee For projects up to 4,999 sq. ft. /gross floor area = \$750 plus \$ .25/sq. ft.

For projects up to 4,999 sq. ft. /gross floor area = 750 plus .25/sq. ft.For projects of 5,000 – 9,999 sq. ft. /gross floor area = 1,000 plus .25/sq. ft.For projects of 10,000 – 14,999 sq. ft. /gross floor area = 1,500 plus .25/sq. ft.For projects of 15,000 sq. ft. or more/gross floor area = 1,500 plus .25/sq. ft.

### Advance on Plan Review Fee

For projects up to 4,999 sq. ft. /gross floor area = \$1,000 deposit. For projects of 5,000 – 9,999 sq. ft. /gross floor area = \$1,500 deposit For projects of 10,000 – 14,999 sq. ft. /gross floor area = \$2,000 deposit For projects of 15,000 sq. ft. or more/gross floor area = \$2,500 deposit

Submit 2 separate checks each made payable to: Town of Medway

## MAJOR SITE PLAN APPLICATION CHECKLIST



Major Site Plan Application (2 signed originals – one for Town Clerk and one for Planning and Economic Development Board)

 $\times$ 

Three (3) full size (24" x 36") copies of the Site Plan prepared in accordance with Sections 204-4 and 204-5 of the *Medway Site Plan Rules and Regulations* – one for the Town Clerk and two for the Planning and Economic Development Board.



One (1) ledger size (11" x 17") copy of the Site Plan



Electronic version of the Site Plan and ALL associated application documents. Provide disk or flash drive or email.



Certified Abutters List from the Medway Assessor's office – for 300 feet around the subject property – Form E

×

One (1) copy of a *Project Description* as described in Section 204 - 3, 6) of the *Medway Site Plan Rules and Regulations*. This description should also include a narrative on how the proposed project meets the requirements of the *Medway Zoning Bylaw* for parking (Section 7.1.1) and outdoor lighting (Section 7.1.2)



One (1) copy of a *Development Impact Statement* as described in Section 204 - 3, 7) of the *Medway Site Plan Rules and Regulations* 



Request for Waivers from the *Medway Site Plan Rules and Regulations*. Use Form Q.



Two (2) copies of the *Stormwater Drainage Report* prepared in conformance with the *Site Plan Rules and Regulations* 

Two (2) copies of a traffic study, depending on the size and scope of the proposed development project.



One (1) copy of all relevant approvals received to date from other Town boards/ committees/departments



Proof of present or pending ownership of all land within the proposed development.



Major Site Plan Filing Fee – Payable to Town of Medway

Advance of Plan Review Fee - Payable to Town of Medway



## Planning & Economic Development Board Town of Medway, MA

## Application for Approval of Special Permit

## INSTRUCTIONS TO APPLICANT/OWNER

This Application is made pursuant to the Medway Zoning Bylaw.

The Town's Planning and Engineering Consultants will review the Application and associated submittals and provide review letters to the Planning and Economic Development Board. A copy of those review letters will be provided to you in advance of the meeting.

You and/or your duly authorized Agent/Official Representative are expected to attend the Board meeting at which your Application will be considered to answer any questions and/or submit such additional information as the Board may request. Your absence may result in a delay the Board's review of the special permit application.

April 13

		,200
APPLICANT INFO	RMATION	
Applicant's Name:	Lobisser Companies	
Mailing Address:	1 Charlesview Road Hopedale, MA 01747	
Name of Primary Co	ntact: Kevin Lobisser	
Telephone: Office: 508-478	-6235 C	iell: 508-294-3177
Email address:	kevin@lobissercompanies.com	
Please check h	ere if the Applicant is the equitable owne	r (purchaser on a purchase and sales agreement.)
PROPERTY INFO	RMATION	
Location Address:	86 Holliston Street	8
The land shown on t	he plan is shown on Medway Ass	essor's Map #_ <sup>41</sup> as Parcel #_ <sup>8</sup>
Size of Development	t Parcel(s): 2.2 Acres	1
Development Name:	Milford Begion	al Medical Center
General Description	of Property: See attached	
Medway Zoning Dist	rict Classification: Central Business Distri	ct

20 22

### TYPE OF SPECIAL PERMIT

As provided in the following Section(s) of the Medway Zoning Bylaw. List all that apply. Zoning Bylaw Section 5.6.3(E)(3)(e) Groundwater Protection District - Uses and Activities Requiring a Special Permit - Rendering more than 15% impervious

PROPERTY	OWNER INFORMATION (if not applicant)	
Property Owne	er's Name: Freil Realty II, LLC	
Mailing Addres	86 Holliston Street Medway, MA 02053	
Primary Conta	ct: David Cassidy	
Telephone: V Office:	508 533 - 8939 Cell: 508 - 493 8939	
Email address	dcassidy518@gmail.com	
OFFICIAL RI	EPRESENTATIVE INFORMATION	
Name:	Guerriere & Halnon, Inc.	
Address:	55 West Central Street Franklin, MA 02038	
Telephone: Office:	508-528-3221 Cell:	
Email address:	acavaliere@gandhengineering.com	

### SIGNATURES

The undersigned, being the Applicant, herewith submits this application for a special permit(s) to the Medway Planning and Economic Development Board for review and action.

I hereby certify, under the pains and penalties of perjury, that the information contained in this application is a true, complete and accurate representation of the facts regarding the property under consideration.

(If applicable, I hereby authorize Guerriere & Halnon, Inc. to serve as my Agent/Official Representative to represent my interests before the Medway Planning & Economic Development Board with respect to this application.)

In submitting this application, I authorize the Board, its consultants and agents, Town staff, and members of the Design Review Committee and other Town boards and committees to access the site during the special permit review process.

Signature of Property Owner re pro Signature of Applicant (if other than Property Owner)

INT

Date

Signature of Agent/Official Representative

SPECIAL PERMIT APPLICATION/FILING FEES

There is no separate special permit application fee when the project also requires site plan review.

## SPECIAL PERMIT APPLICATION CHECKLIST

It is understood that the applicant shall also file a corresponding application for Site Plan Review and Approval with all required submittals.

Х

Complete and detailed narrative on how the proposed development project meets the special permit criteria included in the Medway Zoning Bylaw, SECTION 3.4 Special Permit Criteria AND any specific criteria included in the particular section(s) of the Zoning Bylaw for which a special permit is sought.

7-20-2018

### F-4516 Project Narrative 86 Holliston Street Medway, MA 02053

### **Background:**

The project area is located at 86 Holliston Street and consists of approximately 96,000 +/- sf. (2.20 +/-Ac.) of land owned by Freil Realty II, LLC and being developed by Lobisser Companies. The project area will be created from the larger parcel (8.02+/- acres), which is currently used as a farm, with livestock grazing within the project area. The property is bordered by a residential neighborhood to the north, a Walgreens pharmacy store to the east, Main Street and a commercial plaza to the south, and the remaining portion of the farm to the west. The site is located within the Central Business zoning district and has frontage along Main Street. Portions of the site lie within the jurisdictional buffers of bordering vegetated wetlands, FEMA flood zone X, and the site is located within the Medway Ground Water Protection District.

The topography is mainly grass and consists of slopes ranging from 0% to 10% grade. A 36" culvert, originating offsite, daylights on-site near the southwestern portion of the site adjacent to Main Street. The area that daylights was designated by Goddard Consulting, LLC as a regulated resource, or bank of intermittent stream channel and has a 100-ft jurisdictional buffer zone. A report and associated wetland data forms prepared by Goddard Consulting, dated December 14, 2021 is attached for your reference.

### **Project Description:**

The Applicant is proposing to construct a one story 21,900 +/- sf medical building and associated driveways, parking lots, utilities, landscaping and grading. Drainage infrastructure associated with the new development will also be constructed. The proposed medical building will consist of pediatric care, women's health and wellness and emergency care. A total of 102 parking spaces are proposed, which include 10 handicap accessible spaces, 6 spaces for electric vehicles and 86 standard size parking spaces.




2

g

200 ft

INDEX

COVER SHEET ABUTTER SHEET 2. EXISTING CONDITIONS EROSION CONTROL 4. PROPOSED SITE LAYOUT -5. -GRADING PLAN UTILITY PLAN 7. LANDSCAPING PLAN 9. CONSTRUCTION DETAILS 10. CONSTRUCTION DETAILS CONSTRUCTION DETAILS 11 12. CONSTRUCTION DETAILS PHOTOMETRIC PLAN (BY OTHERS) ARCHITECTURAL PLANS (BY OTHERS)

# SITE PLAN 86 HOLLISTON STREET MEDWAY MASSACHUSETTS



# WAIVERS REQUESTED

REQUEST FROM THE TOWN MEDWAY PLANNING BOARD RULES AND REGULATIONS CHAPTER 200

1.	SECTION	04-5 B SITE CONTEXT SHEET
2.	SECTION	04-5 D.8 LANDSCAPE PLAN
3.	SECTION	07-9 PEDESTRIAN & BICYCLE ACCESS AND SIDEWALKS. B. SIDEWALKS (1)
3.	SECTION	07-19 LANDSCAPING. B. LANDSCAPE BUFFERS (2)
4.	SECTION	07-19 LANDSCAPING. C. PARKING AREAS (1a)
5.	SECTION	07-19 LANDSCAPING. H.6. SECTION 207-12 PARKING SPACE G. (3) LOCATION (a)

DUFF No. 40707, CIVIL CONSTANTINE No. 49611 11. 19.2022 I, STEFANY OHANNESIAN, CLERK OF THE TOWN OF MEDWAY, RECEIVED AND RECORDED FROM THE PLANNING BOARD COVENANT APPROVAL OF THIS PLAN ON AND NO APPEAL WAS TAKEN FOR TWENTY DAYS NEXT AFTER RECEIPT AND RECORDING OF SAME.

TOWN CLERK

DATE

BOARD MEMEBER DATE LEGAL NOTES UTILITIES ARE PLOTTED AS A COMPILATION OF RECORD DOCUMENTS MARKINGS AND OTHER OTHER OBSERVED EXASEN CONSIDERED APPROXIMA THE EXACT LOCATION OF UNDER CANNOT BE AC RELIABLY DEPIC EVIDENCED BY RECORD CUMI PHYSICAL EVIDENCE MALLEXIST. CONTRACTORS (II ACCORDANCE WITH MASS.GL CHAPTER 82 SECTION 40 AS AMENDED) MUST CONTACT ALL UTILITY COMPANIES BEFORE EXCAVATING AND DRILLING AND CALL DIGSAFE AT 1(888)DIG-SAFE{7233}. CONSTRUCTION ON THIS LAND IS SUBJECT TO ANY EASEMENTS, RIGHTS-OF-WAY, RESTRICTIONS, RESERVATIONS, OR OTHER LIMITATIONS WHICH MAY BE REVEALED BY AN EXAMINATION OF THE TITLE. OWNER FREIL REALTY II, LLC DEED BOOK 27992 PAGE 300 PLAN BK. 515, PG 721 OF 2003 A.M. 41 LOT 8

AND

APPROVED BY THE TOWN OF MEDWAY PLANNING & ECONOMIC DEVELOPMENT BOARD

APPLICANT LOBISSER COMPANIES 1 CHARLESVIEW ROAD HOPEDALE, MA 01747

SITE PLAN **86 HOLLISTON STREET** MEDWAY MASSACHUSETTS

## COVER SHEET

APRIL 14, 2022 REVISION DESCRIPTION DATE



1 OF 12



#### OWNER(S)/ASSESSOR INFORMATION: PARCEL IDs:

41-007 DEIDRE ODONNELL 64 MAIN ST. MEDWAY, MA.

40-049 FREIL REALTY II, LLC. 86 HOLLISTON ST. MEDWAY, MA.

40-088 LOK CHING NOMINEE TRUST 6 HAVEN WAY HOPEDALE, MA.

31-092 JAMES M. CASSIDY 90 HOLLISTON ST. MEDWAY, MA

40-063 P & A REALTY TRUST 82 HOLLISTON ST. MEDWAY, MA

41-027 SEAN M CURRIVAN TRUSTEE 36 ELLIS ST. MEDWAY, MA.

40--050 CHARLES RIVER BANK 70 MAIN ST. MEDWAY, MA

41-10 **REBECCA L. PURCELL** 4 KAREN AVE. MEDWAY, MA.

40-061 DAVID J. MCWHINNIE 11 ROBIN CIRCLE MEDWAY, MA.

40-047 HERISTON PINTO 91 HOLLISTON ST. MEDWAY, MA.

31-090 CHARLES J. DUDDY JR. 15 ROBIN CIRCLE MEDWAY, MA.

41-021 ANGELO MUCCI TRUSTEE 2 RICHARD RD. MEDWAY, MA.

32-086 GEORGE M. FASOLINO 8 ROBIN CIRCLE MEDWAY, MA.

32-067 MICHAELS TRAINOR 10 RICHARD RD. MEDWAY, MA.

40-059 FREIL REALTY II, LLC 86 HOLLISTON ST. MEDWAY, MA.

40-064 NORMAN W. GREEN REALTY TRUST 71 MAIN ST. MEDWAY, MA.

41-023 HIDDEN ACRES REALTY I, LLC 1371 OAKLAND BLVD. WALNUT CREEK, CA.

41-023-067 HIDDEN ACRES REALTY I, LLC. (67 C MAIN ST) 75 HOLLYHILL LANE GREENWICH, CT.

32-085 CHRISTOPHER A. ANTHONY 6 ROBIN CIRCLE MEDWAY, MA.

ERIC H. KESSLER 4 RICHARD RD. MEDWAY, MA.

PARCEL IDs:

32-079 KATHLEEN A. BUXTON 8 RICHARD RD. MEDWAY, MA.

32-082 ALAN J. MEISTER 9 RICHARD RD. MEDWAY, MA.

41-023-067 (67 A MAIN ST) 75 HOLLY HILL LANE GREENWICH, CT.

41-023-067 (67 B MAIN ST.) PO BOX 902 SPENCER MA.

31-085 JOSEPH J. LATOSEK JR. **10 ROBIN CIRCLE** MEDWAY, MA.

41-023-067 (67 D MAIN ST.) ONE CVS DRIVE WOONSOCKET, RI

31-091 CHARLES J. DUDDY JR. 15 ROBIN CIRCLE MEDWAY, MA.

41-25 FREIL REALTY I, LLC. 86 HOLLISTON ST. MEDWAY, MA.

32-083

DIANE PRIDE 2 ROBIN CIRCLE MEDWAY, MA.

SYDNEY LAMPKE 5 RICHARD RD. MEDWAY, MA.

41-004

62 MAIN ST. MEDWAY, MA.

6 HAVEN WAY HOPEDALE, MA. 32-078

7539 DANVERS CIRCLE PORT CHARLOTTE, FL.

32-084 RYAN P. SULLIVAN 4 ROBIN CIRCLE MEDWAY, MA.

40-048 FREIL REALTY II, LLC. 86 HOLLISTON ST. MEDWAY, MA.

41-026

59 MAIN ST. MEDWAY, MA. 40-066

41-019 WILLIAM MCCAUL 60 MAIN ST. MEDWAY, MA.

MEDWAY, MA.

41-022



	REQUIRED
	40.000 CT
MIN. LOT AREA	10,000 SF
MIN. LOT FRONTAGE	NAT
MIN. YARD SETBACKS	
FRONT	10 FT
SIDE	10 FT 25 FT*
REAR	25 FT
STRUCTURE COVERAGE	80%
MAXIMUM IMPERVIOUS COVERAGE	NA
MINIMUM OPEN SPACE	15%

PROPERTIES IN THE CENTRAL BUSINESS DISTRICT THAT DO NOT HAVE FRONTAGE ON A PUBLIC STREET SHALL BE REQUIRED TO HAVE AN EASEMENT OF AT LEAST 30 FEET IN WIDTH PROVIDING ACCESS TO A PUBLIC STREET.

		LEG	END	-			
ſ	⊞	CATCH BASIN		\$	LIGHT POLE		
	<b>O</b>	DRAIN MANHOLE		Ω,	UTILITY POLE		
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:		W	EXISTING	WATER LI	VE		
		<del>- x - x - x -</del>	EXISTING FENCE				
	- x		FLOOD ZONE X- MINIMAL RISK AREA				
			ZONE 2	WELLHEAD	PROTECTION DISTRICT		

# TTATIST

# **NOTES**

1. THIS LAND IS ZONED CENTRAL BUSINESS.

2. A PORTION OF THIS SITE IS LOCATED FLOOD HAZARD ZONE X PER FEMA FLOOD MAP 25021C0143E, EFFECTIVE DATE 7/17/2012.

3. THE WETLANDS WERE EVALUATED BY GODDARD CONSULTING LLC. ON DECEMBER 13, 2021 AND JANUARY 28, 2022 SEE WETLAND REPORTS FOR FURTHER INFORMATION. WETLANDS WERE FIELD LOCATED BY GUERRIERE & HALNON, INC.

- 4. REFER TO MEDWAY ASSESSORS MAP 41 LOT 008
- 5. THIS SITE IS LOCATED WITHIN THE GROUNDWATER PROTECTION DISTRICT.
- 6. ALL REFERENCED DEEDS ARE ON RECORD AT THE NORFOLK REGISTRY OF DEEDS.
- 7. THIS SITE IS NOT LOCATED WITHIN A NATURAL HERITAGE AND ENDANGERED SPECIES PROGRAM AREA.
- 8. ELEVATIONS ARE BASED ON HORIZONTAL DATUM: NAD83; VERTICAL DATUM: NAVD88.

9. EXISTING SEWER INVERTS IN MAIN STREET OBTAINED FROM PLAN TITLED "TOWN OF MEDWAY, MASSACHUSETTS BOARD OF WATER/SEWER COMMISSIONERS SANITARY SEWER PROGRAM MAIN STREET - STA. 45+00 TO STA. 55+60.71" SHEET 5 OF 16 DATED 3-20-84, REVISED THROUGH 4-7-89, AND PREPARED BY METCALF & EDDY, INC. /ENGINEERS.

10. EXISTING SEWER INVERTS TO BE VERIFIED PRIOR TO START OF CONSTRUCTION.

									· · ·	
207 60	TP 1		206.5	TP 2	<u></u> .	208.1	TP 3		214.20	TP 4
207.00	SANDY	8"	۲۰۰۰ به ۲۰۰۰ (۲۰۰۰ ۲۰۰۰) ۲۰۰۰ (۲۰۰۱) ۲۰۰۰ (۲۰۰۰ ۲۰۰۰) ۲۰۰۰ (۲۰۰۰ ۲۰۰۰)		42"		·	36"		
208 94	LOAM	10YR 2/2	203,00	F		205 <u>.10</u>	F	· · · · · · · · · · · · · · · · · · ·		
200.34	CANDY	19"		SANDY	18"		SANDY	12"	. *	
205 36	LOAM B	7.5YR 5/8	201 50	Ab	10YR 2/2	204.10	At	10YR2/2	•	and the second second
200.00	COARSE	21"	2. V 1 • <u>V V</u>	LOAMY	-		SANDY	18"	-	LOAM/FILL
203 62	SAND C1	10YR 5/8	• •	SAND	63"	202.60	B	7.5YR 5/8		
200,02	SANDY	16"	· ·	Ab VARIES			SAND &	42"		
202.29	LOAM C2	2.5YR 5/4		IN DEPTH			GRAVEL	1.000	. · ·	
	SAND &	46"						1000 5/9	040.00	
108 49	GRAVEL	2.5YR 6/3	196.25		10YR 5/4	199.10	6		210.40	
130.40	WEEPING @ 7	7 <sup>°</sup>		MOTTLES @ 3	4" 203.67 5'		NOTTLES @ 4	2* 204.60 3*	- -	GH & 0.0
	NO REFUSAL	27" 205.35					₩₩₩₩ 175¥₩ ₩₩ 7¥	•		-



		TP 5		· ·	214.20	TP 6		212.20	TP 7		209.90	TP 8	
and and an and an address	214.80						30 <sup>*</sup>			36"	206.90	F	36"
			۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰		211.70	F		209 <u>.20</u>	F		200.30	SANDY	12"
					· · · · · · ·	GRAVEL	28"				205 <u>.90</u>	LUAM Ab	10YR2/2
		LOAM/FILL			209.20	LOAMY	6"			90"	204.00	SANDY LOAM R	12" 7.5YR 5/8
· · ·					208 <u>.70</u>	SAND C2	2.5YR 5/4		SANDY		204.30	SAND &	<u>,,,,,,,,</u> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,
				· .· .		GRAVEL	38"	· · · ·	· · · · ·			GRAVEL	54"
	209.80				205.53	<u>C3</u>	2.5YR 6/3	201.70	C C	10YR 5/8	200.40	<u> </u>	10YR 5/8
		GW @ 5'				MOTTLES @ 3 WEEPING @ 9	36" 18"	, = 1	WEEPING O 12	4" 20"		B LAYERS V	54° ARY



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EXISTING CONTOUR			
EXISTING WATER LINE			

# EROSION CONTROL AND DRAINAGE CONSTRUCTION PHASING

1. INSTALL EROSION CONTROL DEVICES ALONG PERIMETER OF SITE WHERE SHOWN.

- 2. INSTALL CONSTRUCTION ENTRANCE.
- 3. SITE TO BE CLEARED AND GRUBBED.
- 4. INSTALL SLOPE MATTING TO STABILIZE SLOPES (IF APPLICABLE)
- 5. INSTALL DRAINAGE MANHOLES AND CATCHBASINS AND ENSURE TEMPORARY COVER IS IN PLACE.
- 6. INSTALL ALL DRAINAGE RISERS, GRATES AND COVERS
- 7. REMOVE CONSTRUCTION ENTRANCES.
- 8. UPON ALL CATCHMENT STRUCTURES AND MITIGATION FEATURES BECOMING OPERATIONAL INSTALL PAVEMENT TO BINDER FINISH GRADE. PAVER TO PROVIDE TEMPORARY ASPHALT BERM ON BOTH SIDES OF PROPOSED PAVED AREAS. EROSION CONTROL MEASURES BACKED BY CRUSHED STONE TO BE PROVIDED ON DOWN GRADIENT SIDE OF CATCH
- BASINS TO DIRECT WATER TO TEMPORARY BASIN. 9. REMOVE TEMPORARY SEDIMENTATION BASIN AND FOREBAY AFTER SITE HAS BEEN STABILIZED AND PREPARED FOR BUILDING FOUNDATION INSTALLATION.

# **GENERAL NOTES:**

- ENTERING DRAINAGE SYSTEM. 2. INSTALL SILT SACKS.
- SYSTEM.
- OF EROSION CONTROL MEASURES.
- 6. ALL EXISTING STRUCTURES TO BE RAZED.
- BASINS DURING CONSTRUCTION.



1. SPECIAL CONSIDERATION FOR INLET CONTROLS FOR EROSION COLLECTION BEFOR

3. INSTALL BARRIER AROUND CATCH BASIN, MULCH SOCK OR EQUAL. 4. INSTALL FILTER FABRIC ON ALL DRAIN MANHOLE OUTLETS DISCHARGING TO INFILTRATION

5. INSPECTIONS BEFORE AND AFTER STORM EVENTS ARE REQUIRED TO INSURE ADEQUACY

7. STOCK PILE AREA TO BE CONTAINED USING EROSION CONTROL DEVICES 8. DIRT BAG SHALL BE USED TO PERIODICALLY CLEAN THE TEMPORARY SEDIMENTATION

9. A CONSTRUCTION FENCE SHALL BE PLACED AROUND THE PERIMETER OF THE SITE.

# ZONING DISTRICT CENTRAL BUSINESS

	REQUIRED	<u>PROPOSED</u>
MIN. LOT AREA	10,000 SF	96,000 SF
MIN. LOT FRONTAGE	NAf	300.00 FT
MIN. YARD SETBACKS		
FRONT	10 FT	97.2 FT
SIDE	10 FT 25 FT <sup>e</sup>	58.4 FT
REAR	25 FT	83.0 FT
STRUCTURE COVERAGE	80%	22.8%
MAXIMUM IMPERVIOUS COVERAGE**	NA	73.7%**
MINIMUM OPEN SPACE	15%	22.4%

WHEN ABUTTING A RESIDENTIAL DISTRICT

PROPERTIES IN THE CENTRAL BUSINESS DISTRICT THAT DO NOT HAVE FRONTAGE ON A PUBLIC STREET SHALL BE REQUIRED TO HAVE AN EASEMENT OF AT LEAST 30 FEET IN WIDTH PROVIDING ACCESS TO

A PUBLIC STREET.

\*\*MAXIMUM IMPERVIOUS COVERAGE IN A GROUND WATER PROTECTION DISTRICT: ANY USE THAT WILL RENDER IMPERVIOUS MORE THAN 15% OR 2500 SF. OF ANY LOT WHICHEVER IS GREATER.

# NOTE

A SPECIAL PERMIT WILL BE REQUIRED BY THE PLANNING BOARD FOR IMPERVIOUS COVERAGE IN A GROUNDWATER PROTECTION DISTRICT

NEW LOT AREA =  $96,000\pm$ SF.

EXISTING PAVEMENT =  $10,263\pm$  SF. PROPOSED BUILDING =  $21,900\pm$  SF. PROPOSED PAVEMENT =  $38,553\pm$  SF. TOTAL IMPERVIOUS =  $70,716\pm$  SF.

(73.7%)

# LEGEND

±	CATCH BASIN		\$	LIGHT POLE	
Ø	DRAIN MANHOLE		φ.	UTILITY POLE	
©	ELECTRIC MANHOLE		-0	GUY WIRE	
S	SEWER MANHOLE		-0	SIGN	
0	MANHOLE		•	WETFLAG	
GV	GAS VALVE		പ	UTILITY POLE	
రో	GAS SHUT OFF VALVE	•	\$	PROP. STREET LIGHTING	
X	WATER VALVE	•	VGC	VERTICAL GRANITE CURB	
ð	WATER SHUT OFF VAL	LVE	x 000.0	SPOT ELEVATION	
¥	FIRE HYDRANT			RIPRAP	
	000	EXISTING	CONTOUR		
	D	EXISTING DRAIN LINE			
		EXISTING	WATER LI	VE	

# PARKING NOTES

ZONED: CENTRAL BUSINESS PARKING REQUIREMENTS PER ZONING: TABLE 3. SCHEDULE OF OFF STREET PARKING REQUIREMENTS

> MEDICAL OFFICE OR CLINIC: 1 SPACE PER 300 SF. = 73 SPACES REQUIRED PARKING SPACES PROVIDED = 102 SPACES

TYPICAL PARKING SPACE: 18' X 9'

ELECTRIC VEHICLE SPACES REQ'D = 4 ELECTRIC VEHICLE SPACES PROVIDED = 6

A SPECIAL PERMIT WILL BE REQUIRED BY THE PLANNING BOARD FOR PARKING LOCATED WITHIN THE FRONT YARD SETBACK.

SECTION 7. GENERAL REGULATIONS

7.1.1. OFF STREET PARKING AND LOADING

K.(4) SPECIAL PARKING TYPES AND STANDARDS; FRONTAGE PARKING- BY SPECIAL PERMIT, BY THE BOARD TO ALLOW A LIMITED AMOUNT OF OFFSTREET

SURFACE PARKING TO BE PLACED BETWEEN A PUBLIC STREET AND THE STREET FACING FACADE OF A PRIMARY BUILDING. WHERE THIS IS PERMITTED BY THE BOARD, THE PARKING AREA WILL BE SETBACK A MINIMUM OF TWENTY FEET FROM THE STREET LINE AND STREETSCAPE TREATMENT.



	LEG	END		
E	CATCH BASIN		\$	LIGHT POLE
0	DRAIN MANHOLE		С С	UTILITY POLE
Ē	ELECTRIC MANHOLE			GUY WIRE
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0	MANHOLE			WETFLAG
SS	GAS VALVE		പ	UTILITY POLE
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××	WATER VALVE			
*8	WATER SHUT OFF VA	LVE	x 000.0	SPOT ELEVATION
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	000	EXISTING CONTOUR		
	D	EXISTING	DRAIN LIN	E
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# **LEGEND**

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©	ELECTRIC MANHOLE			GUY WIRE
S	SEWER MANHOLE			SIGN
0	MANHOLE		•	WETFLAG
ςγ	GAS VALVE		സ	UTILITY POLE
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₩V X	WATER VALVE			
*ð	WATER SHUT OFF VA	LVE	x 000.0	SPOT ELEVATION
¥	FIRE HYDRANT			RIPRAP
	000	EXISTING	CONTOUR	
	<i>D</i>	EXISTING I	DRAIN LIN	E
	— <i>W</i> ———	EXISTING	WATER LIN	VE
			-	

### STORM DRAINAGE NOTES

ALL DRAINAGE PIPES TO BE 12" RCP UNLESS OTHERWISE NOTED. WHERE LESS THAN 3.5' OF COVER IS PROVIDED, CLASS V RCP SHALL BE USED. DMH #2, DMH #7, AND CB #4 SHALL BE CONTECH CDS1515-3-C WATER QUALITY MANHOLES.

SPECIAL CONSIDERATION FOR INLET CONTROLS FOR EROSION COLLECTION BEFORE ENTERING DRAINAGE SYSTEM:

1. INSTALL SILT SACKS.

2. BARRIER AROUND CATCH BASIN, MULCH SOCK OR EQUAL 3. INSTALL FILTER FABRIC ON ALL DRAIN MANHOLE OUTLETS DISCHARGING TO

INFILTRATION SYSTEM. 4. INSPECTIONS BEFORE AND AFTER STORM EVENTS ARE REQUIRED TO INSURE ADEQUACY OF EROSION CONTROL MEASURES.

5. CONTRACTOR & ARCHITECT ARE TO VERIFY SITE UTILITIES PRIOR TO DESIGN & CONSTRUCTION.

6. ALL PIPE GASKETS SHALL BE PRE-MOLDED NEOPRENE O-RING TYPE (300-11 B.(2)(A)).

SITE DRAINAGE INSTALLATIONS NOTES 1. EACH SUBSURFACE CHAMBER WILL BE INSTALLED SEPARATELY TO DESIGN ELEVATION.

2. INSTALL CONNECTIONS TO CATCH BASINS, WATER QUALITY MANHOLE (WQMH) AND DRAIN MANHOLES.

3. EXCAVATE AND INSTALL SUBSURFACE UNIT, BACKFILL W/ STONE MAINTAINING 18"-24" COVER AND AS-BUILT EACH SECTION.

UTILITY NOTE

# ALL UTILITIES SHALL BE CONSTRUCTED AND TESTED ACCORDING TO STATE &

CB #3-RIM=210.8' INV. OUT=206.91' INV(24"CPP)=201.88 INV(10"CPP)=202.63 INV(12"RCP)=202.66

25' NO DISTURB BUFFER -

50' NO STRUCTURE BUFFER

DMH -RIM=210.35 Under Fence-Unable to open DMH -RIM=210.36 INV(i)=204.66

100' WETLAND BUFFER .

INV(0)=204.56 DATRO SMH -R=210.0 /=199.64± the second se Annager and the second second 12"RCP -DMH RIM=210.32 *i*₩*(i−12")=205.22* IN \$(i-10")=206.12 1-205 12

INV(24")=200.99

2 🖌

DMH

 $\circ$ 

213x7

0

213x0

RIM=215.99

INV(i)=208.64

INV(o)=208.54

-Story

DMH

RIM=211.28

INV(1)=203.23

-INV(o)=203.23

Barn

1.8'





# LEGEND

Ħ	CATCH BASIN		≎	LIGHT POLE
Ø	DRAIN MANHOLE	DRAIN MANHOLE ELECTRIC MANHOLE		
©	ELECTRIC MANHOLE			
S	SEWER MANHOLE	SEWER MANHOLE		
0	MANHOLE	· · · · · · · · · · · · · · · · · · ·	•	WETFLAG
°×⊠	GAS VALVE	GAS VALVE		UTILITY POLE
්	GAS SHUT OFF VALVE		Ø	PROP. STREET LIGHTING
X	WATER VALVE			
rie Ver	WATER SHUT OFF VA	LVE	x 000.0	SPOT ELEVATION
¥	FIRE HYDRANT			RIPRAP
	000	EXISTING	CONTOUR	
	D	EXISTING	DRAIN LIN	E
	W	EXISTING	WATER LI	VE

# NOTES

1. THE CONTRACTOR SHALL VERIFY ALL UTILITIES PRIOR TO CONSTRUCTION. 2. PLANT MATERIALS SHALL CONFORM TO THE GUIDELINES BY THE AMERICAN STANDARD FOR NURSERY STOCK PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN. 3. ALL PLANTING SHALL BE PLACED ACCORDING TO THE APPROVED LANDSCAPING PLAN. 4. AFTER PLANTING 4" OF MULCH SHALL BE PLACED WITHIN THE DESIGNATED AREAS. 5. ALL PLANT MATERIAL SHALL INCLUDE A 1 YEAR GUARANTEE. 6. THE CONTRACTOR/LANDSCAPER SHALL WATER NEWLY PLANTED MATERIAL FOR 90 DAYS. 7. DAMAGED VEGETATION WILL BE REMOVED AND REPLACED IF NECESSARY. 8. AREA OF INTERIOR LANDSCAPING =  $6,005\pm$ SF (13.3%)

	PLANTING	LEGEND	
SYMBOL	NAME	SIZE	QUANTITY
£	RED MAPLE ACER RUBRUM	5' MIN. 2.5" CAL.	13
*	EASTERN WHITE PINE PINUS STROBUS	10' HIGH MIN.	14
0	RED OAK QUERCUS RUBRA	5' MIN. 2.5" CAL.	4

· · · .	REPLICATION 1	EGEND	· .
SYMBOL	NAME	SIZE	QUANTITY
	RIVER BIRCH BETULA NIGRA	4' MIN. 2.5" CAL.	3
0	MOUNTAIN PEPPERBUSH CLETHRA ACUMINATA	3 GAL.	4
G	HIGH BUSH BLUEBERRY VACCINIUM CORYMBOSUM	5 GAL.	2
0	WINTERBERRY ILEX VERTICILLATA	3 GAL.	4
*	SHEEP LAUREL KALMIA ANGUSTIFORLIA	3 GAL.	4
*	CINNAMON FERN OSMUNDA CINNAMOMEA	2 GAL.	9

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# BLACK REINFORCED RUBBER /HOSE ABOVE FIRST BRANCH TWO STRANDS OF 18 GA GALVANIZED EYE 4 TURNBUCKLE WRAPPING PAPER TO FIRST 6 -4" CONTINUOUS PLANT PLANTING SOIL MIX BACKFILL IN LOOSE LIFTS OF 6" TO 8" DEPTH. FREIL REALTY II, LLC SETTLE LIFT W/ THOROUGH WATER SOAKING POSSIBLE STORM DRAINAGE EASEMENT NO EASEMENT \_\_ REMAINING LAND OF PARCEL A (PL.BK. 515 PG. 721) OF RECORD FOUND Max8 10.4' 1-Story Barn 10.81 SNOW STGE 7 SIDEWALK 214

**Dd** 170.2' 귫 TP7 PROPOSED 212 1 STORY MEDICAL BUILDING W.C.C.S 21,900± SF. SLAB=213.00 ৽ঢ় 100' WETLAND BUFFER -HANDICAP SIGNS(TYP) ~n° HANDICAP SIGNS(TYP) OTOC 41.5 50' NO STRUCTURE BUFFER-25' NO DISTURB BUFFER SNOW R=210.0 |=199.64± (1921 COUNTY LAYOUT RELOCATION FO 101 PLNG. 128) SN OC





#### **GENERAL EROSION CONTROL AND CONSTRUCTION NOTES**

- 1. THE LIMITS OF ALL CLEARING, GRADING AND DISTURBANCE SHALL BE KEPT TO A MINIMUM WITHIN THE PROPOSED AREA OF CONSTRUCTION. ALL AREAS OUTSIDE THE LIMITS OF DISTURBANCE. SHALL REMAIN TOTALLY UNDISTURBED.
- 2. INSPECT ALL SEDIMENT AND EROSION CONTROL MEASURES AT LEAST ONCE PER WEEK AND WITHIN 24 HOURS AFTER EVERY RAINFALL EVENT.
- 3. MAINTAIN ALL EROSION AND SEDIMENT CONTROL MEASURES OR REPLACE AS REQUIRED TO ASSURE PROPER FUNCTION.
- 4. CONTRACTOR SHALL IMMEDIATELY REPAIR ANY AND ALL EROSION AND SEDIMENT CONTROLS FOUND TO BE FAULTY.
- 5. ANY AND ALL DEBRIS AND LITTER WHICH ACCUMULATES IN THE BASINS SHALL BE REMOVED WEEKLY.
- 6. THE CONTRACTOR SHALL IMPLEMENT ALL REASONABLE EROSION AND SEDIMENT CONTROLS PRIOR TO THE ACTUAL COMMENCEMENT OF CONSTRUCTION ACTIVITIES INCLUDING THE CLEARING AND/OR GRUBBING OF ANY PORTION OF THE PROPERTY. THESE MEASURES SHALL BE MAINTAINED IN EFFECT THROUGHOUT THE ENTIRE CONSTRUCTION PHASE, OR UNTIL THE SITE HAS BECOME STABILIZED WITH AN ADEQUATE VEGETATIVE COVER.
- 7. SEDIMENT BUILD UP BEHIND FILTERMITT SHALL BE MONITORED AND BE REMOVED WHENEVER IT HAS ACCUMULATED TO FOUR INCHES IN DEPTH.
- 8. CATCH BASINS SHALL BE PROTECTED WITH SILT FILTERS (SILT SACKS). INSPECT SEDIMENT FILTERS AT LEAST ONCE PER WEEK AND WITHIN 24 HOURS AFTER RAINFALL THAT PRODUCES RUNOFF. 9. CLEAN OR REPLACE FILTERS WITHIN 24 HOURS OF INSPECTION WHEN SEDIMENT REACHES ONE HALF OF THE FILTER SACK DEPTH. CATCH BASINS SHALL BE PROTECTED BY SEDIMENT FILTERS THROUGHOUT THE CONSTRUCTION PERIOD AND UNTIL ALL DISTURBED AREAS ARE THOROUGHLY STABILIZED. SUMPS SHALL BE CLEANED WHENEVER SEDIMENT HAS ACCUMULATED TO A DEPTH OF 24 INCHES AND IMMEDIATELY FOLLOWING INSTALLATION OF PERMANENT PAVEMENT.
- 10. THE CONTRACTOR SHALL MAINTAIN AN ADEQUATE STOCKPILE OF EROSION CONTROL MATERIALS ON-SITE AT ALL TIMES FOR EMERGENCY OR ROUTINE REPLACEMENT AND SHALL INCLUDE MATERIALS TO REPAIR OR REPLACE SILT FENCE, MULCH SOCK, STONE FILTER DIKES OR ANY OTHER DEVICES PLANNED FOR USE DURING CONSTRUCTION.
- 11. THE CONTRACTOR IS TO INSPECT ALL CONTROLS NO LESS THAN WEEKLY, AND IN ANTICIPATION OF RAINFALL EVENTS EXPECTED TO EXCEED 1/2 INCH IN DEPTH. ALL DEFICIENCIES NOTED DURING SAID INSPECTION SHALL BE REPAIRED IMMEDIATELY AND IN NO CASE SHALL A DEFICIENCY BE ALLOWED TO GO UNCORRECTED DURING A RAINFALL EVENT. THE EROSION CONTROL DEVICES SHALL BE MAINTAINED, REINFORCED, OR REPLACED IF NECESSARY. ALL ACCUMULATED SEDIMENTS AND OTHER MATERIALS COLLECTED
- 12. BY THE SEDIMENTATION CONTROL SYSTEMS SHALL BE REMOVED AS NECESSARY TO INSURE PROPER FUNCTION OF SYSTEMS AND DISPOSED OF IN A MANNER THAT IS CONSISTENT WITH THE INTENT OF THIS PLAN, IN AN UPLAND AREA.
- 13. TEMPORARY EARTH OR STONE DIKES, DRAINAGE SWALES AND/OR TEMPORARY SLOPE DRAINS SHALL BE INSTALLED WHERE OFF-SITE OR ON-SITE RUNOFF IS SUFFICIENT ENOUGH SUCH THAT IT WILL BE NECESSARY TO DIVERT THE FLOW AROUND THE SITE OR PREVENT EROSION WITHIN THE LIMITS OF WORK.
- 14. STORM DRAIN INLET PROTECTION SHALL BE USED FOR ALL EXISTING AND PROPOSED CATCH BASINS IN THE PROJECT AREA. PRIOR TO COMPLETION OF THE PROJECT, ALL CATCH BASINS WITHIN THE PROJECT AREA SHALL BE CLEANED.
- 15. ALL DISTURBED EARTH SLOPES AREA TO BE STABILIZED WITH PERMANENT VEGETATIVE COVER, TO BE ESTABLISHED AS SOON AS POSSIBLE. DISTURBED AREAS THAT ARE NOT SUBJECT TO CONSTRUCTION TRAFFIC SHALL RECEIVE A PERMANENT OR TEMPORARY VEGETATIVE COVER AS SOON AS FINAL CONTOURS ARE ESTABLISHED. TEMPORARY VEGETATIVE COVER IS TO BE ESTABLISHED ON ALL DISTURBED AREAS WHERE CONSTRUCTION ACTIVITIES WILL NOT REQUIRE ADDITIONAL DISTURBANCE FOR PERIOD OF 30 DAYS OR MORE. IF THE SEASON PREVENTS THE ESTABLISHMENT OF VEGETATIVE COVER, DISTURBED AREAS SHALL BE MULCHED AND THEN SEEDED AS SOON AS WEATHER CONDITIONS ALLOW.
- 16. THERE SHALL BE NO DIRECT DISCHARGE OF DEWATERING OPERATIONS INTO ANY DRAINAGE SYSTEM UNLESS THIS DISCHARGE IS CLEAN AND FREE OF SETTLEABLE SOLIDS. ANY DEWATERING DISCHARGE CONTAINING SETTLEABLE SOLIDS (SEDIMENTS) SHALL BE PASSED THROUGH A SEDIMENTATION CONTROL DEVICE(FILTER BAG) TO REMOVE THESE SOLIDS. THE CONTRACTOR IS TO MAINTAIN SAID SEDIMENT CONTROL DEVICE THROUGHOUT THE ENTIRE DEWATERING OPERATION AND REPAIR DEFICIENCIES IMMEDIATELY.
- 17. SOIL STOCKPILE AREAS FOR CONSTRUCTION MATERIALS SHALL BE LOCATED OUTSIDE WETLAND AREAS AND ASSOCIATED BUFFERS. 18. ALL PLANTINGS SHALL BE ACCOMPLISHED BY THE CONTRACTOR
- AS EARLY AS THE POSSIBLE UPON COMPLETION OF GRADING AND CONSTRUCTION. 19. ALL PLANTINGS SHALL BE WATERED AND MAINTAINED BY THE
- CONTRACTOR TO ENSURE SURVIVAL. 20. EROSION CONTROL SHALL REMAIN IN PLACE UNTIL THE CERTIFICATE OF COMPLETION IS ISSUED

![](_page_262_Figure_19.jpeg)

- INSPECT AND PREPARE LETTER. CONSTRUCTION.
- POINT ON EACH SYSTEM.
- TEMPORARILY, IF DISTURBED.
- CONTROL DEVISE.
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- AND SURFACE STABILIZATION.
- CLEAN OF DEBRIS.
- BAGS AT EACH CATCH BASIN. MANAGEMENT PLAN.

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	D SOLUTIONS LLC	ONLINE CDS STANDAPD DETAIL				
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![](_page_265_Picture_0.jpeg)

	HPA
	Design, Inc.
	ARCHITECTS
Milford Regional Physician Group The Benchmark for Quality Care	35 Main Street Milford, MA 01757 (P) 781.407.0000 (P) 508.384.8838 Contact@HPADesign.com
	PROPOSED MEDICAL BUILDING FOR: LOBISSER BUILDING CORP MEDWAY MA
	A 4/18/22 ISS FOR BOARD REVIEW REVISIONS: PROJECT #: 20210177
	FEBRUARY 11, 2021
	DRAWN BY: DEY
	SCALE: SEE DRAWING
	SHEET TITLE:
	ELEVATIONS
	These drawings and specifications were prepared for use at the location indicated hereon. Publication and use is expressly limited to the identified location. Re-use or reproduction by any method, in whole or in part, is prohibited without the written permission of Architect. © 2019
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Scale: 1 Inch= 50 Ft.

HOLBROOK-ASSOCIATED Electrical Manufacturer's Representatives

Prepared By: Holbrook-Associated 35 Reservoir Park Drive Rockland, MA 02370 Job Name: Medical Office Bui Medway, MA

Filename: C:\Users\jholbrook\Documents\AGI32 - Designs\2022 Designs\Andrew Holbrook

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ilding		Date:4/15/2022	Rep: AH	provided by others have not been field verified by Hol Holbrook-Associated recommends that design parame
		Filename: MOB REVISED.AGI		Holbrook-Associated neither warranties, either implie by the Lighting Design. Holbrook-Associated neither w intent as compliant with any applicable regulatory com
		Drawn By: JHolbrook		The Lighting design is issued, in whole or in part, as ac project's construction documentation package.
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or Visual Simulation ("Lighting Design") provided by Holbrook-Associated represent an anticipated n design parameters and information supplied by others. These design parameters and information Ibrook-Associated and therefore actual measured r esults may vary from the actual field conditions. eters and other information be field verified to reduce variation.

ed or stated with regard to actual measured light levels or energy consumption levels as compared to those illustrated warranties, either implied or stated, nor represents the appropriateness, completeness or suitability of the Lighting Design ode requirements with the exception of those specifically stated on drawings created and submitted by Holbrook-Associated. advisory documents for informational purposes and is not intended for construction nor as being part of a

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Calculation Summary				
Label CalcType Units Avg Max Min Avg/Min Max/Min Description		PtSpcLr	PtSpcTb	Meter Type
Parking LotIlluminanceFc0.418.10.0N.A.N.A.Readings Taken @ 0'-0"	' AFG	10	10	Horizontal
Lot         Illuminance         Fc         2.05         8.1         0.3         6.83         27.00         Readings Taken @ 0'-0"	' AFG			

Luminaire Schedule All quotes/orders generated				enerated from this layout will I	ed from this layout will be processed by Holbrook-Associated					
Symbol	Qty	Tag	Label	Arrangement	LLF	Description	<b>BUG Rating</b>			
	8	Α	ALED4T78	Single	1.000	ALED4T78 - RWLED4T78 - RWLED4T78SF - WPLED4T78	B1-U0-G2			
						(TYPE IV)				

Expanded Luminaire Location Summary						
LumNo	Tag	X	Y	MTG HT	Orient	Tilt
1	Α	681425.4	2880989.	20	290.659	0
		24	129			
2	A	681357.4	2880965.	20	290.659	0
		33	807			
3	Α	681288.9	2880942.	20	290.659	0
		8	138			
4	Α	681273.6	2880831.	20	20.958	0
• •		18	26			
5	Α	681298.5	2880754.	20	20.958	0
		29	391			
6	A	681364.0	2880703.	20	52.167	0
		13	01			
7	A	681531.2	2880789.	20	196.729	0
		81	75			
8	Α	681462.3	2880713.	20	111.03	0
		58	312			
Total Qua	ntitv: 8		- <b></b>	- <del>5.</del>		••••

HOLBROOK-ASSOCIATED Electrical Manufacturer's Representatives Prepared By: Holbrook-Associated 35 Reservoir Park Drive Rockland, MA 02370

Job Name: Medical Office B Medway, MA

Filename: C:\Users\jholbrook\Documents\AGI32 - Designs\2022 Designs\Andrew Holbroo

![](_page_267_Picture_7.jpeg)

Render Image - Top View

	Scale: as noted	Project ID: 192568	The Lighting Analysis, ezLayout, Energy Analysis an prediction of lighting system performance based up	
Suilding	Date:4/15/2022	Rep: AH	provided by others have not been field verified k Holbrook-Associated recommends that design p	
	Filename: MOB REVISED.A	Filename: MOB REVISED.AGI		
	Drawn By: JHolbrook		The Lighting design is issued, in whole or in part, a project's construction documentation package.	
ok\Medical Office Building\MOB REVISED.AGI	<b>L</b>			

NOTES: \* The light loss factor (LLF) is a product of many variables, only lamp lumen depreciation (LLD) has been applied to the calculated results unless otherwise noted. The LLD is the result (quotient) of mean lumens / initial lumens per lamp manufacturers' specifications.

\* Illumination values shown (in footcandles) are the predicted results for planes of calculation either horizontal, vertical or inclined as designated in the calculation summary. Meter orientation is normal to the plane of calculation.

\* The calculated results of this lighting simulation represent an anticipated prediction of system performance. Actual measured results may vary from the anticipated performance and are subject to means and methods which are beyond the control of Holbrook-Associated.

\* Mounting height determination is job site specific, our lighting simulations assume a mounting height (insertion point of the luminaire symbol) to be taken at the top of the symbol for ceiling mounted luminaires and at the bottom of the symbol for all other luminaire mounting configurations.

\* It is the Owner's responsibility to confirm the suitability of the existing or proposed poles and bases to support the proposed fixtures, based on the weight and EPA of the proposed fixtures and the owner's site soil conditions and wind zone. It is recommended that a professional engineer licensed to practice in the state the site is located be engaged to assist in this determination.

\* The landscape material shown hereon is conceptual, and is not intended to be an accurate representation of any particular plant, shrub, bush, or tree, as these materials are living objects, and subject to constant change. The conceptual objects shown are for illustrative purposes only. The actual illumination values measured in the field will vary.

\* Photometric model elements such as buildings, rooms, plants, furnishings or any architectural details which impact the dispersion of light must be detailed by the customer documents for inclusion in the Holbrook-Associated lighting design model. Holbrook-Associated is not responsible for any inaccuracies caused by incomplete information on the part of the customer, and reserves the right to use best judgement when translating customer requests into photometric studies.

\* RAB Lighting Inc. luminaire and product designs are protected under U.S. and International intellectual property laws. Patents issued or pending apply.

nd/or Visual Simulation ("Lighting Design") provided by Holbrook-Associated represent an anticipated upon design parameters and information supplied by others. These design parameters and information y Holbrook-Associated and therefore actual measured r esults may vary from the actual field conditions. rameters and other information be field verified to reduce variation.

nplied or stated with regard to actual measured light levels or energy consumption levels as compared to those illustrated her warranties, either implied or stated, nor represents the appropriateness, completeness or suitability of the Lighting Design y code requirements with the exception of those specifically stated on drawings created and submitted by Holbrook-Associated. as advisory documents for informational purposes and is not intended for construction nor as being part of a

Project Name	Site Plan 86 Holliston Street Medway, Massachusetts
Property Location	86 Holliston Street
Type of Permit	Major Site Plan
Identify the number and title of the relevant section of the <i>Site</i> <i>Plan Rules and Regulations</i> from which a waiver is sought.	Section 207-19 (B) Landscaping C. Parking Areas(d)
Summarize the text of the relevant section of the <i>Rules</i> and <i>Regulations</i> from which a waiver is requested.	To provide shade trees for every 6 parking spaces.
What aspect of the <i>Rule and</i> <i>Regulation</i> do you propose be waived?	To provide an adequate amount of shade trees where possible and not conflict with the underground utilities.
What do you propose as an alternative to the standard?	N/A
Explanation/justification for the waiver request. How does the particular rule/regulation not apply to the site or situation under review?	The underground utilities located within the site allows for limited plantings.
Explanation/justification. How would approval of this waiver request not be significantly detrimental to achieving the purposes of site plan review?	Shade trees have been proposed around the site to provide shade in all areas possible while avoiding interference with the underground utilities.
Explanation/justification. How would approval of this waiver request result in a superior design or provide a clear and significant improvement to the quality of this development?	To provide shade whereever possible and allow for the construction of the utilities and underground drainage.
What is the impact on the development if this waiver request is denied?	Interference with utility locations.
What mitigation measures do you propose to offset not complying with the particular Rule/Regulation?	N/A
Waiver Request Prepared By:	Mike Hassett
Date:	4/14/2022
Questions?? -	Please contact the Medway PEDB office at 508-533-3291.
	2/7/2022

Project Name	Site Plan 86 Holliston Street Medway, Massachusetts
Property Location	86 Holliston Street
Type of Permit	Major Site Plan
Identify the number and title of the relevant section of the <i>Site</i> <i>Plan Rules and Regulations</i> from which a waiver is sought.	Section 204-5 (D) (8) Landscape Plan
Summarize the text of the relevant section of the <i>Rules</i> and <i>Regulations</i> from which a waiver is requested.	To provide a landscape plan by a Registered Professional Landscape Architect
What aspect of the <i>Rule and</i> <i>Regulation</i> do you propose be waived?	To provide a landscape plan that is not prepared by a Reg. Professional Landscape Architect
What do you propose as an alternative to the standard?	Prepare a landscape plan stamped by a Registered P.E.
Explanation/justification for the waiver request. How does the particular rule/regulation not apply to the site or situation under review?	Waiver requested because proposed landscaping needs are minimal and services of a Professional Landscape Architect is not necessary
Explanation/justification. How would approval of this waiver request not be significantly detrimental to achieving the purposes of site plan review?	Waiver requested because the proposed landscaping needs are minimal allowing for site improvements to be completed
Explanation/justification. How would approval of this waiver request result in a superior design or provide a clear and significant improvement to the quality of this development?	Approval would allow significant site and safety improvements to be completed
What is the impact on the development if this waiver request is denied?	N/A
What mitigation measures do you propose to offset not complying with the particular Rule/Regulation?	N/A
Waiver Request Prepared By:	Mike Hassett
Date:	4/14/2022
Questions?? - Please contact the Medway PEDB office at 508-533-3291.	
	2/7/2022

Project Name	Site Plan 86 Holliston Street Medway, Massachusetts
Property Location	86 Holliston Street
Type of Permit	Major Site Plan
Identify the number and title of the relevant section of the <i>Site</i> <i>Plan Rules and Regulations</i> from which a waiver is sought.	Section 204-5 (B) Site Context Sheet.
Summarize the text of the relevant section of the <i>Rules</i> and <i>Regulations</i> from which a waiver is requested.	Section 204-5 (B) in its entirety
What aspect of the <i>Rule and</i> <i>Regulation</i> do you propose be waived?	Full section
What do you propose as an alternative to the standard?	N/A
Explanation/justification for the waiver request. How does the particular rule/regulation not apply to the site or situation under review?	N/A
Explanation/justification. How would approval of this waiver request not be significantly detrimental to achieving the purposes of site plan review?	N/A
Explanation/justification. How would approval of this waiver request result in a superior design or provide a clear and significant improvement to the quality of this development?	N/A
What is the impact on the development if this waiver request is denied?	N/A
What mitigation measures do you propose to offset not complying with the particular Rule/Regulation?	N/A
Waiver Request Prepared By:	Mike Hassett
Date:	4/14/2022
Questions?? - Please contact the Medway PEDB office at 508-533-3291.	
	2/7/2022

Project Name	Site Plan 86 Holliston Street Medway, Massachusetts
<b>Property Location</b>	86 Holliston Street
Type of Permit	Major Site Plan
Identify the number and title of the relevant section of the <i>Site</i> <i>Plan Rules and Regulations</i> from which a waiver is sought.	Section 207-19 Landscaping B. (2) Landscape buffers
Summarize the text of the relevant section of the <i>Rules and Regulations</i> from which a waiver is requested.	Waiver request for perimeter landscaping around entire site.
What aspect of the <i>Rule and</i> <i>Regulation</i> do you propose be waived?	To allow an evergreen buffer along the rear of the site only.
What do you propose as an alternative to the standard?	N/A
Explanation/justification for the waiver request. How does the particular rule/regulation not apply to the site or situation under review?	Planting along the west side of the site would conflict with the existing drainage located along the property line. Evergreen plantings on the easterly site would interfere with site lines along the access road.
Explanation/justification. How would approval of this waiver request not be significantly detrimental to achieving the purposes of site plan review?	If the waiver is granted, there would be no conflicts with drainage and would allow for plantings within the buffer. The access road site line would remain clear for vehicle safety
Explanation/justification. How would approval of this waiver request result in a superior design or provide a clear and significant improvement to the quality of this development?	The waiver would provide safety measures around the site.
What is the impact on the development if this waiver request is denied?	The drainage could be damaged with root and tree growth and safety around the site would be compromised.
What mitigation measures do you propose to offset not complying with the particular Rule/Regulation?	N/A
Waiver Request Prepared By:	Mike Hassett
Date:	4/14/2022
Questions?? - Please contact the Medway PEDB office at 508-533-3291.	
	2/7/2022

Project Name	Site Plan 86 Holliston Street Medway, Massachusetts
Property Location	86 Holliston Street
Type of Permit	Major Site Plan
Identify the number and title of the relevant section of the <i>Site</i> <i>Plan Rules and Regulations</i> from which a waiver is sought.	Section 207-12 (B) Parking G.(3) location(a)
Summarize the text of the relevant section of the <i>Rules and Regulations</i> from which a waiver is requested.	Parking spaces designed in the front of proposed building with minimal screening provided.
What aspect of the <i>Rule and</i> <i>Regulation</i> do you propose be waived?	To allow parking within the front yard along Holliston Street
What do you propose as an alternative to the standard?	N/A
Explanation/justification for the waiver request. How does the particular rule/regulation not apply to the site or situation under review?	The proposed site is a medical building, parking allowed in the front would provide ample parking for safety and emergency vehicles.
Explanation/justification. How would approval of this waiver request not be significantly detrimental to achieving the purposes of site plan review?	N/A
Explanation/justification. How would approval of this waiver request result in a superior design or provide a clear and significant improvement to the quality of this development?	The waiver would provide ample parking for the medical facility.
What is the impact on the development if this waiver request is denied?	Insufficient parking
What mitigation measures do you propose to offset not complying with the particular Rule/Regulation?	N/A
Waiver Request Prepared By:	Mike Hassett
Date:	4/14/2022
Questions?? -	Please contact the Medway PEDB office at 508-533-3291.

Project Name	Site Plan 86 Holliston Street Medway, Massachusetts
Property Location	86 Holliston Street
Type of Permit	Major Site Plan
Identify the number and title of the relevant section of the <i>Site</i> <i>Plan Rules and Regulations</i> from which a waiver is sought.	Section 207-9 Pedestrian and Bicycle Access and Sidewalks. B. Sidewalks (1)
Summarize the text of the relevant section of the <i>Rules and Regulations</i> from which a waiver is requested.	Five foot sidewalks shall be provided within parking areas. Where sidewalks abut parking areas. The sidewalk width shall be increased by 2' to accommodate vehicular bumper overhang.
What aspect of the <i>Rule and</i> <i>Regulation</i> do you propose be waived?	To provide 5' sidewalks for a short distance in front of building entrance
What do you propose as an alternative to the standard?	To remove a portion of the sidewalk and create a landscape buffer
Explanation/justification for the waiver request. How does the particular rule/regulation not apply to the site or situation under review?	The entrance to the building is to the right and left of the proposed sidewalk. Pedestrians can access the building from either entrance.
Explanation/justification. How would approval of this waiver request not be significantly detrimental to achieving the purposes of site plan review?	By constructing sidewalks around the building provides pedestrian safety.
Explanation/justification. How would approval of this waiver request result in a superior design or provide a clear and significant improvement to the quality of this development?	Approval would allow significant site and safety improvements to be completed
What is the impact on the development if this waiver request is denied?	N/A
What mitigation measures do you propose to offset not complying with the particular Rule/Regulation?	N/A
Waiver Request Prepared By:	Mike Hassett
Date:	4/14/2022
Questions?? -	Please contact the Medway PEDB office at 508-533-3291. 2/7/2022

#### Susan Affleck-Childs

From:	Barbara Saint Andre
Sent:	Wednesday, April 27, 2022 12:44 PM
То:	Susan Affleck-Childs
Subject:	Milford Regional Medical Facility

Susy, here are my comments on the application received for 86 Holliston Street:

1. The site plan shows a "Possible Storm Drainage Easement No Easement of Record Found". It is my understanding that this drainage structure was constructed many years ago and carries stormwater from Holliston Street. If this easement is not on record, would the owner be willing to provide the town with an easement now in order to memorialize this? This is not a requirement of the applicant, but it seems an opportune time to nail this down while we are reviewing this plan.

2. There is no Project Description as required by the site plan regulations, although it is checked off on the checklist; perhaps the applicant inadvertently did not include it.

3. There is a note on the Layout Plan that a special permit is required under Section 7.1.1.K(4) for parking in front of the building, but no such special permit application has been filed. Also, because this property is in the CB District, a special permit is required under Section 10.2.D.2.c to allow parking between the front building line and the street right of way. It would seem that the provisions of Section 10.2.D.2.c would be the applicable provision, rather than Section 7.1.1.K(4) since it is specific to the CB zone.

3. Section 10.2.D.2.a provides that the minimum number of off-street parking spaces set forth in Table 3 of Section 7.1.1.D shall be interpreted as both a minimum and a maximum amount of parking spaces, and a waiver from the PEDB is required for additional off-street parking. The site plan shows that 73 spaces are required under Table 3, but 102 are provided. This requires a waiver under Section 10.2.D.2.a but no such waiver request is included in the application.

4. Section 10.2.D.2.b provides certain requirements for parking areas. Although the applicant has requested waivers of certain similar site plan regulations, these are requirements of the zoning by-law.

5. There are no Outdoor Amenity spaces identified on the site plan, see Section 10.D.2.F and Section 10.5.B.

6. The building should comply with Section 10.4. Under Section 10.4.C, the building type needs to be determined. It would appear that this building does not fall within any of the building type categories listed, in which case it would require a special permit from the PEDB under Section 10.4.C.2.

There may be other issues, depending upon how the applicant addresses the Central Business requirements.

Barbara J. Saint Andre Director, Community and Economic Development Town of Medway 155 Village Street Medway, MA 02053 (508) 321-4918

#### From: Susan Affleck-Childs

Sent: Monday, April 25, 2022 9:15 AM

To: Michael Boynton <mboynton@townofmedway.org>; Barbara Saint Andre <bsaintandre@townofmedway.org>; Bridget Graziano <bgraziano@townofmedway.org>; Peter Pelletier <ppelletier@townofmedway.org>; Sean Harrington <sharrington@townofmedway.org>; Joanne Russo <jrusso@townofmedway.org>; Donna Greenwood <dgreenwood@townofmedway.org>; Jeff Lynch <ChiefLynch@townofmedway.org>; Mike Fasolino <mfasolino@townofmedway.org>; Sgt. Jeffrey Watson <JWatson@medwaypolice.com>; Beth Hallal <bhallal@townofmedway.org>; Jack Mee <jmee@townofmedway.org> Subject: Recent project applications

#### Good morning,

The Board has received two applications for which the public hearings will start on Tuesday, May 10<sup>th</sup>.

- Cassidy Field Parking Area Improvements Site Plan <u>https://www.townofmedway.org/planning-</u> economic-development-board/pages/medway-department-public-services-building-site-plan
- Milford Regional Medical Facility Site Plan (86 Holliston Street) <a href="https://www.townofmedway.org/planning-economic-development-board/pages/milford-regional-medical-center">https://www.townofmedway.org/planning-economic-development-board/pages/milford-regional-medical-center</a>

Project information is available at the noted links. Please review the information and provide your comments to me by May 5<sup>th</sup> so I may share with the Board during the hearings. Thanks.

Susan E. Affleck-Childs Planning and Economic Development Coordinator Town of Medway 155 Village Street Medway, MA 02053 508-533-3291

![](_page_275_Picture_9.jpeg)

# **Transportation Impact Assessment**

Proposed Medical Office Building 86 Holliston Street Medway, Massachusetts

Prepared for:

Guerriere & Halnon, Inc. Franklin, Massachusetts

April 2022

Prepared by:

![](_page_276_Picture_6.jpeg)

35 New England Business Center Drive Suite 140 Andover, MA 01810

![](_page_277_Picture_0.jpeg)

Dear Reviewer:

This letter shall certify that this *Transportation Impact Assessment* has been prepared under my direct supervision and responsible charge. I am a Registered Professional Engineer (P.E.) in the Commonwealth of Massachusetts (Massachusetts P.E. No. 38871, Civil) and hold Certification as a Professional Traffic Operations Engineer (PTOE) from the Transportation Professional Certification Board, Inc. (TPCB), an independent affiliate of the Institute of Transportation Engineers (ITE) (PTOE Certificate No. 993). I am also a Fellow of the Institute of Transportation Engineers (FITE).

Sincerely,

VANASSE & ASSOCIATES, INC.

Grey S. Dirk

ffrey S. Dirk, P.E., PTOE, FITE Managing Partner

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No.	Title
1	Study Area Intersection Description
2	2022 Existing Traffic Volumes
3	Vehicle Travel Speed Measurements
4	Motor Vehicle Crash Data Summary
5	Trip-Generation Summary
6	Peak-Hour Traffic-Volume Increases
7	Level-of-Service Criteria for Signalized Intersections
8	Signalized Intersection Level-of-Service and Vehicle Queue Summary
9	Sight Distance Measurements

Vanasse & Associates, Inc. (VAI) has conducted a Transportation Impact Assessment (TIA) in order to determine the potential impacts on the transportation infrastructure associated with the proposed construction of a medical office building to be located at 86 Holliston Street in Medway, Massachusetts (hereafter referred to as the Project). This assessment was prepared in consultation with the Town of Medway and the Massachusetts Department of Transportation (MassDOT), and was performed in accordance with MassDOT's *Transportation Impact Assessment (TIA) Guidelines* and the standards of the Traffic Engineering and Transportation Planning professions for the preparation of such reports.

Based on this assessment, we have concluded the following with respect to the Project:

- 1. Using trip-generation statistics published by the Institute of Transportation Engineers (ITE),<sup>1</sup> the Project is expected to generate approximately 788 vehicle trips on an average weekday and 302 vehicle trips on a Saturday (both two-way volumes over the operational day of the Project), with approximately 61 vehicle trips expected during the weekday morning peak-hour, 86 vehicle trips expected during the weekday evening peak-hour and 66 vehicle trips expected during the Saturday midday peak-hour;
- 2. The Project will not result in a significant impact (increase) on motorist delays or vehicle queuing over anticipated future conditions without the Project (No-Build condition), with overall intersection operations maintained at a level of service (LOS) of D or better, where an LOS of "D" or better is defined as "acceptable" traffic operations;
- 3. All movements at the Project site driveway intersection with Main Street (Route 109) were shown to operate at a LOS D or better during the peak hours, with vehicle queue increases attributable to the Project shown to range from 0 to 6 vehicles (Route 109 eastbound approach);
- 4. The study area intersections were found to have a motor vehicle crash rate that is <u>below</u> the MassDOT Highway Division District 3 average crash rate for similar intersections, but <u>above</u> the MassDOT statewide average crash rate. A Road Safety Audit (RSA) has been

<sup>&</sup>lt;sup>1</sup>*Trip Generation*, 11<sup>th</sup> Edition; Institute of Transportation Engineers; Washington, DC; 2021.

conducted at the Route 109/Holliston Street intersection and the majority of the improvements recommended therein have been completed;<sup>2</sup> and

5. Lines of sight to and from the Project site driveway intersection were found to exceed the recommended minimum distances for safe and efficient operation based on the appropriate approach speed.

In consideration of the above, we have concluded that the Project can be accommodated within the confines of the existing transportation infrastructure in a safe and efficient manner with implementation of the recommendations that follow.

#### **RECOMMENDATIONS**

A detailed transportation improvement program has been developed that is designed to provide safe and efficient access to the Project site and address any deficiencies identified at off-site locations evaluated in conjunction with this study. The following improvements have been recommended as a part of this evaluation and, where applicable, will be completed in conjunction with the Project subject to receipt of all necessary rights, permits, and approvals.

#### **Project Access**

Access to the Project will be provided by way of the existing driveway that serves the abutting commercial property (Walgreens Pharmacy) and intersects the north side of Route 109 opposite the Medway Commons driveway. The intersection operates under traffic signal control. The following recommendations are offered with respect to the design and operation of the Project site access and internal circulation, many of which are reflected on the site plans:

- The shared (with Walgreens) access driveway should continue to provide two (2) exiting travel lanes (left-turn lane and a through/right-turn lane) and a two (2) entering travel lanes, with exiting traffic under traffic signal control. The individual driveways that will serve the Project site and internal circulating aisles should be a minimum of 24 feet in width and designed to accommodate the turning and maneuvering requirements of the largest anticipated responding emergency vehicle as defined by the Medway Fire Department.
- ➤ Where perpendicular parking is proposed, the drive aisle behind the parking should be a minimum of 23 feet in order to facilitate parking maneuvers.
- All signs and pavement markings to be installed within the Project site will conform to the applicable standards of the *Manual on Uniform Traffic Control Devices* (MUTCD).<sup>3</sup>
- A sidewalk is proposed within the Project site that will extend to the existing sidewalk along the north side of Route 109. Pedestrian crossings that are constructed in conjunction with the Project will include marked crosswalks with Americans with Disabilities Act (ADA) compliant wheelchair ramps.

 <sup>&</sup>lt;sup>2</sup>Road Safety Audit, Route 109 (Main Street) at Holliston Street, Howard/Stein-Hudson Associates; January 2014.
 <sup>3</sup>Manual on Uniform Traffic Control Devices (MUTCD); Federal Highway Administration; Washington, D.C.; 2009.

- Signs and landscaping to be installed as a part of the Project within the intersection sight triangle areas of the Project site driveway should be designed and maintained so as not to restrict lines of sight.
- Snow accumulations (windrows) within the sight triangle areas of the Project site driveway should be promptly removed where such accumulations would impede sight lines.
- Electric vehicle (EV) charging stations are provided in accordance with the Town of Medway Zoning Bylaw.

#### **Transportation Demand Management**

Regularly scheduled public transportation services are not currently provided in the immediate vicinity of the Project site. To the south of the Project site, the Greater Attleboro-Taunton Regional Transit Authority (GATRA) operates fixed route bus service along Holliston Street by way of the Medway T Shuttle, with a stop at the Medway Middle School, an approximate 13 minute walking distance from the Project site. In addition, GATRA provides Dial-a-Ride paratransit services to eligible persons that cannot use fixed-route transit all or some of the time due to a physical, cognitive or mental disability in compliance with the ADA.

In an effort to encourage the use of alternative modes of transportation to single-occupant vehicles (SOVs), the following Transportation Demand Management (TDM) measures will be implemented as a part of the Project:

- A transportation coordinator will be assigned for the Project to coordinate the TDM program;
- ➤ A "welcome packet" will be provided to employees detailing available public transportation services, bicycle and walking alternatives, and commuter options, and should include the contact information for the transportation coordinator;
- Specific amenities will be provided to discourage off-site trips, including providing a break-room equipped with a microwave and refrigerator; offering direct deposit of paychecks; and other such measures to reduce overall traffic volumes and travel during peak traffic volume periods;
- > Pedestrian accommodations are incorporated within the Project site; and
- > Secure bicycle parking has been provided within the Project site.

With implementation of the aforementioned recommendations, safe and efficient access will be provided to the Project site and the Project can be accommodated within the confines of the existing transportation system.

Vanasse & Associates, Inc. (VAI) has conducted a Transportation Impact Assessment (TIA) in order to determine the potential impacts on the transportation infrastructure associated with the proposed construction of a medical office building to be located at 86 Holliston Street in Medway, Massachusetts (hereafter referred to as the Project). This study evaluates the following specific areas as they relate to the Project: i) access requirements; ii) potential off-site improvements; and iii) safety considerations; and identifies and analyzes existing traffic conditions and future traffic conditions, both with and without the Project, along Main Street (Route 109) and at the intersections of Route 109 at Holliston Street and Route 109 at the Project site driveway and the Medway Commons driveway.

#### **PROJECT DESCRIPTION**

The Project will entail the construction of a  $21,900\pm$  square foot (sf) medical office building to be located at 86 Holliston Street in Medway, Massachusetts. The Project will be constructed on a portion of a larger parcel of land that extends between the Walgreens Pharmacy and Holliston Street. The parcel that will contain the Project encompasses approximately  $2.20\pm$  acres of land that is bounded by areas of open and wooded space to the north and west; a commercial property (Walgreens) to the east; and Route 109 to the south. Figure 1 depicts the Project site location in relation to the existing roadway network.

Access to the Project will be provided by way of the existing driveway that serves the abutting Walgreens Pharmacy and intersects the north side of Route 109 opposite the Medway Commons driveway. The intersection operates under traffic signal control.

On-site parking will be provided for 102 vehicles, or a parking ratio of approximately 1.4 parking spaces per 300 sf of floor area, which exceeds the requirements of Section 7.1.1, *Off-Street Parking and Loading*, of the Town of Medway Zoning Bylaw (one (1) space per 300 sf of floor area is required for medical offices or clinics).

![](_page_286_Picture_0.jpeg)

#### STUDY METHODOLOGY

This study was prepared in consultation with the Town of Medway and MassDOT; was performed in accordance with MassDOT's *Transportation Impact Assessment (TIA) Guidelines* and the standards of the Traffic Engineering and Transportation Planning professions for the preparation of such reports; and was conducted in three distinct stages.

The first stage involved an assessment of existing conditions in the study area and included an inventory of roadway geometrics; pedestrian and bicycle facilities; on-street parking; public transportation services; observations of traffic flow; and collection of pedestrian, bicycle and vehicle counts.

In the second stage of the study, future traffic conditions were projected and analyzed. Specific travel demand forecasts for the Project were assessed along with future traffic demands due to expected traffic growth independent of the Project. A seven-year time horizon was selected for analyses consistent with MassDOT's *Transportation Impact Assessment (TIA) Guidelines*. The traffic analysis conducted in stage two identifies existing or projected future roadway capacity, traffic safety, and site access issues.

The third stage of the study presents and evaluates measures to address traffic and safety issues, if any, identified in stage two of the study.
A comprehensive field inventory of existing conditions within the study area was conducted in February 2022. The field investigation consisted of an inventory of existing roadway geometrics; pedestrian and bicycle facilities; public transportation services; traffic volumes; and operating characteristics; as well as posted speed limits and land use information within the study area. The study area that was assessed for the Project consisted of Route 109 and the intersections of Route 109 at Holliston Street and Route 109 at the Project site driveway and the Medway Commons driveway.

The following describes the study area roadway and intersections.

#### ROADWAY

#### Main Street (Route 109)

- > Two-lane urban principal arterial roadway under Town jurisdiction;
- > Traverses the study area in a general northeast-southwest direction;
- Provides two 11 to 14-foot wide travel lanes that are separated by a double-yellow centerline with 1 to 2-foot wide marked shoulders and additional turning lanes provided at major intersections;
- > The posted speed limit is 35 miles per hour (mph) within the study area;
- Sidewalks are provided along both sides of the roadway west of Holliston Street and along the north side to the east;
- Illumination is provided by way of street lights mounted on wood and steel poles;
- Land use within the study area consists of the Project site, Walgreens Pharmacy, Medway Commons, and residential and commercial properties.

#### **INTERSECTIONS**

Table 1 and Figure 2 summarize existing lane use, traffic control, and pedestrian and bicycle accommodations at the study area intersections as observed in February 2022.

Intersection	Traffic Control Type <sup>a</sup>	No. of Travel Lanes Provided	Shoulder Provided? (Yes/No/Width)	Pedestrian Accommodations? (Yes/No/Description)	Bicycle Accommodations? (Yes/No/Description)
Rte. 109/ Holliston St.	TS	1 left-turn lane, 1 through lane, and 1 channelized right-turn lane on Rte. 109; 1 left-turn lane and 1 shared through/right-turn lane on Holliston St. northbound; 1 left-turn lane, 1 through lane, and 1 right-turn lane on Holliston St. southbound	Yes; 1 to 2 feet on Rte. 109; 1 to 4 feet on Holliston St.	Yes, both sides of Rte. 109 west of Holliston St.; north side of Rte. 109 east of Holliston St.; both sides of Holliston St. north of Rte. 109; east side of Holliston St south of Rte. 109; crosswalks provided across all legs; pedestrian traffic signal equipment and phasing (exclusive) provided as a part of the traffic signal system	Yes; bike lanes and "sharrow" markings along Rte. 109; shared traveled-way <sup>b</sup> along Holliston St.
Rte. 109/ Project Site Dwy./Medway Commons Dwy.	e TS I left-turn lane, 1 through lane, and 1 right-turn lane on Rte. 109 eastbound; 1 left-turn lane and 1 shared through/right-turn lane on Rte. 109 westbound and the Project site dwy.; 1 shared left-turn/through lane and 1 right-turn lane on Medway Commons dwy.		Yes; 2-feet on Rte. 109	Yes, north side of Rte. 109 and the west side of Medway Commons dwy.; crosswalks provided across the Rte 109 west leg and across the Project site dwy.; pedestrian traffic signal equipment and phasing (exclusive) provided as a part of the traffic signal system	Yes; shared travel-way along Rte. 109

# Table 1STUDY AREA INTERSECTION DESCRIPTION

<sup>a</sup>TS = traffic signal control.

<sup>b</sup>Combined shoulder and travel lane width equal to or exceed 14 feet.

#### **TRAFFIC VOLUMES**

In order to determine existing traffic-volume demands and flow patterns within the study area, automatic traffic recorder (ATR) counts, turning movement counts (TMCs) and vehicle classification counts were completed in February 2022. The ATR counts were conducted on Route 109 in the vicinity of the Project site on February 17<sup>th</sup> through 19<sup>th</sup>, 2022 (Thursday through Saturday, inclusive) in order to record traffic volume and flow conditions over an extended period, with peak period TMCs performed at the study intersections during the weekday morning (7:00 to

#### Legend:







#### Figure 2

Existing Intersection Lane Use, Travel Lane Width, and Pedestrian Facilities 9:00 AM) and evening (4:00 to 6:00 PM) peak periods on Thursday, February 17, 2022, and during the Saturday midday (11:00 AM to 2:00 PM) peak period on February 19, 2022. These time periods were selected for analysis purposes as they are representative of the peak-traffic-volume hours for both the Project and the adjacent roadway network.

#### **Traffic-Volume Adjustments**

In order to evaluate the potential for seasonal fluctuation of traffic volumes within the study area, traffic volume data from MassDOT Continuous Count Station No. 3180 located on Interstate 495 at the Bellingham town line in Medway were reviewed.<sup>4</sup> Based on a review of this data, it was determined that traffic volumes for the month of February are approximately 12.5 percent *below* average-month conditions. As such, the February traffic volumes were adjusted upward by 12.5 percent in order to be representative of average-month conditions.

In order to account for the impact on traffic volumes and trip patterns resulting from the COVID-19 pandemic, the TMCs that were collected as part of this assessment at the Route 109/Project site driveway/Medway Commons driveway were compared to those that were collected at the same intersection in October 2018. The 2018 traffic volumes were expanded to 2022 by applying the traffic growth procedure detailed in the April 2020 "Guidance on Traffic Counting Data" published by MassDOT<sup>5</sup> in order to allow for a comparison of the data. Based on this pre and post COVID-19 traffic-volume comparison, the traffic volume data that was collected as a part of this assessment was found to be representative conditions that existed prior to the onset of the COVID-19 pandemic. As such, further adjustment of the traffic-volume data was not necessary.

The 2022 Existing traffic volumes are summarized in Table 2, with the weekday morning, weekday evening and Saturday midday peak-hour traffic volumes graphically depicted on Figure 3. Note that the peak-hour traffic volumes that are presented in Table 2 were obtained from the aforementioned figures.

# Table 22022 EXISTING TRAFFIC VOLUMES

Location/Peak Hour	AWT <sup>a</sup>	Saturday <sup>b</sup>	VPH <sup>c</sup>	K Factor <sup>d</sup>	Directional Distribution <sup>e</sup>
<i>Route 109, east of Holliston Street:</i> Weekday Morning (8:00 – 9:00 AM) Weekday Evening (4:30 – 5:30 PM)	14,365  	12,520  	 1,101 1,202	 7.7 8.4	 62.2% EB 51.7% WB
Saturday Midday (11:30 AM – 12:30 PM)			1,261	10.1	51.5% WB

<sup>a</sup>Average weekday traffic in vehicles per day.

<sup>b</sup>Saturday traffic in vehicles.

<sup>c</sup>Vehicles per hour.

<sup>d</sup>Percent of daily traffic occurring during the peak hour.

<sup>e</sup>Percent traveling in peak direction.

EB = eastbound; WB = westbound.

<sup>&</sup>lt;sup>4</sup>MassDOT Traffic Volumes for the Commonwealth of Massachusetts; 2022.

<sup>&</sup>lt;sup>5</sup>*Guidance on Traffic Count Data*; MassDOT; revised April 2020.

#### WEEKDAY MORNING PEAK HOUR (7:15 to 8:15 AM)



#### WEEKDAY EVENING PEAK HOUR (4:00 to 5:00 PM)



#### SATURDAY MIDDAY PEAK HOUR (11:00 AM to 12:00 PM)



As can be seen in Table 2, Route 109 in the vicinity of the Project site was found to accommodate approximately 14,365 vehicles on an average weekday and 12,520 vehicles on a Saturday (two-way, 24-hour volumes), with approximately 1,101 vehicles per hour (vph) during the weekday morning peak-hour, 1,202 vph during the weekday evening peak-hour and 1,261 vph during the Saturday midday peak-hour.

#### PEDESTRIAN AND BICYCLE FACILITIES

A comprehensive field inventory of pedestrian and bicycle facilities within the study area was undertaken in February 2022. The field inventory consisted of a review of the location of sidewalks and pedestrian crossing locations along the study roadways and at the study area intersections. As detailed on Figure 2, sidewalks are provided along one or both sides of the study area roadways, with marked crosswalks provided for crossing one or more legs of the study area intersections. Pedestrian traffic signal equipment and phasing are provided as a part of the traffic signal system at the study area intersections.

Within the study area, Holliston Street generally provides sufficient width to accommodate bicycle travel in a shared traveled-way configuration (i.e., bicyclists and motor vehicles sharing the traveled-way).<sup>6</sup> A combination of on-road bicycle lanes and "sharrow" pavement markings are provided along Route 109 beginning at a point just east of Holliston Street and proceeding westerly thereafter. Bicycle detection is provided as a part of the traffic signal system at the Route 109/Holliston Street intersection.

#### PUBLIC TRANSPORTATION

Regularly scheduled public transportation services are not currently provided in the immediate vicinity of the Project site. To the south of the Project site, the Greater Attleboro-Taunton Regional Transit Authority (GATRA) operates fixed route bus service along Holliston Street by way of the Medway T Shuttle, with a stop located at the Medway Middle School, an approximate 13 minute walking distance from the Project site. In addition, GATRA provides Dial-a-Ride paratransit services to eligible persons that cannot use fixed-route transit all or some of the time due to a physical, cognitive or mental disability in compliance with the Americans with Disabilities Act (ADA).

<sup>&</sup>lt;sup>6</sup>A minimum combined travel lane and paved shoulder width of 14-feet is required to support bicycle travel in a shared traveled-way condition.

#### SPOT SPEED MEASUREMENTS

Vehicle travel speed measurements were performed on Route 109 in conjunction with the ATR counts. Table 3 summarizes the vehicle travel speed measurements.

	Route 109					
	Eastbound	Westbound				
Mean Travel Speed (mph)	29	21				
85 <sup>th</sup> Percentile Speed (mph)	32	28				
Posted Speed Limit (mph)	35	35				

# Table 3VEHICLE TRAVEL SPEED MEASUREMENTS

mph = miles per hour.

As can be seen in Table 3, the mean vehicle travel speed along Route 109 within the study area was found to be 29 mph in the eastbound direction and 21 mph westbound. The measured 85<sup>th</sup> percentile vehicle travel speed, or the speed at which 85 percent of the observed vehicles traveled at or below, was found to be 32 mph eastbound and 28 mph westbound, which is 3 to 7 mph below the posted speed limit in the vicinity of the Project site (35 mph). The 85<sup>th</sup> percentile speed is used as the basis of engineering design and in the evaluation of sight distances, and is often used in establishing posted speed limits.

#### MOTOR VEHICLE CRASH DATA

Motor vehicle crash information for the study area intersections was provided by the MassDOT Highway Division Safety Management/Traffic Operations Unit for the most recent five-year period available (2015 through 2019, inclusive) in order to examine motor vehicle crash trends occurring within the study area. The data is summarized by intersection, type, severity, roadway and weather conditions, and day of occurrence, and presented in Table 4.

As can be seen in Table 4, the study area intersections were found to have experienced an average of 7.2 or fewer reported motor vehicle crashes over the five-year review period and were found to have a motor vehicle crash rate that is <u>below</u> the MassDOT District average for similar intersections for the MassDOT Highway Division District in which the intersections are located (District 3), but <u>above</u> the MassDOT statewide average. The majority of the crashes were reported to have occurred on a weekday; under clear weather conditions; during daylight; and were reported as rear-end type collisions that resulted in property damage only.

	Rte. 109/ Holliston St.	Rte. 109/ Project Site Dwy./Medway Commons Dwy.
Traffic Control Type: <sup>b</sup>	TS	TS
<i>Year:</i> 2015 2016 2017 2018 <u>2019</u> Total	$     \begin{array}{c}       0 \\       4 \\       10 \\       9 \\       \underline{13} \\       36     \end{array} $	8 $4$ $5$ $0$ $25$
Average Rate <sup>c</sup> MassDOT Crash Rate: <sup>d</sup> Significant? <sup>e</sup>	7.2 0.79 0.78/0.89 No	5.0 0.86 0.78/0.89 No
<i>Type:</i> Angle Rear-End Head-On Sideswipe Fixed Object Pedestrian/Bicycle <u>Unknown/Other</u> Total	$ \begin{array}{r} 5\\23\\0\\4\\2\\0\\\underline{2}\\36\end{array} $	$ \begin{array}{r} 4\\ 16\\ 0\\ 2\\ 3\\ 0\\ \underline{0}\\ 25\end{array} $
Conditions: Clear Cloudy Rain <u>Snow/Ice</u> Total	28 $3$ $2$ $3$ $3$ $3$ $3$	$ \begin{array}{r} 19\\ 4\\ 0\\ \underline{2}\\ 25\end{array} \end{array} $
<i>Lighting:</i> Daylight Dawn/Dusk Dark (Road Lit) <u>Dark (Road Unlit)</u> Total	$\begin{array}{c} 24\\ 3\\ 9\\ \underline{0}\\ 36 \end{array}$	21 $0$ $4$ $0$ $25$
<i>Day of Week:</i> Monday through Friday Saturday <u>Sunday</u> Total	$26 \\ 6 \\ \frac{4}{36}$	$ \begin{array}{r} 19\\ 4\\ \underline{2}\\ 25 \end{array} $
Severity: Property Damage Only Personal Injury Fatality <u>Unknown</u> Total	$23$ 7 0 $\frac{6}{36}$	$ \begin{array}{r} 16\\ 7\\ 0\\ \frac{2}{25} \end{array} $

#### Table 4 MOTOR VEHICLE CRASH DATA SUMMARY<sup>a</sup>

<sup>a</sup>Source: MassDOT Safety Management/Traffic Operations Unit records, 2015 through 2019. <sup>b</sup>Traffic Control Type: TS = traffic signal control. <sup>c</sup>Crash rate per million vehicles entering the intersection. <sup>d</sup>Statewide/District crash rate.

"The intersection crash rate is significant if it is found to exceed the MassDOT crash rate for the MassDOT Highway Division District in which the Project is located (District 3).

A Road Safety Audit (RSA) was conducted at the Route 109/Holliston Street intersection in 2014 in order to identify potential safety enhancements at the intersection.<sup>7</sup> The RSA suggested a number of safety-related improvements that included access management; traffic signal improvements; sign enhancements; and pedestrian and bicyclist improvements; the majority of which appear to have been completed.

A review of the MassDOT statewide High Crash Location List indicated that there are no locations within the Town of Medway that are included on MassDOT's Highway Safety Improvement Program (HSIP) listing as a high crash location. In addition, no fatal motor vehicle crashes were reported to have occurred at the study area intersections over the five-year review period.

The detailed MassDOT Crash Rate Worksheets are provided in the Appendix.

<sup>&</sup>lt;sup>7</sup>Ibid 2.

Traffic volumes in the study area were projected to the year 2029, which reflects a seven-year planning horizon consistent with MassDOT's *Transportation Impact Assessment (TIA) Guidelines*. Independent of the Project, traffic volumes on the roadway network in the year 2029 under No-Build conditions include all existing traffic and new traffic resulting from background traffic growth. Anticipated Project-generated traffic volumes superimposed upon the 2029 No-Build traffic volumes reflect 2029 Build traffic-volume conditions with the Project.

#### FUTURE TRAFFIC GROWTH

Future traffic growth is a function of the expected land development in the immediate area and the surrounding region. Several methods can be used to estimate this growth. A procedure frequently employed estimates an annual percentage increase in traffic growth and applies that percentage to all traffic volumes under study. The drawback to such a procedure is that some turning volumes may actually grow at either a higher or a lower rate at particular intersections.

An alternative procedure identifies the location and type of planned development, estimates the traffic to be generated, and assigns it to the area roadway network. This procedure produces a more realistic estimate of growth for local traffic; however, potential population growth and development external to the study area would not be accounted for in the resulting traffic projections.

To provide a conservative analysis framework, both procedures were used, the salient components of which are described below.

#### **Specific Development by Others**

The Medway Planning and Economic Development Department was contacted in order to determine if there were any projects planned within the study area that would have an impact on future traffic volumes at the study intersections. Based on this consultation, the following project was identified for inclusion in this assessment:

Proposed Residential Development, 39 Main Street (Route 109), Medway, Massachusetts. This proposed project consists of the construction of a 190-unit multifamily residential development to be located at 39 Main Street (Route 109), east of the Project site. Traffic volumes associated with the aforementioned development project by others were obtained from the traffic study conducted for the specific development.<sup>8</sup> No other developments were identified at this time that are expected to result in an increase in traffic within the study area beyond the general background traffic growth rate.

#### **General Background Traffic Growth**

Traffic-volume data compiled by MassDOT from permanent count stations located in Medway were reviewed in order to determine general traffic growth trends in the area. This data indicates that traffic volumes have fluctuated over the 10-year period between 2009 and 2019, with an average decrease of 0.86 percent per year. In order to provide a prudent planning condition for the Project, a 1.0 percent per year compounded annual background traffic growth rate was used in order to account for future traffic growth and presently unforeseen development within the study area.

#### **Roadway Improvement Projects**

The Town of Medway and MassDOT were contacted in order to determine if there were any planned future roadway improvement projects expected to be complete by 2029 within the study area. Based on these discussions, no roadway improvement projects aside from routine maintenance activities were identified to be planned within the study area at this time.

#### No-Build Traffic Volumes

The 2029 No-Build condition peak-hour traffic volumes were developed by applying the 1.0 percent per year compounded annual background traffic growth rate to the 2022 Existing peak-hour traffic volumes and then adding the traffic volumes associated with the identified specific development project by others. The resulting 2029 No-Build weekday morning, weekday evening and Saturday midday peak-hour traffic volumes are shown on Figure 4.

#### PROJECT-GENERATED TRAFFIC

Design year (2029 Build) traffic volumes were determined by estimating Project-generated traffic volumes and assigning those volumes on the study area. The following sections describe the methodology used to develop the anticipated traffic characteristics of the Project.

As proposed, the Project will entail the construction of a  $21,900\pm$  sf medical office building. In order to develop the traffic characteristics of the Project, trip-generation statistics published by the Institute of Transportation Engineers (ITE)<sup>9</sup> for a similar land use as that proposed was used. ITE Land Use Code (LUC) 720, *Medical-Dental Office Building*; was used to establish the trip-generation characteristics of the Project, the results of which are summarized in Table 5, with the detailed trip calculations provided in the Appendix.

<sup>&</sup>lt;sup>8</sup>*Transportation Impact Assessment*, Proposed Residential Development; 39 Main Street (Route 109); Medway, Massachusetts; VAI; November 2018.

<sup>&</sup>lt;sup>9</sup>Ibid 1.

#### WEEKDAY MORNING PEAK HOUR (7:15 to 8:15 AM)



#### WEEKDAY EVENING PEAK HOUR (4:00 to 5:00 PM)



#### SATURDAY MIDDAY PEAK HOUR (11:00 AM to 12:00 PM)



# Table 5TRIP GENERATION SUMMARY

	Vehicle Trips <sup>a</sup>				
Time Period	Entering	Exiting	Total		
Average Weekday:	394	394	788		
Weekday Morning Peak-Hour:	48	13	61		
Weekday Evening Peak-Hour:	26	60	86		
Average Saturday:	151	151	302		
Saturday Midday Peak-Hour:	38	28	66		

<sup>a</sup>Based on ITE LUC 720, Medical-Dental Office Building.

#### **Project-Generated Traffic-Volume Summary**

As can be seen in Table 5, the Project is expected to generate approximately 788 vehicle trips on an average weekday and 302 vehicle trips on a Saturday (both two way volumes over the operational day of the Project), with approximately 61 vehicle trips (48 vehicles entering and 13 exiting) expected during the weekday morning peak-hour, 86 vehicle trips (26 vehicles entering and 60 exiting) expected during the weekday evening peak-hour and 66 vehicle trips (38 vehicles entering and 28 exiting) expected during the Saturday midday peak-hour.

#### TRIP DISTRIBUTION AND ASSIGNMENT

The directional distribution of generated trips to and from the Project site was determined based on a review of existing traffic patterns within the study area during the commuter peak periods. The general trip distribution for the Project is graphically depicted on Figure 5. Traffic volumes expected to be generated by the Project were assigned onto the study area roadway network as shown on Figure 6 for the weekday morning, weekday evening and Saturday midday peak hours.

#### **FUTURE TRAFFIC VOLUMES - BUILD CONDITION**

The 2029 Build condition traffic volumes consist of the 2029 No-Build traffic volumes with the additional traffic expected to be generated by the Project added to them. The 2029 Build weekday morning, weekday evening and Saturday midday peak-hour traffic volumes are graphically depicted on Figure 7.

A summary of peak-hour projected traffic-volume changes outside of the study area that is the subject of this assessment is shown in Table 6. These changes are a result of the construction of the Project.

#### Transportation Impact Assessment - Proposed Medical Office Building - Medway, Massachusetts

Legend:

- XX Entering Trips
- (XX) Exiting Trips







#### WEEKDAY EVENING PEAK HOUR (4:00 to 5:00 PM)



#### SATURDAY MIDDAY PEAK HOUR (11:00 AM to 12:00 PM)



#### WEEKDAY MORNING PEAK HOUR (7:15 to 8:15 AM)



#### WEEKDAY EVENING PEAK HOUR (4:00 to 5:00 PM)



#### SATURDAY MIDDAY PEAK HOUR (11:00 AM to 12:00 PM)



Location/Peak Hour	2022 Existing	2029 No-Build	2029 Build	Traffic- Volume Increase Over No-Build	Percent Increase Over No-Build
Route 109, east of the Project site driveway:					
Weekday Morning	1,076	1,198	1,213	15	1.3
Weekday Evening	1,140	1,281	1,304	23	1.8
Saturday Midday	1,149	1,289	1,306	17	1.3
Route 109, west of Holliston Street:					
Weekday Morning	1,514	1,650	1,674	24	1.5
Weekday Evening	1,687	1,842	1,875	33	1.8
Saturday Midday	1,752	1,907	1,933	26	1.4
Holliston Street, north of Route 109:					
Weekday Morning	759	823	833	10	1.2
Weekday Evening	808	878	892	14	1.6
Saturday Midday	730	794	805	11	1.4
Holliston Street, south of Route 109:					
Weekday Morning	822	888	900	12	1.4
Weekday Evening	803	869	885	16	1.8
Saturday Midday	805	872	884	12	1.4

# Table 6PEAK-HOUR TRAFFIC-VOLUME INCREASES

As shown in Table 6, Project-related traffic-volume increases outside of the study area relative to 2029 No-Build conditions are anticipated to range from 1.2 to 1.8 percent during the peak periods, with vehicle increases shown to range from 10 to 33 vehicles. When distributed over the peak hour, the predicted traffic-volume increases would not result in a significant impact (increase) on motorist delays or vehicle queuing outside of the immediate study area that is the subject of this assessment.

Measuring existing and future traffic volumes quantifies traffic flow within the study area. To assess quality of flow, roadway capacity and vehicle queue analyses were conducted under Existing, No-Build, and Build traffic-volume conditions. Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed upon them, with vehicle queue analyses providing a secondary measure of the operational characteristics of an intersection or section of roadway under study.

#### **METHODOLOGY**

#### Levels of Service

A primary result of capacity analyses is the assignment of level of service to traffic facilities under various traffic-flow conditions.<sup>10</sup> The concept of level of service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level-of-service definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six levels of service are defined for each type of facility. They are given letter designations from A to F, with level-of-service (LOS) A representing the best operating conditions and LOS F representing congested or constrained operating conditions.

Since the level of service of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of levels of service, depending on the time of day, day of week, or period of year.

<sup>&</sup>lt;sup>10</sup>The capacity analysis methodology is based on the concepts and procedures presented in the *Highway Capacity Manual;* Transportation Research Board; Washington, DC; 2010.

#### Signalized Intersections

The six levels of service for signalized intersections may be described as follows:

- LOS A describes operations with very low control delay; most vehicles do not stop at all.
- *LOS B* describes operations with relatively low control delay. However, more vehicles stop than LOS A.
- *LOS C* describes operations with higher control delays. Individual cycle failures may begin to appear. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
- *LOS D* describes operations with control delay in the range where the influence of congestion becomes more noticeable. Many vehicles stop and individual cycle failures are noticeable.
- *LOS E* describes operations with high control delay values. Individual cycle failures are frequent occurrences.
- LOS F describes operations with high control delay values that often occur with oversaturation. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Levels of service for signalized intersections are calculated using the operational analysis methodology of the 2000 *Highway Capacity Manual*<sup>11</sup> and implemented as a part of the Synchro® 11 software as recommended by MassDOT. This method assesses the effects of signal type, timing, phasing, and progression; vehicle mix; and geometrics on delay. Level-of-service designations are based on the criterion of control or signal delay per vehicle. Control or signal delay is a measure of driver discomfort, frustration, and fuel consumption, and includes initial deceleration delay approaching the traffic signal, queue move-up time, stopped delay and final acceleration delay. Table 7 summarizes the relationship between level of service and control delay. The tabulated control delay criterion may be applied in assigning level-of-service designations to individual lane groups, to individual intersection approaches, or to entire intersections.

<sup>&</sup>lt;sup>11</sup>*Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2000.

#### Table 7 LEVEL-OF-SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS<sup>a</sup>

Level of Service	Control (Signal) Delay Per Vehicle (Seconds)				
	10.0				
A	<u>&lt;</u> 10.0				
В	10.1 to 20.0				
С	20.1 to 35.0				
D	35.1 to 55.0				
Е	55.1 to 80.0				
F	>80.0				

<sup>a</sup>Source: *Highway Capacity Manual*, Transportation Research Board; Washington, DC; 2000; page 16-2.

#### Vehicle Queue Analysis

Vehicle queue analyses are a direct measurement of an intersection's ability to process vehicles under various traffic control and volume scenarios and lane use arrangements. The vehicle queue analysis was performed using the Synchro® intersection capacity analysis software which is based upon the methodology and procedures presented in the 2010 *Highway Capacity Manual*. The Synchro® vehicle queue analysis methodology is a simulation based model which reports the number of vehicles that experience a delay of six seconds or more at an intersection. For signalized intersections, Synchro® reports both the average (50<sup>th</sup> percentile) the 95<sup>th</sup> percentile vehicle queue. Vehicle queue lengths are a function of the capacity of the movement under study and the volume of traffic being processed by the intersection during the analysis period. The 95<sup>th</sup> percentile vehicle queue is the vehicle queue length that will be exceeded only 5 percent of the time, or approximately three minutes out of sixty minutes during the peak one hour of the day (during the remaining fifty-seven minutes, the vehicle queue length will be less than the 95<sup>th</sup> percentile queue length).

#### ANALYSIS RESULTS

Level-of-service and vehicle queue analyses were conducted for 2022 Existing, 2029 No-Build, and 2029 Build conditions for the intersections within the study area. The results of the intersection capacity and vehicle queue analyses are summarized in Table 8, with the detailed analysis results presented in the Appendix.

The following is a summary of the level-of-service and vehicle queue analyses for the intersections within the study area. For context, we note that an LOS of "D" or better is generally defined as "acceptable" operating conditions. Project-related impacts at the study area intersections were identified as follows:

# Table 8SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

		2022	Existing			2029 No-Build			2029 Build			
Signalized Intersection/Peak Hour/Movement	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
Route 109 at Holliston Street												
Weekday Morning:												
Route 109 EB LT	0.33	12.6	В	2/3	0.38	13.1	В	2/3	0.39	13.3	В	2/3
Route 109 EB TH	0.84	33.5	С	11/21	0.91	39.4	D	12/24	0.97	51.1	D	19/25
Route 109 EB RT	0.13	0.2	А	0/0	0.14	0.2	А	0/0	0.14	0.2	А	0/0
Route 109 WB LT	0.11	16.3	В	1/1	0.17	16.5	В	1/1	0.17	16.8	В	1/1
Route 109 WB TH	0.55	25.9	С	5/7	0.62	25.9	С	6/8	0.63	25.9	С	6/8
Route 109 WB RT	0.04	0.0	А	0/0	0.05	0.1	А	0/0	0.05	0.1	А	0/0
Holliston Street NB LT	0.69	27.3	С	4/6	0.77	32.1	С	5/7	0.77	32.1	С	5/7
Holliston Street NB TH/RT	0.67	34.8	С	6/9	0.79	43.3	D	7/11	0.82	46.3	D	7/11
Holliston Street SB LT	0.39	26.9	С	2/3	0.46	27.2	С	2/3	0.51	27.5	С	2/3
Holliston Street SB TH	0.81	49.9	D	6/8	0.91	66.3	Е	6/9	0.91	66.3	Е	6/9
Holliston Street SB RT	0.10	22.1	С	0/1	0.11	22.6	С	0/1	0.11	22.6	С	0/1
Overall		27.9	С			32.3	С			35.5	D	
Weekdav Evening:												
Route 109 EB LT	0.35	12.9	В	2/2	0.43	14.8	В	2/3	0.44	15.1	В	2/3
Route 109 EB TH	0.52	18.7	B	6/12	0.60	21.3	Ē	9/13	0.60	21.3	Ē	9/14
Route 109 EB RT	0.14	0.2	A	0/0	0.15	0.2	Ā	0/0	0.15	0.2	Ā	0/0
Route 109 WB LT	0.07	10.7	B	1/1	0.09	10.9	B	1/1	0.13	11.6	B	1/1
Route 109 WB TH	0.72	24.0	Ē	9/12	0.79	26.5	Ē	8/13	0.81	27.2	C	10/13
Route 109 WB RT	0.04	0.0	Ă	0/0	0.05	0.1	Ă	0/0	0.06	0.1	Ă	0/0
Holliston Street NB LT	0.69	31.4	C	4/7	0.76	35.7	D	4/8	0.78	38.4	D	4/8
Holliston Street NB TH/RT	0.58	36.1	Ď	4/7	0.63	37.5	D	5/8	0.76	39.4	D	5/8
Holliston Street SB LT	0.42	26.8	Č	2/4	0.50	27.4	Č	3/5	0.53	28.0	Č	3/5
Holliston Street SB TH	0.12	43.2	Ď	5/7	0.30	45.2	D	5/8	0.55	45.2	D	5/8
Holliston Street SB RT	0.14	24.4	C	0/2	0.23	24.9	C	1/3	0.74	25.0	C	1/3
Overall	0.14	27.9	č	0/2	0.25	24.9	Č		0.24	25.0	Č	1/5
Saturday Midday:		22.9	C			24.0	C			23.0	C	
Route 109 FB I T	0.39	13.5	в	2/3	0.47	15.4	R	2/4	0.48	15.9	R	2/4
Route 109 EB ET	0.57	20.9	C	9/16	0.72	23.1	C	11/21	0.40	24.0	C	12/22
Route 109 EB RT	0.00	0.2	Δ	0/0	0.12	0.2	Δ	0/0	0.18	0.2	Δ	0/0
Poute 109 EB RT	0.10	14.0	B	1/1	0.16	14.9	R	1/1	0.18	15.2	R	1/2
Route 100 WB TH	0.12	20.2	Б С	10/10	0.10	22.7	D C	12/22	0.16	24.8	D C	12/22
Route 109 WB III	0.79	29.2		0/0	0.85	0.1		0/0	0.80	0.1		13/23
Halliston Street ND I T	0.07	27.1	A C	5/7	0.08	21.5	A C	5/0	0.08	21.9	A C	5/0
Holliston Street ND TH/DT	0.07	2/.1	C	5/ /	0.74	22.0	C	5/9 1/7	0.74	22.6	C	5/9 1/7
Holliston Street ND IT/KI	0.45	25.0	C	4/0	0.49	32.0 26.0	C	4/ /	0.31	32.0 26.2	C	4//
Holliston Street SB L1	0.29	23.0	C	2/3	0.34	20.0	C	2/3	0.37	20.3	C	2/4
nomision Street SB 1H	0.40	32.9 20.4	C	3/3	0.48	34.0 21.6	C	3/0 1/2	0.48	34.Z	C	3/0
HOIIISTON STREET SB KI	0.11	20.4	C	0/2	0.17	21.6	C	1/3	0.18	21.8	C	1/3
Overall		21.3	C			23.7	C			24.3	C	

See notes at end of table.

#### Table 8 (Continued) SIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY

		2022	Existing		2029 No-Build			2029 Build				
Signalized Intersection/Peak Hour/Movement	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>	V/C	Delay	LOS	Queue 50 <sup>th</sup> /95 <sup>th</sup>
Route 109 at the Project site driveway and the Medway Commons Driveway												
Weekday Morning:												
Route 109 EB LT	0.00	4.9	А	0/0	0.00	4.9	А	0/0	0.06	4.9	А	0/1
Route 109 EB TH	0.52	7.4	А	5/6	0.57	7.4	Α	4/5	0.57	8.0	А	4/11
Route 109 EB RT	0.05	9.0	А	0/0	0.05	9.0	Α	0/0	0.05	9.0	А	0/0
Route 109 WB LT	0.07	3.7	А	0/1	0.08	4.1	А	0/1	0.08	4.2	А	0/1
Route 109 WB TH/RT	0.31	5.4	А	2/7	0.36	5.7	А	3/7	0.39	6.8	А	5/8
Medway Commons driveway NB LT/TH	0.42	38.5	D	2/3	0.44	38.9	D	2/3	0.45	39.1	D	2/3
Medway Commons driveway NB RT	0.06	35.2	D	0/1	0.06	35.5	D	0/1	0.06	35.5	D	0/1
Project site driveway SB LT	0.00	0.0	А	0/0	0.00	0.0	А	0/0	0.04	35.4	D	0/1
Project site driveway SB TH/RT	0.01	34.9	С	0/0	0.01	35.2	D	0/0	0.02	35.3	D	0/1
Overall		10.3	В			10.3	В			10.8	В	
Weekdav Evening:												
Route 109 EB LT	0.05	4.3	А	0/1	0.06	4.3	А	0/1	0.10	4.4	А	0/1
Route 109 EB TH	0.37	7.6	А	4/6	0.44	7.6	А	5/6	0.44	7.8	А	5/6
Route 109 EB RT	0.10	4.7	А	0/1	0.11	4.7	Α	0/1	0.11	4.7	А	0/1
Route 109 WB LT	0.17	3.7	А	1/2	0.19	4.2	А	1/2	0.19	4.4	А	1/2
Route 109 WB TH/RT	0.42	8.1	А	4/11	0.47	8.7	Α	4/13	0.49	8.7	А	8/13
Medway Commons driveway NB LT/TH	0.48	36.5	D	2/4	0.48	36.5	D	2/4	0.50	36.5	D	2/4
Medway Commons driveway NB RT	0.05	32.5	С	0/1	0.05	32.5	С	0/1	0.05	32.5	С	0/1
Project site driveway SB LT	0.10	32.9	С	1/1	0.10	32.9	С	1/1	0.18	33.3	С	1/2
Project site driveway SB TH/RT	0.05	32.5	С	0/1	0.05	32.5	С	0/1	0.08	32.5	С	0/2
Overall		11.3	В			11.3	В			12.5	В	
Saturday Midday:												
Route 109 EB LT	0.09	9.1	А	0/1	0.10	9.4	А	0/1	0.20	9.9	А	1/1
Route 109 EB TH	0.58	14.7	В	6/11	0.64	15.6	В	7/13	0.64	15.7	В	7/13
Route 109 EB RT	0.16	11.3	В	1/2	0.17	11.3	В	1/3	0.17	11.3	В	1/3
Route 109 WB LT	0.22	6.8	А	1/2	0.24	7.4	А	1/2	0.24	7.8	А	1/2
Route 109 WB TH/RT	0.62	13.4	В	5/12	0.68	14.3	В	6/14	0.72	16.6	В	10/15
Medway Commons driveway NB LT/TH	0.56	21.9	С	3/5	0.58	24.1	С	3/5	0.60	24.5	С	3/5
Medway Commons driveway NB RT	0.10	17.4	В	0/1	0.10	18.9	В	0/1	0.10	18.9	В	0/1
Project site driveway SB LT	0.05	17.2	В	0/1	0.05	18.6	В	0/1	0.09	18.9	В	1/1
Project site driveway SB TH/RT	0.08	17.3	B	1/1	0.08	18.7	B	1/1	0.10	18.8	B	1/1
Overall		14.5	В			15.4	В			16.2	В	

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

<sup>b</sup>Control (signal) delay per vehicle in seconds. <sup>c</sup>Level-of-Service.

 $^{d}$ Queue length in vehicles based on 25-feet per vehicle. NB = northbound; SB = southbound; EB = eastbound; WB = westbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.

#### **Route 109 at Holliston Street**

Overall operating conditions were shown to degrade from LOS C to a LOS D during the weekday morning peak-hour as a result of a predicted increase in overall average motorist delay of 3.2 seconds with the addition of Project-related traffic. Vehicle queues at the intersection were shown to increase by up to seven (7) vehicles with the addition of Project-related traffic. Independent of the Project, it was noted that through movements on the Holliston Street southbound approach are predicted to operate at capacity (i.e., LOS "E") during the weekday morning peak-hour under No-Build conditions.

#### Route 109 at the Project site driveway and the Medway Commons Driveway

No-change in overall level of service is predicted to occur over No-Build conditions; however, the addition of Project-related traffic was shown to result in an increase in average motorist delay (35.4 seconds) that caused a degradation in level-of-service for left-turn movements from the Project site driveway during the weekday morning peak-hour from LOS A to LOS D. Vehicle queues at the intersection were shown to increase by up to six (6) vehicles with the addition of Project-related traffic.

Sight distance measurements were performed at the Project site driveway intersection with Route 109 in accordance with MassDOT and American Association of State Highway and Transportation Officials (AASHTO)<sup>12</sup> requirements. Both stopping sight distance (SSD) and intersection sight distance (ISD) measurements were performed. In brief, SSD is the distance required by a vehicle traveling at the design speed of a roadway, on wet pavement, to stop prior to striking an object in its travel path. ISD or corner sight distance (CSD) is the sight distance required by a driver entering or crossing an intersecting roadway to perceive an on-coming vehicle and safely complete a turning or crossing maneuver with on-coming traffic. In accordance with AASHTO standards, if the measured ISD is at least equal to the required SSD value for the appropriate design speed, the intersection can operate in a safe manner. Table 9 presents the measured SSD and ISD at the subject intersection.

<sup>&</sup>lt;sup>12</sup>A Policy on Geometric Design of Highway and Streets, 7<sup>th</sup> Edition; American Association of State Highway and Transportation Officials (AASHTO); Washington D.C.; 2018.

#### Table 9 SIGHT DISTANCE MEASUREMENTS<sup>a</sup>

Intersection/Sight Distance Measurement	Required Minimum (SSD)	Desirable (ISD) <sup>b</sup>	Measured
Route 109 at the Project Site Driveway			
Stopping Sight Distance:			
Route 109 approaching from the east	250		500 +
Route 109 approaching from the west	250		500+
Intersection Sight Distance:			
Looking to the east from the Project Site Driveway	250	335	500 +
Looking to the west from the Project Site Driveway	250	415	500+

<sup>a</sup>Recommended minimum values obtained from *A Policy on Geometric Design of Highways and Streets,* 7<sup>th</sup> Edition; American Association of State Highway and Transportation Officials (AASHTO); 2018; and based on a 35 mph approach speed along Route 109. <sup>b</sup>Values shown are the intersection sight distance for a vehicle turning right or left exiting a roadway under STOP control such that motorists approaching the intersection on the major street should not need to adjust their travel speed to less than 70 percent of their initial approach speed. The critical gap for left-turn movements exiting the Project site driveway was increased by 0.5 seconds in order to account for the time to cross the left-turn lane along Route 109 westbound.

As can be seen in Table 9, the available lines of sight at the Project site driveway intersection with Route 109 exceed the recommended minimum sight distance to function in a safe (SSD) and efficient (ISD) manner based on a 35 mph approach speed along Route 109, which is 3 to 7 mph above the measured 85<sup>th</sup> percentile vehicle travel speed approaching the driveway (28/32 mph) and is consistent with the posted speed limit.

#### CONCLUSIONS

VAI has conducted a TIA in order to determine the potential impacts on the transportation infrastructure associated with the proposed construction of a medical office building to be located at 86 Holliston Street in Medway, Massachusetts. The following specific areas have been evaluated as they relate to the Project: i) access requirements; ii) potential off-site improvements; and iii) safety considerations; under existing and future conditions, both with and without the Project. Based on this assessment, we have concluded the following with respect to the Project:

- 1. Using trip-generation statistics published by the ITE,<sup>13</sup> the Project is expected to generate approximately 788 vehicle trips on an average weekday and 302 vehicle trips on a Saturday (both two-way volumes over the operational day of the Project), with approximately 61 vehicle trips expected during the weekday morning peak-hour, 86 vehicle trips expected during the weekday evening peak-hour and 66 vehicle trips expected during the Saturday midday peak-hour;
- 2. The Project will not result in a significant impact (increase) on motorist delays or vehicle queuing over anticipated future conditions without the Project (No-Build condition), with overall intersection operations maintained at LOS D or better, where an LOS of "D" or better is defined as "acceptable" traffic operations;
- 3. All movements at the Project site driveway intersection with Main Street (Route 109) were shown to operate at a LOS D or better during the peak hours, with vehicle queue increases attributable to the Project shown to range from 0 to 6 vehicles (Route 109 eastbound approach);
- 4. The study area intersections were found to have a motor vehicle crash rate that is <u>below</u> the MassDOT Highway Division District 3 average crash rate for similar intersections, but <u>above</u> the MassDOT statewide average crash rate. A Road Safety Audit (RSA) has been conducted at the Route 109/Holliston Street intersection and the majority of the improvements recommended therein have been completed;<sup>14</sup> and

<sup>&</sup>lt;sup>13</sup>Ibid 1.

<sup>&</sup>lt;sup>14</sup>Ibid 2.

5. Lines of sight to and from the Project site driveway intersection were found to exceed the recommended minimum distances for safe and efficient operation based on the appropriate approach speed.

In consideration of the above, we have concluded that the Project can be accommodated within the confines of the existing transportation infrastructure in a safe and efficient manner with implementation of the recommendations that follow.

#### **RECOMMENDATIONS**

A detailed transportation improvement program has been developed that is designed to provide safe and efficient access to the Project site and address any deficiencies identified at off-site locations evaluated in conjunction with this study. The following improvements have been recommended as a part of this evaluation and, where applicable, will be completed in conjunction with the Project subject to receipt of all necessary rights, permits, and approvals.

#### **Project Access**

Access to the Project will be provided by way of the existing driveway that serves the abutting commercial property (Walgreens Pharmacy) and intersects the north side of Route 109 opposite the Medway Commons driveway. The intersection operates under traffic signal control. The following recommendations are offered with respect to the design and operation of the Project site access and internal circulation, many of which are reflected on the site plans:

- The shared (with Walgreens) access driveway should continue to provide two (2) exiting travel lanes (left-turn lane and a through/right-turn lane) and a two (2) entering travel lanes, with exiting traffic under traffic signal control. The individual driveways that will serve the Project site and internal circulating aisles should be a minimum of 24 feet in width and designed to accommodate the turning and maneuvering requirements of the largest anticipated responding emergency vehicle as defined by the Medway Fire Department.
- Where perpendicular parking is proposed, the drive aisle behind the parking should be a minimum of 23 feet in order to facilitate parking maneuvers.
- ➢ All signs and pavement markings to be installed within the Project site will conform to the applicable standards of the *Manual on Uniform Traffic Control Devices* (MUTCD).<sup>15</sup>
- A sidewalk is proposed within the Project site that will extend to the existing sidewalk along the north side of Route 109. Pedestrian crossings that are constructed in conjunction with the Project will include marked crosswalks with Americans with Disabilities Act (ADA) compliant wheelchair ramps.
- Signs and landscaping to be installed as a part of the Project within the intersection sight triangle areas of the Project site driveway should be designed and maintained so as not to restrict lines of sight.
- Snow accumulations (windrows) within the sight triangle areas of the Project site driveway should be promptly removed where such accumulations would impede sight lines.

<sup>&</sup>lt;sup>15</sup>Ibid 3.

Electric vehicle (EV) charging stations are provided in accordance with the Town of Medway Zoning Bylaw.

#### **Transportation Demand Management**

Regularly scheduled public transportation services are not currently provided in the immediate vicinity of the Project site. To the south of the Project site, GATRA operates fixed route bus service along Holliston Street by way of the Medway T Shuttle, with a stop at the Medway Middle School, an approximate 13 minute walking distance from the Project site. In addition, GATRA provides Dial-a-Ride paratransit services to eligible persons that cannot use fixed-route transit all or some of the time due to a physical, cognitive or mental disability in compliance with the ADA.

In an effort to encourage the use of alternative modes of transportation to single-occupant vehicles (SOVs), the following Transportation Demand Management (TDM) measures will be implemented as a part of the Project:

- A transportation coordinator will be assigned for the Project to coordinate the TDM program;
- ➤ A "welcome packet" will be provided to employees detailing available public transportation services, bicycle and walking alternatives, and commuter options, and should include the contact information for the transportation coordinator;
- Specific amenities will be provided to discourage off-site trips, including providing a break-room equipped with a microwave and refrigerator; offering direct deposit of paychecks; and other such measures to reduce overall traffic volumes and travel during peak traffic volume periods;
- > Pedestrian accommodations are incorporated within the Project site; and
- > Secure bicycle parking has been provided within the Project site.

With implementation of the aforementioned recommendations, safe and efficient access will be provided to the Project site and the Project can be accommodated within the confines of the existing transportation system.

### APPENDIX

PROJECT SITE PLAN AUTOMATIC TRAFFIC RECORDER COUNT DATA MANUAL TURNING MOVEMENT COUNT DATA SEASONAL ADJUSTMENT DATA COVID-19 ADJUSTMENT DATA VEHICLE TRAVEL SPEED DATA MASSDOT CRASH RATE WORKSHEETS AND HIGH CRASH LOCATION MAPPING GENERAL BACKGROUND TRAFFIC GROWTH BACKGROUND DEVELOPMENT TRAFFIC-VOLUME NETWORKS TRIP-GENERATION CALCULATIONS SIGHT DISTANCE CALCULATIONS CAPACITY ANALYSIS WORKSHEETS



PROJECT SITE PLAN





# INDEX

1. COVER SHEET 2. ABUTTERS SHEET 3. EXISTING CONDITIONS 4. EROSION CONTROL 5. PROPOSED SITE LAYOUT 6. GRADING & DRAINAGE PLAN 7. UTILITY PLAN 8. LANDSCAPING PLAN 9. PHOTOMETRIC PLAN 10. CONSTRUCTION DETAILS 11. CONSTRUCTION DETAILS 12. CONSTRUCTION DETAILS 13. CONSTRUCTION DETAILS

# SITE PLAN 86 HOLLISTON STREET MEDWAY MASSACHUSETTS



# WAIVERS REQUESTED

REQUEST FROM THE TOWN MEDWAY PLANNING BOARD RULES AND REGULATIONS CHAPTER 200

- 1. SECTION 204-5 B SITE CONTEXT SHEET 2. SECTION 204-5 D.8 LANDSCAPE PLAN
- 3. SECTION 207-19 LANDSCAPING. B. LANDSCAPE BUFFERS (2)
- 4. SECTION 207-19 LANDSCAPING. C. PARKING AREAS (1a) 5. SECTION 207-19 LANDSCAPING. H.
- 6. SECTION 207-12 PARKING SPACE G. (3) LOCATION (a)

, <u>STEFANY OHANNESIAN</u>, CLERK OF THE TOWN OF MEDWAY, RECEIVED AND RECORDED FROM THE PLANNING BOARD COVENANT APPROVAL OF THIS PLAN ON AND NO APPEAL WAS TAKEN FOR TWENTY DAYS NEXT AFTER RECEIPT AND RECORDING OF SAME.

TOWN CLERK

DATE

	F4516					
APPROVED DATE:	_					
MEDWAY PLANNING BOARD						
	_					
	_					
	_					
	_					
	_					
BEING A MAJORITY	_					
LEGAL NOTES						
UTILITIES ARE PLOTTED AS A COMPILATION OF RECORD DOCUMENTS, MARKINGS AND OTHER OBSERVED EXIDENCE TO DEVELOR A VIEW OF THE UNDERGROUND UTILITIES AND SHOULD BE CONSIDERED APPROXIMATE. LACKING EXCAVATION, THE EXACT LOCATION OF UNDERGROUND FEATURES CANNOT BE ACCURATELY, COMPLETELY AND RELIABLY DEPICTED. ADDITIONAL UTILITIES, NOT EVIDENCED BY RECORD DOCUMENTS OR OBSERVED PHYSICAL EVIDENCE, MAY EXIST. CONTRACTORS (IN ACCORDANCE WITH MASS.G.L. CHAPTER 82 SECTION 40 AS AMENDED) MUST CONTACT ALL UTILITY COMPANIES BEFORE EXCAVATING AND DRILLING AND CALL DIGSAFE AT 1(888)DIG-SAFE{7233}. CONSTRUCTION ON THIS LAND IS SUBJECT TO ANY EASEMENTS, RIGHTS-OF-WAY, RESTRICTIONS, RESERVATIONS, OR OTHER LIMITATIONS WHICH MAY						
OWNER						
FREIL REALTY II, LLC DEED BOOK 27992 PAGE 300 PLAN BK. 515, PG 721 OF 2003 A.M. 41 LOT 8						
APPLICANT						
LOBISSER COMPANIES 1 CHARLESVIEW ROAD HOPEDALE, MA 01747 86 HOLLISTON STREET MEDWAY MASSACHUSETTS						
COVER SHEET						
FEBRUARY 7, 2022						
DATE REVISION DESCRIPTION	١					
GRAPHIC SCALE: 1"=30' 0 10 20 30 40 50 75 0 5 10 15 20 25	S					
S5 WEST CENTRAL ST. PH. (508) 528–31 FRANKLIN, MA 02038 FX. (508) 528–71 www.gandhengineering.com	NG 221 921					

1	OF	13

## ZONING DISTRICT CENTRAL BUSINESS

	<u>REQUIRED</u>	<u>PROPOSED</u>						
MIN. LOT AREA	10,000 SF	96,000 SF						
MIN. LOT FRONTAGE	NA <sup>f</sup>	300.00'						
MIN. YARD SETBACKS								
FRONT	10 FT	99'						
SIDE	10 FT 25 FT°	58.4'						
REAR	25 FT	83.0'						
STRUCTURE COVERAGE	80%	22.8%						
MAXIMUM IMPERVIOUS COVERAGE**	NA	NA						
MINIMUM OPEN SPACE	15%	22.4%						
*WHEN ABUTTING A RESIDENTIAL DISTRICT PROPERTIES IN THE CENTRAL BUSINESS DISTRICT THAT DO NOT HAVE								

FROPERTIES IN THE CENTRAL BUSINESS DISTRICT THAT DO NOT HAVE FRONTAGE ON A PUBLIC STREET SHALL BE REQUIRED TO HAVE AN EASEMENT OF AT LEAST 30 FEET IN WIDTH PROVIDING ACCESS TO A PUBLIC STREET.

\*\*MAXIMUM IMPERVIOUS COVERAGE IN A GROUND WATER PROTECTION DISTRICT: ANY USE THAT WILL RENDER IMPERVIOUS MORE THAN 15% OR 2500 SF. OF ANY LOT WHICHEVER IS GREATER.

## NOTE

A SPECIAL PERMIT WILL BE REQUIRED BY THE PLANNING BOARD FOR IMPERVIOUS COVERAGE IN A GROUNDWATER PROTECTION DISTRICT

NEW LOT AREA =  $96,000\pm$ SF.

EXISTING PAVEMENT =  $10,263\pm$  SF. PROPOSED BUILDING =  $21,900\pm$  SF. PROPOSED PAVEMENT =  $42,355\pm$  SF. TOTAL IMPERVIOUS =  $74,518\pm$  SF. (77.6%)

# LEGEND

⊞	CATCH BASIN	¢	LIGHT POLE			
O	DRAIN MANHOLE	ပ်	UTILITY POLE			
Ē	ELECTRIC MANHOLE	-0	GUY WIRE			
S	SEWER MANHOLE		-0-	SIGN		
0	MANHOLE	۹	WETFLAG			
GV	GAS VALVE	പ	UTILITY POLE			
s S	GAS SHUT OFF VALVE	Þ	PROP. STREET LIGHTING			
<b>₩</b> ×	WATER VALVE					
#So	WATER SHUT OFF VA	LVE	x 000.0	SPOT ELEVATION		
Д.	FIRE HYDRANT		RIPRAP			
	000	EXISTING CONTOUR				
	D	EXISTING DRAIN LINE				
	W	EXISTING WATER LINE				

# PARKING NOTES

ZONED: CENTRAL BUSINESS PARKING REQUIREMENTS PER ZONING:

TABLE 3. SCHEDULE OF OFF STREET PARKING REQUIREMENTS

MEDICAL OFFICE OR CLINIC: 1 SPACE PER 300 SF. = 67 SPACES REQUIRED PARKING SPACES PROVIDED = 109 SPACES TYPICAL PARKING SPACE: 18' X 9'

A SPECIAL PERMIT WILL BE REQUIRED BY THE PLANNING BOARD FOR PARKING LOCATED WITHIN THE FRONT YARD SETBACK.

SECTION 7. GENERAL REGULATIONS

7.1.1. OFF STREET PARKING AND LOADING

K.(4) SPECIAL PARKING TYPES AND STANDARDS;

FRONTAGE PARKING- BY SPECIAL PERMIT, BY THE BOARD TO ALLOW A LIMITED AMOUNT OF OFFSTREET

SURFACE PARKING TO BE PLACED BETWEEN A PUBLIC STREET AND THE STREET FACING FACADE OF A PRIMARY BUILDING. WHERE THIS IS PERMITTED BY THE BOARD, THE PARKING AREA WILL BE SETBACK A MINIMUM OF TWENTY FEET FROM THE STREET LINE AND STREETSCAPE TREATMENT.





AUTOMATIC TRAFFIC RECORDER COUNT DATA

Location : Route 109	
Location : West of Walgreen's Driveway	/
City/State: Medway, MA	

2/17/2022	EI	В,	Hour T	otals	W	В,	Hour	Fotals	Combine	d Totals
Time	Morning	Afternoon	Morning	Afternon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	2	121	0		6	98	0		0	
12:15	1	130			3	105				
12:30	2	108			7	108				
12:45	2	154	7	513	6	103	22	414	29	927
1:00	1	110			2	81				
1:15	4	108			4	113				
1:30	0	130			1	101				
1:45	2	95	7	443	3	89	10	384	17	827
2:00	1	120			3	83				
2:15	4	109			1	103				
2:30	1	125			1	111				
2:45	0	129	6	483	2	97	7	394	13	877
3:00	1	106			10	103				
3:15	0	156			0	104				
3:30	6	123			0	115				
3:45	5	135	12	520	4	95	14	417	26	937
4:00	5	139			4	100				
4:15	12	119			2	102				
4:30	17	119			3	106				
4:45	34	123	68	500	9	88	18	396	86	896
5:00	28	124			6	94				
5:15	38	125			22	91				
5:30	65	118			13	101				
5:45	80	109	211	476	28	106	69	392	280	868
6:00	105	109		110	37	99	00	002	200	000
6:15	126	90			42	105				
6:30	147	86			51	99				
6:45	142	78	520	363	67	81	197	384	717	747
7:00	133	82	020		68	90				
7:15	168	52			72	63				
7:30	149	60			75	79				
7:45	150	57	600	251	92	63	307	295	907	546
8:00	141	36	000	201	74	45	001	200	001	0.10
8:15	133	57			97	53				
8:30	141	37			74	51				
8:45	138	34	553	164	88	40	333	189	886	353
9:00	108	35	000		97	41				000
9:15	109	18			79	33				
9:30	111	15			79	33				
9:45	124	23	452	91	94	19	349	126	801	217
10:00	120	21		0.1	83	17	0.0	.20		
10:15	102	21			80	16				
10:30	105	12			83	20				
10:45	121	15	448	69	89	20	335	74	783	143
11:00	99	.0	1.0	00	97	12	000		,	1.0
11.15	112	5			95	10				
11:30	136	7			86	7				
11:45	115	6	462	25	83	8	361	37	823	62
Total	3346	3898	102	20	2022	3502	001		5368	7400
Percent	46.2%	53.8%			36.6%	63.4%			42.0%	58.0%

Location : Route 109	
Location : West of Walgreen's Driveway	
City/State: Medway, MA	

2/18/2022	EB	8,	Hour T	otals	WE	3,	Hour 1	otals	Combine	d Totals
Time	Morning	Afternoon	Morning	Afternon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	3	115			11	104				
12:15	5	127			9	94				
12:30	7	121			4	112				
12:45	1	111	16	474	10	103	34	413	50	887
1:00	1	127			3	111				
1:15	5	103			5	100				
1:30	5	129			2	102				
1:45	2	138	13	497	0	93	10	406	23	903
2:00	0	112			3	97				
2:15	2	112			3	117				
2:30	2	135			0	110				
2:45	1	139	5	498	1	118	7	442	12	940
3:00	0	130			13	106				
3:15	1	151			1	106				
3:30	3	143			3	95				
3:45	3	127	7	551	0	114	17	421	24	972
4:00	3	122			1	89				
4:15	11	128			1	111				
4:30	9	99			6	98				
4:45	33	118	56	467	3	94	11	392	67	859
5:00	29	121			7	106				
5:15	38	117			18	135				
5:30	54	122			13	115				
5:45	70	113	191	473	20	115	58	471	249	944
6:00	86	107			34	112				
6:15	128	104			37	122				
6:30	128	86			50	118				
6:45	144	77	486	374	61	101	182	453	668	827
7:00	148	86			55	101				
7:15	128	75			68	115				
7:30	134	52			79	63				
7:45	150	58	560	271	84	60	286	339	846	610
8:00	132	44			72	73				
8:15	143	54			85	47				
8:30	138	49			68	58				
8:45	139	43	552	190	75	32	300	210	852	400
9:00	117	32			82	49				
9:15	129	27			74	34				
9:30	110	19			87	33				
9:45	117	29	473	107	78	25	321	141	794	248
10:00	106	19			88	30				
10:15	98	33			81	30				
10:30	80	17			88	19				
10:45	100	20	384	89	97	17	354	96	738	185
11:00	120	14			101	17				
11:15	111	10			99	6				
11:30	129	13			101	16				
11:45	140	15	500	52	95	12	396	51	896	103
Total	3243	4043			1976	3835			5219	7878
Percent	44.5%	55.5%			34.0%	66.0%			39.8%	60.2%

Location : Route 109	
Location : West of Walgreen's Driveway	
City/State: Medway, MA	

92420001
02-120001

2/19/2022	EE	З,	Hour T	otals	W	В,	Hour	lotals	Combine	d Totals
Time	Morning	Afternoon	Morning	Afternon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	5	136			15	92				
12:15	7	115			11	108				
12:30	2	133			13	97				
12:45	7	121	21	505	5	94	44	391	65	896
1:00	6	119			7	110				
1:15	3	144			3	85				
1:30	3	132			3	103				
1:45	0	145	12	540	3	110	16	408	28	948
2:00	2	132			2	96				
2:15	5	136			3	111				
2:30	4	116			0	102				
2:45	1	128	12	512	1	121	6	430	18	942
3:00	0	105			2	106				
3:15	2	115			0	93				
3:30	2	117			2	116				
3:45	2	103	6	440	0	103	4	418	10	858
4:00	5	111			4	98				
4:15	7	105			0	93				
4:30	5	106			2	91				
4:45	10	109	27	431	4	92	10	374	37	805
5:00	10	87			4	99				
5:15	16	75			8	68				
5:30	18	98			11	89				
5:45	24	83	68	343	11	73	34	329	102	672
6:00	30	81			11	97				
6:15	21	63			21	78				
6:30	46	69			28	67				
6:45	41	65	138	278	19	61	79	303	217	581
7:00	52	46			29	60				
7:15	65	55			27	58				
7:30	57	60			46	50				
7:45	84	49	258	210	59	40	161	208	419	418
8:00	82	34			55	37				
8:15	77	33			68	36				
8:30	93	28			71	39				
8:45	109	37	361	132	72	27	266	139	627	271
9:00	95	42			87	27				
9:15	110	39			108	32				
9:30	99	20			75	29				
9:45	131	26	435	127	112	18	382	106	817	233
10:00	119	16			101	23				
10:15	118	25			109	19				
10:30	119	22			126	13				
10:45	144	19	500	82	101	19	437	74	937	156
11:00	112	12			125	16				
11:15	143	13			96	8				
11:30	147	11			102	21				
11:45	134	15	536	51	108	9	431	54	967	105
Total	2374	3651			1870	3234			4244	6885
Percent	39.4%	60.6%			36.6%	63.4%			38.1%	61.9%
Grand Total	8963	11592			5868	10571			14831	22163
Percent	43.6%	56.4%			35.7%	64.3%			40.1%	59.9%
ADT	1	ADT: 12,331	AA	ADT: 12,331						
Location	: Route 109									
------------	---------------------------------------									
Location	: West of Walgreen's Driveway									
0:1./01-1.	· · · · · · · · · · · · · · · · · · ·									

2/14/2022	Mond	av	Tueso	dav	Wedne	sdav	Thurs	dav	Frida	IV	Saturo	lav	Sund	av	Week Av	erade
Time	EB.	WB.	EB.	WB.	EB.	ŴВ.	EB.	у WB.	EB.	WB.	EB.	WB.	EB.	WB.	EB.	WB.
12:00 AM	*	*	*	*	*	*	7	22	16	34	21	44	*	*	15	33
1:00	*	*	*	*	*	*	7	10	13	10	12	16	*	*	11	12
2:00	*	*	*	*	*	*	6	7	5	7	12	6	*	*	8	7
3:00	*	*	*	*	*	*	12	14	7	17	6	4	*	*	8	12
4:00	*	*	*	*	*	*	68	18	56	11	27	10	*	*	50	13
5:00	*	*	*	*	*	*	211	69	191	58	68	34	*	*	157	54
6:00	*	*	*	*	*	*	520	197	486	182	138	79	*	*	381	153
7:00	*	*	*	*	*	*	600	307	560	286	258	161	*	*	473	251
8:00	*	*	*	*	*	*	553	333	552	300	361	266	*	*	489	300
9:00	*	*	*	*	*	*	452	349	473	321	435	382	*	*	453	351
10:00	*	*	*	*	*	*	448	335	384	354	500	437	*	*	444	375
11:00	*	*	*	*	*	*	462	361	500	396	536	431	*	*	499	396
12:00 PM	*	*	*	*	*	*	513	414	474	413	505	391	*	*	497	406
1:00	*	*	*	*	*	*	443	384	497	406	540	408	*	*	493	399
2:00	*	*	*	*	*	*	483	394	498	442	512	430	*	*	498	422
3:00	*	*	*	*	*	*	520	417	551	421	440	418	*	*	504	419
4:00	*	*	*	*	*	*	500	396	467	392	431	374	*	*	466	387
5:00	*	*	*	*	*	*	476	392	473	471	343	329	*	*	431	397
6:00	*	*	*	*	*	*	363	384	374	453	278	303	*	*	338	380
7:00	*	*	*	*	*	*	251	295	271	339	210	208	*	*	244	281
8:00	*	*	*	*	*	*	164	189	190	210	132	139	*	*	162	179
9:00	*	*	*	*	*	*	91	126	107	141	127	106	*	*	108	124
10:00	*	*	*	*	*	*	69	74	89	96	82	74	*	*	80	81
11:00	*	*	*	*	*	*	25	37	52	51	51	54	*	*	43	47
Total	0	0	0	0	0	0	7244	5524	7286	5811	6025	5104	0	0	6852	5479
Day	0		0		0		1276	58	1309	7	1112	9	0		1233	51
AM Peak							7:00	11:00	7:00	11:00	11:00	10:00			11:00	11:00
Volume							600	361	560	396	536	437			499	396
PM Peak							3:00	3:00	3:00	5:00	1:00	2:00			3:00	2:00
Volume							520	417	551	471	540	430			504	422
Comb Total	0		0		0		1276	58	1309	7	1112	9	0		1233	1
ADT	AD	T: 12,331	AAD	T: 12,331												



MANUAL TURNING MOVEMENT COUNT DATA

		Groups Printed- Cars - Trucks           Holliston St         Route 109         Holliston St         Route 109											
	н	olliston St		R	oute 109		H	olliston St		R	oute 109		
	F	rom North		Fr	om East		Fr	om South		Fr	om West		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	17	31	20	6	51	8	30	25	4	16	119	45	372
07:15 AM	21	70	24	5	73	14	49	46	12	27	135	65	541
07:30 AM	13	34	27	7	61	13	54	53	14	22	119	25	442
07:45 AM	15	27	24	2	85	7	44	39	7	27	128	34	439
Total	66	162	95	20	270	42	177	163	37	92	501	169	1794
08:00 AM	23	32	25	3	73	10	33	48	2	32	120	26	427
08:15 AM	15	21	23	2	89	13	34	53	1	27	116	30	424
08:30 AM	25	18	30	2	83	10	28	31	4	28	109	23	391
08:45 AM	30	37	42	3	69	21	30	21	4	27	107	27	418
Total	93	108	120	10	314	54	125	153	11	114	452	106	1660
Grand Total	159	270	215	30	584	96	302	316	48	206	953	275	3454
Apprch %	24.7	41.9	33.4	4.2	82.3	13.5	45.3	47.4	7.2	14.4	66.5	19.2	
Total %	4.6	7.8	6.2	0.9	16.9	2.8	8.7	9.1	1.4	6	27.6	8	
Cars	148	259	212	29	570	93	297	305	46	203	922	265	3349
% Cars	93.1	95.9	98.6	96.7	97.6	96.9	98.3	96.5	95.8	98.5	96.7	96.4	97
Trucks	11	11	3	1	14	3	5	11	2	3	31	10	105
% Trucks	6.9	4.1	1.4	3.3	2.4	3.1	1.7	3.5	4.2	1.5	3.3	3.6	3

		Hollis	ston St			Rou	te 109			Hollis	ston St			Rout	te 109		]
		From	North			From	n East			From	South			From	West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analy	ysis Fror	n 07:00	AM to (	08:45 AM	- Peak 1	of 1	-				-				-		
Peak Hour for E	ntire Inte	ersection	n Begins	s at 07:15	AM												
07:15 AM	21	70	24	115	5	73	14	92	49	46	12	107	27	135	65	227	541
07:30 AM	13	34	27	74	7	61	13	81	54	53	14	121	22	119	25	166	442
07:45 AM	15	27	24	66	2	85	7	94	44	39	7	90	27	128	34	189	439
08:00 AM	23	32	25	80	3	73	10	86	33	48	2	83	32	120	26	178	427
Total Volume	72	163	100	335	17	292	44	353	180	186	35	401	108	502	150	760	1849
% App. Total	21.5	48.7	29.9		4.8	82.7	12.5		44.9	46.4	8.7		14.2	66.1	19.7		
PHF	.783	.582	.926	.728	.607	.859	.786	.939	.833	.877	.625	.829	.844	.930	.577	.837	.854
Cars	70	155	98	323	16	284	43	343	176	179	33	388	106	485	143	734	1788
% Cars	97.2	95.1	98.0	96.4	94.1	97.3	97.7	97.2	97.8	96.2	94.3	96.8	98.1	96.6	95.3	96.6	96.7
Trucks	2	8	2	12	1	8	1	10	4	7	2	13	2	17	7	26	61
% Trucks	2.8	4.9	2.0	3.6	5.9	2.7	2.3	2.8	2.2	3.8	5.7	3.2	1.9	3.4	4.7	3.4	3.3



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	07:15 AM				07:45 AM				07:15 AM				07:00 AM			
+0 mins.	21	70	24	115	2	85	7	94	49	46	12	107	16	119	45	180
+15 mins.	13	34	27	74	3	73	10	86	54	53	14	121	27	135	65	227
+30 mins.	15	27	24	66	2	89	13	104	44	39	7	90	22	119	25	166
+45 mins.	23	32	25	80	2	83	10	95	33	48	2	83	27	128	34	189
Total Volume	72	163	100	335	9	330	40	379	180	186	35	401	92	501	169	762
% App. Total	21.5	48.7	29.9		2.4	87.1	10.6		44.9	46.4	8.7		12.1	65.7	22.2	
PHF	.783	.582	.926	.728	.750	.927	.769	.911	.833	.877	.625	.829	.852	.928	.650	.839
Cars	70	155	98	323	9	324	39	372	176	179	33	388	89	488	161	738
% Cars	97.2	95.1	98	96.4	100	98.2	97.5	98.2	97.8	96.2	94.3	96.8	96.7	97.4	95.3	96.9
Trucks	2	8	2	12	0	6	1	7	4	7	2	13	3	13	8	24
% Trucks	2.8	4.9	2	3.6	0	1.8	2.5	1.8	2.2	3.8	5.7	3.2	3.3	2.6	4.7	3.1



					Grou	ps Printec	I- Cars						
	H	olliston St		R	oute 109		H	olliston St		R	oute 109		
	Fr	om North		F	rom East		Fr	om South		Fre	om West		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	17	31	20	6	50	8	29	24	4	15	116	42	362
07:15 AM	21	65	24	4	72	14	46	43	12	27	132	61	521
07:30 AM	13	33	26	7	60	12	53	51	13	20	117	25	430
07:45 AM	15	26	23	2	80	7	44	39	7	27	123	33	426
Total	66	155	93	19	262	41	172	157	36	89	488	161	1739
08:00 AM	21	31	25	3	72	10	33	46	1	32	113	24	411
08:15 AM	15	19	22	2	89	12	34	52	1	27	114	30	417
08:30 AM	18	17	30	2	83	10	28	29	4	28	105	23	377
08:45 AM	28	37	42	3	64	20	30	21	4	27	102	27	405
Total	82	104	119	10	308	52	125	148	10	114	434	104	1610
Grand Total	148	259	212	29	570	93	297	305	46	203	922	265	3349
Apprch %	23.9	41.8	34.2	4.2	82.4	13.4	45.8	47.1	7.1	14.6	66.3	19.1	
Total %	4.4	7.7	6.3	0.9	17	2.8	8.9	9.1	1.4	6.1	27.5	7.9	

		Hollis	ston St			Rou	te 109			Hollis	ston St			Rout	te 109		
		From	North			From	n East			From	South			From	West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fror	n 07:00	AM to 0	08:45 AM	Peak 1	of 1											
Peak Hour for E	ntire Inte	rsectior	n Begins	s at 07:15	5  AM 0 4 72 14 90 46 43 12 101 27 132 61 220 $101$												
07:15 AM	21	65	24	110	4	72	14	90	46	43	12	101	27	132	61	220	521
07:30 AM	13	33	26	72	7	60	12	79	53	51	13	117	20	117	25	162	430
07:45 AM	15	26	23	64	2	80	7	89	44	39	7	90	27	123	33	183	426
08:00 AM	21	31	25	77	3	72	10	85	33	46	1	80	32	113	24	169	411
Total Volume	70	155	98	323	16	284	43	343	176	179	33	388	106	485	143	734	1788
% App. Total	21.7	48	30.3		4.7	82.8	12.5		45.4	46.1	8.5		14.4	66.1	19.5		
PHF	.833	.596	.942	.734	.571	.888.	.768	.953	.830	.877	.635	.829	.828	.919	.586	.834	.858

N/S Street : Holliston Street File Name : 92420001 E/W Street : Route 109 City/State : Medway, MA Weather : Cloudy Site Code : 92420001 Start Date : 2/17/2022 Page No : 5 Holliston St Out 328 <u>In Total</u> 323 651 In 98 155 70 Right Thru Left 70 Peak Hour Data Total 1292 North Peak Hour Begins at 07:15 AM 343 Cars <u>931</u> Thru Right 176 179 33 314 Out 702 Total 388 In Hollisto

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	07:15 AM		-		07:45 AM				07:15 AM				07:00 AM			
+0 mins.	21	65	24	110	2	80	7	89	46	43	12	101	15	116	42	173
+15 mins.	13	33	26	72	3	72	10	85	53	51	13	117	27	132	61	220
+30 mins.	15	26	23	64	2	89	12	103	44	39	7	90	20	117	25	162
+45 mins.	21	31	25	77	2	83	10	95	33	46	1	80	27	123	33	183
Total Volume	70	155	98	323	9	324	39	372	176	179	33	388	89	488	161	738
% App. Total	21.7	48	30.3		2.4	87.1	10.5		45.4	46.1	8.5		12.1	66.1	21.8	
PHF	.833	.596	.942	.734	.750	.910	.813	.903	.830	.877	.635	.829	.824	.924	.660	.839



N/S Street : Holliston Street

					Grou	os Printed-	Trucks						
	Ho	olliston St		F	Route 109		Н	Iolliston St		F	Route 109		
	Fr	om North		F	rom East		F	rom South		F	rom West		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	0	0	0	0	1	0	1	1	0	1	3	3	10
07:15 AM	0	5	0	1	1	0	3	3	0	0	3	4	20
07:30 AM	0	1	1	0	1	1	1	2	1	2	2	0	12
07:45 AM	0	1	1	0	5	0	0	0	0	0	5	1	13
Total	0	7	2	1	8	1	5	6	1	3	13	8	55
08:00 AM	2	1	0	0	1	0	0	2	1	0	7	2	16
08:15 AM	0	2	1	0	0	1	0	1	0	0	2	0	7
08:30 AM	7	1	0	0	0	0	0	2	0	0	4	0	14
08:45 AM	2	0	0	0	5	1	0	0	0	0	5	0	13
Total	11	4	1	0	6	2	0	5	1	0	18	2	50
Grand Total	11	11	3	1	14	3	5	11	2	3	31	10	105
Apprch %	44	44	12	5.6	77.8	16.7	27.8	61.1	11.1	6.8	70.5	22.7	
Total %	10.5	10.5	2.9	1	13.3	2.9	4.8	10.5	1.9	2.9	29.5	9.5	

		Hollis	ston St			Rou	te 109			Holli	ston St			Rou	te 109		]
		From	n North			From	n East			From	South			From	n West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fror	n 07:00	AM to 0	08:45 AM	Peak 1	of 1											
Peak Hour for E	ntire Inte	ersection	n Begins	s at 07:15	AM												
07:15 AM	0	5	0	5	1	1	0	2	3	3	0	6	0	3	4	7	20
07:30 AM	0	1	1	2	0	1	1	2	1	2	1	4	2	2	0	4	12
07:45 AM	0	1	1	2	0	5	0	5	0	0	0	0	0	5	1	6	13
08:00 AM	2	1	0	3	0	1	0	1	0	2	1	3	0	7	2	9	16
Total Volume	2	8	2	12	1	8	1	10	4	7	2	13	2	17	7	26	61
% App. Total	16.7	66.7	16.7		10	80	10		30.8	53.8	15.4		7.7	65.4	26.9		
PHF	.250	.400	.500	.600	.250	.400	.250	.500	.333	.583	.500	.542	.250	.607	.438	.722	.763



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	07:45 AM		-		07:00 AM				07:15 AM				07:15 AM			
+0 mins.	0	1	1	2	0	1	0	1	3	3	0	6	0	3	4	7
+15 mins.	2	1	0	3	1	1	0	2	1	2	1	4	2	2	0	4
+30 mins.	0	2	1	3	0	1	1	2	0	0	0	0	0	5	1	6
+45 mins.	7	1	0	8	0	5	0	5	0	2	1	3	0	7	2	9
Total Volume	9	5	2	16	1	8	1	10	4	7	2	13	2	17	7	26
% App. Total	56.2	31.2	12.5		10	80	10		30.8	53.8	15.4		7.7	65.4	26.9	
PHF	.321	.625	.500	.500	.250	.400	.250	.500	.333	.583	.500	.542	.250	.607	.438	.722



# N/S Street : Holliston Street E/W Street : Route 109 City/State : Medway, MA Weather : Cloudy

File Name : 92420001 
 Site Code
 : 92420001

 Start Date
 : 2/17/2022

 Page No
 : 9

								<u>Groups</u>	Printed	<u>- Bikes</u>	Peds								
		Hollist	on St			Route	e 109			Hollist	on St			Route	e 109				
		From	North			From	East			From \$	South			From	West				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1
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	1	0	0	0	0	0	0	0	0	1	0	1
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	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1
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	0	0	1	0	0	0	0	0	0	0	1	1
Grand Total	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	1	2
Apprch %	0	0	0		0	0	0		0	100	0		0	0	0				
Total %	0	0	0		0	0	0		0	100	0		0	0	0		50	50	

		Hollis	ston St			Rou	te 109			Holli	ston St			Rout	te 109		]
		From	North			From	n East			From	n South			From	West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fror	m 07:00	AM to 0	08:45 AM	- Peak 1	of 1											
Peak Hour for E	ntire Inte	ersection	n Begins	s at 07:45	AM												
07:45 AM	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
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
Total Volume	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
% App. Total	0	0	0		0	0	0		0	100	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.250	.000	.000	.000	.000	.250

N/S Street : Holliston Street File Name : 92420001 E/W Street : Route 109 City/State : Medway, MA Weather : Cloudy Site Code : 92420001 Start Date : 2/17/2022 Page No : 11 Holliston St Total 1 Out In 0 1 0 0 0 Right Thru Left 0 Peak Hour Data Total 0 2 North Peak Hour Begins at 07:45 AM Bikes Peds ota Out 1 Total 1 In

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	07:00 AM		-		07:00 AM				07:45 AM				07:00 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	1	0	1	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
% App. Total	0	0	0		0	0	0		0	100	0		0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.250	.000	.000	.000	.000



## File Name : 92420001 Site Code : 92420001 Start Date : 2/17/2022 Page No : 12

					Groups F	Printed- Ca	ars - Trucks						
	н	olliston St		R	Route 109		Н	olliston St		R	oute 109		
	F	rom North		F	rom East		Fi	rom South		Fr	om West		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	27	40	43	6	118	20	49	40	5	24	105	49	526
04:15 PM	25	31	32	7	119	9	49	28	4	31	96	42	473
04:30 PM	24	36	44	5	122	13	40	34	5	26	85	48	482
04:45 PM	25	54	43	5	114	12	39	33	9	22	95	55	506
Total	101	161	162	23	473	54	177	135	23	103	381	194	1987
05:00 PM	26	35	46	5	121	16	40	64	7	35	94	37	526
05:15 PM	24	34	51	7	99	14	42	34	5	21	92	46	469
05:30 PM	22	30	29	3	120	23	46	40	7	24	87	37	468
05:45 PM	13	31	18	3	113	20	35	23	3	19	93	40	411
Total	85	130	144	18	453	73	163	161	22	99	366	160	1874
Grand Total	186	291	306	41	926	127	340	296	45	202	747	354	3861
Apprch %	23.8	37.2	39.1	3.7	84.6	11.6	49.9	43.5	6.6	15.5	57.3	27.2	
Total %	4.8	7.5	7.9	1.1	24	3.3	8.8	7.7	1.2	5.2	19.3	9.2	
Cars	184	288	306	40	917	127	339	295	45	202	740	354	3837
% Cars	98.9	99	100	97.6	99	100	99.7	99.7	100	100	99.1	100	99.4
Trucks	2	3	0	1	9	0	1	1	0	0	7	0	24
% Trucks	1.1	1	0	2.4	1	0	0.3	0.3	0	0	0.9	0	0.6

		Hollis	ston St			Rout	te 109			Hollis	ston St			Rout	te 109		
		From	North			From	n East			From	South			From	West	-	
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analy	ysis Fror	n 04:00	PM to 0	)5:45 PM	- Peak 1	of 1	-				-				-		
Peak Hour for E	ntire Inte	rsectior	n Begins	s at 04:00	PM												
04:00 PM	27	40	43	110	6	118	20	144	49	40	5	94	24	105	49	178	526
04:15 PM	25	31	32	88	7	119	9	135	49	28	4	81	31	96	42	169	473
04:30 PM	24	36	44	104	5	122	13	140	40	34	5	79	26	85	48	159	482
04:45 PM	25	54	43	122	5	114	12	131	39	33	9	81	22	95	55	172	506
Total Volume	101	161	162	424	23	473	54	550	177	135	23	335	103	381	194	678	1987
% App. Total	23.8	38	38.2		4.2	86	9.8		52.8	40.3	6.9		15.2	56.2	28.6		
PHF	.935	.745	.920	.869	.821	.969	.675	.955	.903	.844	.639	.891	.831	.907	.882	.952	.944
Cars	99	158	162	419	22	469	54	545	176	134	23	333	103	377	194	674	1971
% Cars	98.0	98.1	100	98.8	95.7	99.2	100	99.1	99.4	99.3	100	99.4	100	99.0	100	99.4	99.2
Trucks	2	3	0	5	1	4	0	5	1	1	0	2	0	4	0	4	16
% Trucks	2.0	1.9	0	1.2	4.3	0.8	0	0.9	0.6	0.7	0	0.6	0	1.0	0	0.6	0.8



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	04:30 PM				04:00 PM				04:45 PM				04:00 PM			
+0 mins.	24	36	44	104	6	118	20	144	39	33	9	81	24	105	49	178
+15 mins.	25	54	43	122	7	119	9	135	40	64	7	111	31	96	42	169
+30 mins.	26	35	46	107	5	122	13	140	42	34	5	81	26	85	48	159
+45 mins.	24	34	51	109	5	114	12	131	46	40	7	93	22	95	55	172
Total Volume	99	159	184	442	23	473	54	550	167	171	28	366	103	381	194	678
% App. Total	22.4	36	41.6		4.2	86	9.8		45.6	46.7	7.7		15.2	56.2	28.6	
PHF	.952	.736	.902	.906	.821	.969	.675	.955	.908	.668	.778	.824	.831	.907	.882	.952
Cars	98	159	184	441	22	469	54	545	167	171	28	366	103	377	194	674
% Cars	99	100	100	99.8	95.7	99.2	100	99.1	100	100	100	100	100	99	100	99.4
Trucks	1	0	0	1	1	4	0	5	0	0	0	0	0	4	0	4
% Trucks	1	0	0	0.2	4.3	0.8	0	0.9	0	0	0	0	0	1	0	0.6



					Grou	ps Printed	- Cars						
	H	olliston St		R	oute 109		Ho	olliston St		R	oute 109		
	Fr	om North		Fr	om East		En	om South		Fr	om West		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	27	38	43	6	118	20	48	40	5	24	103	49	521
04:15 PM	24	30	32	6	115	9	49	28	4	31	94	42	464
04:30 PM	24	36	44	5	122	13	40	33	5	26	85	48	481
04:45 PM	24	54	43	5	114	12	39	33	9	22	95	55	505
Total	99	158	162	22	469	54	176	134	23	103	377	194	1971
05:00 PM	26	35	46	5	117	16	40	64	7	35	94	37	522
05:15 PM	24	34	51	7	98	14	42	34	5	21	91	46	467
05:30 PM	22	30	29	3	120	23	46	40	7	24	86	37	467
05:45 PM	13	31	18	3	113	20	35	23	3	19	92	40	410
Total	85	130	144	18	448	73	163	161	22	99	363	160	1866
Grand Total	184	288	306	40	917	127	339	295	45	202	740	354	3837
Apprch %	23.7	37	39.3	3.7	84.6	11.7	49.9	43.4	6.6	15.6	57.1	27.3	
Total %	4.8	7.5	8	1	23.9	3.3	8.8	7.7	1.2	5.3	19.3	9.2	

		Hollis	ston St			Rou	te 109			Hollis	ston St			Rout	te 109		]
		From	North			From	n East			From	South			From	West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fror	n 04:00	PM to C	)5:45 PM	- Peak 1	of 1											
Peak Hour for E	ntire Inte	ersection	n Begins	s at 04:30	PM												
04:30 PM	24	36	44	104	5	122	13	140	40	33	5	78	26	85	48	159	481
04:45 PM	24	54	43	121	5	114	12	131	39	33	9	81	22	95	55	172	505
05:00 PM	26	35	46	107	5	117	16	138	40	64	7	111	35	94	37	166	522
05:15 PM	24	34	51	109	7	98	14	119	42	34	5	81	21	91	46	158	467
Total Volume	98	159	184	441	22	451	55	528	161	164	26	351	104	365	186	655	1975
% App. Total	22.2	36.1	41.7		4.2	85.4	10.4		45.9	46.7	7.4		15.9	55.7	28.4		
PHF	.942	.736	.902	.911	.786	.924	.859	.943	.958	.641	.722	.791	.743	.961	.845	.952	.946

N/S Street : Holliston Street File Name : 92420001 E/W Street : Route 109 City/State : Medway, MA Weather : Cloudy Site Code : 92420001 Start Date : 2/17/2022 Page No : 5 Holliston St 
 Out
 In
 Total

 323
 441
 764
 98 Peak Hour Data Total 1451 North Peak Hour Begins at 04:30 PM 528 Cars Total 1017 Thru Right 161 164 26 367 Out 351 In 718 Total Hollisto

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	04:30 PM		-		04:00 PM				04:45 PM				04:00 PM			
+0 mins.	24	36	44	104	6	118	20	144	39	33	9	81	24	103	49	176
+15 mins.	24	54	43	121	6	115	9	130	40	64	7	111	31	94	42	167
+30 mins.	26	35	46	107	5	122	13	140	42	34	5	81	26	85	48	159
+45 mins.	24	34	51	109	5	114	12	131	46	40	7	93	22	95	55	172
Total Volume	98	159	184	441	22	469	54	545	167	171	28	366	103	377	194	674
% App. Total	22.2	36.1	41.7		4	86.1	9.9		45.6	46.7	7.7		15.3	55.9	28.8	
PHF	.942	.736	.902	.911	.917	.961	.675	.946	.908	.668	.778	.824	.831	.915	.882	.957





					Grou	ps Printed-	Trucks						
	F	Iolliston St		F	Route 109		F	Iolliston St		I	Route 109		
	F	rom North		F	rom East		F	rom South		F	rom West		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	0	2	0	0	0	0	1	0	0	0	2	0	5
04:15 PM	1	1	0	1	4	0	0	0	0	0	2	0	9
04:30 PM	0	0	0	0	0	0	0	1	0	0	0	0	1
04:45 PM	1	0	0	0	0	0	0	0	0	0	0	0	1
Total	2	3	0	1	4	0	1	1	0	0	4	0	16
05:00 PM	0	0	0	0	4	0	0	0	0	0	0	0	4
05:15 PM	0	0	0	0	1	0	0	0	0	0	1	0	2
05:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	1
Total	0	0	0	0	5	0	0	0	0	0	3	0	8
Grand Total	2	3	0	1	9	0	1	1	0	0	7	0	24
Apprch %	40	60	0	10	90	0	50	50	0	0	100	0	
Total %	8.3	12.5	0	4.2	37.5	0	4.2	4.2	0	0	29.2	0	

		Hollis	ston St			Rout	te 109			Hollis	ston St			Rou	te 109		
		From	North			From	n East			From	South			From	n West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fror	n 04:00	PM to 0	)5:45 PM ·	Peak 1	of 1											
Peak Hour for E	ntire Inte	ersection	n Begins	s at 04:00	PM												
04:00 PM	0	2	0	2	0	0	0	0	1	0	0	1	0	2	0	2	5
04:15 PM	1	1	0	2	1	4	0	5	0	0	0	0	0	2	0	2	9
04:30 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
04:45 PM	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Volume	2	3	0	5	1	4	0	5	1	1	0	2	0	4	0	4	16
% App. Total	40	60	0		20	80	0		50	50	0		0	100	0		
PHF	.500	.375	.000	.625	.250	.250	.000	.250	.250	.250	.000	.500	.000	.500	.000	.500	.444

N/S Street : Holliston Street File Name : 92420001 E/W Street : Route 109 City/State : Medway, MA Weather : Cloudy 
 Site Code
 : 92420001

 Start Date
 : 2/17/2022

 Page No
 : 8
 Holliston St Out Total In 5 6 1 0 3 2 Right Thru Left 2 Peak Hour Data Fotal 9 2 North Peak Hour Begins at 04:00 PM Trucks ota 6 Total 4 2 Out In

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	04:00 PM		-		04:15 PM				04:00 PM				04:00 PM			
+0 mins.	0	2	0	2	1	4	0	5	1	0	0	1	0	2	0	2
+15 mins.	1	1	0	2	0	0	0	0	0	0	0	0	0	2	0	2
+30 mins.	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
+45 mins.	1	0	0	1	0	4	0	4	0	0	0	0	0	0	0	0
Total Volume	2	3	0	5	1	8	0	9	1	1	0	2	0	4	0	4
% App. Total	40	60	0		11.1	88.9	0		50	50	0		0	100	0	
PHF	.500	.375	.000	.625	.250	.500	.000	.450	.250	.250	.000	.500	.000	.500	.000	.500



N/S Street : Holliston Street

File Name : 92420001 
 Site Code
 : 92420001

 Start Date
 : 2/17/2022

 Page No
 : 9

								<u>Groups</u>	Printed	<ul> <li>Bikes</li> </ul>	Peds								
		Hollist	on St			Route	e 109			Hollist	on St			Route	e 109				
		From	North			From	East			From	South			From	West				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	2	0	2
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	0	0	0	0	0
04:45 PM	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	1	0	0	0	0	2	0	2
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	1	1	0	0	0	0	0	0	0	1	1	2
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	1	0	0	0	0	1	0	1
Total	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	2	1	3
Grand Total	0	0	0	0	0	0	0	2	1	0	0	2	0	0	0	0	4	1	5
Apprch %	0	0	0		0	0	0		100	0	0		0	0	0				
Total %	0	0	0		0	0	0		100	0	0		0	0	0		80	20	

		Hollis	ston St			Rou	te 109			Holli	ston St			Rout	te 109		]
		From	n North			From	n East			From	n South			From	West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fror	n 04:00	PM to C	)5:45 PM ·	Peak 1	of 1											
Peak Hour for E	ntire Inte	ersection	n Begins	s at 04:30	PM												
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	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	1	0	0	1	0	0	0	0	1
Total Volume	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
% App. Total	0	0	0		0	0	0		100	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250	.000	.000	.000	.000	.250

N/S Street : Holliston Street File Name : 92420001 E/W Street : Route 109 City/State : Medway, MA Weather : Cloudy Site Code : 92420001 Start Date : 2/17/2022 Page No : 11 Holliston St Total 0 Out In 0 0 0 0 0 Right Thru Left 0 Peak Hour Data Fotal 2 North Peak Hour Begins at 04:30 PM Bikes Peds ota Right Out 1 Total 1 In Hollieta

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	04:00 PM		-		04:00 PM				04:30 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	0	0
+45 mins.	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
% App. Total	0	0	0		0	0	0		100	0	0		0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250	.000	.000	.000	.000



					Groups P	rinted- Ca	ars - Trucks	;					
	F	Iolliston St		R	oute 109		Н	Iolliston St		F	Route 109		
	F	rom North		Fr	rom East		F	rom South		F	rom West		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
11:00 AM	22	30	37	15	109	22	53	30	5	26	87	51	487
11:15 AM	22	28	41	6	118	21	58	21	10	23	111	50	509
11:30 AM	23	38	26	5	103	18	49	38	11	26	109	52	498
11:45 AM	13	22	35	6	120	24	50	26	4	34	119	57	510
Total	80	118	139	32	450	85	210	115	30	109	426	210	2004
12:00 PM	26	25	35	6	110	11	40	27	5	29	106	37	457
12:15 PM	32	21	25	4	117	28	43	35	8	31	77	46	467
12:30 PM	25	21	23	2	116	18	35	24	3	28	107	46	448
12:45 PM	21	32	30	5	96	22	42	24	5	27	94	66	464
Total	104	99	113	17	439	79	160	110	21	115	384	195	1836
01:00 PM	14	21	28	5	124	15	47	27	2	20	104	42	449
01:15 PM	20	22	27	4	99	16	33	21	9	28	122	40	441
01:30 PM	31	19	26	3	100	22	33	24	3	28	87	39	415
01:45 PM	23	22	24	10	123	17	31	27	8	34	110	48	477
Total	88	84	105	22	446	70	144	99	22	110	423	169	1782
Grand Total	272	301	357	71	1335	234	514	324	73	334	1233	574	5622
Apprch %	29.2	32.4	38.4	4.3	81.4	14.3	56.4	35.6	8	15.6	57.6	26.8	
Total %	4.8	5.4	6.4	1.3	23.7	4.2	9.1	5.8	1.3	5.9	21.9	10.2	
Cars	272	301	357	71	1332	234	514	323	73	334	1229	574	5614
% Cars	100	100	100	100	99.8	100	100	99.7	100	100	99.7	100	99.9
Trucks	0	0	0	0	3	0	0	1	0	0	4	0	8
% Trucks	0	0	0	0	0.2	0	0	0.3	0	0	0.3	0	0.1

		Hollis	ton St			Rout	te 109			Hollis	ston St			Rout	te 109		
		From	North			From	n East			From	South			From	West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analy	ysis From	n 11:00	AM to (	01:45 PM	- Peak 1	of 1	-				-				-		
Peak Hour for E	ntire Inte	rsectior	Begins	s at 11:00	AM												
11:00 AM	22	30	37	89	15	109	22	146	53	30	5	88	26	87	51	164	487
11:15 AM	22	28	41	91	6	118	21	145	58	21	10	89	23	111	50	184	509
11:30 AM	23	38	26	87	5	103	18	126	49	38	11	98	26	109	52	187	498
11:45 AM	13	22	35	70	6	120	24	150	50	26	4	80	34	119	57	210	510
Total Volume	80	118	139	337	32	450	85	567	210	115	30	355	109	426	210	745	2004
% App. Total	23.7	35	41.2		5.6	79.4	15		59.2	32.4	8.5		14.6	57.2	28.2		
PHF	.870	.776	.848	.926	.533	.938	.885	.945	.905	.757	.682	.906	.801	.895	.921	.887	.982
Cars	80	118	139	337	32	449	85	566	210	115	30	355	109	424	210	743	2001
% Cars	100	100	100	100	100	99.8	100	99.8	100	100	100	100	100	99.5	100	99.7	99.9
Trucks	0	0	0	0	0	1	0	1	0	0	0	0	0	2	0	2	3
% Trucks	0	0	0	0	0	0.2	0	0.2	0	0	0	0	0	0.5	0	0.3	0.1



Peak Hour Analysis From 11:00 AM to 01:45 PM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	11:00 AM		-		11:00 AM				11:00 AM				11:15 AM			
+0 mins.	22	30	37	89	15	109	22	146	53	30	5	88	23	111	50	184
+15 mins.	22	28	41	91	6	118	21	145	58	21	10	89	26	109	52	187
+30 mins.	23	38	26	87	5	103	18	126	49	38	11	98	34	119	57	210
+45 mins.	13	22	35	70	6	120	24	150	50	26	4	80	29	106	37	172
Total Volume	80	118	139	337	32	450	85	567	210	115	30	355	112	445	196	753
% App. Total	23.7	35	41.2		5.6	79.4	15		59.2	32.4	8.5		14.9	59.1	26	
PHF	.870	.776	.848	.926	.533	.938	.885	.945	.905	.757	.682	.906	.824	.935	.860	.896
Cars	80	118	139	337	32	449	85	566	210	115	30	355	112	444	196	752
% Cars	100	100	100	100	100	99.8	100	99.8	100	100	100	100	100	99.8	100	99.9
Trucks	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1
% Trucks	0	0	0	0	0	0.2	0	0.2	0	0	0	0	0	0.2	0	0.1



					Grou	ps Printed	- Cars						
	H	Iolliston St		R	oute 109		H	olliston St		R	loute 109		
	F	rom North		Fi	rom East		Fr	om South		Fr	om West		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
11:00 AM	22	30	37	15	109	22	53	30	5	26	86	51	486
11:15 AM	22	28	41	6	118	21	58	21	10	23	111	50	509
11:30 AM	23	38	26	5	103	18	49	38	11	26	109	52	498
11:45 AM	13	22	35	6	119	24	50	26	4	34	118	57	508
Total	80	118	139	32	449	85	210	115	30	109	424	210	2001
12:00 PM	26	25	35	6	109	11	40	27	5	29	106	37	456
12:15 PM	32	21	25	4	117	28	43	35	8	31	76	46	466
12:30 PM	25	21	23	2	115	18	35	24	3	28	107	46	447
12:45 PM	21	32	30	5	96	22	42	24	5	27	94	66	464
Total	104	99	113	17	437	79	160	110	21	115	383	195	1833
01:00 PM	14	21	28	5	124	15	47	27	2	20	103	42	448
01:15 PM	20	22	27	4	99	16	33	20	9	28	122	40	440
01:30 PM	31	19	26	3	100	22	33	24	3	28	87	39	415
01:45 PM	23	22	24	10	123	17	31	27	8	34	110	48	477
Total	88	84	105	22	446	70	144	98	22	110	422	169	1780
Grand Total	272	301	357	71	1332	234	514	323	73	334	1229	574	5614
Apprch %	29.2	32.4	38.4	4.3	81.4	14.3	56.5	35.5	8	15.6	57.5	26.9	
Total %	4.8	5.4	6.4	1.3	23.7	4.2	9.2	5.8	1.3	5.9	21.9	10.2	

		Hollis	ston St			Rou	te 109			Hollis	ston St			Rou	te 109		
		From	North			From	n East			From	South			From	n West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fron	n 11:00	AM to 0	)1:45 PM	Peak 1	of 1											
Peak Hour for E	ntire Inte	rsection	n Begins	s at 11:00	AM												
11:00 AM	22	30	37	89	15	109	22	146	53	30	5	88	26	86	51	163	486
11:15 AM	22	28	41	91	6	118	21	145	58	21	10	89	23	111	50	184	509
11:30 AM	23	38	26	87	5	103	18	126	49	38	11	98	26	109	52	187	498
11:45 AM	13	22	35	70	6	119	24	149	50	26	4	80	34	118	57	209	508
Total Volume	80	118	139	337	32	449	85	566	210	115	30	355	109	424	210	743	2001
% App. Total	23.7	35	41.2		5.7	79.3	15		59.2	32.4	8.5		14.7	57.1	28.3		
PHF	.870	.776	.848	.926	.533	.943	.885	.950	.905	.757	.682	.906	.801	.898	.921	.889	.983

N/S Street : Holliston Street File Name : 924200S1 E/W Street : Route 109 Site Code : 92420001 City/State : Medway, MA Weather : Cloudy Start Date : 2/19/2022 Page No : 5 Holliston St Out \_\_\_\_\_\_ In Total 337 646 In \_\_\_\_\_\_\_ 139 118 80 Right Thru Left ↓ ↓ 80 Peak Hour Data Total 1541 North Peak Hour Begins at 11:00 AM 566 Cars 1100 Thru Right 210 115 30 360 Out 715 Total 355 In Hollisto

Peak Hour Analysis From 11:00 AM to 01:45 PM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	11:00 AM		•		11:00 AM				11:00 AM				11:15 AM			
+0 mins.	22	30	37	89	15	109	22	146	53	30	5	88	23	111	50	184
+15 mins.	22	28	41	91	6	118	21	145	58	21	10	89	26	109	52	187
+30 mins.	23	38	26	87	5	103	18	126	49	38	11	98	34	118	57	209
+45 mins.	13	22	35	70	6	119	24	149	50	26	4	80	29	106	37	172
Total Volume	80	118	139	337	32	449	85	566	210	115	30	355	112	444	196	752
% App. Total	23.7	35	41.2		5.7	79.3	15		59.2	32.4	8.5		14.9	59	26.1	
PHF	.870	.776	.848	.926	.533	.943	.885	.950	.905	.757	.682	.906	.824	.941	.860	.900



#### N/S Street : Holliston Street E/W Street : Route 109 City/State : Medway, MA Weather : Cloudy

 File Name
 : 924200S1

 Site Code
 : 92420001

 Start Date
 : 2/19/2022

 Page No
 : 6

					Group	os Printed	- Trucks						
	Н	Iolliston St		F	Route 109		F	Iolliston St		F	Route 109		
	F	rom North		F	rom East		F	rom South		F	rom West		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
11:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	1
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	1	0	0	0	0	0	1	0	2
Total	0	0	0	0	1	0	0	0	0	0	2	0	3
12:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
12:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	1
12:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	2	0	0	0	0	0	1	0	3
01:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	1
01:15 PM	0	0	0	0	0	0	0	1	0	0	0	0	1
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	1	0	0	1	0	2
Grand Total	0	0	0	0	3	0	0	1	0	0	4	0	8
Apprch %	0	0	0	0	100	0	0	100	0	0	100	0	
Total %	0	0	0	0	37.5	0	0	12.5	0	0	50	0	

		Hollis	ton St			Rout	te 109			Hollis	ston St			Rout	te 109		
		From	North			From	n East			From	South			From	West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fron	n 11:00	AM to C	)1:45 PM ·	Peak 1	of 1	-				-				-		
Peak Hour for E	ntire Inte	rsectior	Begins	at 11:45	AM												
11:45 AM	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	2
12:00 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
12:30 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
Total Volume	0	0	0	0	0	3	0	3	0	0	0	0	0	2	0	2	5
% App. Total	0	0	0		0	100	0		0	0	0		0	100	0		
PHF	.000	.000	.000	.000	.000	.750	.000	.750	.000	.000	.000	.000	.000	.500	.000	.500	.625

N/S Street : Holliston Street File Name : 924200S1 E/W Street : Route 109 City/State : Medway, MA Weather : Cloudy Site Code : 92420001 Start Date : 2/19/2022 Page No : 8 Holliston St Total 0 Out In 0 0 0 0 0 Right Thru Left 0 Peak Hour Data Total 5 North Peak Hour Begins at 11:45 AM Trucks ota 0 Total 0 0 Out In ollista

Peak Hour Analysis From 11:00 AM to 01:45 PM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	11:00 AM		-		11:45 AM				12:30 PM				11:00 AM			
+0 mins.	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1
+15 mins.	0	0	0	0	0	1	0	1	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	1	0	1	0	1	0	1	0	1	0	1
Total Volume	0	0	0	0	0	3	0	3	0	1	0	1	0	2	0	2
% App. Total	0	0	0		0	100	0		0	100	0		0	100	0	
PHF	.000	.000	.000	.000	.000	.750	.000	.750	.000	.250	.000	.250	.000	.500	.000	.500



# File Name :924200S1 Site Code :92420001 Start Date :2/19/2022 Page No :9

								Groups	Printec	I- Bikes	Peds						-		
		Hollist	on St			Route	e 109			Hollis	ton St			Route	e 109				
		From	North			From	East			From	South			From	West				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
11:00 AM	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	3	0	3
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1
Total	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	4	0	4
12:00 PM	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	3	0	3
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
12:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	2	1	3
Total	0	0	0	2	0	0	0	0	0	1	0	2	0	0	0	2	6	1	7
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
	-	-	-		-	-	-	- 1	-	-	-	- 1	-	-	-	-		-	
Grand Total	0	0	0	3	0	0	0	2	0	1	0	4	0	0	0	2	11	1	12
Apprch %	0	Ó	0	-	Ó	0	0	-	Ó	100	0	-	Ó	Ő	Ó				
Total %	Õ	Õ	Õ		Õ	Õ	Õ		Õ	100	Õ		Õ	Õ	Õ		91.7	8.3	
/ - /	-	-	-	'	-	-	-	,	-		-		-	-	-				

	Holliston St				Route 109				Holliston St				Route 109				
	From North				From East				From South				From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analy	eak Hour Analysis From 11:00 AM to 01:45 PM - Peak 1 of 1																
Peak Hour for E	Peak Hour for Entire Intersection Begins at 12:00 PM																
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
Total Volume	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
% App. Total	0	0	0		0	0	0		0	100	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.250	.000	.000	.000	.000	.250
N/S Street : Holliston Street File Name : 924200S1 E/W Street : Route 109 City/State : Medway, MA Weather : Cloudy Site Code : 92420001 Start Date : 2/19/2022 Page No : 11 Holliston St Total 1 Out In 0 1 0 0 0 Right Thru Left 0 Peak Hour Data Total 0 2 North Peak Hour Begins at 12:00 PM Bikes Peds ota Out 1 Total 1 In

Peak Hour Analysis From 11:00 AM to 01:45 PM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	11:00 AM		-		11:00 AM				12:00 PM				11:00 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	1	0	1	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
% App. Total	0	0	0		0	0	0		0	100	0		0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.250	.000	.000	.000	.000



#### File Name : 924200S1 Site Code : 92420001 Start Date : 2/19/2022 Page No : 12

					Groups F	Printed- Ca	ars - Trucks						
	V	Valgreens		F	Route 109		Medw	ay Commo	ons	R	Route 109		
	F	rom North		F	rom East		Fr	rom South		Fr	rom West		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	1	0	0	5	57	0	13	0	7	0	132	11	226
07:15 AM	0	0	0	11	66	0	16	0	13	0	133	28	267
07:30 AM	0	0	0	5	66	0	15	0	21	0	148	8	263
07:45 AM	0	0	0	6	86	0	12	0	14	0	135	12	265
Total	1	0	0	27	275	0	56	0	55	0	548	59	1021
08:00 AM	0	1	0	12	69	0	9	0	14	0	121	19	245
08:15 AM	0	0	1	5	100	1	12	0	12	1	119	24	275
08:30 AM	1	0	0	10	65	1	22	0	7	2	111	22	241
08:45 AM	0	0	0	10	82	0	17	0	14	2	119	24	268
Total	1	1	1	37	316	2	60	0	47	5	470	89	1029
Grand Total	2	1	1	64	591	2	116	0	102	5	1018	148	2050
Apprch %	50	25	25	9.7	90	0.3	53.2	0	46.8	0.4	86.9	12.6	
Total %	0.1	0	0	3.1	28.8	0.1	5.7	0	5	0.2	49.7	7.2	
Cars	2	1	1	62	573	2	113	0	98	5	977	143	1977
% Cars	100	100	100	96.9	97	100	97.4	0	96.1	100	96	96.6	96.4
Trucks	0	0	0	2	18	0	3	0	4	0	41	5	73
% Trucks	0	0	0	3.1	3	0	2.6	0	3.9	0	4	3.4	3.6

		Walg	greens			Rou	te 109		Ν	ledway	Commo	ons		Rou	te 109		]
		From	North			From	n East			From	South			From	West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fron	n 07:00	AM to C	08:45 AM	- Peak 1	of 1											
Peak Hour for E	ntire Inte	rsectior	n Begins	at 07:30	AM												
07:30 AM	0	0	0	0	5	66	0	71	15	0	21	36	0	148	8	156	263
07:45 AM	0	0	0	0	6	86	0	92	12	0	14	26	0	135	12	147	265
08:00 AM	0	1	0	1	12	69	0	81	9	0	14	23	0	121	19	140	245
08:15 AM	0	0	1	1	5	100	1	106	12	0	12	24	1	119	24	144	275
Total Volume	0	1	1	2	28	321	1	350	48	0	61	109	1	523	63	587	1048
% App. Total	0	50	50		8	91.7	0.3		44	0	56		0.2	89.1	10.7		
PHF	.000	.250	.250	.500	.583	.803	.250	.825	.800	.000	.726	.757	.250	.883	.656	.941	.953
Cars	0	1	1	2	27	312	1	340	46	0	60	106	1	505	62	568	1016
% Cars	0	100	100	100	96.4	97.2	100	97.1	95.8	0	98.4	97.2	100	96.6	98.4	96.8	96.9
Trucks	0	0	0	0	1	9	0	10	2	0	1	3	0	18	1	19	32
% Trucks	0	0	0	0	3.6	2.8	0	2.9	4.2	0	1.6	2.8	0	3.4	1.6	3.2	3.1



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	07:45 AM				07:45 AM				07:15 AM				07:00 AM			
+0 mins.	0	0	0	0	6	86	0	92	16	0	13	29	0	132	11	143
+15 mins.	0	1	0	1	12	69	0	81	15	0	21	36	0	133	28	161
+30 mins.	0	0	1	1	5	100	1	106	12	0	14	26	0	148	8	156
+45 mins.	1	0	0	1	10	65	1	76	9	0	14	23	0	135	12	147
Total Volume	1	1	1	3	33	320	2	355	52	0	62	114	0	548	59	607
% App. Total	33.3	33.3	33.3		9.3	90.1	0.6		45.6	0	54.4		0	90.3	9.7	
PHF	.250	.250	.250	.750	.688	.800	.500	.837	.813	.000	.738	.792	.000	.926	.527	.943
Cars	1	1	1	3	31	313	2	346	49	0	62	111	0	534	57	591
% Cars	100	100	100	100	93.9	97.8	100	97.5	94.2	0	100	97.4	0	97.4	96.6	97.4
Trucks	0	0	0	0	2	7	0	9	3	0	0	3	0	14	2	16
% Trucks	0	0	0	0	6.1	2.2	0	2.5	5.8	0	0	2.6	0	2.6	3.4	2.6

N/S Street : Walgreens / Medway Commons E/W Street : Route 109 City/State : Medway, MA Weather : Cloudy

 File Name
 : 92420002

 Site Code
 : 92420002

 Start Date
 : 2/17/2022

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					Grou	ps Printed	- Cars						
	W	algreens		R	oute 109		Medw	ay Commo	ons	R	oute 109		
	Fr	om North		F	rom East		Fr	om South		Er	om West		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	1	0	0	5	56	0	13	0	6	0	129	11	221
07:15 AM	0	0	0	11	64	0	15	0	13	0	129	26	258
07:30 AM	0	0	0	5	64	0	14	0	21	0	146	8	258
07:45 AM	0	0	0	5	82	0	11	0	14	0	130	12	254
Total	1	0	0	26	266	0	53	0	54	0	534	57	991
08:00 AM	0	1	0	12	68	0	9	0	14	0	114	18	236
08:15 AM	0	0	1	5	98	1	12	0	11	1	115	24	268
08:30 AM	1	0	0	9	65	1	22	0	7	2	102	21	230
08:45 AM	0	0	0	10	76	0	17	0	12	2	112	23	252
Total	1	1	1	36	307	2	60	0	44	5	443	86	986
Grand Total	2	1	1	62	573	2	113	0	98	5	977	143	1977
Apprch %	50	25	25	9.7	90	0.3	53.6	0	46.4	0.4	86.8	12.7	
Total %	0.1	0.1	0.1	3.1	29	0.1	5.7	0	5	0.3	49.4	7.2	

		Walo	greens			Rou	te 109		Ν	/ledway	Commo	ons		Rou	te 109		
		From	North			From	n East			From	n South			From	West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fron	n 07:00	AM to 0	08:45 AM	- Peak 1	of 1											
Peak Hour for E	ntire Inte	rsection	n Begins	s at 07:30	AM												
07:30 AM	0	0	0	0	5	64	0	69	14	0	21	35	0	146	8	154	258
07:45 AM	0	0	0	0	5	82	0	87	11	0	14	25	0	130	12	142	254
08:00 AM	0	1	0	1	12	68	0	80	9	0	14	23	0	114	18	132	236
08:15 AM	0	0	1	1	5	98	1	104	12	0	11	23	1	115	24	140	268
Total Volume	0	1	1	2	27	312	1	340	46	0	60	106	1	505	62	568	1016
% App. Total	0	50	50		7.9	91.8	0.3		43.4	0	56.6		0.2	88.9	10.9		
PHF	.000	.250	.250	.500	.563	.796	.250	.817	.821	.000	.714	.757	.250	.865	.646	.922	.948

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N/S Street : Walgreens / Medway Commons E/W Street : Route 109 City/State : Medway, MA Weather : Cloudy Walgreens Total 4 Out In 2 2 1 1 0 Right Thru Left 0 Peak Hour Data otal North Peak Hour Begins at 07:30 AM 340 Cars <u>1 otal</u> 905 Right 60 196 Total 90 Out 106 In r

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	07:45 AM		-		07:45 AM				07:15 AM				07:00 AM			
+0 mins.	0	0	0	0	5	82	0	87	15	0	13	28	0	129	11	140
+15 mins.	0	1	0	1	12	68	0	80	14	0	21	35	0	129	26	155
+30 mins.	0	0	1	1	5	98	1	104	11	0	14	25	0	146	8	154
+45 mins.	1	0	0	1	9	65	1	75	9	0	14	23	0	130	12	142
Total Volume	1	1	1	3	31	313	2	346	49	0	62	111	0	534	57	591
% App. Total	33.3	33.3	33.3		9	90.5	0.6		44.1	0	55.9		0	90.4	9.6	
PHF	.250	.250	.250	.750	.646	.798	.500	.832	.817	.000	.738	.793	.000	.914	.548	.953



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					Group	os Printed-	Trucks						
	W	algreens		F	Route 109		Medv	vay Comm	ons	F	Route 109		
	Fre	om North		F	rom East		F	rom South		FI	rom West		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	0	0	0	0	1	0	0	0	1	0	3	0	5
07:15 AM	0	0	0	0	2	0	1	0	0	0	4	2	9
07:30 AM	0	0	0	0	2	0	1	0	0	0	2	0	5
07:45 AM	0	0	0	1	4	0	1	0	0	0	5	0	11
Total	0	0	0	1	9	0	3	0	1	0	14	2	30
08:00 AM	0	0	0	0	1	0	0	0	0	0	7	1	9
08:15 AM	0	0	0	0	2	0	0	0	1	0	4	0	7
08:30 AM	0	0	0	1	0	0	0	0	0	0	9	1	11
08:45 AM	0	0	0	0	6	0	0	0	2	0	7	1	16
Total	0	0	0	1	9	0	0	0	3	0	27	3	43
Grand Total	0	0	0	2	18	0	3	0	4	0	41	5	73
Apprch %	0	0	0	10	90	0	42.9	0	57.1	0	89.1	10.9	
Total %	0	0	0	2.7	24.7	0	4.1	0	5.5	0	56.2	6.8	

		Walo	greens			Rou	te 109		Ν	/ledway	Commo	ons		Rou	te 109		
		From	North			From	n East			From	n South			From	n West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fror	n 07:00	AM to 0	8:45 AM	- Peak 1	of 1											
Peak Hour for E	ntire Inte	ersection	n Begins	at 08:00	AM												
08:00 AM	0	0	0	0	0	1	0	1	0	0	0	0	0	7	1	8	9
08:15 AM	0	0	0	0	0	2	0	2	0	0	1	1	0	4	0	4	7
08:30 AM	0	0	0	0	1	0	0	1	0	0	0	0	0	9	1	10	11
08:45 AM	0	0	0	0	0	6	0	6	0	0	2	2	0	7	1	8	16
Total Volume	0	0	0	0	1	9	0	10	0	0	3	3	0	27	3	30	43
% App. Total	0	0	0		10	90	0		0	0	100		0	90	10		
PHF	.000	.000	.000	.000	.250	.375	.000	.417	.000	.000	.375	.375	.000	.750	.750	.750	.672

N/S Street : Walgreens / Medway Commons E/W Street : Route 109 City/State : Medway, MA Weather : Cloudy Walgreens Out Total In 0 0 0 0 0 0 Right Thru Left 0 Peak Hour Data T<u>otal</u> 39 North Peak Hour Begins at 08:00 AM Trucks <u>1 otal</u> 7 Total 4 3 Out In

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	07:00 AM		-		07:00 AM				07:00 AM				08:00 AM			
+0 mins.	0	0	0	0	0	1	0	1	0	0	1	1	0	7	1	8
+15 mins.	0	0	0	0	0	2	0	2	1	0	0	1	0	4	0	4
+30 mins.	0	0	0	0	0	2	0	2	1	0	0	1	0	9	1	10
+45 mins.	0	0	0	0	1	4	0	5	1	0	0	1	0	7	1	8
Total Volume	0	0	0	0	1	9	0	10	3	0	1	4	0	27	3	30
% App. Total	0	0	0		10	90	0		75	0	25		0	90	10	
PHF	.000	.000	.000	.000	.250	.563	.000	.500	.750	.000	.250	1.000	.000	.750	.750	.750





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								Groups	Printec	I- Bikes	Peds								
		Walg	reens			Route	e 109		Me	edway (	Commo	ns		Route	e 109				
		From	North			From	East			From	South			From	West				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
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	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
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	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Grand Total	0	0	0	1	0	0	0	0	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	

		Walg	reens			Rou	te 109		Ν	/ledway	Commo	ons		Rou	te 109		
		From	North			From	n East			From	South			From	West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fron	n 07:00	AM to 0	08:45 AM ·	Peak 1	of 1											
Peak Hour for E	ntire Inte	rsection	n Begins	at 07:00	AM												
07:00 AM	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
07:30 AM	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
Total Volume	0	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	.000

N/S Street : Walgreens / Medway Commons E/W Street : Route 109 City/State : Medway, MA Weather : Cloudy Walgreens Out Total In 0 0 0 0 0 0 Right Thru Left 0 Peak Hour Data Total 0 2 North Peak Hour Begins at 07:00 AM Bikes Peds ota Riaht 0 Total 0 0 Out In

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	07:00 AM		•		07:00 AM				07:00 AM				07:00 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

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					Groups F	Printed- Ca	ars - Trucks						
	V	Valgreens		F	Route 109		Medw	ay Commo	ons	R	oute 109		
	F	rom North		F	rom East		Fr	om South		Fr	om West		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	3	1	9	31	111	5	18	0	13	8	88	40	327
04:15 PM	4	1	7	29	113	3	20	2	19	7	98	30	333
04:30 PM	3	0	4	22	128	2	16	0	19	3	86	29	312
04:45 PM	4	3	6	22	106	3	15	5	14	6	87	33	304
Total	14	5	26	104	458	13	69	7	65	24	359	132	1276
05:00 PM	1	1	4	13	112	1	22	1	13	10	81	34	293
05:15 PM	4	3	5	33	94	4	14	4	23	2	94	31	311
05:30 PM	3	5	3	22	118	6	19	0	20	1	87	29	313
05:45 PM	1	2	4	20	102	3	29	1	23	7	77	23	292
Total	9	11	16	88	426	14	84	6	79	20	339	117	1209
Grand Total	23	16	42	192	884	27	153	13	144	44	698	249	2485
Apprch %	28.4	19.8	51.9	17.4	80.1	2.4	49.4	4.2	46.5	4.4	70.4	25.1	
Total %	0.9	0.6	1.7	7.7	35.6	1.1	6.2	0.5	5.8	1.8	28.1	10	
Cars	23	16	42	189	877	27	152	13	143	44	690	249	2465
% Cars	100	100	100	98.4	99.2	100	99.3	100	99.3	100	98.9	100	99.2
Trucks	0	0	0	3	7	0	1	0	1	0	8	0	20
% Trucks	0	0	0	1.6	0.8	0	0.7	0	0.7	0	1.1	0	0.8

		Walg	greens			Rou	te 109		Ν	/ledway	Commo	ons		Rout	te 109		
		From	North			From	n East			From	South			From	West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fron	n 04:00	PM to (	)5:45 PM	- Peak 1	of 1											
Peak Hour for E	ntire Inte	rsection	n Begins	s at 04:00	PM												
04:00 PM	3	1	9	13	31	111	5	147	18	0	13	31	8	88	40	136	327
04:15 PM	4	1	7	12	29	113	3	145	20	2	19	41	7	98	30	135	333
04:30 PM	3	0	4	7	22	128	2	152	16	0	19	35	3	86	29	118	312
04:45 PM	4	3	6	13	22	106	3	131	15	5	14	34	6	87	33	126	304
Total Volume	14	5	26	45	104	458	13	575	69	7	65	141	24	359	132	515	1276
% App. Total	31.1	11.1	57.8		18.1	79.7	2.3		48.9	5	46.1		4.7	69.7	25.6		
PHF	.875	.417	.722	.865	.839	.895	.650	.946	.863	.350	.855	.860	.750	.916	.825	.947	.958
Cars	14	5	26	45	101	454	13	568	68	7	64	139	24	354	132	510	1262
% Cars	100	100	100	100	97.1	99.1	100	98.8	98.6	100	98.5	98.6	100	98.6	100	99.0	98.9
Trucks	0	0	0	0	3	4	0	7	1	0	1	2	0	5	0	5	14
% Trucks	0	0	0	0	2.9	0.9	0	1.2	1.4	0	1.5	1.4	0	1.4	0	1.0	1.1



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	04:00 PM		-		04:00 PM				05:00 PM				04:00 PM			
+0 mins.	3	1	9	13	31	111	5	147	22	1	13	36	8	88	40	136
+15 mins.	4	1	7	12	29	113	3	145	14	4	23	41	7	98	30	135
+30 mins.	3	0	4	7	22	128	2	152	19	0	20	39	3	86	29	118
+45 mins.	4	3	6	13	22	106	3	131	29	1	23	53	6	87	33	126
Total Volume	14	5	26	45	104	458	13	575	84	6	79	169	24	359	132	515
% App. Total	31.1	11.1	57.8		18.1	79.7	2.3		49.7	3.6	46.7		4.7	69.7	25.6	
PHF	.875	.417	.722	.865	.839	.895	.650	.946	.724	.375	.859	.797	.750	.916	.825	.947
Cars	14	5	26	45	101	454	13	568	84	6	79	169	24	354	132	510
% Cars	100	100	100	100	97.1	99.1	100	98.8	100	100	100	100	100	98.6	100	99
Trucks	0	0	0	0	3	4	0	7	0	0	0	0	0	5	0	5
% Trucks	0	0	0	0	2.9	0.9	0	1.2	0	0	0	0	0	1.4	0	1



					Grou	ps Printed	- Cars						
	W	algreens		R	oute 109		Medw	ay Commo	ons	R	oute 109		
	Fr	om North		Fr	om East		Fr	om South		Fre	om West		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	3	1	9	29	111	5	17	0	13	8	86	40	322
04:15 PM	4	1	7	29	110	3	20	2	19	7	96	30	328
04:30 PM	3	0	4	21	128	2	16	0	19	3	86	29	311
04:45 PM	4	3	6	22	105	3	15	5	13	6	86	33	301
Total	14	5	26	101	454	13	68	7	64	24	354	132	1262
05:00 PM	1	1	4	13	110	1	22	1	13	10	81	34	291
05:15 PM	4	3	5	33	93	4	14	4	23	2	93	31	309
05:30 PM	3	5	3	22	118	6	19	0	20	1	86	29	312
05:45 PM	1	2	4	20	102	3	29	1	23	7	76	23	291
Total	9	11	16	88	423	14	84	6	79	20	336	117	1203
Grand Total	23	16	42	189	877	27	152	13	143	44	690	249	2465
Apprch %	28.4	19.8	51.9	17.3	80.2	2.5	49.4	4.2	46.4	4.5	70.2	25.3	
Total %	0.9	0.6	1.7	7.7	35.6	1.1	6.2	0.5	5.8	1.8	28	10.1	

		Walg	greens			Rou	te 109		Ν	/ledway	Commo	ons		Rou	te 109		]
		From	North			From	n East			From	n South			From	n West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fror	n 04:00	PM to 0	)5:45 PM	- Peak 1	of 1											
Peak Hour for E	ntire Inte	ersection	n Begins	s at 04:00	PM												
04:00 PM	3	1	9	13	29	111	5	145	17	0	13	30	8	86	40	134	322
04:15 PM	4	1	7	12	29	110	3	142	20	2	19	41	7	96	30	133	328
04:30 PM	3	0	4	7	21	128	2	151	16	0	19	35	3	86	29	118	311
04:45 PM	4	3	6	13	22	105	3	130	15	5	13	33	6	86	33	125	301
Total Volume	14	5	26	45	101	454	13	568	68	7	64	139	24	354	132	510	1262
% App. Total	31.1	11.1	57.8		17.8	79.9	2.3		48.9	5	46		4.7	69.4	25.9		
PHF	.875	.417	.722	.865	.871	.887	.650	.940	.850	.350	.842	.848	.750	.922	.825	.951	.962

File Name : 92420002

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N/S Street : Walgreens / Medway Commons E/W Street : Route 109 City/State : Medway, MA Weather : Cloudy Walgreens Out Total In 45 89 44 26 5 14 Right Thru Left 14 Peak Hour Data Total 1058 North 10 Peak Hour Begins at 04:00 PM 568 Cars 1000 Right 64 238 Out 377 Total 139 In rΝ.

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	04:00 PM		0		04:00 PM				05:00 PM				04:00 PM			
+0 mins.	3	1	9	13	29	111	5	145	22	1	13	36	8	86	40	134
+15 mins.	4	1	7	12	29	110	3	142	14	4	23	41	7	96	30	133
+30 mins.	3	0	4	7	21	128	2	151	19	0	20	39	3	86	29	118
+45 mins.	4	3	6	13	22	105	3	130	29	1	23	53	6	86	33	125
Total Volume	14	5	26	45	101	454	13	568	84	6	79	169	24	354	132	510
% App. Total	31.1	11.1	57.8		17.8	79.9	2.3		49.7	3.6	46.7		4.7	69.4	25.9	
PHF	.875	.417	.722	.865	.871	.887	.650	.940	.724	.375	.859	.797	.750	.922	.825	.951



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 : 92420002

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					Grou	os Printed-	- Trucks						
	N N	/algreens		F	Route 109		Medv	vay Comm	ons	F	Route 109		
	Fr	om North		F	rom East		F	rom South		F	rom West		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	0	0	0	2	0	0	1	0	0	0	2	0	5
04:15 PM	0	0	0	0	3	0	0	0	0	0	2	0	5
04:30 PM	0	0	0	1	0	0	0	0	0	0	0	0	1
04:45 PM	0	0	0	0	1	0	0	0	1	0	1	0	3
Total	0	0	0	3	4	0	1	0	1	0	5	0	14
05:00 PM	0	0	0	0	2	0	0	0	0	0	0	0	2
05:15 PM	0	0	0	0	1	0	0	0	0	0	1	0	2
05:30 PM	0	0	0	0	0	0	0	0	0	0	1	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	1
Total	0	0	0	0	3	0	0	0	0	0	3	0	6
Grand Total	0	0	0	3	7	0	1	0	1	0	8	0	20
Apprch %	0	0	0	30	70	0	50	0	50	0	100	0	
Total %	0	0	0	15	35	0	5	0	5	0	40	0	

		Walo	greens			Rou	te 109		Ν	/ledway	Commo	ons		Rou	te 109		]
		From	North			From	n East			From	n South			From	n West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fror	n 04:00	PM to 0	5:45 PM	- Peak 1	of 1											
Peak Hour for E	ntire Inte	ersection	n Begins	at 04:00	PM												
04:00 PM	0	0	0	0	2	0	0	2	1	0	0	1	0	2	0	2	5
04:15 PM	0	0	0	0	0	3	0	3	0	0	0	0	0	2	0	2	5
04:30 PM	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
04:45 PM	0	0	0	0	0	1	0	1	0	0	1	1	0	1	0	1	3
Total Volume	0	0	0	0	3	4	0	7	1	0	1	2	0	5	0	5	14
% App. Total	0	0	0		42.9	57.1	0		50	0	50		0	100	0		
PHF	.000	.000	.000	.000	.375	.333	.000	.583	.250	.000	.250	.500	.000	.625	.000	.625	.700

N/S Street : Walgreens / Medway Commons E/W Street : Route 109 City/State : Medway, MA Weather : Cloudy Walgreens Total 0 Out In 0 0 0 0 0 Right Thru Left 0 Peak Hour Data Total 10 2 North Peak Hour Begins at 04:00 PM Trucks 13 5 Total 3 2 Out In

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	04:00 PM		0		04:00 PM				04:00 PM				04:00 PM			
+0 mins.	0	0	0	0	2	0	0	2	1	0	0	1	0	2	0	2
+15 mins.	0	0	0	0	0	3	0	3	0	0	0	0	0	2	0	2
+30 mins.	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	1	0	1	0	0	1	1	0	1	0	1
Total Volume	0	0	0	0	3	4	0	7	1	0	1	2	0	5	0	5
% App. Total	0	0	0		42.9	57.1	0		50	0	50		0	100	0	
PHF	.000	.000	.000	.000	.375	.333	.000	.583	.250	.000	.250	.500	.000	.625	.000	.625

# File Name : 92420002 Site Code : 92420002 Start Date : 2/17/2022 Page No : 8



								Groups	Printec	I- Bikes	Peds								
		Walg	reens			Route	e 109		Me	edway (	Commo	ns		Route	e 109				
		From	North			From	East			From	South			From	West				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
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	0	0	0	0	0
04:45 PM	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
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
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0		0	0	0		0	0	0		0	0	0				
Total %																	0	0	

		Walg	greens			Rou	te 109		Ν	/ledway	Commo	ons		Rout	te 109		]
		From	North			From	n East			From	n South			From	n West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fror	n 04:00	PM to 0	)5:45 PM	Peak 1	of 1											
Peak Hour for E	ntire Inte	ersection	n Begins	s 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	0	0	0
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	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	.000

N/S Street : Walgreens / Medway Commons E/W Street : Route 109 City/State : Medway, MA Weather : Cloudy Walgreens Total 0 Out In 0 0 0 0 0 Right Thru Left 0 Peak Hour Data Total 0 2 North Peak Hour Begins at 04:00 PM Bikes Peds ota Riaht 0 Total 0 0 Out In

Peak Hour Analysis From 04:00 PM to 05:45 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	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

## File Name : 92420002 Site Code : 92420002 Start Date : 2/17/2022 Page No : 11



					Groups P	rinted- Ca	rs - Trucks						
	V	Valgreens		R	oute 109		Medw	ay Commo	ons	F	Route 109		
	F	rom North		Fr	om East		Fr	om South		Fi	rom West		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
11:00 AM	2	2	6	29	123	6	27	3	21	6	80	34	339
11:15 AM	4	3	11	20	101	7	25	3	19	9	85	41	328
11:30 AM	2	5	6	20	102	3	27	2	34	8	105	39	353
11:45 AM	1	3	5	17	102	3	41	3	35	1	100	36	347
Total	9	13	28	86	428	19	120	11	109	24	370	150	1367
12:00 PM	3	0	10	21	96	5	32	1	22	5	101	31	327
12:15 PM	4	3	5	17	97	1	38	2	23	4	74	37	305
12:30 PM	0	3	4	16	92	3	33	2	25	4	93	38	313
12:45 PM	1	1	8	13	82	2	32	1	20	6	93	23	282
Total	8	7	27	67	367	11	135	6	90	19	361	129	1227
01:00 PM	2	1	4	11	117	4	25	0	18	4	95	25	306
01:15 PM	0	5	7	22	80	3	26	3	27	8	97	36	314
01:30 PM	3	3	3	18	108	1	24	1	19	2	87	45	314
01:45 PM	2	1	5	19	106	2	32	1	27	6	97	42	340
Total	7	10	19	70	411	10	107	5	91	20	376	148	1274
Grand Total	24	30	74	223	1206	40	362	22	290	63	1107	427	3868
Apprch %	18.8	23.4	57.8	15.2	82.1	2.7	53.7	3.3	43	3.9	69.3	26.7	
Total %	0.6	0.8	1.9	5.8	31.2	1	9.4	0.6	7.5	1.6	28.6	11	
Cars	24	30	74	223	1205	40	361	22	290	63	1105	427	3864
% Cars	100	100	100	100	99.9	100	99.7	100	100	100	99.8	100	99.9
Trucks	0	0	0	0	1	0	1	0	0	0	2	0	4
% Trucks	0	0	0	0	0.1	0	0.3	0	0	0	0.2	0	0.1

		Walg	reens			Rou	te 109		Ν	ledway	Commo	ons		Rout	te 109		
		From	North			From	n East			From	South			From	West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fron	n 11:00	AM to C	1:45 PM	- Peak 1	of 1	-				-				-		
Peak Hour for E	ntire Inte	rsectior	n Begins	at 11:00	AM												
11:00 AM	2	2	6	10	29	123	6	158	27	3	21	51	6	80	34	120	339
11:15 AM	4	3	11	18	20	101	7	128	25	3	19	47	9	85	41	135	328
11:30 AM	2	5	6	13	20	102	3	125	27	2	34	63	8	105	39	152	353
11:45 AM	1	3	5	9	17	102	3	122	41	3	35	79	1	100	36	137	347
Total Volume	9	13	28	50	86	428	19	533	120	11	109	240	24	370	150	544	1367
% App. Total	18	26	56		16.1	80.3	3.6		50	4.6	45.4		4.4	68	27.6		
PHF	.563	.650	.636	.694	.741	.870	.679	.843	.732	.917	.779	.759	.667	.881	.915	.895	.968
Cars	9	13	28	50	86	428	19	533	119	11	109	239	24	369	150	543	1365
% Cars	100	100	100	100	100	100	100	100	99.2	100	100	99.6	100	99.7	100	99.8	99.9
Trucks	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	1	2
% Trucks	0	0	0	0	0	0	0	0	0.8	0	0	0.4	0	0.3	0	0.2	0.1



Peak Hour Analysis From 11:00 AM to 01:45 PM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	11:15 AM		-		11:00 AM				11:30 AM				11:15 AM			
+0 mins.	4	3	11	18	29	123	6	158	27	2	34	63	9	85	41	135
+15 mins.	2	5	6	13	20	101	7	128	41	3	35	79	8	105	39	152
+30 mins.	1	3	5	9	20	102	3	125	32	1	22	55	1	100	36	137
+45 mins.	3	0	10	13	17	102	3	122	38	2	23	63	5	101	31	137
Total Volume	10	11	32	53	86	428	19	533	138	8	114	260	23	391	147	561
% App. Total	18.9	20.8	60.4		16.1	80.3	3.6		53.1	3.1	43.8		4.1	69.7	26.2	
PHF	.625	.550	.727	.736	.741	.870	.679	.843	.841	.667	.814	.823	.639	.931	.896	.923
Cars	10	11	32	53	86	428	19	533	137	8	114	259	23	390	147	560
% Cars	100	100	100	100	100	100	100	100	99.3	100	100	99.6	100	99.7	100	99.8
Trucks	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	1
% Trucks	0	0	0	0	0	0	0	0	0.7	0	0	0.4	0	0.3	0	0.2



					Grou	ps Printec	I- Cars						
	۱	Nalgreens		F	Route 109		Medv	vay Comm	ons	F	Route 109		
	F	rom North		F	rom East		F	rom South		F	rom West		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
11:00 AM	2	2	6	29	123	6	27	3	21	6	80	34	339
11:15 AM	4	3	11	20	101	7	25	3	19	9	85	41	328
11:30 AM	2	5	6	20	102	3	27	2	34	8	105	39	353
11:45 AM	1	3	5	17	102	3	40	3	35	1	99	36	345
Total	9	13	28	86	428	19	119	11	109	24	369	150	1365
12:00 PM	3	0	10	21	96	5	32	1	22	5	101	31	327
12:15 PM	4	3	5	17	97	1	38	2	23	4	74	37	305
12:30 PM	0	3	4	16	91	3	33	2	25	4	93	38	312
12:45 PM	1	1	8	13	82	2	32	1	20	6	93	23	282
Total	8	7	27	67	366	11	135	6	90	19	361	129	1226
01:00 PM	2	1	4	11	117	4	25	0	18	4	94	25	305
01:15 PM	0	5	7	22	80	3	26	3	27	8	97	36	314
01:30 PM	3	3	3	18	108	1	24	1	19	2	87	45	314
01:45 PM	2	1	5	19	106	2	32	1	27	6	97	42	340
Total	7	10	19	70	411	10	107	5	91	20	375	148	1273
Grand Total	24	30	74	223	1205	40	361	22	290	63	1105	427	3864
Apprch %	18.8	23.4	57.8	15.2	82.1	2.7	53.6	3.3	43.1	3.9	69.3	26.8	
Total %	0.6	0.8	1.9	5.8	31.2	1	9.3	0.6	7.5	1.6	28.6	11.1	

		Walg	reens			Rout	te 109		N	1edway	Commo	ns		Rou	te 109		
		From	North			From	n East			From	South			From	n West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fron	n 11:00	AM to C	)1:45 PM ·	Peak 1	of 1	-				-				-		
Peak Hour for E	ntire Inte	rsectior	n Begins	at 11:00	AM												
11:00 AM	2	2	6	10	29	123	6	158	27	3	21	51	6	80	34	120	339
11:15 AM	4	3	11	18	20	101	7	128	25	3	19	47	9	85	41	135	328
11:30 AM	2	5	6	13	20	102	3	125	27	2	34	63	8	105	39	152	353
11:45 AM	1	3	5	9	17	102	3	122	40	3	35	78	1	99	36	136	345
Total Volume	9	13	28	50	86	428	19	533	119	11	109	239	24	369	150	543	1365
% App. Total	18	26	56		16.1	80.3	3.6		49.8	4.6	45.6		4.4	68	27.6		
PHF	.563	.650	.636	.694	.741	.870	.679	.843	.744	.917	.779	.766	.667	.879	.915	.893	.967

N/S Street : Walgreens / Medway Commons E/W Street : Route 109 City/State : Medway, MA Weather : Cloudy Walgreens n Total 50 104 Out In 54 28 13 9 Right Thru Left 9 Peak Hour Data Total 1118 North Peak Hour Begins at 11:00 AM 533 Cars 1020 Thru Right 11 109 249 Out 488 Total 239 In rΝ.

Peak Hour Analysis From 11:00 AM to 01:45 PM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	11:15 AM		•		11:00 AM				11:30 AM				11:15 AM			
+0 mins.	4	3	11	18	29	123	6	158	27	2	34	63	9	85	41	135
+15 mins.	2	5	6	13	20	101	7	128	40	3	35	78	8	105	39	152
+30 mins.	1	3	5	9	20	102	3	125	32	1	22	55	1	99	36	136
+45 mins.	3	0	10	13	17	102	3	122	38	2	23	63	5	101	31	137
Total Volume	10	11	32	53	86	428	19	533	137	8	114	259	23	390	147	560
% App. Total	18.9	20.8	60.4		16.1	80.3	3.6		52.9	3.1	44		4.1	69.6	26.2	
PHF	.625	.550	.727	.736	.741	.870	.679	.843	.856	.667	.814	.830	.639	.929	.896	.921

 File Name
 : 924200S2

 Site Code
 : 92420002

 Start Date
 : 2/19/2022

 Page No
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## File Name : 924200S2 Site Code : 92420002 Start Date : 2/19/2022 Page No : 6

					Group	s Printed	- Trucks						
	V	Valgreens		F	Route 109		Medv	vay Comm	ons	F	Route 109		
	F	rom North		F	rom East		F	rom South		F	rom West		
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	1	0	0	0	1	0	2
Total	0	0	0	0	0	0	1	0	0	0	1	0	2
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	1	0	0	0	0	0	0	0	1
01:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	1
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	1	0	1
Grand Total	0	0	0	0	1	0	1	0	0	0	2	0	4
Apprch %	0	0	0	0	100	0	100	0	0	0	100	0	
Total %	0	0	0	0	25	0	25	0	0	0	50	0	

		Walg	reens			Rout	te 109		N	ledway	Commo	ns		Rout	te 109		
		From	North			From	n East			From	South			From	West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fron	n 11:00	AM to 0	1:45 PM -	Peak 1	of 1	-				-				-		
Peak Hour for E	ntire Inte	rsectior	Begins	at 11:45	AM												
11:45 AM	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	1	2
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
Total Volume	0	0	0	0	0	1	0	1	1	0	0	1	0	1	0	1	3
% App. Total	0	0	0		0	100	0		100	0	0		0	100	0		
PHF	.000	.000	.000	.000	.000	.250	.000	.250	.250	.000	.000	.250	.000	.250	.000	.250	.375

 File Name
 : 924200S2

 Site Code
 : 92420002

 Start Date
 : 2/19/2022

 Page No
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N/S Street : Walgreens / Medway Commons E/W Street : Route 109 City/State : Medway, MA Weather : Cloudy Walgreens Out Total In 0 0 0 0 0 0 Right Thru Left 0 Peak Hour Data Fotal 3 North Peak Hour Begins at 11:45 AM Trucks ota Right 1 Total 0 1 Out In

Peak Hour Analysis From 11:00 AM to 01:45 PM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	11:00 AM		•		11:45 AM				11:00 AM				11:00 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	1	0	1	1	0	0	1	0	1	0	1
Total Volume	0	0	0	0	0	1	0	1	1	0	0	1	0	1	0	1
% App. Total	0	0	0		0	100	0		100	0	0		0	100	0	
PHF	.000	.000	.000	.000	.000	.250	.000	.250	.250	.000	.000	.250	.000	.250	.000	.250



								Groups	Printed	I- Bikes	Peds								
		Walg	reens			Route	e 109		Me	dway (	Commo	ns		Route	e 109				
		From	North			From	East			From	South			From	West				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Exclu. Total	Inclu. Total	Int. Total
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
12:00 PM	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	1	2
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	2	1	3
																	1		
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
	1																		
Grand Total	0	0	0	4	0	0	0	0	1	0	0	0	0	0	0	0	4	1	5
Apprch %	0	0	0		0	0	0		100	0	0		0	0	0				
Total %	0	0	0		0	0	0	ļ	100	0	0		0	0	0		80	20	

		Walg	reens			Rout	te 109		Ν	/ledway	Commo	ons		Rou	te 109		
		From	North			From	n East			From	South			From	n West		
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Anal	ysis Fron	n 11:00	AM to C	)1:45 PM ·	Peak 1	of 1	-				-				-		
Peak Hour for E	ntire Inte	rsectior	n Begins	at 11:15	AM												
11:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
Total Volume	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
% App. Total	0	0	0		0	0	0		100	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250	.000	.000	.000	.000	.250
#### Accurate Counts 978-664-2565

N/S Street : Walgreens / Medway Commons E/W Street : Route 109 City/State : Medway, MA Weather : Cloudy Walgreens Out Total In 0 0 0 0 0 0 Right Thru Left 0 Peak Hour Data Fotal 2 North Peak Hour Begins at 11:15 AM Bikes Peds ota Right 1 Total 0 1 Out In

Peak Hour Analysis From 11:00 AM to 01:45 PM - Peak 1 of 1 Peak Hour for Each Approach Begins at:

	11:00 AM				11:00 AM				11:15 AM				11:00 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	1	0	0	1	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
% App. Total	0	0	0		0	0	0		100	0	0		0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250	.000	.000	.000	.000

# File Name : 924200S2 Site Code : 92420002 Start Date : 2/19/2022 Page No : 11

Accurate Counts 978-664-2565





SEASONAL ADJUSTMENT DATA

### Massachusetts Highway Department 3180: Monthly Hourly Volume for February 2019

Locat Count Funct Locat	ion ID: :y: ional Cla ion:	155	3 1 1 1	3180 Norfolk L NTERST	ATE 49	5						Seasona Daily Fa Axle Fac Growth	al Facto octor Gr ctor Gro Factor	r Group oup: oup: Group: Group:	<b>):</b>	U1-Bost U1-Bost	ton									
	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	TOTAL	QC Status
1	516	347	311	387	817	2575	5282	7295	6673	4738	4088	4341	4680	5004	6310	7847	7485	7917	5209	3226	2401	1795	1524	1140	91908	Accepted
2	686	423	369	294	378	951	1744	2419	3359	3715	4358	4837	5177	5153	5069	5157	5109	4497	3670	2537	2002	1741	1396	858	65899	Accepted
3	482	319	207	162	169	353	691	1117	1661	2347	3214	3947	4138	4251	4034	4079	3942	3308	1783	872	822	647	1736	1623	45904	Accepted
4																										
5	343	260	245	368	754	2547	5867	8301	7208	5300	4104	3808	4101	4348	5412	6661	7603	7860	5192	2908	2009	1342	933	655	88129	Accepted
7	330	244	219	344	731	2583	5/55	8339	7001	51/9	3846	4030	4240	4280	5352	7133	8119	7835	4870	2816	1869	1385	929	507	88036	Accepted
8	339	234	253	352	680	2492	5225	7246	6424	1024	3887	3802	4030	5259	6125	2021	7730 9104	7944	5250	2884	2049	1771	1245	708	01015	Accepted
9	433 545	384	272	246	389	2373 819	1697	2294	2863	3618	4195	5068	5302	5175	5175	5292	5121	4553	3844	2678	2233	1779	1345	1035	65917	
10	579	367	210	160	168	393	901	1239	1686	2669	3681	4524	4973	5109	5078	5249	5038	4242	3331	2554	1728	1224	768	476	56347	Accepted
11	263	200	186	318	729	2652	5680	8361	7146	5124	3949	3937	4019	4336	5144	6640	7547	7997	4917	2707	1863	1324	875	609	86523	Accepted
12	306	274	272	362	746	2642	5545	7901	6296	4314	3670	4035	5399	5213	4786	4416	3675	2252	1372	678	610	463	422	325	65974	Accepted
13	265	245	215	298	587	2108	4532	7071	6581	4562	3544	3619	3779	3829	4947	6558	7530	7573	4779	2835	1947	1519	977	719	80619	Accepted
14	375	281	256	377	715	2542	5705	8248	7254	5345	4141	4051	4363	4673	5739	7399	8218	8274	5379	3079	2003	1456	1085	754	91712	Accepted
15	458	300	259	359	704	2395	5351	7413	6289	4890	4348	4561	5071	5791	6750	8495	8777	7994	5425	3546	2262	1755	1393	905	95491	Accepted
16	635	377	291	261	340	778	1531	2204	3023	3903	4776	5395	5576	5434	5446	5491	5374	4781	3857	2664	2071	1668	1470	1066	68412	Accepted
17	539	319	235	171	160	410	797	1180	1822	2780	3922	4689	4984	5141	5054	5071	4943	4433	3616	2564	1946	1482	978	585	57821	Accepted
18	313	279	209	286	442	1077	2275	3763	3618	2999	3088	3548	3829	4102	4466	5017	5356	5191	3241	2203	1645	1172	805	560	59484	Accepted
19	315	236	250	355	735	2669	5545	6832	6240	5118	4366	4450	4662	4765	5740	6881	7669	7971	5052	2782	1942	1450	996	626	87647	Accepted
20	360	263	303	389	813	2663	5515	7693	6870	4943	4283	4427	4558	4807	5735	7118	8074	7823	5019	2668	1851	1279	904	572	88930	Accepted
21	419	275	274	316	621	1885	3941	6425	5960	4424	4018	4235	4270	4512	5591	6797	7509	7730	5139	3057	2232	1589	1127	741	83087	Accepted
22	432	311	268	359	688	2410	4722	6580	6223	5207	4736	5059	5240	5845	6804	7954	8139	7673	5282	3426	2317	1720	1345	974	93714	Accepted
23	594	384	346	244	346	775	1525	2379	2961	3796	4782	5039	5579	5411	5591	5622	5380	4953	3951	2853	2248	1937	1572	994	69262	Accepted
24	661	352	251	171	162	369	663	1053	1560	2420	3334	4308	4875	4738	4689	4833	4319	3708	3041	2201	1663	1151	752	515	51789	Accepted
25	271	193	195	315	728	2628	4553	7552	6860	4873	3892	3829	3889	3989	4904	6391	7363	7307	4502	2578	1754	1195	821	570	81152	Accepted
20	338	277	264	334	711	2628	6071	8576	7095	5312	4136	4074	4220	4341	5352	6911	7892	7884	5266	2892	2036	1478	1047	732	89867	Accepted
27	369	276	268	323	710	2769	5951	7272	7349	5288	4061	4181	4297	4362	5682	7141	8213	8020	5006	2671	1866	1274	820	761	88930	Accepted
20	594	308	292	391	669	1798	4288	6040	6006	5143	4141	3813	3947	3982	5126	6526	/1/2	7449	4950	2936	2230	1617	1059	802	81279	Accepted
																						F	201 201	o A A DT	87507	
																						Saac	۲UL مnal Adiu	stment	1 1 25	
																						Jeas	Jilai Auju	Junent	1.125	



COVID-19 ADJUSTMENT DATA

## Covid Adjustments for Route 109 at the Medway Commons driveway and the Project site driveway

#### **October 2, 2018 Turning Movement Counts**

Weekday Morning Peak Hour Volume = 988 Weekday Evening Peak Hour Volume = 1,243

Growth Rate (2018-2019): 0.4% [MassDOT Yearly Growth Rates] Growth Rate (2019-2020): 0.0% [MassDOT Guidance on Traffic Count Data] Growth Rate (2020-2021): 1.0% [Assumed] Growth Rate (2021-2022): 1.0% [Assumed] Total Growth Adjustment: (1.004)  $\times$  (1.000)  $\times$  (1.010)  $\times$  (1.010) = 1.024

Seasonal Adjustment: 0.93 [MassDOT 2019 Weekday Seasonal Factors - Group U3]

Weekday Morning =  $988 \times (1.024) \times (0.93) = 941$ Weekday Evening =  $1,243 \times (1.024) \times (0.93) = 1,184$ 

#### February 17, 2022 Turning Movement Counts

Weekday Morning Peak Hour Volume = 1,048 Weekday Evening Peak Hour Volume = 1,276

Seasonal Adjustment: 1.03 [MassDOT 2019 Weekday Seasonal Factors - Group U3]

Weekday Morning =  $1,048 \times (1.03) = 1,079$ Weekday Evening =  $1,276 \times (1.03) = 1,314$ 

#### **Covid Adjustments**

Weekday Morning =  $\frac{941}{1,079} = 0.872$ Weekday Evening =  $\frac{1,184}{1,314} = 0.901$ 



VEHICLE TRAVEL SPEED DATA

Location : Route 109 Location : West of Walgreen's Driveway City/State: Medway, MA Direction: EB,

_	,															
	2/17/2022					> 12 -	> 15 -	> 18 -	> 21 -	> 24 -	> 27 -	> 30 -	> 33 -	> 36 -		
	2/11/2022	0 - 3	> 3 - 6	> 6 - 9	> 9 - 12	15	18	21	24	27	30	33	36	39	> 39	
_	Time	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	Total
	12:00 AM	0	0	0	0	0	0	0	0	1	2	2	1	1	0	7
	1:00	0	0	0	0	0	0	0	0	0	2	1	2	1	1	7
	2:00	0	0	0	0	0	0	0	0	1	2	2	1	0	0	6
	3:00	0	0	0	0	0	0	0	0	0	5	4	2	0	1	12
	4:00	0	0	0	0	0	0	0	2	8	20	9	17	8	4	68
	5:00	0	0	0	1	0	0	1	5	32	33	63	44	23	9	211
	6:00	0	0	2	6	10	4	10	29	70	179	167	30	12	1	520
	7:00	0	0	11	5	12	9	23	48	82	189	164	44	12	1	600
	8:00	0	0	5	8	15	4	25	36	110	198	97	33	18	4	553
	9:00	0	0	4	2	7	5	17	29	76	138	130	30	11	3	452
	10:00	0	0	1	1	16	9	26	31	142	120	67	27	6	2	448
	11:00	0	0	3	3	7	4	37	55	92	135	91	26	9	0	462
	12:00 PM	0	0	5	4	2	22	31	52	111	165	87	21	10	3	513
	1:00	0	0	0	2	3	5	13	45	124	137	85	14	6	9	443
	2:00	0	0	6	7	13	11	44	36	125	150	65	15	8	3	483
	3:00	0	0	5	6	13	12	26	28	124	126	137	29	14	0	520
	4:00	0	0	9	13	16	14	21	54	104	145	83	26	13	2	500
	5:00	0	0	3	5	11	15	22	61	113	123	84	24	12	3	476
	6:00	0	0	0	0	3	1	3	30	111	73	89	36	16	1	363
	7:00	0	0	0	1	0	3	4	21	49	83	52	23	8	7	251
	8:00	0	0	0	0	0	1	5	16	23	46	45	15	12	1	164
	9:00	0	0	0	0	0	0	0	1	13	17	31	16	8	5	91
	10:00	0	0	0	0	0	0	0	0	4	15	22	18	5	5	69
	11:00	0	0	0	0	0	0	0	0	1	7	6	7	2	2	25
_	Total	0	0	54	64	128	119	308	579	1516	2110	1583	501	215	67	7244
			P	ercentile	15th	50th	85th	95th								

29

Speed 24 Mean Speed (Average) 10 MPH Pace Speed Number in Pace 28.7 24-33

5379 Percent in Pace 74.3%

Number > 30 MPH 2366 Percent > 30 MPH 32.7%

Location : Route 109 Location : West of Walgreen's Driveway City/State: Medway, MA Direction: EB,

_	,															
	2/18/2022					> 12 -	> 15 -	> 18 -	> 21 -	> 24 -	> 27 -	> 30 -	> 33 -	> 36 -		
	2/10/2022	0 - 3	> 3 - 6	> 6 - 9	> 9 - 12	15	18	21	24	27	30	33	36	39	> 39	
	Time	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	Total
	12:00 AM	0	0	0	0	0	0	0	1	1	1	4	2	3	4	16
	1:00	0	0	0	0	0	0	0	2	0	4	2	2	2	1	13
	2:00	0	0	0	0	0	0	0	0	0	3	1	0	0	1	5
	3:00	0	0	0	0	0	0	0	1	1	1	1	1	2	0	7
	4:00	0	0	0	0	0	0	0	0	10	5	18	10	8	5	56
	5:00	0	0	0	1	0	0	2	2	19	54	63	23	17	10	191
	6:00	0	0	10	5	14	8	10	34	82	151	113	47	12	0	486
	7:00	0	0	2	8	4	16	9	22	105	159	168	52	13	2	560
	8:00	0	0	17	10	19	18	55	78	146	111	64	21	10	3	552
	9:00	0	0	0	7	6	14	11	42	144	127	84	33	4	1	473
	10:00	0	0	5	2	15	10	21	46	68	110	67	26	12	2	384
	11:00	0	0	7	7	11	3	12	99	110	123	97	20	11	0	500
	12:00 PM	0	0	6	6	21	11	22	57	102	146	79	13	6	5	474
	1:00	0	0	12	2	5	12	21	48	123	147	97	18	9	3	497
	2:00	0	0	8	4	10	13	24	56	139	143	60	30	9	2	498
	3:00	0	0	11	7	6	5	24	60	131	170	99	26	6	6	551
	4:00	0	0	3	2	8	4	8	21	108	144	119	33	14	3	467
	5:00	0	0	7	3	12	5	16	28	142	127	85	31	16	1	473
	6:00	0	0	0	0	10	11	13	16	86	124	66	33	15	0	374
	7:00	0	0	0	0	7	1	5	7	76	87	44	27	11	6	271
	8:00	0	0	0	0	1	2	0	7	34	45	59	23	16	3	190
	9:00	0	0	0	0	0	0	0	3	7	40	32	15	5	5	107
	10:00	0	0	0	0	0	0	0	2	4	19	35	20	5	4	89
	11:00	0	0	0	0	0	0	0	4	2	7	17	11	8	3	52
_	Total	0	0	88	64	149	133	253	636	1640	2048	1474	517	214	70	7286
			P	ercentile	15th	50th	85th	95th								

28

Speed23Mean Speed (Average)28.510 MPH Pace Speed23-32Number in Pace5346Percent in Pace73.4%

Percent in Pace73.4%Number > 30 MPH2275

Percent > 30 MPH 31.2%

Location : Route 109 Location : West of Walgreen's Driveway City/State: Medway, MA Direction: EB,

2/19/2022	03	> 3 6	>6.0	>0.12	> 12 -	> 15 -	> 18 -	> 21 -	> 24 -	> 27 -	> 30 -	> 33 -	> 36 -	> 30	
Time	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	Total
12:00 AM	0	0	0	0	0	0	0	0	4	5	6	5	1	0	21
1:00	0	0	0	0	0	0	0	0	3	1	4	3	1	0	12
2:00	0	0	0	0	0	0	0	1	0	4	1	1	2	3	12
3:00	0	0	0	0	0	0	0	0	0	4	2	0	0	0	6
4:00	0	0	0	0	0	0	0	0	1	7	5	4	4	6	27
5:00	0	0	0	0	0	0	0	0	1	10	18	16	8	15	68
6:00	0	0	0	0	0	0	1	2	13	31	49	25	8	9	138
7:00	0	0	0	0	3	3	0	3	21	59	84	47	28	10	258
8:00	0	0	1	7	2	6	3	13	56	126	78	51	17	1	361
9:00	0	0	2	1	4	9	12	18	114	135	89	30	20	1	435
10:00	0	0	2	4	4	9	17	50	103	182	93	25	9	2	500
11:00	0	0	5	1	3	7	35	64	134	193	61	26	6	1	536
12:00 PM	0	0	5	6	12	10	28	81	126	102	91	34	8	2	505
1:00	0	0	5	2	12	9	38	65	102	154	114	23	14	2	540
2:00	0	0	2	8	1	13	21	56	132	162	80	31	5	1	512
3:00	0	0	5	6	3	8	20	65	81	139	72	29	9	3	440
4:00	0	0	0	1	4	3	5	34	131	137	87	16	9	4	431
5:00	0	0	0	2	11	18	52	50	100	60	34	11	5	0	343
6:00	0	0	1	8	3	14	17	39	73	62	39	13	8	1	278
7:00	0	0	0	0	0	0	4	23	26	51	68	28	8	2	210
8:00	0	0	0	0	0	0	0	2	22	33	46	19	8	2	132
9:00	0	0	0	0	1	0	0	0	4	22	65	24	7	4	127
10:00	0	0	0	0	0	0	0	2	9	20	22	15	8	6	82
11:00	0	0	0	0	0	0	0	1	2	5	23	12	7	1	51
l otal	0	0	28	46	63	109	253	569	1258	1704	1231	488	200	76	6025
		P	ercentile	15th	50th	85th	95th								
		0	Speed	23	29	32	35								
	Mean	Speed (A	verage)	29.3											
	10 1	Number		23-3Z											
		Dereent	in Pace	4301											
	N	Percent		12.4%											
				22 10/											
Crand Total	F		30 IVIER 170	174	240	261	01/	170/	1111	5960	1000	1506	620	212	20555
State	0		ercentile	174 15th	50th	85th	014 05th	1704	4414	3002	4200	1500	029	213	20000
Siais		F	Spood	23	2001	22	35								
	Mean	Snood (A		22 28 8	20	52	55								
		JPH Pac	e Sneed	20.0											
	101	Number	in Pace	15075											
		Percent	in Pace	73 3%											
	N		30 MPH	6636											
	P	ercent >	30 MPH	32.3%											

Location : Route 109 Location : West of Walgreen's Driveway City/State: Medway, MA Direction: WB,

,															
2/17/2022					> 12 -	> 15 -	> 18 -	> 21 -	> 24 -	> 27 -	> 30 -	> 33 -	> 36 -		
2/11/2022	0 - 3	> 3 - 6	> 6 - 9	> 9 - 12	15	18	21	24	27	30	33	36	39	> 39	
Time	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	Total
12:00 AM	0	0	0	0	1	2	1	2	4	5	3	3	1	0	22
1:00	0	0	0	0	0	0	1	0	1	1	5	1	1	0	10
2:00	0	0	0	0	0	0	1	0	3	0	0	1	2	0	7
3:00	0	0	1	0	0	0	1	2	4	2	0	1	3	0	14
4:00	0	0	0	0	0	1	3	1	3	5	2	1	1	1	18
5:00	0	0	0	1	1	1	7	5	11	11	15	9	4	4	69
6:00	0	0	4	7	7	14	18	31	39	26	21	15	8	7	197
7:00	0	0	16	14	22	24	38	40	53	45	31	13	9	2	307
8:00	0	0	19	20	36	31	54	45	60	31	20	10	6	1	333
9:00	0	0	20	28	36	29	53	34	53	46	24	19	5	2	349
10:00	0	0	27	24	38	47	55	44	50	25	18	3	4	0	335
11:00	0	0	31	29	33	29	75	64	49	31	14	4	1	1	361
12:00 PM	0	0	43	40	54	59	63	71	56	21	6	1	0	0	414
1:00	0	0	35	38	56	37	82	48	49	23	11	4	1	0	384
2:00	0	0	37	38	55	49	71	64	41	30	5	2	2	0	394
3:00	0	0	56	48	54	49	88	74	32	9	5	2	0	0	417
4:00	0	0	50	47	59	64	90	63	22	1	0	0	0	0	396
5:00	0	0	50	49	59	67	84	46	25	8	2	2	0	0	392
6:00	0	0	24	25	28	38	78	89	62	20	13	5	2	0	384
7:00	0	0	11	13	21	26	56	50	43	39	19	11	6	0	295
8:00	0	0	5	7	9	15	18	32	31	33	29	5	5	0	189
9:00	0	0	0	1	1	4	17	22	26	18	21	9	6	1	126
10:00	0	0	0	0	0	2	12	10	13	13	12	10	2	0	74
11:00	0	0	0	0	0	0	0	7	10	9	5	3	2	1	37
Total	0	0	429	429	570	588	966	844	740	452	281	134	71	20	5524
		Р	ercentile	15th	50th	85th	95th								
			Speed	12	20	28	32								

opoou	
Mean Speed (Average)	20.6
10 MPH Pace Speed	17-26
Number in Pace	2741
Percent in Pace	49.6%
Number > 30 MPH	506
Percent > 30 MPH	9.2%

Location : Route 109 Location : West of Walgreen's Driveway City/State: Medway, MA Direction: WB,

,															
2/18/2022					> 12 -	> 15 -	> 18 -	> 21 -	> 24 -	> 27 -	> 30 -	> 33 -	> 36 -		
2/10/2022	0 - 3	> 3 - 6	> 6 - 9	> 9 - 12	15	18	21	24	27	30	33	36	39	> 39	
Time	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	Total
12:00 AM	0	0	0	0	1	0	1	3	7	10	4	5	3	0	34
1:00	0	0	0	0	0	1	1	0	2	3	1	0	2	0	10
2:00	0	0	0	0	0	0	0	1	0	2	2	1	1	0	7
3:00	0	0	0	0	0	0	0	4	5	1	2	2	3	0	17
4:00	0	0	0	0	0	0	0	1	2	3	1	1	3	0	11
5:00	0	0	0	0	0	3	5	6	7	10	12	8	4	3	58
6:00	0	0	3	3	3	8	21	24	47	25	27	10	10	1	182
7:00	0	0	14	17	21	31	36	38	56	28	33	11	1	0	286
8:00	0	0	24	21	34	27	58	40	47	26	16	4	3	0	300
9:00	0	0	13	21	31	24	40	56	68	33	16	11	3	5	321
10:00	0	0	32	23	47	35	50	47	59	34	20	5	2	0	354
11:00	0	0	24	32	45	47	68	62	52	32	20	7	5	2	396
12:00 PM	0	0	33	35	54	58	56	68	61	36	8	2	2	0	413
1:00	0	0	40	33	46	48	64	54	76	30	9	4	2	0	406
2:00	0	0	41	23	45	43	99	88	47	32	17	2	1	4	442
3:00	0	0	62	51	50	50	89	73	41	3	1	0	0	1	421
4:00	0	0	49	53	58	63	86	53	26	4	0	0	0	0	392
5:00	0	0	53	45	57	57	100	98	50	11	0	0	0	0	471
6:00	0	0	35	29	40	61	92	68	60	36	21	9	2	0	453
7:00	0	0	19	20	34	34	45	60	53	37	26	5	5	1	339
8:00	0	0	4	3	14	5	26	44	39	29	35	5	6	0	210
9:00	0	0	1	2	3	4	12	24	29	27	26	8	3	2	141
10:00	0	0	0	0	1	2	7	17	19	17	18	13	2	0	96
11:00	0	0	0	0	1	0	6	6	12	11	6	4	5	0	51
Total	0	0	447	411	585	601	962	935	865	480	321	117	68	19	5811
		Р	ercentile	15th	50th	85th	95th								
			Speed	12	20	28	32								

Speed 12 Mean Speed (Average) 10 MPH Pace Speed Number in Pace 20.8 17-26 2954 Percent in Pace 50.8% Number > 30 MPH 525 Percent > 30 MPH 9.0%

5

Location : Route 109 Location : West of Walgreen's Driveway City/State: Medway, MA Direction: WB,

2/19/2022					> 12 -	> 15 -	> 18 -	> 21 -	> 24 -	> 27 -	> 30 -	> 33 -	> 36 -		
	0 - 3	> 3 - 6	> 6 - 9	> 9 - 12	15	18	21	24	27	30	33	36	39	> 39	
l ime	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	Iotal
12:00 AM	0	0	0	0	0	2	/	10	6	5	8	4	2	0	44
1:00	0	0	0	0	0	0	0	1	0	2	3	1	4	1	10
2.00	0	0	0	0	0	0	0	1	1	0	1	1	0	2	0
3.00	0	0	0	0	0	1	1	0	1	3	0	1	1	1	4 10
4.00	0	0	0	0	2	3	ו כ	3	7	4 Q	1	3	1	1	3/
6.00	0	0	0	0	2	1	12	13	14	13	15	5	י א	2	70
7:00	0	0	5	5	12	13	16	22	25	22	18	q	g	5	161
8:00	0	0	14	15	17	14	33	42	45	38	34	10	2	2	266
9:00	Ő	Ő	16	20	27	23	64	65	91	42	20		2	4	382
10:00	0	0	41	27	53	41	75	95	64	22		7	4	1	437
11:00	0	0	49	35	44	47	90	84	58	14	4	5	1	0	431
12:00 PM	0	0	45	31	45	39	81	72	56	11	6	4	1	0	391
1:00	0	0	51	45	41	36	67	71	52	32	11	2	0	0	408
2:00	0	0	28	10	35	40	68	82	86	51	16	8	6	0	430
3:00	0	0	33	33	48	43	81	75	59	24	14	5	3	0	418
4:00	0	0	12	18	35	28	52	69	66	51	26	12	4	1	374
5:00	0	0	19	22	44	38	73	57	42	26	3	2	1	2	329
6:00	0	0	19	32	25	31	43	57	41	36	17	1	1	0	303
7:00	0	0	8	4	14	19	37	45	30	29	14	4	3	1	208
8:00	0	0	1	1	4	3	14	23	26	31	19	14	2	1	139
9:00	0	0	0	1	3	5	9	10	24	28	12	9	4	1	106
10:00	0	0	0	0	1	2	6	15	16	18	6	5	3	2	74
11:00	0	0	0	0	2	2	3	6	14	6	8	7	3	3	54
Total	0	0	341	299	453	431	834	917	830	516	266	126	60	31	5104
		P	ercentile	15th	50th	85th	95th								
		o	Speed	13	21	28	32								
	Mean	Speed (A	Average)	21.8											
	10 1		e Speed	18-27											
		Doroont		Z/30											
	N			183											
			30 MPH	405											
Grand Total	0		1217	1130	1608	1620	2762	2696	2435	1448	868	377	100	70	16439
Stats	0	0	ercentile	15th	50th	85th		2000	2400	1440	000	011	100	10	10400
Oldio		•	Speed	12	20	28	32								
	Mean	Speed (A	Average)	21.1	20	20	02								
	10 1	MPH Pac	e Speed	17-26											
		Number	in Pace	8406											
		Percent	in Pace	51.1%											
	Number > 30 MPH														
	Percent > 30 MPH														

Location : Route 109 Location : West of Walgreen's Driveway City/State: Medway, MA Direction: Combined

Direction. Com	pined														
2/17/2022	0 - 3	> 3 - 6	> 6 - 9	> 9 - 12	> 12 -	> 15 - 18	> 18 - 21	> 21 - 24	> 24 -	> 27 -	> 30 -	> 33 -	> 36 -	> 39	
Time	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	Total
12:00 AM	0	0	0	0	1	2	1	2	5	7	5	4	2	0	29
1:00	0	0	0	0	0	0	1	0	1	3	6	3	2	1	17
2:00	0	0	0	0	0	0	1	0	4	2	2	2	2	0	13
3:00	0	0	1	0	0	0	1	2	4	7	4	3	3	1	26
4:00	0	0	0	0	0	1	3	3	11	25	11	18	9	5	86
5:00	0	0	0	2	1	1	8	10	43	44	78	53	27	13	280
6:00	0	0	6	13	17	18	28	60	109	205	188	45	20	8	717
7:00	0	0	27	19	34	33	61	88	135	234	195	57	21	3	907
8:00	0	0	24	28	51	35	79	81	170	229	117	43	24	5	886
9:00	0	0	24	30	43	34	70	63	129	184	154	49	16	5	801
10:00	0	0	28	25	54	56	81	75	192	145	85	30	10	2	783
11:00	0	0	34	32	40	33	112	119	141	166	105	30	10	1	823
12:00 PM	0	0	48	44	56	81	94	123	167	186	93	22	10	3	927
1:00	0	0	35	40	59	42	95	93	173	160	96	18	7	9	827
2:00	0	0	43	45	68	60	115	100	166	180	70	17	10	3	877
3:00	0	0	61	54	67	61	114	102	156	135	142	31	14	0	937
4:00	0	0	59	60	75	78	111	117	126	146	83	26	13	2	896
5:00	0	0	53	54	70	82	106	107	138	131	86	26	12	3	868
6:00	0	0	24	25	31	39	81	119	173	93	102	41	18	1	747
7:00	0	0	11	14	21	29	60	71	92	122	71	34	14	7	546
8:00	0	0	5	7	9	16	23	48	54	79	74	20	17	1	353
9:00	0	0	0	1	1	4	17	23	39	35	52	25	14	6	217
10:00	0	0	0	0	0	2	12	10	17	28	34	28	7	5	143
11:00	0	0	0	0	0	0	0	7	11	16	11	10	4	3	62
Total	0	0	483	493	698	707	1274	1423	2256	2562	1864	635	286	87	12768
		P	ercentile	15th	50th	85th	95th								
			Speed	16	25	32	34								

Speed 16 Mean Speed (Average) 10 MPH Pace Speed Number in Pace 25.2 23-32 7142 Percent in Pace 55.9% Number > 30 MPH 2872 Percent > 30 MPH 22.5%

Location : Route 109 Location : West of Walgreen's Driveway City/State: Medway, MA Direction: Combined

2/18/2022					> 12 -	> 15 -	> 18 -	> 21 -	> 24 -	> 27 -	> 30 -	> 33 -	> 36 -		
2,10,2022	0 - 3	> 3 - 6	> 6 - 9	> 9 - 12	15	18	21	24	27	30	33	36	39	> 39	
Time	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	MPH	Total
12:00 AM	0	0	0	0	1	0	1	4	8	11	8	7	6	4	50
1:00	0	0	0	0	0	1	1	2	2	7	3	2	4	1	23
2:00	0	0	0	0	0	0	0	1	0	5	3	1	1	1	12
3:00	0	0	0	0	0	0	0	5	6	2	3	3	5	0	24
4:00	0	0	0	0	0	0	0	1	12	8	19	11	11	5	67
5:00	0	0	0	1	0	3	7	8	26	64	75	31	21	13	249
6:00	0	0	13	8	17	16	31	58	129	176	140	57	22	1	668
7:00	0	0	16	25	25	47	45	60	161	187	201	63	14	2	846
8:00	0	0	41	31	53	45	113	118	193	137	80	25	13	3	852
9:00	0	0	13	28	37	38	51	98	212	160	100	44	7	6	794
10:00	0	0	37	25	62	45	71	93	127	144	87	31	14	2	738
11:00	0	0	31	39	56	50	80	161	162	155	117	27	16	2	896
12:00 PM	0	0	39	41	75	69	78	125	163	182	87	15	8	5	887
1:00	0	0	52	35	51	60	85	102	199	177	106	22	11	3	903
2:00	0	0	49	27	55	56	123	144	186	175	77	32	10	6	940
3:00	0	0	73	58	56	55	113	133	172	173	100	26	6	7	972
4:00	0	0	52	55	66	67	94	74	134	148	119	33	14	3	859
5:00	0	0	60	48	69	62	116	126	192	138	85	31	16	1	944
6:00	0	0	35	29	50	72	105	84	146	160	87	42	17	0	827
7:00	0	0	19	20	41	35	50	67	129	124	70	32	16	7	610
8:00	0	0	4	3	15	7	26	51	73	74	94	28	22	3	400
9:00	0	0	1	2	3	4	12	27	36	67	58	23	8	7	248
10:00	0	0	0	0	1	2	7	19	23	36	53	33	7	4	185
11:00	0	0	0	0	1	0	6	10	14	18	23	15	13	3	103
Total	0	0	535	475	734	734	1215	1571	2505	2528	1795	634	282	89	13097
		P	ercentile	15th	50th	85th	95th								
			Speed	16	25	31	34								

Speed16Mean Speed (Average)25.110 MPH Pace Speed23-32Number in Pace7344Percent in Pace56.1%Number > 30 MPH2800Percent > 30 MPH21.4%

8

92420001

Location : Route 109 Location : West of Walgreen's Driveway City/State: Medway, MA Direction: Combined

2/19/2022					> 12 -	> 15 -	> 18 -	> 21 -	> 24 -	> 27 -	> 30 -	> 33 -	> 36 -		
Time	0-3 MDU	> 3 - 6 MDU	>6-9	> 9 - 12	15 MDU	18 MDU	21 MDU	24 MDU	27	30 MDU	33	36	39 MDU	> 39 MDU	Total
12:00 AM						2							<u>10160</u>		10tai 65
12.00 AM	0	0	0	0	0	0	0	0	9	3	7	3	5	1	28
2.00	0	0	0	0	0	0	0	2	1	4	2	2	2	5	18
3:00	0	0	0	0	0	0	0	0	0	7	2	0	0	1	10
4:00	0	0	0	0	0	1	1	0	2	11	5	5	5	7	37
5:00	0	0	0	0	2	3	2	3	8	18	22	19	9	16	102
6:00	0	0	0	0	1	1	13	15	27	44	64	30	11	11	217
7:00	0	0	5	5	15	16	16	25	46	81	102	56	37	15	419
8:00	0	0	15	22	19	20	36	55	101	164	112	61	19	3	627
9:00	0	0	18	21	31	32	76	83	205	177	109	38	22	5	817
10:00	0	0	43	31	57	50	92	145	167	204	100	32	13	3	937
11:00	0	0	54	36	47	54	125	148	192	207	65	31	7	1	967
12:00 PM	0	0	50	37	57	49	109	153	182	113	97	38	9	2	896
1:00	0	0	56	47	53	45	105	136	154	186	125	25	14	2	948
2:00	0	0	30	18	36	53	89	138	218	213	96	39	11	1	942
3:00	0	0	38	39	51	51	101	140	140	163	86	34	12	3	858
4:00	0	0	12	19	39	31	57	103	197	188	113	28	13	5	805
5:00	0	0	19	24	55	56	125	107	142	86	37	13	6	2	672
6:00	0	0	20	40	28	45	60	96	114	98	56	14	9	1	581
7:00	0	0	8	4	14	19	41	68	56	80	82	32	11	3	418
8:00	0	0	1	1	4	3	14	25	48	64	65	33	10	3	271
9:00	0	0	0	1	4	5	9	10	28	50	77	33	11	5	233
10:00	0	0	0	0	1	2	6	17	25	38	28	20	11	8	156
11:00	0	0	0	0	2	2	3	7	16	11	31	19	10	4	105
l otal	0	0	369	345	516	540	1087	1486	2088	2220	1497	614	260	107	11129
		Р	ercentile	15th	50th	85th	95th								
	Maan		Speed	25.0	25	31	35								
			Average)	20.9											
	101	Numbor	in Doco	6300											
		Dorcont		56 6%											
	N			2/178											
		ercent >	30 MPH	27.3%											
Grand Total	0	0	1387	1313	1948	1981	3576	4480	6849	7310	5156	1883	828	283	36994
Stats		P	ercentile	15th	50th	85th	95th	4400	0040	7010	0100	1000	020	200	00004
olato			Speed	16	25	31	34								
	Mean	Speed (A	Averade)	25.4	20	01	01								
	10 M	MPH Pac	e Speed	23-32											
		Number	in Pace	20786											
	Percent in Pace														
	Number > 30 MPH														
	Percent > 30 MPH														



MASSDOT CRASH RATE WORKSHEETS AND HIGH CRASH LOCATION MAPPING



## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN :	Medway			COUNT DA	TE:	Feb-22
DISTRICT : 3	UNSIGN	ALIZED :		SIGNA	LIZED :	X
		~ IN1	ERSECTION	i data ~		
MAJOR STREET :	Route 109					
MINOR STREET(S) :	Holliston Stre	eet				
INTERSECTION DIAGRAM (Label Approaches)	North					
		_	PEAK HOUF		_	Total Peak
APPROACH :	1	2	3	4	5	Hourly
DIRECTION :	NB	SB	EB	WB		Volume
PEAK HOURLY VOLUMES (PM) :	378	479	771	622		2,250
"K" FACTOR :	0.090	INTERSI	ECTION ADT APPROACH	( <b>V</b> )= TOTA I VOLUME:	AL DAILY	25,000
TOTAL # OF CRASHES :	36	# OF YEARS :	5	AVERA CRASHES A	GE # OF PER YEAR ( \):	7.20
CRASH RATE CALCU	ILATION :	0.79	RATE =	<u>(A*1,0</u> (V	000,000) * 365)	
Comments : Above Statewide (0.78) but Below District (0.89) Crash Rates						

Project Title & Date: Proposed Medical Office Building



## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN :	Medway			COUNT DA	TE:	Feb-22	
DISTRICT : 3	UNSIGN	ALIZED :		SIGNA	LIZED :	X	
~ INTERSECTION DATA ~							
MAJOR STREET :	Route 109						
MINOR STREET(S):	Project site d	Project site drvieway					
	Medway Con	nmons drivew	ay				
INTERSECTION DIAGRAM (Label Approaches)	Image: North       Image: North         Image: Nort       Image: North						
APPROACH :	1	2	PEAK HOUF	R VOLUMES	5	Total Peak	
DIRECTION :	NB	SB	EB	WB		Approach	
PEAK HOURLY VOLUMES (PM) :	159	51	580	647		1,437	
"K" FACTOR :	0.090 INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME : 15,96					15,967	
TOTAL # OF CRASHES :	25	# OF YEARS :	5	AVERA CRASHES <b>A</b>	GE # OF PER YEAR ( .):	5.00	
CRASH RATE CALCU	JLATION :	0.86	RATE =	<u>(A*1,0</u> (V	000,000) * 365)		
Comments : Above Statewide (0.78) but Below District (0.89) Crash Rates							

Project Title & Date: Proposed Medical Office Building

## MassDOT Top Crash Locations



3/23/2022, 1:00:21 PM



## **ROAD SAFETY AUDIT**

Route 109 (Main Street) at Holliston Street

Town of Medway

January 2014

Prepared for: Massachusetts Department of Transportation



Prepared by: Howard/Stein-Hudson Associates 38 Chauncy Street Boston, MA 02111



### Table 2. Summary of Potential Safety Enhancements

		Safety			
Safety Issue	Safety Enhancement	Payoff	Time Frame	Cost	<b>Responsible Party</b>
	In order to reduce the occurrence of courtesy crashes, consider restricting left turns from commercial driveways located close to the intersection, including left turns from Energy Gas, Hang Tai, The Little Store, and the adjacent real estate office on Holliston Street.	High	Short-term	Low	Town of Medway
	To help prevent courtesy crashes, work with the owners of Hang Tai and adjacent property owners to arrange a shared parking agreement that would allow Hang Tai to remove the perpendicular parking spaces along Route 109 eastbound and formalize a driveway to the parking lot.	High	Mid-term	Medium	Town of Medway/ Property Owners
Access Management	Work with the owner of Energy Gas to formalize its driveways along Route 109 eastbound and Holliston Street northbound to reduce the occurrence of courtesy crashes and improve efficiency at the intersection.	Medium	Mid-term	Medium	Town of Medway/ Property Owners
	To discourage cut-through traffic, work with the owners of Energy Gas, Hang Tai, and other businesses to implement strategies to discourage cut-through traffic from Holliston Street northbound to Route 109 westbound, including restricting the Hang Tai driveway along Route 109 eastbound to entrance-only; installation of speed humps along the cut- through route, and/or narrowing the curb cut on Holliston Street.		Mid-term	Medium	Town of Medway/ Property Owners
	As part of long-term planning efforts, require access management improvements, including formalization of driveways and driveway consolidation as part of site plan approval for future development.	High	Long-term	High	Town of Medway/ Property Owners

### Table 2. Summary of Potential Safety Enhancements (continued)

		Safety			
Safety Issue	Safety Enhancement	Payoff	Time Frame	Cost	<b>Responsible Party</b>
	Analyze the benefits to traffic operations created by switching to protected-permissive left turns at the intersection compared to the safety benefits of protected-only left-turns. If protected-permissive left turns are implemented, consider the use of a flashing yellow arrow during the permissive phase to alert motorists that left turns are permitted, but motorists must yield to oncoming traffic. Turning radii of larger vehicles should be checked to ensure no conflicts in the vehicles' travel path.	Low	Short-term	Medium	Town of Medway
	Evaluate the existing minimum green times at the intersection, and reduce if appropriate to increase efficiency at the intersection.	Low	Short-term	Low	Town of Medway
Traffic Signal	Evaluate the condition of the existing loop detectors. If necessary, repair, or replace loop detectors to improve operations at the intersection. Consider the benefits of using video detection at the intersection.	Low	Short-term	Low	Town of Medway
	Consider extending longitudinal pavement markings along the Holliston Street southbound approach to the intersection to guide motorists into the intended travel lanes and reduce confusion at the intersection. Supplement with lane use signage and diagrammatic pavement markings.	Medium	Short-term	Medium	Town of Medway
	As part of long-term safety improvements, realign the Holliston Street southbound signal so that it is more visible to approaching vehicles, and so that the signal heads are aligned in the center of their corresponding lanes, especially left-turn signals.	Medium	Long-term	High	Town of Medway

### Table 2. Summary of Potential Safety Enhancements (continued)

Safety Issue	Safety Enhancement	Safety Payoff	Time Frame	Cost	Responsible Party
	Improve guide signage at the intersection. Include names of adjacent towns (Holliston, Millis, etc.). Guide signage for Route 109 westbound should include "To I-495".	Low	Mid-term	Medium	Town of Medway
	Consider the use of a dedicated signal indication so that northbound vehicles see a red arrow instead of a red ball.	Low	Mid-term	Medium	Town of Medway
Signage	Place "Right Turn on Red After Stop" signage in a location visible from the stop bar on the Route 109 westbound channelized right-turn lane. Consider placing "Right Turn on Red" signage adjacent to the right-side signal or on the signal post for added visibility.	Low	Short-term	Low	Town of Medway
	Place a yield line at the yield sign in the Route 109 eastbound channelized right-turn lane.	Low	Short-term	Low	Town of Medway
	Remove the "Do Not Pass" signage and any other unnecessary or distracting signage from the vicinity of the intersection.	Low	Short-term	Low	Town of Medway
	Provide street name signage at all approaches to the intersection.	Low	Short-term	Low	Town of Medway
Pedestrian and	Provide sidewalks where sidewalks are currently not provided on Route 109 and Holliston Street, where feasible within the project limits, to improve pedestrian safety. Provide crosswalks and pedestrian signals at the intersection to connect the existing sidewalks to the new ones.	High	Mid-term	Medium	Town of Medway
Bicycle Accommodations	To discourage pedestrians from crossing at an unsafe location, remove the pedestrian push button on the southeast corner of the intersection facing Holliston Street, unless a crossing across the south leg will be provided as part of future safety improvements.	Medium	Mid-term	Medium	Town of Medway

### Table 2. Summary of Potential Safety Enhancements (continued)

Safety Issue	Safety Enhancement	Safety Payoff	Time Frame	Cost	Responsible Party
	Evaluate the safety benefits of upgrading existing signal indications to include pedestrian countdown timers.	Medium	Mid-term	Medium	Town of Medway
Pedestrian and Bicycle Accommodations	As part of future design considerations, consider providing bicycle accommodations along Route 109 and Holliston Street where feasible.	Medium	Mid-term	Medium	Town of Medway
	As part of future design considerations, provide bicycle detection at the intersection of Route 109/Holliston Street.	Low	Mid-term	Medium	Town of Medway



GENERAL BACKGROUND TRAFFIC GROWTH

#### General Background Traffic Growth - Daily Traffic Volumes

														Annual
CITY/TOWN	ROUTE/STREET	LOCATION	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Growth Rate
Medway	Main Street	at the Millis Town Line	14,500	14,551	14,736	13,426	13,526	14,270	14,939	15,133	15,299	14,067	14,123	0.10%
Medway	Summer Street	South of Milford Street	9,563	9,668	9,776	9,934	10,014	8,576	8,670	8,783	8,210	8,325	8,358	-1.81%
														0.86%



BACKGROUND DEVELOPMENT TRAFFIC-VOLUME NETWORKS

#### WEEKDAY MORNING PEAK HOUR (7:15 to 8:15 AM)



#### WEEKDAY EVENING PEAK HOUR (4:00 to 5:00 PM)



#### SATURDAY MIDDAY PEAK HOUR (11:00 AM to 12:00 PM)





TRIP-GENERATION CALCULATIONS

(720)

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

#### Setting/Location: General Urban/Suburban

Number of Studies: 18 Avg. 1000 Sq. Ft. GFA: 15 Directional Distribution: 50% entering, 50% exiting

#### Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
36.00	14.52 - 100.75	13.38

#### **Data Plot and Equation**



(720)

Vehicle Trip Ends vs: On a:	1000 Sq. Ft. GFA Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	24
Avg. 1000 Sq. Ft. GFA:	25
Directional Distribution:	79% entering, 21% exiting

#### Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Standard Deviation			
3.10	0.87 - 14.30	1.49		

### **Data Plot and Equation**



(720)

Vehicle Trip Ends vs: On a:	1000 Sq. Ft. GFA Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	30
Avg. 1000 Sq. Ft. GFA:	23
Directional Distribution:	30% entering, 70% exiting

#### Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation		
3.93	0.62 - 8.86	1.86		

### **Data Plot and Equation**



(720)

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

#### Setting/Location: General Urban/Suburban

Number of Studies:3Avg. 1000 Sq. Ft. GFA:31Directional Distribution:50% entering, 50% exiting

#### Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
13.78	5.24 - 21.93	9.26

#### **Data Plot and Equation**

Caution – Small Sample Size



Trip Gen Manual, 11th Edition

(720)

#### Vehicle Trip Ends vs: 1000 Sq. Ft. GFA On a: Saturday, Peak Hour of Generator

#### Setting/Location: General Urban/Suburban

Number of Studies: 2 Avg. 1000 Sq. Ft. GFA: 34 Directional Distribution: 57% entering, 43% exiting

#### Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
3.02	1.33 - 4.02	*

#### **Data Plot and Equation**

Caution – Small Sample Size





SIGHT DISTANCE CALCULATIONS
## **Sight Distance Calculations**

Equations:  $ISD = 1.47 \times V \times t$ 

Variables: V = 35 mpht = 8.0 s

## Intersection Sight Distance: looking to the southeast (turning left from stop):

 $ISD = 1.47 \times 40 \times 8.0 = 411.6 \approx 415$ 

## CAPACITY ANALYSIS WORKSHEETS

Route 109 at Holliston Street Route 109 at the Project site driveway and the Medway Commons Driveway



Route 114 at Holliston Street



## 2022 Existing Weekday Morning Peak Hour Traffic Volumes 1: Holliston Street & Route 109

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	۲	+	1	ኘ	<b>†</b>	1	۲	4		1	<b>†</b>	1
Traffic Volume (vph)	122	565	169	20	344	52	202	209	39	81	183	112
Future Volume (vph)	122	565	169	20	344	52	202	209	39	81	183	112
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.976				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1652	1845	1538	1589	1783	1478	1652	1778	0	1636	1749	1531
Flt Permitted	0.333			0.152			0.242			0.450		
Satd. Flow (perm)	579	1845	1538	254	1783	1478	421	1778	0	775	1749	1531
Satd. Flow (RTOR)			242			242		10				153
Adj. Flow (vph)	145	673	201	21	366	55	243	252	47	111	251	153
Lane Group Flow (vph)	145	673	201	21	366	55	243	299	0	111	251	153
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	. 5
Permitted Phases	2		Free	6		Free	8			4		4
Detector Phase	5	2		1	6		3	8		7	4	5
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	12.5	16.5		12.5	16.5		11.0	11.0		11.0	11.0	12.5
Total Split (s)	15.0	39.0		13.0	37.0		19.0	24.0		14.0	19.0	15.0
Total Split (%)	16.7%	43.3%		14.4%	41.1%		21.1%	26.7%		15.6%	21.1%	16.7%
Maximum Green (s)	8.5	32.5		6.5	30.5		14.0	19.0		9.0	14.0	8.5
Yellow Time (s)	4.5	4.5		4.5	4.5		4.0	4.0		4.0	4.0	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	2.0
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5		-1.0	-1.0		-1.0	-1.0	-2.5
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lao		Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?		3			5			3			5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	None
v/c Ratio	0.33	0.75	0.13	0.08	0.54	0.04	0.70	0.68		0.37	0.86	0.25
Control Delay	12.9	28.1	0.2	10 1	26.0	0.0	32.9	39.9		23.3	64.8	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	12.9	28.1	0.2	10.1	26.0	0.0	32.9	39.9		23.3	64.8	4.9
Queue Length 50th (ft)	40	265	0	6	174	0.0	99	154		41	140	0
Queue Length 95th (ft)	66	#518	0	14	124	0	146	222		62	#189	21
Internal Link Dist (ft)		220	•	•••	570	Ū	110	220		02	220	
Turn Bay Length (ft)	200		200	105	010	115	150			85	220	100
Base Canacity (vnh)	440	897	1538	256	681	1478	359	441		311	295	613
Starvation Can Reductn	0	007	0	0	0	0	000	0		0	0	010
Spillback Can Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Can Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0 33	0.75	0 13	0 08	0.54	0.04	89.0	89.0		0 36	0.85	0 25
	0.00	0.15	0.15	0.00	0.04	0.04	0.00	0.00		0.00	0.00	0.20

## Intersection Summary

Cycle Length: 90 Actuated Cycle Length: 90 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection Natural Cycle: 90

Lanes, Volumes, Timings AJA/Vanasse & Assoc., Inc. Synchro 11 Report S:\Jobs\9242\Analysis\22AMEX.syn

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

Queue shown is maximum after two cycles.



## 2022 Existing Weekday Morning Peak Hour Traffic Volumes 1: Holliston Street & Route 109

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	۲.	•	1	ሻ	•	1	ሻ	ţ,		۲	•	1
Traffic Volume (vph)	122	565	169	20	344	52	202	209	39	81	183	112
Future Volume (vph)	122	565	169	20	344	52	202	209	39	81	183	112
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	10	11	10	10	12	12	10	11	11
Total Lost time (s)	4.0	4.0	1.5	4.0	4.0	1.5	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1652	1845	1538	1589	1783	1478	1652	1778		1636	1749	1531
Flt Permitted	0.33	1.00	1.00	0.15	1.00	1.00	0.24	1.00		0.45	1.00	1.00
Satd. Flow (perm)	580	1845	1538	254	1783	1478	420	1778		774	1749	1531
Peak-hour factor, PHF	0.84	0.84	0.84	0.94	0.94	0.94	0.83	0.83	0.83	0.73	0.73	0.73
Adj. Flow (vph)	145	673	201	21	366	55	243	252	47	111	251	153
RTOR Reduction (vph)	0	0	0	0	0	0	0	8	0	0	0	105
Lane Group Flow (vph)	145	673	201	21	366	55	243	291	0	111	251	48
Heavy Vehicles (%)	2%	3%	5%	6%	3%	2%	2%	4%	6%	3%	5%	2%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases	2		Free	6		Free	8			4		4
Actuated Green, G (s)	44.5	36.4	90.0	33.5	30.9	90.0	33.0	21.0		22.0	15.0	23.1
Effective Green, g (s)	48.0	38.9	90.0	38.5	33.4	90.0	34.0	22.0		24.0	16.0	28.1
Actuated g/C Ratio	0.53	0.43	1.00	0.43	0.37	1.00	0.38	0.24		0.27	0.18	0.31
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	5.0		5.0	5.0	6.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	435	797	1538	184	661	1478	350	434		283	310	478
v/s Ratio Prot	c0.04	c0.36		0.01	0.21		c0.11	0.16		0.03	c0.14	0.01
v/s Ratio Perm	0.14		0.13	0.04		0.04	0.15			0.07		0.02
v/c Ratio	0.33	0.84	0.13	0.11	0.55	0.04	0.69	0.67		0.39	0.81	0.10
Uniform Delay, d1	12.1	22.8	0.0	17.5	22.4	0.0	21.5	30.7		26.0	35.5	22.0
Progression Factor	1.00	1.00	1.00	0.92	1.01	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.5	10.6	0.2	0.3	3.2	0.0	5.9	4.1		0.9	14.4	0.1
Delay (s)	12.6	33.5	0.2	16.3	25.9	0.0	27.3	34.8		26.9	49.9	22.1
Level of Service	В	С	А	В	С	A	С	С		С	D	С
Approach Delay (s)		23.9			22.2			31.5			36.7	
Approach LOS		С			С			С			D	
Intersection Summary												
HCM 2000 Control Delay			27.9	Н	CM 2000	Level of	Service		С			
HCM 2000 Volume to Capa	city ratio		0.78									
Actuated Cycle Length (s)			90.0	S	um of los	t time (s)			16.0			
Intersection Capacity Utiliza	ition		68.9%	IC	CU Level	of Service	Э		С			
Analysis Period (min)			15									

## 2022 Existing Weekday Evening Peak Hour Traffic Volumes 1: Holliston Street & Route 109

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	۲	•	1	ኘ	•	1	<u>۲</u>	4Î		۲	•	1
Traffic Volume (vph)	116	437	218	26	535	61	199	152	27	116	181	182
Future Volume (vph)	116	437	218	26	535	61	199	152	27	116	181	182
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.978				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	1881	1615	1620	1818	1507	1668	1843	0	1652	1801	1561
Flt Permitted	0.209			0.391			0.339			0.479		
Satd. Flow (perm)	371	1881	1615	667	1818	1507	595	1843	0	833	1801	1561
Satd. Flow (RTOR)			242			242		9				203
Adj. Flow (vph)	122	460	229	27	557	64	224	171	30	133	208	209
Lane Group Flow (vph)	122	460	229	27	557	64	224	201	0	133	208	209
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases	2		Free	6		Free	8			4		4
Detector Phase	5	2		1	6		3	8		7	4	5
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	12.5	16.5		12.5	16.5		11.0	11.0		11.0	11.0	12.5
Total Split (s)	13.0	43.0		13.0	43.0		14.0	20.0		14.0	20.0	13.0
Total Split (%)	14.4%	47.8%		14.4%	47.8%		15.6%	22.2%		15.6%	22.2%	14.4%
Maximum Green (s)	6.5	36.5		6.5	36.5		9.0	15.0		9.0	15.0	6.5
Yellow Time (s)	4.5	4.5		4.5	4.5		4.0	4.0		4.0	4.0	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	2.0
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5		-1.0	-1.0		-1.0	-1.0	-2.5
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	None
v/c Ratio	0.36	0.47	0.14	0.06	0.72	0.04	0.69	0.59		0.42	0.71	0.34
Control Delay	12.2	17.6	0.2	7.7	24.8	0.0	37.1	39.9		26.0	49.5	5.4
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	12.2	17.6	0.2	7.7	24.8	0.0	37.1	39.9		26.0	49.5	5.4
Queue Length 50th (ft)	32	148	0	7	284	0	92	99		51	111	2
Queue Length 95th (ft)	54	286	0	m14	211	0	#165	171		95	178	45
Internal Link Dist (ft)		220			570			220			220	
Turn Bay Length (ft)	200		200	105		115	150			85		100
Base Capacity (vph)	341	972	1615	448	804	1507	323	350		324	320	623
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	0.36	0.47	0.14	0.06	0.69	0.04	0.69	0.57		0.41	0.65	0.34

## Intersection Summary

Cycle Length: 90 Actuated Cycle Length: 90 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection Natural Cycle: 65

Lanes, Volumes, Timings AJA/Vanasse & Assoc., Inc. Synchro 11 Report S:\Jobs\9242\Analysis\22PMEX.syn

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

Queue shown is maximum after two cycles.

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

Ø1	ø₂ (R)		<b>▲</b> ø3	
13 s	43 s		14 s	20 s
🐓 øs	✓ Ø6 (R)	•	Ø7	A 08
13 s	43 s		14 s	20 s

## 2022 Existing Weekday Evening Peak Hour Traffic Volumes 1: Holliston Street & Route 109

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	•	1	۲	•	1	5	ţ,		ሻ	<b>^</b>	1
Traffic Volume (vph)	116	437	218	26	535	61	199	152	27	116	181	182
Future Volume (vph)	116	437	218	26	535	61	199	152	27	116	181	182
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	10	11	10	10	12	12	10	11	11
Total Lost time (s)	4.0	4.0	1.5	4.0	4.0	1.5	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1685	1881	1615	1620	1818	1507	1668	1842		1652	1801	1561
Flt Permitted	0.21	1.00	1.00	0.39	1.00	1.00	0.34	1.00		0.48	1.00	1.00
Satd. Flow (perm)	371	1881	1615	667	1818	1507	595	1842		833	1801	1561
Peak-hour factor, PHF	0.95	0.95	0.95	0.96	0.96	0.96	0.89	0.89	0.89	0.87	0.87	0.87
Adj. Flow (vph)	122	460	229	27	557	64	224	171	30	133	208	209
RTOR Reduction (vph)	0	0	0	0	0	0	0	7	0	0	0	146
Lane Group Flow (vph)	122	460	229	27	557	64	224	194	0	133	208	63
Heavy Vehicles (%)	0%	1%	0%	4%	1%	0%	1%	1%	0%	2%	2%	0%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases	2		Free	6		Free	8			4		4
Actuated Green, G (s)	46.7	40.1	90.0	38.7	36.1	90.0	26.0	15.4		22.6	13.7	20.3
Effective Green, g (s)	51.7	42.6	90.0	43.7	38.6	90.0	28.0	16.4		24.6	14.7	25.3
Actuated g/C Ratio	0.57	0.47	1.00	0.49	0.43	1.00	0.31	0.18		0.27	0.16	0.28
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	5.0		5.0	5.0	6.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	345	890	1615	377	779	1507	323	335		317	294	438
v/s Ratio Prot	c0.04	0.24		0.00	c0.31		c0.09	0.11		0.05	0.12	0.01
v/s Ratio Perm	0.17		c0.14	0.03		0.04	c0.13			0.07		0.03
v/c Ratio	0.35	0.52	0.14	0.07	0.72	0.04	0.69	0.58		0.42	0.71	0.14
Uniform Delay, d1	12.3	16.5	0.0	12.5	21.2	0.0	25.1	33.6		25.9	35.6	24.2
Progression Factor	1.00	1.00	1.00	0.85	0.89	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.6	2.1	0.2	0.1	5.3	0.0	6.3	2.4		0.9	7.6	0.2
Delay (s)	12.9	18.7	0.2	10.7	24.0	0.0	31.4	36.1		26.8	43.2	24.4
Level of Service	В	В	А	В	С	А	С	D		С	D	С
Approach Delay (s)		12.6			21.1			33.6			32.1	
Approach LOS		В			С			С			С	
Intersection Summary												
HCM 2000 Control Delay			22.9	Н	CM 2000	Level of	Service		С			
HCM 2000 Volume to Capa	city ratio		0.68									
Actuated Cycle Length (s)			90.0	S	um of los	t time (s)			16.0			
Intersection Capacity Utiliza	tion		68.5%	IC	CU Level	of Service	Э		С			
Analysis Period (min)			15									

## 2022 Existing Saturday Midday Peak Hour Traffic Volumes 1: Holliston Street & Route 109

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	۲	•	1	ኘ	•	1	<u>۲</u>	ef 🗍		۲	<b>†</b>	1
Traffic Volume (vph)	123	486	236	36	515	98	236	129	35	91	133	156
Future Volume (vph)	123	486	236	36	515	98	236	129	35	91	133	156
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.968				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	1881	1615	1685	1837	1507	1685	1839	0	1685	1837	1561
Flt Permitted	0.167			0.294			0.475			0.615		
Satd. Flow (perm)	296	1881	1615	521	1837	1507	842	1839	0	1091	1837	1561
Satd. Flow (RTOR)			235			235		13				167
Adj. Flow (vph)	138	546	265	38	548	104	259	142	38	98	143	168
Lane Group Flow (vph)	138	546	265	38	548	104	259	180	0	98	143	168
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases	2		Free	6		Free	8			4		4
Detector Phase	5	2		1	6		3	8		7	4	5
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	12.5	16.5		12.5	16.5		11.0	11.0		11.0	11.0	12.5
Total Split (s)	16.5	36.5		16.5	36.5		15.0	25.0		15.0	25.0	16.5
Total Split (%)	17.7%	39.2%		17.7%	39.2%		16.1%	26.9%		16.1%	26.9%	17.7%
Maximum Green (s)	10.0	30.0		10.0	30.0		10.0	20.0		10.0	20.0	10.0
Yellow Time (s)	4.5	4.5		4.5	4.5		4.0	4.0		4.0	4.0	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	2.0
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5		-1.0	-1.0		-1.0	-1.0	-2.5
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
v/c Ratio	0.39	0.63	0.16	0.10	0.82	0.07	0.68	0.44		0.26	0.48	0.25
Control Delay	12.9	23.7	0.2	10.1	36.5	0.1	32.3	32.6		21.5	37.3	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
Total Delay	12.9	23.7	0.2	10.1	36.5	0.1	32.3	32.6		21.5	37.3	4.2
Queue Length 50th (ft)	31	228	0	8	246	0	106	82		36	70	0
Queue Length 95th (ft)	68	396	0	25	#470	0	176	148		71	126	39
Internal Link Dist (ft)		220			570			220			220	
Turn Bay Length (ft)	200		200	105		115	150			85		100
Base Capacity (vph)	377	867	1615	450	742	1507	383	497		408	479	680
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	0.37	0.63	0.16	0.08	0.74	0.07	0.68	0.36		0.24	0.30	0.25

## Intersection Summary

Cycle Length: 93 Actuated Cycle Length: 81.6 Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Lanes, Volumes, Timings AJA/Vanasse & Assoc., Inc.

Synchro 11 Report S:\Jobs\9242\Analysis\22SMEX.syn # 95th percentile volume exceeds capacity, queue may be longer.Queue shown is maximum after two cycles.



# 2022 Existing Saturday Midday Peak Hour Traffic Volumes <u>1: Holliston Street & Route 109</u>

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	۲	•	1	۲.	•	1	ሻ	ĥ		۲	<b>^</b>	1
Traffic Volume (vph)	123	486	236	36	515	98	236	129	35	91	133	156
Future Volume (vph)	123	486	236	36	515	98	236	129	35	91	133	156
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	10	11	10	10	12	12	10	11	11
Total Lost time (s)	4.0	4.0	1.5	4.0	4.0	1.5	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1685	1881	1615	1685	1837	1507	1685	1840		1685	1837	1561
Flt Permitted	0.17	1.00	1.00	0.29	1.00	1.00	0.47	1.00		0.61	1.00	1.00
Satd. Flow (perm)	297	1881	1615	521	1837	1507	842	1840		1090	1837	1561
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	0.91	0.91	0.91	0.93	0.93	0.93
Adj. Flow (vph)	138	546	265	38	548	104	259	142	38	98	143	168
RTOR Reduction (vph)	0	0	0	0	0	0	0	10	0	0	0	113
Lane Group Flow (vph)	138	546	265	38	548	104	259	170	0	98	143	55
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases	2		Free	6		Free	8			4		4
Actuated Green, G (s)	44.1	35.1	85.5	33.9	30.0	85.5	26.4	16.5		20.6	13.6	22.6
Effective Green, g (s)	48.0	37.6	85.5	38.9	32.5	85.5	28.4	17.5		22.6	14.6	27.6
Actuated g/C Ratio	0.56	0.44	1.00	0.45	0.38	1.00	0.33	0.20		0.26	0.17	0.32
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	5.0		5.0	5.0	6.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	353	827	1615	324	698	1507	387	376		343	313	503
v/s Ratio Prot	c0.05	c0.29		0.01	c0.30		c0.09	0.09		0.03	0.08	0.01
v/s Ratio Perm	0.17		0.16	0.04		0.07	c0.14			0.05		0.02
v/c Ratio	0.39	0.66	0.16	0.12	0.79	0.07	0.67	0.45		0.29	0.46	0.11
Uniform Delay, d1	12.7	18.9	0.0	13.8	23.4	0.0	22.7	29.8		24.6	31.9	20.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	2.0	0.2	0.2	5.8	0.1	4.4	0.9		0.5	1.1	0.1
Delay (s)	13.5	20.9	0.2	14.0	29.2	0.1	27.1	30.7		25.0	32.9	20.4
Level of Service	В	C	A	В	C	A	С	С		С	С	C
Approach Delay (s)		14.0			24.0			28.5			25.9	
Approach LOS		В			С			С			С	
Intersection Summary												
HCM 2000 Control Delay			21.3	Н	CM 2000	Level of	Service		С			
HCM 2000 Volume to Capa	city ratio		0.71									
Actuated Cycle Length (s)			85.5	S	um of los	t time (s)			16.0			
Intersection Capacity Utiliza	ntersection Capacity Utilization 67.3% ICU Level of Service C											
Analysis Period (min)			15									

## 2029 No Build Weekday Morning Peak Hour Traffic Volumes 1: Holliston Street & Route 109

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ኘ	•	1	ኘ	•	1	<u>۲</u>	eî.		۲	<b>†</b>	1
Traffic Volume (vph)	131	613	181	26	388	63	217	224	44	89	196	120
Future Volume (vph)	131	613	181	26	388	63	217	224	44	89	196	120
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.975				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1652	1845	1538	1589	1783	1478	1652	1776	0	1636	1749	1531
Flt Permitted	0.289			0.119			0.208			0.332		
Satd. Flow (perm)	502	1845	1538	199	1783	1478	362	1776	0	572	1749	1531
Satd. Flow (RTOR)			242			242		10				164
Adj. Flow (vph)	156	730	215	28	413	67	261	270	53	122	268	164
Lane Group Flow (vph)	156	730	215	28	413	67	261	323	0	122	268	164
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases	2		Free	6		Free	8			4		4
Detector Phase	5	2		1	6		3	8		7	4	5
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	12.5	16.5		12.5	16.5		11.0	11.0		11.0	11.0	12.5
Total Split (s)	15.0	39.0		13.0	37.0		19.0	24.0		14.0	19.0	15.0
Total Split (%)	16.7%	43.3%		14.4%	41.1%		21.1%	26.7%		15.6%	21.1%	16.7%
Maximum Green (s)	8.5	32.5		6.5	30.5		14.0	19.0		9.0	14.0	8.5
Yellow Time (s)	4.5	4.5		4.5	4.5		4.0	4.0		4.0	4.0	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	2.0
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5		-1.0	-1.0		-1.0	-1.0	-2.5
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	None
v/c Ratio	0.39	0.83	0.14	0.12	0.62	0.05	0.77	0.80		0.46	0.91	0.27
Control Delay	13.8	32.6	0.2	10.1	25.8	0.1	37.4	48.1		25.4	72.0	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	13.8	32.6	0.2	10.1	25.8	0.1	37.4	48.1		25.4	72.0	4.9
Queue Length 50th (ft)	43	302	0	8	201	0	108	170		46	152	0
Queue Length 95th (ft)	70	#586	0	16	146	0	#160	#261		67	#208	21
Internal Link Dist (ft)		220			570			220			220	
Turn Bay Length (ft)	200		200	105		115	150			85		100
Base Capacity (vph)	406	884	1538	233	667	1478	350	406		278	296	623
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	0.38	0.83	0.14	0.12	0.62	0.05	0.75	0.80		0.44	0.91	0.26

## Intersection Summary

Cycle Length: 90 Actuated Cycle Length: 90 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection Natural Cycle: 90

Lanes, Volumes, Timings AJA/Vanasse & Assoc., Inc. Synchro 11 Report S:\Jobs\9242\Analysis\29AMNB.syn

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

Queue shown is maximum after two cycles.



## 2029 No Build Weekday Morning Peak Hour Traffic Volumes 1: Holliston Street & Route 109

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	۲.	•	1	ሻ	•	1	ሻ	ĥ		ሻ	<b>^</b>	1
Traffic Volume (vph)	131	613	181	26	388	63	217	224	44	89	196	120
Future Volume (vph)	131	613	181	26	388	63	217	224	44	89	196	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	10	11	10	10	12	12	10	11	11
Total Lost time (s)	4.0	4.0	1.5	4.0	4.0	1.5	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1652	1845	1538	1589	1783	1478	1652	1776		1636	1749	1531
Flt Permitted	0.29	1.00	1.00	0.12	1.00	1.00	0.21	1.00		0.33	1.00	1.00
Satd. Flow (perm)	502	1845	1538	199	1783	1478	362	1776		572	1749	1531
Peak-hour factor, PHF	0.84	0.84	0.84	0.94	0.94	0.94	0.83	0.83	0.83	0.73	0.73	0.73
Adj. Flow (vph)	156	730	215	28	413	67	261	270	53	122	268	164
RTOR Reduction (vph)	0	0	0	0	0	0	0	8	0	0	0	114
Lane Group Flow (vph)	156	730	215	28	413	67	261	315	0	122	268	50
Heavy Vehicles (%)	2%	3%	5%	6%	3%	2%	2%	4%	6%	3%	5%	2%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases	2		Free	6		Free	8			4		4
Actuated Green, G (s)	45.0	36.8	90.0	33.8	31.2	90.0	32.6	19.2		22.6	14.2	22.4
Effective Green, g (s)	48.4	39.3	90.0	38.8	33.7	90.0	33.6	20.2		24.6	15.2	27.4
Actuated g/C Ratio	0.54	0.44	1.00	0.43	0.37	1.00	0.37	0.22		0.27	0.17	0.30
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	5.0		5.0	5.0	6.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	406	805	1538	164	667	1478	341	398		267	295	466
v/s Ratio Prot	c0.05	c0.40		0.01	0.23		c0.12	c0.18		0.05	0.15	0.01
v/s Ratio Perm	0.16		0.14	0.06		0.05	0.16			0.08		0.02
v/c Ratio	0.38	0.91	0.14	0.17	0.62	0.05	0.77	0.79		0.46	0.91	0.11
Uniform Delay, d1	12.5	23.6	0.0	18.4	22.9	0.0	22.2	32.9		25.9	36.7	22.5
Progression Factor	1.00	1.00	1.00	0.87	0.91	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.6	15.8	0.2	0.5	4.1	0.1	9.8	10.3		1.2	29.6	0.1
Delay (s)	13.1	39.4	0.2	16.5	24.9	0.1	32.1	43.3		27.2	66.3	22.6
Level of Service	В	D	А	В	С	А	С	D		С	E	С
Approach Delay (s)		28.1			21.2			38.2			44.8	
Approach LOS		С			С			D			D	
Intersection Summary												
HCM 2000 Control Delay			32.3	Н	CM 2000	Level of	Service		С			
HCM 2000 Volume to Capa	city ratio		0.86									
Actuated Cycle Length (s)			90.0 Sum of lost time (s) 16.0									
Intersection Capacity Utilization	ation		72.9%	IC	CU Level	of Service	Э		С			
Analysis Period (min)			15									

## 2029 No Build Weekday Evening Peak Hour Traffic Volumes 1: Holliston Street & Route 109

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	•	1	ሻ	<b>†</b>	1	۲	4Î		ሻ	•	1
Traffic Volume (vph)	124	489	234	31	587	70	213	163	34	132	194	195
Future Volume (vph)	124	489	234	31	587	70	213	163	34	132	194	195
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.974				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	1881	1615	1620	1818	1507	1668	1835	0	1652	1801	1561
Flt Permitted	0.167			0.316			0.313			0.427		
Satd. Flow (perm)	296	1881	1615	539	1818	1507	550	1835	0	742	1801	1561
Satd. Flow (RTOR)			242			242		10				171
Adj. Flow (vph)	131	515	246	32	611	73	239	183	38	152	223	224
Lane Group Flow (vph)	131	515	246	32	611	73	239	221	0	152	223	224
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases	2		Free	6		Free	8			4		4
Detector Phase	5	2		1	6		3	8		7	4	5
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	12.5	16.5		12.5	16.5		11.0	11.0		11.0	11.0	12.5
Total Split (s)	13.0	43.0		13.0	43.0		14.0	20.0		14.0	20.0	13.0
Total Split (%)	14.4%	47.8%		14.4%	47.8%		15.6%	22.2%		15.6%	22.2%	14.4%
Maximum Green (s)	6.5	36.5		6.5	36.5		9.0	15.0		9.0	15.0	6.5
Yellow Time (s)	4.5	4.5		4.5	4.5		4.0	4.0		4.0	4.0	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	2.0
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5		-1.0	-1.0		-1.0	-1.0	-2.5
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	None
v/c Ratio	0.43	0.56	0.15	0.08	0.79	0.05	0.76	0.64		0.50	0.75	0.37
Control Delay	13.8	20.9	0.2	7.8	27.4	0.1	42.5	42.0		28.2	51.8	8.5
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	13.8	20.9	0.2	7.8	27.4	0.1	42.5	42.0		28.2	51.8	8.5
Queue Length 50th (ft)	32	223	0	6	309	0	103	113		62	120	21
Queue Length 95th (ft)	58	330	0	m15	192	0	#195	#188		108	#202	69
Internal Link Dist (ft)		220			570			220			220	
Turn Bay Length (ft)	200		200	105		115	150			85		100
Base Capacity (vph)	303	916	1615	391	797	1507	314	348		311	320	605
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	0.43	0.56	0.15	0.08	0.77	0.05	0.76	0.64		0.49	0.70	0.37

## Intersection Summary

Cycle Length: 90 Actuated Cycle Length: 90 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection Natural Cycle: 75

Lanes, Volumes, Timings AJA/Vanasse & Assoc., Inc. Synchro 11 Report S:\Jobs\9242\Analysis\29PMNB.syn

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

Queue shown is maximum after two cycles.

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

Ø1	Ø2 (R)		<b>▲</b> Ø3	∳ Ø4
13 s	43 s		14 s	20 s
₽ <sup>05</sup>	€ Ø6 (R)	,	Ø7	<hr/> <hr/> øs
13 s	43 s		14 s	20 s

## 2029 No Build Weekday Evening Peak Hour Traffic Volumes 1: Holliston Street & Route 109

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	•	1	5	•	1	5	ĥ		5	•	1
Traffic Volume (vph)	124	489	234	31	587	70	213	163	34	132	194	195
Future Volume (vph)	124	489	234	31	587	70	213	163	34	132	194	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	10	11	10	10	12	12	10	11	11
Total Lost time (s)	4.0	4.0	1.5	4.0	4.0	1.5	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1685	1881	1615	1620	1818	1507	1668	1836		1652	1801	1561
Flt Permitted	0.17	1.00	1.00	0.32	1.00	1.00	0.31	1.00		0.43	1.00	1.00
Satd. Flow (perm)	296	1881	1615	539	1818	1507	550	1836		742	1801	1561
Peak-hour factor, PHF	0.95	0.95	0.95	0.96	0.96	0.96	0.89	0.89	0.89	0.87	0.87	0.87
Adj. Flow (vph)	131	515	246	32	611	73	239	183	38	152	223	224
RTOR Reduction (vph)	0	0	0	0	0	0	0	8	0	0	0	122
Lane Group Flow (vph)	131	515	246	32	611	73	239	213	0	152	223	102
Heavy Vehicles (%)	0%	1%	0%	4%	1%	0%	1%	1%	0%	2%	2%	0%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases	2		Free	6		Free	8			4		4
Actuated Green, G (s)	45.3	38.7	90.0	39.7	35.9	90.0	26.1	15.6		22.9	14.0	20.6
Effective Green, g (s)	50.3	41.2	90.0	44.7	38.4	90.0	28.1	16.6		24.9	15.0	25.6
Actuated g/C Ratio	0.56	0.46	1.00	0.50	0.43	1.00	0.31	0.18		0.28	0.17	0.28
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	5.0		5.0	5.0	6.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	305	861	1615	343	775	1507	314	338		305	300	444
v/s Ratio Prot	c0.04	0.27		0.01	c0.34		c0.10	0.12		0.05	0.12	0.02
v/s Ratio Perm	0.20		c0.15	0.04		0.05	c0.14			0.08		0.04
v/c Ratio	0.43	0.60	0.15	0.09	0.79	0.05	0.76	0.63		0.50	0.74	0.23
Uniform Delay, d1	13.8	18.2	0.0	12.6	22.3	0.0	25.3	33.9		26.1	35.7	24.6
Progression Factor	1.00	1.00	1.00	0.86	0.85	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.0	3.1	0.2	0.1	7.4	0.1	10.4	3.7		1.3	9.6	0.3
Delay (s)	14.8	21.3	0.2	10.9	26.5	0.1	35.7	37.5		27.4	45.2	24.9
Level of Service	В	С	А	В	С	А	D	D		С	D	С
Approach Delay (s)		14.5			23.1			36.6			33.1	
Approach LOS		В			С			D			С	
Intersection Summary												
HCM 2000 Control Delay			24.8	Н	CM 2000	Level of	Service		С			
HCM 2000 Volume to Capa	acity ratio		0.75									
Actuated Cycle Length (s)			90.0	S	m of lost time (s) 16.0							
Intersection Capacity Utilization	ation		73.1%	IC	CU Level	of Service	Э		D			
Analysis Period (min)			15									

## 2029 No Build Saturday Midday Peak Hour Traffic Volumes 1: Holliston Street & Route 109

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	•	1	5	•	1	۲	f,		ሻ	•	1
Traffic Volume (vph)	132	536	253	43	566	110	253	138	42	104	143	167
Future Volume (vph)	132	536	253	43	566	110	253	138	42	104	143	167
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.965				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	1881	1615	1685	1837	1507	1685	1834	0	1685	1837	1561
Flt Permitted	0.127			0.237			0.455			0.556		
Satd. Flow (perm)	225	1881	1615	420	1837	1507	807	1834	0	986	1837	1561
Satd. Flow (RTOR)			235			235		15				138
Adj. Flow (vph)	148	602	284	46	602	117	278	152	46	112	154	180
Lane Group Flow (vph)	148	602	284	46	602	117	278	198	0	112	154	180
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases	2		Free	6		Free	8			4		4
Detector Phase	5	2		1	6		3	8		7	4	5
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	12.5	16.5		12.5	16.5		11.0	11.0		11.0	11.0	12.5
Total Split (s)	16.5	36.5		16.5	36.5		15.0	25.0		15.0	25.0	16.5
Total Split (%)	17.7%	39.2%		17.7%	39.2%		16.1%	26.9%		16.1%	26.9%	17.7%
Maximum Green (s)	10.0	30.0		10.0	30.0		10.0	20.0		10.0	20.0	10.0
Yellow Time (s)	4.5	4.5		4.5	4.5		4.0	4.0		4.0	4.0	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	2.0
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5		-1.0	-1.0		-1.0	-1.0	-2.5
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
v/c Ratio	0.46	0.69	0.18	0.14	0.88	0.08	0.75	0.49		0.31	0.50	0.28
Control Delay	16.1	26.4	0.2	10.8	42.4	0.1	37.2	33.5		22.1	37.8	6.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	16.1	26.4	0.2	10.8	42.4	0.1	37.2	33.5		22.1	37.8	6.9
Queue Length 50th (ft)	35	273	0	10	294	0	117	92		42	76	15
Queue Length 95th (ft)	84	#510	0	29	#553	0	#206	161		79	135	56
Internal Link Dist (ft)		220			570			220			220	
Turn Bay Length (ft)	200		200	105		115	150			85		100
Base Capacity (vph)	340	874	1615	407	710	1507	370	482		386	458	657
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	0.44	0.69	0.18	0.11	0.85	0.08	0.75	0.41		0.29	0.34	0.27

## Intersection Summary

Cycle Length: 93 Actuated Cycle Length: 84.6 Natural Cycle: 70 Control Type: Actuated-Uncoordinated

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# 95th percentile volume exceeds capacity, queue may be longer.Queue shown is maximum after two cycles.



## 2029 No Build Saturday Midday Peak Hour Traffic Volumes 1: Holliston Street & Route 109

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	•	1	5	•	1	5	ĥ		5	•	1
Traffic Volume (vph)	132	536	253	43	566	110	253	138	42	104	143	167
Future Volume (vph)	132	536	253	43	566	110	253	138	42	104	143	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	10	11	10	10	12	12	10	11	11
Total Lost time (s)	4.0	4.0	1.5	4.0	4.0	1.5	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1685	1881	1615	1685	1837	1507	1685	1834		1685	1837	1561
Flt Permitted	0.13	1.00	1.00	0.24	1.00	1.00	0.46	1.00		0.56	1.00	1.00
Satd. Flow (perm)	225	1881	1615	421	1837	1507	807	1834		986	1837	1561
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	0.91	0.91	0.91	0.93	0.93	0.93
Adj. Flow (vph)	148	602	284	46	602	117	278	152	46	112	154	180
RTOR Reduction (vph)	0	0	0	0	0	0	0	12	0	0	0	94
Lane Group Flow (vph)	148	602	284	46	602	117	278	186	0	112	154	86
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases	2		Free	6		Free	8			4		4
Actuated Green, G (s)	45.9	36.8	88.4	35.9	31.8	88.4	27.3	17.2		21.7	14.4	23.5
Effective Green, g (s)	49.9	39.3	88.4	40.9	34.3	88.4	29.3	18.2		23.7	15.4	28.5
Actuated g/C Ratio	0.56	0.44	1.00	0.46	0.39	1.00	0.33	0.21		0.27	0.17	0.32
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	5.0		5.0	5.0	6.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	318	836	1615	289	712	1507	377	377		329	320	503
v/s Ratio Prot	c0.06	c0.32		0.01	c0.33		c0.09	0.10		0.03	0.08	0.02
v/s Ratio Perm	0.20		0.18	0.06		0.08	c0.15			0.06		0.03
v/c Ratio	0.47	0.72	0.18	0.16	0.85	0.08	0.74	0.49		0.34	0.48	0.17
Uniform Delay, d1	14.4	20.1	0.0	14.6	24.6	0.0	24.1	31.0		25.4	32.9	21.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.1	3.1	0.2	0.3	9.1	0.1	7.3	1.0		0.6	1.1	0.2
Delay (s)	15.4	23.1	0.2	14.9	33.7	0.1	31.5	32.0		26.0	34.0	21.6
Level of Service	В	С	A	В	С	А	С	С		С	С	С
Approach Delay (s)		15.7			27.5			31.7			27.0	
Approach LOS		В			С			С			С	
Intersection Summary												
HCM 2000 Control Delay			23.7	Н	CM 2000	Level of	Service		С			
HCM 2000 Volume to Capa	acity ratio		0.77									
Actuated Cycle Length (s)			88.4	S	um of los	t time (s)			16.0			
Intersection Capacity Utiliza	ation		72.0%	IC	CU Level	of Service	9		С			
Analysis Period (min)			15									

## 2029 Build Weekday Morning Peak Hour Traffic Volumes 1: Holliston Street & Route 109

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	<b>†</b>	1	1	<b>†</b>	1	۲	ef 👘		1	<b>†</b>	1
Traffic Volume (vph)	131	632	181	29	393	65	217	224	53	97	196	120
Future Volume (vph)	131	632	181	29	393	65	217	224	53	97	196	120
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.971				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1652	1845	1538	1589	1783	1478	1652	1767	0	1636	1749	1531
Flt Permitted	0.283			0.119			0.207			0.299		
Satd. Flow (perm)	492	1845	1538	199	1783	1478	360	1767	0	515	1749	1531
Satd. Flow (RTOR)			242			242		12				164
Adj. Flow (vph)	156	752	215	31	418	69	261	270	64	133	268	164
Lane Group Flow (vph)	156	752	215	31	418	69	261	334	0	133	268	164
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases	2		Free	6		Free	8			4		4
Detector Phase	5	2		1	6		3	8		7	4	5
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	12.5	16.5		12.5	16.5		11.0	11.0		11.0	11.0	12.5
Total Split (s)	15.0	39.0		13.0	37.0		19.0	24.0		14.0	19.0	15.0
Total Split (%)	16.7%	43.3%		14.4%	41.1%		21.1%	26.7%		15.6%	21.1%	16.7%
Maximum Green (s)	8.5	32.5		6.5	30.5		14.0	19.0		9.0	14.0	8.5
Yellow Time (s)	4.5	4.5		4.5	4.5		4.0	4.0		4.0	4.0	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	2.0
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5		-1.0	-1.0		-1.0	-1.0	-2.5
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	None
v/c Ratio	0.39	0.90	0.14	0.14	0.63	0.05	0.77	0.83		0.51	0.91	0.27
Control Delay	14.0	41.9	0.2	10.2	24.3	0.1	37.4	51.1		27.1	72.0	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	14.0	41.9	0.2	10.2	24.3	0.1	37.4	51.1		27.1	72.0	4.9
Queue Length 50th (ft)	43	~468	0	5	204	0	108	176		50	152	0
Queue Length 95th (ft)	70	#612	0	18	154	0	#161	#275		72	#208	21
Internal Link Dist (ft)		220			570			220			220	
Turn Bay Length (ft)	200		200	105		115	150			85		100
Base Capacity (vph)	400	832	1538	233	667	1478	350	403		268	296	623
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	0.39	0.90	0.14	0.13	0.63	0.05	0.75	0.83		0.50	0.91	0.26

## Intersection Summary

Cycle Length: 90 Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection Natural Cycle: 90

Lanes, Volumes, Timings AJA/Vanasse & Assoc., Inc.

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- ~ Volume exceeds capacity, queue is theoretically infinite.
- Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

<b>√</b> Ø1	<u>→</u> Ø2 (R)		<b>▲</b> Ø3	<b>₽</b> Ø4
13 s	39 s		19 s	19 s
₩ <sub>Ø5</sub>	₹ Ø6 (R)	•	Ø7	1 Ø8
15 s	37 s		14 s	24 s

# 2029 Build Weekday Morning Peak Hour Traffic Volumes <u>1: Holliston Street & Route 109</u>

	٦	-	$\mathbf{\hat{z}}$	1	-	•	1	1	1	1	Ŧ	-
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	۲.	<b>^</b>	1	ሻ	•	1	ሻ	ĥ		ሻ	•	1
Traffic Volume (vph)	131	632	181	29	393	65	217	224	53	97	196	120
Future Volume (vph)	131	632	181	29	393	65	217	224	53	97	196	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	10	11	10	10	12	12	10	11	11
Total Lost time (s)	4.0	4.0	1.5	4.0	4.0	1.5	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1652	1845	1538	1589	1783	1478	1652	1768		1636	1749	1531
Flt Permitted	0.28	1.00	1.00	0.12	1.00	1.00	0.21	1.00		0.30	1.00	1.00
Satd. Flow (perm)	492	1845	1538	199	1783	1478	360	1768		515	1749	1531
Peak-hour factor, PHF	0.84	0.84	0.84	0.94	0.94	0.94	0.83	0.83	0.83	0.73	0.73	0.73
Adj. Flow (vph)	156	752	215	31	418	69	261	270	64	133	268	164
RTOR Reduction (vph)	0	0	0	0	0	0	0	9	0	0	0	114
Lane Group Flow (vph)	156	752	215	31	418	69	261	325	0	133	268	50
Heavy Vehicles (%)	2%	3%	5%	6%	3%	2%	2%	4%	6%	3%	5%	2%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases	2		Free	6		Free	8			4		4
Actuated Green, G (s)	43.6	35.4	90.0	35.0	31.1	90.0	32.5	19.1		22.9	14.3	22.5
Effective Green, g (s)	48.3	37.9	90.0	40.0	33.6	90.0	33.7	20.1		24.9	15.3	27.5
Actuated g/C Ratio	0.54	0.42	1.00	0.44	0.37	1.00	0.37	0.22		0.28	0.17	0.31
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	5.0		5.0	5.0	6.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	401	776	1538	187	665	1478	341	394		262	297	467
v/s Ratio Prot	c0.05	c0.41		0.01	0.23		c0.12	c0.18		0.05	0.15	0.01
v/s Ratio Perm	0.16		0.14	0.06		0.05	0.16			0.09		0.02
v/c Ratio	0.39	0.97	0.14	0.17	0.63	0.05	0.77	0.82		0.51	0.90	0.11
Uniform Delay, d1	12.6	25.5	0.0	19.0	23.1	0.0	22.2	33.3		26.0	36.6	22.4
Progression Factor	1.00	1.00	1.00	0.87	0.84	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.6	25.6	0.2	0.4	4.3	0.1	9.8	13.1		1.5	28.5	0.1
Delay (s)	13.3	51.1	0.2	16.8	23.6	0.1	32.0	46.3		27.5	65.1	22.5
Level of Service	В	D	А	В	С	A	С	D		С	E	С
Approach Delay (s)		36.1			20.1			40.0			43.9	
Approach LOS		D			С			D			D	
Intersection Summary												
HCM 2000 Control Delay			35.5	Н	CM 2000	Level of	Service		D			
HCM 2000 Volume to Capa	city ratio		0.89									
Actuated Cycle Length (s)			90.0	S	um of los	t time (s)			16.0			
Intersection Capacity Utiliza	ation		73.9%	IC	CU Level	of Service	e		D			
Analysis Period (min)			15									

## 2029 Build Weekday Evening Peak Hour Traffic Volumes 1: Holliston Street & Route 109

	≯	-	$\mathbf{r}$	4	+	•	1	Ť	1	1	Ŧ	~
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	•	1	ሻ	•	1	۲	4Î		ሻ	•	1
Traffic Volume (vph)	124	499	234	42	610	80	213	163	39	136	194	195
Future Volume (vph)	124	499	234	42	610	80	213	163	39	136	194	195
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.971				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	1881	1615	1620	1818	1507	1668	1830	0	1652	1801	1561
Flt Permitted	0.153			0.310			0.323			0.388		
Satd. Flow (perm)	271	1881	1615	529	1818	1507	567	1830	0	675	1801	1561
Satd. Flow (RTOR)			242			242		12				162
Adj. Flow (vph)	131	525	246	44	635	83	239	183	44	156	223	224
Lane Group Flow (vph)	131	525	246	44	635	83	239	227	0	156	223	224
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases	2		Free	6		Free	8			4		4
Detector Phase	5	2		1	6		3	8		7	4	5
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	12.5	16.5		12.5	16.5		11.0	11.0		11.0	11.0	12.5
Total Split (s)	13.0	43.0		13.0	43.0		14.0	20.0		14.0	20.0	13.0
Total Split (%)	14.4%	47.8%		14.4%	47.8%		15.6%	22.2%		15.6%	22.2%	14.4%
Maximum Green (s)	6.5	36.5		6.5	36.5		9.0	15.0		9.0	15.0	6.5
Yellow Time (s)	4.5	4.5		4.5	4.5		4.0	4.0		4.0	4.0	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	2.0
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5		-1.0	-1.0		-1.0	-1.0	-2.5
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	None
v/c Ratio	0.45	0.57	0.15	0.11	0.81	0.06	0.79	0.68		0.53	0.75	0.37
Control Delay	14.1	20.8	0.2	8.4	28.3	0.1	45.1	44.0		29.6	51.8	9.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	14.1	20.8	0.2	8.4	28.3	0.1	45.1	44.0		29.6	51.8	9.3
Queue Length 50th (ft)	32	228	0	6	322	0	105	115		65	120	25
Queue Length 95th (ft)	58	339	0	m22	#245	0	#192	#197		110	#202	73
Internal Link Dist (ft)		220			570			220			220	
Turn Bay Length (ft)	200		200	105		115	150			85		100
Base Capacity (vph)	293	925	1615	391	797	1507	304	339		298	320	599
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	0.45	0.57	0.15	0.11	0.80	0.06	0.79	0.67		0.52	0.70	0.37

#### Intersection Summary

Cycle Length: 90 Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection Natural Cycle: 80

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

Queue shown is maximum after two cycles.

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

Ø1	ø₂ (R)		<b>▲</b> ø3	
13 s	43 s		14 s	20 s
🐓 øs	✓ Ø6 (R)	•	Ø7	A 08
13 s	43 s		14 s	20 s

# 2029 Build Weekday Evening Peak Hour Traffic Volumes <u>1: Holliston Street & Route 109</u>

	٦	-	$\mathbf{r}$	-	-	•	1	1	1	1	Ŧ	-
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	•	1	۲	•	1	ň	f,		ሻ	<b>^</b>	1
Traffic Volume (vph)	124	499	234	42	610	80	213	163	39	136	194	195
Future Volume (vph)	124	499	234	42	610	80	213	163	39	136	194	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	10	11	10	10	12	12	10	11	11
Total Lost time (s)	4.0	4.0	1.5	4.0	4.0	1.5	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1685	1881	1615	1620	1818	1507	1668	1830		1652	1801	1561
Flt Permitted	0.15	1.00	1.00	0.31	1.00	1.00	0.32	1.00		0.39	1.00	1.00
Satd. Flow (perm)	272	1881	1615	528	1818	1507	567	1830		675	1801	1561
Peak-hour factor, PHF	0.95	0.95	0.95	0.96	0.96	0.96	0.89	0.89	0.89	0.87	0.87	0.87
Adj. Flow (vph)	131	525	246	44	635	83	239	183	44	156	223	224
RTOR Reduction (vph)	0	0	0	0	0	0	0	10	0	0	0	116
Lane Group Flow (vph)	131	525	246	44	635	83	239	217	0	156	223	108
Heavy Vehicles (%)	0%	1%	0%	4%	1%	0%	1%	1%	0%	2%	2%	0%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases	2		Free	6		Free	8			4		4
Actuated Green, G (s)	45.7	39.1	90.0	40.3	36.4	90.0	25.1	15.1		22.9	14.0	20.6
Effective Green, g (s)	50.7	41.6	90.0	45.3	38.9	90.0	27.1	16.1		24.9	15.0	25.6
Actuated g/C Ratio	0.56	0.46	1.00	0.50	0.43	1.00	0.30	0.18		0.28	0.17	0.28
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	5.0		5.0	5.0	6.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	296	869	1615	343	785	1507	305	327		294	300	444
v/s Ratio Prot	c0.04	0.28		0.01	c0.35		c0.10	0.12		0.06	0.12	0.02
v/s Ratio Perm	0.20		c0.15	0.06		0.06	c0.14			0.09		0.04
v/c Ratio	0.44	0.60	0.15	0.13	0.81	0.06	0.78	0.66		0.53	0.74	0.24
Uniform Delay, d1	14.0	18.1	0.0	12.4	22.3	0.0	26.1	34.4		26.2	35.7	24.8
Progression Factor	1.00	1.00	1.00	0.92	0.86	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.1	3.1	0.2	0.2	8.1	0.1	12.4	5.0		1.8	9.6	0.3
Delay (s)	15.1	21.2	0.2	11.6	27.2	0.1	38.4	39.4		28.0	45.2	25.0
Level of Service	В	С	А	В	С	А	D	D		С	D	С
Approach Delay (s)		14.6			23.4			38.9			33.3	
Approach LOS		В			С			D			С	
Intersection Summary												
HCM 2000 Control Delay			25.3	Н	CM 2000	Level of	Service		С			
HCM 2000 Volume to Capa	city ratio		0.77									
Actuated Cycle Length (s)			90.0	S	um of los	t time (s)			16.0			
Intersection Capacity Utiliza	tion		74.3%	IC	CU Level of	of Service	9		D			
Analysis Period (min)			15									

## 2029 Build Saturday Midday Peak Hour Traffic Volumes 1: Holliston Street & Route 109

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	•	1	ሻ	•	1	۲	4		ሻ	•	7
Traffic Volume (vph)	132	551	253	48	577	115	253	138	49	110	143	167
Future Volume (vph)	132	551	253	48	577	115	253	138	49	110	143	167
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.961				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	1881	1615	1685	1837	1507	1685	1826	0	1685	1837	1561
Flt Permitted	0.118			0.219			0.459			0.531		
Satd. Flow (perm)	209	1881	1615	388	1837	1507	814	1826	0	942	1837	1561
Satd. Flow (RTOR)			235			235		18				135
Adj. Flow (vph)	148	619	284	51	614	122	278	152	54	118	154	180
Lane Group Flow (vph)	148	619	284	51	614	122	278	206	0	118	154	180
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases	2		Free	6		Free	8			4		4
Detector Phase	5	2		1	6		3	8		7	4	5
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	12.5	16.5		12.5	16.5		11.0	11.0		11.0	11.0	12.5
Total Split (s)	16.5	36.5		16.5	36.5		15.0	25.0		15.0	25.0	16.5
Total Split (%)	17.7%	39.2%		17.7%	39.2%		16.1%	26.9%		16.1%	26.9%	17.7%
Maximum Green (s)	10.0	30.0		10.0	30.0		10.0	20.0		10.0	20.0	10.0
Yellow Time (s)	4.5	4.5		4.5	4.5		4.0	4.0		4.0	4.0	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	2.0
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5		-1.0	-1.0		-1.0	-1.0	-2.5
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
v/c Ratio	0.47	0.71	0.18	0.15	0.89	0.08	0.75	0.51		0.33	0.49	0.28
Control Delay	17.2	27.4	0.2	11.1	43.9	0.1	37.2	33.6		22.4	37.7	7.1
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	17.2	27.4	0.2	11.1	43.9	0.1	37.2	33.6		22.4	37.7	7.1
Queue Length 50th (ft)	36	289	0	12	306	0	117	95		45	76	16
Queue Length 95th (ft)	89	#537	0	32	#569	0	#204	166		83	135	57
Internal Link Dist (ft)		220			570			220			220	
Turn Bay Length (ft)	200		200	105		115	150			85		100
Base Capacity (vph)	332	874	1615	394	705	1507	370	479		379	455	655
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	0.45	0.71	0.18	0.13	0.87	0.08	0.75	0.43		0.31	0.34	0.27

## Intersection Summary

Cycle Length: 93 Actuated Cycle Length: 85.1 Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Lanes, Volumes, Timings AJA/Vanasse & Assoc., Inc.

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# 95th percentile volume exceeds capacity, queue may be longer.Queue shown is maximum after two cycles.



## 2029 Build Saturday Midday Peak Hour Traffic Volumes 1: Holliston Street & Route 109

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	•	1	5	•	1	ሻ	ĥ		5	•	1
Traffic Volume (vph)	132	551	253	48	577	115	253	138	49	110	143	167
Future Volume (vph)	132	551	253	48	577	115	253	138	49	110	143	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	12	12	10	11	10	10	12	12	10	11	11
Total Lost time (s)	4.0	4.0	1.5	4.0	4.0	1.5	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1685	1881	1615	1685	1837	1507	1685	1825		1685	1837	1561
Flt Permitted	0.12	1.00	1.00	0.22	1.00	1.00	0.46	1.00		0.53	1.00	1.00
Satd. Flow (perm)	210	1881	1615	389	1837	1507	813	1825		941	1837	1561
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	0.91	0.91	0.91	0.93	0.93	0.93
Adj. Flow (vph)	148	619	284	51	614	122	278	152	54	118	154	180
RTOR Reduction (vph)	0	0	0	0	0	0	0	14	0	0	0	91
Lane Group Flow (vph)	148	619	284	51	614	122	278	192	0	118	154	89
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	Free	pm+pt	NA	Free	pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases	2		Free	6		Free	8			4		4
Actuated Green, G (s)	46.2	37.1	89.0	36.4	32.2	89.0	27.4	17.3		22.0	14.6	23.7
Effective Green, g (s)	50.3	39.6	89.0	41.4	34.7	89.0	29.4	18.3		24.0	15.6	28.7
Actuated g/C Ratio	0.57	0.44	1.00	0.47	0.39	1.00	0.33	0.21		0.27	0.18	0.32
Clearance Time (s)	6.5	6.5		6.5	6.5		5.0	5.0		5.0	5.0	6.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	310	836	1615	278	716	1507	377	375		323	321	503
v/s Ratio Prot	c0.06	c0.33		0.01	c0.33		c0.09	0.11		0.03	0.08	0.02
v/s Ratio Perm	0.21		0.18	0.07		0.08	c0.15			0.06		0.03
v/c Ratio	0.48	0.74	0.18	0.18	0.86	0.08	0.74	0.51		0.37	0.48	0.18
Uniform Delay, d1	14.7	20.4	0.0	14.9	24.9	0.0	24.4	31.4		25.6	33.0	21.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.2	3.6	0.2	0.3	10.0	0.1	7.3	1.2		0.7	1.1	0.2
Delay (s)	15.9	24.0	0.2	15.2	34.8	0.1	31.8	32.6		26.3	34.2	21.8
Level of Service	В	С	A	В	С	A	С	С		С	С	С
Approach Delay (s)		16.4			28.2			32.1			27.2	
Approach LOS		В			С			С			С	
Intersection Summary												
HCM 2000 Control Delay			24.3	Н	CM 2000	Level of	Service		С			
HCM 2000 Volume to Capa	city ratio		0.78									
Actuated Cycle Length (s)			89.0	S	um of los	t time (s)			16.0			
Intersection Capacity Utiliza	tion		72.6%	IC	CU Level	of Service	9		С			
Analysis Period (min)			15									

Route 114 at the Project site driveway and the Medway Commons Driveway



## 2022 Existing Weekday Morning Peak Hour Traffic Volumes2: Medway Commons Driveway/Project Site Driveway & Route 109

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	۲	<b>†</b>	1	ኘ	4Î			ર્સ	1	ሻ	4	
Traffic Volume (vph)	1	613	71	32	361	1	54	Ō	69	0	1	1
Future Volume (vph)	1	613	71	32	361	1	54	0	69	0	1	1
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850		0.925	
Flt Protected	0.950			0.950				0.950				
Satd. Flow (prot)	1745	1845	1583	1851	1968	0	0	1736	1583	1900	1758	0
Flt Permitted	0.495			0.320				0.755				
Satd. Flow (perm)	909	1845	1583	624	1968	0	0	1379	1583	1900	1758	0
Satd. Flow (RTOR)			109						109		2	
Adj. Flow (vph)	1	652	76	39	435	1	71	0	91	0	2	2
Lane Group Flow (vph)	1	652	76	39	436	0	0	71	91	0	4	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2		2	6			8		8	4		
Detector Phase	5	2	2	1	6		8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	12.0	16.0	16.0	12.0	16.0		12.0	12.0	12.0	12.0	12.0	
Total Split (s)	12.0	57.0	57.0	15.0	60.0		18.0	18.0	18.0	18.0	18.0	
Total Split (%)	13.3%	63.3%	63.3%	16.7%	66.7%		20.0%	20.0%	20.0%	20.0%	20.0%	
Maximum Green (s)	6.0	51.0	51.0	9.0	54.0		12.0	12.0	12.0	12.0	12.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0			-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lao	Lag	Lead	Lag			-	-			
Lead-Lag Optimize?		5	5		5							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Min	C-Min	None	C-Min		None	None	None	None	None	
v/c Ratio	0.00	0.48	0.06	0.06	0.28			0.39	0.30		0.02	
Control Delay	4.0	8.4	1.5	3.1	5.1			40.8	7.6		26.0	
Queue Delay	0.0	0.1	0.0	0.0	0.0			0.0	0.0		0.0	
Total Delay	4.0	8.4	1.5	3.1	5.1			40.8	7.6		26.0	
Queue Length 50th (ft)	0	124	0	4	54			38	0		1	
Queue Length 95th (ft)	m0	142	m1	11	157			62	17		5	
Internal Link Dist (ft)		570			220			220			219	
Turn Bay Length (ft)	100	010	100	230							210	
Base Capacity (vph)	779	1349	1186	650	1557			221	345		284	
Starvation Can Reductn	0	59	0	0	0			0	0		0	
Spillback Cap Reductn	0	0	0	0	0			0	0		0	
Storage Cap Reductn	0	0	0	0	Ő			0	0		0 0	
Reduced v/c Ratio	0.00	0.51	0.06	0.06	0.28			0.32	0.26		0.01	
Intersection Summary												
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Cycle Length: 90

Actuated Cycle Length: 90

Offset: 16 (18%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow Natural Cycle: 55

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



Splits and Phases: 2: Medway Commons Driveway/Project Site Driveway & Route 109

## 2022 Existing Weekday Morning Peak Hour Traffic Volumes2: Medway Commons Driveway/Project Site Driveway & Route 109

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	•	1	ሻ	ĥ			र्स	1	5	ĥ	
Traffic Volume (vph)	1	613	71	32	361	1	54	Ö	69	0	1	1
Future Volume (vph)	1	613	71	32	361	1	54	0	69	0	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	14	14	14	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		1.00	
Satd. Flow (prot)	1745	1845	1583	1851	1967			1736	1583		1758	
Flt Permitted	0.50	1.00	1.00	0.32	1.00			0.76	1.00		1.00	
Satd. Flow (perm)	909	1845	1583	624	1967			1380	1583		1758	
Peak-hour factor, PHF	0.94	0.94	0.94	0.83	0.83	0.83	0.76	0.76	0.76	0.50	0.50	0.50
Adj. Flow (vph)	1	652	76	39	435	1	71	0	91	0	2	2
RTOR Reduction (vph)	0	0	24	0	0	0	0	0	80	0	2	0
Lane Group Flow (vph)	1	652	52	39	436	0	0	71	11	0	2	0
Heavy Vehicles (%)	0%	3%	2%	4%	3%	0%	4%	0%	2%	0%	0%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	60.6	59.4	59.4	65.8	62.0			8.8	8.8		8.8	
Effective Green, g (s)	64.6	61.4	61.4	69.8	64.0			10.8	10.8		10.8	
Actuated g/C Ratio	0.72	0.68	0.68	0.78	0.71			0.12	0.12		0.12	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	682	1258	1079	563	1398			165	189		210	
v/s Ratio Prot	0.00	c0.35		c0.00	0.22						0.00	
v/s Ratio Perm	0.00		0.03	0.05				c0.05	0.01			
v/c Ratio	0.00	0.52	0.05	0.07	0.31			0.43	0.06		0.01	
Uniform Delay, d1	3.6	7.0	4.7	3.6	4.8			36.7	35.1		34.9	
Progression Factor	1.35	0.90	1.90	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.0	1.1	0.1	0.1	0.6			1.8	0.1		0.0	
Delay (s)	4.9	7.4	9.0	3.7	5.4			38.5	35.2		34.9	
Level of Service	А	А	А	А	А			D	D		С	
Approach Delay (s)		7.6			5.3			36.7			34.9	
Approach LOS		А			А			D			С	
Intersection Summary												
HCM 2000 Control Delay			10.3	Н	CM 2000	Level of	Service		В			
HCM 2000 Volume to Capac	city ratio		0.47									
Actuated Cycle Length (s)			90.0	S	um of lost	t time (s)			12.0			
Intersection Capacity Utiliza	tion		48.6%	IC	CU Level o	of Service	•		А			
Analysis Period (min)			15									

## 2022 Existing Weekday Evening Peak Hour Traffic Volumes 2: Medway Commons Driveway/Project Site Driveway & Route 109

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	۲	<b>†</b>	1	۲	el 🕴			र्स	1	۲	ę.	
Traffic Volume (vph)	27	404	149	117	515	15	78	8	73	16	6	29
Future Volume (vph)	27	404	149	117	515	15	78	8	73	16	6	29
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.996				0.850		0.876	
Flt Protected	0.950			0.950				0.956		0.950		
Satd. Flow (prot)	1745	1881	1615	1869	1999	0	0	1800	1583	1805	1664	0
Flt Permitted	0.414			0.420				0.716		0.669		
Satd. Flow (perm)	760	1881	1615	826	1999	0	0	1348	1583	1271	1664	0
Satd. Flow (RTOR)			148		3				109		34	
Adj. Flow (vph)	28	425	157	123	542	16	91	9	85	19	7	34
Lane Group Flow (vph)	28	425	157	123	558	0	0	100	85	19	41	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		. 1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Detector Phase	5	2	2	1	6		8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	12.0	16.0	16.0	12.0	16.0		12.0	12.0	12.0	12.0	12.0	
Total Split (s)	12.0	49.0	49.0	18.0	55.0		23.0	23.0	23.0	23.0	23.0	
Total Split (%)	13.3%	54.4%	54.4%	20.0%	61.1%		25.6%	25.6%	25.6%	25.6%	25.6%	
Maximum Green (s)	6.0	43.0	43.0	12.0	49.0		17.0	17.0	17.0	17.0	17.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0			-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?		Ŭ	Ŭ		Ŭ							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Min	C-Min	None	C-Min		None	None	None	None	None	
v/c Ratio	0.05	0.37	0.15	0.17	0.40			0.48	0.25	0.10	0.14	
Control Delay	3.1	8.5	1.6	4.0	8.5			41.5	5.8	31.6	14.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	3.1	8.5	1.6	4.0	8.5			41.5	5.8	31.6	14.0	
Queue Length 50th (ft)	2	91	0	15	85			53	0	9	3	
Queue Length 95th (ft)	m7	132	8	35	265			91	22	26	28	
Internal Link Dist (ft)		570			220			220			219	
Turn Bay Length (ft)	100		100	230						60		
Base Capacity (vph)	621	1147	1042	787	1406			284	420	268	378	
Starvation Cap Reductn	0	0	0	0	0			0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0			0	0	0	0	
Storage Cap Reductn	0	0	0	0	0			0	0	0	0	
Reduced v/c Ratio	0.05	0.37	0.15	0.16	0.40			0.35	0.20	0.07	0.11	
Intersection Summary												

Cycle Length: 90 Actuated Cycle Length: 90

Offset: 16 (18%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow Natural Cycle: 45

Lanes, Volumes, Timings AJA/Vanasse & Assoc., Inc. Synchro 11 Report S:\Jobs\9242\Analysis\22PMEX.syn

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



Splits and Phases: 2: Medway Commons Driveway/Project Site Driveway & Route 109
# 2022 Existing Weekday Evening Peak Hour Traffic Volumes2: Medway Commons Driveway/Project Site Driveway & Route 109

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	•	1	5	î,			र्स	1	5	î,	
Traffic Volume (vph)	27	404	149	117	515	15	78	8	73	16	6	29
Future Volume (vph)	27	404	149	117	515	15	78	8	73	16	6	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	14	14	14	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1745	1881	1615	1869	1999			1801	1583	1805	1664	
Flt Permitted	0.41	1.00	1.00	0.42	1.00			0.72	1.00	0.67	1.00	
Satd. Flow (perm)	760	1881	1615	826	1999			1347	1583	1270	1664	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	28	425	157	123	542	16	91	9	85	19	7	34
RTOR Reduction (vph)	0	0	58	0	1	0	0	0	72	0	29	0
Lane Group Flow (vph)	28	425	99	123	557	0	0	100	13	19	12	0
Heavy Vehicles (%)	0%	1%	0%	3%	1%	0%	1%	0%	2%	0%	0%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	55.4	52.9	52.9	64.8	57.6			11.9	11.9	11.9	11.9	
Effective Green, g (s)	59.4	54.9	54.9	68.1	59.6			13.9	13.9	13.9	13.9	
Actuated g/C Ratio	0.66	0.61	0.61	0.76	0.66			0.15	0.15	0.15	0.15	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	550	1147	985	731	1323			208	244	196	256	
v/s Ratio Prot	0.00	0.23		c0.02	c0.28						0.01	
v/s Ratio Perm	0.03		0.06	0.11				c0.07	0.01	0.01		
v/c Ratio	0.05	0.37	0.10	0.17	0.42			0.48	0.05	0.10	0.05	
Uniform Delay, d1	5.4	8.8	7.3	3.6	7.1			34.8	32.4	32.7	32.4	
Progression Factor	0.79	0.76	0.62	1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.0	0.8	0.2	0.1	1.0			1.7	0.1	0.2	0.1	
Delay (s)	4.3	7.6	4.7	3.7	8.1			36.5	32.5	32.9	32.5	
Level of Service	А	А	A	A	А			D	С	С	С	
Approach Delay (s)		6.7			7.3			34.7			32.6	
Approach LOS		A			A			С			С	
Intersection Summary												
HCM 2000 Control Delay			11.3	Н	CM 2000	Level of	Service		В			
HCM 2000 Volume to Capa	city ratio		0.42									
Actuated Cycle Length (s)			90.0	S	um of lost	time (s)			12.0			
Intersection Capacity Utiliza	tion		54.4%	IC	CU Level o	of Service			Α			
Analysis Period (min)			15									

#### 2022 Existing Saturday Midday Peak Hour Traffic Volumes 2: Medway Commons Driveway/Project Site Driveway & Route 109

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	۲	<b>†</b>	1	۲	el F			र्स	1	1	el F	
Traffic Volume (vph)	27	416	169	97	482	21	135	12	123	10	15	32
Future Volume (vph)	27	416	169	97	482	21	135	12	123	10	15	32
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.994				0.850		0.899	
Flt Protected	0.950			0.950				0.956		0.950		
Satd. Flow (prot)	1745	1900	1615	1925	2015	0	0	1800	1615	1805	1708	0
Flt Permitted	0.291			0.300				0.695		0.576		
Satd. Flow (perm)	534	1900	1615	608	2015	0	0	1308	1615	1094	1708	0
Satd. Flow (RTOR)			131		3				162		46	
Adj. Flow (vph)	30	462	188	115	574	25	178	16	162	14	22	46
Lane Group Flow (vph)	30	462	188	115	599	0	0	194	162	14	68	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Detector Phase	5	2	2	1	6		8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	12.0	16.0	16.0	12.0	16.0		12.0	12.0	12.0	12.0	12.0	
Total Split (s)	26.0	36.0	36.0	26.0	36.0		26.0	26.0	26.0	26.0	26.0	
Total Split (%)	29.5%	40.9%	40.9%	29.5%	40.9%		29.5%	29.5%	29.5%	29.5%	29.5%	
Maximum Green (s)	20.0	30.0	30.0	20.0	30.0		20.0	20.0	20.0	20.0	20.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0			-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?		Ŭ	Ŭ		Ŭ							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	Min	Min	None	Min		None	None	None	None	None	
v/c Ratio	0.07	0.60	0.26	0.21	0.59			0.53	0.28	0.05	0.13	
Control Delay	6.3	19.5	6.3	6.8	15.3			27.2	5.6	19.8	10.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	6.3	19.5	6.3	6.8	15.3			27.2	5.6	19.8	10.4	
Queue Length 50th (ft)	4	137	13	16	112			62	0	4	6	
Queue Length 95th (ft)	15	258	54	37	294			114	25	14	23	
Internal Link Dist (ft)		570			220			220			219	
Turn Bay Length (ft)	100		100	230						60		
Base Capacity (vph)	823	1125	1010	913	1240			532	754	445	723	
Starvation Cap Reductn	0	0	0	0	0			0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0			0	0	0	0	
Storage Cap Reductn	0	0	0	0	0			0	0	0	0	
Reduced v/c Ratio	0.04	0.41	0.19	0.13	0.48			0.36	0.21	0.03	0.09	
Intersection Summary												

Cycle Length: 88 Actuated Cycle Length: 59.6

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Lanes, Volumes, Timings AJA/Vanasse & Assoc., Inc. Synchro 11 Report S:\Jobs\9242\Analysis\22SMEX.syn Splits and Phases: 2: Medway Commons Driveway/Project Site Driveway & Route 109

<b>√</b> Ø1		↓ Ø4	
26 s	36 s	26 s	
	<b>★</b> Ø6	1 08	
26 s	36 s	26 s	

# 2022 Existing Saturday Midday Peak Hour Traffic Volumes2: Medway Commons Driveway/Project Site Driveway & Route 109

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	•	1	5	ţ,			र्स	1	5	î,	
Traffic Volume (vph)	27	416	169	97	482	21	135	12	123	10	15	32
Future Volume (vph)	27	416	169	97	482	21	135	12	123	10	15	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	14	14	14	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99			1.00	0.85	1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1745	1900	1615	1925	2014			1800	1615	1805	1707	
Flt Permitted	0.29	1.00	1.00	0.30	1.00			0.69	1.00	0.58	1.00	
Satd. Flow (perm)	535	1900	1615	608	2014			1308	1615	1095	1707	
Peak-hour factor, PHF	0.90	0.90	0.90	0.84	0.84	0.84	0.76	0.76	0.76	0.69	0.69	0.69
Adj. Flow (vph)	30	462	188	115	574	25	178	16	162	14	22	46
RTOR Reduction (vph)	0	0	76	0	2	0	0	0	119	0	34	0
Lane Group Flow (vph)	30	462	112	115	597	0	0	194	43	14	34	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	26.5	24.4	24.4	33.3	27.8			14.5	14.5	14.5	14.5	
Effective Green, g (s)	30.5	26.4	26.4	37.3	29.8			16.5	16.5	16.5	16.5	
Actuated g/C Ratio	0.49	0.42	0.42	0.60	0.48			0.26	0.26	0.26	0.26	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	341	803	683	521	961			345	427	289	451	
v/s Ratio Prot	0.01	0.24		c0.03	c0.30						0.02	
v/s Ratio Perm	0.04		0.07	0.11				c0.15	0.03	0.01		
v/c Ratio	0.09	0.58	0.16	0.22	0.62			0.56	0.10	0.05	0.08	
Uniform Delay, d1	8.9	13.7	11.2	6.6	12.1			19.8	17.3	17.1	17.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	1.0	0.1	0.2	1.3			2.1	0.1	0.1	0.1	
Delay (s)	9.1	14.7	11.3	6.8	13.4			21.9	17.4	17.2	17.3	
Level of Service	А	В	В	А	В			С	В	В	В	
Approach Delay (s)		13.5			12.3			19.9			17.3	
Approach LOS		В			В			В			В	
Intersection Summary												
HCM 2000 Control Delay			14.5	Н	CM 2000	Level of	Service		В			
HCM 2000 Volume to Capa	icity ratio		0.58									
Actuated Cycle Length (s)			62.4	S	um of lost	t time (s)			12.0			
Intersection Capacity Utiliza	ation		56.4%	IC	CU Level o	of Service	)		В			
Analysis Period (min)			15									

# 2029 No Build Weekday Morning Peak Hour Traffic Volumes2: Medway Commons Driveway/Project Site Driveway & Route 109

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	٦	<b>†</b>	1	٦	4Î			<u>स</u> ्	1	ሻ	4Î	
Traffic Volume (vph)	1	674	71	32	422	1	54	0	69	0	1	1
Future Volume (vph)	1	674	71	32	422	1	54	0	69	0	1	1
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850						0.850		0.925	
Flt Protected	0.950			0.950				0.950				
Satd. Flow (prot)	1745	1845	1583	1851	1968	0	0	1736	1583	1900	1758	0
Flt Permitted	0.449			0.287				0.755				
Satd. Flow (perm)	825	1845	1583	559	1968	0	0	1379	1583	1900	1758	0
Satd. Flow (RTOR)			109						109		2	
Adj. Flow (vph)	1	717	76	39	508	1	71	0	91	0	2	2
Lane Group Flow (vph)	1	717	76	39	509	0	0	71	91	0	4	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Detector Phase	5	2	2	1	6		8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	12.0	16.0	16.0	12.0	16.0		12.0	12.0	12.0	12.0	12.0	
Total Split (s)	12.0	57.0	57.0	15.0	60.0		18.0	18.0	18.0	18.0	18.0	
Total Split (%)	13.3%	63.3%	63.3%	16.7%	66.7%		20.0%	20.0%	20.0%	20.0%	20.0%	
Maximum Green (s)	6.0	51.0	51.0	9.0	54.0		12.0	12.0	12.0	12.0	12.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0			-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Min	C-Min	None	C-Min		None	None	None	None	None	
v/c Ratio	0.00	0.53	0.06	0.07	0.33			0.40	0.30		0.02	
Control Delay	3.0	7.3	0.8	2.9	5.2			41.9	7.9		27.0	
Queue Delay	0.0	0.1	0.0	0.0	0.0			0.0	0.0		0.0	
Total Delay	3.0	7.3	0.8	2.9	5.2			41.9	7.9		27.0	
Queue Length 50th (ft)	0	121	1	4	67			38	0		1	
Queue Length 95th (ft)	m0	m104	m0	10	178			64	17		5	
Internal Link Dist (ft)		570			220			220			219	
Turn Bay Length (ft)	100		100	230								
Base Capacity (vph)	725	1356	1192	608	1557			216	340		277	
Starvation Cap Reductn	0	60	0	0	0			0	0		0	
Spillback Cap Reductn	0	0	0	0	0			0	0		0	
Storage Cap Reductn	0	0	0	0	0			0	0		0	
Reduced v/c Ratio	0.00	0.55	0.06	0.06	0.33			0.33	0.27		0.01	
Intersection Summary												
Cycle Length: 90												

Actuated Cycle Length: 90

Offset: 16 (18%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow Natural Cycle: 60

Lanes, Volumes, Timings AJA/Vanasse & Assoc., Inc. Synchro 11 Report S:\Jobs\9242\Analysis\29AMNB.syn

#### Control Type: Actuated-Coordinated

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



Splits and Phases: 2: Medway Commons Driveway/Project Site Driveway & Route 109

# 2029 No Build Weekday Morning Peak Hour Traffic Volumes2: Medway Commons Driveway/Project Site Driveway & Route 109

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	•	1	5	î,			र्स	1	5	î,	
Traffic Volume (vph)	1	674	71	32	422	1	54	Ö	69	0	1	1
Future Volume (vph)	1	674	71	32	422	1	54	0	69	0	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	14	14	14	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		1.00	
Satd. Flow (prot)	1745	1845	1583	1851	1967			1736	1583		1758	
Flt Permitted	0.45	1.00	1.00	0.29	1.00			0.76	1.00		1.00	
Satd. Flow (perm)	825	1845	1583	559	1967			1380	1583		1758	
Peak-hour factor, PHF	0.94	0.94	0.94	0.83	0.83	0.83	0.76	0.76	0.76	0.50	0.50	0.50
Adj. Flow (vph)	1	717	76	39	508	1	71	0	91	0	2	2
RTOR Reduction (vph)	0	0	24	0	0	0	0	0	80	0	2	0
Lane Group Flow (vph)	1	717	52	39	509	0	0	71	11	0	2	0
Heavy Vehicles (%)	0%	3%	2%	4%	3%	0%	4%	0%	2%	0%	0%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	60.9	59.7	59.7	66.1	62.3			8.5	8.5		8.5	
Effective Green, g (s)	64.9	61.7	61.7	70.1	64.3			10.5	10.5		10.5	
Actuated g/C Ratio	0.72	0.69	0.69	0.78	0.71			0.12	0.12		0.12	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0	6.0		6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	627	1264	1085	518	1405			161	184		205	
v/s Ratio Prot	0.00	c0.39		c0.00	0.26						0.00	
v/s Ratio Perm	0.00		0.03	0.05				c0.05	0.01			
v/c Ratio	0.00	0.57	0.05	0.08	0.36			0.44	0.06		0.01	
Uniform Delay, d1	3.6	7.3	4.6	4.0	5.0			37.0	35.4		35.2	
Progression Factor	1.08	0.75	1.01	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.0	1.1	0.1	0.1	0.7			1.9	0.1		0.0	
Delay (s)	3.8	6.6	4.7	4.1	5.7			38.9	35.5		35.2	
Level of Service	А	А	А	А	А			D	D		D	
Approach Delay (s)		6.4			5.6			37.0			35.2	
Approach LOS		А			А			D			D	
Intersection Summary												
HCM 2000 Control Delay			9.5	Н	CM 2000	Level of	Service		А			
HCM 2000 Volume to Capac	city ratio		0.51									
Actuated Cycle Length (s)			90.0	S	um of lost	t time (s)			12.0			
Intersection Capacity Utilization	tion		51.8%	IC	CU Level o	of Service	•		А			
Analysis Period (min)			15									

#### 2029 No Build Weekday Evening Peak Hour Traffic Volumes 2: Medway Commons Driveway/Project Site Driveway & Route 109

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	۲	•	1	۲	eî 👘			र्स	1	1	eî 👘	
Traffic Volume (vph)	27	479	149	117	581	15	78	8	73	16	6	29
Future Volume (vph)	27	479	149	117	581	15	78	8	73	16	6	29
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.996				0.850		0.876	
Flt Protected	0.950			0.950				0.956		0.950		
Satd. Flow (prot)	1745	1881	1615	1869	1999	0	0	1800	1583	1805	1664	0
Flt Permitted	0.368			0.368				0.716		0.669		
Satd. Flow (perm)	676	1881	1615	724	1999	0	0	1348	1583	1271	1664	0
Satd. Flow (RTOR)			125		2				109		34	
Adj. Flow (vph)	28	504	157	123	612	16	91	9	85	19	7	34
Lane Group Flow (vph)	28	504	157	123	628	0	0	100	85	19	41	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Detector Phase	5	2	2	1	6		8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	12.0	16.0	16.0	12.0	16.0		12.0	12.0	12.0	12.0	12.0	
Total Split (s)	12.0	49.0	49.0	18.0	55.0		23.0	23.0	23.0	23.0	23.0	
Total Split (%)	13.3%	54.4%	54.4%	20.0%	61.1%		25.6%	25.6%	25.6%	25.6%	25.6%	
Maximum Green (s)	6.0	43.0	43.0	12.0	49.0		17.0	17.0	17.0	17.0	17.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0			-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	_00.0	3	9		9							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Min	C-Min	None	C-Min		None	None	None	None	None	
v/c Ratio	0.05	0 44	0 15	0.19	0.45		Home	0.48	0.25	0.10	0.14	
Control Delay	3.0	8.5	19	4 1	91			41.5	5.8	31.6	14.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	3.0	8.5	1.9	4 1	9.0			41.5	5.8	31.6	14.0	
Queue Length 50th (ft)	3	111	0	15	101			53	0.0	9	3	
Queue Length 95th (ft)	m7	133	m17	35	312			91	22	26	28	
Internal Link Dist (ft)		570		00	220			220	~~~	20	219	
Turn Ray Length (ft)	100	570	100	230	220			220		60	215	
Base Canacity (vnh)	570	1147	1033	725	1406			284	420	268	378	
Starvation Can Reducto	0	0	000	0	00+1			204	0_ <del>1</del> _2	200	0	
Snillhack Can Reductin	0	0	0	0	0			0	0	0	0	
Storage Can Peducth	0	0	0	0	0			0	0	0	0	
Reduced v/c Ratio	0.05	0.44	0.15	0.17	0.45			0.35	0.20	0.07	0.11	
Intersection Summary												

Cycle Length: 90 Actuated Cycle Length: 90

Offset: 16 (18%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow Natural Cycle: 55

Lanes, Volumes, Timings AJA/Vanasse & Assoc., Inc. Synchro 11 Report S:\Jobs\9242\Analysis\29PMNB.syn

#### Control Type: Actuated-Coordinated

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



Splits and Phases: 2: Medway Commons Driveway/Project Site Driveway & Route 109

# 2029 No Build Weekday Evening Peak Hour Traffic Volumes2: Medway Commons Driveway/Project Site Driveway & Route 109

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	•	1	ሻ	ĥ			र्स	1	5	î,	
Traffic Volume (vph)	27	479	149	117	581	15	78	8	73	16	6	29
Future Volume (vph)	27	479	149	117	581	15	78	8	73	16	6	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	14	14	14	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1745	1881	1615	1869	1999			1801	1583	1805	1664	
Flt Permitted	0.37	1.00	1.00	0.37	1.00			0.72	1.00	0.67	1.00	
Satd. Flow (perm)	675	1881	1615	723	1999			1347	1583	1270	1664	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	28	504	157	123	612	16	91	9	85	19	7	34
RTOR Reduction (vph)	0	0	49	0	1	0	0	0	72	0	29	0
Lane Group Flow (vph)	28	504	108	123	627	0	0	100	13	19	12	0
Heavy Vehicles (%)	0%	1%	0%	3%	1%	0%	1%	0%	2%	0%	0%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	55.4	52.9	52.9	64.8	57.6			11.9	11.9	11.9	11.9	
Effective Green, g (s)	59.4	54.9	54.9	68.1	59.6			13.9	13.9	13.9	13.9	
Actuated g/C Ratio	0.66	0.61	0.61	0.76	0.66			0.15	0.15	0.15	0.15	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	499	1147	985	664	1323			208	244	196	256	
v/s Ratio Prot	0.00	0.27		c0.02	c0.31						0.01	
v/s Ratio Perm	0.03		0.07	0.12				c0.07	0.01	0.01		
v/c Ratio	0.06	0.44	0.11	0.19	0.47			0.48	0.05	0.10	0.05	
Uniform Delay, d1	5.6	9.4	7.3	4.0	7.5			34.8	32.4	32.7	32.4	
Progression Factor	0.76	0.70	0.56	1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.0	1.0	0.2	0.1	1.2			1.7	0.1	0.2	0.1	
Delay (s)	4.3	7.6	4.3	4.2	8.7			36.5	32.5	32.9	32.5	
Level of Service	А	А	A	A	A			D	С	С	С	
Approach Delay (s)		6.7			8.0			34.7			32.6	
Approach LOS		A			A			С			С	
Intersection Summary												
HCM 2000 Control Delay			11.3	Н	CM 2000	Level of	Service		В			
HCM 2000 Volume to Capa	city ratio		0.46									
Actuated Cycle Length (s)			90.0	S	um of lost	t time (s)			12.0			
Intersection Capacity Utiliza	tion		57.9%	IC	CU Level o	of Service			В			
Analysis Period (min)			15									

# 2029 No Build Saturday Midday Peak Hour Traffic Volumes2: Medway Commons Driveway/Project Site Driveway & Route 109

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	٦	<b>†</b>	1	ኘ	ef 👘			र्भ	1	ኘ	ę.	
Traffic Volume (vph)	27	486	169	97	552	21	135	12	123	10	15	32
Future Volume (vph)	27	486	169	97	552	21	135	12	123	10	15	32
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.995				0.850		0.899	
Flt Protected	0.950			0.950				0.956		0.950		
Satd. Flow (prot)	1745	1900	1615	1925	2017	0	0	1800	1615	1805	1708	0
Flt Permitted	0.231			0.252				0.695		0.563		
Satd. Flow (perm)	424	1900	1615	511	2017	0	0	1308	1615	1070	1708	0
Satd. Flow (RTOR)			112		2				162		46	
Adj. Flow (vph)	30	540	188	115	657	25	178	16	162	14	22	46
Lane Group Flow (vph)	30	540	188	115	682	0	0	194	162	14	68	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Detector Phase	5	2	2	1	6		8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	12.0	16.0	16.0	12.0	16.0		12.0	12.0	12.0	12.0	12.0	
Total Split (s)	26.0	36.0	36.0	26.0	36.0		26.0	26.0	26.0	26.0	26.0	
Total Split (%)	29.5%	40.9%	40.9%	29.5%	40.9%		29.5%	29.5%	29.5%	29.5%	29.5%	
Maximum Green (s)	20.0	30.0	30.0	20.0	30.0		20.0	20.0	20.0	20.0	20.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0			-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?		Ŭ	Ŭ		Ŭ							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	Min	Min	None	Min		None	None	None	None	None	
v/c Ratio	0.07	0.66	0.25	0.22	0.64			0.55	0.29	0.05	0.14	
Control Delay	6.3	20.6	7.2	6.8	16.4			28.9	5.7	20.4	10.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	6.3	20.6	7.2	6.8	16.4			28.9	5.7	20.4	10.6	
Queue Length 50th (ft)	4	171	18	17	139			69	0	4	7	
Queue Length 95th (ft)	15	315	61	37	352			114	25	14	23	
Internal Link Dist (ft)		570			220			220			219	
Turn Bay Length (ft)	100		100	230						60		
Base Capacity (vph)	756	1042	936	844	1205			493	709	403	672	
Starvation Cap Reductn	0	0	0	0	0			0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0			0	0	0	0	
Storage Cap Reductn	0	0	0	0	0			0	0	0	0	
Reduced v/c Ratio	0.04	0.52	0.20	0.14	0.57			0.39	0.23	0.03	0.10	
Intersection Summary												

Cycle Length: 88 Actuated Cycle Length: 62.6 Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Lanes, Volumes, Timings AJA/Vanasse & Assoc., Inc. Synchro 11 Report S:\Jobs\9242\Analysis\29SMNB.syn Splits and Phases: 2: Medway Commons Driveway/Project Site Driveway & Route 109

<b>√</b> Ø1	<b>↓</b> <sub>02</sub>		
26 s	36 s	26 s	
▶ <sub>Ø5</sub>	<b>★</b> Ø6	108 Mar	
26 s	36 s	26 s	

#### 2029 No Build Saturday Midday Peak Hour Traffic Volumes 2: Medway Commons Driveway/Project Site Driveway & Route 109

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	•	1	7	ţ,			र्स	1	5	î,	
Traffic Volume (vph)	27	486	169	97	552	21	135	12	123	10	15	32
Future Volume (vph)	27	486	169	97	552	21	135	12	123	10	15	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	14	14	14	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99			1.00	0.85	1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1745	1900	1615	1925	2016			1800	1615	1805	1707	
Flt Permitted	0.23	1.00	1.00	0.25	1.00			0.69	1.00	0.56	1.00	
Satd. Flow (perm)	424	1900	1615	510	2016			1308	1615	1069	1707	
Peak-hour factor, PHF	0.90	0.90	0.90	0.84	0.84	0.84	0.76	0.76	0.76	0.69	0.69	0.69
Adj. Flow (vph)	30	540	188	115	657	25	178	16	162	14	22	46
RTOR Reduction (vph)	0	0	62	0	1	0	0	0	121	0	34	0
Lane Group Flow (vph)	30	540	126	115	681	0	0	194	41	14	34	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	29.6	27.4	27.4	36.4	30.8			14.7	14.7	14.7	14.7	
Effective Green, g (s)	33.6	29.4	29.4	40.4	32.8			16.7	16.7	16.7	16.7	
Actuated g/C Ratio	0.51	0.45	0.45	0.61	0.50			0.25	0.25	0.25	0.25	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	301	850	722	477	1006			332	410	271	433	
v/s Ratio Prot	0.01	0.28		c0.03	c0.34						0.02	
v/s Ratio Perm	0.04		0.08	0.12				c0.15	0.03	0.01		
v/c Ratio	0.10	0.64	0.17	0.24	0.68			0.58	0.10	0.05	0.08	
Uniform Delay, d1	9.3	14.0	10.9	7.1	12.4			21.5	18.8	18.5	18.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	1.6	0.1	0.3	1.8			2.6	0.1	0.1	0.1	
Delay (s)	9.4	15.6	11.0	7.4	14.3			24.1	18.9	18.6	18.7	
Level of Service	A	В	В	A	В			С	В	В	В	
Approach Delay (s)		14.2			13.3			21.7			18.7	
Approach LOS		В			В			С			В	
Intersection Summary												
HCM 2000 Control Delay			15.4	Н	CM 2000	Level of	Service		В			
HCM 2000 Volume to Capa	icity ratio		0.62									
Actuated Cycle Length (s)			65.7	S	um of lost	t time (s)			12.0			
Intersection Capacity Utiliza	ation		60.1%	IC	CU Level o	of Service	•		В			
Analysis Period (min)			15									

## 2029 Build Weekday Morning Peak Hour Traffic Volumes2: Medway Commons Driveway/Project Site Driveway & Route 109

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	۲	•	1	۲	eî 👘			र्भ	1	<u>۲</u>	eî 👘	
Traffic Volume (vph)	37	674	71	32	422	13	54	0	69	3	1	11
Future Volume (vph)	37	674	71	32	422	13	54	0	69	3	1	11
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.995				0.850		0.862	
Flt Protected	0.950			0.950				0.950		0.950		
Satd. Flow (prot)	1745	1845	1583	1851	1960	0	0	1736	1583	1805	1638	0
Flt Permitted	0.414			0.298				0.742		0.711		
Satd. Flow (perm)	760	1845	1583	581	1960	0	0	1356	1583	1351	1638	0
Satd. Flow (RTOR)			109		3				109		22	
Adj. Flow (vph)	39	717	76	39	508	16	71	0	91	6	2	22
Lane Group Flow (vph)	39	717	76	39	524	0	0	71	91	6	24	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Detector Phase	5	2	2	1	6		8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	12.0	16.0	16.0	12.0	16.0		12.0	12.0	12.0	12.0	12.0	
Total Split (s)	12.0	57.0	57.0	15.0	60.0		18.0	18.0	18.0	18.0	18.0	
Total Split (%)	13.3%	63.3%	63.3%	16.7%	66.7%		20.0%	20.0%	20.0%	20.0%	20.0%	
Maximum Green (s)	6.0	51.0	51.0	9.0	54.0		12.0	12.0	12.0	12.0	12.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0			-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag				•			
Lead-Lag Optimize?		3	5		5							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Min	C-Min	None	C-Min		None	None	None	None	None	
v/c Ratio	0.06	0.53	0.06	0.07	0.36			0.40	0.30	0.03	0.10	
Control Delay	3.3	9.0	11	3.0	7.6			42.2	7.9	33.0	15.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	3.3	9.1	11	3.0	7.6			42.2	79	33.0	15.8	
Queue Length 50th (ft)	8	263	4	4	128			38	0	3	10.0	
Queue Length 95th (ft)	m3	m104	m0	10	184			64	17	8	8	
Internal Link Dist (ft)	nio	570	mo	10	220			220		Ū	219	
Turn Bay Length (ft)	100	010	100	230	LLU			LLU		60	210	
Base Canacity (vph)	680	1356	1192	620	1446			212	340	211	275	
Starvation Can Reductn	000	70	0	020	0			0	0+0	0	0	
Snillback Can Reductn	0	0	0	0	0			0	0	0	0	
Storage Can Reductn	0	0	0	0	0			0	0	0	0	
Reduced v/c Ratio	0.06	0.56	0.06	0.06	0.36			0.33	0.27	0.03	0.09	
Intersection Summary												

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 16 (18%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow Natural Cycle: 60

Lanes, Volumes, Timings AJA/Vanasse & Assoc., Inc. Synchro 11 Report S:\Jobs\9242\Analysis\29AMBU.syn

#### Control Type: Actuated-Coordinated

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



Splits and Phases: 2: Medway Commons Driveway/Project Site Driveway & Route 109

# 2029 Build Weekday Morning Peak Hour Traffic Volumes2: Medway Commons Driveway/Project Site Driveway & Route 109

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	•	1	5	î,			र्स	1	5	î,	
Traffic Volume (vph)	37	674	71	32	422	13	54	Ö	69	3	1	11
Future Volume (vph)	37	674	71	32	422	13	54	0	69	3	1	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	14	14	14	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85	1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1745	1845	1583	1851	1960			1736	1583	1805	1639	
Flt Permitted	0.41	1.00	1.00	0.30	1.00			0.74	1.00	0.71	1.00	
Satd. Flow (perm)	760	1845	1583	581	1960			1355	1583	1350	1639	
Peak-hour factor, PHF	0.94	0.94	0.94	0.83	0.83	0.83	0.76	0.76	0.76	0.50	0.50	0.50
Adj. Flow (vph)	39	717	76	39	508	16	71	0	91	6	2	22
RTOR Reduction (vph)	0	0	24	0	1	0	0	0	80	0	19	0
Lane Group Flow (vph)	39	717	52	39	523	0	0	71	11	6	5	0
Heavy Vehicles (%)	0%	3%	2%	4%	3%	0%	4%	0%	2%	0%	0%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	63.3	59.7	59.7	63.7	59.9			8.5	8.5	8.5	8.5	
Effective Green, g (s)	67.3	61.7	61.7	67.7	61.9			10.5	10.5	10.5	10.5	
Actuated g/C Ratio	0.75	0.69	0.69	0.75	0.69			0.12	0.12	0.12	0.12	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	629	1264	1085	518	1348			158	184	157	191	
v/s Ratio Prot	0.00	c0.39		c0.00	0.27						0.00	
v/s Ratio Perm	0.04		0.03	0.05				c0.05	0.01	0.00		
v/c Ratio	0.06	0.57	0.05	0.08	0.39			0.45	0.06	0.04	0.02	
Uniform Delay, d1	3.2	7.3	4.6	4.1	6.0			37.1	35.4	35.3	35.2	
Progression Factor	1.15	0.97	1.52	1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.0	0.9	0.0	0.1	0.8			2.0	0.1	0.1	0.1	
Delay (s)	3.8	8.0	7.1	4.2	6.8			39.1	35.5	35.4	35.3	
Level of Service	А	A	A	А	А			D	D	D	D	
Approach Delay (s)		7.7			6.6			37.1			35.3	
Approach LOS		А			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			10.8	Н	CM 2000	Level of	Service		В			
HCM 2000 Volume to Capa	icity ratio		0.51									
Actuated Cycle Length (s)			90.0	S	um of lost	t time (s)			12.0			
Intersection Capacity Utiliza	ation		55.5%	IC	CU Level of	of Service			В			
Analysis Period (min)			15									

## 2029 Build Weekday Evening Peak Hour Traffic Volumes2: Medway Commons Driveway/Project Site Driveway & Route 109

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	•	1	1	ę			र्स	1	ľ	el el	
Traffic Volume (vph)	46	479	149	117	581	22	78	8	73	32	6	73
Future Volume (vph)	46	479	149	117	581	22	78	8	73	32	6	73
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.995				0.850		0.861	
Flt Protected	0.950			0.950				0.956		0.950		
Satd. Flow (prot)	1745	1881	1615	1869	1997	0	0	1800	1583	1805	1636	0
Flt Permitted	0.343			0.371				0.676		0.670		
Satd. Flow (perm)	630	1881	1615	730	1997	0	0	1273	1583	1273	1636	0
Satd. Flow (RTOR)			125		3				109		85	
Adj. Flow (vph)	48	504	157	123	612	23	91	9	85	37	7	85
Lane Group Flow (vph)	48	504	157	123	635	0	0	100	85	37	92	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Detector Phase	5	2	2	1	6		8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	12.0	16.0	16.0	12.0	16.0		12.0	12.0	12.0	12.0	12.0	
Total Split (s)	12.0	49.0	49.0	18.0	55.0		23.0	23.0	23.0	23.0	23.0	
Total Split (%)	13.3%	54.4%	54.4%	20.0%	61.1%		25.6%	25.6%	25.6%	25.6%	25.6%	
Maximum Green (s)	6.0	43.0	43.0	12.0	49.0		17.0	17.0	17.0	17.0	17.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0			-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	C-Min	C-Min	None	C-Min		None	None	None	None	None	
v/c Ratio	0.09	0.44	0.15	0.19	0.48			0.50	0.25	0.18	0.28	
Control Delay	3.3	8.8	2.0	4.3	10.8			42.1	5.6	33.0	10.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	3.3	8.8	2.0	4.3	10.8			42.1	5.6	33.0	10.6	
Queue Length 50th (ft)	5	116	0	15	183			53	0	18	3	
Queue Length 95th (ft)	m11	134	m18	36	327			91	22	41	38	
Internal Link Dist (ft)		570			220			220			219	
Turn Bay Length (ft)	100		100	230						60		
Base Capacity (vph)	543	1139	1027	726	1345			270	422	270	414	
Starvation Cap Reductn	0	0	0	0	0			0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0			0	0	0	0	
Storage Cap Reductn	0	0	0	0	0			0	0	0	0	
Reduced v/c Ratio	0.09	0.44	0.15	0.17	0.47			0.37	0.20	0.14	0.22	
Intersection Summary												

Cycle Length: 90 Actuated Cycle Length: 90

Offset: 16 (18%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow Natural Cycle: 55

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#### Control Type: Actuated-Coordinated

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



Splits and Phases: 2: Medway Commons Driveway/Project Site Driveway & Route 109

# 2029 Build Weekday Evening Peak Hour Traffic Volumes2: Medway Commons Driveway/Project Site Driveway & Route 109

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	•	1	7	ţ,			र्स	1	5	î,	
Traffic Volume (vph)	46	479	149	117	581	22	78	8	73	32	6	73
Future Volume (vph)	46	479	149	117	581	22	78	8	73	32	6	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	14	14	14	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99			1.00	0.85	1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1745	1881	1615	1869	1996			1801	1583	1805	1637	
Flt Permitted	0.34	1.00	1.00	0.37	1.00			0.68	1.00	0.67	1.00	
Satd. Flow (perm)	631	1881	1615	730	1996			1273	1583	1273	1637	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	48	504	157	123	612	23	91	9	85	37	7	85
RTOR Reduction (vph)	0	0	49	0	1	0	0	0	72	0	72	0
Lane Group Flow (vph)	48	504	108	123	634	0	0	100	13	37	20	0
Heavy Vehicles (%)	0%	1%	0%	3%	1%	0%	1%	0%	2%	0%	0%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	56.6	52.6	52.6	63.0	55.8			12.2	12.2	12.2	12.2	
Effective Green, g (s)	60.6	54.6	54.6	67.0	57.8			14.2	14.2	14.2	14.2	
Actuated g/C Ratio	0.67	0.61	0.61	0.74	0.64			0.16	0.16	0.16	0.16	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	499	1141	979	659	1281			200	249	200	258	
v/s Ratio Prot	0.01	0.27		c0.02	c0.32						0.01	
v/s Ratio Perm	0.06		0.07	0.12				c0.08	0.01	0.03		
v/c Ratio	0.10	0.44	0.11	0.19	0.49			0.50	0.05	0.18	0.08	
Uniform Delay, d1	5.6	9.5	7.5	4.2	8.4			34.7	32.2	32.9	32.3	
Progression Factor	0.78	0.71	0.58	1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	1.0	0.2	0.1	1.4			2.0	0.1	0.4	0.1	
Delay (s)	4.4	7.8	4.5	4.4	9.8			36.6	32.3	33.3	32.5	
Level of Service	A	A	A	A	A			D	С	С	С	
Approach Delay (s)		6.8			8.9			34.6			32.7	
Approach LOS		A			A			С			С	
Intersection Summary												
HCM 2000 Control Delay			12.5	Н	CM 2000	Level of	Service		В			
HCM 2000 Volume to Capa	acity ratio		0.48									
Actuated Cycle Length (s)			90.0	S	um of lost	t time (s)			12.0			
Intersection Capacity Utiliza	ation		58.3%	IC	CU Level o	of Service	1		В			
Analysis Period (min)			15									

#### 2029 Build Saturday Midday Peak Hour Traffic Volumes 2: Medway Commons Driveway/Project Site Driveway & Route 109

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	۲	<b>†</b>	1	٦	¢,			र्स	1	ኘ	f,	
Traffic Volume (vph)	55	486	169	97	552	31	135	12	123	17	15	53
Future Volume (vph)	55	486	169	97	552	31	135	12	123	17	15	53
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.992				0.850		0.883	
Flt Protected	0.950			0.950				0.956		0.950		
Satd. Flow (prot)	1745	1900	1615	1925	2010	0	0	1800	1615	1805	1678	0
Flt Permitted	0.186			0.263				0.674		0.563		
Satd. Flow (perm)	342	1900	1615	533	2010	0	0	1269	1615	1070	1678	0
Satd. Flow (RTOR)			112		4				162		77	
Adj. Flow (vph)	61	540	188	115	657	37	178	16	162	25	22	77
Lane Group Flow (vph)	61	540	188	115	694	0	0	194	162	25	99	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		. 1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Detector Phase	5	2	2	1	6		8	8	8	4	4	
Switch Phase												
Minimum Initial (s)	6.0	10.0	10.0	6.0	10.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	12.0	16.0	16.0	12.0	16.0		12.0	12.0	12.0	12.0	12.0	
Total Split (s)	26.0	36.0	36.0	26.0	36.0		26.0	26.0	26.0	26.0	26.0	
Total Split (%)	29.5%	40.9%	40.9%	29.5%	40.9%		29.5%	29.5%	29.5%	29.5%	29.5%	
Maximum Green (s)	20.0	30.0	30.0	20.0	30.0		20.0	20.0	20.0	20.0	20.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0			-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?		Ŭ	Ŭ		Ŭ							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	Min	Min	None	Min		None	None	None	None	None	
v/c Ratio	0.16	0.64	0.24	0.22	0.70			0.57	0.30	0.09	0.20	
Control Delay	6.9	20.3	7.2	6.9	20.1			30.2	5.7	21.1	9.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	6.9	20.3	7.2	6.9	20.1			30.2	5.7	21.1	9.0	
Queue Length 50th (ft)	9	174	18	17	238			74	0	8	7	
Queue Length 95th (ft)	24	315	61	37	371			115	25	20	24	
Internal Link Dist (ft)		570			220			220			219	
Turn Bay Length (ft)	100		100	230						60		
Base Capacity (vph)	718	1008	909	829	1101			463	692	390	661	
Starvation Cap Reductn	0	0	0	0	0			0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0			0	0	0	0	
Storage Cap Reductn	0	0	0	0	0			0	0	0	0	
Reduced v/c Ratio	0.08	0.54	0.21	0.14	0.63			0.42	0.23	0.06	0.15	
Intersection Summary												

Cycle Length: 88 Actuated Cycle Length: 64

Natural Cycle: 60 Control Type: Actuated-Uncoordinated

Lanes, Volumes, Timings AJA/Vanasse & Assoc., Inc.

Synchro 11 Report S:\Jobs\9242\Analysis\29SMBU.syn Splits and Phases: 2: Medway Commons Driveway/Project Site Driveway & Route 109

<b>√</b> Ø1		▼Ø4
26 s	36 s	26 s
	<b>₩</b> Ø6	< <b>↑</b> ø8
26 s	36 s	26 s

# 2029 Build Saturday Midday Peak Hour Traffic Volumes2: Medway Commons Driveway/Project Site Driveway & Route 109

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	5	•	1	5	ţ,			र्स	1	5	î,	
Traffic Volume (vph)	55	486	169	97	552	31	135	12	123	17	15	53
Future Volume (vph)	55	486	169	97	552	31	135	12	123	17	15	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	14	14	14	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99			1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1745	1900	1615	1925	2010			1800	1615	1805	1678	
Flt Permitted	0.19	1.00	1.00	0.26	1.00			0.67	1.00	0.56	1.00	
Satd. Flow (perm)	342	1900	1615	533	2010			1268	1615	1070	1678	
Peak-hour factor, PHF	0.90	0.90	0.90	0.84	0.84	0.84	0.76	0.76	0.76	0.69	0.69	0.69
Adj. Flow (vph)	61	540	188	115	657	37	178	16	162	25	22	77
RTOR Reduction (vph)	0	0	62	0	2	0	0	0	120	0	57	0
Lane Group Flow (vph)	61	540	126	115	692	0	0	194	42	25	42	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	31.3	27.6	27.6	35.1	29.5			15.0	15.0	15.0	15.0	
Effective Green, g (s)	35.3	29.6	29.6	39.1	31.5			17.0	17.0	17.0	17.0	
Actuated g/C Ratio	0.53	0.45	0.45	0.59	0.48			0.26	0.26	0.26	0.26	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0			6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	303	849	722	474	956			325	414	274	430	
v/s Ratio Prot	0.02	0.28		c0.03	c0.34						0.02	
v/s Ratio Perm	0.09		0.08	0.12				c0.15	0.03	0.02		
v/c Ratio	0.20	0.64	0.17	0.24	0.72			0.60	0.10	0.09	0.10	
Uniform Delay, d1	9.5	14.1	11.0	7.5	13.9			21.6	18.8	18.7	18.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	1.6	0.1	0.3	2.7			2.9	0.1	0.1	0.1	
Delay (s)	9.9	15.7	11.1	7.8	16.6			24.5	18.9	18.9	18.8	
Level of Service	А	В	В	А	В			С	В	В	В	
Approach Delay (s)		14.2			15.4			22.0			18.9	
Approach LOS		В			В			С			В	
Intersection Summary												
HCM 2000 Control Delay			16.2	Н	CM 2000	Level of	Service		В			
HCM 2000 Volume to Capa	city ratio		0.64									
Actuated Cycle Length (s)			66.2	S	um of lost	time (s)			12.0			
Intersection Capacity Utiliza	ition		60.7%	IC	CU Level o	of Service			В			
Analysis Period (min)			15									



### Medway Planning and Economic Development Board Meeting Tuesday, May 10, 2022

### Milford Regional Hospital Facility Major Site Plan and Groundwater Protection Special Permit Public Hearing

### **SUPPLEMENTAL INFORMATION**

- Design Review Committee review letter dated 5-10-22
- Email memo from Fire Chief Jeff Lynch dated 5-9-22
- Memo dated 5-10-22 from Sergeant Jeff Watson with attached Intersection Safety Audit report from March 2022.
- Susy Affleck-Childs review notes dated 5-9-22



Town of Medway DESIGN REVIEW COMMITTEE 155 Village Street Medway MA 02053 508-533-3291 <u>drc@townofmedway.org</u>

May 10, 2022

TO: Medway Planning and Economic Development Board

FROM: Design Review Committee

RE: DRC Comments, Site plan review – Milford Regional Medical Center 86 Holliston Street, Medway, MA 02053

Dear Members of the Medway Planning and Economic Development Board

The Medway Design Review Committee [DRC] is pleased to provide a comment letter for the proposed Milford Regional Medical Center office building at 86 Holliston Street. The DRC met with representatives of the project on Monday, May 2<sup>nd</sup>, 2022. At this meeting we reviewed a site plan dated April 14, 2022 for the project to be located on a portion of 86 Holliston Street, Medway, MA and received a presentation prepared by project engineer Guerriere & Halnon, Inc. of Franklin, MA.

The DRC believes that these plans demonstrate a serious effort by the applicant to align the building design, site layout and amenities with the Medway *Design Review Guidelines*. Careful thought has been given to the design and materials to create an appropriate and attractive building and site. A constructive discussion followed during which the DRC provided several recommendations as follows.

- The applicant proposed "false" windows in some spaces of the façade. The details of the windows have not been established. The DRC requests that a clearly defined rendering and description of these be provided. The DRC recommend that they appear as realistic as actual windows. They should include glass with dimensional interior boxes and consider lighting that will augment the appearance of actual windows.
- The final details of the façade material and colors have not been finalized. The DRC requests that they be provided for review. The DRC recommended that the stonework trim at the base of the building be of a color and style of stone that has a local New England appearance. See image below.
- The DRC recommends that further architectural details be included on the East facing façade. The lengthy building can be broken up with an increased roofline and broader vertical elements and moldings. The landscaping along this end of the building can include vertical plantings or trellising to interrupt the length.
- The North facing façade will be a visible element of this four-sided building and should be developed with more detail and include visual breaks to eliminate the length and mass. The DRC recommends that the locations of the downspouts are appropriate places to create these breaks. Adding molding elements or larger colored downspouts could easily introduce these effects.
- The DRC provided a recommendation, at the applicant's request, about the false barn doors on the West facing façade. The DRC recommends they be of a natural wood color that can weather and have a naturalized appearance.

#### **Design Review Committee Members**

Matthew Buckley, Member & Chair Jessica Chabot, Member Rachel Walsh, Member Janine Clifford, Member

- The DRC also indicated that a standing seam metal roof was consistent with a New England style appearance as called out in the Design review guidelines.
- The DRC requests that the transformer located at the Southeast corner of the building be screened in an appropriate manner with vegetation and solid buffers.
- The DRC similarly requests that the backup generator located at the Northeast corner of the building be screened as well. The current position does not provide much area for screening and is also adjacent to snow storage. The DRC recommended that, if possible, the applicant consider relocating the generator to a less conspicuous location, such as near the dumpster. The dumpster enclosure could serve as a screen.
- The DRC recommends a natural color vinyl fence be used a screen for the dumpster enclosure. See image below.
- The DRC recommends that the retaining wall at the Southwest corner of the parking area be constructed of an indigenous stone style consistent with local stone walls. See image below.
- The DRC recommends that fencing, similar to that currently on the property, be included throughout the site to maintain a connection to the farm on this parcel. The fence can be used as both a barrier or visual detail. See image below.
- The DRC recommends that open space be provided and include amenities like a picnic table for both employees and visitors.
- The DRC requests to review the completed landscaping plan when available.
- The DRC recommends providing better pedestrian access from the street to site.
- The DRC requests that lighting fixtures styles be made available for review.

The DRC also reviewed a proposed signage plan for the site. Karen Mullen of Signs Plus, 89 South Main Street, Milford presented initial concepts for signs throughout the site. The plans presented were preliminary and the DRC provided several recommendations.

- The DRC recommends that a consistent format be established for the wall signs to create continuity, improve site recognition and promote way finding.
- The DRC recommends that the free-standing monument sign be utilized as a means to direct drivers to the site with a clear business name and address. The DRC does not recommend the ladder sign form of monument sign as initially proposed. The convention of a ladder sign is commonly found at multi-use commercial sites, identifying unrelated vendors. This site is essentially a single entity. This does not require the street sign to call out each service. This will allow the sign to both comply with the size provisions of the sign bylaw and also provide clear, uncluttered guidance to the public.
- The initial sign plan includes many large wall signs identifying the various medical services to be provided within the building. The DRC recommends that these signs be limited to the naming of the business at the site. The details of the services can be provided with smaller wayfinding signs, localized to their vicinity within the building. These services can also be better detailed in directory signs within the site near the driveways.
- The DRC recommends that externally illuminated wall signs be selected to maintain the attractive appearance of the proposed building. Internally illuminated channel letters of box signs are not consistent with the building style.

• The DRC recommends signage plans that find design solutions within the established constructs of the sign bylaw. Both the sign bylaw and *Design Review Guidelines* receive their instruction from the Medway Master Plan, which promotes a desire to maintain designs consistent with Medway's New England styles. The proposed building achieves this, and the DRC would like to help the applicant develop a signage plan that also does so.

Thank you for your time and again, thank you for providing the DRC the opportunity to review this important site plan. The DRC remains available to review any updates and will gladly provide feedback in the most effective manner that will assist these proceedings.

Sincerely,

Mather JBuhley

Matthew J. Buckley Chair



Wall Veneers



Dumpster fence



Retaining Wall



Fence style

#### Susan Affleck-Childs

Jeff Lynch
Monday, May 9, 2022 12:32 PM
Susan Affleck-Childs; Mike Fasolino
RE: Recent project applications
Medway Fire Apparatus dimensions 04212022.xlsx

#### Good afternoon Susy,

Sorry for the delay, not sure how this got overlooked. I have attached a copy of our fire apparatus dimensions. We would like a turn analysis done to ensure our apparatus will maneuver around the building. Also, I do not see fire hydrants on the plan. They will be required to have at least two hydrants, and maybe more, hydrants on the property. Lastly, if additional buildings are put on the property at a later date there will need to be a second access road to access the complex.

Thanks.

Chief Lynch

Jeffrey P. Lynch Chief of Department Medway Fire Department 155 Village Street Medway, MA 02053 508-533-3211

Mailing address; 44 Milford Street Medway, MA 02053

From: Susan Affleck-Childs
Sent: Monday, May 9, 2022 11:19 AM
To: Jeff Lynch <ChiefLynch@townofmedway.org>; Mike Fasolino <mfasolino@townofmedway.org>
Subject: FW: Recent project applications

Hi Jeff,

Here's the original email from April 25<sup>th</sup>. See links below to access the site plan for review.

Thanks for your help.

Susy

From: Susan Affleck-Childs
Sent: Monday, April 25, 2022 9:15 AM
To: Michael Boynton <<u>mboynton@townofmedway.org</u>>; Barbara Saint Andre <<u>bsaintandre@townofmedway.org</u>>;
Bridget Graziano <<u>bgraziano@townofmedway.org</u>>; Peter Pelletier <<u>ppelletier@townofmedway.org</u>>; Sean Harrington
<<u>sharrington@townofmedway.org</u>>; Joanne Russo <<u>jrusso@townofmedway.org</u>>; Donna Greenwood
<<u>dgreenwood@townofmedway.org</u>>; Jeff Lynch (<u>ChiefLynch@townofmedway.org</u>) <<u>ChiefLynch@townofmedway.org</u>>;

#### **MEASUREMENTS:**

	Legnth	Width	Width w/o mirrors	Wheel base
Tanker 1	32'1.7"	9'5"	8'6"	20'8"
Ladder 1	41'	9'10"	8'2"	17'1"-21'7"
Engine 1	32'6"	9'10"	8'9"	19'9"
Engine 2	36'	10'4"	9"1"	16'4"
Engine 3	34'1"	10'2"	9'	17'5"
A1	25'4"	9'	8'6"	16'
A2	24'8"	8'11"	8'6"	14'3"
A3	25'10"	9'3"	8"6"	16'2"

Mike Fasolino <<u>mfasolino@townofmedway.org</u>>; Sgt. Jeffrey Watson <<u>JWatson@medwaypolice.com</u>>; Beth Hallal <<u>bhallal@townofmedway.org</u>>; Jack Mee <<u>jmee@townofmedway.org</u>> Subject: Recent project applications

Good morning,

The Board has received two applications for which the public hearings will start on Tuesday, May 10<sup>th</sup>.

- Cassidy Field Parking Area Improvements Site Plan <u>https://www.townofmedway.org/planning-economic-development-board/pages/medway-department-public-services-building-site-plan</u>
- Milford Regional Medical Facility Site Plan (86 Holliston Street) <a href="https://www.townofmedway.org/planning-economic-development-board/pages/milford-regional-medical-center">https://www.townofmedway.org/planning-economic-development-board/pages/milford-regional-medical-center</a>

Project information is available at the noted links. Please review the information and provide your comments to me by May 5<sup>th</sup> so I may share with the Board during the hearings. Thanks.

Susan E. Affleck-Childs Planning and Economic Development Coordinator Town of Medway 155 Village Street Medway, MA 02053 508-533-3291



Susan E. Affleck-Childs

Planning and Economic Development Coordinator



Medway Town Hall 155 Village Street Medway, MA 02053 Phone (508) 533-3291 Fax (508) 321-4987 Email: sachilds@ townofmedway.org www.townofmedway.org

### TOWN OF MEDWAY Commonwealth of Massachusetts

### PLANNING AND ECONOMIC DEVELOPMENT OFFICE

### Memorandum

May 9, 2022

- TO: Planning and Economic Development Board
- FROM: Susy Affleck-Childs, Planning and Economic Development Coordinator
- RE: Milford Regional Hospital Medical Facility Major Site Plan, 86 Holliston Street

I have reviewed the submitted documents against the Site Plan Rules and Regulations and the Zoning Bylaw and offer the following comments based on this initial review.

#### SITE PLAN SUBMITTAL - Items missing or lacking in detail

- 1. 204-3 PEDB Submittals. C. Project Narrative. The submitted Project description is not complete as it does not include or address all of the items noted in the *Site Plan Rules and Regulations*. No waiver is requested.
- 2. 204-3 PEDB Submittals. F. Development Impact Statement. No waiver is requested.
- 3. 204-3. PEDB Submittals. H. Construction Management Plan. No waiver is requested.
- 4. 204-3 PEDB Submittals. I. Earth Removal Calculations and J. Earth Fill Calculations. No waiver is requested.
- 5. 204-5 Site Plan Contents. D. 10) Color Renderings. No waiver is requested.
- 6. 204-5 Site Plan Contents. D. 13) Site Amenities. Are details provided for all items including benches, trash containers, bollards, planters, fences and retaining walls?

#### **GROUNDWATER PROTECTION SPECIAL PERMIT**

1. Narrative describing how the proposed development meets the general special permit criteria in Section 3.4 of the ZBL and the criteria in Section 5.6.3 Groundwater Protection District.

#### GENERAL ZONING

 Requirement for 15% open space area per Section 6.2 Table 2 Dimensional and Density Regulations. No open space area is specifically designated.

#### **OTHER COMMENTS**

- 1. The parcel as indicated on the site plan does not yet exist. The applicant and property owner will need to file an ANR plan for the Board's endorsement and subsequent recording at the Norfolk County Registry of Deeds to formally create the lot.
- Address for the new parcel. The parcel from which this new lot is to be created has an 86 Holliston Street address. Vehicular and pedestrian access to this new facility will be from Main Street, so it needs a Main Street address. Walgreens is 68 Main Street. Charles River Bank is 70 Main Street. Discussion will be needed with Town Assessor Donna Greenwood along with Police Chief Allen Tingley and Fire Chief Jeff Lynch to determine a suitable address for the new parcel.



## Medway Police Department

315 Willane Street Medway, MA 02053

Phone: 508-533-3212 **MAX: 508-533-3216** Emergency: 911

Allen M. Tingley Chief of Police

May 10, 2022

To: Susan Affleck-Childs Planning & Economic Development Coordinator

From: Jeffrey W. Watson Sergeant/Safety Officer Medway Police Department

Ref: 86 Holliston St. Medical Center

I have reviewed the proposed site plan for 86 Holliston St. done by Guerriere & Halnon, Inc. dated April 14, 2022.

I would request that the South Side Entrance become exit only. All traffic entering the complex would enter through the North entrance. Do not Enter signs would be installed on the outside of the Exit. I would also request Stop signs and painted stop lines at both the north and south Exits.

In March of 2022 a Road Safety Audit was done by Mass DOT on the intersection of Main St at Medway Commons and Walgreens. The audit shows many rear end accidents at this intersection on the West bound lane. The current southern exit and entrance is too close to the Main St intersection. This has the potential to have cars queuing up causing a great safety concern for even more rear end accidents.

I would also request the Town look at Table Three, page 10 and 11 of the Safety Audit. This table shows the potential safety enhancements necessary for this intersection. If we are to add this type of traffic to this area, I would ask that the Town request these recommendations.

If you have any questions, please let me know.

I will email a copy of the Road Safety Audit to you.

All signage shall meet the standards of the Medway Department of Public Works.

### ROAD SAFETY AUDIT

Main Street (Route 109) at Medway Commons and Walgreens Driveways

Town of Medway

March 2022

**Prepared For:** 



On Behalf of: Toll Brothers Apartment Living

Prepared By:



Transportation Engineers & Planners

35 New England Business Center Drive Suite 140 Andover, MA 01810-1066

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### Background

The Federal Highway Administration (FHWA) defines a Road Safety Audit (RSA) as the formal safety examination of an existing or future road or intersection by an independent, multidisciplinary team. The purpose of an RSA is to identify potential safety issues and possible opportunities for safety improvements considering all roadway users. The Massachusetts Department of Transportation's (MassDOT) RSA procedures are defined in Appendix D.

The intersection of Main Street (Route 109) with Medway Commons and Walgreens driveways was identified as a high crash cluster based on the Highway Safety Improvement Program (HSIP) cluster data for the period of time from 2013-2015. Currently the MassDOT HSIP map shows HSIP cluster for 2015-2017, 2016-2018, and 2017-2019. The intersection of Main Street with Medway Commons and Walgreens driveways is not listed as a high crash location on those three lists.

This RSA was proposed by the proponent for the 190-unit multifamily residential development to be located at 39 Main Street. Although the 190-unit residential development was not shown to result in a change in level of service (LOS) over No-Build conditions, in an effort to advance safety improvements at this location that are warranted as a result of existing conditions unrelated to the multifamily residential development, the proponent facilitated this RSA in order to identify improvement strategies for the intersection.

### **Project Data**

The RSA for the subject location was conducted on March 1, 2022 at Medway Town Hall. The RSA Meeting Agenda is provided in Appendix A. Participating audit team members and their affiliation are listed in Table 1 with team member contact information provided in Appendix B. For this RSA, team members were encouraged to visit the location prior to the meeting to observe operations and evaluate potential safety issues, using MassDOT's Safety Review Prompt list for guidance. Prior to the meeting, team members were provided with the following:

- 1. Collision diagram,
- 2. Crash data summary table,
- 3. Bar charts analyzing motor vehicle crashes reported within the review period (2014-2018).

This material was reviewed by the audit team at the March 1, 2022 meeting in conjunction with aerial views of the subject intersection via Google Earth.

Audit Team Member	Agency/Affiliation
Shane Leary	MassDOT District 3 Traffic
Lola Campbell	MassDOT District 3 Traffic
Dakota DelSignore	MassDOT Traffic Safety Division
Michelle Deng	MassDOT Traffic Safety Division
Peter Pelletier	Town of Medway Department of Public Works
Tom Irwin	Town of Medway Fire Department
Jeff Watson	Town of Medway Police Department
Jennifer Conners	Vanasse and Associates, Inc.
Derek Roach	Vanasse and Associates, Inc.

### Table 1: Participating Audit Team Members

Motor vehicle crash data was provided by the MassDOT Traffic Safety Division for the most recent fiveyear review period available at the time (2014-2018). All reported collisions that involved police dispatch were handled by the Town of Medway Police Department.

The data provided for the study area intersections include 19 reported crashes, with 16 crashes (84 percent) resulting in property damage only, three (3) (16 percent) resulting in personal injury or possible injury, and no reported fatalities. The majority of the crashes, 17 of the total 19 (89 percent) were rear-end crashes while two (2) (11 percent) were sideswipe crashes. The majority of the crashes, 17 out of 19 (89 percent) occurred on dry pavement, while one (1) crash (5 percent) occurred on wet pavement, and one (1) (5 percent) occurred during clear weather, while three (3) crashes (16 percent) occurred during cloudy weather, and one (1) (5 percent) occurred during snowy/icy weather conditions. The majority of the reported crashes occurred during the afternoon hours, with 26 percent occurring from 12:00 to 2:00 PM, 32 percent occurring from 2:00 to 4:00 PM, and 26 percent occurring from 4:00 to 6:00 PM. All of the crashes occurred during daylight hours.
### **Project Location and Description**

#### Main Street (Route 109)

Main Street is a two-lane urban principal arterial roadway under the jurisdiction of the Town of Medway that traverses the study area in a general east-west orientation. Within the study area, Main Street provides one lane of travel in each direction, with additional turning lanes provided at signalized intersections. Directional travel along Main Street is separated by a double-yellow centerline. The posted speed limit on Main Street in the study area is 35 miles per hour (mph). Sidewalk is provided along the north side of Main Street within the study area. Illumination along the corridor is provided by way of streetlights mounted on wooden utility poles with the nearest streetlight located on a utility pole approximately 25 feet east of this intersection on the north side of the roadway. Land use along Main Street in the vicinity of the study area consists primarily of commercial properties including the Medway Commons shopping center and Walgreens.

#### Main Street at Medway Commons and Walgreens Driveways

Main Street is intersected by Medway Commons and Walgreens driveways from the south and north, respectively, to form a four-way intersection under traffic signal control. The Main Street eastbound approach provides an 11-foot wide exclusive left-turn lane, a 12-foot wide general-purpose travel lane, and a 12-foot wide exclusive right-turn lane. The Main Street westbound approach provides a 14-foot wide through/right-turn lane. The Medway Commons northbound approach provides a 12-foot wide left-turn/through lane and a 12-foot wide exclusive right-turn lane. The Walgreens driveway southbound approach provides a 12-foot wide exclusive left-turn lane. The wide exclusive right-turn lane. The walgreens driveway southbound approach provides a 12-foot wide exclusive left-turn lane and an 11-foot wide through/right-turn lane.

The traffic signal at this location operates under a three-phase traffic signal operation, with protected leftturn phases provided for eastbound and westbound traffic on Main Street. Pedestrian signal phasing is provided via push-button activation and occurs as an exclusive phase. Painted crosswalks are provided across the Main Street eastbound and Walgreens driveway southbound approaches to this intersection. Figure 1 depicts the intersection of Main Street with Medway Commons and Walgreens driveways in relation to the surrounding area. Road Safety Audit—Main Street at Medway Commons/Walgreens Driveways Medway, Massachusetts *Prepared by Vanasse & Associates, Inc.* 



Figure 1: Locus Map

### Audit Observations and Potential Safety Enhancements

Following the RSA site visit, audit team members returned to the meeting room at Medway Town Hall and a group discussion was held on the various safety issues that were observed in the field. The safety issues observed are summarized and described in more detail in the following section with summaries of potential safety enhancements as discussed during the RSA.

#### <u>Main Street at Medway Commons And Walgreens Driveways –</u> <u>Observations and Safety Issues</u>

- 1. Congestion on Main Street, particularly in the westbound direction, leads to long queues and motorist frustration. Specifically, the westbound queue from the intersection of Main Street at Holliston Street is spilling back to this signal and beyond. It was noted by audit team members that this signal is not currently coordinated with the intersection of Main Street with Holliston Street, which seems to be contributing to the long westbound queues. While waiting in the queue, drivers are constantly starting and stopping which leads to more chances for rear-end collisions. In addition, drivers want to clear the intersection and will queue up through the intersection to do so which may block vehicles on the northbound and southbound approaches from entering the intersection. Some drivers speed up to try and make it through the intersection on the yellow interval and have to stop suddenly due to the queue at the intersection of Main Street at Holliston Street. On the contrary, some westbound drivers may stop when they still have the green indication because the queue from Main Street at Holliston Street has already backed up through the intersection. This may cause cars further back in the queue who only see the green indication to continue driving and cause a rear-end collision. Fourteen (14) of the 19 reported collisions at this intersection were rear-end crashes involving westbound traffic on Main Street.
- 2. During the field visit, audit team members stated that the westbound clearance interval (yellow time) seemed to be shorter than the eastbound clearance interval. The shortened clearance interval in the westbound direction may be contributing to drivers speeding up to try and clear the intersection on the yellow interval. However, due to the westbound queue at the intersection of Main Street with Holliston Street, these drivers often have to stop suddenly after clearing the Main Street at Medway Commons and Walgreens driveways intersection.
- 3. During the field visit, audit team members noted the lack of retroreflective strips on the backplates to the signal heads of the intersection. This may be contributing to rear-end collisions if drivers are having difficulty seeing the signal indications and when they change. In addition, team members noted that drivers stuck in the long queue westbound may confuse the signal heads at the intersection of Main Street with Medway Commons and Walgreens driveways with the signal heads for the intersection of Main Street with Holliston Street. At a certain distance away, the two sets of signal heads align. This maybe contributing to rear-end crashes as drivers assume they have the red/green light when it is actually the Main Street at Holliston Street signal heads they are seeing change indications. In addition, trees on the north side of Main Street hang over the westbound approach and may obscure the traffic signal heads when the trees have leaves. This may further contribute to westbound rear-end crashes.
- 4. Pavement markings are either faded or not provided at a number of locations at this intersection. Pavement markings are lightly faded on all approaches to this intersection, potentially leading to

driver confusion and contributing to crashes at this location. Furthermore, no pavement markings are provided on the Medway Commons inbound leg to delineate the two inbound lanes. This is a contributing factor for sideswipe crashes.

- 5. The crash data indicated that the driver's contributing factor in five (5) of the crashes was "following too closely" and in another six (6) the factor was "inattention". These behaviors often lead to rear-end collisions.
- 6. Glare was noted by the audit team members as a known issue, especially for westbound traffic in the evening. There was one rear-end crash in the data where the driver indicated they caused the collision due to not being able to see the car in front of them stop because of solar glare.
- 7. During the field visit, audit team members acknowledged that pedestrian equipment at this location does not meet Americans with Disabilities Act (ADA) standards. Although the crash history did not indicate any pedestrian-related crashes at this location over the time period reviewed, it is anticipated that there will be more pedestrian activity at this intersection once the 190-unit multifamily residential development is constructed and occupied.

#### Safety Issue No. 1 – Congestion:

Prior to the site visit, audit team members noted the frequency of motor vehicle collisions in the westbound direction on Main Street, including 14 westbound rear-end collisions. In comparison, four (4) motor vehicle collisions were reported for vehicles traveling eastbound on Main Street at this location. Only one (1) crash was reported on the southbound approach and no crashes were reported on the northbound approach. During the site visit, it was noted by audit team members that this signal is not coordinated with the intersection of Main Street at Holliston Street, which is contributing to the long westbound queues. While waiting in the queue, drivers are constantly starting and stopping, which leads to more chances for rear-end collisions. In addition, frustrated drivers want to clear the intersection and will queue up through the intersection to do so which may block vehicles on the northbound and southbound approaches from entering the intersection. Also, drivers speed up to try and clear the intersection and have to stop suddenly due to the queue at the intersection of Main Street at Holliston Street. This behavior was observed by audit team members during the site visit. On the contrary, some westbound drivers may stop when they still have the green indication because the queue from Main Street at Holliston Street has already backed up through the intersection. This may cause cars further back in the queue who only see the green indication to continue driving and cause a rear-end collision. Fourteen (14) of the 19 reported collisions at this intersection were rear-end crashes involving westbound traffic on Main Street.

Potential Safety Enhancements:

1. Consider coordinating the Main Street at Medway Commons and Walgreens driveways signal with the Main Street at Holliston Street signal. Audit team members from the Town of Medway indicated that the coordination of these two signals is planned and will be implemented as soon as a part for the Main Street at Holliston Street intersection arrives.

#### Safety Issue No. 2 – Clearance Intervals:

During the field visit, audit team members observed that the westbound clearance interval (yellow time) was shorter than the eastbound clearance interval. One would expect that these clearance intervals would

be the same length. If in fact, the westbound clearance interval is shorter than required by MassDOT standards, it may be contributing to the high number of westbound rear-end collisions. Frustrated drivers who have been waiting in the long queue may speed up when the light turns yellow in order to try and clear the intersection before the all-red indication. However, the westbound queue from the intersection of Main Street with Holliston Street is often queued up through this intersection which causes those speeding up to clear the intersection to then stop suddenly. During the site visit, team members observed vehicles speeding up to get through the intersection on the yellow interval only to then stop suddenly due to the queue at Main Street with Holliston Street.

Potential Safety Enhancements:

1. Check the clearance intervals at this intersection and consider updating the timings if determined they do not meet MassDOT standards.

#### Safety Issue No. 3 – Traffic Signal Head Conspicuity:

During the field visit, audit team members noted the lack of retroreflective strips on the backplates of the signal heads of the intersection. This may be contributing to rear-end collisions if drivers are having difficulty seeing the signal indications and when they change. In addition, team members noted that drivers stuck in the long queue westbound may confuse the signal heads at the intersection of Main Street with Medway Commons and Walgreens driveways with the signal for the intersection of Main Street with Holliston Street. At the right distance away, the two sets of signal heads align exactly. This is also likely contributing to rear-end crashes as drivers assume they have the red/green light when it is actually the Main Street at Holliston Street signal head they are looking at. In addition, trees on the north side of Main Street hang over the westbound approach and may obscure the traffic signal heads when the trees have leaves. This may further contribute to westbound rear-end crashes.

Potential Safety Enhancements:

- 1. Install retroreflective strips to the backplates of the signal heads to improve signal head conspicuity.
- 2. Consider trimming trees on the north side of Main Street if it is determined they hang down and obscure the signal heads when the trees have leaves.

#### Safety Issue No. 4 – Pavement Markings:

Field observations revealed the pavement markings at this intersection are lightly faded with no pavement markings provided on the Medway Commons approach to delineate that there are two entering lanes. This was a contributing factor in Cash Number 5, which was a sideswipe on the entering lanes of the Medway Commons shopping center.

Potential Safety Enhancements:

- 1. Consider striping pavement markings on the Medway Commons entering approach to delineate between the two entering lanes. It should be noted that this approach of the intersection is privately owned and any improvement made on this approach would have to be agreed upon with the owners of the Medway Commons development.
- 2. Consider restriping the intersection.

#### Safety Issue No. 5 – Driver Distraction/Inattention:

During the pre-audit meeting, audit team members noted that the crash data showed a trend of driver distraction and inattention. The driver's contributing factor in five (5) of the crashes was "following too closely" and in another six (6) the factor was "inattention".

Potential Safety Enhancements:

- 1. Consider educational outreach/campaigns for residents to better inform the public of the safety issues surrounding distracted drivers and inattention. It should be noted that audit team members indicated that the Town of Medway already has crosswalk and distracted driver initiatives. It was suggested that further outreach be done with middle schoolers in the Town.
- 2. Increase police enforcement of cell phone use and other activities that distract drivers.

#### Safety Issue No. 6 – Solar Glare:

Audit team members noted that the driver that caused Crash Number 17 stated they could not see the cars in front of them stop due to glare from the sun. In addition, audit team members from the Town of Medway indicated that solar glare is a known issue on Main Street westbound, particularly in the afternoons.

Potential Safety Enhancements:

- 1. Consider posting warning signs that caution drivers of possible solar glare on Main Street westbound.
- 2. Consider educational outreach to residents to inform them of the hazard of glare, specifically westbound on Main Street in the afternoons, and methods for minimizing the effects of the glare on drivers.

#### Safety Issue No. 7 – Pedestrian Accommodations:

During the field visit, audit team members acknowledge that the pedestrian equipment at this location is not up to ADA standards. Although the crash history did not indicate any pedestrian-related crashes at this location over the time period reviewed, it is anticipated that there will be more pedestrian activity at this intersection once the 190-unit multifamily residential development is constructed and occupied.

Potential Safety Enhancements:

- 1. Update the crosswalks at the intersection from Standard crosswalks to Ladder crosswalks.
- 2. Update all wheelchair ramps at the intersection to ADA standards including installing standard tactile warning panels.
- 3. Upgrade the pedestrian signal heads to ADA standards including a pedestrian countdown signal.
- 4. Upgrade the pedestrian push buttons to Accessible Pedestrian Signal (APS) buttons that have auditory functions.

### Summary of Road Safety Audit

The RSA team identified safety issues and potential safety enhancements for the intersection under review, based on the on-site field observations, the meeting discussion, and a review of the available crash data. Table 2 lists estimated time frames and construction costs for each category (for timeframe, short-, medium, and long-term, and for costs, low, medium, and high).

### Table 2: Estimated Time Frame and Costs Breakdown

Time Frame	Time	Cost Frame	Costs
Short-Term	<1 Year	Low	<\$10,000
Mid-Term	1-3 Years	Medium	\$10,001-\$50,000
Long-Term	>3 Years	High	>\$50,000

Safety payoffs were based on Crash Modification Factors (CMFs) found on the USDOT FHWA CMF Clearinghouse website for improvement strategies considered in the RSA.

Table 3 provides a summary of the Potential Safety Enhancements discussed during the audit, along with the potential safety payoffs, the estimated time frame for completion, the estimated construction cost, and the responsible agency involved.

# Table 3: Potential Safety Enhancement Summary –Main Street at Medway Commons and Walgreens Driveways

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Congestion	Consider coordinating the Main Street at Medway Commons and Walgreens driveways signal with the Main Street at Holliston Street signal	Medium	Short-Term	Medium	Town of Medway
Clearance Intervals	Check clearance intervals and consider updating if they do not meet MassDOT standards	Medium	Short-Term	Low	Town of Medway
Traffic Signal Head Conspicuity	Install retroreflective strips to the backplates of the signal heads to improve signal head conspicuity	Medium	Short-Term	Low	Town of Medway
	Consider trimming trees on the north side of Main Street if it is determined they hang down and obscure the signal heads when the tree have leaves	Low	Short-Term	Low	Town of Medway
Pavement Markings	Consider striping pavement markings on Medway Commons entering approach to delineate between the two entering lanes	Low	Short-Term	Low	Owner of Medway Commons
	Consider restriping the intersection	Low	Short-Term	Low	Town of Medway

### Table 3: Potential Safety Enhancement Summary –

Main Street at Medway Commons and Walgreens Driveways (continued)

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
Driver Distraction/ Inattention	Consider educational outreach/ campaigns for residents to better inform the public of the safety issue surrounding distracted drivers and inattention.	Low	Long-Term	Low	Town of Medway
	Increase police enforcement of cell phone use and other activities that distract drivers.	Medium	Long-Term	Low	Town of Medway
	Consider posting warning signs that caution drivers of possible solar glare on Main Street westbound.	Low	Short-Term	Low	Town of Medway
Solar Glare	Consider educational outreach to residents to inform them of the hazard of glare, specifically westbound on Main Street in the afternoons and methods for handling the glare.	Low	Long-Term	Low	Town of Medway

### Table 3: Potential Safety Enhancement Summary –

Main Street at Medway Commons and Walgreens Driveways (continued)

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Jurisdiction
	Update the crosswalks at the intersection from Standard crosswalks to Ladder crosswalks	Low	Short-Term	Low	Town of Medway
Pedestrian Accommodations	Update all wheelchair ramps at the intersection to ADA standards including installing standard tactile warning panels	Medium	Mid-Term	Medium	Town of Medway
	Upgrade the pedestrian signal heads to ADA standards including a pedestrian countdown signal	Medium	Mid-Term	Medium	Town of Medway
	Upgrade the pedestrian push buttons to Accessible Pedestrian Signal (APS) buttons that have auditory function	Medium	Mid-Term	Medium	Town of Medway

# Appendix A. RSA Meeting Agenda

### **Road Safety Audit**

### Medway

MEETING LOCATION: Medway Town Hall, Sanford Hall Medway Town Hall (155 Village Street) Medway, MA DATE: March 1, 2022 TIME : 1:00 PM – 4:00 PM

Type of Meeting:	Road Safety Audit
Attendees:	Invited Participants to Comprise a Multidisciplinary Team
1:00 PM	Welcome and Introductions
1:15 PM	Discussion of Safety Issues
	<ul> <li>Crash History – Provided in Advance</li> <li>Existing Geometries and Conditions</li> </ul>
2:00 PM	Site Visit
	<ul> <li>Drive to the intersection of Main Street with Medway Commons and Walgreens Driveways</li> <li>As a group, identify areas for improvement</li> </ul>
3:00 PM	Discussion of Potential Improvements
	<ul> <li>Return to Town Hall</li> <li>Discuss observations and finalizes safety issue areas</li> <li>Discuss potential improvements and finalize recommendations</li> </ul>
4:00 PM	Adjourn for the day – but the RSA has not ended
Instructions for Participants:	
<ul> <li>Before attending the F the intersection and c safety</li> </ul>	RSA on March 1, 2022, participants are encouraged to drive/walk through complete/consider elements of the RSA Prompt List with a focus on
<ul> <li>All participants will be encouraged to come develops and respect RSA process.</li> </ul>	e actively involved in the process throughout. Participants are with thoughts and ideas but are reminded that the synergy that for others' opinions are key elements to the success of the overall
<ul> <li>After the RSA meeting document materials to team.</li> </ul>	g, participants will be asked to comment and respond to the o assure it is reflective of the RSA completed by the multidisciplinary

Agenda

# Safety Review Prompt List

The Safety Review Prompt List provides basic safety-related questions to use when evaluating a given roadway location. The prompt list should be considered when evaluating a roadway to design improvements or conduct a Road Safety Audit. The primary purpose of the prompt list is to identify potential road safety hazards. The list is meant to be general and should be used to prompt an evaluator as to specific matters identified in the field that may have an adverse effect on road safety. The Safety Review Prompt List is not a check of compliance with design standards.

This Prompt List represents the minimum that should be considered when exploring safety opportunities and is not intended to address all aspects of safety.

A summary of the responses should be prepared to highlight potential safety improvement opportunities.

### Speed

- Are posted speed limits consistent with speed regulations; are they adequate?
- Are design features consistent with the posted speed (passing opportunities, sight distance, warning signs for horizontal and vertical curves, clearance intervals, sign placement, etc.)?
- Are adequate controls in place for driver compliance with speed limits?

### Multi-modal

- Have accommodations been provided for safe movement of pedestrians, bicycles, emergency vehicles, public transportation, and commercial vehicles?
- What design features could be improved, added, or removed to enhance the safe mobility of the various modes?

### **Pavement Markings**

- Are there highly visible and retro-reflective edge lines, centerlines, and other pavement markings?
- Do the pavement markings provide sufficient guidance to the road users? Can the placement of the pavement markings be modified to improve guidance to road users?

### Signs

- Are all signs retro-reflective and visible for all roadway conditions, including placed free from obstructions?
- Are signs located to maximize perception and reaction while minimizing intrusion in clear zones?
- Does the signage provide adequate guidance to road users for given road conditions?

• Are pavement markings and signs consistent in effectively guiding road users?

### **Intersection Control**

- Do all signs (STOP signs, lane assignments, street names, etc.) provide visible, clear, non-conflicting messages?
- Is there clear, non-conflicting visibility of traffic control (signal heads, signs, and markings) from all approach lanes?
- Has the potential of misrepresentation of intersection control been considered (at closely spaced intersections or through control that is against expectation)?
- For signalized intersections, have the implications on safety been considered for the signal phasing?
- Is there a safe means by which all modes can travel through the intersection?

### Lighting

- Is lighting (from headlights and/or streetlights) adequate for specific roadway conditions and/or use?
- If glare exists from sunlight or opposing headlights, are there countermeasures that can be implemented to minimize potentially detrimental effects?

### Obstructions

- Are there obstructions to sightlines or roadway guidance (signs, markings, etc.) that can be removed, relocated, or minimized as part of this project?
- If obstructions or fixed objects exist but cannot be moved, can they be shielded (with guardrails, etc.) or delineated (with reflectors) to improve road user safety? If so, what can be done?

### Pavement

- Could the condition of the pavement impact mobility and safety (potholes, edge drop-offs, skid resistance, etc.)?
- What improvements can be made to minimize safety impacts?

### Access Points and Traffic Generators

- Is the access control sufficient for the road's function?
- Are site access points located to maximize safety while still providing adequate access?
- Have impacts of site developments been adequately accommodated for safe mobility of all road users?

### Parking

- Is parking clearly delineated and in conformance with signs, markings, and regulations?
- Might parking obstruct mobility/safety of pedestrians and other roadway users?

### Weather Conditions

• Have accommodations been made for impacts from adverse weather conditions (storage of snow, removal of ponding, adequate drainage, signage of low salt areas, maintenance program for snow removal, and catch basin clearing, etc.)?

### **Auxiliary Lanes**

- Could taper locations and/or alignments contribute to safety challenges?
- Could lack of climbing lanes or passing zones cause driver frustration?
- Do acceleration/deceleration lane lengths necessitate additional signage and/or markings?

### Animals

- Do animal migrations impact safety?
- Can measures be taken to reduce animal-vehicle conflicts?

Appendix B. RSA Audit Team Contact List

### Participating Audit Team Members

Date: March	Location:	155 Village Street, Medway, MA	
Audit Team Members	Agency/Affiliation	Email Address	Phone Number
Shane Leary	MassDOT District 3 Traffic	shane.leary@state.ma.us	774-366-5174
Lola Campbell	MassDOT District 3 Traffic	alolade.campbell@dot.state.ma.us	508-929-3800
Dakota DelSignore	MassDOT Traffic Safety Division	dakota.d.delsignore@dot.state.ma.us	857-368-9648
Michelle Deng	MassDOT Traffic Safety Division	michelle.deng@state.ma.us	857-368-9648
Peter Pelletier	Town of Medway Department of Public Work	ppelletier@townofmedway.org	508-333-3275
Tom Irwin	Town of Medway Fire Department	tirwin@townofmedway.org	508-889-7995
Jeff Watson	Town of Medway Police Department	JWatson@medwaypolice.com	508-328-1781
Jennifer Conners	Vanasse & Associates Inc.	jconners@rdva.com	978-474-8800
Derek Roach	Vanasse & Associates Inc.	droach@rdva.com	978-474-8800

## Appendix C. Detailed Crash Data



	<u>C</u> F	RASH TYPE				PD - Pro	porty Damago	Only
		Unknown (l	Se	everity	PI = Pers	sonal Injury	Only	
Angle	(A)	Turning Mov	ement (TM) 🗕			F = Fata U = Ukna	lity own	
Rear E	ind (RE) —	Backing Up	Road Surface Weather (R/S) (W)					
Head (	On (HO)	Lane Change	e (LC)	1 = D	ГУ.		1 = Clear	
Fixed (	Object (FO) ————————————————————————————————————	Out of Cont	rol (OC)	2 = W 3 = S	et nowy		2 = Cloudy 3 = Rain	
Side S	wipe (SS)	Pedest./Bicy	/cle (P/B)	4 = 10 5 = 0 6 = 5	;y nknown lush		4 = Snow 5 = Other 6 = Unknowr	1
CRASH #	DATE	DAY	TIME	SEV.	R/S	W	CRASH TYPE	No. Of VEHICLES
1	05/15/2014	Thursday	4:32 PM	PD	1	1	RE	2
2	06/14/2014	Saturday	10:58 AM	Pl	1	1	RE	4
3	07/24/2014	Thursday	1:29 PM	PD	1	1	RE	2
4	08/22/2014	Friday	11:25 AM	PD	1	1	RE	2
5	09/06/2014	Saturday	12:10 PM	PD	1	1	SS	2
6	06/10/2015	Wednesday	4:24 PM	PD	1	1	RE	2
7	06/22/2015	Monday	4:10 PM	PD	1	1	RE	2
8	09/04/2015	Friday	6:39 AM	PI	1	1	RE	4
9	10/03/2015	Saturday	1:46 PM	Pl	1	2	RE	4
10	10/29/2015	Thursday	12:06 PM	PD	1	1	SS	2
11	12/13/2015	Sunday	2:57 PM	PD	1	1	RE	2
12	12/15/2015	Tuesday	3:51 PM	PD	1	1	RE	3
13	03/07/2016	Monday	3:04 PM	PD	1	1	RE	2
14	04/23/2016	Saturday	2:01 PM	PD	1	2	RE	2
15	01/07/2017	Saturday	1:16 PM	PD	3	4	RE	2
16	07/12/2017	Wednesday	4:49 PM	PD	1	1	RE	2
17	10/27/2017	Friday	5:17 PM	PD	1	1	RE	2
18	05/24/2018	Thursday	2:42 PM	PD	1	1	RE	3
19	06/05/2018	Tuesday	3:52 PM	PD	2	2	RE	2



#### Figure CD2

Collision Diagram Data Summary Main Street (Route 109) at Medway Commons/ Walgreens Driveway

#### Table 1 Crash Data Summary Main Street (Route 109) at Medway Commons/Walgreens Driveways January 2014 - December 2018

Crash Diagram Reference #	Crash Date	Crash Day	Time	Manner of Collision	Injury Status	Light Conditions	Weather Conditions	Road Surface Condition		Drive	er Ages	;	Driver Contributing Circumstances	
1	5/15/2014	Thuirsday	4:32 PM	Rear-end	No Injury	Daylight	Clear	Dry	24	21			No Improper Driving/Unknown	V1 was stoppe struck V1 from
														V1, V2, and V3
														Walgreen's. V4
2	06/14/2014	Saturday	10:58 AM	Rear-end	Non-fatal Injury	Daylight	Clear	Dry	24	19	50	17	Followed too closely	and V2 was pu
														V1 was beadin
3	07/24/2014	Thursday	1:29 PM	Rear-end	No Injury	Daylight	Clear	Dry	61	80			Followed too closely/Inattention	Medway Comr
														V1 was taking
														executing the
														failed causing
4	08/22/2014	Friday	11:25 AM	Rear-end	No Injury	Daylight	Clear	Dry	64	21			Operating defective equipment	onto flatbed.
														V1 and V2 wer
				Cideouvine, como										Commons. Due
5	09/06/2014	Saturday	12·10 DM	Sideswipe, same	No Iniun/	Davlight	Clear	Dry	24	80			Other improper action	the access road
5	03/00/2014	Saturuay	12.10 FIVI	direction	NO INJULY	Daylight	Clear	Diy	24	80				V1.
														V1 was stoppir
6	06/10/2015	Wednesday	4:24 PM	Rear-end	No Injury	Daylight	Clear	Dry	30	74			Inattention	stopped and st
														V1 and V2 wer
														westbound. Th
														direction. V1 e
7	06/22/2015	Monday	4:10 PM	Rear-end	No Injury	Daylight	Clear	Dry	31	46			No Improper Driving	ended by V2.
0	00/04/2015	Estates	6.20 414	Deen and	No. fatal lations	Devilent	Class	Davi	24	27	22	24	Net Deverted	V1, V2, V3, and
8	09/04/2015	Friday	6:39 AIVI	Rear-end	Non-ratal injury	Daylight	Clear	Dry	34	37	23	31	Not Reported	and struck v3
														V1 $V2$ and $V3$
9	10/03/2015	Saturday	1:46 PM	Rear-end	Non-fatal Injury	Daylight	Cloudy	Dry	74	55	59	34	Followed too closely/Inattention	behind causing
-	-,,	,	-		j- j		,	,				-		
														V1 was stoppe
				Sideswipe, opposite										Eastbound and
10	10/29/2015	Thursday	12:06 PM	direction	No Injury	Daylight	Clear	Dry	88				Other improper action	to turn right in
								_						
11	12/13/2015	Sunday	2:57 PM	Rear-end	No Injury	Daylight	Clear	Dry	42	19			Inattention	V1 was stoppe
														V1 and V2 wor
12	12/15/2015	Tuesday	3.21 PM	Rear-end	No Iniury	Davlight	Clear	Dry	39	21	54		Followed too closely	causing a chair
12	12/13/2013	rucsuuy	5.5111	incur chu	i të nijary	Buyiigiit	cicui	Biy			51			
														V1 was stoppe
13	03/07/2016	Monday	3:04 PM	Rear-end	No Injury	Daylight	Clear	Dry	17				Inattention	traveling west,
														V1 was stoppe
14	04/23/2016	Saturday	2:01 PM	Rear-end	No Injury	Daylight	Cloudy	Dry	26	28			Inattention	see V1 stop an
15	01/07/2017	Saturday	1.16 DM	Rear-ond	No Iniuny	Davlight	Snow	Snow	20	20			Not Reported	v1 was trvaelin
15	01/07/2017	Saturuay	1.10 FIVI	iteal-ellu	NO IIJUI Y	Daylight	5100	5100	39	30				
														V1 was stoppe
16	07/12/2017	Wednesday	4:49 PM	Rear-end	No Injury	Daylight	Clear	Dry	67	1	1		Not Reported	V2 fled the sce

#### Comments

d in traffic westbound on Main Street when V2 also traveling westbound behind.

were stopped in traffic on Main Street westbound at the intersection of I struck V3 from behind causing chain reaction where V3 was pushed into V2 shed into V1.

g eastbound on Main Street and was stopped in traffic for the light at mons when V2 struck V1 from behind.

a left out of Medway Commons onto Main Street westbound. V2 was same maneuver and struck V1 from behind. V2 reported that their brakes the collision. Tow operator reported brakes were working when loading V2

e traveling westbound on Main St and both turned left into Medway e to the roadway width, V1 and V2 were side by side prior to turning onto d. Both vehicles attempted to turn right at the same time.and V2 sideswiped

ng in traffic westbound on Main Street when V2 did not notice V1 had truck V1 from behind.

re exiting Medway Commons and attempting to turn left onto Main St ne light turned green, but there was a large amount of traffic in the WB executed its turn and was stopped in the line of traffic when it was rear-

I V4 were traveling eastbound on Main Street when V4 failed to stop in time from behind causing a chain reaction with V3 striking V2 then V2 striking V1.

were stopped in traffic on Main Street westbound. V4 struck V3 from g chain reaction with V3 striking V2 then V2 striking V1.

d in traffic on Main Street westbound. V2 was traveling on Main Street I swerved to the left across the double yellow line to pass a vehicle slowing to Medway Commons. In doing so V2 struck V1 on the left side.

d in traffic westbound on Main Street when V2 struck V1 from behind.

e stopped in traffic on Main Street westbound. V3 struck V2 from behind n reaction collision.

ed at the traffic light for the Walgreens on Main Street westbound. V2 also , failed to stop in time and struck V1 from behind.

d in traffic westbound on Main Street when V2 also traveling west, did not d struck V1 from behind.

ng westbound on Mian Street and stopped for traffic. V2 did not see V1 stop from behind.

d at the red-light eastbound on Main Street when V2 struck V1 from behind. me.

#### Table 1 Crash Data Summary Main Street (Route 109) at Medway Commons/Walgreens Driveways January 2014 - December 2018

Crash Diagram Reference #	Crash Date	Crash Day	Time	Manner of Collision	Injury Status	Light Conditions	Weather Conditions	Road Surface Condition		Drive	er Ages	5	Driver Contributing Circumstances	
17	10/27/2017	Friday	5:17 PM	Rear-end	No Injury	Daylight	Clear	Dry	38	36			Glare	V1 was stopped behind. Operat
18	05/24/2018	Thursday	2:42 PM	Rear-end	No Injury	Daylight	Clear	Dry	66	25	26		Followed too closely	V1 and V2 were failed to stop ir
19	06/05/2018	Tuesday	3:52 PM	Rear-end	No Injury	Daylight	Cloudy	Wet	39	28			No Improper Driving	V1 was stopped behind. Operat

#### Comments

d at the red light on Main Street westbound when V2 struck V1 from tor of V2 states they could not see that V1 had stopped due to glare.

e stopped in traffic on Main Street westbound. V3, traveling behind V2, n time and struck V2 from behind causing a chain reaction collision.

d at the red light on Main Street westbound when V2 struck V1 from tor of V2 claims he could not stop in time due to wet pavement.

















# Appendix D. RSA Procedure



## **Road Safety Audit Guidelines**

Massachusetts Department of Transportation – Highway Division 10 Park Plaza, Boston, Ma 02116-3973

November 1, 2015

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### **1.0 Introduction**

#### 1.1 Definition

In an effort to reduce the number of crash-related fatalities and incapacitating injuries, Massachusetts Department of Transportation has developed a Strategic Highway Safety Plan. The mission of the Safety Plan is to "Develop, promote, implement, and evaluate data-driven, multidisciplinary strategies to maximize safety for users of the roadway system." One of the many strategies noted in the current Safety Plan is to "conduct Road Safety Audits (RSA) at high-crash locations throughout the Commonwealth." A Road Safety Audit, as defined by the Federal Highway Administration (FHWA) is "a formal safety performance examination of an existing or future road or intersection by an independent audit team." Simply stated, an RSA is a relatively quick process that identifies safety improvements focused on decreasing the number and severity of roadway crashes. The safety improvements that have employed the RSA technique and implemented the recommendations, have seen measurable decreases in the number of incapacitating and fatal crashes as a result.

#### 1.2 When is a Road Safety Audit Required?

The Massachusetts Department of Transportation (MassDOT) Highway Division has fully embraced the RSA process and has incorporated it into its safety programs. MassDOT has provided RSA training for the District Traffic Engineers and Regional Planning Agencies, and conducted audits for locations experiencing lane departure crashes, cross-median crashes, intersections, bicycle and pedestrian, accessibility, and other high crash locations. MassDOT has incorporated the RSA process as a requirement under any of the following conditions:

- 1. Projects that include roadway or traffic signal improvements located within a High Crash Cluster (Vehicle, Bicycle, or Pedestrian) of the most recent available years.
- 2. Projects that include improvements adjacent to a High Crash Cluster or are anticipated to impact the operations of a High Crash Cluster. (ex. Increasing the traffic volumes to a high crash cluster)
- 3. Projects securing federal funding through the Highway Safety Improvement Program (HSIP) or are anticipated to utilize HSIP funding.

Knowing the success of an RSA, the MassDOT Safety Management Unit is encouraging MassDOT Districts and communities to conduct RSAs at the initial stage of the design process so as to help guide the design and reduce fatalities and injury crashes for locations in which safety has been noted to be a factor in determining needs for improvement.

**Tips:** To determine if your project is located within a high crash cluster (vehicle, bicycle, or pedestrian) visit the MassDOT Top Crash Location Mapping service. High crash clusters within the most recent posted year will require an RSA. The designer should also check previous years' crash clusters to verify that the location has never been classified as a high crash location.

http://services.massdot.state.ma.us/maptemplate/TopCrashLocations

The designer should also verify that the location does not exceed the threshold of a high crash cluster by comparing the calculated Equivalent Property Damage Only (EPDO) to the regional maximum located in the latest Massachusetts HSIP Guidelines.

https://www.massdot.state.ma.us/Portals/8/docs/traffic/HSIP/HSIP%20Criteria%20Updates.pdf

#### 1.3 Who Facilitates the Road Safety Audit?

The RSA should be incorporated into a project designer's scope of work for a roadway improvement project that has identified safety concerns as one of the reasons for the improvement needs or qualifies for one of the listed conditions in Section 1.2. The intention is to have the designer of the improvement project facilitate the RSA and prepare the RSA report. As an RSA must be facilitated by an "Independent" organization, it is critical that the process be conducted early in the project stages prior to any preliminary design. Therefore it shall be required that an RSA be conducted at the following stages:

- 1. In relation to a MassDOT project scope, prior to the development of the 25% Design Submission documents.
- 2. In relation to a Massachusetts Environmental Policy Act (MEPA) filing, prior to the Environmental Impact Report (EIR) filing and prior to the Transportation Impact Assessment (TIA) report. Note that the RSA may be conducted following the Traffic Scoping Letter.

In the case where an RSA is being conducted after either of the listed stages have been completed, or MassDOT has determined that the project designer cannot be considered an independent organization, an outside consultant shall be retained to facilitate the RSA and prepare the RSA report in accordance with these guidelines.

The necessary steps to prepare, conduct and finalize a RSA are described in Section 2.0. Generally, RSAs last approximately three hours and include a pre-meeting, a field visit, and a post-field visit meeting so that an audit report can be prepared. During the pre-meeting, the team gathers to discuss the location and project, review materials and discuss general concerns of the location. The team, as a group, visits the project site and walks / drives through the area. The team then reconvenes to discuss the safety issues that were noted and to develop short and long term recommendations to ameliorate the safety concerns.

### 2.0 Road Safety Audit Procedure

As described in the sections below, the RSA should follow a specific procedure to obtain the most useful information possible and hold a successful RSA. The figure below illustrates the steps to completing an RSA.



#### 2.1 Preparing Background Materials

The designer shall obtain, review and summarize the most recent pertinent available information regarding safety. This may include the following:

- Crash Data
- Traffic Volumes
- Traffic Speed Data (including regulatory speeds)
- Other Safety Concerns

Note that the crash data summaries obtained from the MassDOT Statewide database (Crash Portal) are not adequate and that the actual crash reports (including narratives and diagrams), from the police department reporting the crash data, are critical to a successful audit. The designer shall submit a request to the police department(s) within the study area (State, Local, or other). Such request should encompass an area larger than the study intersection or project limits to have more accurate data for analysis (as an example, requesting crash reports for the entire length of local roadways intersecting the study corridor). The designer shall incorporate all crashes that occur in the study or are a result of the design of the study area (for example, crashes occurring within the limit of the queue storage of an intersection).

The designer should cross-reference the provided crash reports with the Crash Portal using both a mapping method and AdHoc Query tool separately (to compile located and non-located crashes). This cross-reference will help determine that the police department has provided all relevant crash reports for the study area.

The actual crash reports shall be used to prepare collision diagrams and summaries (See Appendix F).

Details of the crash analyses must be concise since they will be used as the "before" information when an evaluation is performed on the effectiveness of the countermeasures. Other relevant information regarding the location may include, but is not limited to: traffic volumes (including pedestrians and bicycles if available), speed/citation data, available roadway plans, traffic reports, and/or signal timings and phasing information (if appropriate).

**Tips:** All information provided in the Collision Data Summary Table must match the Motor Vehicle Crash Police Report. The consultant should include pertinent information in the comments section for each crash to assist the audit team in identifying the specific cause for the crash. The MassDOT crash portal can be found at the following location: <u>http://mhd-arcgis/crashportal/</u>

#### 2.2 Assembling an Audit Team

With input and assistance from the community and/or MassDOT, the designer will select the multidisciplinary RSA team, date, time and location. The team should include (but not limited to) the following:

- **Solution** Engineering (Municipal Engineering, MassDOT District Traffic and Projects)
- **Solution** Enforcement (local and/or state police, depending upon jurisdiction)
- **Constant Series and S**
- ✤ MassDOT Safety Management Unit
- Transit (MBTA, RTA, and other transit providers)
- Regional Planning Agency (RPA)
- Federal Highway Administration (Safety Engineer)
- Maintenance (Local Public Works and/or MassDOT maintenance depending upon jurisdiction)

At a minimum, the RSA team requires a representative from Engineering, Enforcement, Emergency Response and the MassDOT's SMU (as shown in bold above). Additional members and interested parties may include the following:

- Municipal Planning Department
- MassDOT Project Manager (if applicable)
- Local Public Health Professionals
- Bicycle and Pedestrian Advocacy Groups

The designer shall contact the MassDOT Safety Management unit initially for availability. It shall be the responsibility of the designer to ensure that all required interested parties are available to attend the scheduled RSA. An email invitation should be sent to all RSA team participants and include an attachment with the RSA agenda, background materials, and prompt list. (See Appendix A for suggested text of email invite and Appendix B for a copy of a sample agenda).

**Tips:** It is best for the meetings to take place in close proximity to the project location for meeting efficiency. The designer should discuss with the City/Town officials those parties that would be appropriate to attend the meeting. The designer should also conduct research to determine if applicable advocacy groups should be invited to the RSA. This can include such groups as MassBike, WalkBoston, Mass-in-Motion, etc.

#### 2.3 Conducting the Road Safety Audit Meeting

The RSA meeting shall be conducted in three (3) stages:



#### 2.3.1 Pre-Audit Meeting

During the pre-audit meeting, the designer will provide handouts of all information that was provided in the invitation email. It will be the responsibility of the designer to facilitate the RSA meeting, take notes and photos, and then prepare the report in a timely manner. The RSA participants will meet (pre-audit meeting) to discuss the process and goals for the RSA. The designer will present the existing crash data and any known related planned projects to the participants in order to provide an introduction to project. The designer will then begin the conversation of what may be some of the safety issues so that participants can explain why they may be happening (as an example, if a location exhibits a high number of rear end locations from one approach, this should be suggested as an observation and solicit ideas as to why this may be occurring). General comments, safety issues and concerns will also be solicited about the subject location.

**Tips:** The intention of the RSA meeting is to solicit thoughts and ideas about issues and solutions; therefore, the designer should avoid specific design details regarding any proposed project (for example, that a signal or a re-alignment is being proposed). The designer should prepare visuals such as overall satellite imagery or mapping to assist in pointing out specific issues. Good practice in keeping a record of the safety issues discussed in the meeting is the utilization of note boards.

#### 2.3.2 Perform Field Visit

Following the pre-audit meeting, the team will perform a field visit (audit), during which specific issues and concerns will be pointed out by the RSA team (and/or designer) and recorded by the designer. As a minimum, the designer should use the safety review prompt list (see Appendix C) as a reference to ensure that a comprehensive list of safety issues is discussed at the audit site visit. Additionally, the designer should obtain photographs of key safety issues that may be included in the final report.

**Tips:** The group should verify the issues discussed during the pre-audit meeting. The designer should also ensure that the team walks the site as a group so that all members are able to participate in the conversation. Designers are advised to bring two (2) representatives as one may act as the facilitator and one as the recorder/photographer to ensure that all information discussed during the RSA is captured for the final report.

#### 2.3.3 Post-Audit Meeting

Following the field visit, the RSA participants will return to the meeting facility (post-audit meeting) and the designer will facilitate a group discussion, which would confirm that a complete list of safety issues had been identified during the RSA. This is followed by a discussion identifying potential countermeasures. The countermeasures may include short-term, intermediate-term, and long-term improvements and the entity responsible for each of the safety issues for the improvements will be identified. It should be noted that recommendations should be comprehensive and may include engineering, maintenance, enforcement, educational and behavioral countermeasures. In cases where recommendations are presented that do not meet federal or state guidelines, it should be discussed and detailed explanation given. If plans are already underway, the plans may be discussed and reviewed to determine whether or not the existing concerns and issues will be adequately addressed. The designer should then adjourn the meeting by describing the next steps in the process which includes the draft and final reports to be reviewed by the group.

**Tips:** During the post-audit meeting, the designer should confirm that each safety issue discussed previously is presented with one or many possible solutions. The designer should also stress the importance of the report review process finalizing the meeting as this is critical to ensuring a quality product.

#### 2.4 Preparing the Road Safety Audit Report

An RSA Report, based on MassDOT's report template (see Appendix E), will be prepared describing the Safety issues and countermeasures identified during the RSA. Countermeasures which were not discussed during the RSA may also be included, if they are found to be appropriate. Potential countermeasures which do not conform to MassDOT or FHWA standards will be noted as such in the report.

The MassDOT RSA Report Template in Microsoft Word Format can be found in Appendix E. It is also recommended that the designer review past RSA Reports for examples.

The RSA Report preparation and report review will require the following submissions:



The final RSA report must be submitted in a fully accessible PDF format with a file size no greater than 4 MB. It is suggested to use the Adobe Acrobat Professional Accessibility Checker tool for verifying that the document is accessible. This tool will provide guidance for identified issues.

A complete RSA report should clearly state the safety issues related to the subject location and describe in detail why this poses a risk to this location. An example of how to word a safety issue may be:

"The sight distance on Side Street looking north is impeded by many objects including brush, utility poles, guardrail, and the vertical curvature of the roadway. This poor sight distance appears to be a contributing factor in the number of angle crashes occurring from this approach."

The designer should avoid vague language and broad descriptions. An example of a poorly worded safety issue description may be:

"The sight distance looking north from Side Street is inadequate and may be the cause of crashes".

Each potential safety enhancement should then describe how it will mitigate the safety issue. The designer should recognize that this stage of the design is intended to suggest possible mitigation techniques and that multiple enhancements may be applicable to single safety issues. The report should

avoiding phrasing such as "Install Traffic Signal" but rather suggest this as a possible solution by stating "Evaluate the installation of a Traffic Signal."

As shown in Appendix E and below, the final report should be broken out into five (5) main sections.

Background	The background should describe the RSA process and why the audit was conducted. This should describe that the location of the project is within a high crash cluster in the region (if applicable).
Project Data	This section should describe the date and location of the audit, as well as names and affiliations of the audit team members. It should also describe the process that took place and materials that were utilized and discussed during the audit.
Project Location and Description	This section should describe the location in detail (required descriptions vary if project includes isolated intersections or a roadway corridor. It should also include a location map of the area.
Observations and Potential Enhancements	This section must include all safety issues discussed during the RSA and subsequent potential enhancements. This section may be laid out with each issue described directly followed by the enhancements.
Summary of Road Safety Audit	The summary should provide a basic overview of the recommendations including the major key points. It should also include a complete table listing of all issues and enhancements. The table should provide a general description of the enhancement.
Ting. All observ	ad sofaty issues must have at least one clearly stated enhancement which describes

**Tips:** All observed safety issues must have at least one clearly stated enhancement which describes in detail how it would help to mitigate the safety issue being described. It is also helpful to highlight the crashes that are occurring due to the safety issue. More Information for preparing the Road Safety Audit report can be found in the MassDOT RSA Report Template with additional tips on formatting and editing to create a fully accessible document.
# Appendix E. Road Safety Audit References

#### Road Safety Audit References

- CMF Clearinghouse, U.S. DOT Federal Highway Administration; Office of Safety Programs; 2016, http://www.cmfclearinghouse.org/
- Massachusetts Traffic Safety Toolbox, Massachusetts Highway Department, <u>www.mhd.state.ma.us/safetytoolbox</u>.
- Road Safety Audits, A Synthesis of Highway Practice. NCHRP Synthesis 336. Transportation Research Board, National Cooperative Highway Research Program, 2004.
- *Road Safety Audits*. Institute of Transportation Engineers and U.S. Department of Transportation, Federal Highway Administration, <u>www.roadwaysafetyaudits.org</u>.
- FHWA Road Safety Audit Guidelines. U.S. Department of Transportation, Federal Highway Administration, 2006.
- Road Safety Audit, 2<sup>nd</sup> edition. Austroads, 2000.
- Road Safety Audits. ITE Technical Council Committee 4S-7. Institute of Transportation Engineers, February 1995.



## Medway Planning and Economic Development Board Meeting Tuesday, May 10, 2022

# **Construction Reports**

## **Medway Mill**

- April summary report from project engineer Guerriere and Halnon
- Tetra Tech field report #11 dated 4-25-22

### **Evergreen Village**

 April summary report from project engineer Ron Tiberi

### **Rocky's Hardware**

- Tetra Tech field report #1 dated 4-18-22
- Tetra Tech field report #2 dated 4-25-22

## William Wallace Village

 April monthly report from project engineer Dan Merrikin

## **Cutler Place**

 April summary report from project engineer Ron Tiberi



Milford Office 333 West Street, P. O. Box 235 Milford, MA 01757-0235 (508) 473-6630/Fax (508) 473-8243

Franklin Office 55 West Central Street Franklin, MA 02038-2101 (508) 528-3221/Fax (508) 528-7921

Whitinsville Office 1029 Providence Road Whitinsville, MA 01588-2121 (508) 234-6834/Fax (508) 234-6723

www.gandhengineering.com

Est. 1972

April 27, 2022

F3519

Town of Medway Planning and Economic Development Board 155 Village Street Medway, MA. 02053 Attn: Susan Affleck-Childs

#### RE: Medway Mills - Monthly Inspection Report: 165 Main Street, Medway, MA 02053.

On behalf of the Applicant, 165 Main Street Realty Trust, and in accordance with Major Site Plan Decision dated June 22, 2021 General Conditions of Approval Paragraph (G)(4), Guerriere & Halnon, Inc. conducted the monthly site inspection on April 27, 2022 and observed the following construction activities:

- Construction of the paver walkway;
- Erosion control measures have been installed on the east side of the project site and appear to be in satisfactory condition;
- Construction of the swale on east side of the project has begun;
- Construction of the infiltration basin has resumed, and
- Work on restoration areas A & B has begun.

Should you have any questions or require additional information, please contact our office.

Sincerely, Guerriere & Halnon, Inc.

applace

Amanda Cavaliere Franklin Office Manager



cc: Mr. John Greene, Applicant

Tetra Tech 100 Nickerson Road, Suite 200 Marlborough, MA 01752	FIELD REPORT		
Project	Dat	te	Report No.
Medway Mills	04/	/25/2022	11
Location	Proj	oject No.	Sheet 1 of
165 Main Street, Medway, MA	143	3-21583-20011	2
Contractor	Wea	eather	Temperature
Peter McCarthy (Site Contractor)	A.N	M. CLEAR	а.м. 50°F
John Greene (Developer)	P.M	M. CLEAR	р.м. 50°F
FIELD OBSERVATIONS			

On Monday, April 25, 2022, Bradley M. Picard, EIT from Tetra Tech (TT) visited the project location to inspect the current condition of the site and monitor construction progress. The following report outlines observations made during the site visit.

#### 1. OBSERVATIONS

- A. Site Condition/Erosion Controls: Dry ground surface that is firm throughout. Sit fence barrier (SFB) and compost filter socks have been installed around the perimeter of the site in accordance with approved site plans and appear to be in good condition. Silt sacks have been installed at catch basins adjacent to the driveway apron. Stockpiles of excavated material are present adjacent to the east side of parking lot.
- B. Contractor is installing stone gabion weir at the proposed infiltration basin during the inspection. Contractor is using a rotary laser level to verify top of weir elevation and basin bottom grades. 6" PVC pipe for the proposed slow drain is installed at the bottom of the stone gabion weir as indicated on the Plans.
- C. Excavation has been performed for the proposed swale at the southeast corner of the property adjacent to the existing parking lot. Contractor has exposed and damaged an existing roof drain that is within the limit of the drainage swale, roof drain runs perpendicular to the swale and discharged to the adjacent wetlands. TT directed the owner to cap or plug the downstream section of the pipe (riverside of swale) to ensure material does not enter the pipe and travel into the wetlands during rain events. Contractor begins plugging pipe upon departure from the site, roof drain on building side of the swale is modified to discharge to the swale. Developer in the process of finalizing a field change for the swale modifications with the Medway Conservation Commission.

CONTRACTOR'S FORCE AND EQUIPMENT			WORK DON	WORK DONE BY OTHERS		
Sup't		Bulldozer		Asphalt Paver	Dept. or Company	Description of Work
Foreman		Backhoe		Asphalt Reclaimer		
Laborers		Loader		Vib. Roller		
Drivers		Rubber Tire Backhoe/Loader		Static Roller		
Oper. Engr.	2	Skid Steer		Vib. Walk Comp.		
Carpenters		Hoeram		Compressor		
Masons		Excavator	2	Jack Hammer		
Iron Workers		Grader		Power Saw		
Electricians		Crane		Conc. Vib.		
Flagpersons		Scraper		Tack Truck		
Surveyors		Conc. Mixer		Man Lift		
Roofers		Conc. Truck		Skidder	OFFICIAL VIS	SITORS TO JOB
Mechanical/HVAC		Conc. Pump Truck		Compact Track Loader		
		Pickup Truck	1			
		Tri-Axle Dump Truck				
		Trailer Dump Truck				
Police Details:				RESIDENT REPRE	RESIDENT REPRESENTATIVE FORCE	
Contractor's Hours of Work: 7:00 A.M. to 6:00 P.M.			Name	Time on-site		
					Bradley Picard, EIT	11:45 A.M. – 12:30 P.M.
NOTE: Please use reverse	side	for remarks and sketches				

Project	Date	Report No.
Medway Mills	04/25/2022	11
Location	Project No.	Sheet 2 of
165 Main Street, Medway, MA	143-21583-20011	2

#### FIELD OBSERVATIONS CONTINUED

#### 2. SCHEDULE

- A. Contractor to continue gabion forebay install for infiltration basin.
- B. TT will maintain communication with the developer and will inspect the site on an as-need basis.

#### 3. NEW ACTION ITEMS

A. N/A

#### 4. PREVIOUS OPEN ACTION ITEMS

A. N/A

#### 5. MATERIALS DELIVERED TO SITE SINCE LAST INSPECTION

A. Sand for infiltration basin.

# **Progress Report**

## **Project Details**

Project name	Evergreen	
Location	22 Evergreen Road	Medway MA
Owner	Broken Tree LLC	Medway MA
Reporting period	3-31-2022 thru 4-30-2022	
Report compiled by	Ron Tiberi P.E.	9 Mass Ave Natick MA
Date inspected/ submitted	4/27/22	

### Summary

Erosion controls installed & maintained. Road set to binder level & site rough graded to subgrade. Phase 2 Structure framed & enclosed. Drainage system 90% installed. Limited Site Activity.

### Activities

#### **Activity 1 Construction Controls**

Status	Achieved
Objective	Layout & Construction controls set and provided by Cheney Engineering
Activity dates	
Progress	Asbuilt information surveyed
Comments	Sanitary Facilities on-site, No construction trailers

#### **Activity 2 Erosion Controls**

Status	Achieved
Objective	Erosion controls implemented and approved on site Temporary sedimentation basins installed & maintained
Activity dates	During Month
Progress	Completed & maintained
Comments	

#### Activity 3 Access Road

Status	In progress
Objective	Paved to binder coarse
Activity dates	
Progress	Partially completed 85%,
Comments	3 Infiltration system installed

#### Activity 4 Water & Sewer Utilities

Status	Achieved
Objective	Sewer line and water lines connected to units, Water lines charged. GAS Services Installed; Underground installed
Activity dates	
Progress	Completed
Comments	

#### Activity 5 Building

Status	In Progress
Objective	Building 2 enclosed, water & sewer connections completed
Activity dates	Current
Progress	
Comments	

#### Activity 6 Site Features

Status	In Progress
Objective	Segmented retaining wall being constructed behind building 1 approved and backfilled
Activity dates	
Progress	100%
Comments	

### Photographs



Building 2 Enclosed

#2



#1

Tetra Tech 100 Nickerson Road, Suite 200 Marlborough, MA 01752	FIELD REPORT		
Project		Date	Report No.
Rocky's Hardware Garden Center		4/18/2022	1
Location		Project No.	Sheet 1 of
98 Main Street, Medway, MA		143-21583-21013	2
Contractor/Owner		Weather	Temperature
Rocky's Ace Hardware, LLC (Applicant)		A.M. CLEAR	А.М. 55°F
Rothwell Landscape, Inc. (Contractor)		P.M.	P.M.
FIFI D OBSERVATIONS			

On Monday April 18, 2022, Bradley M. Picard, EIT from Tetra Tech (TT) visited the project location to monitor construction progress. The following report outlines observations made during the site visit.

#### 1. OBSERVATIONS

A. TT on site to inspect the construction of the proposed concrete pad located on the east side of the project's limit of work. Upon arrival, concrete has been poured within the forms at the proposed location indicated on the endorsed plans. Concrete was also placed for ramps on the southeast corner of the building at the existing sidewalk, and at the side door that will provide access to the proposed garden center. Contractor is using 4,000 psi concrete with 3/4" aggregate acquired from Tresca Brothers in Millis, MA. Contractor's crew places a brush finish on the concrete pad and ramps before placing cones and barriers around wet concrete. Contractor informed TT that the Town's building inspector visited the site on Thursday (4/14) to inspect and approve the subbase material and concrete reinforcement (6" x 6" wire mesh).

CONTRACTOR'S FORCE AND EQUIPMENT			WORK DON	WORK DONE BY OTHERS			
Sup't		Bulldozer		Asphalt Paver	Dept. or Company	Description of Work	
Foreman	1	Backhoe		Asphalt Reclaimer			
Laborers	2	Loader		Vib. Roller			
Drivers		Rubber Tire Backhoe/Loader		Static Roller			
Oper. Engr.		Skid Steer		Vib. Walk Comp.			
Carpenters		Hoeram		Compressor			
Masons		Excavator		Jack Hammer			
Iron Workers		Grader		Power Saw			
Electricians		Crane		Conc. Vib.			
Flagpersons		Scraper		Tack Truck			
Surveyors		Conc. Mixer		Man Lift			
Roofers		Conc. Truck		Skidder	OFFICIAL VI	OFFICIAL VISITORS TO JOB	
Mechanical/HVAC		Conc. Pump Truck		Compact Track Loader			
		Pickup Truck	1				
		Tri-Axle Dump Truck					
		Trailer Dump Truck					
Police Details:				RESIDENT REPR	RESIDENT REPRESENTATIVE FORCE		
Contractor's Hours of Work: 7:00 A.M. to 6:00 P.M.			Name	Time on-site			
					Bradley M. Picard, EIT	10:00 A.M. – 10:30 A.M.	
NOTE: Please use reverse	side	for remarks and sketches					

Project	Date	Report No.	
Rocky's Hardware Garden Center	4/18/2022	1	
Location	Project No.	Sheet 2 of	
98 Main Street, Medway, MA	143-21583-21013	2	

#### FIELD OBSERVATIONS CONTINUED

#### 2. <u>SCHEDULE</u>

A. TT will maintain communication with the developer and will inspect the site on an as-needed basis.

#### 3. NEW ACTION ITEMS

A. N/A

#### 4. PREVIOUS OPEN ACTION ITEMS

A. N/A

#### 5. MATERIALS DELIVERED TO SITE SINCE LAST INSPECTION

A. N/A

Tetra Tech 100 Nickerson Road, Suite 200 Marbaraugh MA 01752	FIELD REPORT		
Project		Date	Report No
Rocky's Hardware Garden Center		4/25/2022	2
Location		Project No.	Sheet 1 of
98 Main Street, Medway, MA		143-21583-21013	2
Contractor/Owner		Weather	Temperature
Rocky's Ace Hardware, LLC (Applicant)		A.M. CLEAR	А.М. 50°F
Rothwell Landscape, Inc. (Contractor)		P.M.	P.M.
FIELD OBSERVATIONS			

On Monday April 25, 2022, Bradley M. Picard, EIT from Tetra Tech (TT) visited the project location to monitor construction progress. The following report outlines observations made during the site visit.

#### 1. OBSERVATIONS

A. TT on site to inspect the progress for chain link fence installation. Contractor not on-site during inspection. Contractor has placed the propane tank and appurtenant equipment on the concrete slab as shown on the Plans. Contractor has installed 6' tall, black vinyl-coated chain link fence around the perimeter of the proposed garden center and the perimeter of the propane tank. Entrance gate to the garden center, as well as perimeter fencing for the proposed dumpster enclosure, has yet to be installed. TT will continue to coordinate with the contractor and inspect the site on an as-needed basis.

CON	TRACTOR'S FORCE AND	EQUIPMENT	WORK DON	E BY OTHERS	
Sup't	Bulldozer	Asphalt Paver	Dept. or Company	Description of Work	
Foreman	Backhoe	Asphalt Reclaimer			
Laborers	Loader	Vib. Roller			
Drivers	Rubber Tire Backhoe/Loader	Static Roller			
Oper. Engr.	Skid Steer	Vib. Walk Comp.			
Carpenters	Hoeram	Compressor			
Masons	Excavator	Jack Hammer			
Iron Workers	Grader	Power Saw			
Electricians	Crane	Conc. Vib.			
Flagpersons	Scraper	Tack Truck			
Surveyors	Conc. Mixer	Man Lift			
Roofers	Conc. Truck	Skidder	OFFICIAL VI	OFFICIAL VISITORS TO JOB	
Mechanical/HVAC	Conc. Pump Truck	Compact Track Loader			
	Pickup Truck				
	Tri-Axle Dump Truck				
	Trailer Dump Truck				
Police Details:		RESIDENT REPRI	SENTATIVE FORCE		
Contractor's Hours of Work: 7:00 A.M. to 6:00 P.M.		Name	Time on-site		
			Bradley M. Picard, EIT	11:15 A.M. – 11:45 A.M.	
NOTE: Please use reverse	side for remarks and sketches				

Project	Date	Report No.	
Rocky's Hardware Garden Center	4/25/2022	2	
Location	Project No.	Sheet 2 of	
98 Main Street, Medway, MA	143-21583-21013	2	

#### FIELD OBSERVATIONS CONTINUED

#### 2. <u>SCHEDULE</u>

A. TT will maintain communication with the contractor and will inspect the site on an as-need basis.

#### 3. <u>NEW ACTION ITEMS</u>

A. N/A

#### 4. PREVIOUS OPEN ACTION ITEMS

A. N/A

#### 5. MATERIALS DELIVERED TO SITE SINCE LAST INSPECTION

P:\21583\143-21583-21013 (PEDB ROCKYS HARDWARE)\Construction\FieldObservation\FieldReports\Rocky's Hardware\_Field Report No. 02\_2022-04-25.docx

A. Chain link fence materials.



dan@legacy-ce.com 508-376-8883(o) 508-868-8353(c) 730 Main Street Suite 2C Millis, MA 02054

#### **CONSTRUCTION INSPECTION REPORT**

Date of Inspection: 5/5/2022 Time On-Site: 10:15 am Weather: 60F, Sunny

Location: William Wallace Village, 274 Village Street, Medway, MA

Inspection By: Daniel J. Merrikin, P.E.

**Date of Report:** 5/7/2022

**Observation Requested by:** DTRT LLC

Medway Planning & Economic Development Board

#### **Activity Summary:**

At the time of inspection work on the following structures was ongoing:

- Unit 2/4 is substantially complete and occupied.
- > Unit 18 (old house) is substantially complete and occupied.
- Aside from garage doors, unit 20/22/24 is weather tight and interior construction continues.
- > Aside from garage doors, unit 6/8 is weather tight and interior construction continues.
- > Unit 10/12 is framed, roofed and ready for door, window and siding installation.
- > Unit 14/16 building foundations is partially excavated.
- > The mail kiosk is substantially complete.

Note the following site construction activities since our last inspection.

Site work on the site is still minimal as the primary focus is currently building construction. Utility service installation to buildings under construction but otherwise, there has been little site work since our last inspection. Site Inspection Report May 7, 2022 Page 2 of 4



dan@legacy-ce.com 508-376-8883(o) 508-868-8353(c) 730 Main Street Suite 2C Millis, MA 02054

#### **Erosion Controls:**

Note the following:

- > Perimeter erosion controls were inspected and found to be in adequate condition.
- Temporary sediment basins appear to be functioning well and newly installed stormwater systems are protected with erosion controls. The partially excavated foundation for unit 14/16 is acting as a temporary sediment basin. Once the foundation is installed, the area will be re-evaluated to determine if additional erosion controls are needed.

#### **Recommended Improvements:**

1. None.

Site Inspection Report May 7, 2022 Page 3 of 4



dan@legacy-ce.com 508-376-8883(o) 508-868-8353(c) 730 Main Street Suite 2C Millis, MA 02054





Site Inspection Report May 7, 2022 Page 4 of 4



dan@legacy-ce.com 508-376-8883(o) 508-868-8353(c) 730 Main Street Suite 2C Millis, MA 02054





# **Progress Report**

## **Project Details**

Project name	Cutler Place	
Location	6 Cutler Street	Medway MA
Owner	Cutler Place LLC	Medway MA
Reporting period	3-31-2022 thru 4-30-2022	
Report compiled by	Ron Tiberi P.E.	9 Mass Ave Natick MA
Date inspected/ submitted	4/27/22	

### Summary

Erosion controls partially installed & maintained. Limited Site Activity.

### Activities

#### **Activity 1 Construction Controls**

Status	Achieved
Objective	
Activity dates	
Progress	
Comments	Sanitary Facilities on-site, No construction trailers

#### Activity 2 Erosion Controls

Status	Achieved
Objective	Erosion controls partially implemented
Activity dates	During Month
Progress	Completed & maintained
Comments	

#### Activity 3 Water & Sewer Utilities

	·
Status	
Objective	
Activity dates	
Progress	
Comments	

#### Activity 4 Parking Area

Status	
Objective	
Activity dates	
Progress	
Comments	

#### Activity 5 Building

Status	Selective demolition
Objective	
Activity dates	Thru Month
Progress	
Comments	

#### Activity 6 Site Features

Status	
Objective	
Activity dates	
Progress	
Comments	



Building Sanitary Facilities & Erosion Control

#2





## Medway Planning and Economic Development Board Meeting Tuesday, May 10, 2022

# **ZBA** Petition

- Application from Shaw's for an outdoor display special permit. This will be considered at the ZBA's May 18<sup>th</sup> meeting.
- I will have some notes for you Tuesday night of possible items to include in any comments you might offer the ZBA.



### TOWN OF MEDWAY

ZONING BOARD OF APPEALS

155 Village Street Medway MA 02053 Phone: 508-321-4915 |zoning@townofmedway.org www.townofmedway.org/zoning-board-appeal

#### NOTE: THE APPLICATION WILL NOT BE CONSIDERED "COMPLETE" UNLESS ALL NECESSARY DOCUMENTS, FEES, & WAIVER REQUESTS ARE SUBMITTED. A GENERAL APPLICATION FORM MUST BE COMPLETED FOR ALL APPLICATIONS.

#### TO BE COMPLETED BY THE APPLICANT

Applicant/Petitioner(s):	Application Request(s):	
Shaw's Supermarkets Inc.		
Property Owner(s):	Anneal	[]
Charter Medway I, LLC	Appear	
	Special Permit	~
site Address(es): 65 Main Street, Medway, MA 02053	Variance	
	Determination/Finding	
	Extension	
	Modification	
Parcel ID(s): #41 parcel 023	Comprehensive Permit	
The second s		
Zoning District(s): CB		
Registry of Deeds Book & Page No. and Date or Land C	ourt Certificate No. and Date of Current Tit	le:

TO BE COMPLETED BY STAFF: Check No.: Date of Complete Submittal: Comments:

#### APPLICANT/PETITIONER INFORMATION

The owner(s) of the land must be included as an applicant, even if not the proponent. Persons or entities other than the owner may also serve as coapplicants in addition to the owner(s), however, in each instance, such person shall provide sufficient written evidence of authority to act on behalf of the owner(s). For legal entities such as corporations, LLCs, etc., list the type and legal status of ownership, the name of the trustees/officer members, their affiliation, and contact information. Please provide attachment for information if necessary.

Applicant/Petitioner(s):	Phone:				
Shaw's Supermarkets Inc.	508-313-3604				
	Email: amy.burke@albertsons.com				
Address:					
750 W. Center Street, W. Bridgewater, MA					
Attorney/Engineer/Representative(s): Andrea McCarthy	Phone: 508-254-2366				
	Email: andreamccarthylaw@gmail.com				
Address:					
P.O. Box 541, Falmouth, MA 02536					
Owner(s): Charter Medway I, LLC	Phone: 203-689-7000				
	Email: psb@chartweb.com				
Mailing Address:					
309 Greenwich Avenue. Greenwich. CT 06830					

Please list name and address of other parties with financial interest in this property (use attachment if necessary): n/a

Please disclose any relationship, past or present, interested parties may have with members of the ZBA: n/a

I hereby certify that the information on this application and plans submitted herewith are correct, and that the application complies with all applicable provisions of Statutes, Regulations, and Bylaws to the best of my knowledge, and that all testimony to be given by me during the Zoning Board of Appeals public hearing associated with this application are true to the best of my knowledge and belief.

e-of Applicant/Petitioner or Representative

24.55-22 Date

<u>U</u> <u>25</u> <u>27</u> Date

Date:

Signature Property Owner (if different than Applicant/Petitioner)

APPLICATION INFORMATION

		YES NO
Applicable Section(s) of the Zoning Bylaw:	Requesting Waivers?	
Bylaw Section 3.4.C	Does the proposed use conform to the current Zoning Bylaw?	$\checkmark$
Present Use of Property: Retail Shopping Center	Has the applicant applied for and/or been refused a building permit?	
	Is the property or are the buildings/ structures pre-existing nonconforming?	
Proposed Use of Property: same, special permit for outdoor display	Is the proposal subject to approval by the BOH or BOS?	
	Is the proposal subject to approval by the Conservation Commission?	
Date Lot was created:	Is the property located in the Floodplain District?	
Date Building was erected:	Is the property located in the Groundwater Protection District?	
Does the property meet the intent of the Design Review Guidelines?	Is the property located in a designated Historic District or is it designated as a Historic Landmark?	
yes		

**Describe Application Request:** 

Shaw's Supermarkets, Inc. ("Shaw's") submits this application for a special permit to add an outdoor display area adjacent to leased space on the property known as 65 Main Street (the Property ) located in the Commercial Business ( CB ) zoning district.

The Property has been used as a retail shopping center for many years and continues to be used for that purpose. Shaw s is leasing the easternmost commercial building on the Property for use as a grocery store. As is customary for grocery stores, Shaw s seeks to add an outdoor display area. This area will be adjacent to the western end of the building on the Property as shown on the Site Plan. Shaw s seeks this special permit under Bylaw Section 3.4 for use of that area as an outdoor display as defined in Bylaw Section 2. Shaw s proposes up to 1,200 square feet of outdoor display area. Because there is no change to the building, the only question for the Board pertains to the use of this area of the Property that is now (and will remain) a paved lot and sidewalk. An outdoor display is allowed in the CB district as an accessory use to the grocery store by special permit provided the requirements of Bylaw Section 3.4.C are met. As set out in the special permit application each requirement in that section is met here, and the Board can find that the adverse effects of the proposed use will not outweigh its beneficial impacts to the town or the neighborhood, in view of the particular characteristics of the site, and of the proposal in relation to that site. Bylaw Section 3.4.C.

#### FILL IN THE APPLICABLE DATA BELOW

Required Data	Bylaw Requirement	Existing	Proposed
A. Use			
B. Dwelling Units			
C. Lot Size			
D. Lot Frontage			
E. Front Setback			
F. Side Setback			
G. Side Setback			
H. Rear Setback			
I. Lot Coverage			
J. Height			
K. Parking Spaces			
L. Other			

FOR TOWN HALL USE ONLY

To be filled out by the Building Commissioner:

Date Reviewed

Medway Building Commissioner

Comments:

After completing this form, please submit an electronic copy to <u>zoning@townofmedway.org</u> and 4 paper copies to the Community & Economic Development Department.



### TOWN OF MEDWAY ZONING BOARD OF APPEALS

155 Village Street Medway MA 02053 Phone: 508-321-4915 | zoning@townofmedway.org www.townofmedway.org/zoning-board-appeal

#### NOTE: THE APPLICATION WILL NOT BE CONSIDERED "COMPLETE" UNLESS ALL NECESSARY DOCUMENTS, FEES, & WAIVER REQUESTS ARE SUBMITTED. A GENERAL APPLICATION FORM MUST BE COMPLETED FOR ALL APPLICATIONS.

#### TO BE COMPLETED BY THE APPLICANT

Please provide evidence regarding how the Special Permit Decision Criteria, outlined below, is met. Please write "N/A" if you believe any of the Criteria is Not Applicable. Provide attachments if necessary.

#### 1. The proposed site is an appropriate location for the proposed use:

The Property has been used as a retail store location for decades. The location of an outdoor display adjacent to the western end of the building will allow for the existing pedestrian and vehicular traffic circulation to be unimpeded. The sidewalk is twelve feet and the proposed outdoor display is up against the building in a no traffic area, and would not impede pedestrian traffic as it would only take up six feet or less.

#### 2. Adequate and appropriate facilities will be provided for the operation of the proposed use:

The grocery store will have staff who move items to and from this outdoor display area, which is for merchandising purposes. The underutilized parking spaces on the western end of the building can be used for temporary loading of any larger items, thus avoiding any hazards that might be created by loading and unloading in the fire lane that runs in front of the retail building.

### 3. The proposed use as developed will not create a hazard to abutters, vehicles, pedestrians, or the environment:

This use will not create a hazard to abutters, vehicles, pedestrians or the environment. The area is a paved parking lot and concrete sidewalk. There will be no impact on abutters. The existing retail shopping center is located on Main Street with other commercial uses and ample parking. The property is commercial in nature and features extensive parking lots and sidewalks. The display area will not have separate hours from those of the retail operation and the merchandise will be securely stored after hours. In order to comply with fire code requirements, the lane in front of the retail storefronts must be kept clear of any vehicles and objects. The outdoor display would not impede fire trucks from safely and easily circulating the building, if necessary.

#### 4. The proposed use will not cause undue traffic congestion or conflicts in the immediate area:

As noted above, the display would be on the sidewalk, traffic circulation should be unaffected. The goal of placing a display area in this location is to keep the main channel for vehicular traffic that runs along the front of the retail buildings open and given the size of the sidewalk, pedestrian traffic will not be impeded.

# 5. The proposed use will not be detrimental to the adjoining properties due to lighting, flooding, odors, dust, noise, vibration, refuse materials, or other undesirable visual, site, or operational attributes of the proposed use:

The proposed use will not change the lighting plan for the Property. There will be no change to the pervious surface area, and so flooding will be unaffected. There will be no notable increase in odors, dust, noise, vibration, or refuse associated with the use of this display area. An outdoor retail display is visually consistent with the mix of retail uses on site. There will not be any detriment to the site that arises from this use. The display area will at all times be part of the grocery store operation and will not have a meaningfully different impact than the use of the Property as a grocery store.

### 6. The proposed use as developed will not adversely affect the surrounding neighborhood or significantly alter the character of the zoning district:

The proposed use as an outdoor display area is customary for grocery store retail uses and is consistent with the retail use of the Property. The impact on the neighborhood in terms of traffic will not be different than that of the existing retail use of the Property. There are no other neighborhood impacts that will arise from this use. The outdoor display will not significantly alter the character of the CB zoning district.

#### 7. The proposed use is in harmony with the general purpose and intent of this Zoning Bylaw:

The zoning bylaw contemplates commercial and business activity in the CB zoning district. The definition of " outdoor display " contemplates that the display of materials may be allowed as an accessory use provided the display is not on " any parking, delivery or loading areas, fire lanes, drive aisles, or sidewalks where less than 6 feet of sidewalk width remains for pedestrian access." The focus appears to be on preventing any negative impacts to pedestrian and vehicular safety, and not on what will be displayed. However, an outdoor display of goods sold by a grocery store is typical and customary. The location proposed will avoid the creation of hazards. The use is harmonious with the general purpose and intent of the Zoning Bylaw.

#### 8. The proposed use is consistent with the goals of the Medway Master Plan:

The display area will allow further use of this commercial section of Town without any detriment. Fully utilizing this commercial area on Main Street is consistent with the Master Plan goals of economic development in existing commercial areas. Shaw 's is a large company based in West Bridgewater, Massachusetts with locations in New Hampshire, Maine, Massachusetts, Rhode Island, and Vermont. Having stable and growing companies like Shaw 's in Medway is consistent with the Master Plan. One of the draws to this particular retail location in Medway is the possibility of having an outdoor display area.

#### 9. The proposed use will not be detrimental to the public good:

The proposed use will not be detrimental to the public good.

For the reasons stated, the proposed use will not be detrimental to the public good. This outdoor display area will not create problems with site circulation, and should provide a benefit to both customers and staff. The display area will feature typical seasonal grocery store items such as plants, produce and other grocery merchandise. Such an outdoor display is a reasonable accessory use to the existing retail use of the Property. For the foregoing reasons, the Board should issue a special permit to Shaw 's for an extension of the retail on the outdoor display area as shown.

Signature of Applicant/Petitioner or Representative

4/22/22

Date







