PLANNING BOARD MEETING

Tuesday, April 25, 2023 at 6:00 PM

Town Hall - 41 South Main Street Randolph, MA 02368

AGENDA

In accordance with Governor Baker's Order Suspending Certain Provisions of the Open Meeting Law, G. L. c. 30A, § 20, relating to the 2020 COVID 19 emergency, the Planning Board shall meet remotely to avoid group congregation.

A. Call to Order - Roll Call

B. Chairperson Comments

C. Approval of Minutes

1. Minutes of 4-11-2023

D. Public Speaks

E. Public Hearings

1. Site Plan and Design Review - 34 Scanlon Drive
2. Subdivision - Mill Street Definitive (continuation)

F. Old/Unfinished Business

1. 19 Highland Avenue - facade samples for commercial area

G. New Business

1. 84 Mazzeo Drive - Access to Circuit Drive

H. Staff Report
***Active Subdivision Review**
***Active Project Review**
***Upcoming Projects**

I. Board Comments

J. Adjournment
Notification of Upcoming Meeting Dates

5/9/23	5/23/23
6/13/23	6/27/23

PLANNING BOARD MEETING

Tuesday, April 11, 2023 at 6:00 PM

Town Hall - 41 South Main Street Randolph, MA 02368

MINUTES

In accordance with Governor Baker's Order Suspending Certain Provisions of the Open Meeting Law, G. L. c. 30A, § 20, relating to the 2020 COVID 19 emergency, the Planning Board shall meet remotely to avoid group congregation.

A. Call to Order - Roll Call

Called to order at 6:02pm
Member Alexopoulos arrived at 6:05pm after roll call

PRESENT
Alexandra Alexopoulos
Tony Plizga
Nereyda Santos-Pina
Peter Taveira
Lou Sahlu

B. Chairperson Comments

None

C. Approval of Minutes

Minutes reviewed and approved as amended.

Motion made by Alexopoulos, Seconded by Santos-Pina to approve the (notes) minutes as amended.
Voting Yea: Alexopoulos, Plizga, Santos-Pina, Taveira, Sahlu

1. Minutes of 3/28/23

   Minutes reviewed and approved as amended.

   Motion made by Alexopoulos, Seconded by Santos-Pina to approve the notes as amended.
   Voting Yea: Alexopoulos, Plizga, Santos-Pina, Taveira, Sahlu

D. Public Speaks

Barbara Coppola of 1 Orchard Street requested information about 13 Clark Street. Chairman Plizga to respond once the hearing is open.

1. Request for In-Law Apartment 13 Clark Street

Planner Tyler read the legal notice into the record and provided an overview of the proposed project.

Abutters notices were mailed out and date stamped by the U.S. Postal Service on March 15, 2023. The Board received from the petitioner an application, application fee and a set of plans reviewed by the Building Commissioner for an in-law apartment and 2-car garage.

Applicants Melanie Kwong and Brandon Dyer were present. Mr. Dyer explained that the addition will add roughly 800 square feet of living space to the left side of the house with an in-law apartment on the top floor and a 2-car garage on the bottom. The in-law will include a kitchen, living room, bedroom, office and full bathroom with a pass-thru to existing dining room. They also plan to rebuild the deck and add a sunroom off the back of the house.

Chairman Plizga asked about proposed driveways. Mr. Dyer outlined the proposal to pave the area next to the garage as shown on the plan and to reclaim an access point from Orchard Street which requires some tree clearing. The applicant proposes a permeable surface such as crushed stone for the portion of the driveway accessed from Orchard Street.

Chairman Plizga opened the hearing to the public.

Barbara Coppola of 1 Orchard Street is concerned with driveway access from Orchard Street and snow removal. Mr. Dyer explained that the access point would be used semi-seasonally for their trailer of motorsports equipment. During the winter months the Clark Street access would be used. Ms. Coppola asked if there would be chain at the end of the driveway. Mr. Dyer replied yes.

Joseph Coppola of 1 Orchard Street is concerned the area is too tight for a trailer to come in and out of. He believes the area between his fence and the neighbors' is only about 10 feet apart and worries his dog may get hurt with cars coming into an area where cars have never been since he has lived there. Chairman Plizga asked Mr. Dyer the width of the area. He said the property width along that access is about 16 feet wide. The driveway would be 10 feet wide, centered.

Chairman Plizga closed the public comment portion of the hearing.

Chairman Plizga gave an overview of the Zoning Ordinance as it relates to in-law apartments noting that the applicant meets the criteria. The Board discussed in detail the access point from Orchard Street described as a “seasonal drive”.

Ms. Alexopoulos inquired about the type of recreational vehicles and the size of the trailer. The applicant did not have dimensions but noted it holds one vehicle. Ms. Alexopoulos noted the average trailer is about 8 feet wide and believes they could

maneuver the trailer without any damage to the neighbors' property.

Chairman Plizga clarified for the Board that the proposed pad next to the garage will be paved, the seasonal drive will be crushed stone.

Mr. Taveira asked if the stone pillar shown in the photo of the Orchard Street access point is on their property? They believe it could be a boundary marker on 1 Orchard Street. Chairman Plizga asked if the pieces of concrete slab visible in the photos would be removed and covered with crushed stone? Mr. Dyer said he could remove them. Chairman Plizga thinks it will look more presentable.

Mr. Taveira asked if an additional electrical box would be run to the house. Mr. Dyer said he would like a separate meter and would discuss that with the builder. Chairman Plizga asked if they had any intention to bring in a utility pole? Mr. Dyer replied no.

Ms. Santos-Pina pointed out there is no annotation on the plan of what materials will be used on the exterior and would like to know if it will match the existing home? She would like the applicant to add notes specifying the existing materials and what is being used to match. Mr. Dyer replied that the Town specifies that it has to look like one unit, so the plan is to match the existing materials.

Chairman Plizga, preparing to make a motion, noted the Board will be addressing the in-law and garage under, drawing dates December 11, 2022 with the only condition being that the new driveway from Orchard Street be a maximum of 10 feet wide and of crushed stone or other suitable permeable material. The only asphalt area to be added will be at the garage entrance as shown on the drawings**.**

Mr. Taveira pointed out that the Town's interactive maps of the land show abutters have outbuildings along the property line. He asked if there will be any additional fencing added especially on the side of the house that is being extended. Planner Tyler said the maps showing structures are outdated and should not be used for accuracy. Applicant has no plans to put up fencing at this time.

Motion made by Chairman Plizga, seconded by Santos-Pina to approve the in-law apartment 13 Clark Street as presented on the drawing package by T. Design, LLC dated 12/11/2022 subject to the condition that the new driveway from Orchard Street be constructed of crushed stone or other permeable material, that a gate be included at the Orchard Street entrance and that the driveway is to be used only during the non-winter season, i.e. it is not going to be plowed. The other conditions that go with the special permit: the proposed use will be in harmony with the general purpose and intent of the zoning ordinance; the specific site is an appropriate location for such use; the specific site has adequate public sewage and water facilities, or suitable soil for on lot sewerage and water system; the proposed used, as developed will not adversely affect the neighborhood; there will not be a nuisance or serious hazard to vehicles or pedestrians presented or caused by the proposed use and the proposed change will not be substantially more detrimental to the neighborhood.

On discussion, a motion was made by Taveira, seconded by Chairman Plizga to amend the main motion and instead of reading *"to not use the impervious driveway during the winter months*", to be read, *to not plow snow on the impervious driveway*

Voted Yea: Plizga, Taveira

Voted Nay: Alexopoulos, Santos-Pina, Sahlu

(2-3-0) FAILED

Vote on the main motion:

Voted Yea: Santos-Pina, Plizga, Sahlu, Alexopoulos

Voted Nay: Taveira

(4-1-0) PASSES

Chairman Plizga read the following:

Any person aggrieved by a decision of the special permit granting authority concerning this application may appeal to the Land Court Department, the Superior Court of Norfolk County, or to the division of Norfolk District Court by bringing in action within 20 days after the decision has been filed in the office of a Town Clerk. Decisions are filed at the Town Clerk's office within 14 days following the vote of the planning board.

Planner Tyler will file the decision with the 14 day appeal period and the applicant will get a copy of that and there will be 20 days for the appeal period.

Motion made by Chairman Plizga, Seconded by Alexopoulos to close the public hearing.
Voting Yea: Alexopoulos, Plizga, Santos-Pina, Taveira, Sahlu

E. Public Hearings

1. Site Plan and Design Review - 34 Scanlon Drive

Chairman Plizga read the hearing notice into the record.

Planner Tyler received a completed application from the property owner for the proposed transportation hub located at 34 Scanlon Drive. Abutters notices were date stamped by the U.S. Postal Service on March 20, 2023, and mailed to abutters within 300 feet of the property. The Board received a set of civil plans that were sent to the Department of Public Works and Fire Department for review. The Planning Board received a letter from the applicant addressed to Chairman Plizga on April 7, 2023 requesting a continuation. Planner Tyler read it into the record.

Motion made by Alexopoulos, Seconded by Sahlu to continue the Public Hearing on April 25 at 6:15 pm.
Voting Yea: Alexopoulos, Plizga, Santos-Pina, Taveira, Sahlu

Chairman Plizga noted in order to continue the Hearing for that date and time Board would need to receive the entire drawing package by the Thursday or Friday before the meeting. Planner Tyler has been working with the applicant's team regarding changes they need to make which includes a letter of map amendment from FEMA and some additional civil plan changes.

F. Old/Unfinished Business

1. Trim Way Subdivision - Performance Guarantee

Planner Tyler gave a brief overview of the Trim Way subdivision noting that the Board cursorily agreed to adopt the subdivision of land under the Subdivision Control Law. One of the requirements of the Subdivision Control Law is that a performance guarantee must be established before the Board can approve plans. Mass General Law provides the methods that are acceptable and the applicant chooses which type they will use. There has been a lot of discussion between the applicant's agent and the Town's attorney as to what qualifies as a suitable performance guarantee. The applicant does not intend to construct the road, so there is no work actually being done to guarantee. The last set of information received by the Town related to proposed language in the decision referencing the performance guarantee is not yet solid enough to protect the Town's interest.

Planner Tyler introduced Mike Khoury, the agent for the applicant. Mr. Khoury summarized the additional language they requested for the performance guarantee.

At Planner Tyler's suggestion, he added a new Item 12 which mirrors the language of the statutes, saying that except where it's expressly stated otherwise in deeds, by such owners acquiring title to lots, the rights and obligations of the owners of the lots abutting Trim Way shall be defined as set forth in Mass General Laws including Chapter 183, Section 58 *Real Estate Abutting a Way* and Mass General Laws 187, Section 5, *Installation of Public Utilities*. In summation, everybody who has property touching this way would have a right of access to it and would own it halfway. Because the road is not going to be constructed in this case, and this effort is in order to allow a land swap of unbuildable parcels between Ms. Stein Sharpe and her neighbor, they wanted to clarify that there is no financial or other obligation as long as Trim Way remains private. He added language to the first condition on page 5 of the language that Planner Tyler drew up: the subdivision plan approved hereunder, and the land swap to be undertaken by the applicant and the owner of 398 North Street do not propose any construction or improvement to the roadways, the utilities, sidewalks or all other elements there on or there of, to the extent any roadway construction, of any degree to Trim Way, proposed now or in the future, the proponent seeking to undertake such roadway construction shall provide security by one of the methods described in the subdivision rules and regulations, and in accordance with Mass General Laws Chapter 41, Section 81U. Mr. Khoury also added the language: it being understood that the Town of note shall have no obligation or liability with regard to improvement, maintenance, or repair of Trim Way or so long as Trim Way remains a private way.

Mike Khoury also added language to Sections 1 & 2 conditions prior to issuance of a Certificate of Completion, Release of Bond, Release of Covenants: the performance guarantees are needed under Mass General Laws Chapter 41, Section 81U that if any

work touching the roadway is proposed or any construction involving the roadway whatever nature and degree, by any owner of lots adjoining Trim Way or other parties, the applicant needs to submit complete as-built plans at time of completion.

In section 2 of *Conditions Prior to Issuance of Certificate of Completion* – that section labeled *Final Release of Performance* – Mr. Khoury wanted to clarify the requirements to be obtained from the Planning Board that a release of any performance guarantees would be necessary in the event to any roadway construction of any degree or nature is undertaken.

Ms. Stein Sharpe commented that since no construction will take place, she finds it hard to imagine how one would construct a performance guarantee – what would it say, what would it guarantee and how do you value it. She is hopeful that the Board will agree to the proposed language that says if in the future, or if any actual construction is to happen they are committed to a performance guarantee of that construction.

Chairman Plizga does not feel comfortable with the agreement if the Town Planner and Town Attorney haven't blessed it. He is hopeful that an agreement will be reached by way of covenant. There was a discussion about the recording of the covenant and decision and how future owners would be impacted by it.

Ms. Alexopoulos asked Planner Tyler if the Town Attorney has reviewed the proposed language. She replied not specifically the covenant form but she has looked at the recommendations and requests by the applicant to see if they comply with the law. She continues to have concerns with the word “proponent” and that the obligation for providing security doesn’t kick in until and unless someone wants to do work on the road which could be anytime in the future. Noting it is hard to see that a residential abutter on the road, or someone other than the applicant would know enough to provide security on the proposed road.

Mr. Khoury thanked Planner Tyler for her creativity and ingenuity during this process.

Ms. Alexopoulos wanted to confirm that once this language is ironed out they will be set to go? Planner Tyler replied yes, the Board has expressed a willingness to approve once the performance guaranteed is ironed out.

Mr. Khoury asked Planner Tyler if she has a form for the covenant for him to follow. She sent the covenant form to him via email during the meeting.

Chairman Plizga noted once they have the covenant and it has been reviewed by the Town’s Attorney and Planner Tyler they will schedule a time to meet with the Board.

Chairman Plizga closed the discussion on Trim Way.

G. New Business

1. 19 Highland Avenue - commercial section facade color

Planner Tyler and Chairman Plizga met with the owner to review possible colors for the facade on the commercial section of the building. Planner Tyler showed a rendering of 19 Highland Avenue that was approved to the Board in July 2020 and

explained that when the hearing took place, it was during Covid and one of the meetings done via remote participation. After the Board approved the plan in concept, the owner provided samples for the façade. Planner Tyler took the samples house to house to each member so that they could make selections. The Board members chose each option for each façade, color and texture. The selections were marked and given back to the property owner. The colors were not recorded as the samples did not have names on them.

During the installation of the siding on the residential sections of the building, the Board discovered that the orientation and product was not what was approved. The samples approved were a hardie plank type product with a texture to them. Instead of that product being installed, the color was matched by the owner and applied over a different product.

The sample that was reviewed and approved for the commercial property was a hardy plank with a stone-faced stippled texture. The commercial product currently installed is that of a flat panel, scored to mimic brick. During the recent site visit, and in follow-up email, the Planner asked the owner to provide the feasibility of installing a type of stone veneer over the existing facade in addition to providing samples of the existing surface painted using 4-6 different colors recommended by her. Planner Tyler showed the Board paint samples on a piece of siding that is currently installed. The owner did not provide a stoneface sample or information on the feasibility of such an installation.

Chairman Plizga feels they should stick with what was originally approved, which is a stone looking veneer or material equivalent to that.

Ms. Santos-Pina discussed with the Board the possibility of stamped concrete as a less expensive option to a full veneer.

Planner Tyler showed the Board a few samples she researched for a stone-face.

Owner, Miraj Ahmed joined the meeting.

Chairman Plizga took a poll of the Board and the consensus was in favor of stone veneer over what is currently installed. Chairman Plizga requested the owner provide the Board with actual vendor samples of proposed products so the Board can make a selection. Once the Board has the samples, they can have a discussion and take a vote.

2. Short Street exterior renovations

Planner Tyler gave the Board some history on the property. The Building Commissioner provided her a single plan page, not a full set, from the property owner asking for a review of the proposed location of the dumpster. The plan also contained notes about refrigeration units being installed. There had been work done at the rear of the property – trenching for a retaining wall that was not reviewed by the Board.

The Planner met with Joe Bouhaya of Keohane Company (owners) on site to review the proposal. She was not satisfied with the proposed location of the dumpster, as there would not be enough room for a truck to turn around without using adjacent property. The owner(s) have no agreement with the abutter to use their property for a turn around. The plan page provided had no detail on the cooler and there was a

notation on the plan about adding a covered porch or roof over a door and ins another door at the rear of the building. The Planner discussed the concerns and lack of information with Mr. Bouhya.

The property owner asked for another meeting on site this time with Denis Keohane of Keohane Company. Chairman Plizga accompanied. He concurred with Planner Tyler's denial and asked for more definitive plans so the Board would have something to look at. When the plan came in there were a series of changes from what was discussed regarding the dumpster location. The Planner provided a copy to the Building Commissioner who also hadn't seen the extent of what the owner was requesting. The Building Commissioner indicated that he will not approve permits for the work as he believes it will require a variance from the Zoning Board of Appeals. The proposed work is right up against the lot line - no set back. The building appears to be over 100 years old which would require Historical Commission review.

The proposed changes were initially only to look at the dumpster location which is located along an 11-foot-wide access and easement. The plan submitted shows additional work to be done including a new retaining wall and fence at the rear of the property. The owner has stated that the trash removal company will back down the access way, open the gate to the enclosure, wheel the dumpster out, pick it up and pull forward. Planner Tyler suggests that most drivers would use the abutting property to turn around. She suggested the owners seek an easement, but they do not believe the abutter would be willing to do that. Planner Tyler asked the owner of an abutting commercial property about any willingness to provide an easement to allow the dumpsters to be located on his property. He declined as it would impede his use of his parking area. Ms. Santos-Pina asked where the dumpster is located currently? Planner Tyler is unsure.

Chris Pelletteri, Superintendent of Public Works was present. He was contacted a while back by the applicant to see if they could make improvements to the sidewalks. Mr. Pelletteri instructed them that any work would need to be ADA compliant, and he would need to see a drawing before they got approval. Chairman Plizga asked if they would need to raise the curbing or not? Mr. Pelletteri said yes, the reveal is probably about 2 inches at best, to get a 6-inch reveal there is work to be done. Chairman Plizga noted that their sketch says nothing about raising the curbing, or materials for a ramp. Chairman Plizga feels what has been presented is an incomplete package for the Board.

Chairman Plizga has concerns that utilities are not shown on the plan. He wonders if the Fire Department will take issue with how close the equipment is to other buildings in such a congested area. Planner Tyler noted that the original plan was for the dumpster pad, so things halted after that. They would need to resubmit and at that point it would go through a more detailed process of having it reviewed by DPW, Engineering, Fire and Building Commissioner.

There was a discussion by the Board about the plans seeming to propose new windows on the front of the building that appear to swing out. Planner Tyler showed a rendering of a request to change their windows from about a year ago. Ms. Santos-Pina explained that the proposed windows are done a lot in restaurant to open the inside out. They are like a bifold window and that is why it shows a 3-foot clearing when the window is open. Chairman Plizga needs window details.

Planner Tyler and Chairman Plizga explained that most of the details on the plans are added changes not discussed at the site visit.

Ms. Alexopoulos asked if the site had been surveyed. Planner Tyler does not believe so, but pointed out there is a property marker at the edge of the easement/access point.

Mr. Sahlu asked if there is enough room for the dumpster truck? Planner Tyler said the owner says that one gets back there now. Chairman Plizga believes that there is room because there are currently dumpsters back there for other properties.

The Board had a lengthy discussion about the dumpster, the access point, proposed windows, drainage, sidewalk improvements and ADA compliance. The Board agrees the applicant needs to submit a full set of plans. Chairman Plizga would like Planner Tyler to get the Building Commissioner's input to see if Zoning Board of Appeals should be involved.

H. Staff Report
***Active Subdivision Review**
***Active Project Review**
***Upcoming Projects**

Allen Street - Contractor made a visit. He has cleaned up the site and secured it. He has been having issues with some unhoused people living in the basement. The contractor indicated there have been difficulties with the owner regarding payment which is why the work hasn't continued, but the property is at least secured.

647 North Main Street - the day care under construction. Planner Tyler sent out a request to the owner asking about Mass DOT and the status of a stop light.

I. Board Comments

J. Adjournment
Notification of Upcoming Meeting Dates

4/25/23
5/9/23
5/23/23
6/13/23
6/27/23

Adjourned at 8:29pm

Motion made by Taveira, Seconded by Sahlu.
Voting Yea: Alexopoulos, Plizga, Santos-Pina, Taveira, Sahlu

34 SCANLON DR

LEGAL NOTICE
Public Hearing

The Randolph Planning Board will conduct a public hearing on Tuesday, April 11, 2023 at 6:00pm on the petition of Scanlon Suburban LLC/451 High Street LLC of 800 Boylston Street, Boston MA 02116 for proposed transportation hub on the parcel located at 34 Scanlon Drive and adjacent parcels (assessor's map 5-A-45.422). This meeting is conducted via ZOOM with remote participation. The link to join the meeting is on the Town of Randolph website. Plans and materials may be viewed in the office of the Town Clerk at 41 South Main Street Randolph during regular business hours.

AD# 8603972
PL 03/24 & 03/31/2023

PLANNING DEPARTMENT

APPLICATION FOR A SPECIAL PERMIT OR SITE PLAN & DESIGN REVIEW

Project Type	○ Tier 1 Review ○ Tier 2 Review ☒ Tier 4 Site Plan/Design Review	○ In-Law ○ Two-Family ○ Special Permit	
Assessor Parcel ID *map-block-parcel*	05-A-45.422	**Norfolk County Registry of Deeds**	*Book/Page or Cert #* 17103, 192
Parcel Address	34 Scanlon Drive		
Current use	Warehouse/ Church		
Zoning District	BRHD	**Size of Parcel**	5.6 +/- Acres
Parcel Attributes	☒ Wetland ☒ Flood Plain ☒ Wetland Resource		
Project Description	See Project Narrative Yankee Bus Headquarters 		

Applicant	Scanlon Suburban LLC/ 451 High Street LLC		
Contact person	Art Campbell		
Applicant Status	☒ Owner ○ Tenant ○ Licensee ○ Buyer ○ Other_____		
Address	800 Boylston St; Boston, MA 02116		
Phone	908-239-4642	**Email**	acampbell@coreinvestmentinc.com

Surveyor	CHA Consulting, Inc.		
Contact person			
Address	141 Longwater Drive; Norwell, MA 02061		
Phone	781-982-7700	**Email**	

Engineer	Samiotes Consultants, Inc		
Contact person	Stephen Garvin, PE		
Address	20 A Street; Framingham, MA 01701		
Phone	508-877-6688	**Email**	sgarvin@samiotes.com

If property owner is not the Applicant, authorization from the owner is required

Property Owner			
Address			
Phone		**Email**	

I hereby certify, under the pains and penalties of perjury, that the information contained in this application is true, accurate and complete to the best of my knowledge and belief. I agree to abide by the Randolph Zoning Ordinances and complete construction of the project in accordance with said rules and any conditions of the Planning Board.

Applicant — Date: 3/13/23

Agent/Representative — Date

FOLEY HOAG LLP

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Ethan A. Severance
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April 7, 2023

Via E-mail

Tony Pizga, Chair
Randolph Planning Board
Town Hall
Randolph, MA

Re: 34 Scanlon Drive Site Plan Application

Dear Chairman Pizaga:

I write this letter on behalf of Scanlon Suburban LLC/451 High Street LLC (Applicant). This letter confirms the Applicant's discussion earlier this week with Planning Director Michelle Tyler, due to a number of unanticipated but required further refinements that we are making to the proposed development plan for 34 Scanlon Drive, I hereby request a continuance of the public hearing on this matter to Tuesday, April 25th at 6:15 pm. Thank you for your consideration in this matter.

Sincerely,

/s/ Ethan Severance
Ethan A. Severance
Associate

To: Town of Randolph Planning Board, Planning Department, Building Department, and Conservation Commission
From: Scanlon Development LLC and 451 High Street LLC
Re: Site Plan & Design Review, Future Yankee Line Corporate Headquarters and Transportation Center
Date: April 20, 2023

Memorandum In Support of Application
For Site Plan & Design Review

Application for Site Plan & Design Review

The applicants, 451 High Street LLC and Scanlon Development LLC, (collectively, the "**Applicants**"), submit this memorandum in support of its application (the "**Application**") for Tier 3 Site Plan & Design Review under Section 200-90 of the Town of Randolph Zoning Ordinance. The Applicants are the owners of those certain parcels of land known as and numbered 451 High Street and 34 Scanlon Drive, Randolph, MA (collectively, the "**Properties**"). The Applicants, or their successors in title, wish to develop the Properties as the corporate maintenance and operations headquarters for A Yankee Line, Inc. ("**Yankee**"), in accordance with the plans and specifications (the "**Plans**") attached to this memorandum.[1] Yankee operates an established and highly respected charter motorcoach company, well known in the Greater Boston Area and throughout the Northeast.

Description of Development Plan

As shown on the attached Plans, the intended development site will be comprised of a single building, which will be a newly constructed maintenance and repair facility of approximately 54,700 square feet with a parking areas and driveways for motorcoaches and staff vehicles at 34 Scanlon Drive. The 451 High Street property will become a landscaped buffer area. Applicant acquired the Properties over the last two (2) years. It is the intent of the Applicants to consolidate 34 Scanlon Drive with 451 High Street.

The Properties are abutted by the following: (i) to the north, Scanlon Drive; (ii) to the south, the Central Rock Gym and the 451 High Street landscape buffer; (iii) to the west, High Street; and (iv) to the east, residential lots. The Properties will be heavily landscaped and screened along the easterly boundary to provide for a substantial buffer area from the rear lot lines of the residential lots.

Description of Proposed Operations

Day-to-day operations of the Yankee Line business will vary as a result of the number and type of charter contracts in effect during any one period of time. The Yankee Randolph Transportation Headquarters will be home to approximately seventy-five (75) coach busses and other vehicles. It is anticipated that approximately fifty to sixty vehicles will be in use on a daily basis. The departure and arrival of vehicles may be staggered based upon their charter groups and special projects.

[1] It should be noted at the outset that Yankee will also be occupying 20 Scanlon Drive as its corporate headquarters. 20 Scanlon Drive is currently an office building, and while it will undergo interior renovations, it is not required to be and is not part of this Application.

The number of Yankee employees (not including motorcoach drivers accessing and leaving the site) who support dispatch/back of house operations, mechanics, and coach bus support will range from approximately twenty (20) to thirty (30) in total on any given day. These employees will arrive in a staggered fashion, generally in the morning between 6-10AM, and depart from 4-8PM. The number of motorcoach drivers accessing the site in total, typically range from approximately fifty (50) to sixty (60) on any given day, and will arrive and depart intermittently, depending on their individual route planning and charter contracts.

As is currently Yankee's practice in its South Boston site, the on-site activities will be carefully monitored to avoid excess light and noise pollution. Idling and backup beeping will be kept to a minimum, headlights will be dimmed, and use of horns will be prohibited on site. The only on-site activities to occur outside of normal business hours will be washing, using a state-of-the-art wash bay system inside the maintenance garage, and fueling of the motorcoaches. The vast majority of maintenance will occur during the daytime hours but may occasionally run into the early evening. The proposed building plan allows for six (6) maintenance bays to allow for plenty of room to bring buses inside for all required maintenance. Yankee typically performs preventive maintenance and light repair work while all heavy engine or transmission work is sent out to heavy repair shops, as needed. Yankee's business model has always dictated maintaining a contemporary model fleet that results in a lack of heavy repair work, with much of the work being performed under warranty.

It is noteworthy that the Building Commissioner, Ronald Lum, who acts as the Town's Zoning Enforcement Officer, under M.G.L. c. 40A, §7, made the determination early in discussions with Core's Development Team, that Yankee's intended use of the site was permitted as of right (with Site Plan & Design Review and Approval). A letter from the Building Department to that effect, dated October 17, 2023, is attached to this memorandum.

Site Current Use and History

The site is currently home to multiple businesses. Included among these businesses are Equipment Direct Sales, New Life Apostolic Church, and Charles Transportation. The main site at 34 Scanlon Drive was previously used as an overflow parking area to accommodate large gatherings for the neighboring event center, formerly known as The Lantana, which has closed its business. The site also includes 451 High Street, a small parcel of vegetated land adjacent to 34 Scanlon Drive which was previously home to a cell tower that has since been relocated. For contextual purposes 20 Scanlon Drive, which will be occupied by Yankee as its corporate headquarters, has been home to Equipment Direct Sales which acts primarily as an HVAC contractor providing new mechanical equipment to properties in and around Boston.

During the pandemic, and prior to the purchase by the Applicants, The Lantana discontinued use of 34 Scanlon Drive due to the lack of in-person event-centric activity. The site became overgrown and dilapidated as a result of the lack of activity, and eventually became known as a dumping ground.

The Applicants have made numerous material improvements to the Properties; the most extensive of which improvements being the partial rehabilitation of the small intermittent stream running along 34 Scanlon Drive where the dumping occurred. The Applicant's team worked with the

Randolph Conservation Commission to identify resource areas and take steps toward conserving these areas. The rehabilitation included disposal of eight (8) full length dumpsters of trash, and thousands of square feet of removal of invasive species and replacement with native species to revitalize the riverbank. Since the clean-up and replanting, which was designed as an initial phase in anticipation of an eventual and more permanent phase two rehabilitation of the riverbank, the site has consistently been maintained and secured.

Yankee Line History and Site Interest

In the late summer of 2022, Yankee approached Core Investments, an affiliate of the Applicants, in hopes of temporarily staging a portion of its fleet at 34 Scanlon Drive while it conducted operations to assist the MBTA during a period of repairs on the Orange Line. In large part due to the logistics savvy, thorough planning, and transparent communications of Yankee with Town representatives, the operation and the use and occupancy of 34 Scanlon Drive by Yankee went smoothly. Yankee worked with the representatives of Randolph, and its agencies, early and often to avoid disruption to the neighbors and the town as a whole. This process is in Yankee's DNA as an operator of motorcoaches for over 40 years.

A Yankee Line, Inc. was incorporated in 1978 with its initial corporate address being in Randolph, at the home of the late Donald Ogden, one the founding partners. Actual operations began in 1980 with a small fleet of three motorcoaches based in the Allston section of Boston. The second partner and current owner of Yankee, Donald Dunham, was then a college student living in Boston while attending the transportation management program at Northeastern University at the time of Yankee's creation.

From there, the company grew slowly but steadily to a point where eventually more space was needed, and in 1985 the company (then 12 motorcoaches) moved to West First Street in South Boston. Over the years, Yankee grew and expanded at its existing West First Street location in South Boston where it remains to this day. Yankee has developed many valued relationships over the years, with much of the growth in its customer base coming from repeat customers and positive word-of-mouth referrals. Yankee Line currently operates from its base in South Boston as well as from smaller satellite locations at Groton, Massachusetts and Carlstadt, New Jersey. Yankee also conducts temporary operations. Such temporary operations are currently found in Colorado and the Washington, D.C. area.

Yankee's adaptive business model has not only allowed it to survive the pandemic, while many motorcoach charter companies did not, but allowed it to thrive and grow into a larger operation. On top of its ability to accommodate more traditional experiences such as middle school field trips and leaf peeping tours, it has become a leader in the field and has worked with Harvard Business School, the Boston Marathon, the MBTA, the Boston Red Sox, Bruins, and Celtics, along with other prestigious and high-profile clientele. The acclaim around Yankee's handling of the "Orange Line Shut Down" and its other success related increase in demand has caused the group to expand beyond its existing corporate transportation headquarters in South Boston.

Today, 45 years after incorporating in Randolph, Yankee Line finds itself in need of more space and a new corporate home in a location that is close to Boston, close to the highway system and in familiar territory. Fitting these needs into a brand-new highly functional, efficient, and aesthetically

pleasing corporate transportation headquarters facility in Randolph is an opportunity for Yankee Line to make a huge step forward in corporate maturity laying a new foundation for many more decades of successful passenger transportation operations, while at the same time going back to its roots in Randolph.

Yankee also prides itself as being a valued corporate citizen in the Greater Boston Area and beyond. Yankee participates regularly in and sponsors local and regional events, and local and regional programs to give back to the community. Examples of this include Bus transportation for the South Boston Special Kids for summer camp and day trips, sponsoring of South Boston Youth Soccer Team, shuttle transportation for South Boston Christmas House Tour for South Boston Catholic Charities LaBoure Center, and annual transportation for Achilles Wounded Ear Veterans coming from Walter Reed Hospital to the Boston and New York Marathons for participation in the wheelchair race. Yankee continues to look forward to being a proud and contributing corporate citizen of the Town of Randolph and the Greater Boston Area.

Yankee Line in Randolph

The proposed Yankee corporate headquarters facility in Randolph will include of a contemporary office building containing administrative and operations programs and a maintenance and bus wash facility. Located along Scanlon Drive, the office building will establish visual and brand presence for Yankee and contribute to the streetscape with its high quality of architectural design.[2] Main entrance of the building is facing Scanlon Drive and is clearly defined with a canopy. Material palette of the office building consists of terracotta panel rainscreen, wood plank rainscreen, architectural grade metal panel and curtainwall. The main façade of the building presents a dynamic and aesthetically sophisticated character towards Scanlon Drive, composed of three (3) overlapping program-based volumes, distinguished from each other by use of various finish materials.

Applicant will conduct maintenance and bus washing in the facility located right behind the office building. The center-of-the-site placement of this automotive maintenance program volume is intended to minimize the visual and sound impact on adjacent streets and neighboring properties. Architectural design of this modern maintenance facility is envisioned as an integral part of the above-described office building volume. The material palette of maintenance and bus washing facility will consist of tilt-up concrete panels and architectural grade metal panels.

The office building is three (3) stories high (45’-0”). The single story (31’-0”) bus maintenance building volume is a good match to the scale and size of existing surrounding buildings which include: Equipment Direct Sales, Inc. (2 stories), the building which formerly operated as The Lantana (1 story), Lombardo’s (1.5 Stories) and the Comfort Inn (4 stories). The proposed building will follow existing patterns in terms of its relationship to the street, open space, and other buildings. There are continuous sidewalks along Scanlon Drive and High Street encouraging pedestrian traffic. Furthermore, thoughtfully

[2] While the office building (to be located at 20 Scanlon Drive) is not part of the Site Plan Review, this information is being added for illustration of compatibility of design.

allocated landscape, lighting, and site design elements will contribute to the quality of surrounding streetscape and integrate the project into its larger neighborhood context.

A site visit was conducted by Barry Hosmer (Landscape Architect) on March 20, 2023, for the purposes of understanding and identifying existing site conditions as well as the characterization of plant communities found on site and adjacent to the site. This understanding helped to inform species decisions used in the landscape design for this project.

Along the easterly and southerly property boundaries there are riparian woodlands, bisected by a stream. The trees appear to be naturally occurring and the dense matrix of trees is indicative of successful reproduction. Species encountered include: red maple, birch, cherry, ash, poplar, oak, and along the southerly boundary, a clump of black willow. In the southwest corner of the site the tree species change somewhat to include white pine, oak, ash, and red maple. This corner of the lot is exhibiting a more upland species composition more consistent with the native forest west of High Street.

As part of the design process, the Applicants intends to mimic some of the tree genus and species to allow the proposed landscape to visually reflect some of the attributes of the surrounding landscape. It is equally important to note that the genus and species choices will need to be able to withstand the temperature conditions of the United States Department of Agriculture Hardiness Zone 6b. The Applicants have also taken into consideration the plantings needing to be urban, drought tolerant, and the appropriate plant for the space, so that planting do not outgrow their location too quickly, require excessive care, and so that they are not invasive to Massachusetts. Many of the plantings are native to Massachusetts and are often cultivars of native species, which have been selected for various growth characteristics appropriate for the site. Cultivars include oak, red maple and cherry for tree species. Shrubs include juniper, chokeberry, bush honeysuckle, and arrowwood. Perennials are butterfly bush, purple coneflower and Catmint. These plant selections were chosen for their aesthetic qualities, while some also contribute food for birds and resources for pollinators.

Conclusion

Yankee and its development team in partnership with the development staff at Core Investments Development LLC (an affiliate of the Applicants), and TGAS/Samiotes Architects and the engineering staff of Vertex have worked tirelessly with the Town Planning, Building, Conservation, Administration, and other departments in Randolph to develop a plan and design which would be fully consistent with Randolph Zoning Ordinance Section 200-94 criteria. As outlined above, our team of architects has considered and addressed each of the criteria under Section 200-94 and designed the plan for execution of Yankee's development and construction in full sympathy and compliance with that criterion.

On behalf of the Applicants, A Yankee Line Inc. and Core Investments Development LLC, we thank the Board and the Town of Randolph for their assistance and guidance in the Site Plan Review & Design Approval process and ask that the Board act favorably upon the application and grant Site Plan & Design Approval.

The Applicants look forward to our hearing before the Board on April 25, 2023.

Respectfully Submitted on Behalf of Applicant
and the Core Development team,

_____
Gary P. Lilienthal, General Counsel
For the Applicant

YANKEE BUS HEADQUARTERS
CIVIL NARRATIVE

Site Utilities:
The proposed site has access to all utility services currently and shall be serviced by underground utilities to the greatest feasible extent. Included with this application is the utility plan (C-401) that depicts the proposed utilities for the project. Electric, telephone, cable television, and gas are proposed to be routed underground and will connect/ be serviced in Scanlon Drive. The building will be serviced by a 2" domestic water and 8" fire protection line that will connect off of the existing water line within Scanlon. Sanitary sewer for the proposed building will exit from the north face of the building and tie into the existing 8" sanitary sewer main located within Scanlon. Two (2) 2,000-gallon oil & sand interceptors are proposed to capture oil from the vehicle bays within the building. That waste will route around the east side of the building and tie into the existing sewer main.

Solid waste disposal will be managed through the use of proposed dumpsters located at the back of the building (south side of the building) and screened through the use of a dumpster enclosure.

Surface Water Drainage:
The proposed construction of the Yankee Bus Headquarters facility will result in a **decrease** in impervious area. The proposed stormwater management system has been designed to mitigate and improve stormwater quality. Per the Town of Randolph by-laws infiltration and recharge is also provided via underground infiltration recharge systems and a rain garden.

The proposed stormwater management system will capture the surface stormwater runoff from the paved surfaces via catch basins and routes it through water quality units prior to infiltrating. Stormwater overflow will tie into the existing culverts that outlet to the surrounding wetlands. The building's roof runoff is routed to a rain garden, stormwater that doesn't infiltrate, overflows to the surrounding wetlands.

The proposed stormwater management system meets the Department of Environmental Protection implemented Stormwater Management Standards and Randolph bylaws. The stormwater calculations and standards met are described in the included Stormwater Management Report (under separate cover).

Soil Erosion and Sediment Control Plan:
The objectives of the Soil Erosion and Sediment Control Plan are to control erosion at its source during construction activities, by applying temporary control structures, minimizing the runoff from areas of disturbance, and de-concentrating and distributing stormwater runoff through natural vegetation before discharging to critical zones such as streams or wetlands. Soil erosion control does not begin with the perimeter sediment trap. It begins at the source of the sediment the disturbed land areas, and extends down to the control structure.

The Soil Erosion and Sediment Control Plan will be enacted in order to protect the resource areas during construction. The erosion control devices will remain in place until all exposed areas have been stabilized with vegetation or impervious surfaces.

The objective of the Soil Erosion & Sediment Control Plan that will be enacted on site is to control the vulnerability of the soil to the erosion process or the capability of moving water to detach soil particles during the construction phase(s).

A. The Contractor shall submit a copy of the SWPPP and accompanying erosion and sediment control plan prior to commencing work.

B. The Contractor shall implement all soil erosion and sediment control devices prior to excavation within the site.

C. The following erosion control principles shall apply to the land grading and construction phases:

- Stripping of vegetation, grading, or other soil disturbance shall be done in a manner which will minimize soil erosion.
- Whenever feasible, natural vegetation shall be retained and protected.
- Extent of area which is exposed and free of vegetation and duration of its exposure shall be kept within practical limits.
- Temporary seeding, mulching, or other suitable stabilization measures shall be used to protect exposed critical areas during prolonged construction or other land disturbance.
- Sediment shall be retained on-site.
- Erosion control devices shall be installed as early as possible in the construction sequence prior to the start of grubbing and earthwork operations and excavation work.

Erosion Control Devices:

1. Straw Wattles

Straw Wattles shall be manufactured from rice straw and be wrapped in a tubular plastic netting. The netting shall have a strand thickness of 0.03 inch, and a knot thickness of 0.055 and a weight of 0.35 ounce per foot (each +/- 10%) and shall be made from 85% high density polyethylene, 14% ethyl vinyl acetate and 1% color for UV inhibition. Straw Wattles shall be 12 inches in diameter (+/- one inch), twenty-five feet long (+/- 0.5 feet) and weigh approximately 35 pounds (+/- 10%).

Wattles shall be installed along the edge of resource areas adjacent to the proposed work. Wattles shall also be placed around the toe of stockpiles and at locations where grading is performed.

<u>Installation and Maintenance</u>

a. Wattles shall be installed as indicated on the drawing, prior to the start of grubbing and earthwork operations.
b. Wattles shall be new and shall be secured in place as shown on the plans.
c. Wattles shall be placed in a row with ends tightly abutting the adjacent wattles. Each wattles shall be securely anchored in place by 2 stakes or re-bars driven through the wattles. The first stake in each wattle shall be angled toward the previously laid wattles to force the wattles together
d. Sedimentation shall be removed from wattles barrier when sediment has accumulated to greater than 6 inches deep. Sediment deposits shall be disposed of in accordance with the SWPPP.
e. Wattles barrier(s) shall be inspected periodically and deteriorated wattles replaced until such time as construction is completed and exposed slopes have been stabilized.
f. Wattles barrier shall remain in place until exposed soils have been stabilized with a vegetative cover.
g. Wattles shall not be removed until approval is given by the planning board.

2. Siltation Fence

Geotextile Fabric shall consist of long-chain synthetic polymers, composed of at least 85% by weight polylefins, polyesters, or polymides. They shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including selvedes. The geotextile fabric shall have the following properties:

Property(ASTM Test Method)	**Unit**	**Typical Values**
Grab Strength (D-4632-86)	lbs	100
Grab Elongation (D-4632-86)	%	30(Max)
Trapezoid Tear Strength (D-4533-85)	lbs	65
Mullen Burst Strength (D-3786-80a)	psi	280
Coeff. of Permeability (D-4491-85)	cm/sec	0.01
Water Flow Rate (D-4491-85)	gal/min/(ft)(ft)	35
Ultraviolet Stability (D-4355-84)	%	90

Support fence posts shall be at least 48 inches high and strong enough to support applied loads. The Contractor shall have the option of using wood or metal posts. Wood posts shall consist of 1 ½" square, kiln dried, hardwood posts. Steel posts of U, T, L, or C shape weighing 1.3 pounds per linear foot may be substituted for wood. Filter fabric shall be attached to wood posts with staples and with 13 gage minimum, galvanized steel wire for steel post application.

Installation and Maintenance

a. Silt Fence shall be installed as indicated on the drawing, prior to the start of grubbing and earthwork operations.
b. The location of silt fence shall be reviewed and approved by the planning board.
c. Accumulation of siltation behind the fence shall be removed once the total depth of silt reaches 6".

Silt fence shall remain in place until directed to be removed by the planning board.

Areas disturbed after removal shall be regraded and seeded.

3. Catch Basin Filters

The filters will be manufactured to fit the opening of the catch basins, and area drains. The filters will have the following features:

- Two dump straps attached at the bottom to facilitate the emptying of the filters.
- The filters will also have lifting loops as an integral part of the system to be used to lift the filters from the basin.
- The filters will have a restraint cord approximately halfway up the sack to keep the sides away from the catch basin walls; this yellow cord shall also be a visual means of indicating when the sack should be emptied.
- Filters shall be removed once paving is completed but not prior to installation of oil hoods. Filters in landscaped areas (or subject to runoff from landscaped areas) shall remain until vegetation is established.

Installation and Maintenance

a. Silt sacks or approved equal shall be installed where shown on the plans.
b. Silt sacks or approved equal shall be installed in all new drain lets as soon as the structure is installed.
c. Once the strap is covered the filter shall be emptied, cleaned and reinstalled.

4. Construction Entrance

The construction entrance shall consist of filter fabric, a layer of clean, crushed stone, ranging from 1-1/2" to 2-1/2" in size, and a top dressing of clean 2" crushed stone. Geotextile Fabric shall consist of long-chain synthetic polymers, composed of at least 85% by weight polylefins, polyesters, or polymides. They shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including selvedes. The geotextile fabric shall have the following properties:

Property (ASTM Test Method)	Unit	Typical Values
Grab Strength (D-4632-86)	lbs	100
Grab Elongation (D-4632-86)	%	30 (Max)
Trapezoid Tear Strength (D-4533-85)	lbs	65
Mullen Burst Strength (D-3786-80a)	psi	280
Coeff. of Permeability (D-4491-85)	cm/sec	0.01
Water Flow Rate (D-4491-85)	gal/min/(ft)(ft)	35
Ultraviolet Stability (D-4355-84)	%	90

5. Dust Control

Water will be applied by sprinkler or water truck as necessary during grading operations in order to minimize sediment transport and maintain acceptable air quality conditions. Repetitive treatments will be done as needed until the grades are paved or seeded.

6. Temporary seed cover

Grass seed for temporary seed cover shall be the previous year's crop. Not more than 0.1% by weight shall be weed seed and not more than 1.75% by weight shall be crop seed. Seed shall be delivered to the site in sealed containers, labeled with name of seed grower and seed formula, in form stated below. Seed shall be dry and free of mold. Seed shall meet the following requirements:

Species Name	% by Weight	Minimum % in Mixture	Minimum % Germination Purity
Chewing Fescue (Festuca Rubra Comutata)	25	85	97
Alta Fescue (Festuca Arundinacea)	30	85	97
Annual Rye Grass (Lolium Multiflorum)	20	90	98
Red Top (Agrostis Alba)	15	90	92
White Clover (Trifolium Repens)	10	90	98

Installation

a. At the Contractor's option, seed may be spread by the hydro-seeding method, utilizing power equipment commonly used for that purpose. Seed and mulch shall be mixed and applied to achieve application quantities specified herein for the conventional seeding method, with mulch applied at the rate of 2700 lb. dry weight of mulch per acre. A mulching machine, acceptable to the Civil Engineer, shall be equipped to eject the thoroughly wet mulch material at a uniform rate to provide the mulch coverage specified.

b. If the results of hydro-seeding are unsatisfactory, the mixture and/or application rates and methods shall be modified to achieve the desired results.

c. After the grass has appeared, all areas and parts of areas which fail to show a uniform stand of grass, for any reason whatsoever, shall be re-seeded repeatedly if necessary, until all areas are covered with a satisfactory growth of grass.

d. If seeding cannot be established due to weather conditions, jute mesh shall be placed on the surface to reduce soil erosion.

7. Jute Mesh

Jute mesh shall be a uniform, open, plain weave cloth of undyed and unbleached single jute yarn. The yarn shall be of a loosely twisted construction and it shall not vary in thickness more than one-half its normal diameter. Jute mesh shall be furnished in rolled strips and shall meet the following requirements:

- Width - 48 inches, plus or minus one inch
- 78 warp - ends per width of cloth (minimum)
- 41 weft - ends per yard (minimum)
- Weight shall average 1.22 pounds per linear yard with a tolerance of plus or minus 5%.
- Mesh shall be secure using U-shaped staples.

ZONING MATRIX 34 SCANLON DRIVE, 451 HIGH STREET

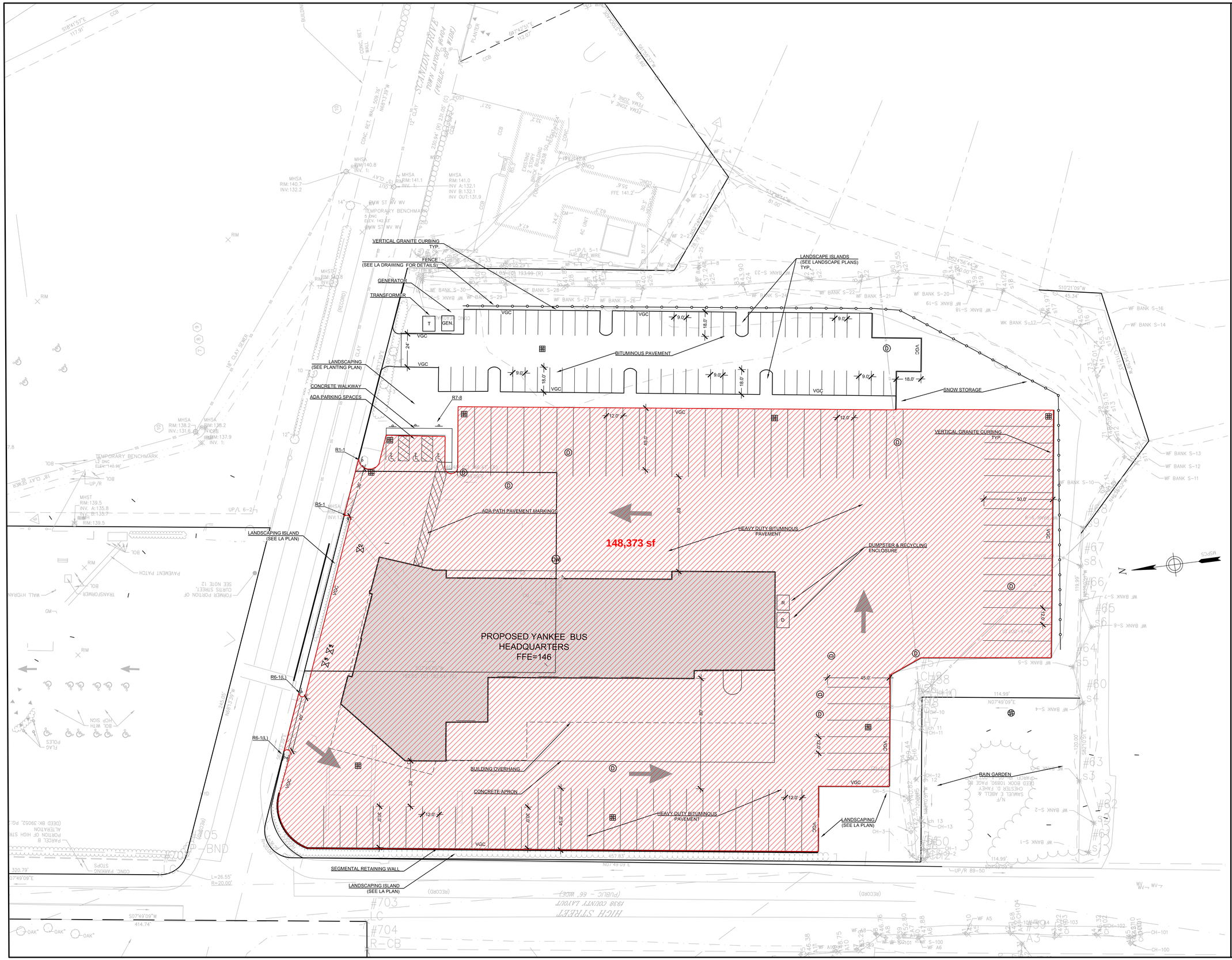
AND ACCOMPANYING PARCELS

The zoning matrix below is for a parcel assemblage as set forth on an Approval Not Required Subdivision Plan prepared by CHA Companies for Core Investments Development LLC entitled "Project Location 451 High Street & 34 Scanlon Drive Randolph, MA 02368". The parcels included are:

- 34 Scanlon Drive (Assessor's Parcel 5-A-45.422)
- Scanlon Drive Parcel 6 (Assessor's Parcel 5-A-6.A)
- Scanlon Drive Parcel 6.2 (Assessor's Parcel 5-A-6.02)
- Scanlon Drive Parcel 6.4 (Assessor's Parcel 5-A-6.04)
- 451 High Street (Assessor's Parcel 5-A-7.404)
- High Street Parcel 7.1 (Assessor's Parcel 5-A-7.01)
- High Street Parcel 1 (Assessor's Parcel 5-A-1.2)
- High Street parcel 2 (Assessor's Parcel 5-A-2.389)

Standard (Blue Hill River Highway District)	Minimum/Maximum	Actual/Proposed
Minimum Lot Area	20,000 sq. ft.	245,308 sq. ft.
Maximum Building Lot Coverage (A)	60%	10.78%
Maximum Impervious Lot Coverage (B)	30%	57.70%
Minimum Green Area Open Space	10%	31.52%
Maximum Lot Coverage (A+B)	90%	60.48%
Maximum Floor Area Ratio	n/a	n/a
Maximum Building Height	4 stories/50 feet	45 feet
Minimum Frontage	130 feet	415.55 feet
Minimum Depth	100 feet	478.50 feet

Minimum Width	100 feet	428 feet
Setback from Street	15 feet	31 feet
Setback from Front Yard	15 feet	31 feet
Setback from Side Yard	10 feet	64 and 217 feet
Setback from Rear Yard	15 feet	108 feet
Buffer Strip to Street	5 feet	15 feet
Buffer Strip to Residential District/Use	10 feet	15 feet
Buffer Strip to Commercial District/Use	2.5 feet	15 feet



TGAS

THE GALANTE ARCHITECTURE STUDIO INC

146 MT AUBURN ST CAMBRIDGE, MA 02138

6 1 7 5 7 6 2 5 0 0

WWW.GALANTEARCHITECTURE.COM

Project Number
2221

Project Title
Yankee Bus Line HQ

34 Scanlon Drive
Randolph, MA 02368

samiotes

Samiotes Consultants Inc.
Civil Engineers + Land Surveyors

20 A Street
Framingham, MA 01701

T 508.877.6688
F 508.877.8349

www.samiotes.com

Drawing Title

Date/Issued For
04.xx.23
Planning Board Submission

NOT FOR CONSTRUCTION

Print 24x36

Scale
As Noted

Drawn By
MEK

Drawing Number

March 14, 2023

Ms. Michelle Tyler
Director of Planning
Town of Randolph
41 South Main Street
Randolph, MA 02368

Re: 34 Scanlon Drive and 451 High Street Consolidation

Dear Ms. Tyler,

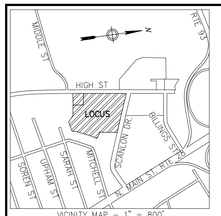
On behalf of our client, Core Investments Development, LLC (Core), the VERTEX Companies (VERTEX) is pleased to submit the attached draft Approval Not Required (ANR) plan for the parcels located at 34 Scanlon Drive and 451 High Street.

The plan depicts the consolidation of the several parcels associated with 34 Scanlon Drive and the 451 High Street parcel and is submitted to show the future intent to combine these parcels at Core's closing.

We appreciate your consideration. Please feel free to contact me with any questions.

Sincerely,
THE VERTEX COMPANIES, INC

Andrew B. Street, PE
Senior Project Manager



VICINITY MAP - 1" = 800'

PURPOSE STATEMENT:

THE PURPOSE OF THIS PLAN IS TO COMBINE LOTS IDENTIFIED AS ASSESSORS PARCEL ID'S: 05-A-45.422, 05-A-006.A, 05-A-006.02, 05-A-006.04, 05-A-001.2, 05-A-002.389, 05-A-007.01, AND 05-A-007.404 TO CREATE ONE CONTIGUOUS PARCEL UNDER COMMON OWNERSHIP WITH A TOTAL LOT AREA OF 245,308± SQUARE FEET OR 5.632± ACRES.

PREVIOUS ZONING BOARD DECISIONS:

1. GRANT OF VARIANCE DATED NOVEMBER 18, 1970 (BK:4711, PG:414)
2. GRANT OF VARIANCE DATED FEBRUARY 07, 1996 (BK:11252, PG:503)
3. GRANT OF VARIANCE DATED NOVEMBER 01, 2000 (BK:14529, PG:371)

GENERAL NOTES:

1. INFORMATION SHOWN HEREON IS THE RESULT OF AN ON-THE-GROUND SURVEY PERFORMED BY CHA CONSULTING, INC. IN JUNE OF 2019, MARCH OF 2021 AND APRIL 2022.
2. ALL DEED REFERENCES ARE TO NORFOLK COUNTY REGISTRY OF DEEDS UNLESS OTHERWISE NOTED.
3. LOCUS OWNERS OF RECORD:

   SCANLON DEVELOPMENT, LLC
   DEED BOOK 39654 PAGE 348
   PARCEL ID: 05-A-45.422 05-A-006.A, 05-A-006.02, 05-A-006.04, 05-A-001.2, 05-A-002.389 & 05-A-007.01

   451 HIGH STREET, LLC
   DEED BOOK 41032 PAGE 26
   PARCEL ID: 05-A-7.404
4. TOPOGRAPHY, CONTOURS AND BENCHMARKS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). TEMPORARY BENCHMARKS, REFERENCED TO THE DATUM ARE INDICATED ON THE SURVEY.

   IN THE EVENT THAT BENCHMARKS (TBM'S), ESTABLISHED FOR THIS PROJECT AND PUBLISHED ON THIS SURVEY ARE DESTROYED, NOT RECOVERABLE OR A DISCREPANCY IS FOUND, THE USER SHOULD NOTIFY THIS FIRM IN WRITING PRIOR TO COMMENCING OR CONTINUING ANY WORK.
5. PLAN REFERENCES:

   LAND COURT PLAN 4921S
   PLAN BOOK 382 PAGE 570
   PLAN BOOK 437 PAGE 117
   PLAN BOOK 541 PAGE 682
   PLAN BOOK 480 PAGE 645
   PLAN BOOK 67 PAGE 3227
   PLAN BOOK 4915 PAGE 153
   PLAN BOOK 4998 PAGE 667
   PLAN BOOK 4709 PAGE 407
   PLAN BOOK 221 PAGE 683
   PLAN BOOK 1773 PAGE END
   PLAN BOOK 4813 PAGE 209
   PLAN BOOK 4899 PAGE 700
   PLAN BOOK 4842 PAGE 385
   PLAN BOOK 4335 PAGE 354
   PLAN BOOK 230 PAGE 164
   PLAN BOOK 204 PAGE 1072-1076
   PLAN BOOK 4707 PAGE 50
   PLAN BOOK 596 PAGE 30
   PLAN BOOK 480 PAGE 645
   PLAN BOOK 5116 PAGE 585
   PLAN BOOK 253 PAGE 91
   PLAN BOOK 694 PAGE 99

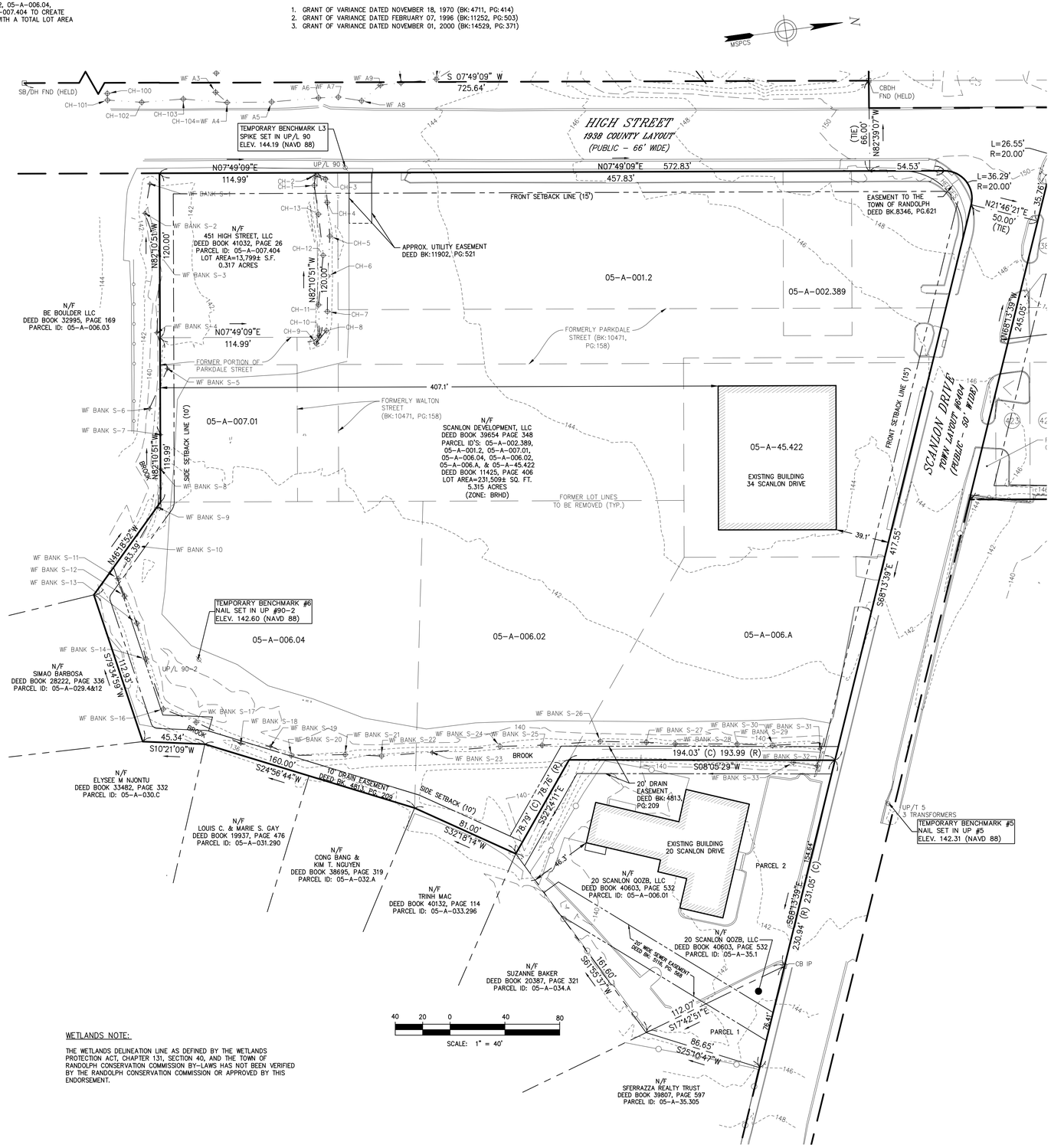
   PLAN ENTITLED "PLAN SHOWING THE ALTERATION OF PORTIONS OF HIGH STREET, RANDOLPH, MA" PREPARED BY CHA CONSULTING, INC. DATED JUNE 15, 2020, SCALE: 1" = 40'.
6. WETLAND/BANK LINES SHOWN HEREON ARE BASED ON A COMBINATION OF FIELD LOCATIONS BY CHA CONSULTING, INC. AND ADDITIONAL LOCATIONS PROVIDED BY PARE CORP.
7. THE LOCUS PARCEL IS LOCATED IN THE TOWN OF RANDOLPH BLUE HILL RIVER HIGHWAY DISTRICT (BRHD) AS DEFINED BY THE TOWN OF RANDOLPH ZONING MAP.

   MINIMUM SETBACK REQUIREMENTS ARE:

   FRONT SETBACK:.....15'
   SIDE SETBACK:.....10'
   REAR SETBACK:.....15'
   LOT FRONTAGE:.....130'
   LOT WIDTH:.....100'
   LOT DEPTH:.....100'
   LOT AREA:.....20,000 S.F.

LEGEND:

- BUILDING LINE
- PARCEL BOUNDARY LINE
- EASEMENT LINE
- ADJOINING PARCEL LINE
- STREET/HIGHWAY LINE
- EDGE OF ASPHALT
- EDGE OF CONCRETE
- STONE WALL
- CHAIN LINK FENCE LINE
- CH-11 CH-12 CH-13 BANK/WETLAND LINE
- SB/DH STONE BOUND
- UTILITY POLE



WETLANDS NOTE:

THE WETLANDS DELINEATION LINE AS DEFINED BY THE WETLANDS PROTECTION ACT, CHAPTER 131, SECTION 40, AND THE TOWN OF RANDOLPH CONSERVATION COMMISSION BY-LAWS HAS NOT BEEN VERIFIED BY THE RANDOLPH CONSERVATION COMMISSION OR APPROVED BY THIS ENDORSEMENT.

FOR REGISTRY USE ONLY

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMITY WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS OF THE COMMONWEALTH OF MASSACHUSETTS

_____ DATE: _____
ERIC J. POREDA PLS# 41612

APPROVAL NOT REQUIRED UNDER THE SUBDIVISION CONTROL LAW.

NO DETERMINATION AS TO COMPLIANCE WITH ZONING REQUIREMENTS HAS BEEN MADE OR INTENDED

TOWN OF RANDOLPH PLANNING BOARD

_____

_____

_____

_____

DATE: _____

FILED WITH TOWN CLERK'S OFFICE

_____

DATE: _____

CHA
141 Longwater Drive - Suite 104
Norwell, MA 02061
781.982.5400 • www.chacompanies.com

PREPARED FOR:

CORE INVESTMENTS DEVELOPMENT LLC
800 BOYLSTON STREET
30TH FLOOR
BOSTON, MA 02199

PROJECT LOCATION:

451 HIGH STREET,
&
34 SCANLON DRIVE

RANDOLPH, MA
02368

No.	Submittal / Revision	App'd.	By	Date
0	Issued As Final	WJD	CDE	03/09/2023

APPROVAL NOT REQUIRED PLAN OF LAND

Designed By:	Drawn By:	Checked By:
---	CDE	WJD
Issue Date:	Project No:	Scale:
03/09/2023	068668	1" = 40'

Drawing No.:

SHEET 1 OF 1

Hunt River - Randolph, Massachusetts

RANDOLPH FLOODPLAIN ANALYSIS

RANDOLPH, MA

JUNE 13, 2022

PREPARED FOR:
Mr. Art Campbell
Core Investments Development, LLC
800 Boylston Street, 30th Floor
Boston, MA 02199

PREPARED BY:
The Vertex Companies, Inc.
400 Libbey Parkway
Weymouth, MA 02189
PHONE 781.952.6000

CORE INVESTMENTS PROJECT ID: 20066-00CDEV
VERTEX PROJECT NO: 78000

June 13, 2022

Mr. Art Campbell
Core Investments Development, LLC
800 Boylston Street, 30th Floor
Boston, MA 02199

Re: Randolph Project Floodplain Analysis Report
VERTEX Project 78000

Mr. Campbell:

The Vertex Companies, Inc. (VERTEX) is pleased to submit this Floodplain Analysis report for the potential development on the Randolph, Massachusetts properties (the Site). The report presents an analysis of the unstudied floodplain along Hunt River which bisects the development area.

This report steps through the process of our analysis, our determinations, and recommended considerations.

Please do not hesitate to contact us at your convenience should you have any questions or comments regarding this analysis.

Sincerely,

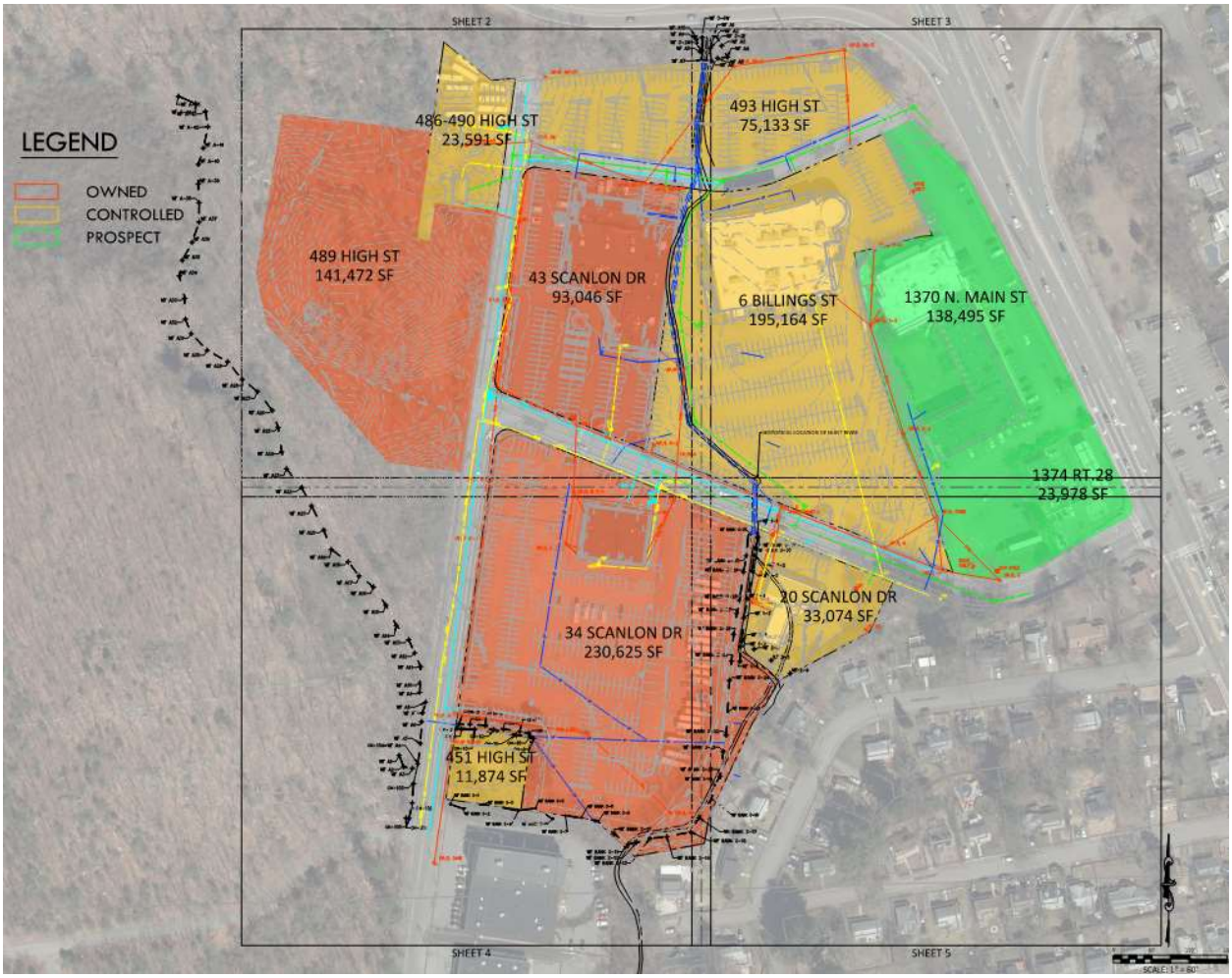
The Vertex Companies, Inc.

Omeed Mollaian
Vice President – Civil Engineering

TABLE OF CONTENTS

STUDY AREA DESCRIPTION

The Vertex Companies, Inc. (VERTEX) was retained by Core Investments Development, LLC (Core) to conduct a floodplain analysis of development area located at: 34 Scanlon Drive, 43 Scanlon Drive, 489 High Street, 486-490 High Street, 451 High Street, 493 High Street, 6 Billings Street, and 20 Scanlon Drive in Randolph, Massachusetts. The location of the project limits and separation of sites is shown below.



The project site consists of 16 parcels totaling approximately 17.8 acres, improved with several commercial buildings and paved parking lots occupying most of the land.

The purpose of this report is to present the findings of a hydraulic analysis of the Hunt River channel and associated culvert relative to floodplain mapping of the project area.

EFFECTIVE FLOODPLAIN

The effective floodplain for the project area is shown of FEMA FIRM map 25021C0204E below dated July 17, 2012. There is a section of floodplain adjacent to a portion of the southern project area as shown below. The shaded area below is noted as Zone A:

HYDROLOGY

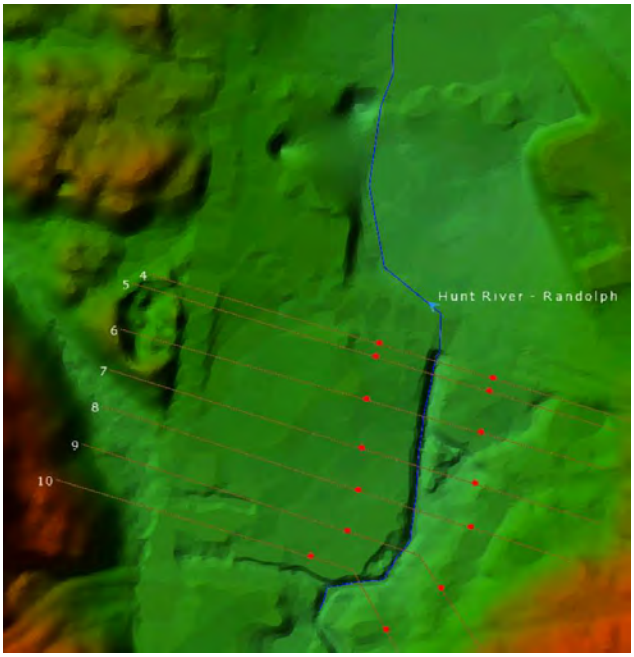
Stormwater flows in the area generally flow from the south to north and are fed by a hydrologic basin as shown on the map below in the yellow shaded region. Stormwater in this area is conveyed down to the Hunt River which flows north across the development area. The tributary basin is relatively small covering 0.52 sq miles with a mean elevation of 187 feet.

When flows from this basin cross the project area, they have the following return totals:

5 Year	41.6 CFS
10 Year	55.2 CFS
25 Year	75.1 CFS
100 Year	109 CFS

Floodplain analysis and Flood Insurance Rate Maps (FIRM) focus predominately on the 100-year storm event. The associated 109 CFS flow rate was used for our analysis.

HYDRAULICS



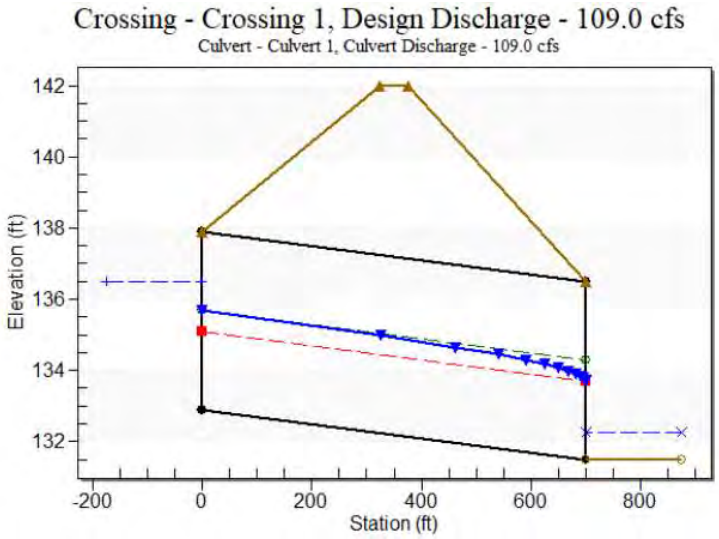
The Hunt River travels across the site via an open channel along the east side of the 34 Scanlon Dr parcel, transitioning into an existing box culvert at south side of Scanlon Dr. Survey for the site was used to construct a topographic model of the channel and surrounding area. Using this data, a hydraulic study was conducted to determine the water surface elevation (WSEL) and floodplain boundary surrounding Hunt River for the 100-year storm interval. At Scanlon Dr the channel flows into a 6x5 foot box culvert (W x H) which conveys flow across the 6 Billings St and 493 High St parcels. A separate analysis was performed to evaluate the culvert capacity for this section. The image below shows the cross sections and flow path that were used.

FINDINGS

A full-sized set of diagrams and cross sections from our analysis can be found at the end of the report. Based on our analysis, the surveyed channel has capacity to hold a majority of the 100-year storm event. As shown in the image below, based on the available information, a small portion of the 20 Scanlon Dr parcel would be within the floodplain where low lying areas allow some inundation, but a majority is held within the wooded channel area. The approximate base

flood elevation for these sections is 139.1 feet and shown in more detail in the cross sections found in the appendix.

The box culvert that conveys flow north past Scanlon Dr was modeled as well. There is a discrepancy between the design drawings for the culvert showing an invert at 132.9 feet and the survey showing the channel bottom at 136.9 feet. It is possible that survey data is mapping the water surface versus bottom of channel, or sediment buildup has occurred over the years. We have modeled the condition conservatively based on this inconsistency but may be able to reduce the BFE with additional information. There are catch basins across the paved areas that convey surface flows into the box culvert, and this total flow condition was considered. Based on the culvert size, slope, and 100-year storm event flow rates, the culvert flow will be within the design capacity.



CONSIDERATIONS AND RECOMMENDATIONS

1. The entrance to the culvert should be inspected prior to any development activities. This area needs to be a clear opening and free of any debris. Any buildup of silt/debris would reduce the capacity of the culvert and could raise the BFE.

2. A conditional analysis of the culvert entrance / exit should be conducted to evaluate the condition of the wingwalls, apron and headwall. Particular attention should be taken to any scouring effects behind the wingwalls or under the concrete apron.

3. Based on potential development activities the existing culvert location may conflict with building foundations and require location. The cost of this should be factored into development considerations.

4. Should the existing culvert remain and continue to be used, a CCTV camera should run the full length of the culvert, if not done already, to evaluate the integrity and condition.

5. Generally, if a mortgage is taken out on a parcel with floodplain touching it, it triggers potential flood insurance for any built structures. Based on our evaluation, a FEMA Letter of Map Amendment (LOMA) could be filed to remove this requirement as long as the footprint of the building remains out of the floodplain.

6. The discrepancy between design drawings and survey should not impact our determinations and floodplain mapping. Investigating this further could reduce the BFE that has been calculated.

APPENDIX

Parcel Map

Know what's below. Call before you dig.

SHEET 2

SHEET 3

SHEET 4

SHEET 5

LEGEND

- OWNED
- CONTROLLED
- PROSPECT

486-490 HIGH ST
23,591 SF

493 HIGH ST
75,133 SF

489 HIGH ST
141,472 SF

43 SCANLON DR
93,046 SF

6 BILLINGS ST
195,164 SF

1370 N. MAIN ST
138,495 SF

1374 RT.28
23,978 SF

20 SCANLON DR
33,074 SF

34 SCANLON DR
230,625 SF

451 HIGH ST
11,874 SF

HISTORICAL LOCATION OF HUNT RIVER

SCALE: 1" = 60'

VERTEX®
100 North Washington Street, Suite 302 | Boston, MA 02114
Main: 617.275.5407 | VERTEXENG.COM

COMBINED PARCELAGE

SITE: SCANLON DRIVE, BILLINGS STREET AND HIGH STREET
RANDOLPH, MA 02368

FOR: CORE INVESTMENTS, INC.
800 BOYLSTON STREET, 30TH FLOOR
BOSTON, MA 02199

NO.	REVISIONS
1	REVISION 1
2	
3	
4	
5	
6	
7	
8	
9	
10	

DATE: 03/29/2022
DRAWN BY: JL
CHECKED BY: AS
JOB #: 78000

1

FEMA FIRM Map

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Massachusetts State Plane Mainland Zone (FIPS zone 2001). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from digital orthophotography. Base map files were provided in digital format by Massachusetts Geographic Information Systems (MassGIS). Ortho imagery was produced at a scale of 1:5,000. Aerial photography is dated April 2005.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

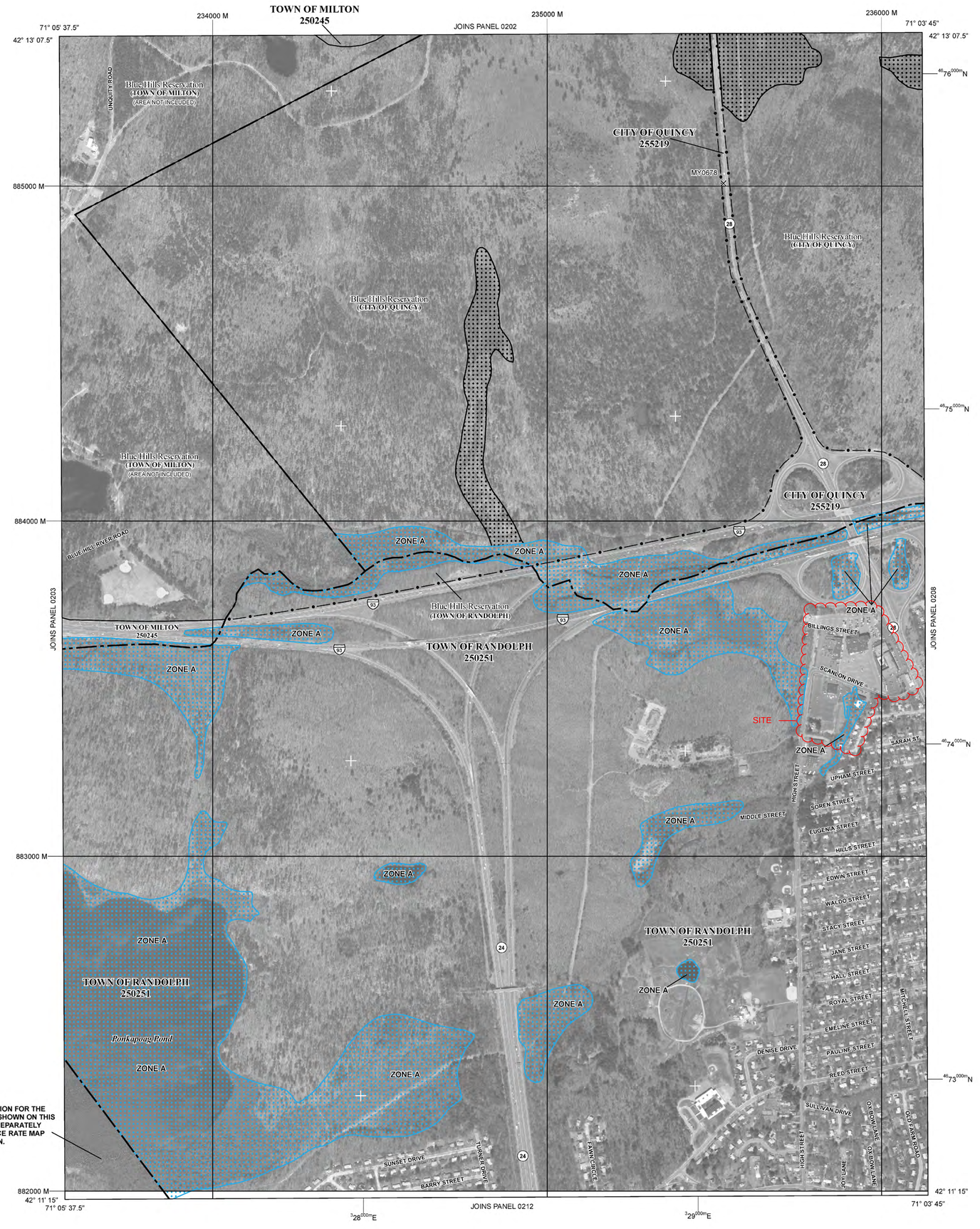
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center** (MSC) website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange (FMIX) at **1 -877-FEMA-MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% Annual Chance Floodplain Boundary
	0.2% Annual Chance Floodplain Boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — 23	Transect line
	Culvert
	Bridge
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
4989000 M	1000-meter ticks: Massachusetts State Plane Mainland Zone (FIPS Zone 2001), Lambert Conformal Conic projection
4680000mN	1000-meter Universal Transverse Mercator grid values, zone 19N
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
July 17, 2012

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP

PANEL 0204E

FIRM

FLOOD INSURANCE RATE MAP

NORFOLK COUNTY, MASSACHUSETTS (ALL JURISDICTIONS)

PANEL 204 OF 430
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MILTON, TOWN OF	250245	0204	E
QUINCY, CITY OF	255219	0204	E
RANDOLPH, TOWN OF	250251	0204	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 25021C0204E

EFFECTIVE DATE JULY 17, 2012

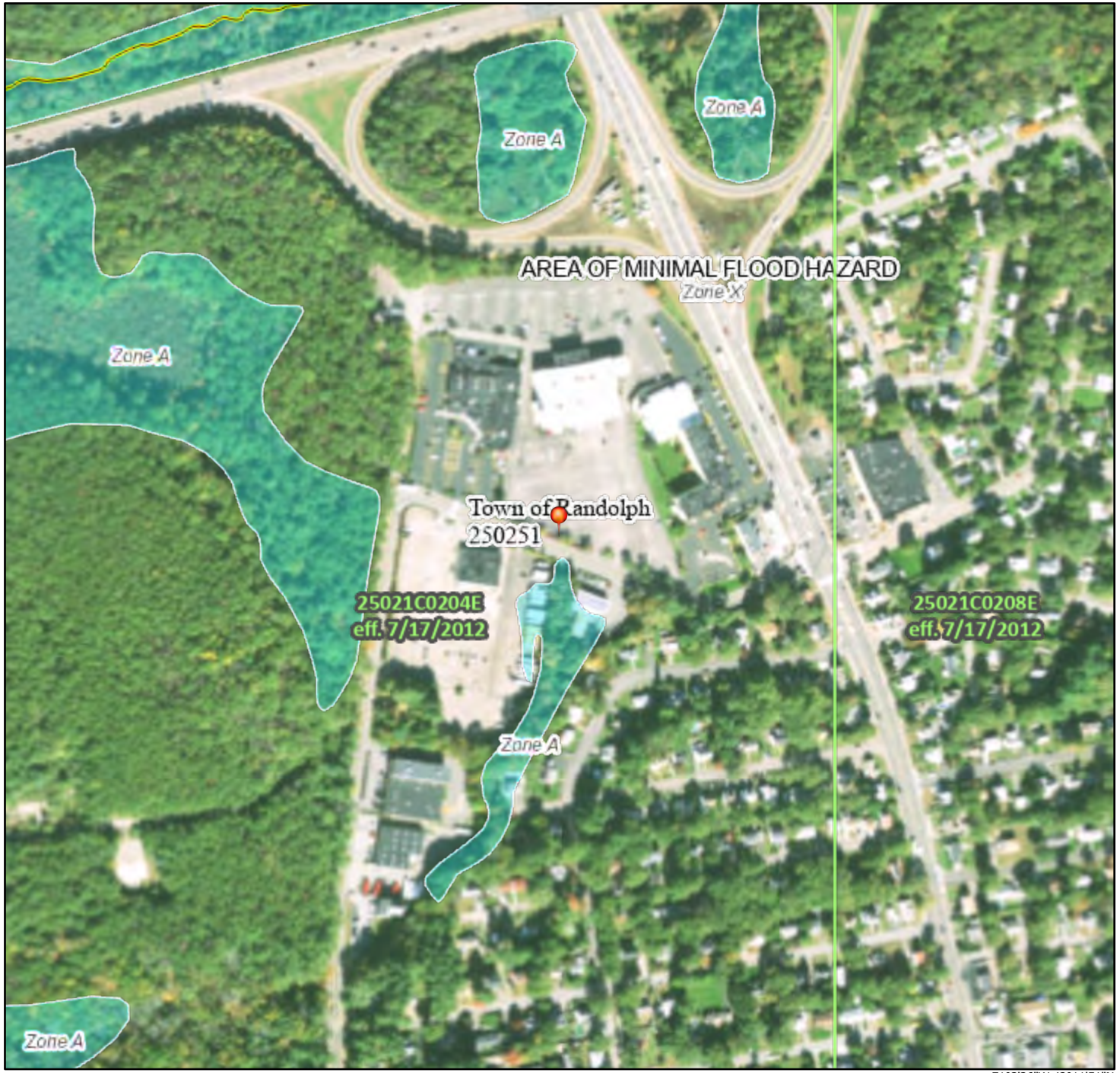
Federal Emergency Management Agency

MAP REVISED

FEMA Firmette

National Flood Hazard Layer FIRMette

71°4'13"W 42°12'18"N



71°3'36"W 42°11'51"N

Feet 1:6,000

0 250 500 1,000 1,500 2,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND IND UT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

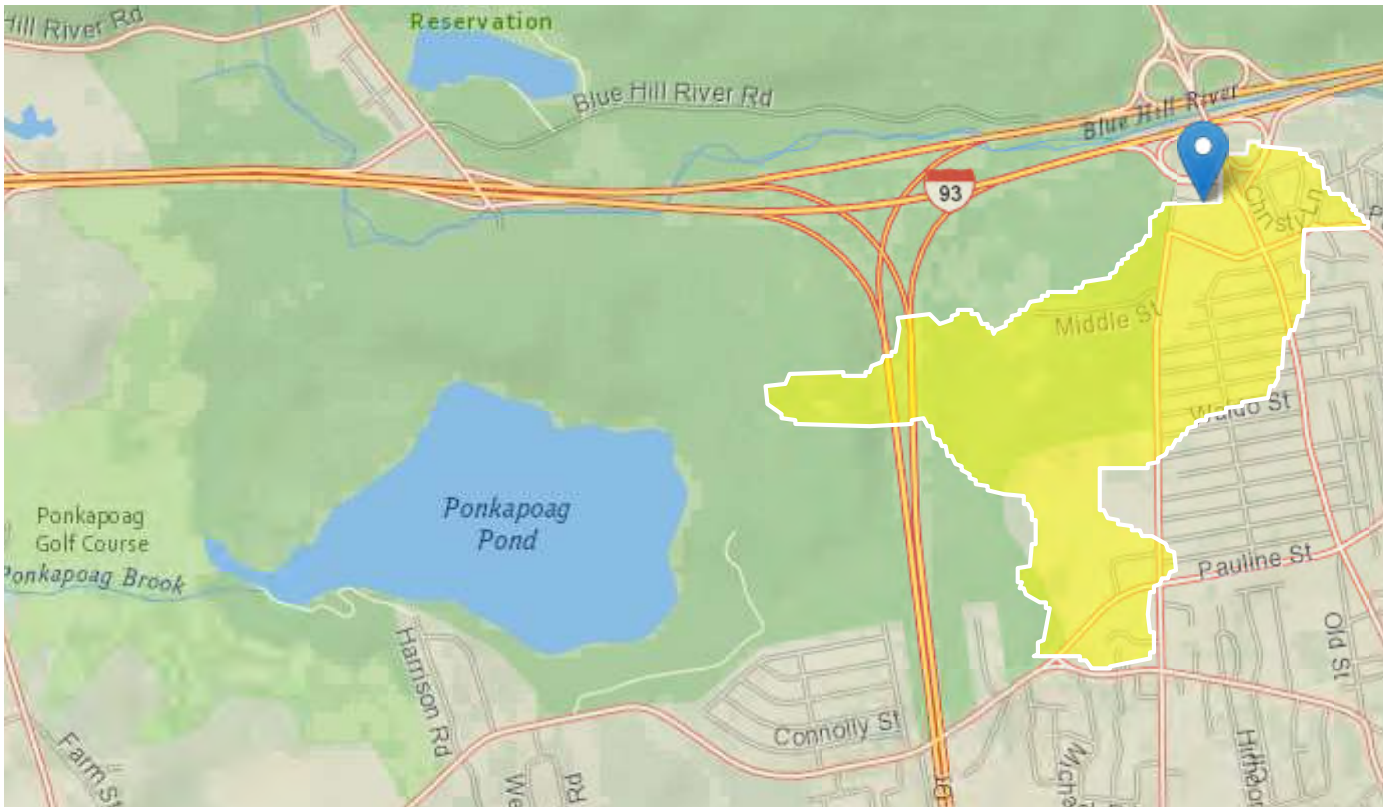
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/9/2022 at 7:17 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community ide FIRM panel number, and FIRM effective date. Map im unmapped and unmodernized areas cannot be used regulatory purposes.

Hydrology - Stream Stats Report

StreamStats Report

Region ID: MA
Workspace ID: MA20220607164531827000
Clicked Point (Latitude, Longitude): 42.20257, -71.06521
Time: 2022-06-07 10:45:52 -0600



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	0.52	square miles
ELEV	Mean Basin Elevation	187	feet
LC06STOR	Percentage of water bodies and wetlands determined from the NLCD 2006	3.9	percent

Peak-Flow Statistics

Peak-Flow Statistics Parameters [Peak Statewide 2016 5156]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.52	square miles	0.16	512
ELEV	Mean Basin Elevation	187	feet	80.6	1948
LC06STOR	Percent Storage from NLCD2006	3.9	percent	0	32.3

Peak-Flow Statistics Flow Report [Peak Statewide 2016 5156]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	PIu	ASEp
50-percent AEP flood	24.7	ft^3/s	12.5	48.9	42.3
20-percent AEP flood	41.6	ft^3/s	20.7	83.7	43.4
10-percent AEP flood	55.2	ft^3/s	26.8	114	44.7
4-percent AEP flood	75.1	ft^3/s	35.1	161	47.1
2-percent AEP flood	91.6	ft^3/s	41.5	202	49.4
1-percent AEP flood	109	ft^3/s	47.8	249	51.8
0.5-percent AEP flood	129	ft^3/s	54.8	304	54.1
0.2-percent AEP flood	157	ft^3/s	63.6	388	57.6

Peak-Flow Statistics Citations

Zarriello, P.J.,2017, Magnitude of flood flows at selected annual exceedance probabilities for streams in Massachusetts: U.S. Geological Survey Scientific Investigations Report 2016–5156, 99 p. (https://dx.doi.org/10.3133/sir20165156)

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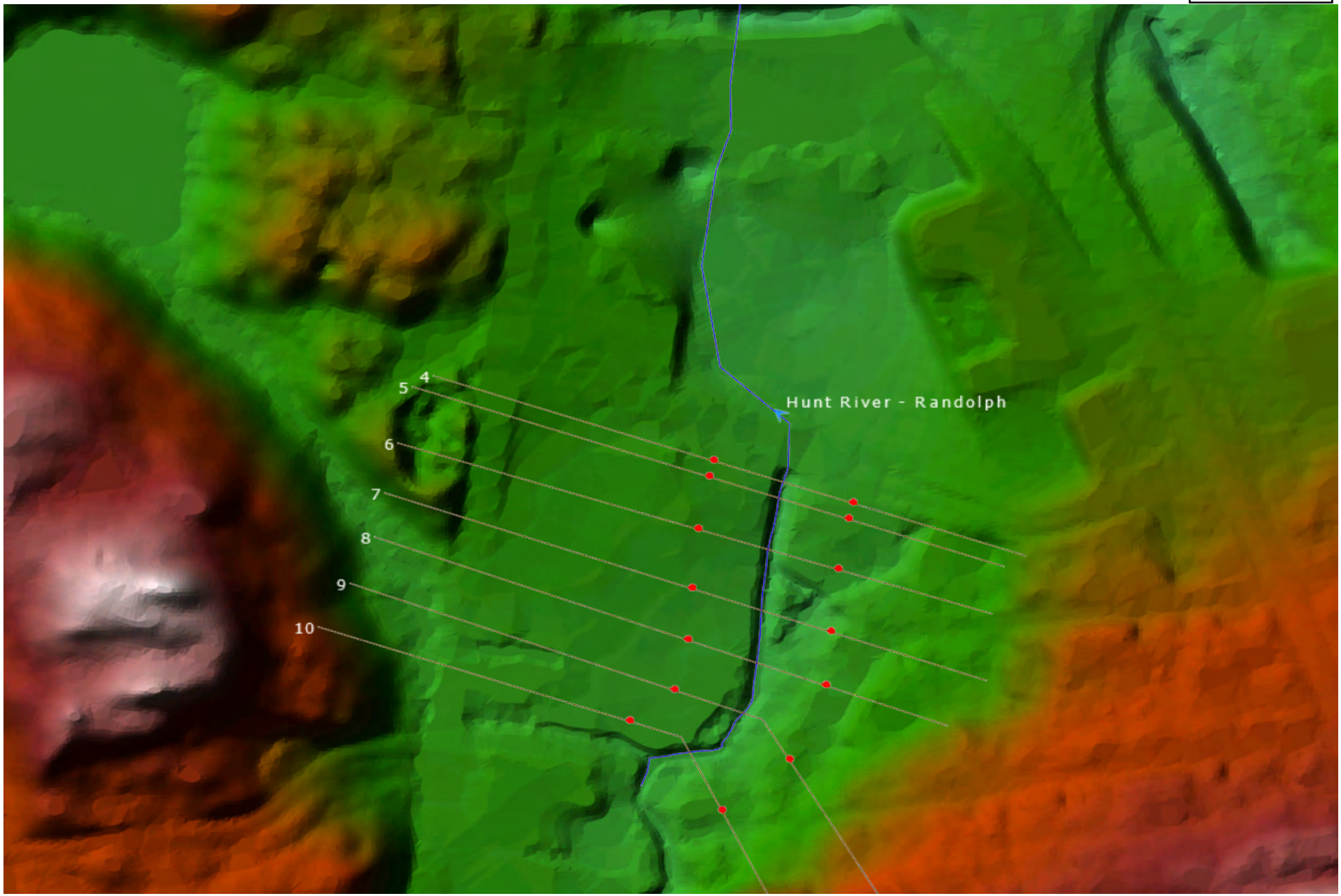
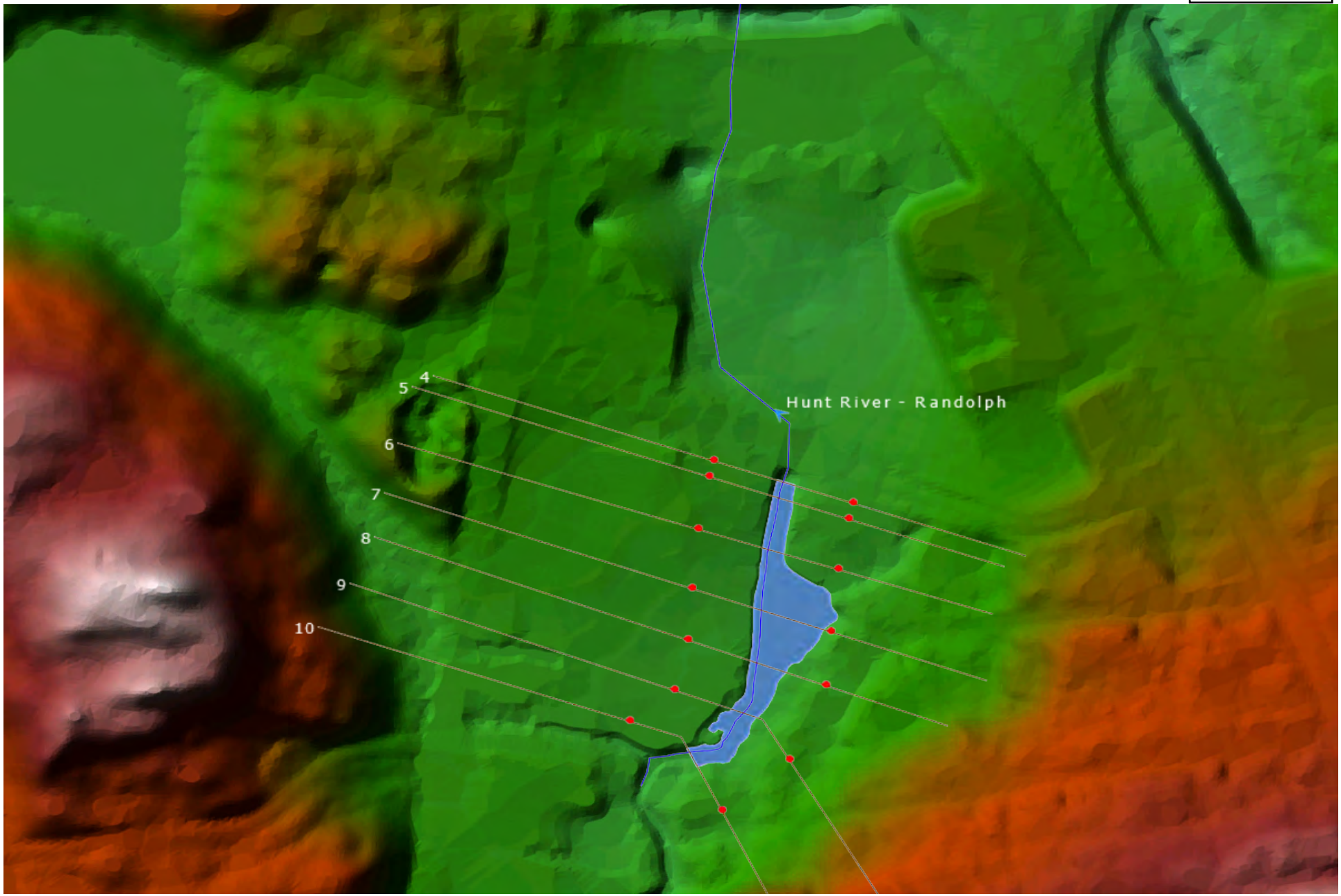
USGS Product Names Disclaimer: Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Application Version: 4.9.0
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.0

Hydraulics - Modeling Maps

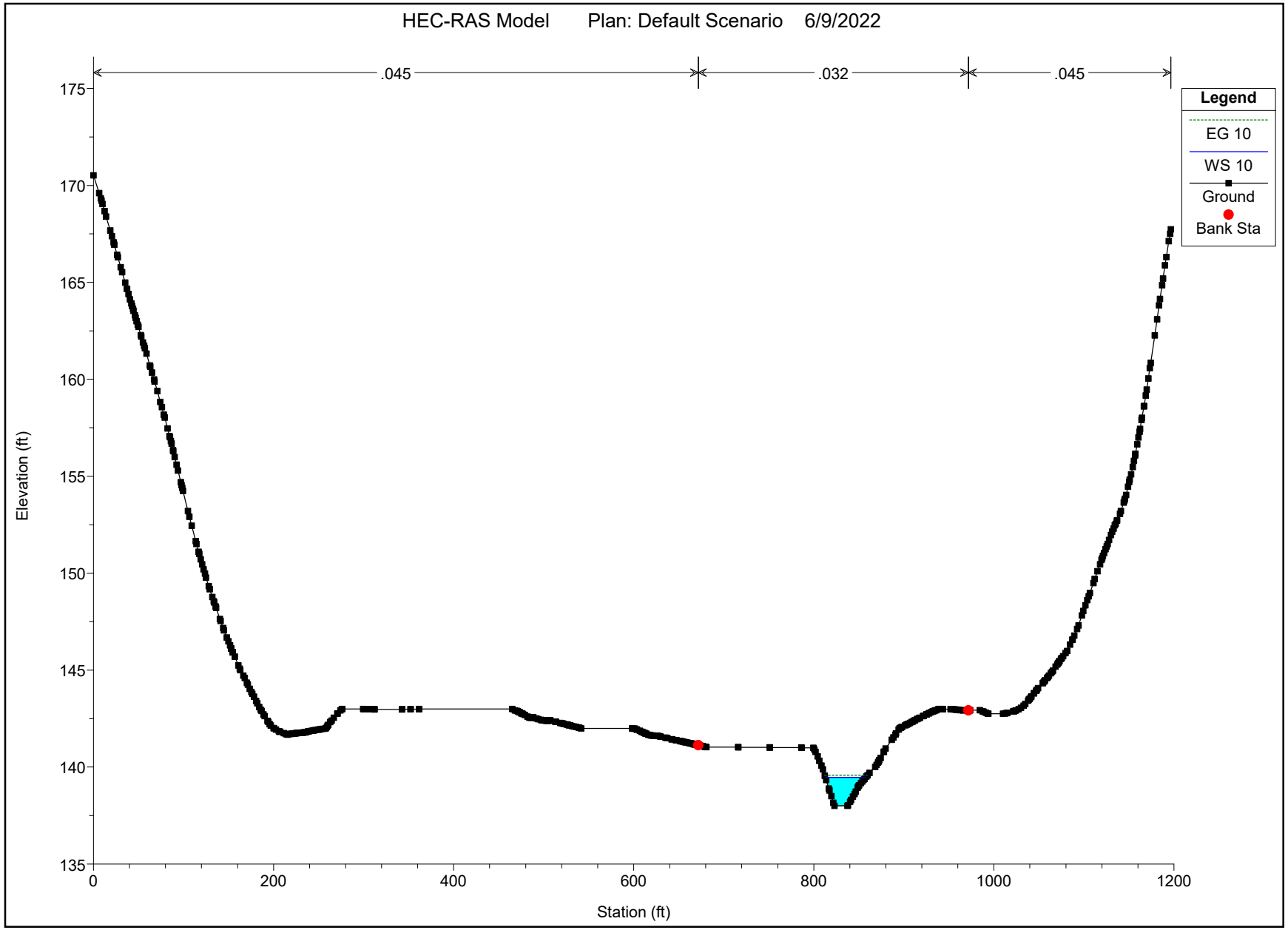


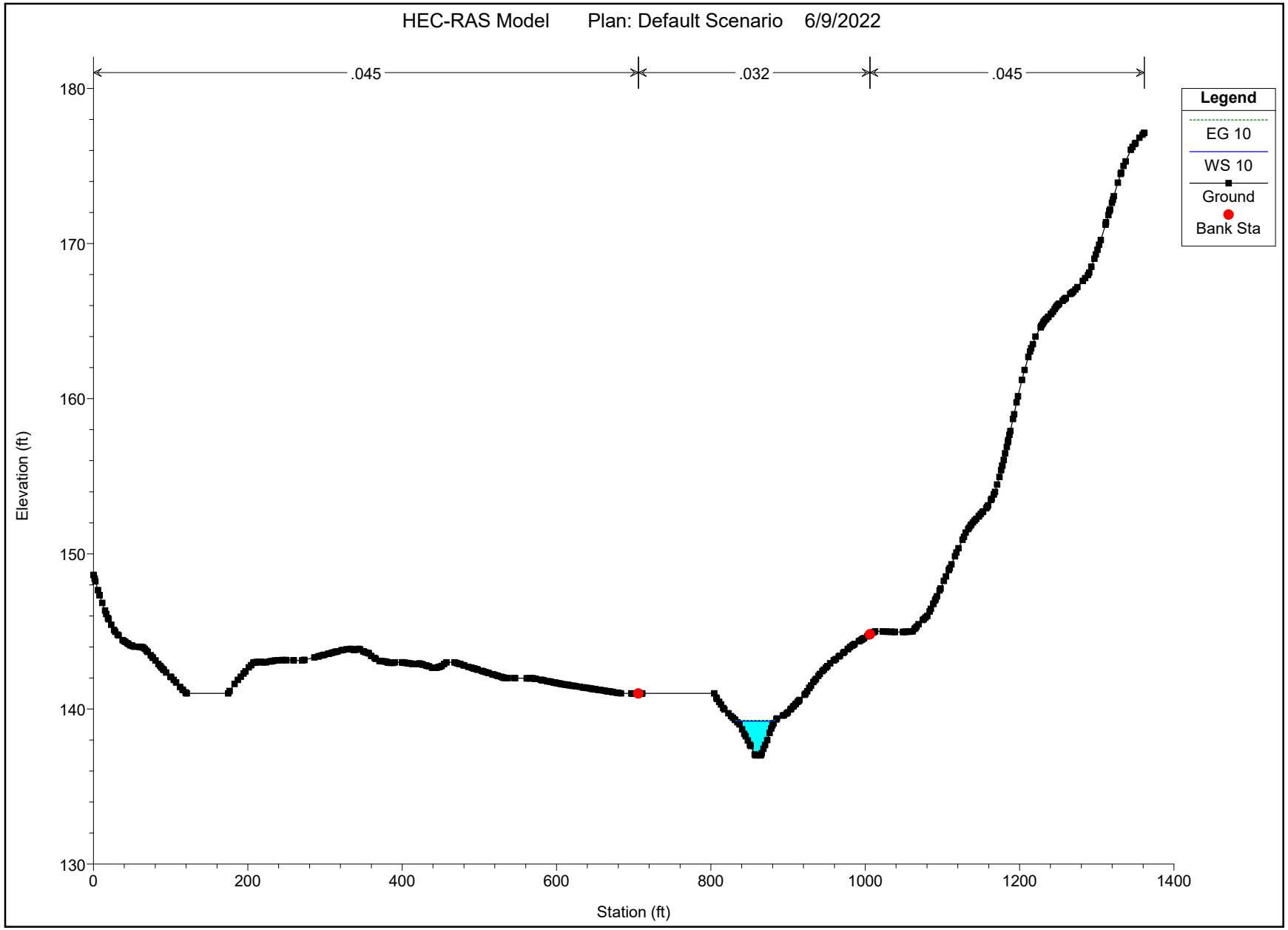


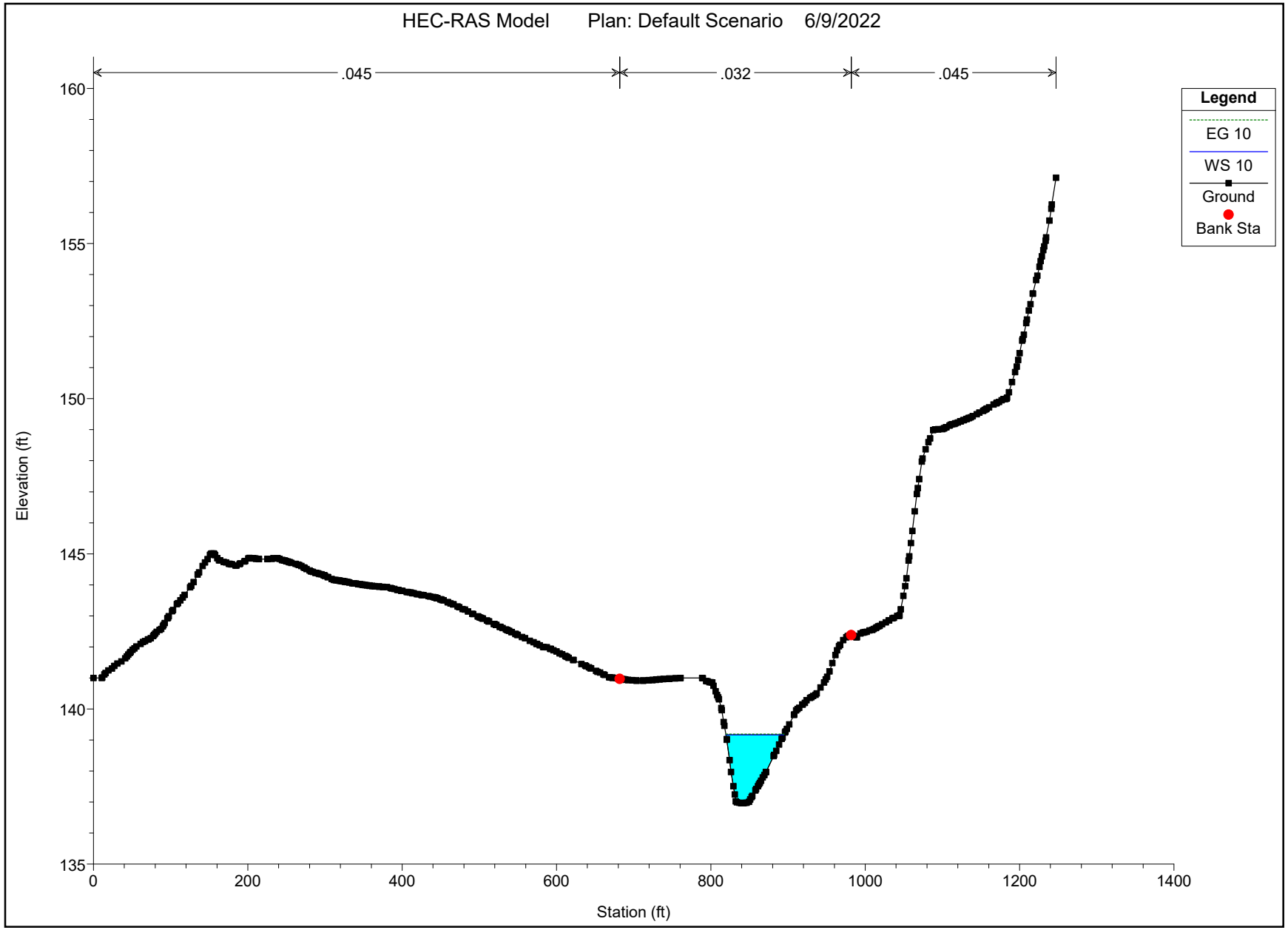
Hydraulics – Cross Sections

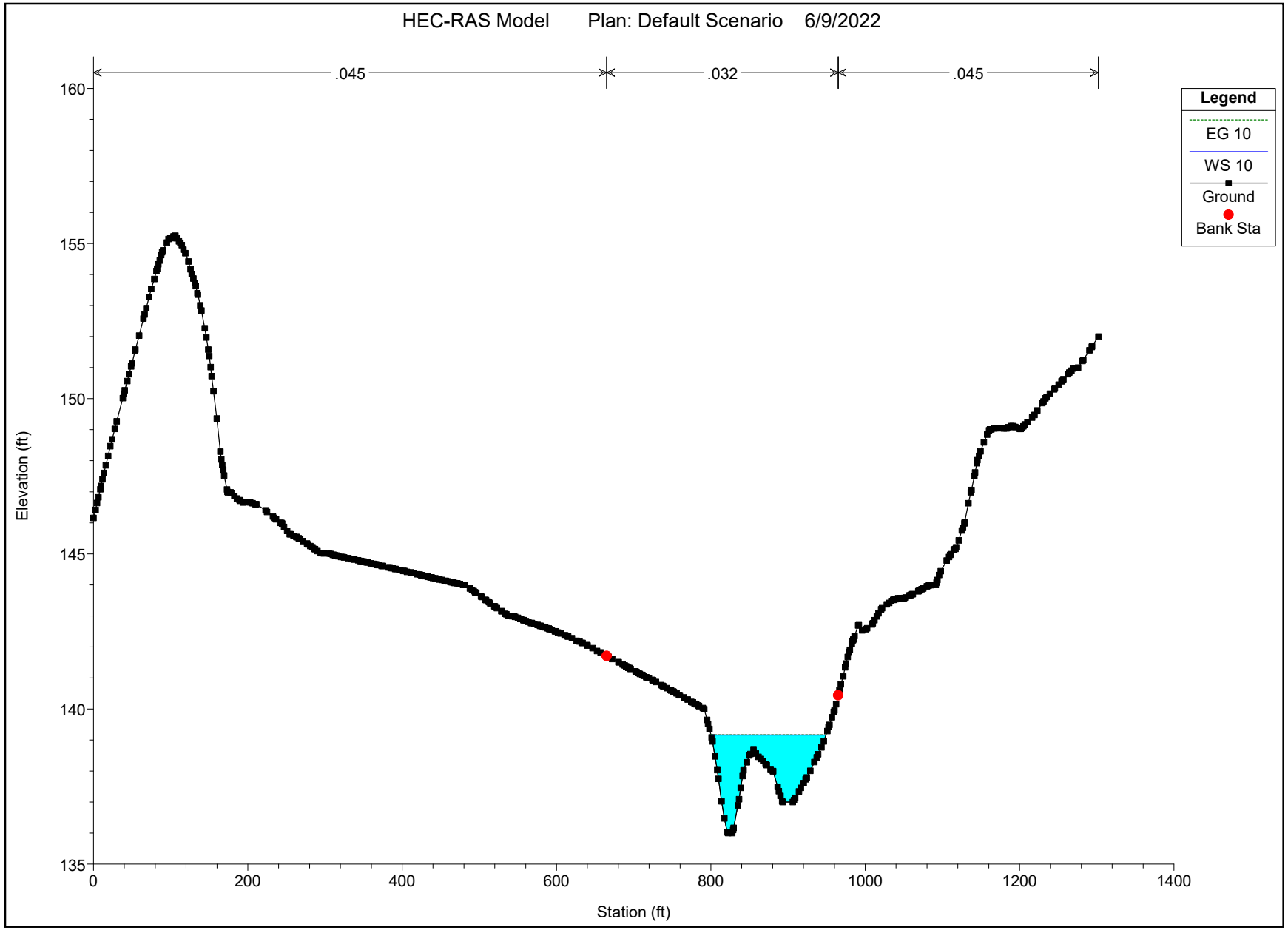
HEC-RAS Plan: Default Scenario River: Hunt River Reach: Randolph Profile: 10

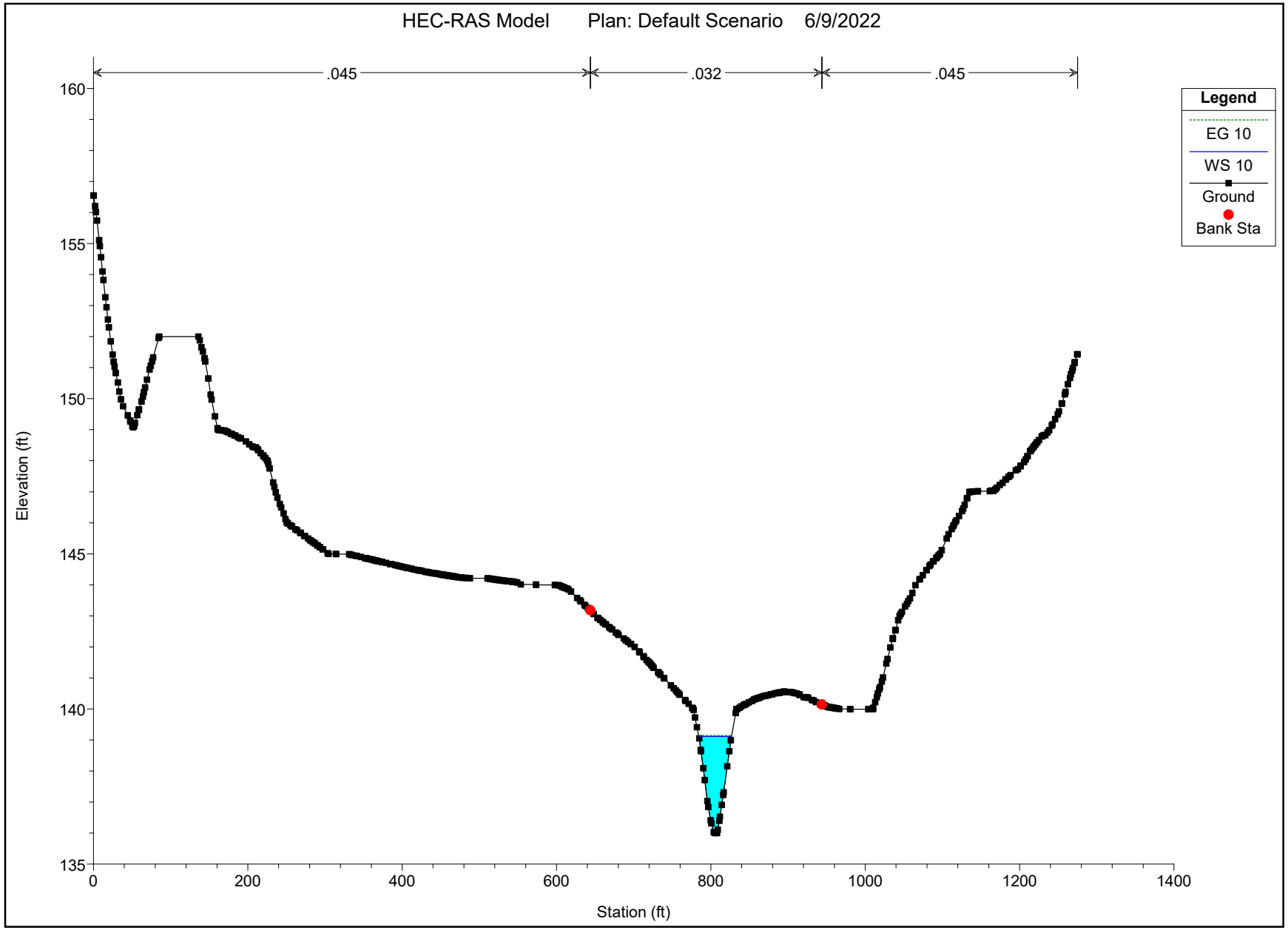
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Randolph	10	10	109.00	138.00	139.47		139.58	0.003248	2.55	42.67	44.84	0.46
Randolph	9	10	109.00	137.00	139.22		139.27	0.001189	1.80	60.41	50.26	0.29
Randolph	8	10	109.00	136.96	139.17		139.19	0.000349	1.06	102.41	75.12	0.16
Randolph	7	10	109.00	136.00	139.16		139.17	0.000071	0.50	217.25	148.94	0.07
Randolph	6	10	109.00	136.00	139.11		139.14	0.000432	1.42	76.67	42.35	0.19
Randolph	5	10	109.00	136.00	139.06		139.09	0.000446	1.48	73.63	39.09	0.19
Randolph	4	10	109.00	136.90	138.98	138.05	139.06	0.001458	2.19	49.66	35.73	0.33

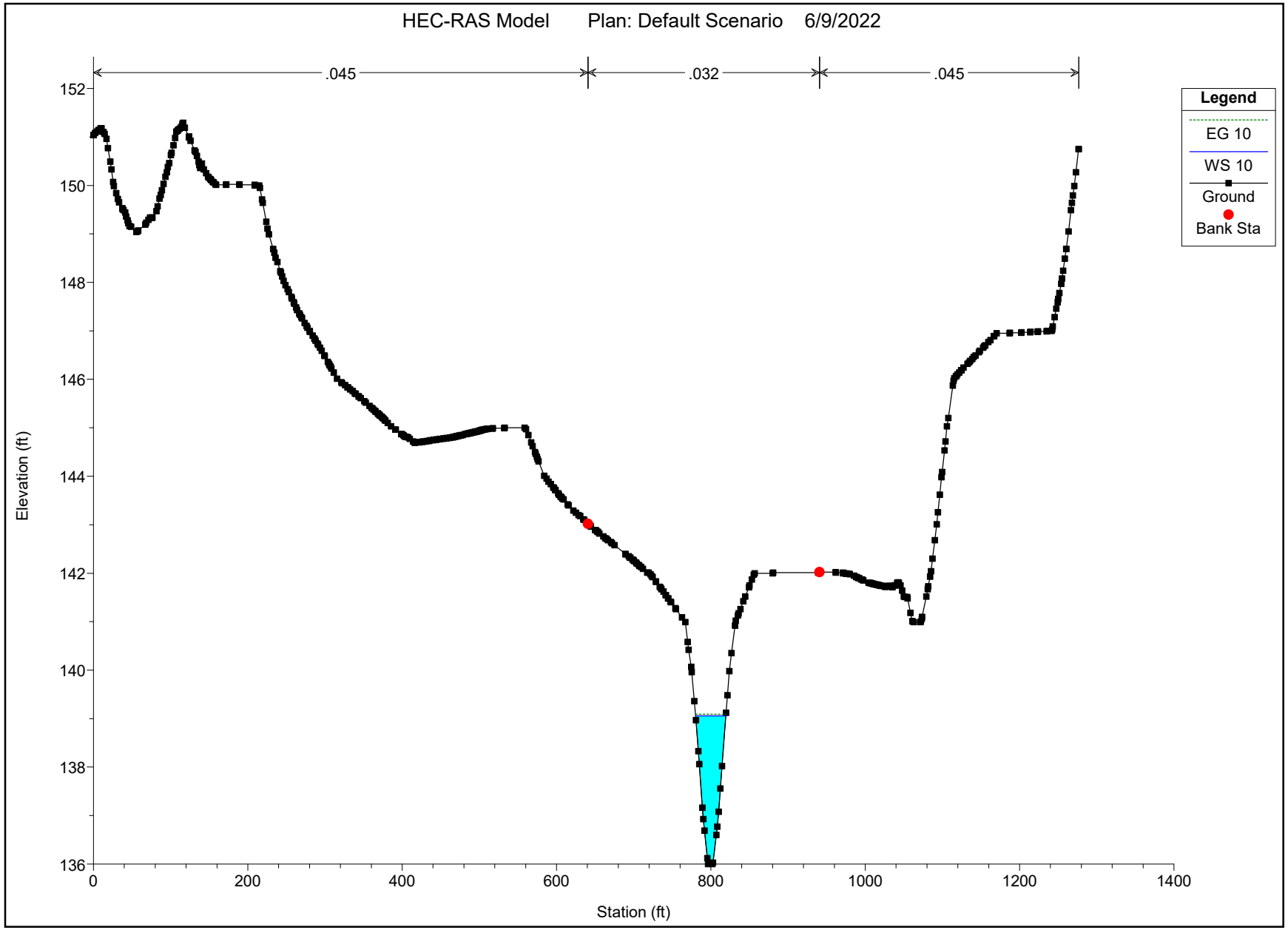

HEC-RAS Model Plan: Default Scenario 6/9/2022
.045
.032
.045
Legend
EG 10
WS 10
Ground
Bank Sta
Elevation (ft)
175
170
165
160
155
150
145
140
135
0
200
400
600
800
1000
1200
Station (ft)

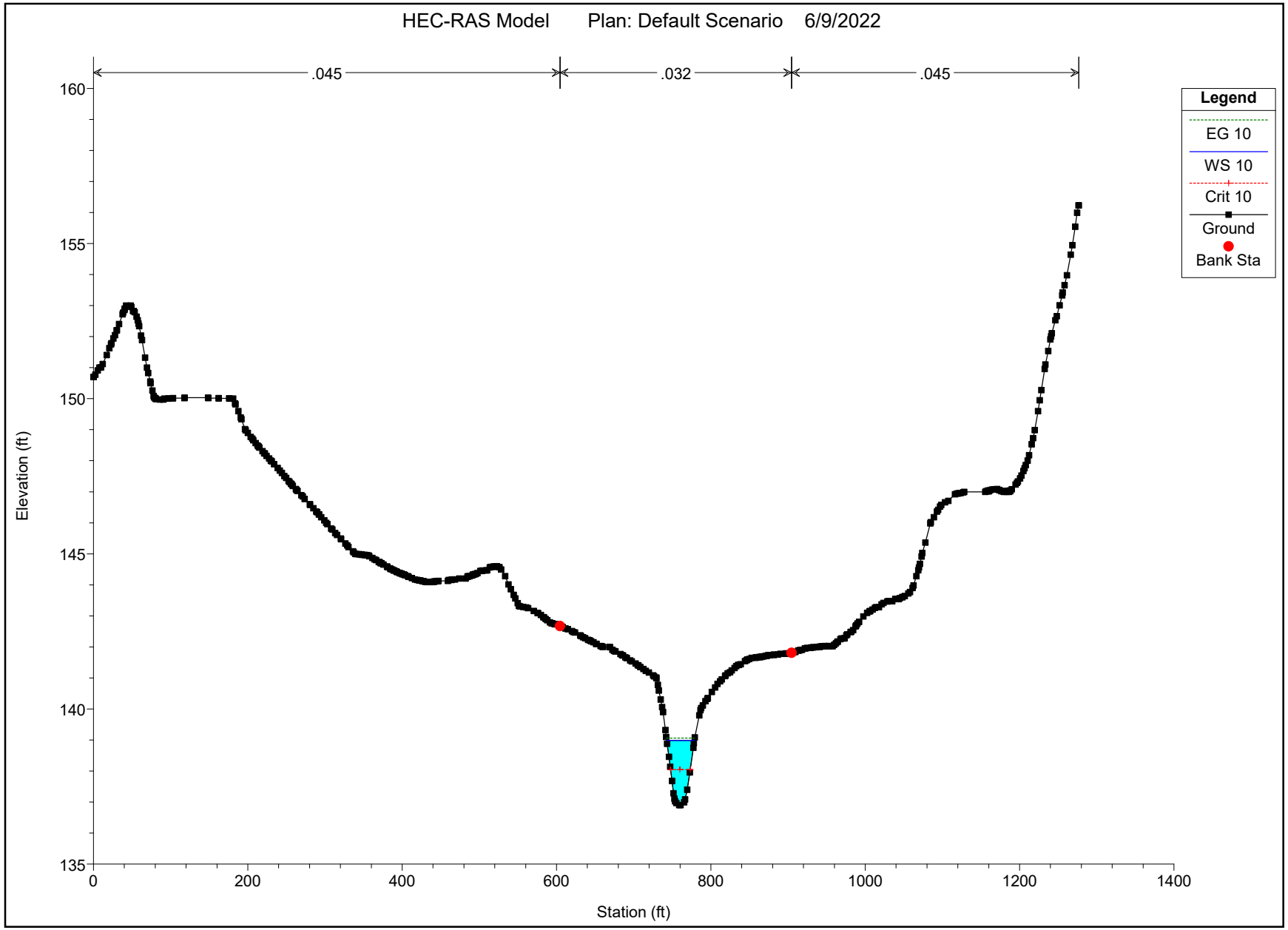

HEC-RAS Model Plan: Default Scenario 6/9/2022
.045
.032
.045
Legend
EG 10
WS 10
Ground
Bank Sta
Elevation (ft)
180
170
160
150
140
130
0
200
400
600
800
1000
1200
1400
Station (ft)


HEC-RAS Model Plan: Default Scenario 6/9/2022
.045
.032
.045
Legend
EG 10
WS 10
Ground
Bank Sta
Elevation (ft)
160
155
150
145
140
135
0
200
400
600
800
1000
1200
1400
Station (ft)


HEC-RAS Model Plan: Default Scenario 6/9/2022
.045
.032
.045
Legend
EG 10
WS 10
Ground
Bank Sta
Elevation (ft)
160
155
150
145
140
135
0
200
400
600
800
1000
1200
1400
Station (ft)


HEC-RAS Model Plan: Default Scenario 6/9/2022
.045
.032
.045
Legend
EG 10
WS 10
Ground
Bank Sta
Elevation (ft)
160
155
150
145
140
135
0
200
400
600
800
1000
1200
1400
Station (ft)


HEC-RAS Model Plan: Default Scenario 6/9/2022
.045
.032
.045
Legend
EG 10
WS 10
Ground
Bank Sta
Elevation (ft)
Station (ft)
152
150
148
146
144
142
140
138
136
0
200
400
600
800
1000
1200
1400


HEC-RAS Model Plan: Default Scenario 6/9/2022
.045
.032
.045
Legend
EG 10
WS 10
Crit 10
Ground
Bank Sta
Elevation (ft)
160
155
150
145
140
135
0
200
400
600
800
1000
1200
1400
Station (ft)

Hydraulics – Culvert Analysis

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 109 cfs

Design Flow: 109 cfs

Maximum Flow: 109 cfs

Table 1 - Summary of Culvert Flows at Crossing: Crossing 1

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
136.47	109.00	109.00	0.00	1
136.47	109.00	109.00	0.00	1
136.47	109.00	109.00	0.00	1
136.47	109.00	109.00	0.00	1
136.47	109.00	109.00	0.00	1
136.47	109.00	109.00	0.00	1
136.47	109.00	109.00	0.00	1
136.47	109.00	109.00	0.00	1
136.47	109.00	109.00	0.00	1
136.47	109.00	109.00	0.00	1
136.47	109.00	109.00	0.00	1
142.00	308.89	308.89	0.00	Overtopping

Rating Curve Plot for Crossing: Crossing 1

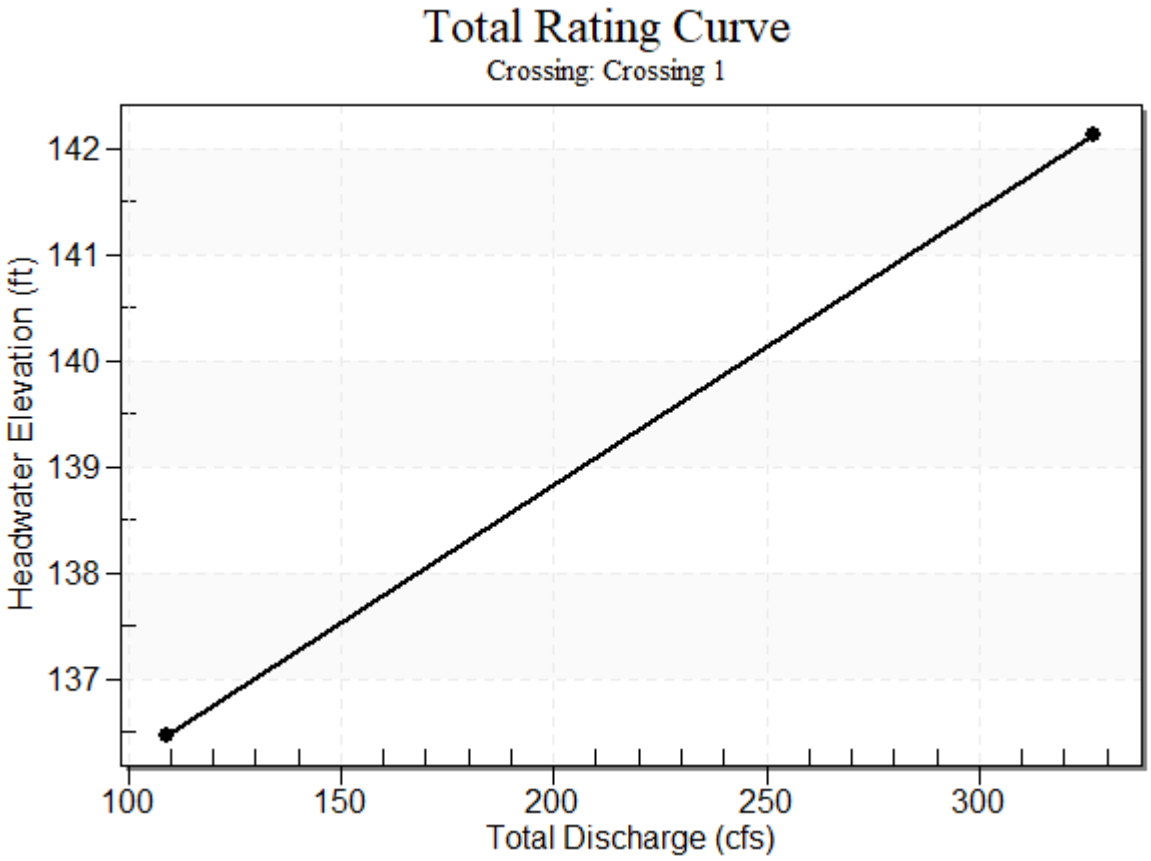


Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
109.00	109.00	136.47	3.392	3.571	2-M2c	2.778	2.172	2.172	0.762	8.363	2.863
109.00	109.00	136.47	3.392	3.571	2-M2c	2.778	2.172	2.172	0.762	8.363	2.863
109.00	109.00	136.47	3.392	3.571	2-M2c	2.778	2.172	2.172	0.762	8.363	2.863
109.00	109.00	136.47	3.392	3.571	2-M2c	2.778	2.172	2.172	0.762	8.363	2.863
109.00	109.00	136.47	3.392	3.571	2-M2c	2.778	2.172	2.172	0.762	8.363	2.863
109.00	109.00	136.47	3.392	3.571	2-M2c	2.778	2.172	2.172	0.762	8.363	2.863
109.00	109.00	136.47	3.392	3.571	2-M2c	2.778	2.172	2.172	0.762	8.363	2.863
109.00	109.00	136.47	3.392	3.571	2-M2c	2.778	2.172	2.172	0.762	8.363	2.863
109.00	109.00	136.47	3.392	3.571	2-M2c	2.778	2.172	2.172	0.762	8.363	2.863
109.00	109.00	136.47	3.392	3.571	2-M2c	2.778	2.172	2.172	0.762	8.363	2.863
109.00	109.00	136.47	3.392	3.571	2-M2c	2.778	2.172	2.172	0.762	8.363	2.863

****

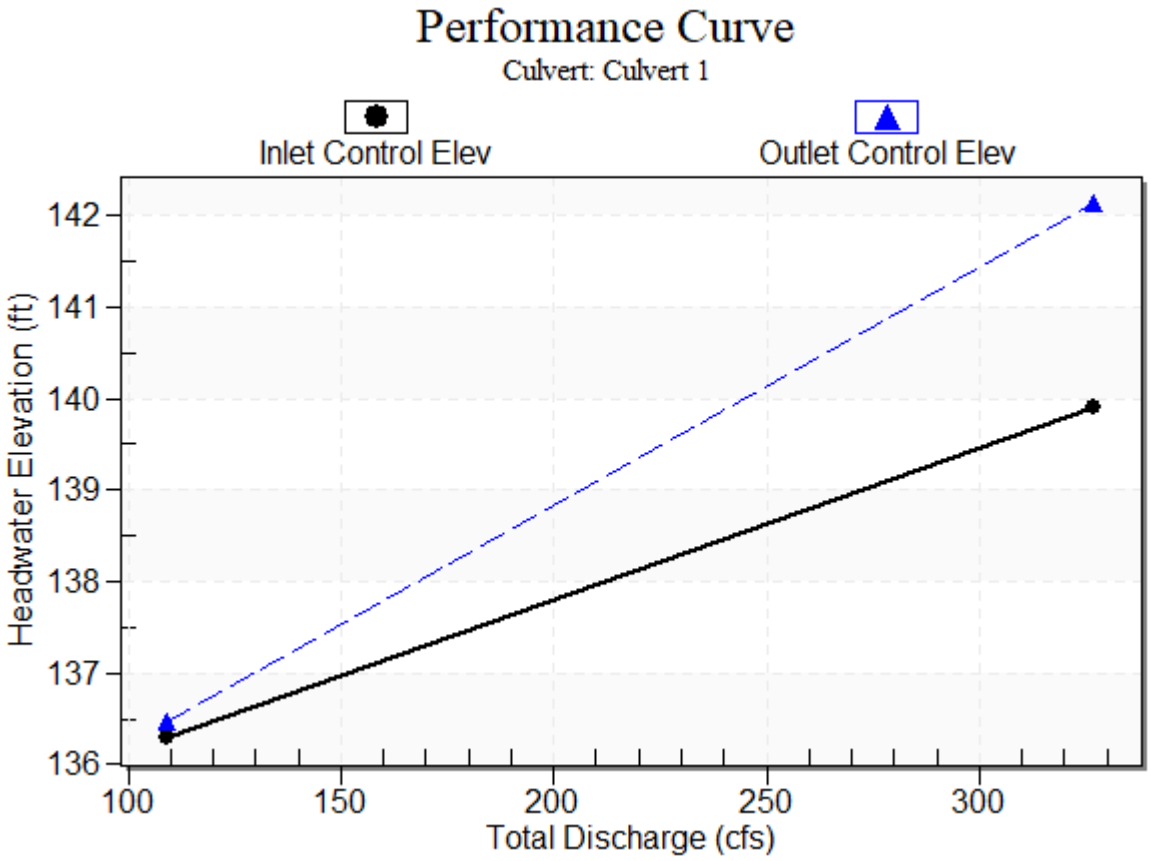
Straight Culvert

Inlet Elevation (invert): 132.90 ft, Outlet Elevation (invert): 131.50 ft

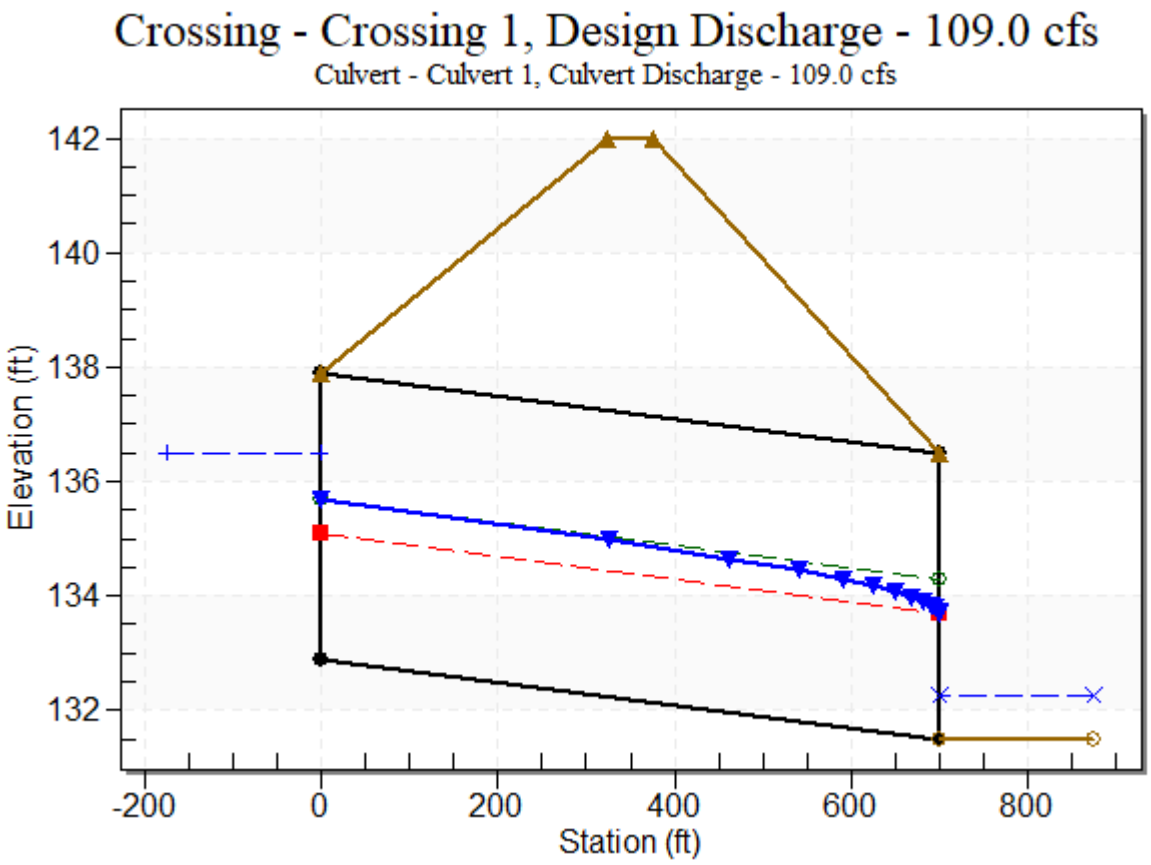
Culvert Length: 700.00 ft, Culvert Slope: 0.0020

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 132.90 ft

Outlet Station: 700.00 ft

Outlet Elevation: 131.50 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Concrete Box

Barrel Span: 6.00 ft

Barrel Rise: 5.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0130

Culvert Type: Straight

Inlet Configuration: 1.5:1 Bevel (90º) Headwall

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: Crossing 1)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
109.00	132.26	0.76	2.86	0.24	0.58
109.00	132.26	0.76	2.86	0.24	0.58
109.00	132.26	0.76	2.86	0.24	0.58
109.00	132.26	0.76	2.86	0.24	0.58
109.00	132.26	0.76	2.86	0.24	0.58
109.00	132.26	0.76	2.86	0.24	0.58
109.00	132.26	0.76	2.86	0.24	0.58
109.00	132.26	0.76	2.86	0.24	0.58
109.00	132.26	0.76	2.86	0.24	0.58
109.00	132.26	0.76	2.86	0.24	0.58
109.00	132.26	0.76	2.86	0.24	0.58

Tailwater Channel Data - Crossing 1

Tailwater Channel Option: Rectangular Channel

Bottom Width: 50.00 ft

Channel Slope: 0.0050

Channel Manning's n: 0.0300

Channel Invert Elevation: 131.50 ft

Roadway Data for Crossing: Crossing 1

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 1.00 ft

Crest Elevation: 142.00 ft

Roadway Surface: Paved

Roadway Top Width: 50.00 ft

Hydraulics – HEC-RAS Report

HEC-RAS HEC-RAS 5.0.7 March 2019
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X   X XXXXXX  XXXX    XXXX    XX   XXXX
X   X X     X  X    X  X   X X  X
X   X X     X       X  X   X  X  X
XXXXXXX XXXX   X    XXX XXXX   XXXXXX  XXXX
X   X X     X       X X   X  X    X
X   X X     X  X    X  X   X  X    X
X   X XXXXXX  XXXX    X  X  X  X  XXXXX
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Project File : Randolph Floodplain Analysis.prj
Run Date and Time: 6/9/2022 3:10:55 PM

Project in English units

Project Description:
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PLAN DATA

Plan Title: Default Scenario
Plan File : Z:\Shared\Projects\78000-78999\78000-78099\78000.Randolph - Site Development - MA\05-Engineering\Vertex Models\Floodplain Analysis\Randolph Floodplain Analysis.p01

Geometry Title: Default Geometry
Geometry File : Z:\Shared\Projects\78000-78999\78000-78099\78000.Randolph - Site Development - MA\05-Engineering\Vertex Models\Floodplain Analysis\Randolph Floodplain Analysis.g01

Flow Title : Default Steady Flow
Flow File : Z:\Shared\Projects\78000-78999\78000-78099\78000.Randolph - Site Development - MA\05-Engineering\Vertex Models\Floodplain Analysis\Randolph Floodplain Analysis.f01

Plan Description:
Default Scenario

Plan Summary Information:
Number of: Cross Sections = 7 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.33
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Default Steady Flow
Flow File : Z:\Shared\Projects\78000-78999\78000-78099\78000.Randolph - Site Development - MA\05-Engineering\Vertex Models\Floodplain Analysis\Randolph Floodplain Analysis.f01

Flow Data (cfs)

River	Reach	RS	10
Hunt River	Randolph	10	109

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Hunt River	Randolph	10		Normal S = 0.001458

GEOMETRY DATA

Geometry Title: Default Geometry
Geometry File : Z:\Shared\Projects\78000-78999\78000-78099\78000.Randolph - Site Development - MA\05-Engineering\Vertex Models\Floodplain Analysis\Randolph Floodplain Analysis.g01

CROSS SECTION

RIVER: Hunt River
REACH: Randolph RS: 10

INPUT
Description:
Station Elevation Data num= 491

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	170.52	6.19	169.6	8.12	169.33	8.9	169.21	10.11	169.04
12.38	168.68	14.05	168.4	18.57	167.67	20.39	167.38	22.29	167.06
23.08	166.94	26.23	166.42	27.02	166.3	30.17	165.78	31.74	165.53
35.18	164.99	37.14	164.67	37.26	164.66	38.83	164.4	40.59	164.12
41.98	163.91	42.77	163.78	43.8	163.63	44.34	163.54	45.92	163.3
46.71	163.17	47.86	163	49.07	162.81	49.86	162.7	52.61	162.28
53.01	162.21	55.02	161.9	56.16	161.73	56.94	161.6	58.8	161.32
62.65	160.72	63.04	160.65	64.99	160.35	67.18	160	67.93	159.89
71.07	159.39	74.27	158.83	75.88	158.57	78.21	158.17	79.09	158.03
82.29	157.47	84.51	157.07	84.84	157.02	85.89	156.82	86.65	156.69
88.45	156.34	88.71	156.3	90.31	155.99	92.39	155.6	93.96	155.29
97.11	154.7	97.9	154.54	98.69	154.4	99.47	154.24	104.99	153.2
106.56	152.91	109.13	152.45	113.65	151.65	114.37	151.51	116.8	151.11
117.58	150.99	119.16	150.71	120.69	150.46	122.39	150.2	123.78	149.98
124.98	149.78	128.15	149.33	129.21	149.17	132.02	148.77	133.62	148.55
134.13	148.49	135.7	148.28	136.16	148.21	140.43	147.64	141.22	147.54
144	147.17	144.85	147.05	148.06	146.69	149.88	146.49	151.63	146.28
152.87	146.12	153.03	146.11	154.56	145.93	154.73	145.92	156.97	145.69
160.89	145.24	162.48	145.07	163.01	145	166.42	144.72	167.99	144.6
170.41	144.35	171.47	144.25	173.58	144.03	175.33	143.88	176.39	143.78
178.23	143.63	180.59	143.41	182.03	143.29	184.14	143.09	185.67	142.96
186.56	142.9	188.77	142.72	190.05	142.63	193.2	142.39	193.98	142.34
195.56	142.22	196.82	142.14	199.99	142.01	200.28	142.01	202.65	141.93
205.81	141.85	206.33	141.83	207.41	141.82	211.31	141.75	213.72	141.7
215.25	141.68	216.04	141.68	218.4	141.72	220.24	141.72	220.76	141.73
222.34	141.73	222.81	141.74	224.29	141.74	224.7	141.75	226.4	141.75
226.66	141.76	228.64	141.76	229	141.77	230.63	141.77	231	141.78
232.74	141.78	233.07	141.79	234.85	141.79	234.94	141.8	236.28	141.8
238.28	141.84	238.87	141.84	242.03	141.88	244.39	141.89	244.47	141.9
246.75	141.91	249.64	141.94	250.72	141.94	252.26	141.96	254.63	141.97
257.04	141.99	258.09	142.01	259.15	142.07	260.14	142.14	260.93	142.18
263.04	142.32	264.43	142.4	266.76	142.55	270.77	142.75	271.17	142.76
274.32	142.92	275.89	142.99	276.38	143	299.52	143	300.17	142.99
305.82	142.99	306.36	142.98	311.97	142.98	312.12	142.97	342.61	142.97
342.83	142.98	352.12	142.98	352.29	142.99	361.63	142.99	361.74	143
465.16	143	468.06	142.93	470.47	142.9	471.5	142.88	472.78	142.84
473.47	142.83	475.15	142.78	475.93	142.77	476.89	142.74	479.09	142.69
482.06	142.61	484.17	142.56	484.91	142.55	486.17	142.55	486.29	142.56
487.75	142.56	488.54	142.57	492.03	142.51	494.05	142.47	496.85	142.44
497.74	142.42	498.96	142.42	499.35	142.41	500.95	142.41	501.08	142.4
502.71	142.4	503.19	142.39	505.08	142.39	505.3	142.4	506.65	142.4
507.51	142.41	512.95	142.34	513.74	142.34	518.6	142.28	519.88	142.26
521.15	142.25	522.21	142.23	525.37	142.2	526.34	142.18	527.13	142.18
528.22	142.16	529.6	142.15	531.43	142.12	533.83	142.1	536.24	142.07
538.94	142.03	539.45	142.03	541.55	142	598.27	142	598.8	141.99
600.4	141.99	601.44	141.98	603.44	141.94	603.61	141.93	606.82	141.87
608.42	141.83	609.82	141.81	611.4	141.77	612.72	141.75	613.24	141.73
614.12	141.72	616.23	141.67	618.05	141.65	619.27	141.63	621.26	141.63
621.51	141.62	626.07	141.62	627.15	141.6	628.91	141.59	629.96	141.57
635.24	141.52	636.6	141.5	637.39	141.5	642.11	141.44	642.9	141.44
646.84	141.39	647.63	141.39	651.56	141.34	652.35	141.34	654.26	141.32
655.32	141.3	657.08	141.29	658.15	141.27	659.75	141.26	661.8	141.23
662.71	141.23	663.77	141.21	664.57	141.21	666.53	141.18	667.32	141.18
668.42	141.16	670.11	141.15	671.25	141.13	671.74	141.13	672.04	141.13

674.19 141.1 676.77 141.08 679 141.05 679.62 141.05 680.61 141.03
715.89 141.03 716.15 141.02 750.8 141.02 751.18 141.01 786.23 141.01
786.71 141 799.59 141 800.71 140.91 801.82 140.79 804.19 140.55
806.17 140.32 808.44 140.08 809.98 139.88 812.22 139.55 813.71 139.34
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837.46 138 837.96 138.03 840.23 138.21 841.35 138.31 843.54 138.48
845.26 138.62 846.59 138.74 848.6 138.94 849.71 139.03 850.33 139.06
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859.74 139.58 861.96 139.7 868.26 140.01 869.77 140.12 871.25 140.24
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908.74 142.33 909.86 142.35 911.6 142.4 912.35 142.41 914.59 142.47
915.34 142.48 916.83 142.52 917.86 142.54 921.32 142.63 922.06 142.64
925.05 142.72 925.45 142.72 927.68 142.78 928.04 142.78 929.9 142.83
931.78 142.86 932.53 142.88 934.02 142.9 934.77 142.92 936.26 142.94
938.5 142.99 939.25 143 942.99 143 943.27 142.99 951.95 142.99
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1012.53 142.77 1014.03 142.79 1014.77 142.79 1021.51 142.88 1022.25 142.88
1023 142.9 1024.55 142.92 1027.49 142.98 1030.04 143.06 1033.07 143.17
1034.97 143.26 1037.97 143.43 1038.72 143.48 1039.56 143.52 1041.16 143.61
1041.71 143.65 1044.49 143.8 1044.7 143.82 1046.95 143.94 1047.69 143.99
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1059.03 144.6 1060.06 144.65 1061.19 144.72 1063.35 144.84 1064.5 144.91
1065.72 144.97 1068.64 145.18 1070.3 145.29 1071.17 145.36 1071.63 145.38
1072.38 145.44 1073.13 145.48 1074.63 145.58 1075.38 145.62 1076.87 145.72
1079.45 145.88 1081.36 145.99 1084.52 146.32 1087.15 146.56 1087.35 146.59
1089.31 146.78 1092.58 147.13 1094.08 147.31 1097.75 147.82 1099.32 148.05
1101.56 148.35 1103.81 148.62 1105.3 148.81 1106.75 148.98 1110.54 149.49
1112.04 149.7 1115.03 150.1 1117.87 150.46 1119.59 150.69 1120.27 150.77
1121.2 150.9 1122.32 151.04 1124.01 151.24 1125.2 151.39 1126.25 151.51
1127.88 151.71 1130.1 151.97 1131.49 152.14 1132.98 152.3 1134.35 152.47
1135.23 152.55 1136.63 152.71 1136.9 152.73 1140.1 153.06 1141.22 153.2
1144.21 153.64 1144.95 153.76 1145.55 153.84 1146.78 154.03 1149 154.46
1150.36 154.71 1150.94 154.83 1152.44 155.1 1154.2 155.48 1155.67 155.79
1156.93 156.08 1157.22 156.16 1159.17 156.65 1160.67 157 1161.8 157.29
1162.34 157.44 1164.08 157.9 1164.56 158.02 1166.65 158.6 1166.79 158.63
1168.66 159.16 1169.64 159.47 1171.51 160.04 1173.23 160.58 1174.13 160.85
1178.62 162.27 1181.24 163.09 1183.46 163.82 1184.49 164.15 1186.8 164.85
1187.91 165.2 1190.14 165.88 1191.53 166.31 1194.33 167.13 1195.69 167.5
1196.61 167.73

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .045 671.74 .032 971.74 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
671.74 971.74 158.82 158.82 158.82 .1 .3

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	139.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.032		
W.S. Elev (ft)	139.47	Reach Len. (ft)	158.82	158.82	158.82

Crit W.S. (ft)		Flow Area (sq ft)	42.67
E.G. Slope (ft/ft)	0.003248	Area (sq ft)	42.67
Q Total (cfs)	109.00	Flow (cfs)	109.00
Top Width (ft)	44.84	Top Width (ft)	44.84
Vel Total (ft/s)	2.55	Avg. Vel. (ft/s)	2.55
Max Chl Dpth (ft)	1.47	Hydr. Depth (ft)	0.95
Conv. Total (cfs)	1912.5	Conv. (cfs)	1912.5
Length Wtd. (ft)	158.82	Wetted Per. (ft)	45.01
Min Ch El (ft)	138.00	Shear (lb/sq ft)	0.19
Alpha	1.00	Stream Power (lb/ft s)	0.49
Frctn Loss (ft)	0.29	Cum Volume (acre-ft)	1.59
C & E Loss (ft)	0.02	Cum SA (acres)	1.11

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Hunt River
REACH: Randolph RS: 9

INPUT
Description:
Station Elevation Data num= 492

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	148.63	.18	148.63	1.54	148.4	2.51	148.22	5.8	147.66
7.89	147.34	8.02	147.33	11.28	146.83	14.96	146.35	16.64	146.12
18.85	145.86	19.76	145.78	23.15	145.43	26.63	145.09	28.24	144.97
31.4	144.79	32.47	144.74	37.8	144.44	39.63	144.37	41.4	144.32
43.74	144.24	45.2	144.2	47.63	144.11	49.96	144.08	50.28	144.06
52.73	144.01	59.74	144.01	60.07	144	62.32	144	63.18	143.97
64.46	143.96	66.59	143.87	68.72	143.75	70.18	143.68	74.11	143.46
76.4	143.34	76.99	143.3	80.45	143.12	84.18	142.9	86.52	142.77
88.07	142.67	90.05	142.56	90.98	142.52	94.23	142.35	99.74	142.08
100.52	142.05	103.91	141.87	107.11	141.71	112.18	141.42	115.29	141.25
116.07	141.22	119.18	141.06	119.8	141.02	120.98	141	174.41	141
176.43	141.15	182.96	141.61	187.09	141.87	190.74	142.07	194.41	142.29
196.96	142.43	201.19	142.68	204.16	142.82	207.07	142.97	207.98	143
209.18	143.01	210.96	143.01	211.37	143.02	213.29	143.02	213.76	143.03
217.18	143.03	217.8	143.02	220.15	143.02	220.29	143.01	223.55	143.01
228.32	143.06	230.02	143.07	231.88	143.1	232.74	143.1	235.04	143.13
238.96	143.13	239.35	143.14	244.68	143.14	245.18	143.15	249.41	143.15
249.85	143.14	259.18	143.14	259.61	143.13	270.28	143.13	272.4	143.16
273.18	143.16	286.27	143.33	291.6	143.39	291.85	143.4	295.39	143.44
297.85	143.48	299.07	143.49	304.01	143.56	305.47	143.57	308.67	143.62
310.8	143.64	313.11	143.67	314	143.69	316.13	143.71	321.26	143.78
323.28	143.79	327.86	143.84	331.52	143.85	333.19	143.87	335.33	143.86
337.46	143.8	339.59	143.81	343.63	143.87	345.32	143.84	349.41	143.72
350.41	143.7	352.39	143.64	355.63	143.61	356.65	143.58	359.85	143.42
363.98	143.3	365.67	143.24	370.41	143.1	371.19	143.09	372.98	143.09
375.07	143.07	377.98	143.06	380.12	143.03	381.3	142.99	384.41	142.97
386.74	142.97	388.65	142.98	390.63	143	399.58	143	400.74	142.99
401.72	143	402.3	142.98	404.67	142.98	406.96	142.95	407.47	142.96
409.76	142.93	411.63	142.92	413.15	142.9	420.19	142.9	421.63	142.93
422.77	142.92	425.02	142.88	425.63	142.88	427.04	142.85	431.07	142.8

431.85 142.78 434.96 142.74 438.58 142.66 444.83 142.66 447.06 142.7
447.7 142.7 449.43 142.73 451.3 142.78 454.41 142.89 457.24 143
467.82 143 469.69 142.97 471.52 142.95 474.19 142.9 475.41 142.89
479.28 142.82 480.36 142.81 485.69 142.72 489.45 142.67 492.09 142.62
493.3 142.61 495.29 142.57 497.19 142.55 497.93 142.53 503.02 142.46
504.96 142.42 508.11 142.38 511.5 142.32 511.96 142.32 516.58 142.24
517.68 142.23 519.82 142.19 523.01 142.15 524.41 142.12 528.17 142.07
530.15 142.03 531.41 142.02 532.19 142 536.08 142 536.79 141.99
545.41 141.99 546.19 141.98 561.41 141.98 561.74 141.97 565.76 141.97
566.41 141.98 568.87 141.98 570.3 141.97 572.54 141.94 573.41 141.94
579.63 141.87 580.6 141.87 581.67 141.85 583.52 141.84 587.8 141.79
589.74 141.78 592.08 141.75 592.85 141.75 595.97 141.71 597.97 141.7
599.08 141.68 600.01 141.68 602.19 141.65 604.06 141.64 605.13 141.62
606.08 141.62 608.33 141.59 610.74 141.58 612.3 141.56 614.63 141.55
614.73 141.54 617.25 141.53 620.02 141.5 622.41 141.49 625.1 141.46
630.19 141.43 634.08 141.39 635.28 141.39 637.97 141.36 640.37 141.35
643.12 141.32 644.19 141.32 645.65 141.3 646.72 141.3 648.08 141.28
650.41 141.27 650.54 141.26 654.18 141.24 654.3 141.23 656.63 141.22
658.19 141.2 661.65 141.18 664.1 141.16 665.8 141.14 666.74 141.14
668.05 141.12 669.19 141.12 671.86 141.09 672.97 141.09 677.67 141.05
679.36 141.03 680.48 141.03 683.35 141 697.08 141 697.72 140.99
706.1 140.99 710.7 140.99 711.08 141 804.41 141 806.92 140.73
807.75 140.66 810.63 140.46 813.32 140.28 816.08 140.06 817.34 139.97
822.68 139.72 826.19 139.54 828.58 139.43 830.86 139.31 831.21 139.3
834.41 139.14 837.08 139 840.45 138.68 843.3 138.4 845.07 138.24
847.97 137.96 850.62 137.69 851.47 137.61 856.8 137.06 857.87 137
864.3 137 865.08 137.05 865.86 137.14 868.19 137.44 870.14 137.68
872.86 138 876.06 138.46 878.13 138.75 879.86 138.95 881.33 139.08
884.51 139.32 885.59 139.38 893.13 139.57 894.71 139.6 898.13 139.71
899.62 139.78 903 139.97 903.93 140.01 906.51 140.15 907.24 140.18
909.43 140.3 910.16 140.33 912.35 140.45 913.67 140.51 914.85 140.58
921.32 140.91 922.75 140.99 924.72 141.14 927.69 141.35 927.71 141.36
929.88 141.51 932.92 141.73 935 141.86 936.14 141.94 939.38 142.14
941.03 142.25 944.57 142.44 946.44 142.53 949.15 142.67 951.07 142.76
954.72 142.95 959.11 143.13 960.27 143.16 961.9 143.22 965.68 143.38
967.04 143.43 971.53 143.62 972.99 143.67 977.37 143.86 978.04 143.88
980.46 144 983.22 144.09 984.68 144.13 986.26 144.19 991.86 144.36
992.71 144.38 994.37 144.44 995.64 144.47 996.69 144.51 998.56 144.56
1002.49 144.69 1004.4 144.74 1006.1 144.8 1006.37 144.81 1007.66 144.84
1010.25 144.92 1010.61 144.94 1012.93 145 1022.67 145 1023.23 144.99
1027.41 144.99 1027.78 144.98 1033.33 144.98 1033.63 144.97 1038.01 144.97
1038.44 144.96 1048.97 144.96 1049.13 144.97 1051.89 144.97 1052.35 144.98
1055.83 144.98 1056.27 144.99 1059.75 144.99 1061.39 145 1063.95 145.15
1064.93 145.22 1066.5 145.31 1068.88 145.46 1074.54 145.73 1076 145.79
1078.19 145.9 1080.38 146 1083.3 146.29 1085.03 146.45 1088.3 146.77
1088.42 146.79 1090.6 147 1091.34 147.09 1092.94 147.26 1096.42 147.65
1097.58 147.77 1101.89 148.25 1104.7 148.55 1108.37 148.96 1109.61 149.08
1111.8 149.32 1116.18 149.84 1118.24 150.08 1120.77 150.36 1126.14 150.91
1127.87 151.1 1130.09 151.36 1133.52 151.6 1134.68 151.69 1136.64 151.82
1137.37 151.88 1139.56 152.03 1141.75 152.14 1143.91 152.26 1146.86 152.41
1147.44 152.45 1149.84 152.57 1151.98 152.69 1152.71 152.72 1156.71 152.94
1158.07 153.01 1159.28 153.12 1162.94 153.47 1163.66 153.55 1166.5 153.82
1168.05 153.99 1170.97 154.47 1173.9 154.96 1176.09 155.39 1177.48 155.68
1177.59 155.69 1179.46 156.06 1181.43 156.48 1183.41 156.89 1184.85 157.21
1185.38 157.34 1186.86 157.67 1188.02 157.91 1191.5 158.7 1192.89 159
1196.14 159.76 1198 160.16 1203.02 161.21 1206.58 161.85 1211.45 162.69
1213.53 163.04 1215 163.25 1217.06 163.52 1220.65 164.01 1227.23 164.6
1228.3 164.7 1229.77 164.82 1230.93 164.93 1232.34 165.03 1233.8 165.11

1234.75 165.15 1236.72 165.26 1237.46 165.29 1240.38 165.45 1241.11 165.48
1243.3 165.61 1245.49 165.77 1246.95 165.89 1248.57 166.01 1249.88 166.06
1251.34 166.13 1255.72 166.31 1257.6 166.4 1259.2 166.46 1259.92 166.5
1265.72 166.75 1266.88 166.79 1268.03 166.85 1269.6 166.91 1272.27 167.04
1274.99 167.2 1281.95 167.59 1284.94 167.77 1288.6 167.97 1290.1 168.13
1292.98 168.51 1297.02 169.03 1298.82 169.3 1301.02 169.61 1303.21 169.93
1305.14 170.23 1311.24 171.23 1312.1 171.38 1314.9 171.84 1316.36 172.09
1317.09 172.2 1319.66 172.63 1320.74 172.82 1322.2 173.06 1327.17 173.93
1330.97 174.49 1331.51 174.56 1334.62 175.01 1337.43 175.3 1344.12 176.04
1346.31 176.23 1349.28 176.43 1350.37 176.49 1355.21 176.82 1359.15 177.02
1361.13 177.13 1361.59 177.13

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .045 706.1 .032 1006.1 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
706.1 1006.1 121.2 121.2 121.2 .1 .3

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	139.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.032		
W.S. Elev (ft)	139.22	Reach Len. (ft)	121.20	121.20	121.20
Crit W.S. (ft)		Flow Area (sq ft)	60.41		
E.G. Slope (ft/ft)	0.001189	Area (sq ft)	60.41		
Q Total (cfs)	109.00	Flow (cfs)	109.00		
Top Width (ft)	50.26	Top Width (ft)	50.26		
Vel Total (ft/s)	1.80	Avg. Vel. (ft/s)	1.80		
Max Chl Dpth (ft)	2.22	Hydr. Depth (ft)	1.20		
Conv. Total (cfs)	3161.6	Conv. (cfs)	3161.6		
Length Wtd. (ft)	121.20	Wetted Per. (ft)	50.50		
Min Ch El (ft)	137.00	Shear (lb/sq ft)	0.09		
Alpha	1.00	Stream Power (lb/ft s)	0.16		
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	1.40		
C & E Loss (ft)	0.01	Cum SA (acres)	0.94		

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Hunt River
REACH: Randolph RS: 8

INPUT
Description:
Station Elevation Data num= 492
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 141 10.65 141 11.26 141.01 14.04 141.11 15.73 141.16
19.32 141.24 23.8 141.3 27.1 141.39 30.99 141.46 36.07 141.53
41.15 141.63 43.25 141.69 44.99 141.75 47.32 141.81 48.1 141.84
50.71 141.91 53.02 141.95 55.43 142.01 61.18 142.1 64.06 142.16
66.93 142.19 70.66 142.24 71.44 142.24 74.17 142.28 77.37 142.35
78.44 142.39 79.99 142.43 81.83 142.49 85.44 142.55 87.77 142.58

89.94 142.66 90.88 142.71 92.44 142.77 95.69 142.92 96.56 142.94
97.63 142.99 101.77 143.15 102.96 143.19 108 143.38 109.36 143.41
112.66 143.5 115.72 143.59 118.11 143.68 125.11 143.92 126.67 143.97
129.62 144.09 134.95 144.33 136.78 144.4 141.45 144.61 144.58 144.72
147.92 144.83 150.95 144.97 152.01 145 153 145.01 155.45 145.01
156.39 145 157.78 144.96 160.54 144.86 162.68 144.79 164 144.79
168.67 144.74 171.78 144.72 175.47 144.68 176.73 144.68 178.42 144.66
179.56 144.66 184 144.62 185.2 144.62 189.33 144.67 190.28 144.69
195.37 144.75 196.68 144.77 200.57 144.85 202.1 144.87 203.2 144.86
206.79 144.86 207.23 144.85 209.9 144.85 210.62 144.84 214.01 144.84
214.57 144.83 225.46 144.83 225.59 144.84 230.96 144.84 233.05 144.86
238.38 144.86 238.68 144.85 241.01 144.84 244.13 144.8 245.24 144.8
246.91 144.78 248.11 144.78 249.57 144.76 251.91 144.75 253.31 144.73
254.68 144.73 256.38 144.71 262.02 144.68 264.85 144.65 266.54 144.64
269.31 144.61 272.51 144.56 273.69 144.55 276.02 144.51 280.1 144.46
281.8 144.43 284.23 144.42 287.43 144.39 288.57 144.39 291.25 144.37
292.76 144.35 295.35 144.34 298.1 144.31 299.16 144.31 300.13 144.29
303.25 144.25 304.02 144.25 308.5 144.19 311.38 144.16 313.36 144.16
313.99 144.15 316.22 144.15 316.47 144.14 318.8 144.14 319.08 144.13
321.14 144.13 321.56 144.12 323.47 144.12 323.69 144.11 325.82 144.11
325.86 144.1 327.95 144.1 328.14 144.09 330.09 144.09 331.51 144.07
335.14 144.05 337.55 144.05 337.72 144.04 340.14 144.04 342.8 144.02
345.25 144.02 345.89 144.01 348.36 144.01 348.77 144 351.28 144
351.41 143.99 353.81 143.99 354.52 143.98 357.7 143.98 357.81 143.97
361.01 143.97 361.44 143.96 364.21 143.96 364.7 143.95 369.92 143.95
370.14 143.94 375 143.94 375.59 143.93 380.4 143.93 384.92 143.9
386.6 143.88 389.8 143.87 393.48 143.84 395.04 143.84 398.73 143.81
400.42 143.81 405.93 143.77 407.48 143.77 409.82 143.75 411.37 143.75
413.26 143.73 414.91 143.73 419.06 143.7 420.76 143.7 424.99 143.68
425.37 143.67 427.54 143.67 433.93 143.64 436.26 143.62 440.15 143.61
442.05 143.59 443.11 143.59 444.48 143.57 445.6 143.57 449.42 143.53
450.58 143.53 451.82 143.51 453.78 143.5 458.82 143.44 459.6 143.44
462.71 143.4 465.82 143.37 466.6 143.37 471.9 143.3 474.04 143.28
478.18 143.22 481.38 143.2 485.27 143.14 490.72 143.07 491.93 143.06
497.72 142.98 498.56 142.98 500.41 142.95 502.1 142.94 503.89 142.91
504.72 142.91 509.81 142.85 511.72 142.82 512.5 142.82 518.72 142.74
519.5 142.74 521.32 142.71 522.02 142.71 526.5 142.65 527.28 142.65
529.94 142.61 534.3 142.56 535.99 142.55 536.95 142.53 538.57 142.52
541.28 142.48 542.06 142.48 546.55 142.42 547.2 142.42 549.06 142.39
549.83 142.39 555.08 142.32 559.34 142.28 565.39 142.2 570.21 142.15
573.95 142.1 574.73 142.1 578.36 142.05 582.51 142 583.87 141.99
587.46 141.99 591.84 141.94 592.62 141.94 596.09 141.89 599.86 141.85
604.13 141.79 607.33 141.76 611.29 141.71 612.25 141.69 613.72 141.68
615.64 141.65 621.4 141.58 622.18 141.58 632.29 141.45 637.18 141.4
638.25 141.38 642.1 141.34 643.96 141.31 644.74 141.31 651.23 141.23
653.18 141.2 656.4 141.17 660.64 141.11 662.23 141.1 668.07 141.02
669.63 141.01 672.37 141.01 672.74 141 677.41 141 679.49 140.98
681.73 140.97 681.95 140.97 684.41 140.97 686.74 140.96 686.82 140.95
689.07 140.95 689.43 140.94 692.63 140.94 692.96 140.93 697.96 140.93
698.41 140.92 703.29 140.92 703.76 140.91 712.24 140.91 712.41 140.92
719.41 140.92 719.75 140.93 724.1 140.93 724.62 140.94 728.88 140.94
729.18 140.95 733.41 140.95 734.13 140.96 738.48 140.96 738.86 140.97
745.95 140.97 746.13 140.98 753.64 140.98 754.26 140.99 760.01 140.99
760.64 141 788.77 141 789.66 140.99 793.93 140.9 795.64 140.89
798.19 140.86 800.36 140.86 801.87 140.85 803.42 140.75 806.02 140.57
808.09 140.45 809.65 140.37 810.42 140.31 813.54 140.03 814.19 139.96
816.65 139.58 817.53 139.46 820.4 139.03 820.59 139.01 824.08 138.35
826.16 137.97 829.17 137.51 830.86 137.24 832.32 137.02 833.76 136.99

836.87 136.98 839.21 136.96 842.32 136.96 844.42 136.98 846.29 136.98
849.5 137.01 850.87 137.08 852.89 137.16 853.64 137.2 857.79 137.37
858.65 137.42 860.99 137.51 862.17 137.57 863.54 137.62 864.88 137.69
867.21 137.79 869.29 137.87 871.1 137.96 871.53 137.97 881.37 138.48
881.99 138.52 884.56 138.65 888.21 138.85 891.87 139.04 892.88 139.08
895.99 139.24 896.77 139.27 898.43 139.36 901.44 139.5 907.66 139.81
908.02 139.82 910.51 139.95 912.21 140 914.42 140.04 918.55 140.14
918.98 140.14 921.66 140.2 924.07 140.28 928.66 140.36 930.42 140.38
932.54 140.42 935.44 140.46 937.22 140.5 942.15 140.69 946.55 140.85
948.89 140.95 950.68 141.04 953.55 141.21 957.44 141.48 961.32 141.74
963.47 141.89 966 142.02 967.56 142.07 971.45 142.22 975.34 142.31
977.33 142.35 979.99 142.37 981.95 142.38 982.67 142.38 983.89 142.36
984.8 142.36 985.86 142.34 987 142.34 988.46 142.31 989.34 142.31
994 142.43 996.94 142.46 997.89 142.46 999.45 142.48 1001.86 142.49
1005.67 142.53 1009.32 142.55 1011.12 142.58 1013.88 142.61 1014.65 142.63
1016.79 142.66 1018.84 142.68 1021.71 142.73 1026.68 142.79 1030.34 142.85
1030.83 142.85 1035.23 142.92 1037.05 142.94 1041.31 143 1043.79 143
1044.57 143.02 1046.08 143.21 1049.47 143.65 1051.97 143.96 1053.35 144.21
1056.25 144.78 1057.01 144.92 1059.1 145.35 1060.9 145.74 1064.01 146.37
1066.9 146.93 1067.97 147.12 1069.81 147.41 1073.2 147.97 1074.37 148.07
1078.28 148.37 1081.91 148.6 1083.96 148.72 1088.13 148.99 1090.46 149.01
1094.35 149.01 1094.63 149.02 1099.96 149.02 1102.01 149.04 1102.09 149.05
1104.46 149.08 1105.24 149.08 1109.13 149.13 1110.86 149.16 1112.75 149.18
1115.56 149.19 1116.91 149.21 1120.02 149.23 1123.13 149.27 1124.04 149.27
1127.02 149.31 1127.8 149.31 1130.88 149.35 1131.69 149.35 1133.87 149.38
1134.8 149.38 1136.75 149.4 1139.29 149.44 1144.37 149.5 1147.76 149.55
1152.85 149.61 1154.54 149.64 1156.58 149.66 1157.36 149.68 1160.47 149.72
1166.4 149.81 1169.81 149.85 1170.58 149.87 1173.18 149.9 1176.81 149.95
1179.14 149.99 1181.65 149.99 1183.13 150 1183.81 150.03 1186.14 150.21
1190.13 150.54 1194.26 150.86 1196.25 151.03 1198.06 151.25 1200.01 151.47
1203.39 151.87 1204.03 151.92 1205.38 152.06 1208.64 152.44 1209.48 152.55
1211.92 152.84 1214.05 153.05 1217.24 153.38 1217.27 153.39 1221.52 153.83
1223.02 153.96 1225.72 154.25 1227.41 154.44 1228.93 154.59 1230.8 154.79
1232.04 154.91 1233.59 155.09 1234.37 155.2 1238.58 155.74 1240.97 156.12
1241.78 156.26 1247.18 157.12

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	681.95	.032	981.95	.045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

681.95	981.95	120.9	120.9	120.9	.1	.3

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	139.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.032		
W.S. Elev (ft)	139.17	Reach Len. (ft)	120.90	120.90	120.90
Crit W.S. (ft)		Flow Area (sq ft)	102.41		
E.G. Slope (ft/ft)	0.000349	Area (sq ft)	102.41		
Q Total (cfs)	109.00	Flow (cfs)	109.00		
Top Width (ft)	75.12	Top Width (ft)	75.12		
Vel Total (ft/s)	1.06	Avg. Vel. (ft/s)	1.06		
Max Chl Dpth (ft)	2.21	Hydr. Depth (ft)	1.36		
Conv. Total (cfs)	5834.2	Conv. (cfs)	5834.2		
Length Wtd. (ft)	120.90	Wetted Per. (ft)	75.36		
Min Ch El (ft)	136.96	Shear (lb/sq ft)	0.03		
Alpha	1.00	Stream Power (lb/ft s)	0.03		

Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	1.18
C & E Loss (ft)	0.00	Cum SA (acres)	0.76

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Hunt River
REACH: Randolph RS: 7

INPUT
Description:
Station Elevation Data num= 492

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	146.16	2.61	146.42	4.64	146.64	6.45	146.82	8.89	147.08
9.79	147.19	11.75	147.4	13.59	147.61	16.07	147.85	19.08	148.16
21.87	148.47	24.23	148.69	27.71	149.03	30.06	149.27	37.91	150.02
39.48	150.16	40.55	150.27	43.81	150.57	46.04	150.79	48.71	151.04
49.89	151.14	54.13	151.55	54.38	151.58	59.09	152.03	64.72	152.58
66.15	152.71	68.29	152.92	72.14	153.28	74.82	153.54	78.7	153.86
81.68	154.12	82.62	154.19	84.19	154.33	85.76	154.45	87.87	154.63
89.09	154.72	90.15	154.78	95.17	155.03	97.39	155.15	99.69	155.18
100.41	155.18	103.8	155.23	106.15	155.25	107.72	155.17	110.72	155.07
112.49	155.02	114.52	154.95	116.64	154.8	118.88	154.69	123	154.42
125.76	154.17	127.33	154.02	129.35	153.87	131.47	153.73	132.53	153.63
134.65	153.4	135.2	153.35	138.46	153.01	139.95	152.84	144.19	152.27
146.31	151.97	148.74	151.58	149.89	151.38	151.76	151.02	153.15	150.73
155.57	150.24	159.68	149.36	164.57	148.29	165.76	148.04	166.86	147.87
168.12	147.71	169.47	147.52	172.9	147.07	173.61	147	174.37	146.98
177.53	146.98	178.94	146.96	182.53	146.86	185.79	146.78	189.29	146.73
190.08	146.71	193.95	146.65	196.1	146.67	200.48	146.67	201.06	146.66
203.11	146.66	206.13	146.63	209.88	146.6	210.94	146.6	223.02	146.4
224.96	146.35	232.43	146.2	234	146.16	236.33	146.12	236.38	146.11
242.38	146	243.42	146	244.54	145.97	246.96	145.87	251.07	145.74
254.33	145.63	255.18	145.63	259.1	145.58	259.89	145.58	263.03	145.54
263.91	145.54	266.03	145.5	267.73	145.48	271.33	145.41	276.63	145.33
277.93	145.3	280.86	145.25	283.71	145.21	286.16	145.16	287.22	145.15
290.23	145.09	294.4	145.03	294.64	145.02	297.82	145.02	298.32	145.01
304.92	145.01	306.95	145	310.09	144.97	311.45	144.97	313.08	144.95
315.58	144.94	317.15	144.92	320.91	144.9	322.87	144.9	324.99	144.88
330.48	144.86	334.3	144.83	336.01	144.83	338.08	144.81	343.03	144.79
345.08	144.77	346.55	144.77	348.52	144.75	350.09	144.75	353.88	144.72
355.58	144.72	359.27	144.69	362.64	144.68	364.56	144.66	366.22	144.66
368.13	144.64	369.7	144.64	373.46	144.61	375.16	144.61	382.25	144.56
383.82	144.56	385.76	144.54	387.36	144.54	390.88	144.51	392.45	144.51
396.31	144.48	397.41	144.48	401.08	144.45	402.64	144.45	406.1	144.42
411	144.4	412.84	144.38	414.41	144.38	419.66	144.34	422.84	144.33
424.61	144.31	426.18	144.31	429.65	144.28	432.67	144.27	433.24	144.26
436.37	144.24	437.94	144.24	439.79	144.22	442.97	144.21	444.75	144.19
448.14	144.18	448.27	144.17	451.45	144.16	455.06	144.13	456.84	144.13
458.86	144.11	462.26	144.1	464.16	144.08	465.9	144.08	467.75	144.06
471.38	144.05	473.24	144.03	474.96	144.03	478.73	144	481.17	144
487.7	143.88	490.5	143.84	492.77	143.8	494.42	143.76	495.99	143.74
502.15	143.62	503.05	143.61	507.6	143.52	508.66	143.51	510.89	143.46

512.46 143.44 514.23 143.4 519.25 143.31 520.31 143.3 522.65 143.25
528.5 143.15 528.93 143.15 533.39 143.07 535.02 143.05 537.56 143
541.55 143 542.26 142.99 544.82 142.99 546.45 142.97 550.11 142.94
553.16 142.9 554.03 142.9 557.17 142.86 557.95 142.86 560.31 142.83
563.44 142.81 566.93 142.77 567.99 142.77 571.29 142.74 575.41 142.71
578.59 142.68 579.65 142.68 582.27 142.65 585.41 142.63 587.76 142.6
589.74 142.59 590.9 142.57 593.77 142.55 597.96 142.5 598.8 142.5
601.82 142.46 605.2 142.43 610.37 142.37 611.29 142.37 613.36 142.34
614.99 142.33 619.92 142.28 626.19 142.2 629.68 142.17 632.62 142.13
633.68 142.13 639.53 142.06 640.31 142.04 646.59 141.96 652.52 141.87
656.99 141.82 663.06 141.74 664.97 141.71 665.41 141.7 667.59 141.68
672.11 141.61 680.27 141.51 680.36 141.5 685.6 141.43 688.43 141.4
690.06 141.37 691.3 141.36 693.01 141.33 694.43 141.32 696 141.29
702.55 141.21 703.61 141.19 706.38 141.16 708.01 141.13 710.91 141.1
711.69 141.08 713.14 141.07 716.17 141.02 718.44 141 719.63 141
724.24 140.94 725.02 140.92 728.95 140.87 735.39 140.77 737.57 140.75
738.36 140.73 742.81 140.67 746.99 140.62 748.56 140.59 751.29 140.56
752.07 140.54 755.62 140.5 758.6 140.45 759.76 140.44 764.94 140.37
765.13 140.36 770.02 140.3 774.6 140.23 776.55 140.21 778.83 140.17
780.95 140.15 783.85 140.11 784.64 140.09 789.61 140.03 791.55 139.99
795.14 139.65 796.4 139.52 798.16 139.36 801.03 139.08 802.14 138.95
805.32 138.47 808.17 138.03 809.74 137.75 813.66 137.02 817.58 136.47
821.21 136.02 822.25 136 827.57 136 828.77 136.1 829.35 136.17
834.99 136.89 836.41 137.09 838.76 137.46 841.11 137.84 842.41 138.02
846.49 138.28 849.74 138.5 851.31 138.55 855.12 138.7 858.3 138.56
861.59 138.46 864.61 138.39 867.64 138.33 870.92 138.23 872.49 138.19
877.19 138.04 880.33 138 880.55 137.99 886.61 137.49 888.18 137.35
890.08 137.2 892.2 137.02 892.88 137 906.22 137 907.79 137.06
909.35 137.14 914.06 137.34 916.57 137.46 920.16 137.61 922.69 137.73
924.26 137.79 928.96 138.01 934.09 138.29 937.11 138.44 938.82 138.54
943.15 138.76 946.17 138.95 950.93 139.29 952.59 139.42 953.65 139.49
956.83 139.73 959.33 139.91 960.01 139.95 962.13 140.15 964.97 140.44
965.31 140.48 966.61 140.6 968.49 140.79 971.32 141.05 974.02 141.34
975.24 141.46 977.28 141.68 978.91 141.84 979.95 141.91 982.42 142.1
983.32 142.18 984.38 142.22 984.65 142.25 986.22 142.35 990.93 142.69
991.8 142.7 996.03 142.53 1000.54 142.57 1002.39 142.6 1008.75 142.72
1009.92 142.76 1012.11 142.86 1015.11 142.98 1017.22 143.08 1020.4 143.21
1021.68 143.25 1027.82 143.37 1031 143.42 1033.77 143.48 1036.3 143.52
1037.36 143.52 1038.78 143.54 1039.81 143.54 1042.56 143.57 1045.05 143.57
1047.4 143.55 1049.76 143.56 1050.72 143.58 1052.35 143.59 1057.49 143.66
1058.88 143.67 1060.74 143.7 1061.52 143.7 1068.58 143.79 1069.37 143.81
1071.26 143.83 1073.03 143.86 1075.2 143.88 1079.74 143.95 1081.92 143.97
1082.7 143.99 1085.12 143.99 1085.84 144 1091.39 144 1092.45 144.07
1093.51 144.16 1095.63 144.32 1097.75 144.44 1105.45 144.78 1108.59 144.9
1110.16 144.97 1110.94 144.99 1114.7 145.14 1116.82 145.16 1117.88 145.21
1121.06 145.43 1125.29 145.75 1126.63 145.84 1128.47 145.98 1128.98 146.03
1133.77 146.63 1136.82 146.98 1137.61 147.06 1141.53 147.51 1142.31 147.62
1144.67 147.92 1145.53 148.02 1147.54 148.16 1149.37 148.3 1153.53 148.59
1158 148.84 1160.36 148.98 1161.69 149.01 1163.44 149.01 1167.41 149.04
1169.69 149.05 1172.12 149.05 1172.71 149.06 1175.73 149.06 1176.04 149.05
1179.33 149.05 1179.64 149.04 1183.1 149.04 1185.46 149.08 1188.59 149.12
1190.98 149.12 1193.3 149.09 1194.33 149.09 1200.36 149.03 1201.58 149.03
1202.49 149.06 1204.76 149.11 1206.88 149.17 1210.06 149.25 1216.41 149.39
1219.18 149.48 1222.32 149.6 1223.11 149.62 1229.38 149.86 1230.95 149.91
1233.5 150.01 1234.87 150.05 1239.17 150.16 1244.92 150.3 1245.85 150.33
1250.56 150.45 1254.27 150.56 1256.05 150.6 1256.83 150.63 1263.03 150.79
1264.5 150.84 1267.03 150.9 1269.37 150.97 1272.39 150.99 1274.69 150.99
1275.75 151 1281.45 151.22 1282.45 151.25 1290.52 151.56 1293.54 151.67

1293.88 151.69 1302.15 152

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .045 664.97 .032 964.97 .045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
664.97 964.97 140.37 140.37 140.37 .1 .3

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	139.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.	0.032		
W.S. Elev (ft)	139.16	Reach Len. (ft)	140.37	140.37	140.37
Crit W.S. (ft)		Flow Area (sq ft)	217.25		
E.G. Slope (ft/ft)	0.000071	Area (sq ft)	217.25		
Q Total (cfs)	109.00	Flow (cfs)	109.00		
Top Width (ft)	148.94	Top Width (ft)	148.94		
Vel Total (ft/s)	0.50	Avg. Vel. (ft/s)	0.50		
Max Chl Dpth (ft)	3.16	Hydr. Depth (ft)	1.46		
Conv. Total (cfs)	12945.4	Conv. (cfs)	12945.4		
Length Wtd. (ft)	140.37	Wetted Per. (ft)	149.45		
Min Ch El (ft)	136.00	Shear (lb/sq ft)	0.01		
Alpha	1.00	Stream Power (lb/ft s)	0.00		
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.73		
C & E Loss (ft)	0.00	Cum SA (acres)	0.45		

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Hunt River
REACH: Randolph RS: 6

INPUT
Description:
Station Elevation Data num= 492
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 156.55 .24 156.55 2.02 156.21 3.08 156.02 4.47 155.74
7.28 155.11 8.18 154.92 9.77 154.56 11.73 154.1 12.94 153.83
15.33 153.27 16.74 152.95 18.84 152.55 20.09 152.3 22.47 151.85
24.85 151.42 26.19 151.19 27.22 151.03 28.82 150.83 31.45 150.52
33.55 150.23 35.65 149.98 38.35 149.76 44.34 149.46 47.44 149.3
47.88 149.26 50.26 149.12 51.41 149.08 52.65 149.12 53.65 149.22
56.76 149.47 58.77 149.64 59 149.65 62.17 149.91 64.02 150.07
65.35 150.21 66.94 150.36 69.46 150.61 72.71 150.94 74.08 151.06
75.96 151.21 77.26 151.33 84.41 151.96 85.2 152 136.02 152
137.71 151.88 139.99 151.66 141.58 151.52 143.72 151.31 144.93 151.2
148.72 150.65 151.9 150.13 153.03 149.97 157.46 149.43 160.63 149.05
161.43 149 162.79 148.99 164.89 148.99 165.4 148.98 167.78 148.97
170.21 148.97 172.25 148.94 174.35 148.92 177.88 148.87 179.43 148.86
182.86 148.81 183.66 148.81 187.2 148.76 189.7 148.73 191.16 148.72
197.46 148.62 201.92 148.53 205.83 148.46 207.38 148.44 210.49 148.43
212.45 148.38 213.6 148.34 216.7 148.25 219.81 148.17 220.18 148.15

222.56 148.09 224.95 148.02 225.74 147.98 226.54 147.89 228.12 147.75
232.89 147.3 234.48 147.16 236.34 146.98 238.44 146.81 241.55 146.61
243.21 146.49 246.2 146.3 248.77 146.12 250.36 146.02 251.45 145.98
251.94 145.98 255.12 145.92 256.31 145.89 257.36 145.88 261.73 145.79
263.85 145.76 267.7 145.68 268.62 145.67 273.12 145.58 274.16 145.57
278.37 145.49 280.7 145.44 282.12 145.42 284.5 145.37 285.03 145.37
287.2 145.33 289.93 145.27 290.45 145.27 293.23 145.21 293.7 145.21
296.95 145.14 297.45 145.14 303.44 145.02 304.64 145 314.1 145
314.53 144.99 331.35 144.99 333.16 144.97 334.72 144.97 338.26 144.94
341.42 144.93 346.67 144.9 351.92 144.86 353.58 144.86 355.44 144.84
358.69 144.83 360.72 144.81 361.94 144.81 363.9 144.79 365.58 144.79
367.33 144.77 368.88 144.77 370.84 144.75 373.99 144.74 374.22 144.73
379.24 144.71 384.5 144.67 386.13 144.67 391.19 144.64 393.28 144.62
396.06 144.61 398.16 144.59 401.49 144.58 403.41 144.56 406.56 144.55
406.78 144.54 411.54 144.52 415.46 144.49 419.48 144.48 421.68 144.46
423.68 144.46 425.83 144.45 430.18 144.42 432.19 144.42 434.57 144.4
436.68 144.39 438.76 144.39 441.24 144.37 443.34 144.37 443.41 144.36
445.68 144.36 448.59 144.34 450.45 144.34 450.7 144.33 452.8 144.33
452.83 144.32 454.9 144.32 455.21 144.31 457.59 144.31 458.05 144.3
459.98 144.3 460.15 144.29 462.68 144.29 463.15 144.28 465.15 144.28
465.41 144.27 467.51 144.27 467.92 144.26 469.81 144.26 472.43 144.24
476.96 144.24 477.44 144.23 482.24 144.23 483 144.22 487.47 144.22
487.77 144.21 510.59 144.21 510.79 144.2 513.74 144.2 513.97 144.19
516.4 144.19 516.89 144.18 518.99 144.18 519.5 144.17 522.15 144.17
522.61 144.16 525.3 144.16 525.72 144.15 528.45 144.15 528.82 144.14
531.6 144.14 531.93 144.13 535.41 144.13 535.81 144.12 538.58 144.12
538.96 144.11 542.11 144.11 542.55 144.1 545.73 144.1 549.01 144.07
553.67 144.01 573.17 144.01 573.52 144 597.8 144 598.14 143.99
602 143.99 603.69 143.98 606.46 143.95 607.66 143.93 609.57 143.92
610.84 143.9 613.56 143.88 615.42 143.85 618.67 143.78 626.72 143.58
630.37 143.5 631.67 143.46 636.25 143.36 637.52 143.32 640.63 143.26
643.39 143.19 644 143.18 644.19 143.18 648.16 143.06 653.05 142.94
654.42 142.92 656.64 142.87 659.79 142.81 660.81 142.78 663.24 142.73
664.16 142.72 668.01 142.64 669.6 142.6 671.98 142.56 676.61 142.46
678.71 142.43 680.41 142.39 687.21 142.27 689.45 142.22 690.32 142.21
692.62 142.16 695.8 142.1 696.66 142.09 701.36 142 706.92 141.85
707.71 141.82 712.47 141.7 713.27 141.67 716.71 141.58 718.83 141.53
719.62 141.5 721.37 141.46 722.93 141.41 724.38 141.38 725.91 141.33
731.53 141.19 732.41 141.16 733.91 141.13 734.71 141.1 738.91 141
739.47 140.98 748.06 140.76 751.91 140.67 754.56 140.6 756.14 140.55
758.41 140.5 759.62 140.46 766.47 140.29 767.26 140.26 771.06 140.17
775.72 140.04 776.79 140.02 777.58 139.97 779.58 139.72 781.93 139.41
784.83 139.05 786.94 138.68 787.11 138.64 790.09 138.09 791.88 137.71
795.34 137.03 796.64 136.84 799.82 136.41 800.65 136.31 803.67 136.03
804.8 136 807.95 136 809 136.11 810.93 136.4 811.73 136.53
814.25 136.91 816.1 137.23 816.49 137.31 821.25 138.15 823.86 138.64
825.81 138.99 832.12 139.87 833.15 140 834.22 140 837.13 140.04
839.39 140.08 842.69 140.12 843.49 140.14 845.6 140.16 848.93 140.21
853.36 140.26 855.9 140.3 858.39 140.33 860.16 140.34 861.54 140.36
862.59 140.36 864.92 140.39 867.84 140.41 871 140.42 871.28 140.43
874.15 140.44 877.63 140.47 879.4 140.47 882.55 140.5 885.97 140.51
886.36 140.52 888.4 140.52 888.75 140.53 890.63 140.53 892.72 140.54
894.9 140.56 896.21 140.55 901.47 140.55 901.5 140.54 903.83 140.54
906.21 140.53 907.89 140.51 911.14 140.5 914.39 140.47 915.13 140.45
920.38 140.38 922.48 140.38 922.89 140.37 924.79 140.37 926.06 140.36
930.89 140.29 932.99 140.27 936.14 140.22 941.4 140.16 942.74 140.16
944 140.14 946.71 140.11 947.5 140.11 949.64 140.08 951.9 140.06
953.85 140.06 954 140.05 956.24 140.05 956.64 140.04 958.62 140.04

958.96 140.03 961 140.03 961.36 140.02 963.62 140.02 966.39 140
980.27 140 980.7 139.99 1003.99 139.99 1004.44 140 1009.69 140
1010.2 140.04 1010.23 140 1012.85 140.22 1014.99 140.38 1016.41 140.5
1018.17 140.63 1018.96 140.7 1021.35 140.88 1022.93 141.01 1027.28 141.46
1028.83 141.61 1032.46 141.98 1035.64 142.26 1035.96 142.28 1038.81 142.53
1039.12 142.55 1042.78 142.86 1044.36 143 1045.96 143.07 1047.63 143.13
1051.52 143.3 1053.9 143.39 1055.93 143.48 1058.03 143.56 1061.05 143.74
1065.02 143.99 1070.38 144.17 1070.76 144.19 1074.55 144.31 1079.04 144.47
1079.31 144.47 1083.18 144.61 1084.74 144.65 1087.84 144.75 1088.5 144.76
1092.01 144.86 1093.13 144.9 1095.19 144.95 1096.78 145 1099.01 145.12
1105.51 145.49 1108.03 145.63 1111.86 145.8 1113.72 145.89 1114.77 145.93
1116.63 146.02 1118.22 146.08 1121.39 146.22 1125.36 146.38 1126.95 146.46
1128.88 146.58 1131.71 146.78 1132.13 146.8 1134.89 146.99 1135.68 147
1138.07 147 1138.63 147.01 1145.3 147.01 1146.01 147.02 1161.37 147.02
1163.93 147.04 1166.26 147.03 1168.59 147.08 1170.46 147.13 1174.37 147.22
1177.77 147.29 1181.74 147.39 1182.57 147.4 1185.67 147.48 1186.5 147.49
1188.32 147.54 1195.24 147.69 1197.78 147.73 1201.2 147.82 1201.59 147.84
1205.86 147.96 1207.94 148.04 1210.12 148.15 1210.32 148.15 1213.62 148.31
1214.29 148.32 1215.88 148.38 1217.74 148.43 1218.79 148.47 1220.64 148.52
1222.23 148.58 1223.12 148.6 1225.1 148.67 1228.58 148.78 1230.17 148.8
1231.4 148.83 1233.5 148.83 1236.12 148.91 1238.47 148.99 1241.57 149.13
1242.62 149.17 1246.05 149.34 1249.34 149.49 1250.89 149.59 1254.52 149.84
1254.79 149.85 1258.65 150.14 1259.55 150.22 1262.73 150.47 1265.36 150.67
1266.7 150.79 1268.18 150.9 1269.08 150.99 1271.08 151.15 1271.33 151.18
1274.64 151.43 1275.1 151.43

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	644	.032	944	.045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
644 944 119.99 119.99 119.99 .1 .3

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	139.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.032		
W.S. Elev (ft)	139.11	Reach Len. (ft)	119.99	119.99	119.99
Crit W.S. (ft)		Flow Area (sq ft)	76.67		
E.G. Slope (ft/ft)	0.000432	Area (sq ft)	76.67		
Q Total (cfs)	109.00	Flow (cfs)	109.00		
Top Width (ft)	42.35	Top Width (ft)	42.35		
Vel Total (ft/s)	1.42	Avg. Vel. (ft/s)	1.42		
Max Chl Dpth (ft)	3.11	Hydr. Depth (ft)	1.81		
Conv. Total (cfs)	5246.0	Conv. (cfs)	5246.0		
Length Wtd. (ft)	119.99	Wetted Per. (ft)	42.87		
Min Ch El (ft)	136.00	Shear (lb/sq ft)	0.05		
Alpha	1.00	Stream Power (lb/ft s)	0.07		
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	0.26		
C & E Loss (ft)	0.00	Cum SA (acres)	0.14		

CROSS SECTION

RIVER: Hunt River
REACH: Randolph RS: 5

INPUT
Description:
Station Elevation Data num= 491

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	151.04	.4	151.04	2.26	151.08	4.89	151.11	6.49	151.14
7.16	151.14	9.06	151.18	10.33	151.18	12.91	151.1	14.52	151.06
16.94	150.96	18.78	150.77	21.66	150.49	23.24	150.33	25.6	150.07
26.39	149.99	29.35	149.84	31.46	149.72	33.18	149.65	37.41	149.53
37.8	149.51	38.98	149.49	40.97	149.44	42.45	149.36	44.14	149.28
45.2	149.22	46.62	149.16	48.63	149.15	55.52	149.04	57.1	149.05
57.9	149.07	67.18	149.19	68.44	149.23	71.27	149.29	73.36	149.34
75.84	149.33	76.45	149.34	81.51	149.47	83.23	149.57	85.73	149.73
87.02	149.8	88.52	149.9	90.95	150.03	93.32	150.18	95	150.27
96.47	150.38	98.09	150.46	100.4	150.63	101.2	150.67	103.55	150.83
105.92	150.98	107.49	151.11	109.07	151.13	109.85	151.15	111.76	151.17
113.55	151.2	114.58	151.23	115.36	151.27	116.15	151.29	118.51	151.19
123.68	150.99	124.03	151.01	125.91	150.92	131.11	150.72	132.09	150.69
133.95	150.61	136.06	150.49	137.12	150.42	138.27	150.36	138.99	150.37
140.56	150.45	142.93	150.33	146.15	150.25	148.44	150.18	149.36	150.16
151.59	150.13	152.37	150.11	154.74	150.07	155.78	150.06	157.89	150.02
158.99	150.01	171.83	150.01	171.99	150.02	188.89	150.02	189.38	150.01
208.76	150.01	208.97	150	214.58	150	215.55	149.95	218.39	149.71
219.31	149.64	224.03	149.25	225.61	149.11	227.18	148.99	232.69	148.69
234.32	148.61	236.04	148.51	238.2	148.42	242.14	148.23	242.93	148.2
244.5	148.12	246.47	148.03	248.89	147.94	251.59	147.86	253.17	147.8
256.32	147.7	256.91	147.67	259.46	147.59	260.12	147.56	262.61	147.48
263.91	147.43	266.55	147.36	267.34	147.33	269.19	147.28	270.25	147.26
273.64	147.16	276.18	147.1	277.38	147.06	279.94	147	280.47	146.98
283.98	146.9	286.24	146.84	286.65	146.84	287.81	146.8	290.17	146.74
290.96	146.71	293.49	146.65	295.69	146.59	299.02	146.49	299.62	146.48
303.56	146.36	305.2	146.32	305.92	146.29	307.23	146.26	308.28	146.22
311.38	146.14	315.68	146.01	321.12	145.94	322.02	145.92	325.94	145.88
329.15	145.83	329.93	145.83	332.59	145.79	335.76	145.76	338.78	145.71
339.98	145.7	343.6	145.65	343.72	145.64	346.32	145.61	350.81	145.55
352.66	145.52	357.75	145.45	360.06	145.41	361.26	145.4	362.86	145.37
364.98	145.35	365.77	145.33	368.51	145.3	369.28	145.28	370.62	145.27
371.28	145.25	373.2	145.23	374.1	145.21	375.91	145.19	377.31	145.16
378.37	145.15	381.19	145.1	385.57	145.03	390.97	144.96	391.75	144.96
398.84	144.87	399.63	144.87	401.39	144.85	402.32	144.83	404.35	144.81
406.2	144.81	407.6	144.8	409.86	144.77	414.23	144.72	416.16	144.69
418.17	144.7	422.26	144.7	422.4	144.71	426.62	144.71	427.07	144.72
431.12	144.72	431.89	144.73	435.1	144.73	435.85	144.74	439.91	144.74
440.36	144.75	444.3	144.75	444.51	144.76	448.45	144.76	448.81	144.77
453.17	144.77	453.57	144.78	457.57	144.78	457.9	144.79	461.83	144.79
462.39	144.8	465.77	144.8	465.94	144.81	468.13	144.81	468.81	144.82
470.5	144.82	471	144.83	473.11	144.83	473.63	144.84	476.01	144.84
476.28	144.85	478.44	144.85	481.39	144.87	483.26	144.87	483.68	144.88
485.79	144.88	486.25	144.89	488.61	144.89	488.96	144.9	491.07	144.9
491.28	144.91	493.76	144.91	494.12	144.92	496.36	144.92	496.48	144.93
498.84	144.93	499.31	144.94	501.21	144.94	501.64	144.95	503.75	144.95
504.13	144.96	506.72	144.96	506.92	144.97	509.87	144.97	510.55	144.98
516.97	144.98	517.49	144.99	532.28	144.99	532.7	145	558.71	145
560.31	144.97	563.41	144.85	567.15	144.7	568.93	144.62	572.08	144.5
572.86	144.46	574.54	144.4	575.6	144.35	576.8	144.31	584.05	144.01
587.04	143.95	589.58	143.89	592.55	143.84	595.63	143.77	596.49	143.76
598.06	143.72	598.86	143.71	602.05	143.65	603.07	143.62	605.26	143.58
606.24	143.57	607.51	143.54	609.08	143.52	614.31	143.42	615.75	143.4
621.68	143.29	625.26	143.25	628.43	143.2	630.54	143.18	634.77	143.11

635.76 143.1 639.79 143.03 640.76 143.02 643.73 142.98 644.52 142.96
650.03 142.89 651.41 142.88 653.18 142.85 653.79 142.85 655.54 142.82
660.68 142.76 663.3 142.72 664.65 142.71 666.57 142.68 670.69 142.64
671.75 142.62 675.23 142.58 689.4 142.4 689.71 142.39 693.55 142.35
695.15 142.32 695.7 142.32 698.36 142.28 699.64 142.27 700.43 142.25
703.18 142.22 703.96 142.2 706.73 142.17 707.51 142.15 709.6 142.13
711.9 142.09 717.63 142.01 719.32 142.01 721.69 141.98 723.26 141.94
724.58 141.92 728.8 141.83 728.86 141.82 733.68 141.72 734.87 141.7
735.86 141.67 738.5 141.62 741.37 141.55 741.71 141.55 744.52 141.48
744.92 141.48 747.67 141.41 748.46 141.4 753.97 141.28 754.55 141.26
762.57 141.09 766.84 140.99 770.01 140.58 771.3 140.42 774.44 140.07
775.29 139.96 778.63 139.36 780.74 138.97 783.89 138.33 785.05 138.06
789.03 137.16 790.19 136.93 791.77 136.69 795.37 136.12 796.42 136
801.71 136 802.87 136.03 806.99 136.6 808.3 136.77 810.16 137.08
812.34 137.56 814.39 138.02 819.67 139.12 821.42 139.48 823.9 139.98
826.79 140.35 831.29 140.92 832.35 141.02 835.08 141.13 835.86 141.17
838.23 141.26 842.16 141.42 844.44 141.52 849.24 141.71 850.04 141.75
853.19 141.87 855.42 141.97 856.65 142 880.15 142 880.75 142.01
939.06 142.01 939.16 142.02 940.76 142.02 961.63 142.02 961.85 142.01
971.26 142.01 971.3 142 974.99 142 975.24 141.99 979.29 141.99
979.96 141.98 985.55 141.95 988.34 141.92 989.41 141.92 990.99 141.9
992.13 141.9 994.93 141.87 996.12 141.87 997.62 141.85 1004.37 141.8
1006.58 141.8 1006.68 141.79 1009.1 141.79 1009.79 141.78 1011.97 141.78
1012.25 141.77 1014.61 141.77 1015.14 141.76 1017.25 141.76 1017.76 141.75
1019.42 141.75 1020.12 141.74 1022.63 141.74 1025.44 141.72 1027.45 141.72
1029.57 141.74 1031.93 141.74 1032.04 141.73 1035.21 141.71 1037.8 141.75
1038.38 141.75 1041.55 141.8 1042.61 141.81 1043.66 141.8 1045.78 141.75
1047.89 141.64 1049.92 141.52 1051.52 141.51 1054.23 141.51 1054.77 141.48
1058.71 141.18 1061.07 141.01 1062.64 140.99 1071.31 140.99 1072.19 141
1073.25 141.06 1073.67 141.1 1079.18 141.52 1081.08 141.67 1081.7 141.73
1084.17 141.93 1085.24 142.04 1087.26 142.3 1090.05 142.68 1092.57 143.01
1094.14 143.26 1096.54 143.62 1098.87 143.98 1099.68 144.09 1102.72 144.53
1103.89 144.72 1105.95 145.03 1107.53 145.2 1113.4 145.87 1114.46 145.97
1115.4 146.02 1117.34 146.06 1117.76 146.06 1119.34 146.1 1121.85 146.14
1124.36 146.19 1124.85 146.19 1127.45 146.24 1132.42 146.32 1134.53 146.35
1135.88 146.38 1138.76 146.42 1140.6 146.46 1142.9 146.49 1147.21 146.56
1148.47 146.59 1152.66 146.65 1153.99 146.68 1155.66 146.7 1159.5 146.77
1162.29 146.81 1166.59 146.89 1167.1 146.89 1170.31 146.95 1187.06 146.95
1187.36 146.96 1202.15 146.96 1202.42 146.97 1213.83 146.97 1214 146.98
1223.28 146.98 1224.07 146.99 1235.09 146.99 1235.64 147 1241.39 147
1242.3 147.03 1242.97 147.09 1245.47 147.28 1247.58 147.46 1249.27 147.59
1250.05 147.66 1251.63 147.78 1253.92 147.97 1254.98 148.08 1256.35 148.24
1258.6 148.49 1260.29 148.69 1260.37 148.69 1263.46 149.05 1266.55 149.49
1267.66 149.64 1268.95 149.79 1270.83 149.99 1273.05 150.27 1276.26 150.75
1276.72 150.75

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	640.76	.032	940.76	.045

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
640.76	940.76	37.76	37.76	.1	.3

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	139.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.032		
W.S. Elev (ft)	139.06	Reach Len. (ft)	37.76	37.76	37.76

Crit W.S. (ft)		Flow Area (sq ft)	73.63
E.G. Slope (ft/ft)	0.000446	Area (sq ft)	73.63
Q Total (cfs)	109.00	Flow (cfs)	109.00
Top Width (ft)	39.09	Top Width (ft)	39.09
Vel Total (ft/s)	1.48	Avg. Vel. (ft/s)	1.48
Max Chl Dpth (ft)	3.06	Hydr. Depth (ft)	1.88
Conv. Total (cfs)	5164.0	Conv. (cfs)	5164.0
Length Wtd. (ft)	37.76	Wetted Per. (ft)	39.67
Min Ch El (ft)	136.00	Shear (lb/sq ft)	0.05
Alpha	1.00	Stream Power (lb/ft s)	0.08
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	0.05
C & E Loss (ft)	0.00	Cum SA (acres)	0.03

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than
1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Hunt River
REACH: Randolph RS: 4

INPUT
Description:
Station Elevation Data num= 492

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	150.7	.43	150.7	2.55	150.77	5.47	150.91	7.81	151
9.94	151.01	12.06	151.12	17.13	151.41	20.65	151.63	22.8	151.75
23.32	151.79	25.79	151.94	27.9	152.05	30.02	152.2	30.29	152.21
33.03	152.41	37.76	152.72	38.31	152.77	40.12	152.86	40.58	152.9
42.48	153	48.05	153	49.04	152.96	51.14	152.83	52.21	152.83
53.51	152.79	55.97	152.64	57.32	152.53	58.23	152.42	59.18	152.34
61.71	152.03	62.77	151.89	66.89	151.32	69.26	151	70.83	150.83
73.63	150.55	73.98	150.5	76.34	150.26	77.92	150.09	78.62	150.04
80.05	150	80.28	150.02	81.07	149.99	85.79	149.97	90.52	149.97
92.09	150	96.82	150	97.5	150.01	102.52	150.01	102.92	150.02
117.71	150.02	118.08	150.03	148.35	150.03	148.79	150.02	162.17	150.02
162.42	150.01	175.83	150.01	176.35	150	181.11	150	183.43	149.85
184.06	149.82	187.6	149.6	190.81	149.39	191.67	149.34	196.42	149.02
197.23	148.98	199.97	148.9	203.66	148.77	205.69	148.71	207.06	148.66
210.21	148.57	212.57	148.49	213.86	148.46	214.89	148.42	219.15	148.31
221.31	148.24	222.02	148.23	224.24	148.16	227.74	148.07	229.89	148
230.95	147.98	233.94	147.89	238.55	147.77	241.33	147.68	244.07	147.61
247.22	147.51	249.58	147.45	252.73	147.35	254.01	147.32	255.88	147.26
257.18	147.23	258.24	147.19	262.18	147.09	262.96	147.06	264.43	147.03
269.26	146.89	271.08	146.85	273.7	146.77	280.29	146.6	280.71	146.58
285.01	146.47	288.74	146.36	289.74	146.34	291.95	146.27	292.25	146.27
295.16	146.18	299.19	146.08	301.58	146	303.18	145.96	308	145.81
309.42	145.78	313.18	145.67	315.72	145.61	320.45	145.49	320.84	145.47
326.25	145.33	328.87	145.27	330.47	145.22	336.2	145.08	336.98	145.05
339.35	145	340.65	144.99	344.07	144.99	344.8	144.98	347.22	144.98
347.89	144.97	351.34	144.97	351.94	144.96	354.55	144.96	356.67	144.94
357.46	144.92	361.39	144.87	364.18	144.82	366.12	144.8	369.53	144.74
370.84	144.73	372.21	144.7	373.41	144.69	375.71	144.65	380.24	144.59
381.08	144.57	384.23	144.53	384.98	144.51	387.14	144.49	388.95	144.46
389.74	144.46	392.42	144.43	393.48	144.41	396.29	144.39	397.35	144.37

399.19 144.36 400.44 144.34 402.34 144.33 403.53 144.31 407.22 144.28
408.27 144.26 412.58 144.22 416.51 144.17 419.66 144.16 421.97 144.14
423.6 144.14 425.96 144.12 427.54 144.12 429.9 144.1 432.26 144.09
438.56 144.09 438.91 144.1 441.24 144.1 441.71 144.11 443.71 144.11
444.07 144.12 446.44 144.12 446.81 144.13 459.17 144.13 460.5 144.16
463.76 144.16 464.27 144.17 468.53 144.17 473.78 144.2 482.23 144.2
484.58 144.27 485.02 144.26 486.18 144.28 487.79 144.28 490.69 144.3
491.74 144.33 492.8 144.33 494.21 144.35 495.26 144.35 497.62 144.38
501.25 144.45 503.37 144.45 503.84 144.46 508.66 144.46 510.22 144.47
513.37 144.56 514.81 144.58 518.16 144.58 518.29 144.59 521.24 144.59
522.82 144.6 525.97 144.57 528.33 144.49 533.36 144.28 537.78 144.01
540.76 143.86 544.57 143.68 546.69 143.56 549.59 143.41 551.16 143.32
553.02 143.3 556.68 143.29 560.61 143.27 563.24 143.25 570.45 143.16
575.57 143.09 576.08 143.09 579.73 143.03 582.82 142.96 583.67 142.95
585.91 142.9 588.17 142.86 591.32 142.79 593.69 142.76 594.47 142.76
597.4 142.73 598.55 142.73 603.92 142.68 604.45 142.67 606.91 142.64
607.86 142.64 611.8 142.59 614.61 142.57 619.91 142.51 621.7 142.48
623.82 142.46 630.66 142.37 631.48 142.35 634.38 142.31 637.08 142.28
640.72 142.23 642.83 142.21 644.64 142.18 647.73 142.15 651.17 142.1
651.96 142.1 657 142.03 658.68 142.02 659.74 142 668.49 142
669.37 141.99 672.46 141.91 674.53 141.87 676.37 141.85 682.67 141.77
684.82 141.73 686.15 141.72 689.32 141.66 691.01 141.64 695.26 141.56
697.63 141.53 702.35 141.46 705.17 141.41 706.23 141.4 708.65 141.35
712.65 141.29 715.74 141.23 719.67 141.17 725.01 141.08 726.3 141.05
729.12 141.01 729.47 140.99 731.19 140.78 732.64 140.59 735 140.3
736.87 140.06 737.93 139.9 741.1 139.32 742.15 139.1 743.3 138.88
745.66 138.46 747.23 138.14 749.55 137.68 751.66 137.28 752.66 137.11
753.53 137.02 755.11 136.97 759.01 136.9 760.62 136.9 765.4 136.99
766.45 137.08 769.28 137.4 772.79 137.95 777.16 138.75 777.94 138.9
779.13 139.08 785.03 139.79 786.37 139.96 787.39 140.03 789.58 140.11
793.02 140.25 795.27 140.33 796.11 140.35 801.32 140.55 805.38 140.69
808.72 140.81 812.06 140.89 814 140.95 818.48 141.06 818.89 141.08
821.69 141.15 824.9 141.18 827.02 141.24 830.7 141.32 832.92 141.38
835.13 141.42 836.29 141.42 838.58 141.44 844.09 141.54 846.45 141.57
847.24 141.59 849.6 141.61 852.75 141.65 857.93 141.65 858.26 141.66
860.62 141.66 861.02 141.67 863.42 141.67 863.66 141.68 865.77 141.68
866.14 141.69 868.5 141.69 870.86 141.71 872.44 141.71 874.01 141.73
876.37 141.73 876.48 141.74 881.62 141.74 881.89 141.75 886.9 141.75
890.07 141.78 897.13 141.78 897.47 141.79 902.75 141.79 904.45 141.81
908.37 141.84 909.45 141.84 913.19 141.88 914.38 141.88 915.75 141.9
918 141.91 921.77 141.95 922.84 141.95 924.41 141.97 929.24 141.97
929.92 141.98 932.45 141.98 933.07 141.99 937.01 141.99 937.27 142
940.94 142 941.39 142.01 944.09 142.01 944.48 142.02 947.57 142.02
948.03 142.03 952.75 142.03 953.32 142.02 957.69 142.02 959.74 142.07
961.92 142.11 963.78 142.16 964.57 142.17 967.77 142.25 969.21 142.27
972.44 142.27 973.23 142.28 975.59 142.37 976.71 142.4 980.94 142.48
982 142.49 984.25 142.54 987.28 142.66 988.34 142.69 989.76 142.75
992.13 142.81 997.64 142.98 1002.36 143.1 1005.51 143.14 1006.29 143.16
1009.4 143.2 1012.71 143.26 1014.17 143.28 1017.92 143.28 1021.26 143.37
1023.62 143.42 1028.49 143.46 1029.92 143.48 1034.65 143.48 1034.83 143.47
1039.05 143.55 1041.16 143.55 1043.4 143.54 1044.82 143.57 1048.03 143.61
1048.03 143.6 1051.18 143.64 1055.76 143.72 1058.07 143.77 1061.42 143.9
1062.48 143.98 1066.14 144.28 1068.64 144.47 1069.69 144.56 1070.87 144.68
1072.86 144.91 1074.02 145.03 1077.96 145.36 1084.48 145.98 1085.04 146.02
1088.98 146.18 1092.98 146.36 1094.58 146.42 1096.85 146.52 1098.43 146.58
1103.5 146.66 1107.73 146.71 1116.18 146.92 1118.66 146.94 1120.27 146.94
1122.05 146.96 1123.63 146.96 1126.86 146.98 1128.29 147 1155.58 147
1156.7 147.02 1158.79 147.01 1159.06 147.04 1160.4 147.02 1162.21 147.06

1164.78 147.07 1167.05 147.07 1167.72 147.08 1170.14 147.08 1170.87 147.09
1173.23 147.06 1174.02 147.06 1176.32 147.02 1178.75 147.02 1179.41 147
1181.9 147.02 1182.87 147 1184.26 147.03 1186.08 147 1187.41 147.04
1188.03 147.02 1189.77 147.08 1194.87 147.23 1196.48 147.29 1197.96 147.33
1200.53 147.43 1202.37 147.52 1204.93 147.67 1206.31 147.76 1208.1 147.86
1210.32 148 1212.33 148.18 1215.76 148.53 1217.61 148.73 1219.6 148.99
1223.95 149.6 1225.99 149.95 1228.18 150.28 1232.41 150.96 1233.46 151.1
1237.02 151.54 1239.8 151.91 1240.66 152.01 1241.74 152.11 1246.47 152.53
1248.04 152.66 1251.98 153.01 1255.13 153.33 1255.92 153.42 1258.32 153.66
1261.43 153.98 1266.15 154.64 1268.33 154.95 1272.15 155.54 1274.67 155.99
1276.39 156.23 1276.72 156.23

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	604.45	.032	904.45	.045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

604.45	904.45	73.77	73.77	73.77	.1	.3

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	139.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.032	
W.S. Elev (ft)	138.98	Reach Len. (ft)			
Crit W.S. (ft)	138.05	Flow Area (sq ft)		49.66	
E.G. Slope (ft/ft)	0.001458	Area (sq ft)		49.66	
Q Total (cfs)	109.00	Flow (cfs)		109.00	
Top Width (ft)	35.73	Top Width (ft)		35.73	
Vel Total (ft/s)	2.19	Avg. Vel. (ft/s)		2.19	
Max Chl Dpth (ft)	2.08	Hydr. Depth (ft)		1.39	
Conv. Total (cfs)	2854.3	Conv. (cfs)		2854.3	
Length Wtd. (ft)		Wetted Per. (ft)		36.07	
Min Ch El (ft)	136.90	Shear (lb/sq ft)		0.13	
Alpha	1.00	Stream Power (lb/ft s)		0.28	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Hunt River

Reach	River Sta.	n1	n2	n3
Randolph	10	.045	.032	.045
Randolph	9	.045	.032	.045
Randolph	8	.045	.032	.045
Randolph	7	.045	.032	.045
Randolph	6	.045	.032	.045
Randolph	5	.045	.032	.045
Randolph	4	.045	.032	.045

SUMMARY OF REACH LENGTHS

River: Hunt River

Reach	River Sta.	Left	Channel	Right
Randolph	10	158.82	158.82	158.82
Randolph	9	121.2	121.2	121.2
Randolph	8	120.9	120.9	120.9
Randolph	7	140.37	140.37	140.37
Randolph	6	119.99	119.99	119.99
Randolph	5	37.76	37.76	37.76
Randolph	4	73.77	73.77	73.77

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Hunt River

Reach	River Sta.	Contr.	Expan.
Randolph	10	.1	.3
Randolph	9	.1	.3
Randolph	8	.1	.3
Randolph	7	.1	.3
Randolph	6	.1	.3
Randolph	5	.1	.3
Randolph	4	.1	.3

DEMOLITION LEGEND:

- BUILDING TO BE REMOVED
- BITUMINOUS CONCRETE TO BE REMOVED/PULVERIZED
- VEGETATION AREA TO BE CLEARED
- CEMENT CONCRETE TO BE REMOVED
- AREA OF LOAM REMOVAL
- CURB REMOVAL
- UTILITIES LINE TO BE REMOVED
- UTILITIES LINE TO BE ABANDONED
- LIMIT OF WORK
- EROSION CONTROL
- UTILITIES STRUCTURE TO BE REMOVED
- SITE STRUCTURE TO BE REMOVED
- FENCE REMOVAL
- TREE TO BE REMOVED (INCLUDING STUMP)
- PROPOSED CATCHBASIN FILTER

NOTES:

1. THE CONTRACTOR SHALL PHASE ALL DEMOLITION AND REMOVAL WORK TO ALLOW FOR THE CONTINUING OPERATION OF ALL STRUCTURES.
2. DRAWING DOES NOT SHOW ENTIRE SCOPE OF DEMO. IT IS INTENDED TO AID CONTRACTOR WITH IDENTIFYING WORK AND IS NOT ALL INCLUSIVE. CONTRACTOR SHOULD REFER TO OTHER DRAWINGS FOR COORDINATION.

30 15 0 30 60

1 inch = 30 feet

BITUMINOUS PAVEMENT TO BE REMOVED (TYP.)
CONSTRUCTION ENTRANCE 50'L x 24'W
OVERHANG WIRE TO BE REMOVED
EXISTING BUILDING TO BE DEMO'D
GAS LINE TO BE REMOVED
GAS METER TO BE REMOVED
ELECTRICAL LINE TO BE REMOVED
UTILITY POLES TO BE REMOVED TYP
EXISTING CATCH BASIN(S) TO BE REMOVED TYP
DRAIN LINE TO BE REMOVED TYP
CURB TO BE REMOVED TYP
ALL OVERHEAD WIRES TO BE REMOVED TYP.
CATCH BASIN TO BE REMOVED
LIGHT/ ELECTRICAL POLE TO BE REMOVED TYP.
SEE LA PLAN FOR TREES TO BE REMOVED OR SAVED
LIMIT OF WORK
VEGETATION TO BE REMOVED (SEE LA PLAN)
METAL GATE TO BE REMOVED
CONSTRUCTION ENTRANCE
STRAW WATTLE TYP
SILT SACKS TYP

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Project Number
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Drawing Title

DEMO & SOIL EROSION PLAN

Date/Issued For
04.20.23
Planning Board Submission

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Print 24x36

Scale
As Noted

Drawn By
MEK

Drawing Number
C-101

30 15 0 30 60

1 inch = 30 feet

PROPOSED YANKEE BUS HEADQUARTERS FFE=146

VERTICAL GRANITE CURBING TYP.
FENCE (SEE LA DRAWING FOR DETAILS)
GENERATOR
TRANSFORMER
PROPOSED CURB CUT
LANDSCAPING (SEE PLANTING PLAN)
CONCRETE WALKWAY
ADA PARKING SPACES
PROPOSED WIDENED CURB CUT
LANDSCAPING ISLAND (SEE LA PLAN)
3' W LANDSCAPING ISLAND (SEE LA PLAN)
PROPOSED WIDENED CURB CUT
BUILDING OVERHANG
CONCRETE APRON
SEGMENTAL RETAINING WALL
LANDSCAPING ISLAND (SEE LA PLAN)
6' CHAIN LINK FENCE
ADA PATH PAVEMENT MARKINGS
LANDSCAPE ISLANDS (SEE LANDSCAPE PLANS) TYP.
BITUMINOUS PAVEMENT
SNOW STORAGE
VERTICAL GRANITE CURBING TYP.
HEAVY DUTY BITUMINOUS PAVEMENT
DUMPSTER & RECYCLING ENCLOSURE
HEAVY DUTY BITUMINOUS PAVEMENT
LANDSCAPING (SEE LA PLAN)
RAIN GARDEN
VGC
R7-8
R1-1
R5-1
R6-1(L)

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LAYOUT PLAN

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C-201

LEGEND:

129	PROPOSED INTERMEDIATE CONTOUR
130	PROPOSED INDEX CONTOUR
130.0 ×	PROPOSED SPOT GRADE
(130.0) ×	EXISTING GRADE TO REMAIN (V.I.F.)
TW=131.87 BW=130.50 ×	PROPOSED TOP/BOTTOM OF WALL (NOT FOUNDATION)
TC=131.87 BC=130.50 ×	PROPOSED TOP/BOTTOM OF CURB
TS=131.87 BS=130.50 ×	PROPOSED TOP/BOTTOM OF STEP
RIM=130.20 ×	PROPOSED RIM ELEVATION (TO FINAL GRADE)
V.I.F.	VERIFY GRADE IN FIELD \ TO BE SET

30 15 0 30 60

1 inch = 30 feet

CONCRETE WALKWAY TO BE ADA COMPLIANT (NO MORE THAN 5% RUNNING SLOPE; 2% CROSS SLOPE)

5' x 5' LEVEL PAD AT DOOR TO BE UNDER 2% IN ALL DIRECTIONS

ADA COMPLIANT PATH TO BE UNDER 5% RUNNING SLOPE; UNDER 2% CROSS SLOPE

5' x 5' LEVEL PAD AT DOOR TO BE UNDER 2% IN ALL DIRECTIONS

PROPOSED YANKEE BUS HEADQUARTERS FFE=146

SCANLON DRIVE (PUBLIC - 50' WIDE)

HIGH STREET (PUBLIC - 66' WIDE)

TEMPORARY BENCHMARK

TC=(141.50) BC=(141)

TC=142 BC=141.50

TC=(142.50) BC=(142.00)

TC=(144.50) BC=(144.00)

TC=(145.50) BC=(145.00)

TC=(146.50) BC=(146.00)

TC=(148.50) BC=(148.00)

TC=146.50 BC=146.00

TC=145.00 BC=145.50

BC=144.62

BC=146

RIM=145.75

TW=149.00 BW=147.21

TW=150.00 BW=147.00

TW=149.00 BW=146.00

TW=145.00 BW=144.00

FFE=146.00

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GRADING PLAN

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C-301

LEGEND:

- D — PROPOSED STORM DRAINAGE LINE
- RD — PROPOSED ROOF DRAIN LINE
- UD — PROPOSED UNDERDRAIN LINE
- W — PROPOSED WATER LINE
- FP — PROPOSED FIRE PROTECTION LINE
- SS — PROPOSED SANITARY SEWER LINE
- FM — PROPOSED FORCE MAIN
- KW — PROPOSED KITCHEN WASTE LINE
- SW — PROPOSED SCIENCE WASTE LINE
- G — PROPOSED GAS LINE (BY OTHERS)
- E — PROPOSED UNDERGROUND ELECTRIC LINE
- OH — PROPOSED OVERHEAD ELECTRIC LINE
- T — PROPOSED TELEPHONE LINE
- SMH — PROPOSED SANITARY SEWER MANHOLE
- DMH — PROPOSED STORM DRAINAGE MANHOLE
- PROPOSED WATER QUALITY UNIT
- PROPOSED TRENCH DRAIN
- CB — PROPOSED CATCH BASIN
- DCB — PROPOSED DOUBLE CATCH BASIN
- PROPOSED AREA DRAIN
- PROPOSED WINDOW WELL DRAIN
- DS — PROPOSED DOWNSPOUT (DISCHARGE AT GRADE)
- DS — PROPOSED PROPOSED ROOF LEADER
- CO — PROPOSED CLEANOUT
- PROPOSED HYDRANT
- PROPOSED POST INDICATOR VALVE
- PROPOSED GAS GATE VALVE
- PROPOSED WATER GATE VALVE
- PROPOSED TAP AND SLEEVE VALVE
- PROPOSED CORPORATION STOP
- DW — PROPOSED DRYWELL W/ GRATE
- DW — PROPOSED DRYWELL W/ COVER
- PROPOSED LIGHT FIXTURE (SEE ELECTRICAL DWG'S)
- PROPOSED UTILITY POLE (SEE ELECTRICAL DWG'S)

30 15 0 30 60

1 inch = 30 feet

PROPOSED YANKEE BUS HEADQUARTERS FFE=146

WATER QUALITY UNIT (WQU-1)
CATCH BASIN INLET
RIM= 140.80
INV(OUT)=137.61

8" PVC (SCHD 40) 250' S=0.005

CATCH BASIN (CB-)
RIM= 142.93
INV(OUT)=140

CATCH BASIN (CB-)
RIM= 143.93
INV(OUT)=140.93

CATCH BASIN (CB-)
RIM= 142.93
INV(OUT)=140

WATER QUALITY UNIT (WQU-2)
CATCH BASIN INLET
RIM= 143.80
INV(OUT)=138.80

8" PVC (SCHD 40) 85' S=0.018

EX 12" CULVERT
INV=(135.50)
S=0.0145

DOGHOUSE MANHOLE (DDMH-)
RIM= 141.00
INV(IN-WQU-1)=136.36
INV(IN-WQU-2)=137.00
INV(IN-EX12")=(136.26)
INV(OUT)=(136.26)

WATER QUALITY UNIT (WQU-3)
CATCH BASIN INLET
RIM= 141.80
INV(OUT)=138.80

12" RCP 230'

8" RCP 125' S=0.005

EX SMH
RIM=(143.90)
INV(IN)=132.90
INV(OUT)=(132.80)

WATER QUALITY UNIT (WQU-)
RIM= 144.10
INV(IN)=139.68
INV(IN)=139.72
INV(IN)=140.73
INV(OUT)=139.58

INFILTRATION SYSTEM-1
(PRE-CAST 3.6x8x14 GALLEY)
TOP OF GALLEY=142.66
INV(IN)=139.46
INV(OUT)=142.00
BOTTOM OF GALLEY=139.00

8" PVC 180' S=0.03

6" PVC 180' S=0.03

OIL & WATER SEPARATOR
(SEE MEP PLANS FOR DETAILS)

INV(RD)=142.00

EX 12" CULVERT
TOP=139.74
INV=138.74

ROOF DRAIN
(OVER CULVERT)
TOP=141.74
INV=140.74

EX 18" CULVERT
INV=(137.80)
S=0.0089

DRAIN MANHOLE (DMH-XX)
RIM=142.50
INV(IN-RD)=139.96
INV(IN-WQU-3)=138.17
INV(OUT)=137.09

PROPOSED GAS METER
(SEE MEP PLANS)

SEWER
INV=139.00

OIL & WATER SEPARATOR
(SEE MEP PLANS FOR DETAILS)

SEWER
INV=142.00

INFILTRATION SYSTEM-2
(PRE-CAST 3.6x8x14 GALLEY)
MIN COVER=XXX
TOP OF GALLEY=143.66
INV(IN)=XXX
INV(IN-WQU)=141.80
INV(OUT)=142.00
BOTTOM OF GALLEY=140.00

12" RCP 170' S=0.005

DOGHOUSE MANHOLE
RIM=144.00
INV(IN)=140.00
INV(IN-EX12")=(139.59)
INV(OUT)=(139.59)

EX 18" CULVERT
INV=(139.3)
S=0.0089

12" RCP 57' S=0.035

EX 12" CULVERT
INV=(140.00)
S=0.0145

12" DRAIN LINE (UNDER CULVERT)
TOP=138.02
INV=137.02

AREA DRAIN
(OVERFLOW OUTLET)
BEEHIVE GRATE
RIM=140.00
INV(IN)=136.65

RAIN GARDEN
(SEE LANDSCAPE PLANS FOR PLANTINGS)
TOTAL VOLUME=21,000 CF
OVERFLOW WEIR=141.60
L=50' W=6'

FUEL DISPENSER

DRAIN MANHOLE (DMH-)
RIM= 145.25
INV(IN-CB)=141.82
INV(IN-CB)=141.47
INV(OUT)=141.37

12" RCP 185' S=0.005

WATER QUALITY UNIT
RIM= 144.90
INV(IN-DMH)=140.54
INV(IN-CB)=140.63
INV(OUT)=140.44

CATCH BASIN (CB-)
RIM= 144.90
INV(OUT)=141.90

8" RCP 185' S=0.005

CATCH BASIN (CB-)
RIM= 144.75
INV(OUT)=141.75

CATCH BASIN (CB-)
RIM= 145.75
INV(OUT)=142.75

8" FIRE PROTECTION
L=74'

2" DOMESTIC WATER
L=74'

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Drawing Title

CIVIL UTILITIES PLAN

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As Noted

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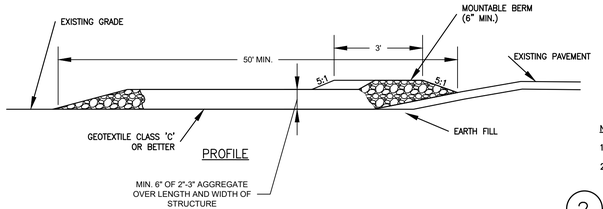
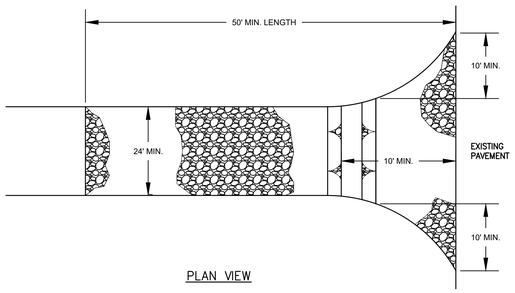
MEK

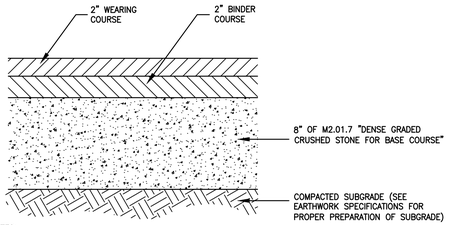
Drawing Number

C-401



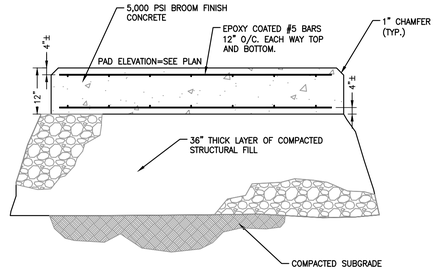
1 STABILIZED CONSTRUCTION ENTRANCE
NTS



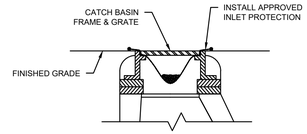


NOTES:
1. SEE GEOTECHNICAL ENGINEERING REPORT FOR SUBGRADE COMPACTION AND PREPARATION REQUIREMENTS.
2. THE TOP 24 INCHES OF EXISTING UNDOCUMENTED FILL SHALL BE REPROCESSED, MOISTURE CONDITIONED, PLACED, AND COMPACTED IN ACCORDANCE WITH THE PROJECT DOCUMENTS.

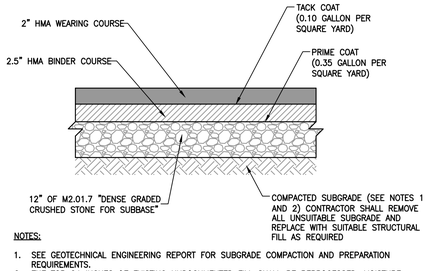
2 STANDARD ASPHALT PAVEMENT DETAIL
NTS



3 CONCRETE PAD FOR GENERATOR AND DUMPSTER
NTS

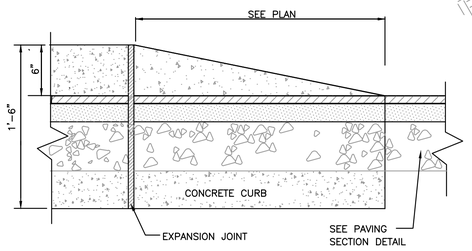


4 CATCH BASIN W/ INLET PROTECTION
NTS

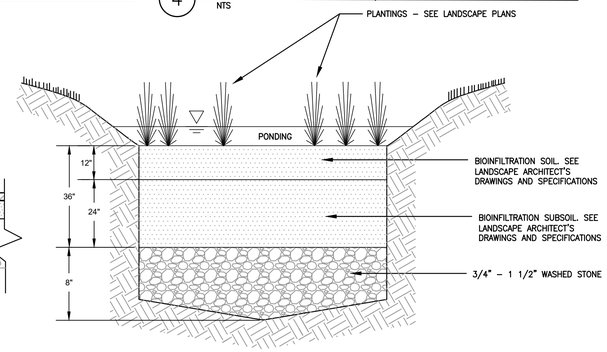


NOTES:
1. SEE GEOTECHNICAL ENGINEERING REPORT FOR SUBGRADE COMPACTION AND PREPARATION REQUIREMENTS.
2. THE TOP 24 INCHES OF EXISTING UNDOCUMENTED FILL SHALL BE REPROCESSED, MOISTURE CONDITIONED, PLACED, AND COMPACTED IN ACCORDANCE WITH THE PROJECT DOCUMENTS.

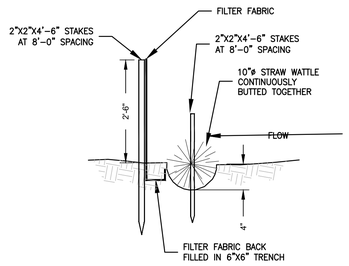
5 HEAVY DUTY ASPHALT PAVEMENT DETAIL
NTS



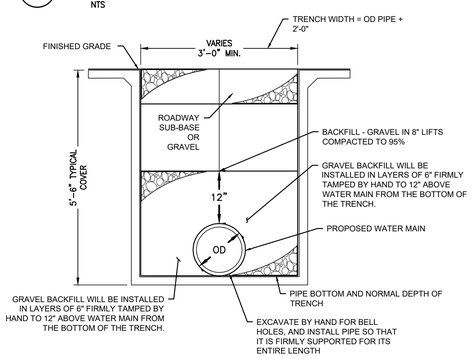
6 CURB TRANSITION
NTS



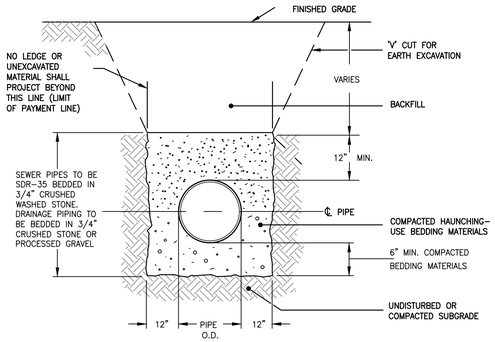
7 RAIN GARDEN CROSS SECTION
NTS



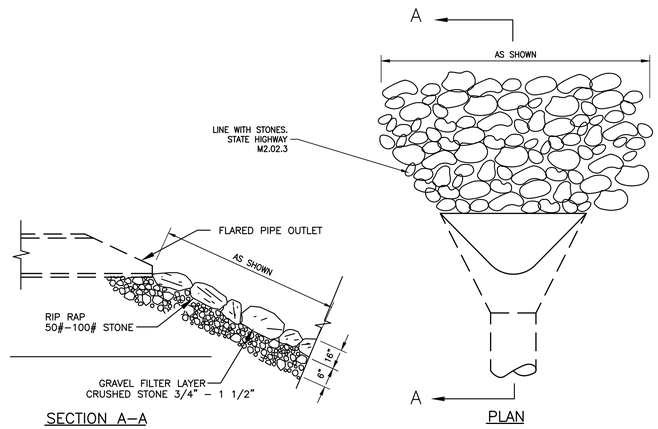
8 SILT FENCE WITH STRAW WATTLE
NTS



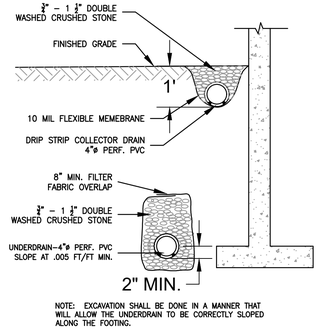
9 WATER MAIN TRENCH IN FIRM GROUND
NTS



10 TRENCH DETAILS FOR HDPE/PVC/RCP GRAVITY PIPE
NTS



11 FLARED END SECTION AND RIP RAP DETAIL
NTS



NOTE: EXCAVATION SHALL BE DONE IN A MANNER THAT WILL ALLOW THE UNDERDRAIN TO BE CORRECTLY SLOPED ALONG THE FOOTING.

12 FOUNDATION UNDERDRAIN
NTS

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2221

Project Title
Yankee Bus Line HQ

34 Scanlon Drive
Randolph, MA 02368

Samiotes Consultants Inc.
Civil Engineers + Land Surveyors
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Drawing Title

CIVIL DETAILS

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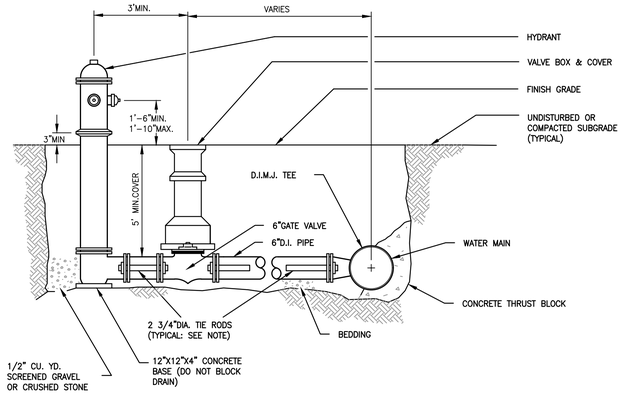
MEK

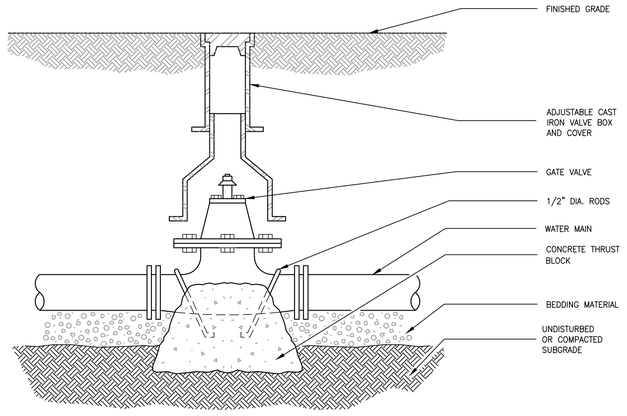
Drawing Number

C-501



1 HYDRANT

NTS



2 GATE VALVE AND BOX

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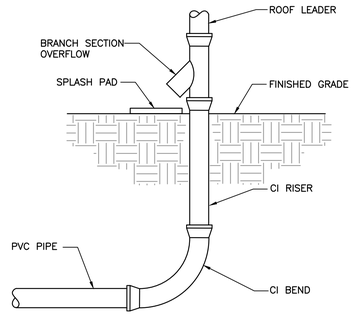

3 ROOF LEADER

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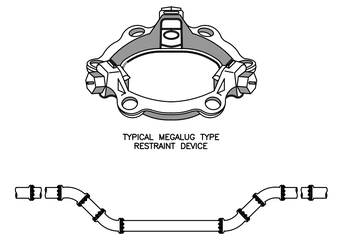

4 MEGALUG DETAIL

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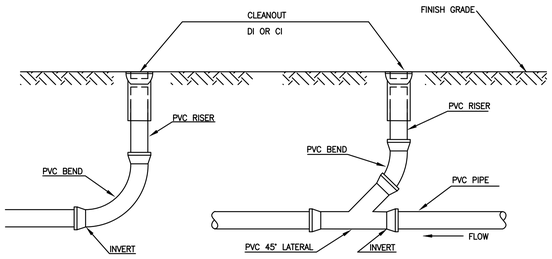
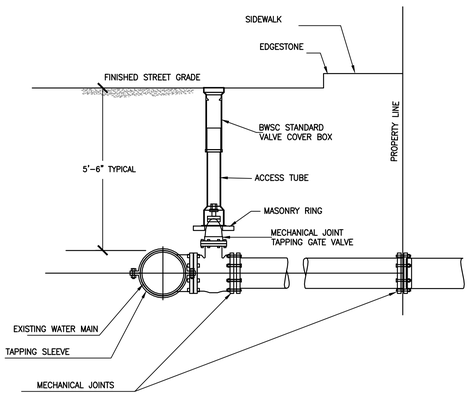


END OF LINE CLEANOUT

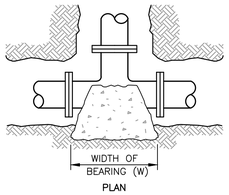
MID – LINE CLEANOUT

5 CLEANOUT

NTS

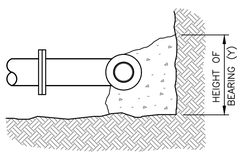


6 WATER PIPE CONNECTION WITH TAPPING SLEEVE AND GATE VALVE



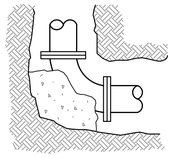
PLAN

TEE

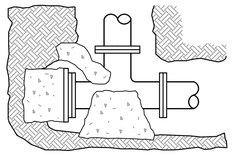


SECTION

BEND

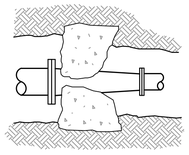


PLAN



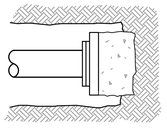
PLAN

CAPPED TEE



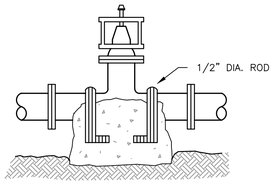
PLAN

REDUCER



PLAN

CAP



ELEVATION

VALVE

MINIMUM THRUST BLOCK AREA REQUIRED (Y x W)		
PIPE SIZE	WATER PIPE	
	TEE, DEAD END, 90° BEND	45° & 22½° BENDS
4" OR LESS	3 SQ. FEET	3 SQ. FEET
6"	4 SQ. FEET	3 SQ. FEET
8"	6 SQ. FEET	3 SQ. FEET
10"	9 SQ. FEET	5 SQ. FEET
12"	13 SQ. FEET	7 SQ. FEET
16"	23 SQ. FEET	12 SQ. FEET

1. THRUST BLOCKS TO EXTEND TO UNDISTURBED GROUND.
2. ALL CONCRETE SHALL BE CLASS B.
3. TABLE IS BASED ON 3000 LB./SQ. FT. SOIL. IF SOIL CONDITIONS ARE FOUND TO INDICATE SOIL BEARING LESS, THE AREAS SHALL BE INCREASED ACCORDINGLY.
4. AREAS FOR PIPES GREATER THAN 16" SHALL BE CALCULATED FOR EACH PROJECT.
5. FOR ALL NON BEARING VERTICAL SURFACES.

7 THRUST BLOCKS (WATER SYSTEM)

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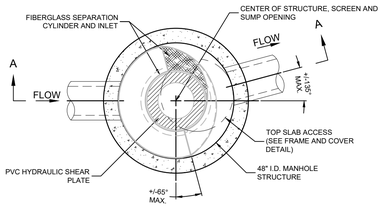
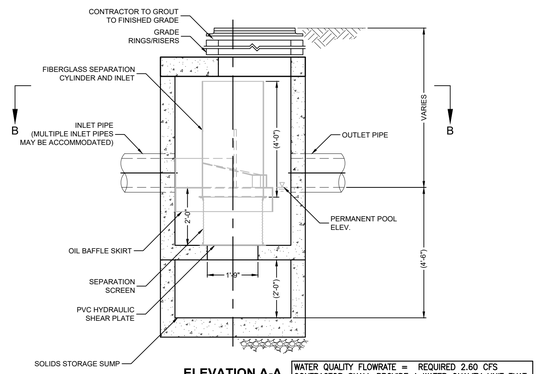


PLAN VIEW B-B
N.T.S.



ELEVATION A-A
N.T.S.

WATER QUALITY FLOWRATE = REQUIRED 2.60 CFS
CONTRACTOR SHALL PROVIDE A WATER QUALITY UNIT THAT EXCEEDS THE MINIMUM REQUIRED DESIGN FLOW RATE

8 WATER QUALITY UNIT DETAIL

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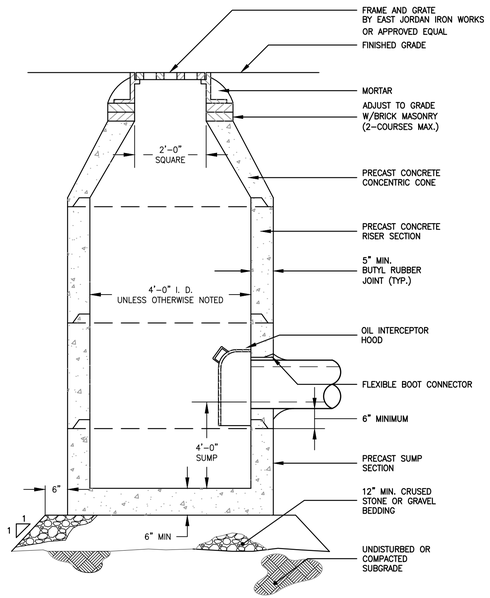
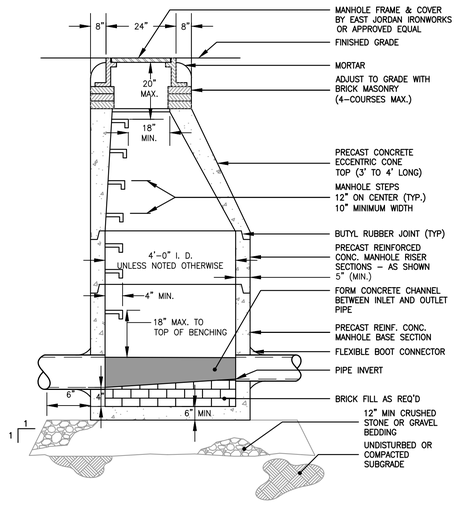


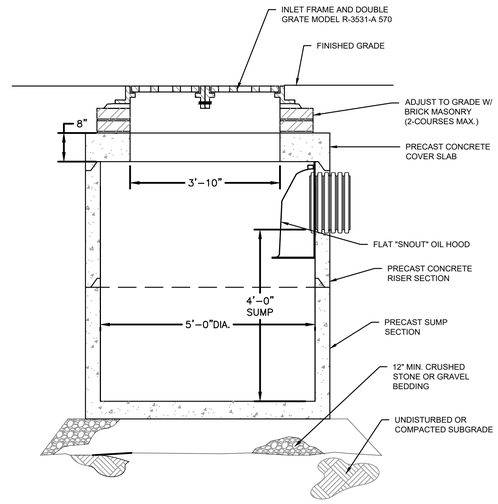
1 CATCH BASIN

NTS



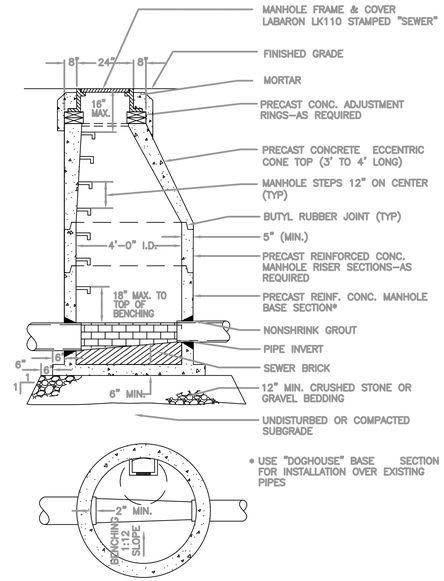
2 PRECAST STORM DRAIN MANHOLE

NTS



X DOUBLE CATCH BASIN

NTS



3 PRECAST SANITARY MANHOLE

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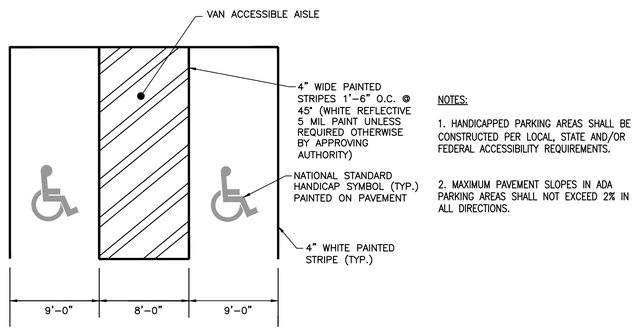
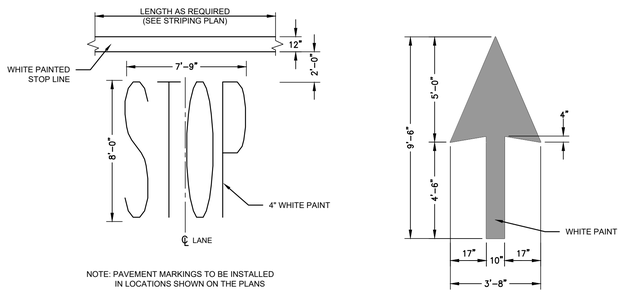


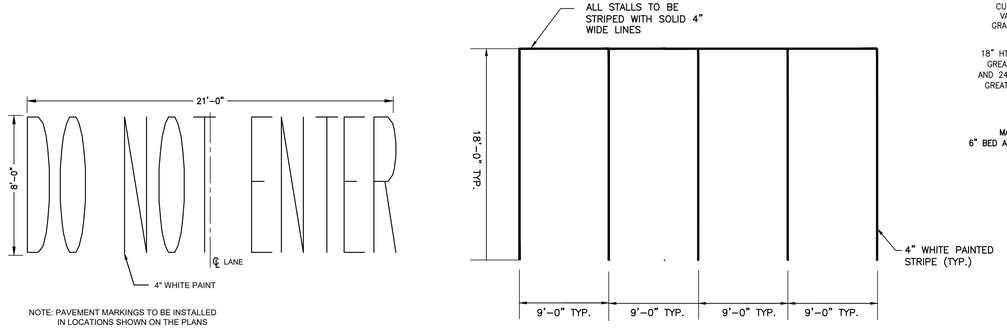
4 HANDICAP PARKING STALL DETAIL

NTS



5 PAVEMENT MARKING DETAIL

NTS



6 PAVEMENT MARKING DETAIL

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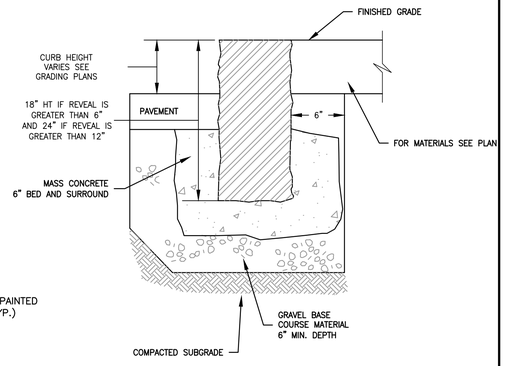

7 VERTICAL GRANITE CURB

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STUDIO INC
146 MT AUBURN ST CAMBRIDGE, MA 02138
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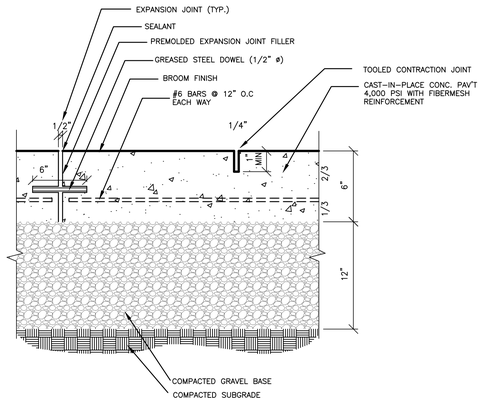
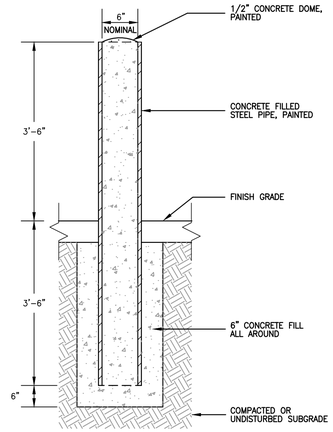


1 CONCRETE DUMPSTER PAD



2 CONCRETE FILLED STEEL PIPE BOLLARD

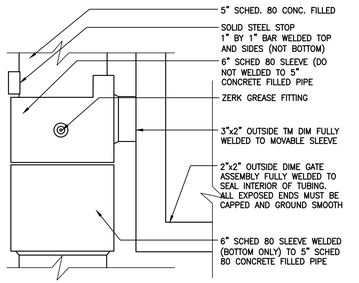
NTS

TRAFFIC CONTROL SIGNAGE SCHEDULE

IDENTIF-ICATION NUMBER	SIZE OF SIGN (INCHES) WIDTH	HEIGHT	UNIT AREA SF	TEXT SEE MUTCD 2009 FOR TEXT DIMENSIONS AND COLORS	NUMBER OF SIGNS REQUIRED	AREA IN SQUARE FEET
R1-1	30"	30"	5.18	STOP	TBD	10.36
R7-8	12"	18"	1.50	RESERVED PARKING	TBD	6.00
R7-8P	18"	9"	1.13	VAN ACCESSIBLE	TBD	4.52
R5-1	30"	30"	6.25	DO NOT ENTER	TBD	12.50
R6-1(L)	36"	12"	3.00	ONE WAY	TBD	3.00

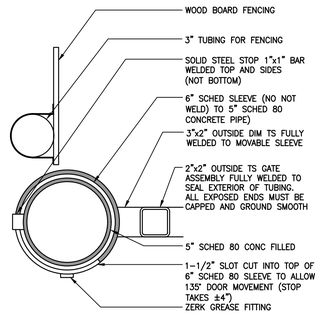
3 TRAFFIC SIGNAGE SCHEDULE

NTS

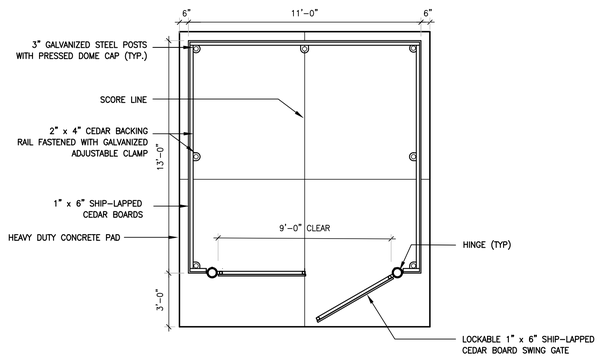


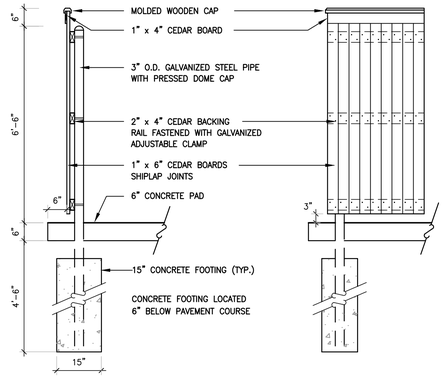
NOTE:
OC TO APPLY LIBERAL AMOUNT OF GREASE WHERE UPPER PORTION OF HINGE RESIDED PRIOR TO SETTING OF TOP PORTION OF HINGE

HINGE DETAIL

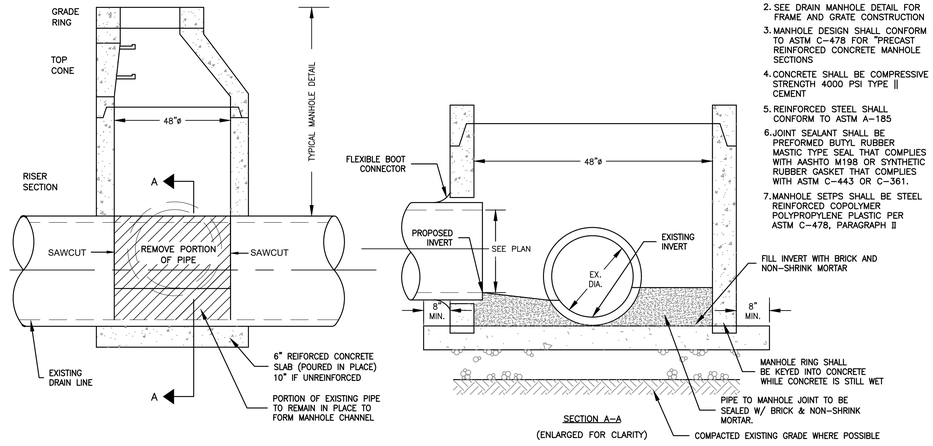


HINGE DETAIL (PLAN)





4 DUMPSTER ENCLOSURE PLAN & ENCLOSURE



NOTES:
1. DESIGN SLABS FOR H-20 LOADING
2. SEE DRAIN MANHOLE DETAIL FOR FRAME AND GRATE CONSTRUCTION
3. MANHOLE DESIGN SHALL CONFORM TO ASTM C-478 FOR "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS
4. CONCRETE SHALL BE COMPRESSIVE STRENGTH 4000 PSI TYPE II CEMENT
5. REINFORCED STEEL SHALL CONFORM TO ASTM A-185
6. JOINT SEALANT SHALL BE PREFORMED BUTYL RUBBER MASTIC TYPE SEAL THAT COMPLIES WITH AASHTO M198 OR SYNTHETIC RUBBER GASKET THAT COMPLIES WITH ASTM C-443 OR C-361.
7. MANHOLE SETPS SHALL BE STEEL REINFORCED COPOLYMER POLYPROPYLENE PLASTIC PER ASTM C-478, PARAGRAPH II

5 DOGHOUSE MANHOLE DETAIL

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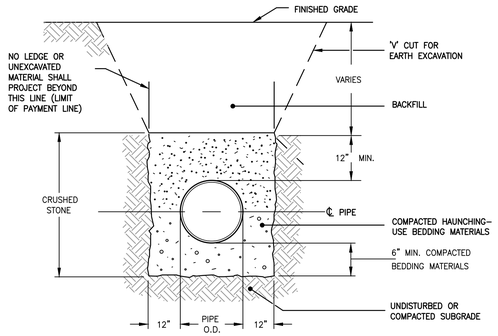
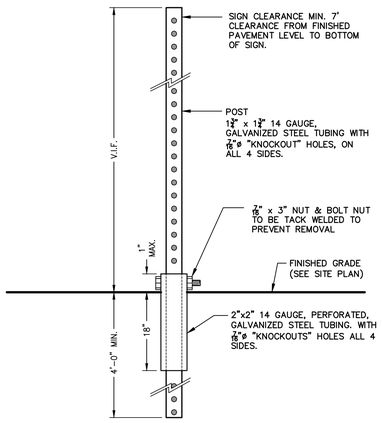
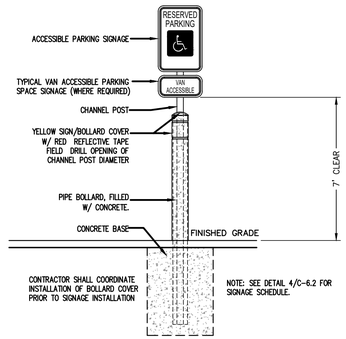


1 TRENCH SECTION– RCP PIPE

NTS



2 TELESCOPING–BREAKAWAY TRAFFIC SIGN POST



3 GROUND MOUNTED SIGNAGE

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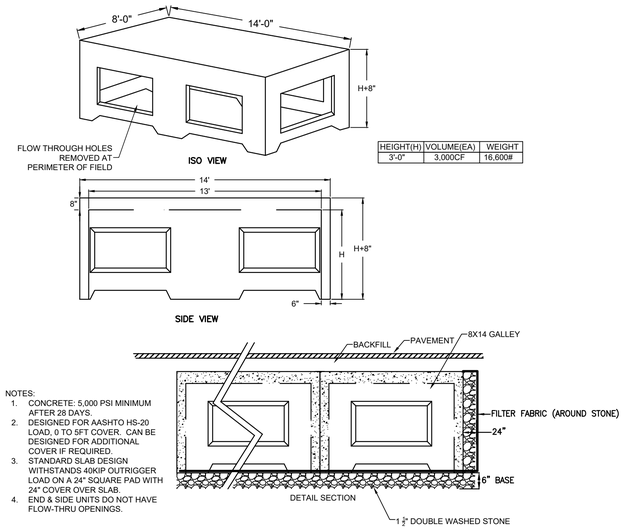

HEIGHT(H)	VOLUME(EA)	WEIGHT
3'-0"	3,000CF	16,600#

NOTES:
1. CONCRETE: 5,000 PSI MINIMUM AFTER 28 DAYS.
2. DESIGNED FOR AASHTO HS-20 LOAD, 0 TO 5FT COVER. CAN BE DESIGNED FOR ADDITIONAL COVER IF REQUIRED.
3. STANDARD SLAB DESIGN WITHSTANDS 40KIP OUTRIGGER LOAD ON A 24" SQUARE PAD WITH 24" COVER OVER SLAB.
4. END & SIDE UNITS DO NOT HAVE FLOW-THRU OPENINGS.

4 8' x 14' Concrete Galley (INFILTRATION SYSTEMS 1&2)

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PARE PROJECT NO. 22077.00
REPORT

TRAFFIC IMPACT ANALYSIS FOR THE PROPOSED DEVELOPMENT RANDOLPH, MASSACHUSETTS

SUBMITTED TO:
THE VERTEX COMPANIES INC.
400 LIBBEY PARKWAY
WEYMOUTH, MA 02189

SUBMITTED BY:
PARE CORPORATION
8 BLACKSTONE VALLEY PLACE
LINCOLN, RI 02865

APRIL 2023

PARE
CORPORATION

TABLE OF CONTENTS

Figures

Tables

APPENDICES

INTRODUCTION

The following represents the traffic study completed for the construction of a proposed bus facility to be located at 34 Scanlon Drive in Randolph, Massachusetts. This site will be utilized as a bus storage and maintenance area. The existing site currently consists of a church and a paved lot for bus and vehicle parking.

Presented within are existing conditions in the vicinity of the project site, a safety analysis of the study area, an analysis of the traffic based on existing, future (2029) no-build and future (2029) build conditions, and proposed recommendations, as necessary. A locus map of the study area is provided in Figure 1 and the proposed site layout is shown in Figure 2.

DATA COLLECTION

In addition to the proposed site driveways, two study intersections have been identified for assessment with regards to traffic capacity and safety as part of this study. The study intersections include:

- North Main Street at Scanlon Drive and Russ Street
- High Street at Reed Street

On May 25, 2022 manual turning movement counts (MTMCs) were conducted at these study area intersections between the hours of 7:00 a.m. and 9:00 a.m. and 4:00 p.m. and 6:00 p.m.

Crash data for the roadway network in the vicinity of the project site was retrieved from the Massachusetts Department of Transportation (MassDOT) Crash Data Portal for the period of January 2018 to December 2022. A crash review is included in this report to identify any potential trends that may require mitigation.

A field review of the study area was conducted on Thursday, April 21, 2022. Geometric measurements and other field observations were recorded at the significant intersections in the vicinity of the project site, the information obtained was used in the analysis of the study area intersections.

The Planning Department for the Town of Randolph was contacted to determine if there are currently any developments proposed whose trip generation information should be included in the study, of which none were noted.

PROJECT NO. 22077.00 DATE: MARCH 2023

PARE

FIGURE 1
LOCUS MAP

SCANLON DRIVE
RANDOLPH, MASSACHUSETTS

30 15 0 30 60

1 inch = 30 feet

PROPOSED YANKEE BUS HEADQUARTERS FFE=146

VERTICAL GRANITE CURBING TYP.
FENCE (SEE LA DRAWING FOR DETAILS)
GENERATOR
TRANSFORMER
PROPOSED CURB CUT
LANDSCAPING (SEE PLANTING PLAN)
CONCRETE WALKWAY
ADA PARKING SPACES
PROPOSED WIDENED CURB CUT
LANDSCAPING ISLAND (SEE LA PLAN)
3' W LANDSCAPING ISLAND (SEE LA PLAN)
PROPOSED WIDENED CURB CUT
BUILDING OVERHANG
CONCRETE APRON
SEGMENTAL RETAINING WALL
LANDSCAPING ISLAND (SEE LA PLAN)
6' CHAIN LINK FENCE
ADA PATH PAVEMENT MARKINGS
LANDSCAPING ISLANDS (SEE LANDSCAPE PLANS) TYP.
BITUMINOUS PAVEMENT
SNOW STORAGE
VERTICAL GRANITE CURBING TYP.
HEAVY DUTY BITUMINOUS PAVEMENT
DUMPSTER & RECYCLING ENCLOSURE
HEAVY DUTY BITUMINOUS PAVEMENT
LANDSCAPING (SEE LA PLAN)
RAIN GARDEN
VGC
R7-8
R1-1
R5-1
R6-1(L)
R6-1(L)

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Yankee Bus Line HQ

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Drawing Title

LAYOUT PLAN

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Submission

NOT FOR CONSTRUCTION

Print 24x36

Scale
As Noted

Drawn By
MEK

Drawing Number
C-201

EXISTING ROADWAY CONDITIONS

The study area for the development is defined as the significant roadways and intersections in the vicinity of the site that may be impacted by the construction of a bus storage and maintenance area. Listed below are the roadways and intersections included in the study area.

Study Area Roadways

1. North Main Street from Reed Street to Scanlon Drive
2. Scanlon Drive from North Main Street to High Street
3. High Street from Scanlon Drive to Reed Street
4. Reed Street from High Street to North Main Street

Study Area Intersections

1. North Main Street at Scanlon Drive and Russ Street
2. High Street at Reed Street

Study Area Roadways

North Main Street

North Main Street (Route 28) is a north/south roadway within the study area. This State route extends from Eastham, Massachusetts to the New Hampshire state line in Methuen, Massachusetts. The roadway is classified as an urban principal arterial under State jurisdiction. The roadway cross section is typically comprised of two, 11-foot-wide travel lanes in each direction. There are 8-foot-wide concrete sidewalks along both the east and west sides of the roadway. The posted speed limit within the study area is 30 miles per hour. Given the site's proximity to the I-93/Route 28 interchange, it is anticipated most bus traffic generated by the site will be destined to/from the highway via North Main Street.

Scanlon Drive

Scanlon Drive is approximately 1,100 feet long extending east/west from North Main Street to High Street and serves as the primary access to and from the site. Scanlon Drive is an urban minor arterial under Town jurisdiction. The roadway cross section consists of one, 12-foot-wide lane with a 7-foot-wide shoulder in each direction. There is no posted speed limit along Scanlon Drive.

High Street

High Street runs in the general north/south direction along the west side of the site connecting to nearby neighborhoods. From Scanlon Drive to Reed Street, this roadway is classified as an urban minor arterial under Town jurisdiction. Similar to Scanlon Drive, the roadway cross section consists of one, 12-foot-wide lane with a 7-foot-wide shoulder in each direction. Parking is prohibited along the western side of the roadway. The posted speed limit is 30 miles per hour.

Reed Street

Reed Street runs in the general east/west direction and is classified as an urban minor arterial under Town jurisdiction. The roadway cross section is typically comprised of one, 12-foot-wide travel lane and a 6-foot-wide shoulder in each direction. There are 5-foot-wide concrete sidewalks along both the north and south sides of the roadway. The posted speed limit within the study area is 30 miles per hour.

Study Area Intersections

North Main Street (Route 28) at Scanlon Drive and Russ Street

North Main Street at Scanlon Drive/Russ Street functions as a four-way, signalized intersection with approach legs from all cardinal directions. The northern quadrants are occupied by commercial properties, while the southern quadrants are residential properties.

Photo 1: North Main Street traveling Southbound to Scanlon Drive and Russ Street Intersection

At the northbound approach to the intersection, the two lanes present on North Main Street taper into three lanes, with one dedicated to left turns, one dedicated to through movements and one for through and right-turn movements. For the southbound approach to the intersection, the two lanes present on North Main Street taper into four lanes, with one dedicated to left-turn movements, two dedicated to through movements and one dedicated to right-turn movements.

The westbound approach to the intersection is two lanes at the intersection, with one dedicated to left-turn movements and one allowing through and right movements. The eastbound approach to the intersection is comprised of two lanes with one lane dedicated to left turn movements, while the other allows for all movements.

Sidewalks surround each leg of the intersection, with crosswalks present along the south, east, and west legs.

High Street at Reed Street

Photo 2: Intersection of High Street at Reed Street

The intersection of High Street at Reed Street forms a four-way, signalized intersection with approach legs from all cardinal directions. High Street forms the north and south legs, while Reed Street forms the east and west legs. This intersection is surrounded predominantly by residential properties. Each leg of the intersection is comprised of one travel lane per direction. Sidewalks exist on both sides of both roadways and crosswalks are present at each leg of the intersection, accompanied by mast-arm mounted push buttons. The vertical curvature of the eastern leg of the intersection limits drivers' sight lines.

EXISTING SITE OBSERVATIONS

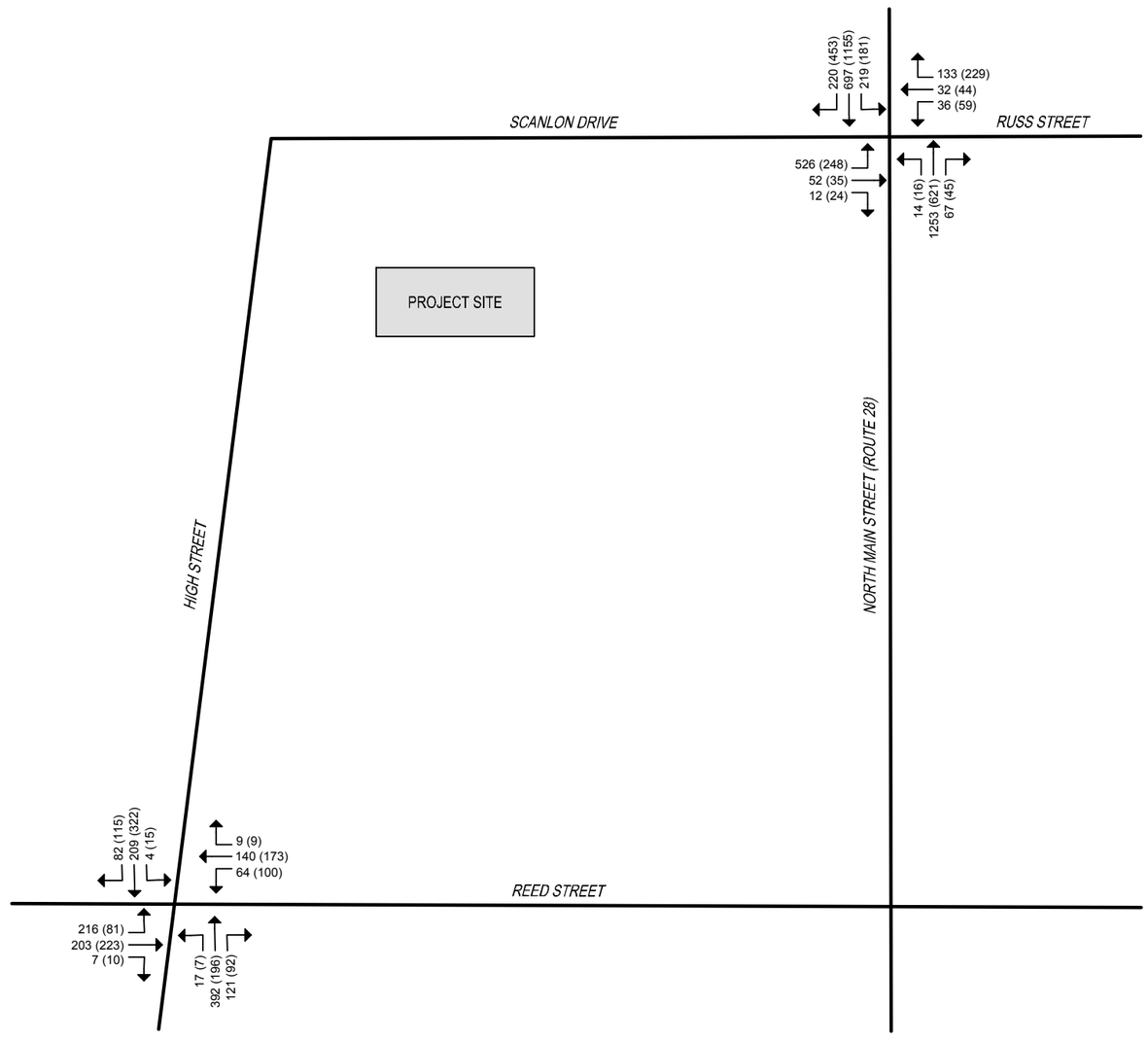
The existing site currently serves a church and a paved lot for bus and vehicle parking. There are multiple driveways along Scanlon Drive and one along High Street. Though the existing uses currently generate traffic, the peak periods for the church are assumed to be in the evening and/or weekend hours.

EXISTING TRAFFIC VOLUMES

Manual turning movement counts (MTMCs) were conducted on May 25, 2022 during the hours of 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. for the following intersections:

- North Main Street at Scanlon Drive and Russ Street
- High Street at Reed Street

Copies of all count data are provided in Appendix A. Existing traffic volumes for the morning peak hour and afternoon peak hour are shown in Figure 3.



AM PEAK VOLUMES (PM PEAK VOLUMES)

PROJECT NO. 22077.00 DATE: MARCH 2023

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FIGURE 3

EXISTING (2022) PEAK HOUR TRAFFIC VOLUMES
RANDOLPH SCANLON DRIVE DEVELOPMENT

RANDOLPH, MASSACHUSETTS

SAFETY ANALYSIS

Crash Data

Crash data for the study area was extracted from the MassDOT Crash Data Portal for the most recent five (5) year period from January 2018 through December 2022. Table 1 shows a summary of crashes by type and severity and a detailed table of all crash data reviewed is provided in Appendix B.

Table 1: Crash Summary for Study Area

Roadway/ Intersection	Total Crashes	Non-Fatal Injuries	Angle	Head On	Single Vehicle	Rear End	Side-swipe	Unknown
High Street	12	4	2	0	5	5	0	0
North Main Street (Route 28)	155	110	75	7	14	35	23	1
Reed Street	7	4	1	0	3	1	2	0
Pond Street	1	0	0	0	0	1	0	0
Scanlon Drive	2	0	2	0	0	0	0	0
High Street at Reed Street	27	22	15	0	3	6	2	1
North Main Street at Reed Street/Pond Street	25	24	14	2	1	2	6	0
North Main Street at Scanlon Drive/Russ Street	26	15	10	0	3	11	2	0
High Street at Scanlon Drive	1	0	0	0	1	0	0	0

Between January 2018 and December 2022, a total of 256 crashes occurred within the study area. There were no fatalities but 47% of the crashes resulted in personal injuries. Most of these collisions (61%) were along the approximate 3,700 feet of North Main Street (Route 28) within the study area. Along this roadway, 48% were angle collisions and 23% were rear-end collisions. The rear end and angle collisions along North Main Street (Route 28) are the most common types of crashes typically associated with turning movements into and out of side streets and driveways and they are generally low-severity incidents.

For the signalized intersections within the crash review area, at least half of the collisions were rear end or angle collisions. Additionally, these three intersections are currently listed on the "Top 5% Intersection Crash Clusters 2017-2019" released by MassDOT.

To assess the severity of this high crash volume, Pare assessed the crash rates for the intersections and roadway segments compared to the state averages. Crash rates are calculated to normalize the number of crashes relative to the volume of traffic that both the roadway segment and intersection see. Typical crash rates for signalized intersections are generally 0.75 crashes per million entering vehicles, while crash rates for urban principal arterials are 3.58 crashes per million vehicle miles traveled. Table 2 provides a summary of the crash rates for the study area.

Table 2: Crash Rate Summary

Intersection/Roadway Segment:	Crash Rate:
North Main Street at Scanlon Drive and Russ Street	0.41/MEV
North Main Street at Reed Street and Pond Street	0.46/ MEV
High Street at Reed Street	0.95/MEV
North Main Street (Route 28)	2.46/MVMT

MEV: Million Entering Vehicles
MVMT: Million Vehicle Miles Traveled

As shown, the intersection of High Street and Reed Street shows a slightly elevated crash rate. The remaining intersections and the segment of North Main Street (Route 28) analyzed have lower crash rates than the state average.

Sight Distance

On June 17, 2021, a spot speed study was conducted on Scanlon Drive near the site driveways to assess driving speeds along the roadway. A summary of the speed data results is shown in Table 3 below. The complete data log can be found in Appendix C. As there was no speed limit posted for Scanlon Drive, a de facto speed of 30 miles per hour was assumed, consistent with all the other roadways in the study area. The most notable metric presented in Table 3 is the 85th percentile speed, which was utilized for the sight distance analysis. The captured 85th percentile speed of 34 miles per hour on Scanlon Drive was rounded up to a design speed of 35 miles per hour to provide a more conservative analysis.

Table 3: Scanlon Drive Speed Study Summary

	Posted Speed	Average Speed	True Median (50th Percentile)	85th Percentile	10 MPH Pace	% over Posted
Eastbound	30	30	31	34	26-35	52%
Westbound	30	30	31	34	26-35	54%

In conjunction with the spot speed study conducted, the available sight distances for the existing site driveways were observed and measured. According to the latest edition of the American Association of State Highway and Transportation Officials (AASHTO) publication *A Policy on the Geometric Design of Highways and Streets*, the minimum safe stopping sight distance (SSD) for 35 miles per hour is 250 feet. AASHTO gives guidance for a more desirable intersection sight distance (ISD) for incremental speeds, which will not only avoid collisions, but maintain vehicular flow of at least 70 percent of the original operating speed. The minimum intersection sight distances (ISD) for left- and right-turning vehicles are 390 feet and 335 feet, respectively, for a speed of 35 mph. A summary of the sight distances available for the driveway can be seen in Table 4 below.

Table 4: Sight Distance Summary

		Required SSD (ft)	Required ISD (ft)
Site Driveway at Scanlon Drive	To the East	250	390
	To the West	250	335

During the field visit, sight lines along Scanlon Drive were assessed to determine areas where sight distance would become hindered, identifying areas where a proposed driveway would be problematic for site design.

On Scanlon Drive, there exists decorative bushes and additional floral arrangements that hinder drivers' sight lines substantially at the existing driveways, requiring drivers to move past the intended shoulder striping when attempting to exit. Additionally, the eastern end of Scanlon Drive has significant horizontal and vertical curvature. For drivers heading west along Scanlon Drive, the combined curvature and placement of bushes can block a driver's sight line to the extent that it prevents them from seeing any drivers attempting to exit the lots. For drivers attempting to exit, this combination will also prevent them from seeing cars as they move along the curve and behind the bushes.

An analysis of the proposed driveway locations shows sufficient sight lines for vehicles circulating the site. Decorative bushes are proposed within the vicinity of the driveway and may increase risks for exiting vehicles. It is recommended that they be regularly maintained so as not to interfere with sightlines in and out of the site.

According to AASHTO, if the intersection sight distances cannot be achieved, but the available sight distance is at least equal to the appropriate stopping sight distance, then drivers have sufficient sight distance to anticipate and avoid collisions.

FUTURE CONDITIONS

Future traffic volumes are determined by projecting the existing traffic volumes based on a determined annual growth rate and including known potential developments within the study area. The Town of Randolph Planning Department was contacted to determine if there are currently any developments proposed within the vicinity of the site whose trip generation information should be included in the study to which none were noted.

To account for background growth along the roadways within the vicinity of the project site, the existing traffic volumes were projected over a seven-year horizon from 2022 to 2029. Recent census data was reviewed to determine the appropriate growth rate. The census data showed an average population increase of approximately 0.86% per year from 2010 to 2020 for the town. To provide a conservative analysis of the project area, a growth rate of 1.0% per year was used for the seven-year projection.

A copy of the available census data is provided in Appendix D. Figure 4 provides the 2029 future no-build volumes for the morning peak hour, and the afternoon peak hour.

BUILD CONDITIONS

The future 2029 build condition represents the future 2029 no-build condition plus potential traffic increases expected from new bus storage and maintenance area.

Trip Generation

The site will generate trips for both buses and passenger vehicles. Information provided for the proposed site operations and parking usage were used to determine the estimated trips at the site. Approximately 75 buses are expected to be using the site; however, due to the staggering schedule of operations, only 20% or 15 buses are estimated to enter and exit the site during peak hours. This

number is also used to determine the bus drivers' contribution to the number of passenger vehicles circulating the site during peak hours. In addition, on-site staff will be present to regulate the maintenance area in which up to 20 passenger vehicles were estimated to be entering in the morning and exiting in the afternoon peak. Circulation at the site is as follows:

Morning Peak Hour

- Entering:
  - 20 passenger vehicles for on-site staff
  - 15 passenger vehicles for bus drivers starting their shift.
  - 15 buses returning from a trip.
- Exiting:
  - 15 buses leaving for a trip
  - 15 passenger vehicles for bus drivers leaving after their shift

Afternoon Peak Hour

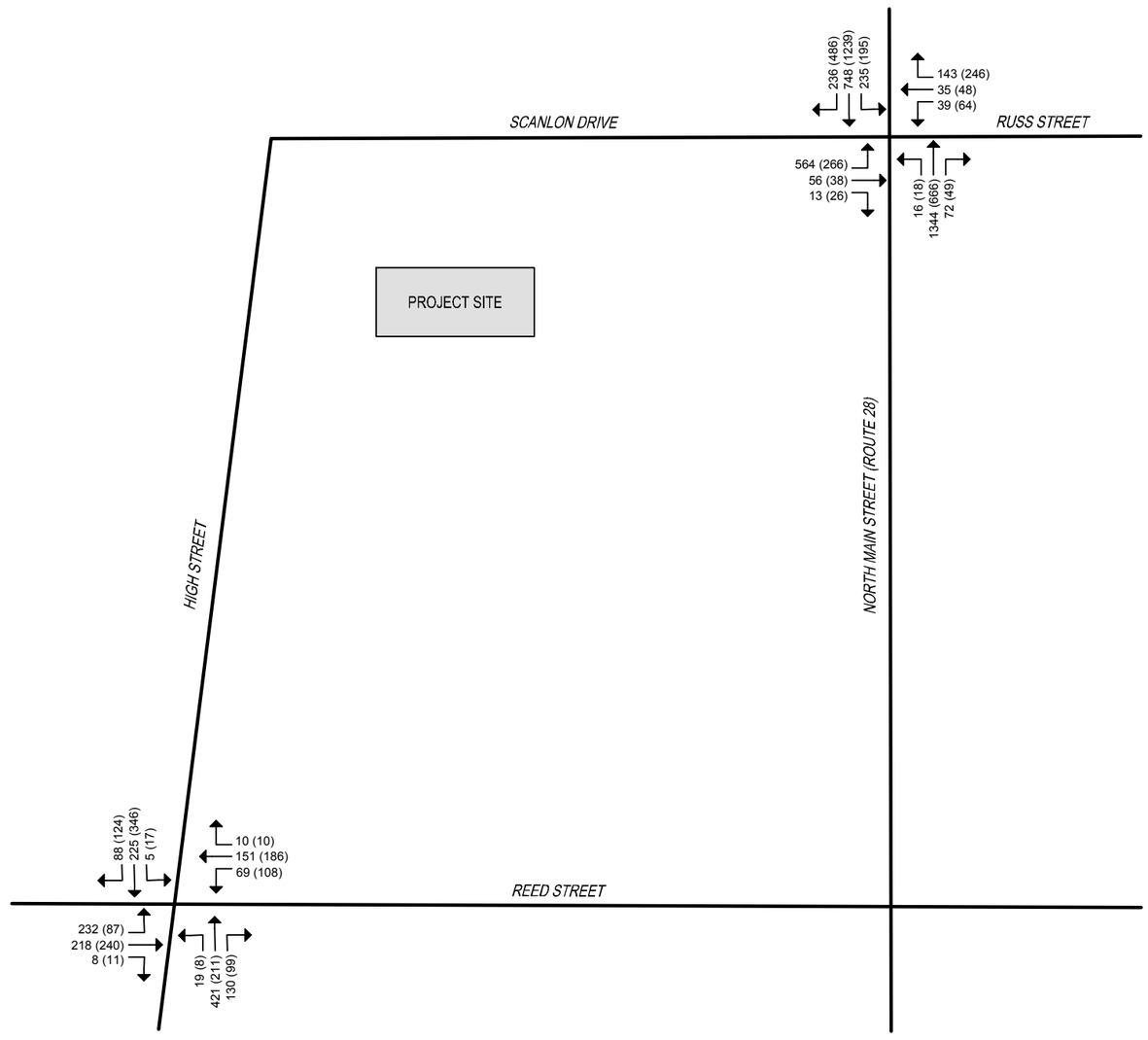
- Entering:
  - 15 buses returning from a trip
  - 15 passenger vehicles for bus drivers starting their shift
- Exiting:
  - 20 passenger vehicles for on-site staff
  - 15 passenger vehicles for bus drivers after their shift
  - 15 buses leaving for a trip

Complete trip generation calculations are provided in Appendix E.

Trip Distribution

Trip distribution of the new bus storage and maintenance area for passenger vehicles will mimic the existing site operations. As bus operations are not localized within the town, it is assumed that trips for buses will use the most direct route to and from the highway using North Main Street (Route 28). Within the site, the western driveway will be utilized for entering buses, the central driveway will be utilized for exiting buses, and the eastern driveway will be utilized by autos entering and exiting the site.

Complete trip distribution calculations are provided in Appendix E. Site generated traffic volumes are shown in Figure 5 and the future (2029) build volumes are shown in Figure 6.



AM PEAK VOLUMES (PM PEAK VOLUMES)

PROJECT NO. 22077.00 DATE: MARCH 2023

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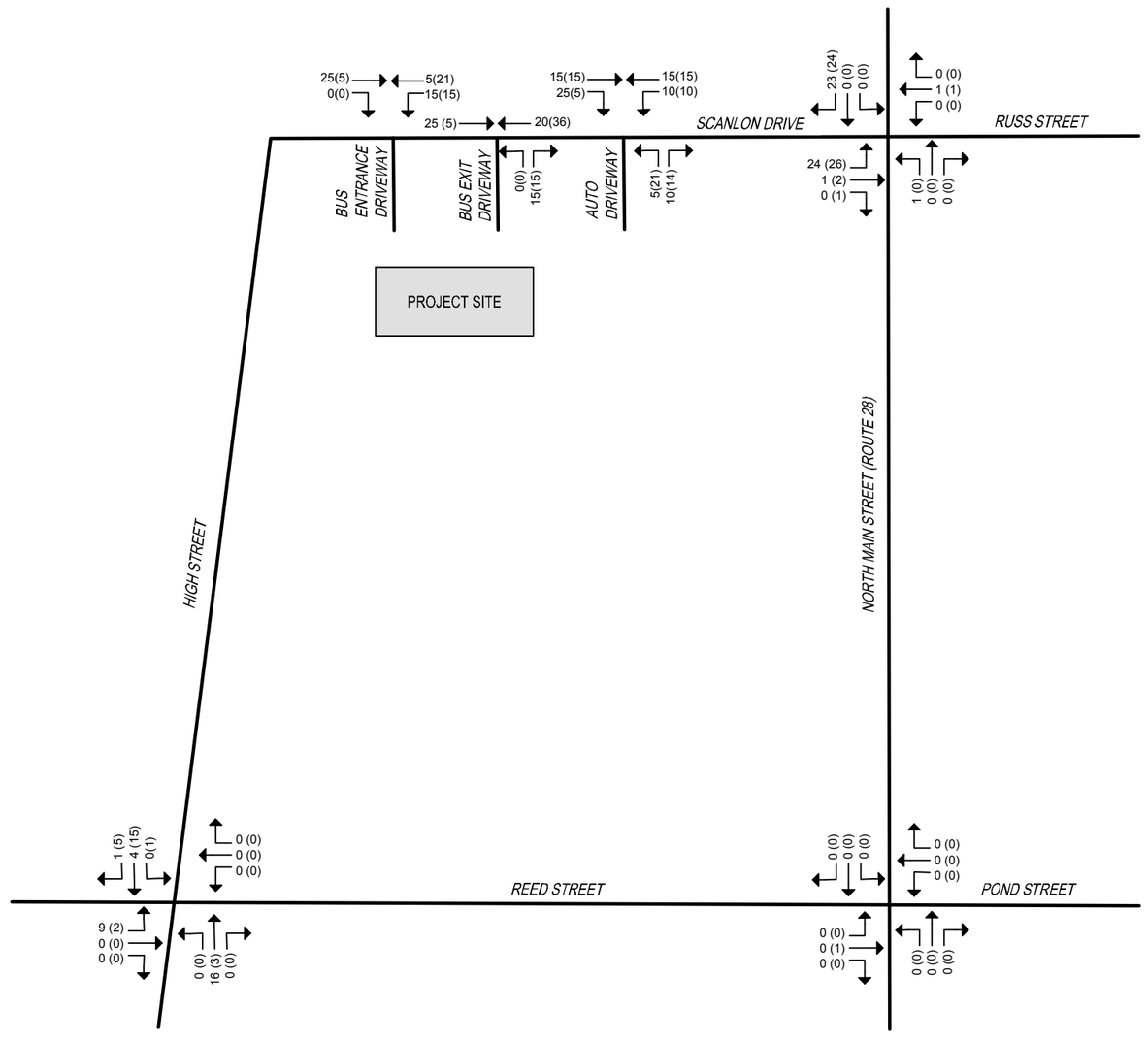
FIGURE 4

NO-BUILD (2029) PEAK HOUR TRAFFIC VOLUMES
RANDOLPH SCANLON DRIVE DEVELOPMENT

RANDOLPH, MASSACHUSETTS



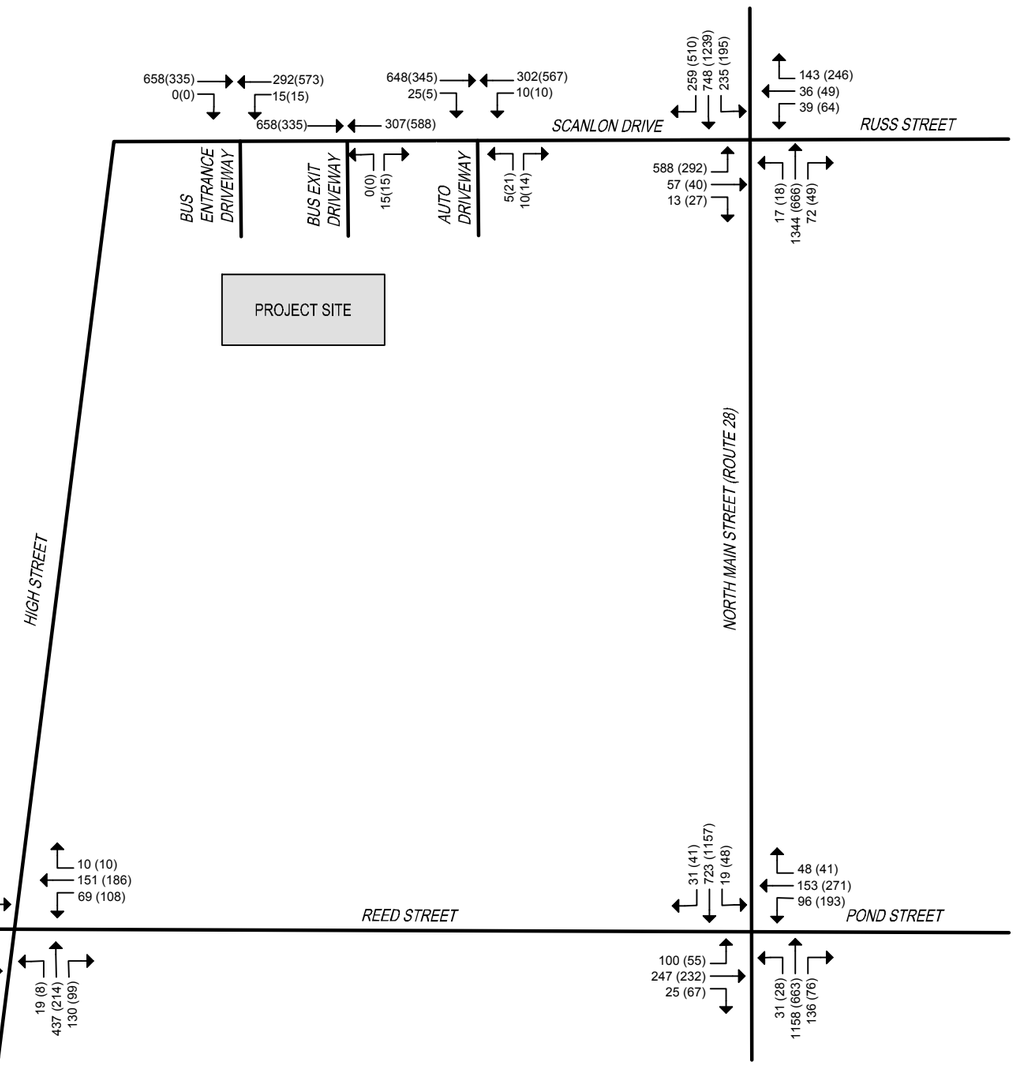
AM PEAK VOLUMES (PM PEAK VOLUMES)

PROJECT NO. 22077.00 DATE: MARCH 2023

FIGURE 5

SITE GENERATED PEAK HOUR TRAFFIC VOLUMES
RANDOLPH SCANLON DRIVE DEVELOPMENT

RANDOLPH, MASSACHUSETTS



AM PEAK VOLUMES (PM PEAK VOLUMES)

PROJECT NO. 22077.00 DATE: MARCH 2023

FIGURE 6

BUILD (2029) PEAK HOUR TRAFFIC VOLUMES
RANDOLPH SCANLON DRIVE DEVELOPMENT

RANDOLPH, MASSACHUSETTS

CAPACITY ANALYSIS

Capacity analysis was completed for all study intersections for existing, future (2029) no-build, and future (2029) build conditions. Capacity analysis characterizes intersections based on their level of service (LOS). LOS is a quality measure describing operational conditions within a traffic stream, generally in terms of service measures such as speed, travel times, traffic interruptions, etc. Six LOS, from A to F, are defined for each type of facility, with A representing the best operating conditions and F representing the worst operating conditions. The LOS criteria for signalized and unsignalized intersections is provided in Table 5. Tables 6 and 7 and provides the capacity analysis results for all intersections for the a.m. and p.m. peak hours, respectively. The complete capacity analyses can be found in Appendix F.

Table 5: LOS Criteria for Signalized Intersections

	Signalized Intersection	**Unsignalized Intersection**
LOS	Delay Time (sec/veh)	Delay Time (sec/veh)
A	≤ 10	0-10
B	> 10-20	> 10-15
C	> 20-35	> 15-25
D	> 35-55	> 25-35
E	> 55-80	> 35-50
F	> 80	> 50

As shown in the tables below, there is not expected to be any change in overall LOS at the signalized intersections between no-build and build conditions during either the morning or afternoon peak hours. The overall impact of the proposed development is anticipated to be less than two seconds of additional delay at both intersections during both peak hours. Under existing conditions, the intersection of North Main Street (Route 128) at Scanlon Drive and Russ Street operates at an LOS D and an LOS C for the morning peak hour and afternoon peak hour, respectively. The afternoon peak hour remains at an LOS C for both the no-build and build conditions. The morning peak hour is expected to operate at an LOS E for both the no-build and build conditions.

The intersection of High Street and Reed Street was also analyzed as a portion of passenger vehicles traveling to and from the site are expected to go through this intersection. A traffic signal plan for the intersection could not be obtained to provide a more accurate analysis. However, optimized timings were utilized to provide an idea of the intersection's conditions. Based on the analyses, the existing condition of the intersection operates at an LOS C and LOS B for the morning and afternoon peak hours, respectively. The no-build and build scenarios for both peaks reflect an increased delay but still maintain the LOS for their respective existing conditions.

There is a minor increase in delay at intersections surrounding the site; however, the additional trips associated with the proposed bus storage and maintenance area is not expected to significantly affect traffic and will result in no change to the level of service compared to the no-build condition.

The proposed driveways in the build scenario were analyzed and are expected to operate at an LOS C or better for all movements at all three driveways. There are expected to be slight delays both entering and exiting the site.

Table 6: A.M. Peak Hour LOS Table

Intersection	Movement		Existing (2022)		Future (2029) No-Build		Future (2029) Build	
			LOS (Delay[1])	Queue Length[2]	LOS (Delay[1])	Queue Length[2]	LOS (Delay[1])	Queue Length[2]
North Main Street (Route 28) at Scanlon Drive/ Russ Street	NB	L	B (16.9)	13	B (10.9)	14	B (10.9)	15
		T, R	D (36.4)	#689	E (70.5)	#798	E (68.0)	#789
	SB	L	C (23.3)	#232	E (63.5)	#284	E (63.5)	#284
		T	C (32.0)	221	B (16.1)	257	B (16.1)	257
		R	A (1.8)	18	A (0.9)	19	A (1.0)	20
	EB	L	D (40.1)	#433	F (93.5)	#469	F (103.8)	#496
		T, R	D (38.1)	#431	F (91.0)	#471	F (99.0)	#493
	WB	L	D (41.0)	63	E (67.0)	69	E (67.0)	69
		T, R	C (32.7)	#170	E (75.6)	#200	E (78.3)	#204
	Intersection		D (49.1)		E (57.6)		E (58.3)	
High Street at Reed Street	NB	L, T, R	C (21.8)	#292	C (26.9)	#340	C (29.0)	#355
	SB	L, T, R	B (12.2)	116	B (12.8)	128	B (13.0)	130
	EB	L, T, R	C (34.5)	#278	C (31.9)	#304	C (34.5)	#313
	WB	L, T, R	B (13.1)	93	B (12.9)	100	B (12.9)	100
	Intersection		C (22.5)		C (23.5)		C (25.1)	
Scanlon Drive at Bus Entrance Driveway	WB	L,T	N/A	N/A	N/A	N/A	B (11.6)	3
Scanlon Drive at Bus Exit Driveway	NB	L, R	N/A	N/A	N/A	N/A	C (17.6)	5
Scanlon Drive at Auto Driveway	NB	L, R	N/A	N/A	N/A	N/A	C (16.0)	3
	WB	L, T	N/A	N/A	N/A	N/A	A (9.1)	0

- 95th percentile volume exceeds capacity; queue may be longer; N/C – No Conflict.
1. Delay shown in seconds per vehicle.
2. Queue Length shown in feet.

Table 7: PM Peak Hour LOS Table

Intersection	Movement		Existing (2022)		Future (2029) No-Build		Future (2029) Build	
			LOS (Delay[1])	Queue Length[2]	LOS (Delay[1])	Queue Length[2]	LOS (Delay[1])	Queue Length[2]
North Main Street (Route 28) at Scanlon Drive/ Russ Street	NB	L	B (16.4)	18	B (16.9)	20	B (17.2)	20
		T, R	C (33.7)	291	D (36.4)	324	D (37.4)	324
	SB	L	C (20.7)	121	C (23.3)	134	C (24.5)	136
		T	C (28.8)	#582	C (32.0)	#659	C (33.3)	#659
		R	A (1.8)	36	A (1.8)	36	A (1.9)	37
	EB	L	D (39.5)	164	D (40.1)	180	D (42.2)	198
		T, R	D (37.3)	157	D (38.1)	174	D (39.2)	188
	WB	L	D (39.8)	78	D (41.0)	84	D (41.6)	84
		T, R	C (31.8)	146	C (30.9)	#193	C (32.6)	#200
	Intersection		C (26.9)		C (28.7)		C (29.7)	
High Street at Reed Street	NB	L, T, R	A (10.0)	92	B (10.7)	103	B (10.9)	105
	SB	L, T, R	B (16.0)	#175	B (18.4)	#231	C (20.2)	#248
	EB	L, T, R	B (15.1)	122	B (14.9)	134	B (15.0)	135
	WB	L, T, R	A (7.5)	m36	A (6.6)	m33	A (6.7)	m33
	Intersection		B (12.6)		B (13.4)		B (14.2)	
Scanlon Drive at Bus Entrance Driveway	WB	L	N/A	N/A	N/A	N/A	A (9.5)	3
Scanlon Drive at Bus Exit Driveway	NB	L, R	N/A	N/A	N/A	N/A	B (12.3)	3
Scanlon Drive at Auto Driveway	NB	L, R	N/A	N/A	N/A	N/A	C (16.6)	10
	WB	L, T	N/A	N/A	N/A	N/A	A (8.1)	0

- 95th percentile volume exceeds capacity; queue may be longer; N/C – No Conflict.
1. Delay shown in seconds per vehicle.
2. Queue Length shown in feet

CONCLUSIONS

Pare Corporation conducted analyses of the potential impacts of the construction of a bus storage and maintenance area located at 34 Scanlon Drive in Randolph, Massachusetts. The site is anticipated to have three driveways along Scanlon Drive, which will be located in close proximity to the existing driveways. The western driveway will be utilized for entering buses, the central driveway will be utilized for exiting buses, and the eastern driveway will be utilized by autos entering and exiting the site.

A safety review was conducted for the study area roadways and intersections. Five years of crash data extracted from the MassDOT Crash Data Portal showed a slightly elevated crash rate for the intersection of High Street at Reed Street compared to the state average. Vertical curvature present on Reed Street can be a factor of the high crash rate. However, the proposed development is expected to generate only a marginal increase compared to the existing trips at the intersection; therefore, the low volume is not anticipated to exacerbate these conditions.

Based on the sight distance analyses, it is anticipated that the addition of this development's traffic to the driveway access and to Scanlon Drive can be accommodated safely if vegetation within the vicinity of the proposed driveways is regularly maintained, so as not to interfere with sight lines. It is also observed that the location of the proposed eastern driveway provides enough reaction time for vehicles approaching and exiting the site.

As outlined in the trip generation section, the proposed bus storage and maintenance use and development size would result in a peak hour demand of 80 trips (entering and exiting) for both the morning and afternoon peak hours. Due to the staggered and irregular bus schedule of operations, a maximum of 15 buses are anticipated to be entering and exiting at a time during the peak hours. The remaining volume contribution is due to bus drivers commuting to and from the site for their work shifts as well as on-site staff that will be maintaining the site during regular work hours.

Capacity analyses were conducted at the signalized intersections of North Main Street at Scanlon Drive and Russ Street and High Street at Reed Street due to the trip distribution to and from the site. The analyses indicated an increased delay from the existing conditions; however, the build conditions are expected to result in less than two seconds of added delay and no change in LOS compared to the no-build conditions. Additionally, the driveways are expected to operate at an LOS C or better. Delays at the three driveways are a result of conflicting movements as vehicles enter or exit the site. Therefore, the bus storage and maintenance area will have an insignificant impact on the surrounding roadway network.

As a result, it is Pare Corporation's professional opinion that the development of a bus storage and maintenance area at 34 Scanlon Drive in Randolph, Massachusetts will not negatively affect traffic conditions or traffic safety in the vicinity of the site.

Appendix A

Traffic Counts

Transportation Data Corporation
Mario Perone, mperone1@verizon.net
tel (781) 587-0086 cell (781) 439-4999

N/S: N. Main Street (Route 28)
E/W: Russ Street/Scanlon Drive
City, State: Randolph, MA
Client: Pare/Amy Archer

File Name : 05569A
Site Code : 05569
Start Date : 5/25/2022
Page No : 1

Groups Printed- Cars & Peds - Trucks & Buses - Bikes by Direction

	N. Main Street (Route 28) From North				Russ Street From East				N. Main Street (Route 28) From South				Scanlon Drive From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
07:00 AM	37	96	31	0	23	7	2	1	18	382	4	1	0	9	171	0	782
07:15 AM	50	112	46	1	22	9	8	0	9	331	3	0	4	9	144	0	748
07:30 AM	57	165	53	0	22	8	12	0	8	351	1	0	3	15	133	0	828
07:45 AM	56	178	60	0	42	7	14	0	18	309	4	0	5	11	157	1	862
Total	200	551	190	1	109	31	36	1	53	1373	12	1	12	44	605	1	3220
08:00 AM	57	177	48	0	33	9	8	0	16	303	3	1	1	21	109	1	787
08:15 AM	50	177	58	0	36	8	2	2	25	290	6	0	3	5	127	1	790
08:30 AM	50	148	49	0	41	10	10	1	13	239	3	0	2	9	124	0	699
08:45 AM	62	152	39	0	36	9	16	2	11	245	9	1	3	12	92	0	689
Total	219	654	194	0	146	36	36	5	65	1077	21	2	9	47	452	2	2965
Grand Total	419	1205	384	1	255	67	72	6	118	2450	33	3	21	91	1057	3	6185
Apprch %	20.9	60	19.1	0	63.8	16.8	18	1.5	4.5	94.1	1.3	0.1	1.8	7.8	90.2	0.3	
Total %	6.8	19.5	6.2	0	4.1	1.1	1.2	0.1	1.9	39.6	0.5	0	0.3	1.5	17.1	0	
Cars & Peds	392	1123	379	1	252	66	71	6	116	2390	31	3	20	90	1041	3	5984
% Cars & Peds	93.6	93.2	98.7	100	98.8	98.5	98.6	100	98.3	97.6	93.9	100	95.2	98.9	98.5	100	96.8
Trucks & Buses																	
% Trucks & Buses	6.4	6.8	1.3	0	1.2	1.5	1.4	0	1.7	2.4	6.1	0	4.8	1.1	1.5	0	3.2
Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	N. Main Street (Route 28) From North					Russ Street From East					N. Main Street (Route 28) From South					Scanlon Drive From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	**57**	165	53	0	275	22	8	12	0	42	8	**351**	1	0	**360**	3	15	133	0	151	828
07:45 AM	56	**178**	**60**	0	**294**	**42**	7	**14**	0	**63**	18	309	4	0	331	**5**	11	**157**	**1**	**174**	**862**
08:00 AM	57	177	48	0	282	33	**9**	8	0	50	16	303	3	**1**	323	1	**21**	109	1	132	787
08:15 AM	50	177	58	0	285	36	8	2	**2**	48	**25**	290	**6**	0	321	3	5	127	1	136	790
Total Volume	220	697	219	0	1136	133	32	36	2	203	67	1253	14	1	1335	12	52	526	3	593	3267
% App. Total	19.4	61.4	19.3	0		65.5	15.8	17.7	1		5	93.9	1	0.1		2	8.8	88.7	0.5		
PHF	.965	.979	.913	.000	.966	.792	.889	.643	.250	.806	.670	.892	.583	.250	.927	.600	.619	.838	.750	.852	.948
Cars & Peds	204	651	216	0	1071	131	32	36	2	201	66	1221	12	1	1300	12	52	519	3	586	3158
% Cars & Peds	92.7	93.4	98.6	0	94.3	98.5	100	100	100	99.0	98.5	97.4	85.7	100	97.4	100	100	98.7	100	98.8	96.7
Trucks & Buses	16	46	3	0	65	2	0	0	0	2	1	32	2	0	35	0	0	7	0	7	109
% Trucks & Buses	7.3	6.6	1.4	0	5.7	1.5	0	0	0	1.0	1.5	2.6	14.3	0	2.6	0	0	1.3	0	1.2	3.3
Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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N/S: N. Main Street (Route 28)
E/W: Russ Street/Scanlon Drive
City, State: Randolph, MA
Client: Pare/Amy Archer

File Name : 05569A
Site Code : 05569
Start Date : 5/25/2022
Page No : 1

Groups Printed- Cars & Peds

	N. Main Street (Route 28) From North				Russ Street From East				N. Main Street (Route 28) From South				Scanlon Drive From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
07:00 AM	37	89	31	0	23	7	2	1	17	374	4	1	0	9	167	0	762
07:15 AM	50	107	46	1	22	8	7	0	9	326	3	0	3	8	142	0	732
07:30 AM	55	158	53	0	21	8	12	0	8	336	1	0	3	15	130	0	800
07:45 AM	51	172	60	0	42	7	14	0	17	306	4	0	5	11	155	1	845
Total	193	526	190	1	108	30	35	1	51	1342	12	1	11	43	594	1	3139
08:00 AM	56	160	46	0	32	9	8	0	16	293	3	1	1	21	108	1	755
08:15 AM	42	161	57	0	36	8	2	2	25	286	4	0	3	5	126	1	758
08:30 AM	46	137	48	0	41	10	10	1	13	230	3	0	2	9	122	0	672
08:45 AM	55	139	38	0	35	9	16	2	11	239	9	1	3	12	91	0	660
Total	199	597	189	0	144	36	36	5	65	1048	19	2	9	47	447	2	2845
Grand Total	392	1123	379	1	252	66	71	6	116	2390	31	3	20	90	1041	3	5984
Apprch %	20.7	59.3	20	0.1	63.8	16.7	18	1.5	4.6	94.1	1.2	0.1	1.7	7.8	90.2	0.3	
Total %	6.6	18.8	6.3	0	4.2	1.1	1.2	0.1	1.9	39.9	0.5	0.1	0.3	1.5	17.4	0.1	

	N. Main Street (Route 28) From North					Russ Street From East					N. Main Street (Route 28) From South					Scanlon Drive From West					
Start Time	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	55	158	53	0	266	21	8	12	0	41	8	**336**	1	0	**345**	3	15	130	0	148	800
07:45 AM	51	**172**	**60**	0	**283**	**42**	7	**14**	0	**63**	17	306	**4**	0	327	**5**	11	**155**	**1**	**172**	**845**
08:00 AM	**56**	160	46	0	262	32	**9**	8	0	49	16	293	3	**1**	313	1	**21**	108	1	131	755
08:15 AM	42	161	57	0	260	36	8	2	**2**	48	**25**	286	4	0	315	3	5	126	1	135	758
Total Volume	204	651	216	0	1071	131	32	36	2	201	66	1221	12	1	1300	12	52	519	3	586	3158
% App. Total	19	60.8	20.2	0		65.2	15.9	17.9	1		5.1	93.9	0.9	0.1		2	8.9	88.6	0.5		
PHF	.911	.946	.900	.000	.946	.780	.889	.643	.250	.798	.660	.908	.750	.250	.942	.600	.619	.837	.750	.852	.934

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N/S: N. Main Street (Route 28)
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City, State: Randolph, MA
Client: Pare/Amy Archer

File Name : 05569A
Site Code : 05569
Start Date : 5/25/2022
Page No : 1

Groups Printed- Trucks & Buses

	N. Main Street (Route 28) From North				Russ Street From East				N. Main Street (Route 28) From South				Scanlon Drive From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
07:00 AM	0	7	0	0	0	0	0	0	1	8	0	0	0	0	4	0	20
07:15 AM	0	5	0	0	0	1	1	0	0	5	0	0	1	1	2	0	16
07:30 AM	2	7	0	0	1	0	0	0	0	15	0	0	0	0	3	0	28
07:45 AM	5	6	0	0	0	0	0	0	1	3	0	0	0	0	2	0	17
Total	7	25	0	0	1	1	1	0	2	31	0	0	1	1	11	0	81
08:00 AM	1	17	2	0	1	0	0	0	0	10	0	0	0	0	1	0	32
08:15 AM	8	16	1	0	0	0	0	0	0	4	2	0	0	0	1	0	32
08:30 AM	4	11	1	0	0	0	0	0	0	9	0	0	0	0	2	0	27
08:45 AM	7	13	1	0	1	0	0	0	0	6	0	0	0	0	1	0	29
Total	20	57	5	0	2	0	0	0	0	29	2	0	0	0	5	0	120
Grand Total	27	82	5	0	3	1	1	0	2	60	2	0	1	1	16	0	201
Apprch %	23.7	71.9	4.4	0	60	20	20	0	3.1	93.8	3.1	0	5.6	5.6	88.9	0	
Total %	13.4	40.8	2.5	0	1.5	0.5	0.5	0	1	29.9	1	0	0.5	0.5	8	0	

	N. Main Street (Route 28) From North					Russ Street From East					N. Main Street (Route 28) From South					Scanlon Drive From West					
Start Time	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	1	**17**	**2**	0	20	**1**	0	0	0	**1**	0	**10**	0	0	**10**	0	0	1	0	1	**32**
08:15 AM	**8**	16	1	0	**25**	0	0	0	0	0	0	4	**2**	0	6	0	0	1	0	1	32
08:30 AM	4	11	1	0	16	0	0	0	0	0	0	9	0	0	9	0	0	**2**	0	**2**	27
08:45 AM	7	13	1	0	21	1	0	0	0	1	0	6	0	0	6	0	0	1	0	1	29
Total Volume	20	57	5	0	82	2	0	0	0	2	0	29	2	0	31	0	0	5	0	5	120
% App. Total	24.4	69.5	6.1	0		100	0	0	0		0	93.5	6.5	0		0	0	100	0		
PHF	.625	.838	.625	.000	.820	.500	.000	.000	.000	.500	.000	.725	.250	.000	.775	.000	.000	.625	.000	.625	.938

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City, State: Randolph, MA
Client: Pare/Amy Archer

File Name : 05569A
Site Code : 05569
Start Date : 5/25/2022
Page No : 1

Groups Printed- Bikes by Direction

	N. Main Street (Route 28) From North				Russ Street From East				N. Main Street (Route 28) From South				Scanlon Drive From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
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	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	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	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
Apprch %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total %																	

	N. Main Street (Route 28) From North					Russ Street From East					N. Main Street (Route 28) From South					Scanlon Drive From West					
Start Time	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection 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	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	0	0
07:30 AM	0	0	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	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0		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	.000	.000	.000	.000

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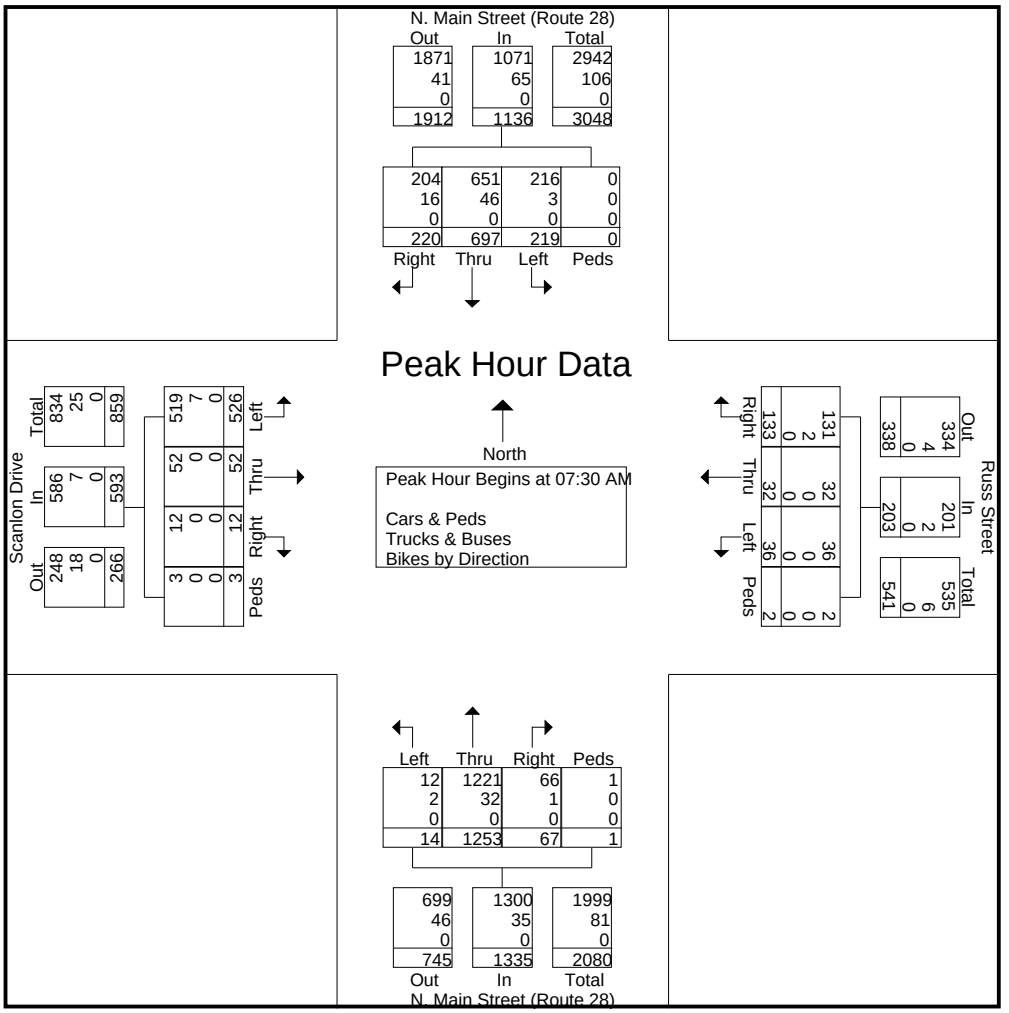
Client: Pare/Amy Archer

File Name : 05569A
Site Code : 05569
Start Date : 5/25/2022
Page No : 1

	N. Main Street (Route 28) From North					Russ Street From East					N. Main Street (Route 28) From South					Scanlon Drive From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	**57**	165	53	0	275	22	8	12	0	42	8	**351**	1	0	**360**	3	15	133	0	151	828
07:45 AM	56	**178**	**60**	0	**294**	**42**	7	**14**	0	**63**	18	309	4	0	331	**5**	11	**157**	**1**	**174**	**862**
08:00 AM	57	177	48	0	282	33	**9**	8	0	50	16	303	3	**1**	323	1	**21**	109	1	132	787
08:15 AM	50	177	58	0	285	36	8	2	**2**	48	**25**	290	**6**	0	321	3	5	127	1	136	790
Total Volume	220	697	219	0	1136	133	32	36	2	203	67	1253	14	1	1335	12	52	526	3	593	3267
% App. Total	19.4	61.4	19.3	0		65.5	15.8	17.7	1		5	93.9	1	0.1		2	8.8	88.7	0.5		
PHF	.965	.979	.913	.000	.966	.792	.889	.643	.250	.806	.670	.892	.583	.250	.927	.600	.619	.838	.750	.852	.948
Cars & Peds	204	651	216	0	1071	131	32	36	2	201	66	1221	12	1	1300	12	52	519	3	586	3158
% Cars & Peds	92.7	93.4	98.6	0	94.3	98.5	100	100	100	99.0	98.5	97.4	85.7	100	97.4	100	100	98.7	100	98.8	96.7
Trucks & Buses	16	46	3	0	65	2	0	0	0	2	1	32	2	0	35	0	0	7	0	7	109
% Trucks & Buses	7.3	6.6	1.4	0	5.7	1.5	0	0	0	1.0	1.5	2.6	14.3	0	2.6	0	0	1.3	0	1.2	3.3
Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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File Name : 05569AA
Site Code : 05569
Start Date : 5/25/2022
Page No : 1

Groups Printed- Cars & Peds - Trucks & Buses - Bikes by Direction

	N. Main Street (Route 28) From North				Russ Street From East				N. Main Street (Route 28) From South				Scanlon Drive From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
04:00 PM	80	223	36	0	80	4	20	1	11	162	3	1	5	4	63	0	693
04:15 PM	93	262	47	0	73	9	18	0	18	166	8	1	9	6	61	2	773
04:30 PM	72	256	40	0	72	11	15	0	11	152	2	0	4	14	52	0	701
04:45 PM	103	287	31	0	59	10	13	1	16	143	2	2	3	7	65	2	744
Total	348	1028	154	0	284	34	66	2	56	623	15	4	21	31	241	4	2911
05:00 PM	101	319	47	0	74	11	16	0	4	173	3	0	6	7	64	0	825
05:15 PM	120	249	51	0	55	9	14	0	13	145	4	1	9	11	56	0	737
05:30 PM	129	300	52	0	41	14	16	0	12	160	7	3	6	10	63	3	816
05:45 PM	110	311	34	0	47	14	14	0	10	130	4	0	3	5	55	1	738
Total	460	1179	184	0	217	48	60	0	39	608	18	4	24	33	238	4	3116
Grand Total	808	2207	338	0	501	82	126	2	95	1231	33	8	45	64	479	8	6027
Apprch %	24.1	65.8	10.1	0	70.5	11.5	17.7	0.3	6.9	90.1	2.4	0.6	7.6	10.7	80.4	1.3	
Total %	13.4	36.6	5.6	0	8.3	1.4	2.1	0	1.6	20.4	0.5	0.1	0.7	1.1	7.9	0.1	
Cars & Peds	779	2131	335	0	498	82	125	2	94	1193	33	8	45	64	472	8	5869
% Cars & Peds	96.4	96.6	99.1	0	99.4	100	99.2	100	98.9	96.9	100	100	100	100	98.5	100	97.4
Trucks & Buses																	
% Trucks & Buses	3.6	3.4	0.9	0	0.6	0	0	0	0	3.1	0	0	0	0	1.5	0	2.6
Bikes by Direction	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	3
% Bikes by Direction	0	0	0	0	0	0	0.8	0	1.1	0	0	0	0	0	0	0	0

	N. Main Street (Route 28) From North					Russ Street From East					N. Main Street (Route 28) From South					Scanlon Drive From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	103	287	31	0	421	59	10	13	**1**	83	**16**	143	2	2	163	3	7	**65**	2	77	744
05:00 PM	101	**319**	47	0	467	**74**	11	**16**	0	**101**	4	**173**	3	0	180	6	7	64	0	77	**825**
05:15 PM	120	249	51	0	420	55	9	14	0	78	13	145	4	1	163	**9**	**11**	56	0	76	737
05:30 PM	**129**	300	**52**	0	**481**	41	**14**	16	0	71	12	160	**7**	**3**	**182**	6	10	63	**3**	**82**	816
Total Volume	453	1155	181	0	1789	229	44	59	1	333	45	621	16	6	688	24	35	248	5	312	3122
% App. Total	25.3	64.6	10.1	0		68.8	13.2	17.7	0.3		6.5	90.3	2.3	0.9		7.7	11.2	79.5	1.6		
PHF	.878	.905	.870	.000	.930	.774	.786	.922	.250	.824	.703	.897	.571	.500	.945	.667	.795	.954	.417	.951	.946
Cars & Peds	440	1111	181	0	1732	229	44	58	1	332	44	600	16	6	666	24	35	245	5	309	3039
% Cars & Peds	97.1	96.2	100	0	96.8	100	100	98.3	100	99.7	97.8	96.6	100	100	96.8	100	100	98.8	100	99.0	97.3
Trucks & Buses	13	44	0	0	57	0	0	0	0	0	0	21	0	0	21	0	0	3	0	3	81
% Trucks & Buses	2.9	3.8	0	0	3.2	0	0	0	0	0	0	3.4	0	0	3.1	0	0	1.2	0	1.0	2.6
Bikes by Direction	0	0	0	0	0	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	2
% Bikes by Direction	0	0	0	0	0	0	0	1.7	0	0.3	2.2	0	0	0	0.1	0	0	0	0	0	0.1

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N/S: N. Main Street (Route 28)
E/W: Russ Street/Scanlon Drive
City, State: Randolph, MA
Client: Pare/Amy Archer

File Name : 05569AA
Site Code : 05569
Start Date : 5/25/2022
Page No : 1

Groups Printed- Cars & Peds

	N. Main Street (Route 28) From North				Russ Street From East				N. Main Street (Route 28) From South				Scanlon Drive From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
04:00 PM	74	215	34	0	79	4	20	1	11	157	3	1	5	4	61	0	669
04:15 PM	87	253	47	0	72	9	18	0	18	161	8	1	9	6	59	2	750
04:30 PM	70	249	39	0	72	11	15	0	11	149	2	0	4	14	52	0	688
04:45 PM	99	273	31	0	59	10	13	1	16	136	2	2	3	7	63	2	717
Total	330	990	151	0	282	34	66	2	56	603	15	4	21	31	235	4	2824
05:00 PM	99	311	47	0	74	11	16	0	4	169	3	0	6	7	64	0	811
05:15 PM	114	240	51	0	55	9	14	0	13	137	4	1	9	11	56	0	714
05:30 PM	128	287	52	0	41	14	15	0	11	158	7	3	6	10	62	3	797
05:45 PM	108	303	34	0	46	14	14	0	10	126	4	0	3	5	55	1	723
Total	449	1141	184	0	216	48	59	0	38	590	18	4	24	33	237	4	3045
Grand Total	779	2131	335	0	498	82	125	2	94	1193	33	8	45	64	472	8	5869
Apprch %	24	65.7	10.3	0	70.4	11.6	17.7	0.3	7.1	89.8	2.5	0.6	7.6	10.9	80.1	1.4	
Total %	13.3	36.3	5.7	0	8.5	1.4	2.1	0	1.6	20.3	0.6	0.1	0.8	1.1	8	0.1	

	N. Main Street (Route 28) From North					Russ Street From East					N. Main Street (Route 28) From South					Scanlon Drive From West					
Start Time	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	99	**311**	47	0	457	**74**	11	**16**	0	**101**	4	**169**	3	0	176	6	7	**64**	0	77	**811**
05:15 PM	114	240	51	0	405	55	9	14	0	78	**13**	137	4	1	155	**9**	**11**	56	0	76	714
05:30 PM	**128**	287	**52**	0	**467**	41	**14**	15	0	70	11	158	**7**	**3**	**179**	6	10	62	**3**	**81**	797
05:45 PM	108	303	34	0	445	46	14	14	0	74	10	126	4	0	140	3	5	55	1	64	723
Total Volume	449	1141	184	0	1774	216	48	59	0	323	38	590	18	4	650	24	33	237	4	298	3045
% App. Total	25.3	64.3	10.4	0		66.9	14.9	18.3	0		5.8	90.8	2.8	0.6		8.1	11.1	79.5	1.3		
PHF	.877	.917	.885	.000	.950	.730	.857	.922	.000	.800	.731	.873	.643	.333	.908	.667	.750	.926	.333	.920	.939

Transportation Data Corporation
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N/S: N. Main Street (Route 28)
E/W: Russ Street/Scanlon Drive
City, State: Randolph, MA
Client: Pare/Amy Archer

File Name : 05569AA
Site Code : 05569
Start Date : 5/25/2022
Page No : 1

Groups Printed- Trucks & Buses

	N. Main Street (Route 28) From North				Russ Street From East				N. Main Street (Route 28) From South				Scanlon Drive From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
04:00 PM	6	8	2	0	1	0	0	0	0	5	0	0	0	0	2	0	24
04:15 PM	6	9	0	0	1	0	0	0	0	5	0	0	0	0	2	0	23
04:30 PM	2	6	1	0	0	0	0	0	0	3	0	0	0	0	0	0	12
04:45 PM	4	14	0	0	0	0	0	0	0	7	0	0	0	0	2	0	27
Total	18	37	3	0	2	0	0	0	0	20	0	0	0	0	6	0	86
05:00 PM	2	8	0	0	0	0	0	0	0	4	0	0	0	0	0	0	14
05:15 PM	6	9	0	0	0	0	0	0	0	8	0	0	0	0	0	0	23
05:30 PM	1	13	0	0	0	0	0	0	0	2	0	0	0	0	1	0	17
05:45 PM	2	8	0	0	1	0	0	0	0	4	0	0	0	0	0	0	15
Total	11	38	0	0	1	0	0	0	0	18	0	0	0	0	1	0	69
Grand Total	29	75	3	0	3	0	0	0	0	38	0	0	0	0	7	0	155
Apprch %	27.1	70.1	2.8	0	100	0	0	0	0	100	0	0	0	0	100	0	
Total %	18.7	48.4	1.9	0	1.9	0	0	0	0	24.5	0	0	0	0	4.5	0	

	N. Main Street (Route 28) From North					Russ Street From East					N. Main Street (Route 28) From South					Scanlon Drive From West					
Start Time	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	**6**	8	**2**	0	16	**1**	0	0	0	**1**	0	5	0	0	5	0	0	**2**	0	**2**	24
04:15 PM	6	9	0	0	15	1	0	0	0	1	0	5	0	0	5	0	0	2	0	2	23
04:30 PM	2	6	1	0	9	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	12
04:45 PM	4	**14**	0	0	**18**	0	0	0	0	0	0	**7**	0	0	**7**	0	0	2	0	2	**27**
Total Volume	18	37	3	0	58	2	0	0	0	2	0	20	0	0	20	0	0	6	0	6	86
% App. Total	31	63.8	5.2	0		100	0	0	0		0	100	0	0		0	0	100	0		
PHF	.750	.661	.375	.000	.806	.500	.000	.000	.000	.500	.000	.714	.000	.000	.714	.000	.000	.750	.000	.750	.796

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N/S: N. Main Street (Route 28)
E/W: Russ Street/Scanlon Drive
City, State: Randolph, MA
Client: Pare/Amy Archer

File Name : 05569AA
Site Code : 05569
Start Date : 5/25/2022
Page No : 1

Groups Printed- Bikes by Direction

	N. Main Street (Route 28) From North				Russ Street From East				N. Main Street (Route 28) From South				Scanlon Drive From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
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	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
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	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2
Grand Total	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	3
Apprch %	0	100	0	0	0	0	100	0	100	0	0	0	0	0	0	0	
Total %	0	33.3	0	0	0	0	33.3	0	33.3	0	0	0	0	0	0	0	

	N. Main Street (Route 28) From North					Russ Street From East					N. Main Street (Route 28) From South					Scanlon Drive From West					
Start Time	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	0	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	0	0
05:15 PM	0	0	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	**1**	0	**1**	**1**	0	0	0	**1**	0	0	0	0	0	**2**
Total Volume	0	0	0	0	0	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	2
% App. Total	0	0	0	0		0	0	100	0		100	0	0	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.250	.000	.250	.250	.000	.000	.000	.250	.000	.000	.000	.000	.000	.250

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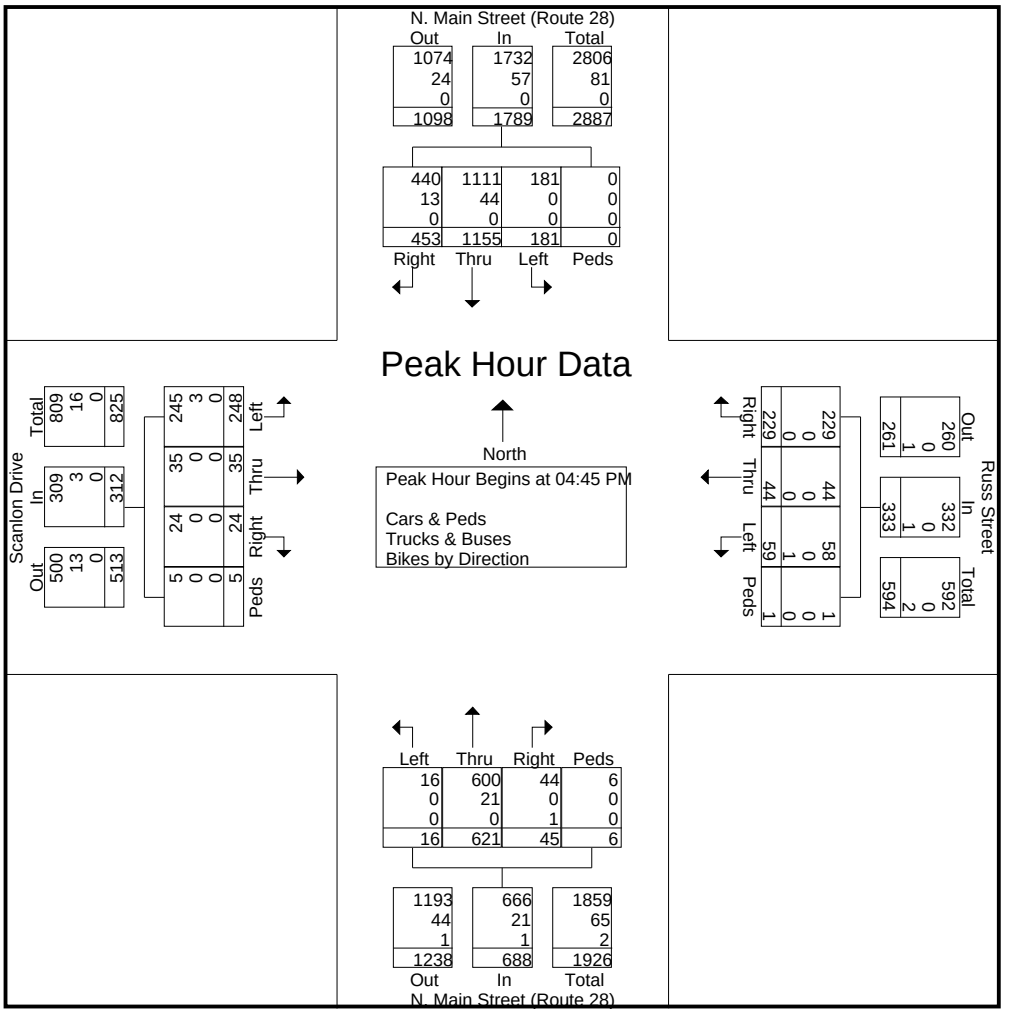
N/S: N. Main Street (Route 28)
E/W: Russ Street/Scanlon Drive
City, State: Randolph, MA
Client: Pare/Amy Archer

File Name : 05569AA
Site Code : 05569
Start Date : 5/25/2022
Page No : 1

	N. Main Street (Route 28) From North					Russ Street From East					N. Main Street (Route 28) From South					Scanlon Drive From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	103	287	31	0	421	59	10	13	**1**	83	**16**	143	2	2	163	3	7	**65**	2	77	744
05:00 PM	101	**319**	47	0	467	**74**	11	**16**	0	**101**	4	**173**	3	0	180	6	7	64	0	77	**825**
05:15 PM	120	249	51	0	420	55	9	14	0	78	13	145	4	1	163	**9**	**11**	56	0	76	737
05:30 PM	**129**	300	**52**	0	**481**	41	**14**	16	0	71	12	160	**7**	**3**	**182**	6	10	63	**3**	**82**	816
Total Volume	453	1155	181	0	1789	229	44	59	1	333	45	621	16	6	688	24	35	248	5	312	3122
% App. Total	25.3	64.6	10.1	0		68.8	13.2	17.7	0.3		6.5	90.3	2.3	0.9		7.7	11.2	79.5	1.6		
PHF	.878	.905	.870	.000	.930	.774	.786	.922	.250	.824	.703	.897	.571	.500	.945	.667	.795	.954	.417	.951	.946
Cars & Peds	440	1111	181	0	1732	229	44	58	1	332	44	600	16	6	666	24	35	245	5	309	3039
% Cars & Peds	97.1	96.2	100	0	96.8	100	100	98.3	100	99.7	97.8	96.6	100	100	96.8	100	100	98.8	100	99.0	97.3
Trucks & Buses	13	44	0	0	57	0	0	0	0	0	0	21	0	0	21	0	0	3	0	3	81
% Trucks & Buses	2.9	3.8	0	0	3.2	0	0	0	0	0	0	3.4	0	0	3.1	0	0	1.2	0	1.0	2.6
Bikes by Direction	0	0	0	0	0	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	2
% Bikes by Direction	0	0	0	0	0	0	0	1.7	0	0.3	2.2	0	0	0	0.1	0	0	0	0	0	0.1



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N/S: High Street
E/W: Reed Street
City, State: Randolph, MA
Client: Pare/Amy Archer

File Name : 05569C
Site Code : 05569
Start Date : 5/25/2022
Page No : 1

Groups Printed- Cars & Peds - Trucks & Buses - Bikes by Direction

	High Street From North				Reed Street From East				High Street From South				Reed Street From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
07:00 AM	17	35	0	0	2	34	5	3	22	121	1	0	1	41	60	0	342
07:15 AM	26	53	1	0	3	33	23	1	22	112	1	0	1	35	53	0	364
07:30 AM	25	49	1	0	4	45	16	0	29	94	3	0	1	58	63	1	389
07:45 AM	20	39	2	0	1	35	7	0	27	97	5	0	4	67	56	0	360
Total	88	176	4	0	10	147	51	4	100	424	10	0	7	201	232	1	1455
08:00 AM	11	68	0	2	1	27	18	3	43	89	8	2	1	43	44	1	361
08:15 AM	21	33	1	10	1	40	6	0	20	83	27	3	3	52	48	4	352
08:30 AM	18	42	2	2	0	51	13	0	24	92	15	0	11	53	53	0	376
08:45 AM	11	45	3	0	4	25	9	0	17	71	2	0	4	38	33	0	262
Total	61	188	6	14	6	143	46	3	104	335	52	5	19	186	178	5	1351
Grand Total	149	364	10	14	16	290	97	7	204	759	62	5	26	387	410	6	2806
Apprch %	27.7	67.8	1.9	2.6	3.9	70.7	23.7	1.7	19.8	73.7	6	0.5	3.1	46.7	49.5	0.7	
Total %	5.3	13	0.4	0.5	0.6	10.3	3.5	0.2	7.3	27	2.2	0.2	0.9	13.8	14.6	0.2	
Cars & Peds	148	338	10	14	16	282	91	7	198	743	58	5	26	380	408	6	2730
% Cars & Peds	99.3	92.9	100	100	100	97.2	93.8	100	97.1	97.9	93.5	100	100	98.2	99.5	100	97.3
Trucks & Buses																	
% Trucks & Buses	0.7	7.1	0	0	0	1.4	6.2	0	2.9	2.1	1.6	0	0	1.8	0.5	0	2.5
Bikes by Direction	0	0	0	0	0	4	0	0	0	0	3	0	0	0	0	0	7
% Bikes by Direction	0	0	0	0	0	1.4	0	0	0	0	4.8	0	0	0	0	0	0.2

	High Street From North					Reed Street From East					High Street From South					Reed Street From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	**26**	53	1	0	80	3	33	**23**	1	60	22	**112**	1	0	135	1	35	53	0	89	364
07:30 AM	25	49	1	0	75	**4**	**45**	16	0	**65**	29	94	3	0	126	1	58	**63**	**1**	123	**389**
07:45 AM	20	39	**2**	0	61	1	35	7	0	43	27	97	5	0	129	**4**	**67**	56	0	**127**	360
08:00 AM	11	**68**	0	**2**	**81**	1	27	18	**3**	49	**43**	89	**8**	**2**	**142**	1	43	44	1	89	361
Total Volume	82	209	4	2	297	9	140	64	4	217	121	392	17	2	532	7	203	216	2	428	1474
% App. Total	27.6	70.4	1.3	0.7		4.1	64.5	29.5	1.8		22.7	73.7	3.2	0.4		1.6	47.4	50.5	0.5		
PHF	.788	.768	.500	.250	.917	.563	.778	.696	.333	.835	.703	.875	.531	.250	.937	.438	.757	.857	.500	.843	.947
Cars & Peds	82	200	4	2	288	9	137	62	4	212	118	383	15	2	518	7	200	214	2	423	1441
% Cars & Peds	100	95.7	100	100	97.0	100	97.9	96.9	100	97.7	97.5	97.7	88.2	100	97.4	100	98.5	99.1	100	98.8	97.8
Trucks & Buses	0	9	0	0	9	0	2	2	0	4	3	9	1	0	13	0	3	2	0	5	31
% Trucks & Buses	0	4.3	0	0	3.0	0	1.4	3.1	0	1.8	2.5	2.3	5.9	0	2.4	0	1.5	0.9	0	1.2	2.1
Bikes by Direction	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	0	0	0	0	0	2
% Bikes by Direction	0	0	0	0	0	0	0.7	0	0	0.5	0	0	5.9	0	0.2	0	0	0	0	0	0.1

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N/S: High Street
E/W: Reed Street
City, State: Randolph, MA
Client: Pare/Amy Archer

File Name : 05569C
Site Code : 05569
Start Date : 5/25/2022
Page No : 1

Groups Printed- Cars & Peds

	High Street From North				Reed Street From East				High Street From South				Reed Street From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
07:00 AM	17	35	0	0	2	32	5	3	22	117	1	0	1	39	60	0	334
07:15 AM	26	51	1	0	3	31	23	1	22	107	1	0	1	35	53	0	355
07:30 AM	25	48	1	0	4	45	14	0	28	93	3	0	1	57	62	1	382
07:45 AM	20	36	2	0	1	35	7	0	26	95	4	0	4	67	56	0	353
Total	88	170	4	0	10	143	49	4	98	412	9	0	7	198	231	1	1424
08:00 AM	11	65	0	2	1	26	18	3	42	88	7	2	1	41	43	1	351
08:15 AM	21	28	1	10	1	39	6	0	20	83	25	3	3	51	48	4	343
08:30 AM	18	37	2	2	0	49	12	0	23	90	15	0	11	53	53	0	365
08:45 AM	10	38	3	0	4	25	6	0	15	70	2	0	4	37	33	0	247
Total	60	168	6	14	6	139	42	3	100	331	49	5	19	182	177	5	1306
Grand Total	148	338	10	14	16	282	91	7	198	743	58	5	26	380	408	6	2730
Apprch %	29	66.3	2	2.7	4	71.2	23	1.8	19.7	74	5.8	0.5	3.2	46.3	49.8	0.7	
Total %	5.4	12.4	0.4	0.5	0.6	10.3	3.3	0.3	7.3	27.2	2.1	0.2	1	13.9	14.9	0.2	

	High Street From North					Reed Street From East					High Street From South					Reed Street From West					
Start Time	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	**26**	51	1	0	**78**	3	31	**23**	1	58	22	**107**	1	0	130	1	35	53	0	89	355
07:30 AM	25	48	1	0	74	**4**	**45**	14	0	**63**	28	93	3	0	124	1	57	**62**	**1**	121	**382**
07:45 AM	20	36	**2**	0	58	1	35	7	0	43	26	95	4	0	125	**4**	**67**	56	0	**127**	353
08:00 AM	11	**65**	0	**2**	78	1	26	18	**3**	48	**42**	88	**7**	**2**	**139**	1	41	43	1	86	351
Total Volume	82	200	4	2	288	9	137	62	4	212	118	383	15	2	518	7	200	214	2	423	1441
% App. Total	28.5	69.4	1.4	0.7		4.2	64.6	29.2	1.9		22.8	73.9	2.9	0.4		1.7	47.3	50.6	0.5		
PHF	.788	.769	.500	.250	.923	.563	.761	.674	.333	.841	.702	.895	.536	.250	.932	.438	.746	.863	.500	.833	.943

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N/S: High Street
E/W: Reed Street
City, State: Randolph, MA
Client: Pare/Amy Archer

File Name : 05569C
Site Code : 05569
Start Date : 5/25/2022
Page No : 1

Groups Printed- Trucks & Buses

	High Street From North				Reed Street From East				High Street From South				Reed Street From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
07:00 AM	0	0	0	0	0	2	0	0	0	4	0	0	0	2	0	0	8
07:15 AM	0	2	0	0	0	2	0	0	0	5	0	0	0	0	0	0	9
07:30 AM	0	1	0	0	0	0	2	0	1	1	0	0	0	1	1	0	7
07:45 AM	0	3	0	0	0	0	0	0	1	2	0	0	0	0	0	0	6
Total	0	6	0	0	0	4	2	0	2	12	0	0	0	3	1	0	30
08:00 AM	0	3	0	0	0	0	0	0	1	1	1	0	0	2	1	0	9
08:15 AM	0	5	0	0	0	0	0	0	0	0	0	0	0	1	0	0	6
08:30 AM	0	5	0	0	0	0	1	0	1	2	0	0	0	0	0	0	9
08:45 AM	1	7	0	0	0	0	3	0	2	1	0	0	0	1	0	0	15
Total	1	20	0	0	0	0	4	0	4	4	1	0	0	4	1	0	39
Grand Total	1	26	0	0	0	4	6	0	6	16	1	0	0	7	2	0	69
Apprch %	3.7	96.3	0	0	0	40	60	0	26.1	69.6	4.3	0	0	77.8	22.2	0	
Total %	1.4	37.7	0	0	0	5.8	8.7	0	8.7	23.2	1.4	0	0	10.1	2.9	0	

	High Street From North					Reed Street From East					High Street From South					Reed Street From West					
Start Time	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	3	0	0	3	0	0	0	0	0	1	1	**1**	0	**3**	0	**2**	**1**	0	**3**	9
08:15 AM	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	6
08:30 AM	0	5	0	0	5	0	0	1	0	1	1	**2**	0	0	3	0	0	0	0	0	9
08:45 AM	**1**	**7**	0	0	**8**	0	0	**3**	0	**3**	**2**	1	0	0	3	0	1	0	0	1	**15**
Total Volume	1	20	0	0	21	0	0	4	0	4	4	4	1	0	9	0	4	1	0	5	39
% App. Total	4.8	95.2	0	0		0	0	100	0		44.4	44.4	11.1	0		0	80	20	0		
PHF	.250	.714	.000	.000	.656	.000	.000	.333	.000	.333	.500	.500	.250	.000	.750	.000	.500	.250	.000	.417	.650

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Client: Pare/Amy Archer

File Name : 05569C
Site Code : 05569
Start Date : 5/25/2022
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Groups Printed- Bikes by Direction

	High Street From North				Reed Street From East				High Street From South				Reed Street From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
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	1	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
08:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
08:15 AM	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	3
08:30 AM	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	4	0	0	0	0	2	0	0	0	0	0	6
Grand Total	0	0	0	0	0	4	0	0	0	0	3	0	0	0	0	0	7
Apprch %	0	0	0	0	0	100	0	0	0	0	100	0	0	0	0	0	
Total %	0	0	0	0	0	57.1	0	0	0	0	42.9	0	0	0	0	0	

	High Street From North					Reed Street From East					High Street From South					Reed Street From West					
Start Time	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
08:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
08:15 AM	0	0	0	0	0	0	1	0	0	1	0	0	**2**	0	**2**	0	0	0	0	0	**3**
08:30 AM	0	0	0	0	0	0	**2**	0	0	**2**	0	0	0	0	0	0	0	0	0	0	2
Total Volume	0	0	0	0	0	0	4	0	0	4	0	0	3	0	3	0	0	0	0	0	7
% App. Total	0	0	0	0		0	100	0	0		0	0	100	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.500	.000	.000	.500	.000	.000	.375	.000	.375	.000	.000	.000	.000	.000	.583

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Client: Pare/Amy Archer

File Name : 05569C
Site Code : 05569
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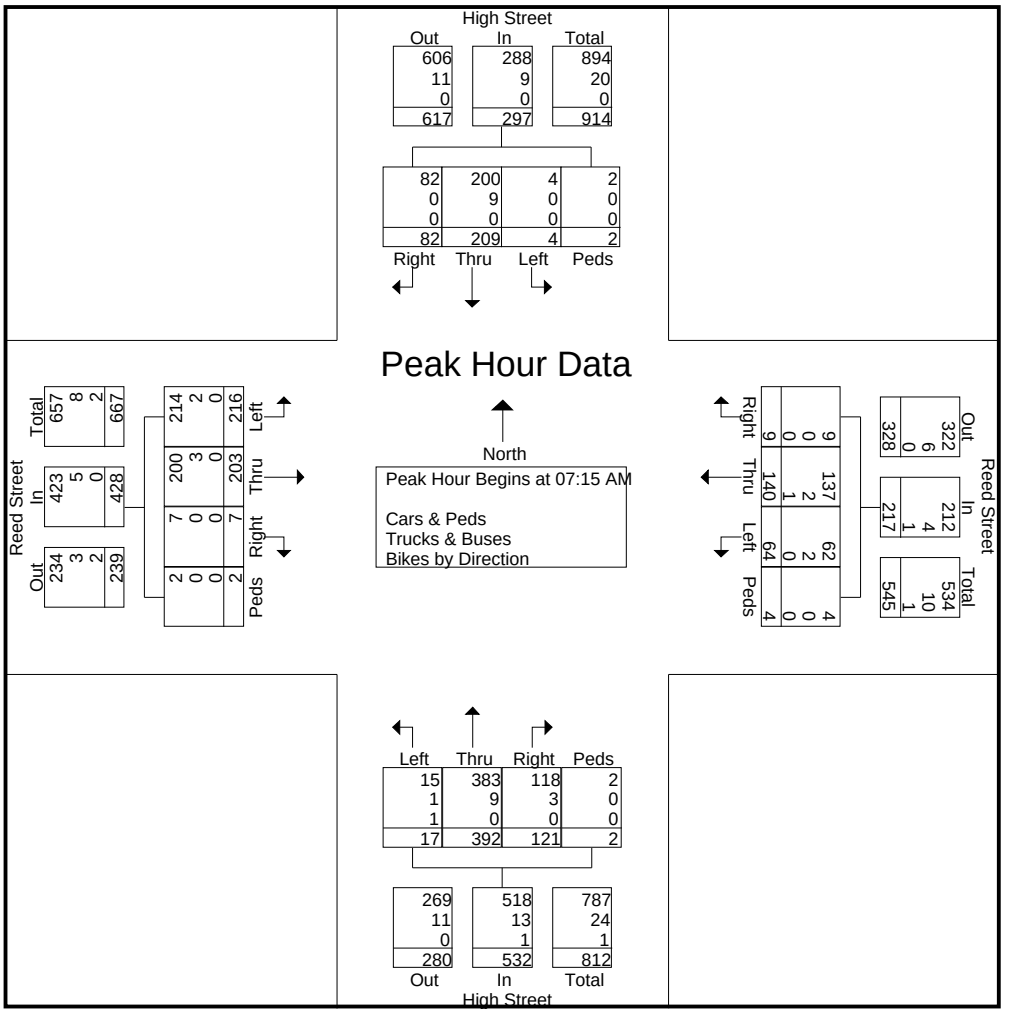
	High Street From North					Reed Street From East					High Street From South					Reed Street From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	**26**	53	1	0	80	3	33	**23**	1	60	22	**112**	1	0	135	1	35	53	0	89	364
07:30 AM	25	49	1	0	75	**4**	**45**	16	0	**65**	29	94	3	0	126	1	58	**63**	**1**	123	**389**
07:45 AM	20	39	**2**	0	61	1	35	7	0	43	27	97	5	0	129	**4**	**67**	56	0	**127**	360
08:00 AM	11	**68**	0	**2**	**81**	1	27	18	**3**	49	**43**	89	**8**	**2**	**142**	1	43	44	1	89	361
Total Volume	82	209	4	2	297	9	140	64	4	217	121	392	17	2	532	7	203	216	2	428	1474
% App. Total	27.6	70.4	1.3	0.7		4.1	64.5	29.5	1.8		22.7	73.7	3.2	0.4		1.6	47.4	50.5	0.5		
PHF	.788	.768	.500	.250	.917	.563	.778	.696	.333	.835	.703	.875	.531	.250	.937	.438	.757	.857	.500	.843	.947
Cars & Peds	82	200	4	2	288	9	137	62	4	212	118	383	15	2	518	7	200	214	2	423	1441
% Cars & Peds	100	95.7	100	100	97.0	100	97.9	96.9	100	97.7	97.5	97.7	88.2	100	97.4	100	98.5	99.1	100	98.8	97.8
Trucks & Buses	0	9	0	0	9	0	2	2	0	4	3	9	1	0	13	0	3	2	0	5	31
% Trucks & Buses	0	4.3	0	0	3.0	0	1.4	3.1	0	1.8	2.5	2.3	5.9	0	2.4	0	1.5	0.9	0	1.2	2.1
Bikes by Direction	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	0	0	0	0	0	2
% Bikes by Direction	0	0	0	0	0	0	0.7	0	0	0.5	0	0	5.9	0	0.2	0	0	0	0	0	0.1



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File Name : 05569CC
Site Code : 05569
Start Date : 5/25/2022
Page No : 1

Groups Printed- Cars & Peds - Trucks & Buses - Bikes by Direction

	High Street From North				Reed Street From East				High Street From South				Reed Street From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
04:00 PM	19	58	2	0	2	51	28	0	18	45	3	0	2	54	12	0	294
04:15 PM	21	67	0	0	1	53	34	0	17	46	2	0	3	40	13	0	297
04:30 PM	20	52	2	0	3	45	23	0	19	55	2	0	1	57	13	0	292
04:45 PM	19	90	3	2	4	44	32	0	23	49	3	1	3	61	20	3	357
Total	79	267	7	2	10	193	117	0	77	195	10	1	9	212	58	3	1240
05:00 PM	26	70	4	1	1	39	24	0	24	64	2	0	2	45	10	0	312
05:15 PM	36	91	5	2	2	50	28	0	21	40	1	0	2	65	23	0	366
05:30 PM	34	71	3	0	2	40	16	0	24	43	1	1	3	52	28	0	318
05:45 PM	23	83	2	0	1	43	19	2	19	40	1	1	3	57	20	0	314
Total	119	315	14	3	6	172	87	2	88	187	5	2	10	219	81	0	1310
Grand Total	198	582	21	5	16	365	204	2	165	382	15	3	19	431	139	3	2550
Apprch %	24.6	72.2	2.6	0.6	2.7	62.2	34.8	0.3	29.2	67.6	2.7	0.5	3.2	72.8	23.5	0.5	
Total %	7.8	22.8	0.8	0.2	0.6	14.3	8	0.1	6.5	15	0.6	0.1	0.7	16.9	5.5	0.1	
Cars & Peds	196	565	20	5	16	359	197	2	161	376	13	3	17	431	138	3	2502
% Cars & Peds	99	97.1	95.2	100	100	98.4	96.6	100	97.6	98.4	86.7	100	89.5	100	99.3	100	98.1
Trucks & Buses																	
% Trucks & Buses	1	2.9	4.8	0	0	1.4	3.4	0	2.4	1.3	6.7	0	5.3	0	0	0	1.7
Bikes by Direction	0	0	0	0	0	1	0	0	0	1	1	0	1	0	1	0	5
% Bikes by Direction	0	0	0	0	0	0.3	0	0	0	0.3	6.7	0	5.3	0	0.7	0	0.2

	High Street From North					Reed Street From East					High Street From South					Reed Street From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	19	90	3	**2**	114	**4**	44	**32**	0	**80**	23	49	**3**	**1**	76	**3**	61	20	**3**	87	357
05:00 PM	26	70	4	1	101	1	39	24	0	64	**24**	**64**	2	0	**90**	2	45	10	0	57	312
05:15 PM	**36**	**91**	**5**	2	**134**	2	**50**	28	0	80	21	40	1	0	62	2	**65**	23	0	**90**	**366**
05:30 PM	34	71	3	0	108	2	40	16	0	58	24	43	1	1	69	3	52	**28**	0	83	318
Total Volume	115	322	15	5	457	9	173	100	0	282	92	196	7	2	297	10	223	81	3	317	1353
% App. Total	25.2	70.5	3.3	1.1		3.2	61.3	35.5	0		31	66	2.4	0.7		3.2	70.3	25.6	0.9		
PHF	.799	.885	.750	.625	.853	.563	.865	.781	.000	.881	.958	.766	.583	.500	.825	.833	.858	.723	.250	.881	.924
Cars & Peds	114	315	14	5	448	9	172	97	0	278	91	195	6	2	294	9	223	80	3	315	1335
% Cars & Peds	99.1	97.8	93.3	100	98.0	100	99.4	97.0	0	98.6	98.9	99.5	85.7	100	99.0	90.0	100	98.8	100	99.4	98.7
Trucks & Buses	1	7	1	0	9	0	0	3	0	3	1	1	1	0	3	1	0	0	0	1	16
% Trucks & Buses	0.9	2.2	6.7	0	2.0	0	0	3.0	0	1.1	1.1	0.5	14.3	0	1.0	10.0	0	0	0	0.3	1.2
Bikes by Direction	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	2
% Bikes by Direction	0	0	0	0	0	0	0.6	0	0	0.4	0	0	0	0	0	0	0	1.2	0	0.3	0.1

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File Name : 05569CC
Site Code : 05569
Start Date : 5/25/2022
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Groups Printed- Cars & Peds

	High Street From North				Reed Street From East				High Street From South				Reed Street From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
04:00 PM	19	55	2	0	2	50	28	0	18	45	3	0	2	54	12	0	290
04:15 PM	21	63	0	0	1	52	31	0	17	43	2	0	2	40	13	0	285
04:30 PM	20	49	2	0	3	43	22	0	16	54	2	0	1	57	13	0	282
04:45 PM	18	89	2	2	4	44	32	0	22	49	2	1	2	61	20	3	351
Total	78	256	6	2	10	189	113	0	73	191	9	1	7	212	58	3	1208
05:00 PM	26	69	4	1	1	39	23	0	24	64	2	0	2	45	10	0	310
05:15 PM	36	86	5	2	2	49	26	0	21	40	1	0	2	65	23	0	358
05:30 PM	34	71	3	0	2	40	16	0	24	42	1	1	3	52	27	0	316
05:45 PM	22	83	2	0	1	42	19	2	19	39	0	1	3	57	20	0	310
Total	118	309	14	3	6	170	84	2	88	185	4	2	10	219	80	0	1294
Grand Total	196	565	20	5	16	359	197	2	161	376	13	3	17	431	138	3	2502
Apprch %	24.9	71.9	2.5	0.6	2.8	62.5	34.3	0.3	29.1	68	2.4	0.5	2.9	73.2	23.4	0.5	
Total %	7.8	22.6	0.8	0.2	0.6	14.3	7.9	0.1	6.4	15	0.5	0.1	0.7	17.2	5.5	0.1	

	High Street From North					Reed Street From East					High Street From South					Reed Street From West					
Start Time	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	18	**89**	2	**2**	111	**4**	44	**32**	0	**80**	22	49	**2**	**1**	74	2	61	20	**3**	86	351
05:00 PM	26	69	4	1	100	1	39	23	0	63	**24**	**64**	2	0	**90**	2	45	10	0	57	310
05:15 PM	**36**	86	**5**	2	**129**	2	**49**	26	0	77	21	40	1	0	62	2	**65**	23	0	**90**	**358**
05:30 PM	34	71	3	0	108	2	40	16	0	58	24	42	1	1	68	**3**	52	**27**	0	82	316
Total Volume	114	315	14	5	448	9	172	97	0	278	91	195	6	2	294	9	223	80	3	315	1335
% App. Total	25.4	70.3	3.1	1.1		3.2	61.9	34.9	0		31	66.3	2	0.7		2.9	70.8	25.4	1		
PHF	.792	.885	.700	.625	.868	.563	.878	.758	.000	.869	.948	.762	.750	.500	.817	.750	.858	.741	.250	.875	.932

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File Name : 05569CC
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Groups Printed- Trucks & Buses

	High Street From North				Reed Street From East				High Street From South				Reed Street From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
04:00 PM	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	4
04:15 PM	0	4	0	0	0	1	3	0	0	3	0	0	0	0	0	0	11
04:30 PM	0	3	0	0	0	2	1	0	3	0	0	0	0	0	0	0	9
04:45 PM	1	1	1	0	0	0	0	0	1	0	1	0	1	0	0	0	6
Total	1	11	1	0	0	4	4	0	4	3	1	0	1	0	0	0	30
05:00 PM	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2
05:15 PM	0	5	0	0	0	0	2	0	0	0	0	0	0	0	0	0	7
05:30 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
05:45 PM	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	3
Total	1	6	0	0	0	1	3	0	0	2	0	0	0	0	0	0	13
Grand Total	2	17	1	0	0	5	7	0	4	5	1	0	1	0	0	0	43
Apprch %	10	85	5	0	0	41.7	58.3	0	40	50	10	0	100	0	0	0	
Total %	4.7	39.5	2.3	0	0	11.6	16.3	0	9.3	11.6	2.3	0	2.3	0	0	0	

	High Street From North					Reed Street From East					High Street From South					Reed Street From West					
Start Time	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	3	0	0	3	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	4
04:15 PM	0	**4**	0	0	**4**	0	1	**3**	0	**4**	0	**3**	0	0	**3**	0	0	0	0	0	**11**
04:30 PM	0	3	0	0	3	0	**2**	1	0	3	**3**	0	0	0	3	0	0	0	0	0	9
04:45 PM	**1**	1	**1**	0	3	0	0	0	0	0	1	0	**1**	0	2	**1**	0	0	0	**1**	6
Total Volume	1	11	1	0	13	0	4	4	0	8	4	3	1	0	8	1	0	0	0	1	30
% App. Total	7.7	84.6	7.7	0		0	50	50	0		50	37.5	12.5	0		100	0	0	0		
PHF	.250	.688	.250	.000	.813	.000	.500	.333	.000	.500	.333	.250	.250	.000	.667	.250	.000	.000	.000	.250	.682

Transportation Data Corporation
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tel (781) 587-0086 cell (781) 439-4999

N/S: High Street
E/W: Reed Street
City, State: Randolph, MA
Client: Pare/Amy Archer

File Name : 05569CC
Site Code : 05569
Start Date : 5/25/2022
Page No : 1

Groups Printed- Bikes by Direction

	High Street From North				Reed Street From East				High Street From South				Reed Street From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
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	1	0	0	0	1
04:30 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
04:45 PM	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	1	0	0	0	2
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	1	0	0	0	0	0	0	0	0	0	0	1
05:30 PM	0	0	0	0	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	0	0	0	0	1
Total	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	3
Grand Total	0	0	0	0	0	1	0	0	0	1	1	0	1	0	1	0	5
Apprch %	0	0	0	0	0	100	0	0	0	50	50	0	50	0	50	0	
Total %	0	0	0	0	0	20	0	0	0	20	20	0	20	0	20	0	

	High Street From North					Reed Street From East					High Street From South					Reed Street From West					
Start Time	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	0	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	**1**	0	0	**1**	0	0	0	0	0	0	0	0	0	0	**1**
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	**1**	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	**1**	0	0	0	0	0	1
Total Volume	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	0	0	1	0	1	3
% App. Total	0	0	0	0		0	100	0	0		0	0	100	0		0	0	100	0		
PHF	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250	.000	.000	.250	.000	.250	.000	.000	.250	.000	.250	.750

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File Name : 05569CC
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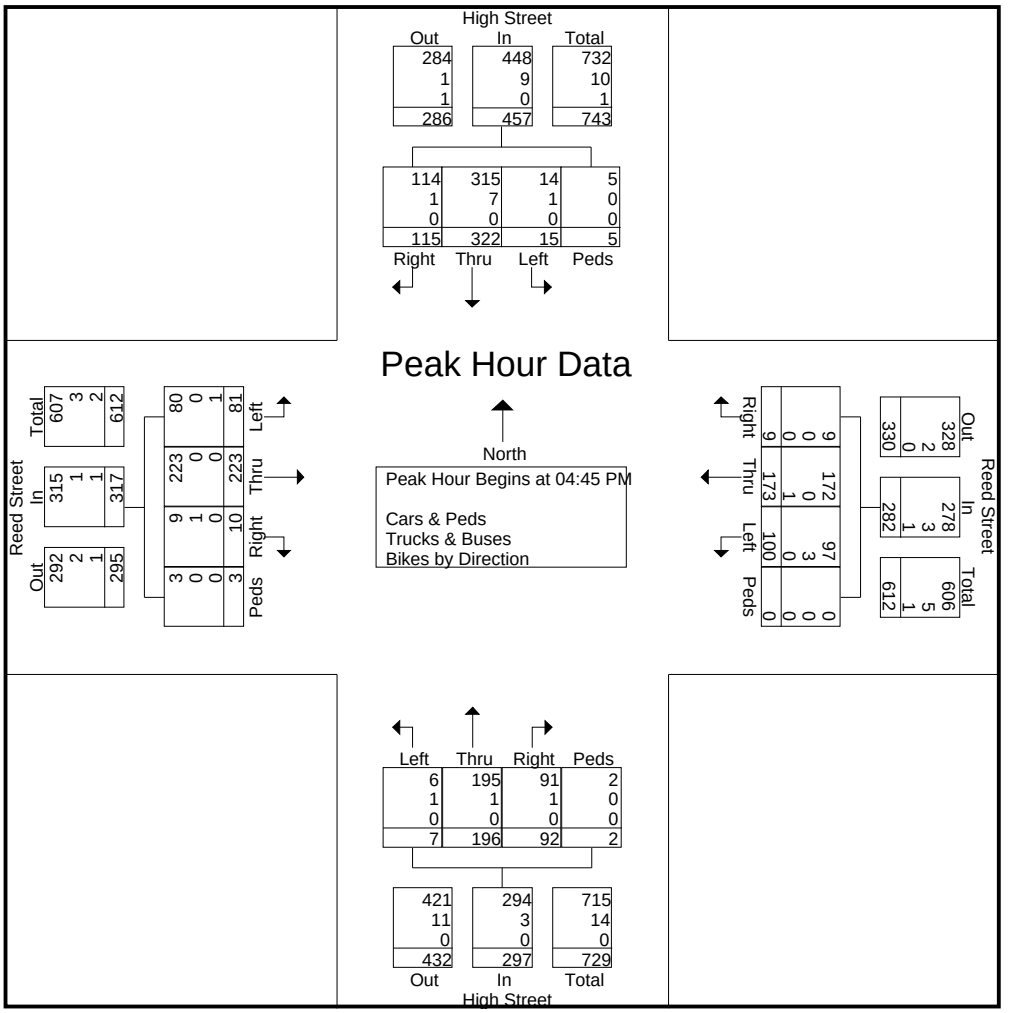
Page No : 1

	High Street From North					Reed Street From East					High Street From South					Reed Street From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	19	90	3	**2**	114	**4**	44	**32**	0	**80**	23	49	**3**	**1**	76	**3**	61	20	**3**	87	357
05:00 PM	26	70	4	1	101	1	39	24	0	64	**24**	**64**	2	0	**90**	2	45	10	0	57	312
05:15 PM	**36**	**91**	**5**	2	**134**	2	**50**	28	0	80	21	40	1	0	62	2	**65**	23	0	**90**	**366**
05:30 PM	34	71	3	0	108	2	40	16	0	58	24	43	1	1	69	3	52	**28**	0	83	318
Total Volume	115	322	15	5	457	9	173	100	0	282	92	196	7	2	297	10	223	81	3	317	1353
% App. Total	25.2	70.5	3.3	1.1		3.2	61.3	35.5	0		31	66	2.4	0.7		3.2	70.3	25.6	0.9		
PHF	.799	.885	.750	.625	.853	.563	.865	.781	.000	.881	.958	.766	.583	.500	.825	.833	.858	.723	.250	.881	.924
Cars & Peds	114	315	14	5	448	9	172	97	0	278	91	195	6	2	294	9	223	80	3	315	1335
% Cars & Peds	99.1	97.8	93.3	100	98.0	100	99.4	97.0	0	98.6	98.9	99.5	85.7	100	99.0	90.0	100	98.8	100	99.4	98.7
Trucks & Buses	1	7	1	0	9	0	0	3	0	3	1	1	1	0	3	1	0	0	0	1	16
% Trucks & Buses	0.9	2.2	6.7	0	2.0	0	0	3.0	0	1.1	1.1	0.5	14.3	0	1.0	10.0	0	0	0	0.3	1.2
Bikes by Direction	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	2
% Bikes by Direction	0	0	0	0	0	0	0.6	0	0	0.4	0	0	0	0	0	0	0	1.2	0	0.3	0.1



Appendix B

Crash Data

Scanlon Drive Development
Randolph, MA
Crash Data Summary
Pare Project No. 22077.00
Feb-23

PARE CORPORATION

Crash Ref. No.	Date	Time	On Street	Intersecting Street	Directions of Travel	No. of Vehicles	Injuries	Fatalities	Weather Condition	Road Condition	Lighting	Crash Type	Notes
1	10/26/2022	7:44 PM	North Main Street		V1: W / V2: N	2	0	0	Rain/Cloudy	Wet	Dark - lighted roadway	Angle	
2	10/26/2022	3:19 PM	North Main Street		V1: S / V2: S	2	0	0	Cloudy/Fog, smog, s	Wet	Daylight	Rear-end	
3	10/16/2022	3:49 AM	North Main Street		V1: S	1	1	0	Clear	Dry	Dark - roadway not lighted	Single vehicle	
4	8/28/2022	9:49 PM	North Main Street	Reed Street/Pond Street	V1: N / V2: S	2	1	0	Clear/Clear	Dry	Daylight	Angle	
5	8/26/2022	7:21 PM	North Main Street		V1: N / V2: W	2	0	0	Clear/Clear	Dry	Dark - lighted roadway	Angle	
6	8/18/2022	3:39 PM	North Main Street		V1: W	1	1	0	Clear	Dry	Daylight	Angle	
7	9/10/2022	9:10 AM	North Main Street	Scanlon Drive/Russ Street	V1: E / V2: S	2	0	0	Clear/Clear	Dry	Daylight	Angle	
8	8/13/2022	6:27 AM	North Main Street	Scanlon Drive/Russ Street	V1: S / V2: S	2	0	0	Clear/Clear	Dry	Daylight	Rear-end	
9	8/13/2022	4:10 PM	North Main Street		V1: S / V2: W	2	0	0	Clear/Clear	Dry	Daylight	Sideswipe	opposite direction
10	8/18/2022	4:50 PM	North Main Street		V2: N / V1: N	2	1	0	Clear	Dry	Daylight	Sideswipe	same direction
11	8/5/2022	1:54 PM	North Main Street		V1: S / V2: N / V3: N	3	0	0	Clear/Clear	Dry	Daylight	Angle	
12	8/2/2022	2:46 PM	High Street	Reed Street	V1: Not Reported / V2: E	2	0	0	Clear/Clear	Dry	Daylight	Rear-end	
13	7/29/2022	10:13 AM	North Main Street		V1: S / V2: N	2	0	0	Clear/Clear	Dry	Daylight	Angle	
14	8/5/2022	11:24 AM	North Main Street	Reed Street/Pond Street	V1: W / V2: Not Reported	2	0	0	Clear	Dry	Daylight	Angle	
15	7/10/2022	7:01 AM	North Main Street		V1: S / V2: S	2	2	0	Clear	Dry	Daylight	Rear-end	
16	6/19/2022	4:50 PM	North Main Street		V1: N / V2: N / V3: N	3	0	0	Clear	Dry	Daylight	Rear-end	
17	1/13/2022	8:45 AM	North Main Street		V1: N / V2: N	2	0	0	Clear/Cloudy	Dry	Daylight	Sideswipe	same direction
18	10/27/2021	8:13 AM	North Main Street	Scanlon Drive/Russ Street	V1: S / V2: E	2	2	0	Rain/Severe crossw	Wet	Daylight	Angle	
19	10/27/2021	8:20 AM	North Main Street	Reed Street/Pond Street	V1: S / V2: W	2	0	0	Rain/Severe crossw	Wet	Daylight	Angle	
20	10/27/2021	9:15 AM	High Street	Reed Street	V1: W / V2: S	2	2	0	Rain	Wet	Daylight	Angle	
21	12/16/2021	4:32 PM	High Street	Scanlon Drive	V1: W	1	0	0	Cloudy/Cloudy	Dry	Dusk	Single vehicle	
22	12/8/2021	9:54 PM	North Main Street	Scanlon Drive/Russ Street	V1: E / V2: N	2	2	0	Sleet, hail (freezing	Wet	Dark - lighted roadway	Angle	
23	10/27/2021	5:23 PM	High Street	Reed Street	V1: W / V2: E	2	0	0	Rain/Cloudy	Wet	Dusk	Sideswipe	same direction
24	10/23/2021	6:46 PM	North Main Street	Scanlon Drive/Russ Street	V1: W / V2: S	2	2	0	Clear/Clear	Dry	Dark - lighted roadway	Angle	
25	1/2/2022	3:37 PM	North Main Street	Reed Street/Pond Street	V1: W / V2: W	2	2	0	Rain	Wet	Daylight	Head-On	
26	1/7/2022	11:58 AM	Reed Street		V1: E	1	0	0	Blowing sand, snow	Snow	Daylight	Single vehicle	
27	12/8/2021	6:14 PM	North Main Street		V1: N / V2: S / V3: S / V4: E	4	3	0	Rain/Snow	Wet	Dark - lighted roadway	Head-On	
28	10/31/2021	12:29 PM	North Main Street	Scanlon Drive/Russ Street	V1: N / V2: N / V3: N / V4: I	5	2	0	Clear/Clear	Dry	Daylight	Rear-end	
29	12/9/2021	12:05 PM	North Main Street		V1: S / V2: E	2	0	0	Clear/Clear	Dry	Daylight	Angle	
30	11/22/2021	3:00 AM	North Main Street	Scanlon Drive/Russ Street	V1: S / V2: S	2	0	0	Rain	Wet	Dark - lighted roadway	Rear-end	
31	10/25/2021	7:35 PM	High Street	Reed Street	V1: E / V2: N / V3: W	3	1	0	Clear	Dry	Dark - lighted roadway	Angle	
32	12/19/2021	4:34 PM	North Main Street		V1: N / V2: E	2	0	0	Clear/Clear	Dry	Daylight	Head-On	
33	6/12/2022	12:47 AM	North Main Street		V1: S	1	1	0	Clear	Dry	Dark - lighted roadway	Single vehicle	
34	10/17/2021	2:16 AM	North Main Street		V1: N / V2: N	2	3	0	Rain/Rain	Wet	Dark - unknown roadway lighting	Rear-end	
35	5/19/2022	7:27 AM	High Street	Reed Street	V1: W	1	1	0	Clear	Dry	Daylight	Single vehicle	
36	5/28/2022	10:58 PM	North Main Street		V1: S	1	1	0	Clear/Clear	Dry	Dark - lighted roadway	Single vehicle	
37	5/23/2022	2:08 PM	North Main Street		V1: N	1	0	0	Clear/Clear	Dry	Daylight	Single vehicle	
38	6/3/2022	8:27 PM	North Main Street		V1: N / V2: N	2	0	0	Rain	Wet	Dark - lighted roadway	Sideswipe	same direction
39	5/2/2022	10:06 PM	North Main Street		V1: S / V2: S	2	0	0	Rain/Rain	Wet	Dark - lighted roadway	Rear-end	
40	5/11/2022	5:12 AM	North Main Street		V1: N / V2: E	2	1	0	Clear	Dry	Daylight	Rear-end	
41	5/12/2022	2:56 PM	North Main Street		V2: S / V1: E	2	1	0	Clear/Clear	Dry	Daylight	Angle	
42	5/19/2022	8:15 AM	North Main Street		V1: N / V2: N	2	0	0	Clear/Clear	Dry	Daylight	Rear-end	
43	5/21/2022	8:03 PM	North Main Street		V1: S / V2: W	2	0	0	Clear/Clear	Dry	Dusk	Angle	
44	4/23/2022	12:08 PM	High Street		V1: N / V2: N	2	1	0	Clear/Clear	Dry	Daylight	Rear-end	
45	4/16/2022	10:36 PM	North Main Street		V1: S / V2: W	2	0	0	Rain/Rain	Wet	Dark - lighted roadway	Angle	
46	3/8/2022	10:05 AM	North Main Street	Scanlon Drive/Russ Street	V1: S	1	1	0	Clear/Clear	Dry	Daylight	Single vehicle	
47	3/19/2022	2:48 PM	Reed Street		V1: E	1	1	0	Cloudy/Rain	Wet	Daylight	Single vehicle	
48	3/26/2022	3:07 PM	High Street	Reed Street	V1: W	1	1	0	Clear/Clear	Dry	Daylight	Single vehicle	
49	2/19/2022	4:11 PM	North Main Street	Reed Street/Pond Street	V1: S / V2: S	2	0	0	Cloudy/Cloudy	Wet	Daylight	Angle	
50	3/14/2022	12:46 PM	North Main Street		V1: S / V2: S	2	1	0	Clear/Clear	Dry	Daylight	Sideswipe	opposite direction
51	2/23/2022	8:12 AM	Scanlon Drive		V1: W / V2: E	2	0	0	Cloudy/Cloudy	Wet	Daylight	Angle	
52	3/5/2022	5:10 PM	North Main Street		V1: E / V2: S	2	2	0	Clear/Clear	Dry	Daylight	Angle	
53	3/26/2022	5:10 PM	North Main Street	Reed Street/Pond Street	V1: W / V2: W	2	0	0	Cloudy	Dry	Dusk	Sideswipe	same direction

Scanlon Drive Development
Randolph, MA
Crash Data Summary
Pare Project No. 22077.00
Feb-23

PARE CORPORATION

Crash Ref. No.	Date	Time	On Street	Intersecting Street	Directions of Travel	No. of Vehicles	Injuries	Fatalities	Weather Condition	Road Condition	Lighting	Crash Type	Notes
54	3/18/2022	12:54 PM	North Main Street		V1: S / V2: S	2	0	0	Clear	Dry	Daylight	Rear-end	
55	4/10/2022	12:33 AM	High Street	Reed Street	V1: S / V2: S	2	1	0	Clear	Dry	Dark - lighted roadway	Rear-end	
56	3/31/2022	3:24 PM	North Main Street		V1: S / V2: W	2	0	0	Clear/Clear	Dry	Daylight	Angle	
57	3/30/2022	2:53 PM	North Main Street		V1: E / V2: S	2	2	0	Clear/Clear	Dry	Daylight	Angle	
58	3/26/2022	7:21 PM	North Main Street	Scanlon Drive/Russ Street	V1: N / V2: S	2	0	0	Rain/Rain	Wet	Dark - lighted roadway	Angle	
59	3/10/2022	5:28 PM	North Main Street		V1: W / V2: S	2	0	0	Clear/Clear	Dry	Daylight	Angle	
60	2/28/2022	8:01 PM	North Main Street		V1: S / V2: S	2	1	0	Clear/Clear	Dry	Dark - lighted roadway	Rear-end	
61	4/7/2022	8:38 PM	North Main Street		V1: N / V2: S	2	0	0	Rain	Wet	Dark - lighted roadway	Angle	
62	3/1/2022	10:41 PM	North Main Street		V1: S / V2: S	2	0	0	Clear/Clear	Wet	Dark - lighted roadway	Sideswipe	same direction
63	3/2/2022	10:36 PM	North Main Street	Reed Street/Pond Street	V1: N / V2: S	2	2	0	Rain/Rain	Wet	Dark - lighted roadway	Sideswipe	opposite direction
64	1/28/2022	10:43 PM	North Main Street		V1: N / V2: S	2	0	0	Snow	Wet	Dark - lighted roadway	Sideswipe	opposite direction
65	2/2/2022	8:16 AM	North Main Street		V1: S / V2: N	2	0	0	Cloudy	Wet	Daylight	Angle	
66	10/12/2021	8:39 PM	North Main Street		V1: N / V2: N	2	0	0	Clear/Clear	Dry	Dark - lighted roadway	Sideswipe	same direction
67	10/9/2021	6:47 PM	North Main Street		V1: S / V2: S	2	0	0	Clear/Clear	Dry	Dark - lighted roadway	Rear-end	
68	10/17/2021	11:25 AM	North Main Street		V1: N / V2: N	2	0	0	Clear/Clear	Dry	Daylight	Rear-end	
69	10/6/2021	1:01 PM	North Main Street		V1: W / V2: N	2	2	0	Clear/Clear	Dry	Daylight	Angle	
70	9/29/2021	7:00 PM	North Main Street		V1: N	1	1	0	Clear/Clear	Dry	Dusk	Single vehicle	
71	10/10/2021	5:30 PM	North Main Street	Reed Street/Pond Street	V1: W / V2: E	2	1	0	Clear	Dry	Daylight	Sideswipe	same direction
72	10/9/2021	7:37 PM	North Main Street		V1: N / V2: N	2	0	0	Clear	Dry	Dark - roadway not lighted	Rear-end	
73	10/4/2021	5:46 AM	High Street	Reed Street	V1: E / V2: S	2	0	0	Rain	Wet	Dark - lighted roadway	Angle	
74	9/30/2021	6:29 AM	North Main Street		V1: N / V2: W	2	1	0	Rain/Rain	Wet	Dawn	Angle	
75	9/15/2021	12:22 AM	North Main Street		V1: N / V2: Not Reported / \	3	0	0	Clear	Dry	Dark - lighted roadway	Single vehicle	
76	9/26/2021	2:10 PM	North Main Street		V1: S / V2: N / V3: N / V4: N	4	1	0	Clear/Clear	Dry	Daylight	Sideswipe	same direction
77	9/18/2021	10:21 AM	North Main Street		V1: N / V2: W	2	1	0	Clear/Clear	Dry	Daylight	Angle	
78	9/19/2021	7:24 AM	North Main Street		V1: S / V2: E	2	0	0	Rain/Cloudy	Wet	Daylight	Angle	
79	6/25/2021	10:36 AM	North Main Street		V1: W / V2: N	2	2	0	Cloudy/Rain	Wet	Daylight	Angle	
80	6/23/2021	9:55 PM	North Main Street		V1: N / V2: N	2	0	0	Clear/Clear	Dry	Dark - lighted roadway	Angle	
81	8/14/2021	11:06 PM	North Main Street		V1: S / V2: N	2	0	0	Clear/Clear	Dry	Dark - lighted roadway	Sideswipe	opposite direction
82	8/14/2021	9:30 PM	North Main Street		V1: S / V2: Not Reported	2	1	0	Cloudy	Dry	Dark - lighted roadway	Rear-end	
83	8/15/2021	9:31 PM	North Main Street		V1: N / V2: N	2	0	0	Clear	Dry	Dark - lighted roadway	Rear-end	
84	8/7/2021	7:16 PM	High Street		V1: N	1	0	0	Clear/Clear	Dry	Daylight	Single vehicle	
85	8/3/2021	11:56 PM	North Main Street	Scanlon Drive/Russ Street	V1: N / V2: N	2	1	0	Clear	Dry	Dark - lighted roadway	Rear-end	
86	7/20/2021	4:02 PM	North Main Street	Reed Street/Pond Street	V1: S / V2: N	2	3	0	Clear/Clear	Dry	Daylight	Angle	
87	7/20/2021	6:45 PM	North Main Street		V1: S / V2: E	2	1	0	Clear/Clear	Dry	Daylight	Angle	
88	7/12/2021	4:22 AM	High Street	Reed Street	V1: E / V2: S	2	0	0	Rain/Cloudy	Wet	Dark - lighted roadway	Angle	
89	6/30/2021	3:06 PM	North Main Street		V1: N / V2: E / V3: S	3	2	0	Clear	Dry	Daylight	Angle	
90	6/22/2021	5:50 PM	North Main Street		V1: W / V2: N	2	2	0	Rain/Cloudy	Wet	Daylight	Angle	
91	6/18/2021	5:57 PM	North Main Street		V1: N / V2: N	2	2	0	Clear/Clear	Dry	Daylight	Angle	
92	6/18/2021	11:34 AM	North Main Street	Reed Street/Pond Street	V1: W / V2: E	2	2	0	Clear	Dry	Daylight	Head-On	
93	8/28/2021	12:38 PM	High Street		V1: S / V2: S	2	0	0	Clear/Cloudy	Dry	Daylight	Rear-end	
94	4/28/2021	8:31 AM	North Main Street		V1: N / V2: S	2	4	0	Cloudy/Cloudy	Dry	Daylight	Angle	
95	4/24/2021	7:32 PM	North Main Street	Reed Street/Pond Street	V1: N / V2: E	2	4	0	Clear/Clear	Dry	Daylight	Angle	
96	4/24/2021	1:29 PM	North Main Street		V1: E / V2: S	2	0	0	Clear	Dry	Daylight	Angle	
97	4/16/2021	12:50 PM	North Main Street	Reed Street/Pond Street	V1: W / V2: S	2	0	0	Sleet, hail (freezing	Wet	Daylight	Angle	
98	4/15/2021	5:34 PM	North Main Street		V1: Not Reported / V2: N	2	2	0	Rain/Rain	Wet	Daylight	Angle	
99	4/6/2021	8:54 AM	North Main Street		V1: E / V2: N	2	2	0	Clear/Cloudy	Dry	Daylight	Angle	
100	3/27/2021	9:37 AM	North Main Street		V1: S / V2: S	2	0	0	Clear/Clear	Dry	Daylight	Rear-end	
101	3/23/2021	9:32 AM	North Main Street		V1: W / V2: E	2	0	0	Clear/Clear	Dry	Daylight	Angle	
102	6/12/2021	1:37 PM	North Main Street		V1: S / V2: S	2	1	0	Clear	Dry	Daylight	Sideswipe	same direction
103	6/12/2021	11:46 AM	North Main Street	Reed Street/Pond Street	V1: E / V2: S	2	3	0	Cloudy	Dry	Daylight	Angle	
104	6/8/2021	4:15 PM	North Main Street		V1: S / V2: S	2	0	0	Clear/Cloudy	Dry	Daylight	Rear-end	
105	5/29/2021	9:15 PM	North Main Street	Reed Street/Pond Street	V1: Not Reported / V2: Not I	2	0	0	Cloudy	Wet	Dark - lighted roadway	Single vehicle	
106	5/22/2021	3:26 PM	North Main Street		V1: S / V2: S	2	0	0	Clear/Clear	Dry	Daylight	Rear-end	

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Crash Ref. No.	Date	Time	On Street	Intersecting Street	Directions of Travel	No. of Vehicles	Injuries	Fatalities	Weather Condition	Road Condition	Lighting	Crash Type	Notes
107	5/3/2021	1:32 PM	North Main Street		V1: E / V2: N	2	0	0	Clear/Clear	Dry	Daylight	Angle	
108	3/23/2021	11:37 AM	North Main Street		V1: S / V2: E	2	0	0	Clear	Dry	Daylight	Angle	
109	3/10/2021	2:16 PM	High Street	Reed Street	V1: S / V2: E	2	1	0	Rain/Cloudy	Wet	Daylight	Angle	
110	7/19/2020	7:22 PM	High Street	Reed Street	V1: N / V2: W	2	1	0	Clear	Dry	Daylight	Angle	
111	3/29/2021	7:57 AM	North Main Street		V2: S / V3: S / V1: S	3	0	0	Clear/Clear	Dry	Daylight	Sideswipe	same direction
112	2/22/2021	7:26 AM	North Main Street	Reed Street/Pond Street	V1: S / V2: N	2	2	0	Clear/Clear	Dry	Daylight	Angle	
113	2/1/2021	7:57 PM	Scanlon Drive		V1: W / V2: E	2	0	0	Snow/Rain	Snow	Dark - lighted roadway	Angle	
114	1/26/2021	7:16 PM	North Main Street		V1: S / V2: S / V3: S	3	0	0	Snow/Snow	Snow	Dark - lighted roadway	Rear-end	
115	1/16/2021	7:51 AM	North Main Street		V1: E / V2: N	2	0	0	Rain/Rain	Wet	Daylight	Head-On	
116	1/7/2021	12:50 PM	High Street	Reed Street	V1: W / V2: W	2	1	0	Clear/Clear	Dry	Daylight	Single vehicle	
117	11/27/2020	11:50 AM	North Main Street		V1: S / V2: S	2	0	0	Cloudy	Dry	Daylight	Angle	
118	1/11/2021	8:13 AM	North Main Street		V1: N / V2: W	2	1	0	Clear/Clear	Dry	Daylight	Angle	
119	12/22/2020	12:17 PM	North Main Street		V1: E / V2: S	2	0	0	Clear	Dry	Daylight	Angle	
120	12/21/2020	7:52 PM	North Main Street		V1: S	1	1	0	Clear/Clear	Wet	Dark - lighted roadway	Single vehicle	
121	11/25/2020	7:12 AM	High Street	Reed Street	V1: S / V2: S	2	1	0	Clear/Clear	Dry	Daylight	Rear-end	
122	9/23/2020	1:29 AM	High Street		V1: S	1	1	0	Clear	Dry	Dark - lighted roadway	Single vehicle	
123	11/21/2020	8:16 AM	North Main Street		V1: S	1	0	0	Clear	Dry	Daylight	Single vehicle	
124	11/20/2020	3:30 PM	North Main Street		V1: N / V2: N	2	1	0	Clear	Dry	Daylight	Angle	
125	11/1/2020	6:08 PM	North Main Street		V1: N	1	1	0	Rain/Rain	Wet	Dark - lighted roadway	Head-On	
126	10/30/2020	8:34 AM	North Main Street		V1: N / V2: S / V3: S	3	1	0	Rain/Snow	Wet	Daylight	Angle	
127	10/26/2020	12:30 AM	North Main Street		V1: E / V2: Not Reported	2	0	0	Clear/Cloudy	Dry	Dark - roadway not lighted	Angle	
128	10/19/2020	6:30 PM	North Main Street		V1: N / V2: N	2	0	0	Cloudy/Cloudy	Dry	Dark - lighted roadway	Rear-end	
129	10/8/2020	8:20 AM	North Main Street	Reed Street/Pond Street	V2: W / V1: W	2	0	0	Clear	Dry	Daylight	Rear-end	
130	10/1/2020	1:52 AM	North Main Street		V1: S / V2: S	2	1	0	Clear	Dry	Dark - lighted roadway	Rear-end	
131	9/26/2020	2:48 PM	North Main Street		V1: S / V2: N / V3: W	3	0	0	Clear	Dry	Daylight	Sideswipe	opposite direction
132	9/20/2020	2:32 PM	North Main Street		V1: S / V2: S	2	0	0	Clear/Clear	Dry	Daylight	Rear-end	
133	9/19/2020	12:50 PM	North Main Street		V1: N / V2: N / V3: W	3	1	0	Clear/Clear	Dry	Daylight	Angle	
134	9/15/2020	2:17 PM	High Street	Reed Street	V1: S / V2: S / V3: S	3	0	0	Clear/Clear	Dry	Daylight	Rear-end	
135	8/27/2020	4:20 PM	North Main Street		V1: N / V2: N	2	1	0	Cloudy/Rain	Wet	Daylight	Rear-end	
136	8/16/2020	8:30 PM	North Main Street		V1: N / V2: N	2	0	0	Rain/Rain	Wet	Dark - lighted roadway	Rear-end	
137	7/22/2020	5:08 PM	North Main Street		V1: S / V2: S	2	0	0	Clear/Clear	Dry	Daylight	Rear-end	
138	8/5/2020	9:54 PM	High Street	Reed Street	V1: N / V2: N	2	0	0	Clear/Clear	Dry	Dark - lighted roadway	Rear-end	
139	8/7/2020	8:05 PM	North Main Street		V1: N / V2: N	2	1	0	Clear/Clear	Dry	Dawn	Rear-end	
140	6/26/2020	12:54 AM	North Main Street		V1: S / V2: N	2	1	0	Clear/Clear	Dry	Dark - lighted roadway	Angle	
141	7/18/2020	6:13 PM	North Main Street		V1: S / V2: S	2	0	0	Clear/Clear	Dry	Daylight	Rear-end	
142	6/13/2020	7:50 PM	North Main Street		V1: W / V2: N	2	0	0	Clear/Clear	Dry	Dusk	Angle	
143	3/8/2020	12:02 AM	High Street	Reed Street	V1: E / V2: N	2	1	0	Clear	Dry	Dark - lighted roadway	Angle	
144	5/13/2020	4:30 PM	North Main Street		V1: S / V2: N	2	1	0	Clear/Clear	Dry	Daylight	Angle	
145	5/2/2020	4:21 PM	High Street	Reed Street	V1: N / V2: N	2	0	0	Clear	Dry	Daylight	Rear-end	
146	3/31/2020	9:52 PM	North Main Street		V1: N	1	0	0	Clear/Clear	Dry	Dark - lighted roadway	Single vehicle	
147	3/17/2020	3:16 PM	High Street	Reed Street	V1: N / V2: W	2	2	0	Clear/Clear	Dry	Daylight	Angle	
148	3/13/2020	7:58 PM	North Main Street		V1: N / V2: W	2	1	0	Clear/Clear	Dry	Dark - lighted roadway	Angle	
149	2/11/2020	8:54 PM	North Main Street		V1: S / V2: E	2	6	0	Clear/Clear	Dry	Dark - lighted roadway	Head-on	
150	2/7/2020	5:41 PM	High Street		V1: S / V2: S	2	0	0	Cloudy/Severe cros	Dry	Dark - lighted roadway	Rear-end	
151	2/22/2020	7:05 AM	North Main Street		V1: N	1	1	0	Clear	Dry	Daylight	Single vehicle	
152	1/22/2020	5:38 PM	North Main Street	Scanlon Drive/Russ Street	V1: N / V2: N	2	0	0	Cloudy	Dry	Dark - lighted roadway	Rear-end	
153	1/21/2020	9:01 AM	North Main Street		V1: S / V2: E	2	2	0	Clear/Clear	Dry	Daylight	Angle	
154	1/10/2020	3:21 PM	North Main Street	Reed Street/Pond Street	V1: S / V2: W	2	0	0	Clear/Clear	Dry	Daylight	Angle	
155	12/12/2019	8:50 AM	North Main Street	Scanlon Drive/Russ Street	V1: E / V2: N	2	0	0	Clear/Clear	Dry	Daylight	Sideswipe	opposite direction
156	12/8/2019	11:30 AM	North Main Street	Scanlon Drive/Russ Street	V1: E / V2: E	2	0	0	Clear	Dry	Daylight	Sideswipe	same direction
157	12/4/2019	8:20 PM	North Main Street		V1: S / V2: S	2	0	0	Clear	Dry	Dark - lighted roadway	Rear-end	
158	11/23/2019	6:08 PM	North Main Street		V1: W / V2: S	2	1	0	Clear/Cloudy	Dry	Dark - lighted roadway	Angle	
159	11/20/2019	7:20 PM	North Main Street		V1: N / V2: E	2	0	0	Rain/Rain	Wet	Dark - lighted roadway	Angle	

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160	11/10/2019	7:34 AM	North Main Street	Reed Street/Pond Street	V1: W / V2: N	2	0	0	Clear	Dry	Daylight	Angle	
161	10/31/2019	11:06 AM	North Main Street		V1: S / V2: S	2	0	0	Rain/Rain	Wet	Daylight	Rear-end	
162	10/27/2019	5:56 PM	North Main Street		V1: N / V2: N	2	0	0	Rain/Rain	Wet	Dark - lighted roadway	Rear-end	
163	10/23/2019	10:38 PM	North Main Street		V1: S / V2: Not Reported	2	2	0	Clear	Dry	Dark - lighted roadway	Sideswipe	same direction
164	10/21/2019	10:22 PM	North Main Street		V1: S / V2: N	2	2	0	Clear/Clear	Dry	Dark - lighted roadway	Head-On	
165	10/17/2019	2:54 PM	North Main Street	Reed Street/Pond Street	V1: W / V2: W	2	2	0	Clear/Clear	Dry	Daylight	Angle	
166	10/4/2019	4:01 PM	North Main Street	Reed Street/Pond Street	V1: S / V2: S / V3: S	3	0	0	Clear	Dry	Daylight	Sideswipe	same direction
167	10/8/2019	1:13 AM	North Main Street		V1: N	1	0	0	Clear/Clear	Dry	Dark - lighted roadway	Single vehicle	
168	9/19/2019	7:34 PM	North Main Street		V1: E / V2: S	2	0	0	Clear/Clear	Dry	Dark - lighted roadway	Head-On	
169	9/11/2019	4:23 PM	North Main Street		V1: N / V2: N	2	2	0	Clear	Dry	Daylight	Rear-end	
170	8/20/2019	5:00 PM	North Main Street	Reed Street/Pond Street	V1: N / V2: N	2	0	0	Clear	Dry	Daylight	Sideswipe	same direction
171	8/18/2019	11:30 AM	High Street	Reed Street	V1: S / V2: E	2	0	0	Clear/Clear	Dry	Daylight	Angle	
172	8/5/2019	1:29 AM	North Main Street	Scanlon Drive/Russ Street	V1: N	1	0	0	Clear/Clear	Dry	Dark - lighted roadway	Single vehicle	
173	7/29/2019	3:15 PM	North Main Street	Scanlon Drive/Russ Street	V1: S / V2: S / V3: S	3	0	0	Clear/Clear	Dry	Daylight	Rear-end	
174	7/24/2019	9:20 AM	North Main Street	Scanlon Drive/Russ Street	V1: N / V2: N	2	2	0	Clear/Clear	Dry	Daylight	Angle	
175	7/21/2019	9:48 AM	North Main Street	Scanlon Drive/Russ Street	V1: E / V2: N	2	0	0	Clear/Clear	Dry	Daylight	Angle	
176	7/19/2019	8:17 AM	North Main Street		V1: N / V2: N	2	2	0	Clear	Dry	Daylight	Rear-end	
177	6/6/2019	4:39 AM	High Street	Reed Street	V1: N / V2: E	2	2	0	Rain	Wet	Dark - lighted roadway	Angle	
178	6/11/2019	7:27 AM	North Main Street		V1: N / V2: N	2	1	0	Rain/Clear	Wet	Daylight	Sideswipe	same direction
179	6/11/2019	2:30 AM	North Main Street		V1: S	1	0	0	Rain/Cloudy	Wet	Dark - lighted roadway	Angle	
180	5/25/2019	12:00 AM	North Main Street		V1: S / V2: S	2	2	0	Clear/Clear	Dry	Daylight	Angle	
181	5/21/2019	1:07 PM	North Main Street	Reed Street/Pond Street	V1: S / V2: S	2	0	0	Clear	Dry	Daylight	Sideswipe	same direction
182	5/14/2019	12:48 PM	North Main Street		V1: N / V2: W	2	1	0	Rain/Rain	Wet	Daylight	Angle	
183	5/11/2019	7:56 PM	North Main Street	Scanlon Drive/Russ Street	V1: S / V2: S	2	0	0	Clear	Dry	Dusk	Angle	
184	5/11/2019	2:40 PM	North Main Street		V1: S / V2: S	2	0	0	Clear	Dry	Daylight	Sideswipe	same direction
185	5/10/2019	8:26 AM	North Main Street		V1: S / V2: S	2	0	0	Cloudy/Cloudy	Dry	Daylight	Rear-end	
186	5/11/2019	12:04 AM	North Main Street		V1: S / V2: S	2	0	0	Rain	Wet	Dark - lighted roadway	Sideswipe	same direction
187	4/24/2019	3:30 AM	Reed Street		V1: E / V2: N	2	1	0	Rain/Rain	Wet	Dark - lighted roadway	Angle	
188	4/23/2019	9:27 PM	North Main Street		V1: S / V2: N	2	0	0	Clear/Clear	Dry	Dark - lighted roadway	Angle	
189	4/15/2019	2:52 AM	North Main Street	Scanlon Drive/Russ Street	V1: N / V2: N / V3: N	3	0	0	Clear/Clear	Dry	Dark - lighted roadway	Rear-end	
190	3/22/2019	8:12 AM	North Main Street		V1: E / V2: S	2	1	0	Rain	Wet	Daylight	Angle	
191	3/10/2019	10:07 PM	North Main Street		V1: S / V2: E	2	0	0	Clear/Clear	Dry	Dark - lighted roadway	Angle	
192	3/15/2019	1:31 PM	North Main Street		V1: S / V2: W / V3: E	3	2	0	Cloudy	Wet	Daylight	Angle	
193	3/15/2019	5:07 AM	North Main Street	Scanlon Drive/Russ Street	V1: N / V2: N	2	0	0	Clear	Wet	Dark - lighted roadway	Rear-end	
194	3/7/2019	4:45 PM	North Main Street		V1: N / V2: S	2	1	0	Clear	Dry	Daylight	Angle	
195	2/24/2019	4:04 PM	North Main Street		V1: N / V2: W	2	0	0	Rain/Rain	Wet	Daylight	Angle	
196	2/20/2019	11:21 AM	North Main Street		V1: W / V2: N	2	1	0	Clear	Dry	Daylight	Angle	
197	2/20/2019	2:57 PM	High Street	Reed Street	V1: S / V2: E	2	1	0	Clear	Dry	Daylight	Angle	
198	2/20/2019	6:25 AM	North Main Street		V1: N	1	2	0	Clear/Clear	Wet	Daylight	Single vehicle	
199	2/9/2019	9:30 AM	North Main Street		V1: E / V2: S	2	0	0	Clear	Dry	Daylight	Angle	
200	1/29/2019	11:18 AM	High Street		V1: N / V2: W	2	0	0	Clear/Clear	Dry	Daylight	Angle	
201	2/7/2019	6:18 PM	North Main Street		V1: N / V2: S	2	0	0	Rain	Wet	Dark - lighted roadway	Angle	
202	1/22/2019	7:35 AM	North Main Street		V1: W / V2: E	2	0	0	Clear/Clear	Ice	Daylight	Angle	
203	1/5/2019	11:00 AM	High Street		V1: S / V2: S	2	0	0	Rain	Wet	Daylight	Rear-end	
204	12/24/2018	7:19 PM	North Main Street		V1: E / V2: W	2	0	0	Clear/Clear	Dry	Other	Sideswipe	opposite direction
205	12/31/2018	6:04 PM	North Main Street		V1: N / V2: S	2	2	0	Cloudy	Dry	Dark - lighted roadway	Sideswipe	opposite direction
206	12/1/2018	4:40 PM	High Street		V1: E	1	1	0	Clear	Dry	Dark - lighted roadway	Single vehicle	
207	11/30/2018	4:17 AM	High Street		V1: N	1	1	0	Clear/Clear	Dry	Dark - lighted roadway	Single vehicle	
208	11/21/2018	7:45 AM	North Main Street		V1: E / V2: S	2	0	0	Clear	Dry	Daylight	Angle	
209	11/22/2018	10:52 PM	North Main Street	Scanlon Drive/Russ Street	V1: S / V2: S	2	1	0	Clear	Dry	Dark - lighted roadway	Rear-end	
210	11/2/2018	11:47 PM	High Street		V1: W	1	0	0	Rain/Rain	Wet	Dark - lighted roadway	Single vehicle	
211	10/28/2018	3:40 PM	North Main Street		V1: W / V2: S	2	1	0	Rain	Wet	Daylight	Angle	
212	10/27/2018	11:20 AM	High Street	Reed Street	V1: N / V2: W	2	3	0	Rain	Wet	Daylight	Angle	

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213	10/19/2018	8:25 AM	North Main Street		V1: N / V2: E	2	0	0	Clear/Clear	Dry	Daylight	Angle	
214	10/18/2018	7:40 AM	North Main Street	Scanlon Drive/Russ Street	V1: E / V2: S	2	0	0	Clear	Dry	Daylight	Angle	
215	10/11/2018	10:48 AM	North Main Street		V1: N / V2: W	2	1	0	Cloudy/Cloudy	Dry	Daylight	Angle	
216	10/9/2018	8:54 PM	North Main Street		V1: E / V2: N	2	1	0	Clear/Clear	Dry	Dark - lighted roadway	Angle	
217	10/10/2018	8:38 AM	Reed Street		V1: W / V2: W	2	1	0	Clear/Clear	Dry	Daylight	Sideswipe	same direction
218	9/26/2018	10:44 PM	High Street	Reed Street	V1: N / V2: S / V3: W	3	0	0	Rain	Wet	Dark - lighted roadway	Unknown	
219	9/24/2018	3:59 AM	North Main Street		V1: N	1	0	0	Clear/Clear	Dry	Dark - lighted roadway	Single vehicle	
220	3/19/2018	6:55 AM	North Main Street		V1: N / V2: N / V3: N	3	1	0	Clear/Clear	Dry	Daylight	Sideswipe	same direction
221	3/17/2018	11:46 PM	High Street		V1: N / V2: Not Reported	2	0	0	Clear/Clear	Dry	Dark - lighted roadway	Rear-end	
222	3/11/2018	7:52 PM	North Main Street		V1: S / V2: E	2	0	0	Clear/Clear	Dry	Dark - lighted roadway	Unknown	
223	3/6/2018	9:00 AM	North Main Street	Reed Street/Pond Street	V1: S / V2: W	2	1	0	Cloudy	Dry	Daylight	Angle	
224	3/7/2018	10:16 PM	High Street	Reed Street	V1: W / V2: N	2	1	0	Rain/Severe crossw	Wet	Dark - roadway not lighted	Angle	
225	3/2/2018	7:27 PM	High Street	Red Street	V1: S / V2: W / V3: E	3	1	0	Sleet, hail (freezing	Wet	Dark - unknown roadway lighting	Angle	
226	2/27/2018	3:18 PM	North Main Street		V1: S / V2: E	2	0	0	Clear/Clear	Dry	Daylight	Angle	
227	2/22/2018	1:17 PM	North Main Street		V1: W / V2: N	2	2	0	Cloudy	Dry	Daylight	Angle	
228	2/16/2018	7:14 PM	North Main Street		V1: S / V2: S	2	0	0	Clear/Clear	Dry	Dark - lighted roadway	Sideswipe	same direction
229	8/13/2018	7:25 AM	High Street		V1: W / V2: N	2	0	0	Rain	Wet	Daylight	Angle	
230	8/12/2018	7:32 PM	North Main Street		V1: S / V2: S	2	4	0	Rain/Cloudy	Wet	Other	Rear-end	
231	8/6/2018	9:37 PM	North Main Street		V1: N / V2: E	2	0	0	Clear	Dry	Dark - lighted roadway	Angle	
232	9/6/2018	7:05 PM	North Main Street		V1: N / V2: Not Reported	2	1	0	Cloudy/Rain	Wet	Daylight	Angle	
233	9/5/2018	4:18 PM	North Main Street	Reed Street/Pond Street	V1: E / V2: E	2	1	0	Clear/Clear	Dry	Daylight	Rear-end	
234	8/22/2018	8:16 AM	Reed Street		V1: E / V2: E	2	1	0	Rain/Cloudy	Wet	Daylight	Rear-end	
235	8/17/2018	12:00 AM	North Main Street		V1: S / V2: S	2	0	0	Clear/Clear	Dry	Dark - lighted roadway	Sideswipe	same direction
236	7/22/2018	4:12 AM	North Main Street		V1: N / V2: N	2	1	0	Other	Dry	Dark - lighted roadway	Single vehicle	
237	6/30/2018	4:22 PM	North Main Street		V1: Not Reported	1	1	0	Clear	Dry	Daylight	Single vehicle	
238	6/26/2018	7:31 AM	North Main Street		V1: E / V2: S	2	0	0	Clear/Clear	Dry	Daylight	Angle	
239	7/22/2018	12:15 AM	High Street	Reed Street	V1: N / V2: E	2	1	0	Other/Other	Dry	Dark - lighted roadway	Angle	
240	7/19/2018	6:58 PM	North Main Street		V1: N / V2: S	2	1	0	Clear	Dry	Daylight	Angle	
241	7/14/2018	11:59 PM	Reed Street		V1: E / V2: E	2	0	0	Clear	Dry	Dark - lighted roadway	Sideswipe	same direction
242	6/30/2018	12:00 AM	North Main Street	Scanlon Drive/Russ Street	V1: S / V2: S	2	0	0	Clear/Clear	Dry	Daylight	Rear-end	
243	6/28/2018	6:45 PM	North Main Street		V1: W / V2: N	2	0	0	Rain	Wet	Daylight	Angle	
244	6/25/2018	8:29 AM	North Main Street	Reed Street/Pond Street	V1: W / V2: Not Reported	2	0	0	Clear/Cloudy	Dry	Daylight	Angle	
245	6/19/2018	2:00 PM	North Main Street		V1: S / V2: S	2	0	0	Clear	Dry	Daylight	Sideswipe	same direction
246	6/19/2018	11:45 AM	North Main Street	Scanlon Drive/Russ Street	V1: S / V2: S	2	1	0	Clear	Dry	Daylight	Rear-end	
247	6/15/2018	11:42 AM	North Main Street		V1: N / V2: W	2	5	0	Clear	Dry	Daylight	Angle	
248	6/6/2018	6:37 PM	North Main Street		V1: S / V2: S / V3: S	3	2	0	Cloudy	Dry	Daylight	Rear-end	
249	4/19/2018	6:28 AM	North Main Street	Scanlon Drive/Russ Street	V1: E / V2: E	2	0	0	Cloudy/Other	Dry	Daylight	Angle	
250	4/18/2018	1:50 PM	Pond Street		V1: E / V2: E	2	0	0	Clear/Clear	Dry	Daylight	Rear-end	
251	4/17/2018	5:11 PM	North Main Street		V1: W / V2: N	2	0	0	Clear/Clear	Dry	Daylight	Angle	
252	4/16/2018	3:38 PM	North Main Street	Scanlon Drive/Russ Street	V1: N	1	1	0	Rain/Cloudy	Wet	Daylight	Single vehicle	
253	5/15/2018	8:13 AM	High Street	Reed Street	V1: E / V2: E	2	0	0	Cloudy	Dry	Daylight	Sideswipe	same direction
254	5/7/2018	5:42 PM	North Main Street		V1: N	1	1	0	Clear/Clear	Dry	Daylight	Angle	
255	5/7/2018	6:53 AM	North Main Street		V1: N / V2: N	2	1	0	Cloudy/Clear	Dry	Daylight	Rear-end	
256	5/2/2018	3:23 PM	North Main Street		V1: N / V2: W	2	2	0		Dry	Daylight	Angle	

Intersection/ Corridor	Roadway 1	Roadway 2	Total	Injury	Fatality	Rear-end	Angle	Sideswipe	Head-On	Single vehicle
High Street	High Street		12	4	0	5	2	0	0	5
North Main Street	North Main Street		155	110	0	35	75	23	7	14
Reed Street	Reed Street		7	4	0	1	1	2	0	3
Pond Street	Pond Street		1	0	0	1	0	0	0	0
Scanlon Drive	Scanlon Drive		2	0	0	0	2	0	0	0
High Street at Reed Street	High Street	Reed Street	27	22	0	6	15	2	0	3
North Main Street at Reed Street/Pond Street	North Main Street	Reed Street/Pond Street	25	24	0	2	14	6	2	1
North Main Street at Scanlon Drive/Russ Street	North Main Street	Scanlon Drive/Russ Street	26	15	0	11	10	2	0	3
High Street at Scanlon Drive	High Street	Scanlon Drive	1	0	0	0	0	0	0	1
		Total	256	179	0	61	119	35	9	30

Unknown
0
1
0
0
0
1
0
0
0
0

Moving Massachusetts Forward. massDOT Highway

SEGMENT CRASH RATE WORKSHEET

CITY/TOWN : Randolph COUNT DATE 5/25/2022

DISTRICT : 6

~ SEGMENT DATA ~

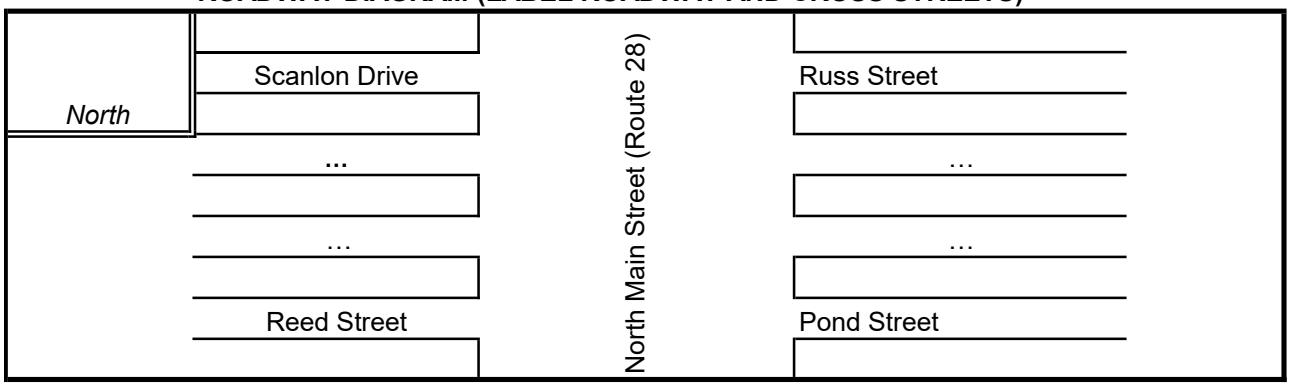
ROADWAY NAME: North Main Street (Route 28)

START POINT: Intersection with Scanlon Drive and Russ Street

END POINT: Intersection with Reed Street and Pond Street

FUNCTIONAL CLASSIFICATION OF ROADWAY: Principal Arterial

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES (**L**):	**0.7**
AVERAGE DAILY TRAFFIC VOLUME (**V**):	49,368

TOTAL # OF CRASHES:	155	# OF YEARS :	5	AVERAGE # OF CRASHES PER YEAR (**A**) :	**31.00**

CRASH RATE CALCULATION : **2.46**

$$RATE = \frac{(A * 1{,}000{,}000)}{(L * V * 365)}$$

Comments :

Project Title & Date: Pare Project No. 22077.00

Moving Massachusetts Forward. massDOT Highway

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Randolph COUNT DATE : May-22

DISTRICT : 6 UNSIGNALIZED : SIGNALIZED : X

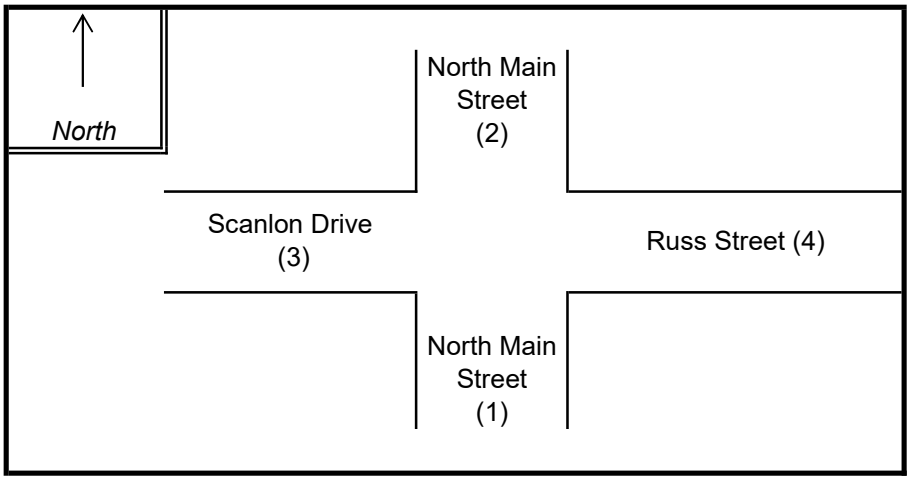
~ INTERSECTION DATA ~

MAJOR STREET : Route 28 (North Main Street)

MINOR STREET(S) : Scanlon Drive

Russ Street

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (AM/(PM)) :	688	1,789	312	333		3,122

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **34,689**

TOTAL # OF CRASHES : 26 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (**A**) : **5.20**

CRASH RATE CALCULATION : **0.41** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments :

Project Title & Date: Pare Project No. 22077.00 May-22

Moving Massachusetts Forward. massDOT Highway

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Randolph COUNT DATE : May-22

DISTRICT : 6 UNSIGNALIZED : SIGNALIZED : X

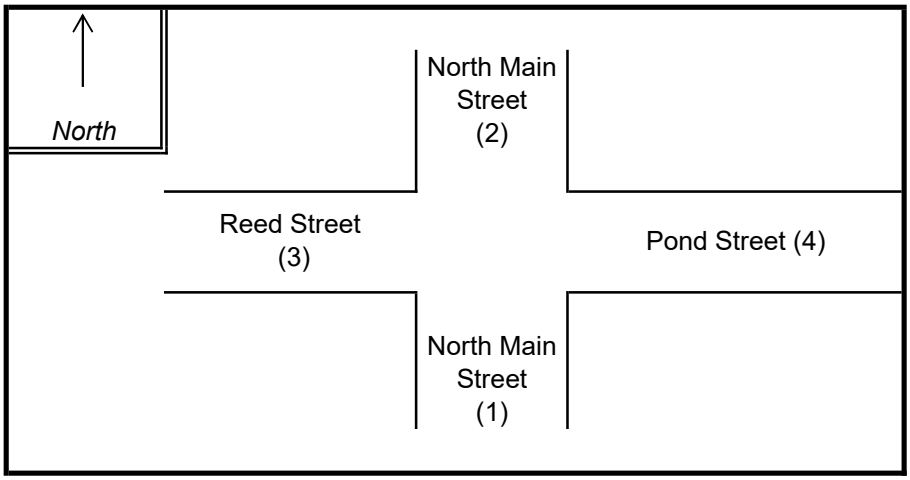
~ INTERSECTION DATA ~

MAJOR STREET : Route 28 (North Main Street)

MINOR STREET(S) : Reed Street

Pond Street

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (AM/(PM)) :	718	1,162	328	470		2,678

" K " FACTOR : 0.090 INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : 29,756

TOTAL # OF CRASHES : 25 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (**A**) : 5.00

CRASH RATE CALCULATION : 0.46 RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments :

Project Title & Date: Pare Project No. 22077.00 May-22

Moving Massachusetts Forward. massDOT Highway

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Randolph COUNT DATE : May-22

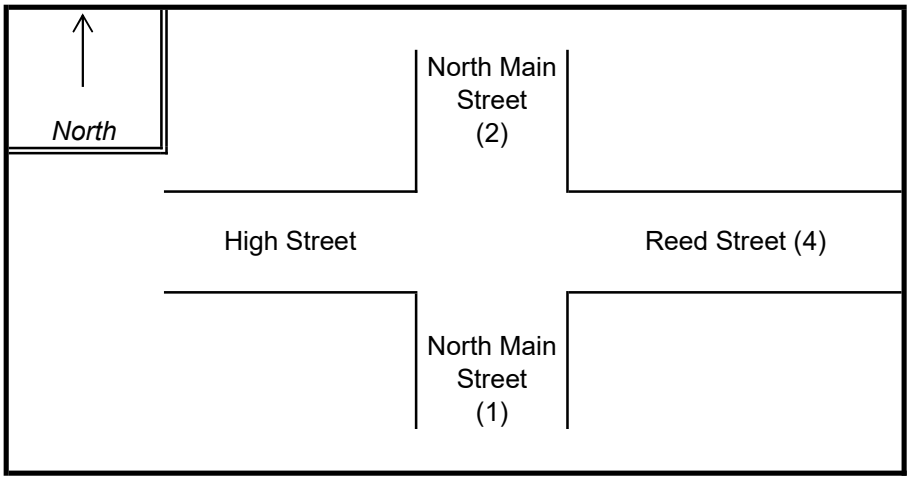
DISTRICT : 6 UNSIGNALIZED : SIGNALIZED : X

~ INTERSECTION DATA ~

MAJOR STREET : High Street

MINOR STREET(S) : Reed Street

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (AM/(PM)) :	297	457	317	282		1,353

" K " FACTOR : 0.090

INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : 15,033

TOTAL # OF CRASHES : 26

OF YEARS : 5

AVERAGE # OF CRASHES PER YEAR (**A**) : 5.20

CRASH RATE CALCULATION : 0.95

$$\text{RATE} = \frac{(A * 1{,}000{,}000)}{(V * 365)}$$

Comments :

Project Title & Date: Pare Project No. 22077.00 May-22

Appendix C

Speed Study

Pare Corporation

8 Blackstone Valley Place
Lincoln, RI 02865
www.parecorp.com

File Name : Scanlon Dr AM Speed Study
Site Code : TP168.21
Start Date : 6/17/2021
Page No : 1

#	EB	WB
1	39	34
2	35	38
3	34	29
4	28	33
5	27	33
6	32	33
7	29	26
8	31	27
9	33	32
10	33	28
11	32	34
12	29	30
13	38	24
14	26	24
15	34	35
16	34	24
17	17	31
18	19	27
19	25	30
20	26	28
21	30	31
22	31	29
23	30	26
24	33	24
25	20	32
26	28	31
27	29	20
28	31	29
29	30	32
30	32	25
31	33	29
32	27	28
33	40	30
34	34	27
35	30	24
36	30	37
37	31	35
38	33	31
39	27	32
40	24	30
41	30	31
42	19	38
43	30	34
44	39	33
45	31	34
46	35	35
47	38	32
48	36	36
49	30	35
50	32	32
51		

Class	Vehicle Count	85 Percentile	10 MPH Pace Speed	Number in Pace	Percent in Pace	Number of Vehicles Over 30 MPH	Percent of Vehicles Over 30 MPH	Average Speed	True Median (50th Percentile)	95 Percentile	15 Percentile
EB	50	34	26 - 35	38	76	26	52	30	31	39	26
WB	50	34	26 - 35	39	78	27	54	30	31	37	26
Summary	100	35	26 - 35	77	77	53	53	30	31	38	26

Appendix D

Census Data

34 Scanlon Drive
Randolph, MA
Background Growth Rate
PARE Project No 22077.00
March 1, 2023

US Census Data
Town of Randolph

	Population
2020	34984
2010	32112
Years	10
ANNUAL GROWTH RATE	0.86%
SAY	**1.00%**

Computations by: EB
Checked by: DH

Appendix E

Trip Generation & Distribution

34 Scanlon Drive
Randoplh, MA
Existing and Proposed Traffic Volumes
PARE Project No. 22077.00
March 1, 2023

PARE CORPORATION

2022-2029
TRAFFIC VOLUME SUMMARY
Future No-Build Growth Factor = 1.0%

Weekday AM Peak Hour
7:30 - 8:30 AM

North Main Street (Route 28) at Russ Street and Scanlon Drive

	2022 Existing	Outside Developments	2029 Future No-Build	Site Generated	2029 Future Build
NB - L	14	0	16	1	17
NB - T	1253	0	1344	0	1344
NB - R	67	0	72	0	72
SB - L	219	0	235	0	235
SB - T	697	0	748	0	748
SB - R	220	0	236	23	259
EB - L	526	0	564	24	588
EB - T	52	0	56	1	57
EB - R	12	0	13	0	13
WB - L	36	0	39	0	39
WB - T	32	0	35	1	36
WB - R	133	0	143	0	143

Weekday PM Peak Hour
4:45 - 5:45 PM

North Main Street (Route 28) at Russ Street and Scanlon Drive

	2022 Existing	Outside Developments	2029 Future No-Build	Site Generated	2029 Future Build
NB - L	16	0	18	0	18
NB - T	621	0	666	0	666
NB - R	45	0	49	0	49
SB - L	181	0	195	0	195
SB - T	1155	0	1239	0	1239
SB - R	453	0	486	24	510
EB - L	248	0	266	26	292
EB - T	35	0	38	2	40
EB - R	24	0	26	1	27
WB - L	59	0	64	0	64
WB - T	44	0	48	1	49
WB - R	229	0	246	0	246

Weekday AM Peak Hour
7:15 - 8:15 AM

Reed Street at High Street

	2022 Existing	Outside Developments	2029 Future No-Build	Site Generated	2029 Future Build
NB - L	17	0	19	0	19
NB - T	392	0	421	16	437
NB - R	121	0	130	0	130
SB - L	4	0	5	0	5
SB - T	209	0	225	4	229
SB - R	82	0	88	1	89
EB - L	216	0	232	9	241
EB - T	203	0	218	0	218
EB - R	7	0	8	0	8
WB - L	64	0	69	0	69
WB - T	140	0	151	0	151
WB - R	9	0	10	0	10

Weekday PM Peak Hour
4:45 - 5:45 PM

Reed Street at High Street

	2022 Existing	Outside Developments	2029 Future No-Build	Site Generated	2029 Future Build
NB - L	7	0	8	0	8
NB - T	196	0	211	3	214
NB - R	92	0	99	0	99
SB - L	15	0	17	1	18
SB - T	322	0	346	15	361
SB - R	115	0	124	5	129
EB - L	81	0	87	2	89
EB - T	223	0	240	0	240
EB - R	10	0	11	0	11
WB - L	100	0	108	0	108
WB - T	173	0	186	0	186
WB - R	9	0	10	0	10

34 Scanlon Drive
Randoplh, MA
Existing and Proposed Traffic Volumes
PARE Project No. 22077.00
March 1, 2023

PARE CORPORATION

2022-2029
TRAFFIC VOLUME SUMMARY
Future No-Build Growth Factor = 1.0%

Weekday AM Peak Hour 7:15 - 8:15 AM **Scanlon Drive at Bus Entrance Driveway**					
	2022 Existing	Outside Developments	2029 Future No-Build	Site Generated	2029 Future Build
EB - T			633	25	658
EB - R			0	0	0
WB - L			0	15	15
WB - T			287	5	292

Weekday PM Peak Hour 4:45 - 5:45 PM **Scanlon Drive at Bus Entrance Driveway**					
	2022 Existing	Outside Developments	2029 Future No-Build	Site Generated	2029 Future Build
EB - T			330	5	335
EB - R				0	0
WB - L				15	15
WB - T			552	21	573

Weekday AM Peak Hour 7:15 - 8:15 AM **Scanlon Drive at Bus Exit Driveway**					
	2022 Existing	Outside Developments	2029 Future No-Build	Site Generated	2029 Future Build
NB - L			0	0	0
NB - R			0	15	15
EB - T			633	25	658
WB - T			287	20	307

Weekday PM Peak Hour 4:45 - 5:45 PM **Scanlon Drive at Bus Exit Driveway**					
	2022 Existing	Outside Developments	2029 Future No-Build	Site Generated	2029 Future Build
NB - L				0	0
NB - R				15	15
EB - T			330	5	335
WB - T			552	36	588

Weekday AM Peak Hour 7:15 - 8:15 AM **Scanlon Drive at Auto Driveway**					
	2022 Existing	Outside Developments	2029 Future No-Build	Site Generated	2029 Future Build
NB - L			0	5	5
NB - R			0	10	10
EB - T			633	15	648
EB - R			0	25	25
WB - L			0	10	10
WB - T			287	15	302

Weekday PM Peak Hour 4:45 - 5:45 PM **Scanlon Drive at Auto Driveway**					
	2022 Existing	Outside Developments	2029 Future No-Build	Site Generated	2029 Future Build
NB - L				21	21
NB - R				14	14
EB - T			330	15	345
EB - R				5	5
WB - L				10	10
WB - T			552	15	567

Appendix F

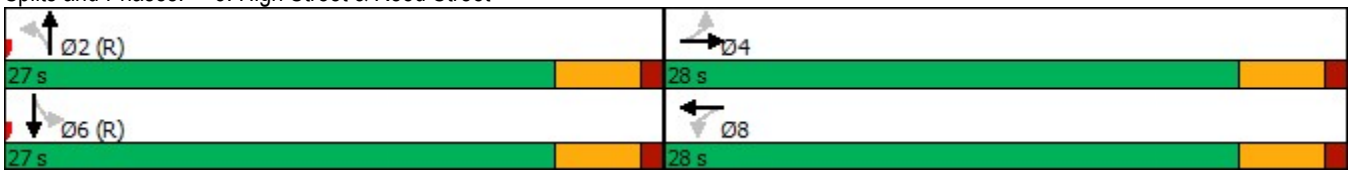
Traffic Capacity Analysis

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	241	218	8	69	151	10	19	437	130	5	229	89
Future Volume (vph)	241	218	8	69	151	10	19	437	130	5	229	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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
Ped Bike Factor		1.00			1.00			1.00			0.99	
Frt		0.998			0.994			0.970			0.963	
Flt Protected		0.975			0.985			0.998			0.999	
Satd. Flow (prot)	0	1822	0	0	1830	0	0	1792	0	0	1767	0
Flt Permitted		0.726			0.800			0.983			0.992	
Satd. Flow (perm)	0	1356	0	0	1486	0	0	1765	0	0	1754	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			5			31			42	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		684			2131			461			4064	
Travel Time (s)		15.5			48.4			10.5			92.4	
Confl. Peds. (#/hr)	1		1	2		2	1		1	1		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	2%	0%	3%	1%	0%	6%	2%	2%	0%	4%	0%
Adj. Flow (vph)	262	237	9	75	164	11	21	475	141	5	249	97
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	508	0	0	250	0	0	637	0	0	351	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	28.0	28.0		28.0	28.0		27.0	27.0		27.0	27.0	
Total Split (%)	50.9%	50.9%		50.9%	50.9%		49.1%	49.1%		49.1%	49.1%	
Maximum Green (s)	23.5	23.5		23.5	23.5		22.5	22.5		22.5	22.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		4.5			4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		23.5			23.5			22.5			22.5	
Actuated g/C Ratio		0.43			0.43			0.41			0.41	
v/c Ratio		0.88			0.39			0.86			0.47	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		34.5			12.9			29.0			13.0	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		34.5			12.9			29.0			13.0	
LOS		C			B			C			B	
Approach Delay		34.5			12.9			29.0			13.0	
Approach LOS		C			B			C			B	
Queue Length 50th (ft)		143			52			173			69	
Queue Length 95th (ft)		#313			100			#355			130	
Internal Link Dist (ft)		604			2051			381			3984	
Turn Bay Length (ft)												
Base Capacity (vph)		580			637			740			742	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.88			0.39			0.86			0.47	

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 55			
Control Type: Pretimed			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 25.1		Intersection LOS: C	
Intersection Capacity Utilization 92.6%		ICU Level of Service F	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: High Street & Reed Street



Lanes, Volumes, Timings
3: High Street & Reed Street

Existin

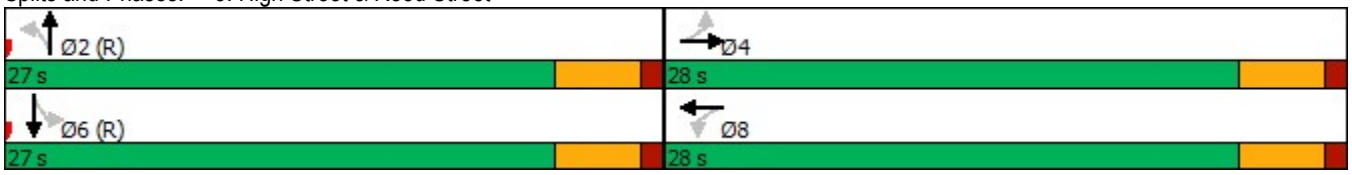
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	216	203	7	64	140	9	17	392	121	4	209	82
Future Volume (vph)	216	203	7	64	140	9	17	392	121	4	209	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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
Ped Bike Factor		1.00			1.00			1.00			0.99	
Frt		0.998			0.994			0.969			0.962	
Flt Protected		0.975			0.985			0.998			0.999	
Satd. Flow (prot)	0	1822	0	0	1830	0	0	1790	0	0	1765	0
Flt Permitted		0.725			0.798			0.985			0.994	
Satd. Flow (perm)	0	1354	0	0	1482	0	0	1767	0	0	1756	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			5			33			43	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		684			2131			461			4064	
Travel Time (s)		15.5			48.4			10.5			92.4	
Confl. Peds. (#/hr)	1		1	2		2	1		1	1		1
Peak Hour Factor	0.84	0.84	0.84	0.83	0.83	0.83	0.94	0.94	0.94	0.92	0.92	0.92
Heavy Vehicles (%)	1%	2%	0%	3%	1%	0%	6%	2%	2%	0%	4%	0%
Adj. Flow (vph)	257	242	8	77	169	11	18	417	129	4	227	89
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	507	0	0	257	0	0	564	0	0	320	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	28.0	28.0		28.0	28.0		27.0	27.0		27.0	27.0	
Total Split (%)	50.9%	50.9%		50.9%	50.9%		49.1%	49.1%		49.1%	49.1%	
Maximum Green (s)	23.5	23.5		23.5	23.5		22.5	22.5		22.5	22.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		4.5			4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		23.5			23.5			22.5			22.5	
Actuated g/C Ratio		0.43			0.43			0.41			0.41	
v/c Ratio		0.88			0.40			0.76			0.43	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		34.5			13.1			21.8			12.2	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		34.5			13.1			21.8			12.2	
LOS		C			B			C			B	
Approach Delay		34.5			13.1			21.8			12.2	
Approach LOS		C			B			C			B	
Queue Length 50th (ft)		143			54			142			61	
Queue Length 95th (ft)		#278			93			#292			116	
Internal Link Dist (ft)		604			2051			381			3984	
Turn Bay Length (ft)												
Base Capacity (vph)		579			636			742			743	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.88			0.40			0.76			0.43	

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 55			
Control Type: Pretimed			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 22.5		Intersection LOS: C	
Intersection Capacity Utilization 84.7%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: High Street & Reed Street



Lanes, Volumes, Timings
3: High Street & Reed Street

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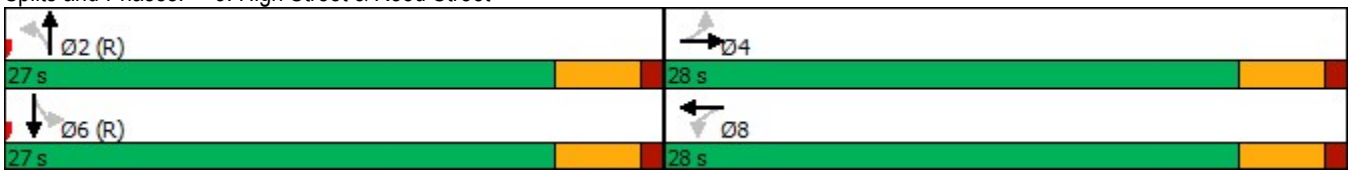
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	232	218	8	69	151	10	19	421	130	5	225	88
Future Volume (vph)	232	218	8	69	151	10	19	421	130	5	225	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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
Ped Bike Factor		1.00			1.00			1.00			0.99	
Frt		0.998			0.994			0.969			0.963	
Flt Protected		0.975			0.985			0.998			0.999	
Satd. Flow (prot)	0	1822	0	0	1830	0	0	1790	0	0	1767	0
Flt Permitted		0.730			0.802			0.983			0.992	
Satd. Flow (perm)	0	1363	0	0	1489	0	0	1763	0	0	1755	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			5			33			43	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		684			2131			461			4064	
Travel Time (s)		15.5			48.4			10.5			92.4	
Confl. Peds. (#/hr)	1		1	2		2	1		1	1		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	2%	0%	3%	1%	0%	6%	2%	2%	0%	4%	0%
Adj. Flow (vph)	252	237	9	75	164	11	21	458	141	5	245	96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	498	0	0	250	0	0	620	0	0	346	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	28.0	28.0		28.0	28.0		27.0	27.0		27.0	27.0	
Total Split (%)	50.9%	50.9%		50.9%	50.9%		49.1%	49.1%		49.1%	49.1%	
Maximum Green (s)	23.5	23.5		23.5	23.5		22.5	22.5		22.5	22.5	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		4.5			4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		23.5			23.5			22.5			22.5	
Actuated g/C Ratio		0.43			0.43			0.41			0.41	
v/c Ratio		0.85			0.39			0.84			0.47	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		31.9			12.9			26.9			12.8	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		31.9			12.9			26.9			12.8	
LOS		C			B			C			B	
Approach Delay		31.9			12.9			26.9			12.8	
Approach LOS		C			B			C			B	
Queue Length 50th (ft)		138			52			165			67	
Queue Length 95th (ft)		#304			100			#340			128	
Internal Link Dist (ft)		604			2051			381			3984	
Turn Bay Length (ft)												
Base Capacity (vph)		583			639			740			743	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.85			0.39			0.84			0.47	

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 55			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 55			
Control Type: Pretimed			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 23.5		Intersection LOS: C	
Intersection Capacity Utilization 90.4%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: High Street & Reed Street



Lanes, Volumes, Timings
3: High Street & Reed Street

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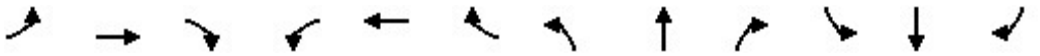
PM Peak

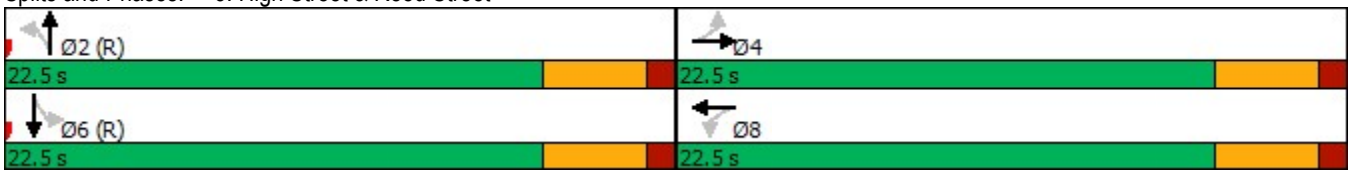


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	240	11	108	186	10	8	214	99	18	361	129
Future Volume (vph)	89	240	11	108	186	10	8	214	99	18	361	129
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Ped Bike Factor		1.00			1.00			0.99			0.99	
Frt		0.996			0.995			0.958			0.966	
Flt Protected		0.987			0.983			0.999			0.998	
Satd. Flow (prot)	0	1836	0	0	1826	0	0	1769	0	0	1772	0
Flt Permitted		0.850			0.779			0.984			0.981	
Satd. Flow (perm)	0	1581	0	0	1447	0	0	1743	0	0	1741	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			5			60			45	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		684			2131			461			4064	
Travel Time (s)		15.5			48.4			10.5			92.4	
Confl. Peds. (#/hr)	1		1	2		2	1		1	1		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	2%	0%	3%	1%	0%	6%	2%	2%	0%	4%	0%
Adj. Flow (vph)	97	261	12	117	202	11	9	233	108	20	392	140
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	370	0	0	330	0	0	350	0	0	552	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	18.0	18.0		18.0	18.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		4.5			4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		18.0			18.0			18.0			18.0	
Actuated g/C Ratio		0.40			0.40			0.40			0.40	
v/c Ratio		0.58			0.57			0.48			0.76	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		15.0			6.7			10.9			20.2	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		15.0			6.7			10.9			20.2	
LOS		B			A			B			C	
Approach Delay		15.0			6.7			10.9			20.2	
Approach LOS		B			A			B			C	
Queue Length 50th (ft)		70			35			51			106	
Queue Length 95th (ft)		135			m33			105			#248	
Internal Link Dist (ft)		604			2051			381			3984	
Turn Bay Length (ft)												
Base Capacity (vph)		634			581			733			723	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.58			0.57			0.48			0.76	

Intersection Summary			
Area Type:	Other		
Cycle Length: 45			
Actuated Cycle Length: 45			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 50			
Control Type: Pretimed			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 14.2		Intersection LOS: B	
Intersection Capacity Utilization 67.9%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 3: High Street & Reed Street



Lanes, Volumes, Timings
3: High Street & Reed Street

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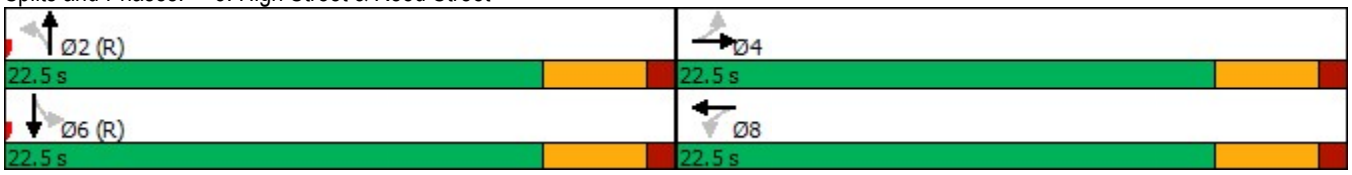
PM Peak

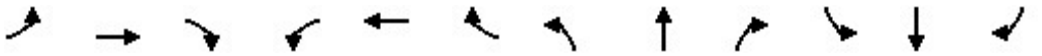
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	223	10	100	173	9	7	196	92	15	322	115
Future Volume (vph)	81	223	10	100	173	9	7	196	92	15	322	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Ped Bike Factor		1.00			1.00			0.99			0.99	
Frt		0.996			0.996			0.958			0.966	
Flt Protected		0.987			0.983			0.999			0.998	
Satd. Flow (prot)	0	1836	0	0	1828	0	0	1769	0	0	1771	0
Flt Permitted		0.850			0.775			0.988			0.985	
Satd. Flow (perm)	0	1581	0	0	1441	0	0	1750	0	0	1748	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			4			60			46	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		684			2131			461			4064	
Travel Time (s)		15.5			48.4			10.5			92.4	
Confl. Peds. (#/hr)	1		1	2		2	1		1	1		1
Peak Hour Factor	0.84	0.84	0.84	0.83	0.83	0.83	0.94	0.94	0.94	0.92	0.92	0.92
Heavy Vehicles (%)	1%	2%	0%	3%	1%	0%	6%	2%	2%	0%	4%	0%
Adj. Flow (vph)	96	265	12	120	208	11	7	209	98	16	350	125
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	373	0	0	339	0	0	314	0	0	491	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	18.0	18.0		18.0	18.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		4.5			4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		18.0			18.0			18.0			18.0	
Actuated g/C Ratio		0.40			0.40			0.40			0.40	
v/c Ratio		0.59			0.59			0.43			0.68	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		15.1			7.5			10.0			16.0	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		15.1			7.5			10.0			16.0	
LOS		B			A			A			B	
Approach Delay		15.1			7.5			10.0			16.0	
Approach LOS		B			A			A			B	
Queue Length 50th (ft)		70			35			43			88	
Queue Length 95th (ft)		122			m36			92			#175	
Internal Link Dist (ft)		604			2051			381			3984	
Turn Bay Length (ft)												
Base Capacity (vph)		634			578			736			726	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.59			0.59			0.43			0.68	

Intersection Summary			
Area Type:	Other		
Cycle Length: 45			
Actuated Cycle Length: 45			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 45			
Control Type: Pretimed			
Maximum v/c Ratio: 0.68			
Intersection Signal Delay: 12.6		Intersection LOS: B	
Intersection Capacity Utilization 62.0%		ICU Level of Service B	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 3: High Street & Reed Street



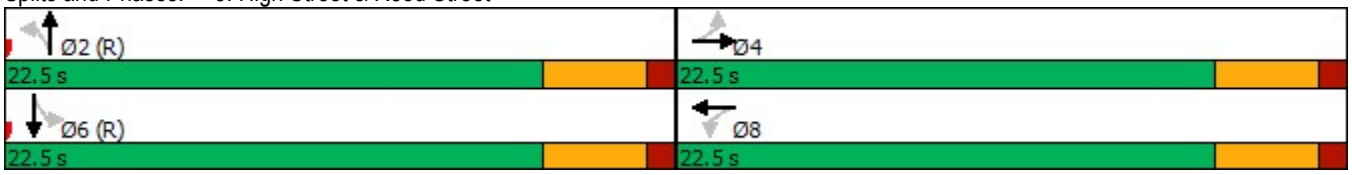


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	240	11	108	186	10	8	211	99	17	346	124
Future Volume (vph)	87	240	11	108	186	10	8	211	99	17	346	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. 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
Ped Bike Factor		1.00			1.00			0.99			0.99	
Frt		0.996			0.995			0.958			0.966	
Flt Protected		0.987			0.983			0.999			0.998	
Satd. Flow (prot)	0	1836	0	0	1826	0	0	1769	0	0	1771	0
Flt Permitted		0.852			0.780			0.985			0.983	
Satd. Flow (perm)	0	1584	0	0	1449	0	0	1744	0	0	1745	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			5			61			46	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		684			2131			461			4064	
Travel Time (s)		15.5			48.4			10.5			92.4	
Confl. Peds. (#/hr)	1		1	2		2	1		1	1		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	2%	0%	3%	1%	0%	6%	2%	2%	0%	4%	0%
Adj. Flow (vph)	95	261	12	117	202	11	9	229	108	18	376	135
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	368	0	0	330	0	0	346	0	0	529	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	18.0	18.0		18.0	18.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		4.5			4.5			4.5			4.5	
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		18.0			18.0			18.0			18.0	
Actuated g/C Ratio		0.40			0.40			0.40			0.40	
v/c Ratio		0.58			0.57			0.47			0.73	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		14.9			6.6			10.7			18.4	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		14.9			6.6			10.7			18.4	
LOS		B			A			B			B	
Approach Delay		14.9			6.6			10.7			18.4	
Approach LOS		B			A			B			B	
Queue Length 50th (ft)		69			35			50			98	
Queue Length 95th (ft)		134			m33			103			#231	
Internal Link Dist (ft)		604			2051			381			3984	
Turn Bay Length (ft)												
Base Capacity (vph)		636			582			734			725	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.58			0.57			0.47			0.73	

Intersection Summary			
Area Type:	Other		
Cycle Length: 45			
Actuated Cycle Length: 45			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 45			
Control Type: Pretimed			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 13.4		Intersection LOS: B	
Intersection Capacity Utilization 66.4%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 3: High Street & Reed Street



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	588	57	13	39	36	143	17	1344	72	235	748	259
Future Volume (vph)	588	57	13	39	36	143	17	1344	72	235	748	259
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor		1.00						1.00				
Frt		0.994			0.880			0.992				0.850
Flt Protected	0.950	0.962		0.950			0.950			0.950		
Satd. Flow (prot)	1698	1712	0	1805	1646	0	1583	3474	0	1787	3374	1442
Flt Permitted	0.950	0.962		0.950			0.344			0.068		
Satd. Flow (perm)	1698	1712	0	1805	1646	0	573	3474	0	128	3374	1442
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			120			6				282
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		895			630			3614			514	
Travel Time (s)		20.3			14.3			82.1			11.7	
Confl. Peds. (#/hr)			1						2			3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	0%	0%	0%	2%	14%	3%	2%	1%	7%	12%
Adj. Flow (vph)	639	62	14	42	39	155	18	1461	78	255	813	282
Shared Lane Traffic (%)	44%											
Lane Group Flow (vph)	358	357	0	42	194	0	18	1539	0	255	813	282
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	pt+ov
Protected Phases	3	3		4	4		5	2		1	6	6 3
Permitted Phases							2			6		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	3	3		4	4		5	2		1	6	6 3
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	12.0		6.0	12.0	
Minimum Split (s)	25.0	25.0		11.0	11.0		13.0	20.0		13.0	24.0	
Total Split (s)	28.0	28.0		11.0	11.0		14.0	53.0		22.0	61.0	
Total Split (%)	24.6%	24.6%		9.6%	9.6%		12.3%	46.5%		19.3%	53.5%	
Maximum Green (s)	23.0	23.0		6.0	6.0		7.0	48.0		15.0	56.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		3.0	1.0		3.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		7.0	5.0		7.0	5.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	2.0		3.0	2.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0						7.0			7.0	
Flash Dont Walk (s)	13.0	13.0						8.0			12.0	
Pedestrian Calls (#/hr)	1	1						2			3	
Act Effct Green (s)	23.0	23.0		6.0	6.0		52.2	48.0		67.2	63.8	91.8
Actuated g/C Ratio	0.20	0.20		0.05	0.05		0.46	0.42		0.59	0.56	0.81
v/c Ratio	1.04	1.02		0.44	0.97		0.06	1.04		0.90	0.43	0.23
Control Delay	103.8	99.0		67.0	78.3		10.9	68.0		63.5	16.1	1.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	103.8	99.0		67.0	78.3		10.9	68.0		63.5	16.1	1.0
LOS	F	F		E	E		B	E		E	B	A
Approach Delay		101.4			76.3			67.3			21.9	
Approach LOS		F			E			E			C	
90th %ile Green (s)	23.0	23.0		6.0	6.0		6.9	48.0		15.0	56.1	
90th %ile Term Code	Max	Max		Max	Max		Gap	Max		Max	Hold	
70th %ile Green (s)	23.0	23.0		6.0	6.0		6.4	48.0		15.0	56.6	
70th %ile Term Code	Max	Max		Max	Max		Gap	Max		Max	Hold	
50th %ile Green (s)	23.0	23.0		6.0	6.0		0.0	48.0		15.0	70.0	
50th %ile Term Code	Max	Max		Max	Max		Skip	Max		Max	Hold	
30th %ile Green (s)	23.0	23.0		6.0	6.0		0.0	48.0		15.0	70.0	
30th %ile Term Code	Max	Max		Max	Max		Skip	Max		Max	Hold	
10th %ile Green (s)	23.0	23.0		6.0	6.0		0.0	48.0		11.2	66.2	
10th %ile Term Code	Max	Max		Max	Max		Skip	Max		Gap	Hold	
Queue Length 50th (ft)	~300	~293		30	55		5	~647		137	148	0
Queue Length 95th (ft)	#496	#493		69	#204		15	#789		#284	257	20
Internal Link Dist (ft)		815			550			3534			434	
Turn Bay Length (ft)												
Base Capacity (vph)	344	349		96	201		330	1476		295	1901	1222
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	1.04	1.02		0.44	0.97		0.05	1.04		0.86	0.43	0.23

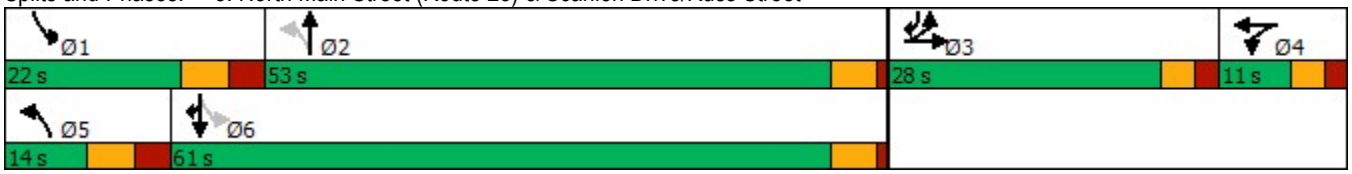
Intersection Summary	
Area Type:	Other

Cycle Length: 114	
Actuated Cycle Length: 113.2	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.04	
Intersection Signal Delay: 58.3	Intersection LOS: E
Intersection Capacity Utilization 99.7%	ICU Level of Service F
Analysis Period (min) 15	
90th %ile Actuated Cycle: 114	
70th %ile Actuated Cycle: 114	
50th %ile Actuated Cycle: 114	
30th %ile Actuated Cycle: 114	
10th %ile Actuated Cycle: 110.2	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: North Main Street (Route 28) & Scanlon Drive/Russ Street



Lanes, Volumes, Timings
8: North Main Street (Route 28) & Scanlon Drive/Russ Street

Existin

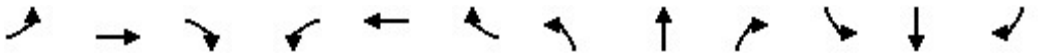
AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	526	52	12	36	32	133	14	1253	67	219	697	220
Future Volume (vph)	526	52	12	36	32	133	14	1253	67	219	697	220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor		1.00						1.00				
Frt		0.994			0.879			0.992				0.850
Flt Protected	0.950	0.962		0.950			0.950			0.950		
Satd. Flow (prot)	1698	1712	0	1805	1644	0	1583	3474	0	1787	3374	1509
Flt Permitted	0.950	0.962		0.950			0.378			0.068		
Satd. Flow (perm)	1698	1712	0	1805	1644	0	630	3474	0	128	3374	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			123			6				227
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		895			630			3614			514	
Travel Time (s)		20.3			14.3			82.1			11.7	
Confl. Peds. (#/hr)			1						2			3
Peak Hour Factor	0.85	0.85	0.85	0.81	0.81	0.81	0.93	0.93	0.93	0.97	0.97	0.97
Heavy Vehicles (%)	1%	0%	0%	0%	0%	2%	14%	3%	2%	1%	7%	7%
Adj. Flow (vph)	619	61	14	44	40	164	15	1347	72	226	719	227
Shared Lane Traffic (%)	44%											
Lane Group Flow (vph)	347	347	0	44	204	0	15	1419	0	226	719	227
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	pt+ov
Protected Phases	3	3		4	4		5	2		1	6	6 3
Permitted Phases							2			6		

Lanes, Volumes, Timings
8: North Main Street (Route 28) & Scanlon Drive/Russ Street

Existin

AM Peak



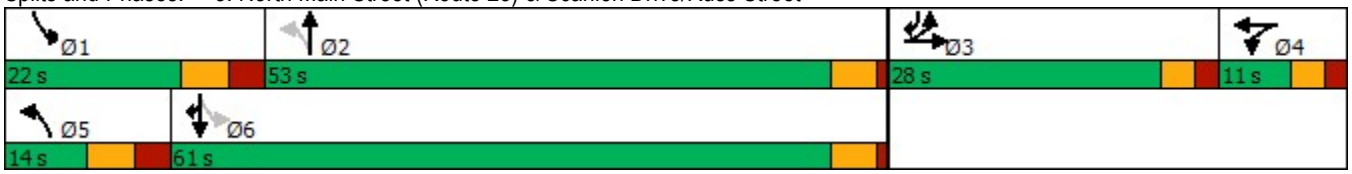
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	3	3		4	4		5	2		1	6	6 3
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	12.0		6.0	12.0	
Minimum Split (s)	25.0	25.0		11.0	11.0		13.0	20.0		13.0	24.0	
Total Split (s)	28.0	28.0		11.0	11.0		14.0	53.0		22.0	61.0	
Total Split (%)	24.6%	24.6%		9.6%	9.6%		12.3%	46.5%		19.3%	53.5%	
Maximum Green (s)	23.0	23.0		6.0	6.0		7.0	48.0		15.0	56.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		3.0	1.0		3.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		7.0	5.0		7.0	5.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	2.0		3.0	2.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0						7.0			7.0	
Flash Dont Walk (s)	13.0	13.0						8.0			12.0	
Pedestrian Calls (#/hr)	1	1						2			3	
Act Effct Green (s)	23.0	23.0		6.0	6.0		51.6	47.5		65.9	62.6	90.6
Actuated g/C Ratio	0.21	0.21		0.05	0.05		0.46	0.42		0.59	0.56	0.81
v/c Ratio	0.99	0.98		0.45	1.00		0.04	0.96		0.83	0.38	0.18
Control Delay	92.4	88.7		67.7	85.9		10.9	47.7		52.4	15.5	0.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	92.4	88.7		67.7	85.9		10.9	47.7		52.4	15.5	0.9
LOS	F	F		E	F		B	D		D	B	A
Approach Delay		90.5			82.7			47.3			19.8	
Approach LOS		F			F			D			B	
90th %ile Green (s)	23.0	23.0		6.0	6.0		6.7	48.0		15.0	56.3	
90th %ile Term Code	Max	Max		Max	Max		Gap	Max		Max	Hold	
70th %ile Green (s)	23.0	23.0		6.0	6.0		6.2	48.0		15.0	56.8	
70th %ile Term Code	Max	Max		Max	Max		Gap	Max		Max	Hold	
50th %ile Green (s)	23.0	23.0		6.0	6.0		0.0	48.0		15.0	70.0	
50th %ile Term Code	Max	Max		Max	Max		Skip	Max		Max	Hold	
30th %ile Green (s)	23.0	23.0		6.0	6.0		0.0	48.0		12.9	67.9	
30th %ile Term Code	Max	Max		Max	Max		Skip	Max		Gap	Hold	
10th %ile Green (s)	23.0	23.0		6.0	6.0		0.0	45.2		9.3	61.5	
10th %ile Term Code	Max	Max		Max	Max		Skip	Gap		Gap	Hold	
Queue Length 50th (ft)	~275	269		32	~61		4	523		113	126	0
Queue Length 95th (ft)	#433	#431		63	#170		13	#689		#232	221	18
Internal Link Dist (ft)		815			550			3534			434	
Turn Bay Length (ft)												
Base Capacity (vph)	349	354		97	204		355	1495		297	1886	1265
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	0.99	0.98		0.45	1.00		0.04	0.95		0.76	0.38	0.18

Intersection Summary	
Area Type:	Other

Cycle Length: 114	
Actuated Cycle Length: 111.9	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.00	
Intersection Signal Delay: 49.1	Intersection LOS: D
Intersection Capacity Utilization 93.4%	ICU Level of Service F
Analysis Period (min) 15	
90th %ile Actuated Cycle: 114	
70th %ile Actuated Cycle: 114	
50th %ile Actuated Cycle: 114	
30th %ile Actuated Cycle: 111.9	
10th %ile Actuated Cycle: 105.5	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: North Main Street (Route 28) & Scanlon Drive/Russ Street



Lanes, Volumes, Timings
8: North Main Street (Route 28) & Scanlon Drive/Russ Street

No Bui

AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	564	56	13	39	35	143	16	1344	82	235	748	236
Future Volume (vph)	564	56	13	39	35	143	16	1344	82	235	748	236
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor		1.00						1.00				
Frt		0.994			0.880			0.991				0.850
Flt Protected	0.950	0.962		0.950			0.950			0.950		
Satd. Flow (prot)	1698	1712	0	1805	1646	0	1583	3470	0	1787	3374	1509
Flt Permitted	0.950	0.962		0.950			0.344			0.068		
Satd. Flow (perm)	1698	1712	0	1805	1646	0	573	3470	0	128	3374	1509
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			121			7				257
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		895			630			3614			514	
Travel Time (s)		20.3			14.3			82.1			11.7	
Confl. Peds. (#/hr)			1						2			3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	0%	0%	0%	2%	14%	3%	2%	1%	7%	7%
Adj. Flow (vph)	613	61	14	42	38	155	17	1461	89	255	813	257
Shared Lane Traffic (%)	44%											
Lane Group Flow (vph)	343	345	0	42	193	0	17	1550	0	255	813	257
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	pt+ov
Protected Phases	3	3		4	4		5	2		1	6	6 3
Permitted Phases							2			6		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	3	3		4	4		5	2		1	6	6 3
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	12.0		6.0	12.0	
Minimum Split (s)	25.0	25.0		11.0	11.0		13.0	20.0		13.0	24.0	
Total Split (s)	28.0	28.0		11.0	11.0		14.0	53.0		22.0	61.0	
Total Split (%)	24.6%	24.6%		9.6%	9.6%		12.3%	46.5%		19.3%	53.5%	
Maximum Green (s)	23.0	23.0		6.0	6.0		7.0	48.0		15.0	56.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		3.0	1.0		3.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		7.0	5.0		7.0	5.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	2.0		3.0	2.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0						7.0			7.0	
Flash Dont Walk (s)	13.0	13.0						8.0			12.0	
Pedestrian Calls (#/hr)	1	1						2			3	
Act Effct Green (s)	23.0	23.0		6.0	6.0		52.2	48.0		67.2	63.8	91.8
Actuated g/C Ratio	0.20	0.20		0.05	0.05		0.46	0.42		0.59	0.56	0.81
v/c Ratio	1.00	0.99		0.44	0.96		0.05	1.05		0.90	0.43	0.20
Control Delay	93.5	91.0		67.0	75.6		10.9	70.5		63.5	16.1	0.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	93.5	91.0		67.0	75.6		10.9	70.5		63.5	16.1	0.9
LOS	F	F		E	E		B	E		E	B	A
Approach Delay		92.2			74.1			69.9			22.3	
Approach LOS		F			E			E			C	
90th %ile Green (s)	23.0	23.0		6.0	6.0		6.9	48.0		15.0	56.1	
90th %ile Term Code	Max	Max		Max	Max		Gap	Max		Max	Hold	
70th %ile Green (s)	23.0	23.0		6.0	6.0		6.3	48.0		15.0	56.7	
70th %ile Term Code	Max	Max		Max	Max		Gap	Max		Max	Hold	
50th %ile Green (s)	23.0	23.0		6.0	6.0		0.0	48.0		15.0	70.0	
50th %ile Term Code	Max	Max		Max	Max		Skip	Max		Max	Hold	
30th %ile Green (s)	23.0	23.0		6.0	6.0		0.0	48.0		15.0	70.0	
30th %ile Term Code	Max	Max		Max	Max		Skip	Max		Max	Hold	
10th %ile Green (s)	23.0	23.0		6.0	6.0		0.0	48.0		11.2	66.2	
10th %ile Term Code	Max	Max		Max	Max		Skip	Max		Gap	Hold	
Queue Length 50th (ft)	~267	267		30	53		5	~657		137	148	0
Queue Length 95th (ft)	#469	#471		69	#200		14	#798		#284	257	19
Internal Link Dist (ft)		815			550			3534			434	
Turn Bay Length (ft)												
Base Capacity (vph)	344	349		96	202		330	1475		295	1901	1272
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	1.00	0.99		0.44	0.96		0.05	1.05		0.86	0.43	0.20

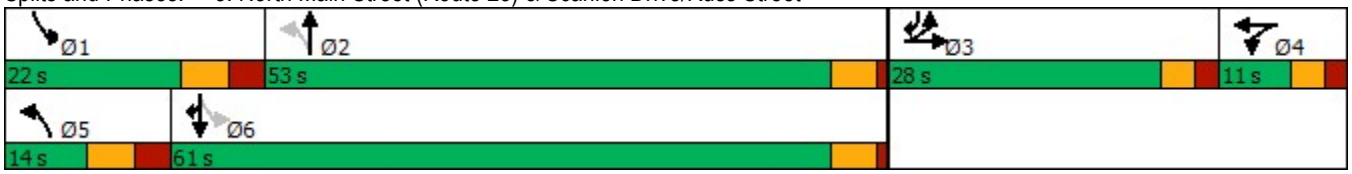
Intersection Summary	
Area Type:	Other

Cycle Length: 114	
Actuated Cycle Length: 113.2	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.05	
Intersection Signal Delay: 57.6	Intersection LOS: E
Intersection Capacity Utilization 99.3%	ICU Level of Service F
Analysis Period (min) 15	
90th %ile Actuated Cycle: 114	
70th %ile Actuated Cycle: 114	
50th %ile Actuated Cycle: 114	
30th %ile Actuated Cycle: 114	
10th %ile Actuated Cycle: 110.2	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: North Main Street (Route 28) & Scanlon Drive/Russ Street

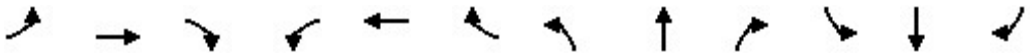


Lanes, Volumes, Timings
8: North Main Street (Route 28) & Scanlon Drive/Russ Street

Bui

PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	292	40	27	64	49	246	18	666	49	195	1239	510
Future Volume (vph)	292	40	27	64	49	246	18	666	49	195	1239	510
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor		1.00						1.00				
Frt		0.977			0.875			0.990				0.850
Flt Protected	0.950	0.970		0.950			0.950			0.950		
Satd. Flow (prot)	1618	1644	0	1805	1662	0	1805	3471	0	1805	3471	1524
Flt Permitted	0.950	0.970		0.950			0.132			0.159		
Satd. Flow (perm)	1618	1644	0	1805	1662	0	251	3471	0	302	3471	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			206			7				554
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		847			630			3614			514	
Travel Time (s)		19.3			14.3			82.1			11.7	
Confl. Peds. (#/hr)			6						1			5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	6%	0%	0%	0%	0%	0%	0%	3%	0%	0%	4%	6%
Adj. Flow (vph)	317	43	29	70	53	267	20	724	53	212	1347	554
Shared Lane Traffic (%)	38%											
Lane Group Flow (vph)	197	192	0	70	320	0	20	777	0	212	1347	554
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	pt+ov
Protected Phases	3	3		4	4		5	2		1	6	6 3
Permitted Phases							2			6		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	3	3		4	4		5	2		1	6	6 3
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	12.0		6.0	12.0	
Minimum Split (s)	25.0	25.0		11.0	11.0		13.0	20.0		13.0	24.0	
Total Split (s)	28.0	28.0		20.0	20.0		13.0	33.0		22.0	42.0	
Total Split (%)	27.2%	27.2%		19.4%	19.4%		12.6%	32.0%		21.4%	40.8%	
Maximum Green (s)	23.0	23.0		15.0	15.0		6.0	28.0		15.0	37.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		3.0	1.0		3.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		7.0	5.0		7.0	5.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	2.0		3.0	2.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0						7.0			7.0	
Flash Dont Walk (s)	13.0	13.0						8.0			12.0	
Pedestrian Calls (#/hr)	6	6						1			5	
Act Effct Green (s)	18.1	18.1		11.5	11.5		29.6	25.5		42.3	39.9	63.1
Actuated g/C Ratio	0.20	0.20		0.13	0.13		0.33	0.29		0.47	0.45	0.71
v/c Ratio	0.60	0.57		0.30	0.81		0.11	0.78		0.62	0.87	0.45
Control Delay	42.2	39.2		41.6	32.6		17.2	37.4		24.5	33.3	1.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	42.2	39.2		41.6	32.6		17.2	37.4		24.5	33.3	1.9
LOS	D	D		D	C		B	D		C	C	A
Approach Delay		40.7			34.2			36.9			24.2	
Approach LOS		D			C			D			C	
90th %ile Green (s)	23.0	23.0		15.0	15.0		6.0	28.0		15.0	37.0	
90th %ile Term Code	Max	Max		Max	Max		Max	Max		Max	Max	
70th %ile Green (s)	23.0	23.0		15.0	15.0		6.0	28.0		15.0	37.0	
70th %ile Term Code	Max	Max		Max	Max		Max	Max		Max	Max	
50th %ile Green (s)	20.4	20.4		13.5	13.5		0.0	26.4		12.3	45.7	
50th %ile Term Code	Gap	Gap		Gap	Gap		Skip	Gap		Gap	Hold	
30th %ile Green (s)	15.8	15.8		9.4	9.4		0.0	21.2		9.9	38.1	
30th %ile Term Code	Gap	Gap		Gap	Gap		Skip	Gap		Gap	Hold	
10th %ile Green (s)	10.1	10.1		6.1	6.1		0.0	22.5		7.5	37.0	
10th %ile Term Code	Gap	Gap		Gap	Gap		Skip	Hold		Gap	Max	
Queue Length 50th (ft)	111	103		38	64		6	225		75	345	0
Queue Length 95th (ft)	198	188		84	#200		20	324		136	#659	37
Internal Link Dist (ft)		767			550			3534			434	
Turn Bay Length (ft)												
Base Capacity (vph)	427	440		310	456		190	1120		401	1548	1298
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	0.46	0.44		0.23	0.70		0.11	0.69		0.53	0.87	0.43

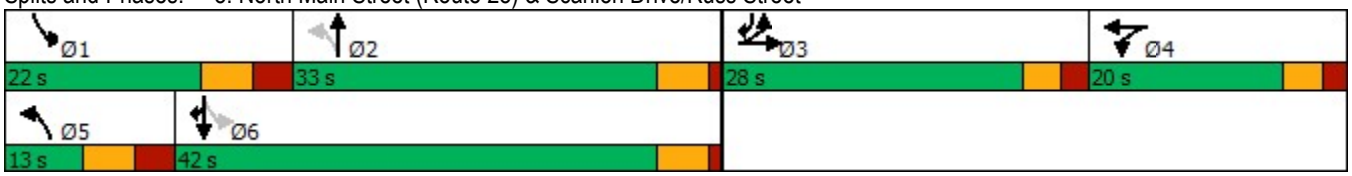
Intersection Summary

Area Type: Other

Cycle Length: 103	
Actuated Cycle Length: 89.4	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.87	
Intersection Signal Delay: 29.7	Intersection LOS: C
Intersection Capacity Utilization 86.5%	ICU Level of Service E
Analysis Period (min) 15	
90th %ile Actuated Cycle: 103	
70th %ile Actuated Cycle: 103	
50th %ile Actuated Cycle: 94.6	
30th %ile Actuated Cycle: 78.3	
10th %ile Actuated Cycle: 68.2	

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: North Main Street (Route 28) & Scanlon Drive/Russ Street



Lanes, Volumes, Timings
8: North Main Street (Route 28) & Scanlon Drive/Russ Street

Existin

PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	248	35	24	59	44	229	16	621	45	181	1155	453
Future Volume (vph)	248	35	24	59	44	229	16	621	45	181	1155	453
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor		1.00						1.00				
Frt		0.977			0.874			0.990				0.850
Flt Protected	0.950	0.970		0.950			0.950			0.950		
Satd. Flow (prot)	1698	1695	0	1805	1661	0	1805	3471	0	1805	3471	1568
Flt Permitted	0.950	0.970		0.950			0.138			0.193		
Satd. Flow (perm)	1698	1695	0	1805	1661	0	262	3471	0	367	3471	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			211			7				487
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		847			630			3614			514	
Travel Time (s)		19.3			14.3			82.1			11.7	
Confl. Peds. (#/hr)			6						1			5
Peak Hour Factor	0.95	0.95	0.95	0.82	0.82	0.82	0.94	0.94	0.94	0.93	0.93	0.93
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	3%	0%	0%	4%	3%
Adj. Flow (vph)	261	37	25	72	54	279	17	661	48	195	1242	487
Shared Lane Traffic (%)	38%											
Lane Group Flow (vph)	162	161	0	72	333	0	17	709	0	195	1242	487
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	pt+ov
Protected Phases	3	3		4	4		5	2		1	6	6 3
Permitted Phases							2			6		

Lanes, Volumes, Timings
8: North Main Street (Route 28) & Scanlon Drive/Russ Street

Existin

PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	3	3		4	4		5	2		1	6	6 3
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	12.0		6.0	12.0	
Minimum Split (s)	25.0	25.0		11.0	11.0		13.0	20.0		13.0	24.0	
Total Split (s)	28.0	28.0		20.0	20.0		13.0	33.0		22.0	42.0	
Total Split (%)	27.2%	27.2%		19.4%	19.4%		12.6%	32.0%		21.4%	40.8%	
Maximum Green (s)	23.0	23.0		15.0	15.0		6.0	28.0		15.0	37.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		3.0	1.0		3.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		7.0	5.0		7.0	5.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	2.0		3.0	2.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0						7.0			7.0	
Flash Dont Walk (s)	13.0	13.0						8.0			12.0	
Pedestrian Calls (#/hr)	6	6						1			5	
Act Effct Green (s)	15.6	15.6		11.7	11.7		28.1	24.0		40.3	38.0	58.8
Actuated g/C Ratio	0.18	0.18		0.14	0.14		0.33	0.28		0.47	0.45	0.69
v/c Ratio	0.52	0.51		0.29	0.81		0.09	0.72		0.54	0.80	0.39
Control Delay	39.5	37.3		39.8	31.8		16.4	33.7		20.7	28.8	1.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	39.5	37.3		39.8	31.8		16.4	33.7		20.7	28.8	1.8
LOS	D	D		D	C		B	C		C	C	A
Approach Delay		38.4			33.2			33.3			21.1	
Approach LOS		D			C			C			C	
90th %ile Green (s)	23.0	23.0		15.0	15.0		6.0	28.0		15.0	37.0	
90th %ile Term Code	Max	Max		Max	Max		Max	Max		Max	Max	
70th %ile Green (s)	20.6	20.6		15.0	15.0		6.0	29.6		13.4	37.0	
70th %ile Term Code	Gap	Gap		Max	Max		Max	Hold		Gap	Max	
50th %ile Green (s)	16.5	16.5		13.6	13.6		0.0	22.9		11.4	41.3	
50th %ile Term Code	Gap	Gap		Gap	Gap		Skip	Gap		Gap	Hold	
30th %ile Green (s)	12.7	12.7		9.7	9.7		0.0	20.7		9.3	37.0	
30th %ile Term Code	Gap	Gap		Gap	Gap		Skip	Hold		Gap	Max	
10th %ile Green (s)	7.9	7.9		6.3	6.3		0.0	18.4		7.1	32.5	
10th %ile Term Code	Gap	Gap		Gap	Gap		Skip	Hold		Gap	Gap	
Queue Length 50th (ft)	83	78		35	61		5	185		63	276	0
Queue Length 95th (ft)	164	157		78	146		18	291		121	#582	36
Internal Link Dist (ft)		767			550			3534			434	
Turn Bay Length (ft)												
Base Capacity (vph)	475	480		329	475		199	1198		436	1598	1335
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	0.34	0.34		0.22	0.70		0.09	0.59		0.45	0.78	0.36

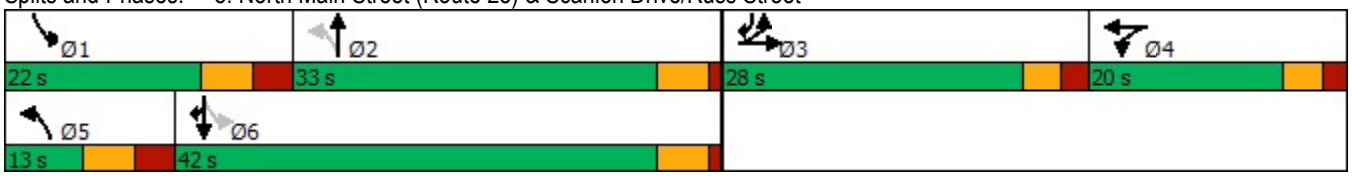
Intersection Summary

Area Type: Other

Cycle Length: 103	
Actuated Cycle Length: 85.2	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 26.9	Intersection LOS: C
Intersection Capacity Utilization 81.7%	ICU Level of Service D
Analysis Period (min) 15	
90th %ile Actuated Cycle: 103	
70th %ile Actuated Cycle: 100.6	
50th %ile Actuated Cycle: 86.4	
30th %ile Actuated Cycle: 74.4	
10th %ile Actuated Cycle: 61.7	

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 8: North Main Street (Route 28) & Scanlon Drive/Russ Street



Lanes, Volumes, Timings
8: North Main Street (Route 28) & Scanlon Drive/Russ Street

No Bui

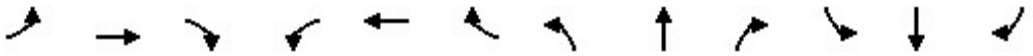
PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	266	38	26	64	48	246	18	666	49	195	1239	486
Future Volume (vph)	266	38	26	64	48	246	18	666	49	195	1239	486
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor		1.00						1.00				
Frt		0.977			0.874			0.990				0.850
Flt Protected	0.950	0.970		0.950			0.950			0.950		
Satd. Flow (prot)	1698	1695	0	1805	1661	0	1805	3471	0	1805	3471	1568
Flt Permitted	0.950	0.970		0.950			0.133			0.163		
Satd. Flow (perm)	1698	1695	0	1805	1661	0	253	3471	0	310	3471	1568
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			210			7				528
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		847			630			3614			514	
Travel Time (s)		19.3			14.3			82.1			11.7	
Confl. Peds. (#/hr)			6						1			5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	3%	0%	0%	4%	3%
Adj. Flow (vph)	289	41	28	70	52	267	20	724	53	212	1347	528
Shared Lane Traffic (%)	38%											
Lane Group Flow (vph)	179	179	0	70	319	0	20	777	0	212	1347	528
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	pt+ov
Protected Phases	3	3		4	4		5	2		1	6	6 3
Permitted Phases							2			6		

Lanes, Volumes, Timings
8: North Main Street (Route 28) & Scanlon Drive/Russ Street

No Bui

PM Peak



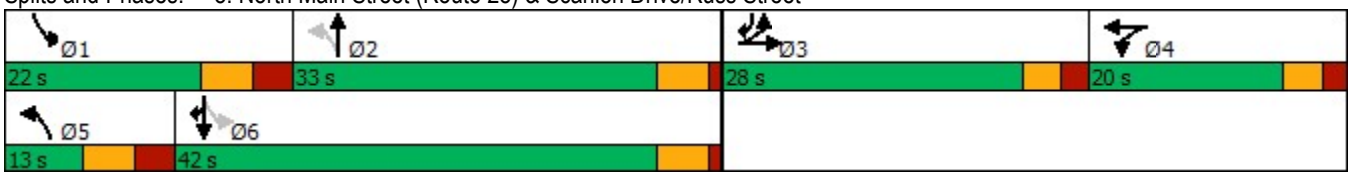
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	3	3		4	4		5	2		1	6	6 3
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		6.0	12.0		6.0	12.0	
Minimum Split (s)	25.0	25.0		11.0	11.0		13.0	20.0		13.0	24.0	
Total Split (s)	28.0	28.0		20.0	20.0		13.0	33.0		22.0	42.0	
Total Split (%)	27.2%	27.2%		19.4%	19.4%		12.6%	32.0%		21.4%	40.8%	
Maximum Green (s)	23.0	23.0		15.0	15.0		6.0	28.0		15.0	37.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		3.0	1.0		3.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0		7.0	5.0		7.0	5.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	2.0		3.0	2.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0						7.0			7.0	
Flash Dont Walk (s)	13.0	13.0						8.0			12.0	
Pedestrian Calls (#/hr)	6	6						1			5	
Act Effct Green (s)	16.9	16.9		11.3	11.3		29.3	25.1		41.9	39.6	61.6
Actuated g/C Ratio	0.19	0.19		0.13	0.13		0.33	0.29		0.48	0.45	0.70
v/c Ratio	0.55	0.54		0.30	0.81		0.10	0.78		0.61	0.86	0.42
Control Delay	40.1	38.1		41.0	30.9		16.9	36.4		23.3	32.0	1.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	40.1	38.1		41.0	30.9		16.9	36.4		23.3	32.0	1.8
LOS	D	D		D	C		B	D		C	C	A
Approach Delay		39.1			32.7			36.0			23.5	
Approach LOS		D			C			D			C	
90th %ile Green (s)	23.0	23.0		15.0	15.0		6.0	28.0		15.0	37.0	
90th %ile Term Code	Max	Max		Max	Max		Max	Max		Max	Max	
70th %ile Green (s)	22.8	22.8		15.0	15.0		6.0	28.0		15.0	37.0	
70th %ile Term Code	Gap	Gap		Max	Max		Max	Max		Max	Max	
50th %ile Green (s)	17.7	17.7		12.9	12.9		0.0	25.5		11.9	44.4	
50th %ile Term Code	Gap	Gap		Gap	Gap		Skip	Gap		Gap	Hold	
30th %ile Green (s)	13.6	13.6		9.0	9.0		0.0	20.5		9.7	37.2	
30th %ile Term Code	Gap	Gap		Gap	Gap		Skip	Gap		Gap	Hold	
10th %ile Green (s)	9.4	9.4		6.0	6.0		0.0	22.5		7.5	37.0	
10th %ile Term Code	Gap	Gap		Min	Min		Skip	Hold		Gap	Max	
Queue Length 50th (ft)	96	92		36	58		6	212		69	319	0
Queue Length 95th (ft)	180	174		84	#193		20	324		134	#659	36
Internal Link Dist (ft)		767			550			3534			434	
Turn Bay Length (ft)												
Base Capacity (vph)	458	463		317	465		194	1146		411	1568	1339
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	0.39	0.39		0.22	0.69		0.10	0.68		0.52	0.86	0.39

Intersection Summary

Area Type: Other

Cycle Length: 103	
Actuated Cycle Length: 87.6	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 28.7	Intersection LOS: C
Intersection Capacity Utilization 85.8%	ICU Level of Service E
Analysis Period (min) 15	
90th %ile Actuated Cycle: 103	
70th %ile Actuated Cycle: 102.8	
50th %ile Actuated Cycle: 90	
30th %ile Actuated Cycle: 74.8	
10th %ile Actuated Cycle: 67.4	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 8: North Main Street (Route 28) & Scanlon Drive/Russ Street



Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	↱	
Traffic Vol, veh/h	658	0	0	307	0	15
Future Vol, veh/h	658	0	0	307	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	5	0	100
Mvmt Flow	715	0	0	334	0	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	1049	715
Stage 1	-	-	-	-	715	-
Stage 2	-	-	-	-	334	-
Critical Hdwy	-	-	-	-	6.4	7.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	-	-	3.5	4.2
Pot Cap-1 Maneuver	-	0	0	-	254	302
Stage 1	-	0	0	-	488	-
Stage 2	-	0	0	-	730	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	254	302
Mov Cap-2 Maneuver	-	-	-	-	254	-
Stage 1	-	-	-	-	488	-
Stage 2	-	-	-	-	730	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	17.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	302	-	-
HCM Lane V/C Ratio	0.054	-	-
HCM Control Delay (s)	17.6	-	-
HCM Lane LOS	C	-	-
HCM 95th %tile Q(veh)	0.2	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	658	0	15	292	0	0
Future Vol, veh/h	658	0	15	292	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	100	0	0	0
Mvmt Flow	715	0	16	317	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	715	0	1064	715
Stage 1	-	-	-	-	715	-
Stage 2	-	-	-	-	349	-
Critical Hdwy	-	-	5.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	3.1	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	565	-	249	434
Stage 1	-	-	-	-	488	-
Stage 2	-	-	-	-	719	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	565	-	241	434
Mov Cap-2 Maneuver	-	-	-	-	241	-
Stage 1	-	-	-	-	488	-
Stage 2	-	-	-	-	695	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	565	-
HCM Lane V/C Ratio	-	-	-	0.029	-
HCM Control Delay (s)	0	-	-	11.6	0
HCM Lane LOS	A	-	-	B	A
HCM 95th %tile Q(veh)	-	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	648	25	10	302	5	10
Future Vol, veh/h	648	25	10	302	5	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	0	0	5	0	0
Mvmt Flow	704	27	11	328	5	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	731	0	1068	718
Stage 1	-	-	-	-	718	-
Stage 2	-	-	-	-	350	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	883	-	248	432
Stage 1	-	-	-	-	487	-
Stage 2	-	-	-	-	718	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	883	-	244	432
Mov Cap-2 Maneuver	-	-	-	-	244	-
Stage 1	-	-	-	-	487	-
Stage 2	-	-	-	-	707	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	16
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	344	-	-	883	-
HCM Lane V/C Ratio	0.047	-	-	0.012	-
HCM Control Delay (s)	16	-	-	9.1	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	335	0	15	573	0	0
Future Vol, veh/h	335	0	15	573	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	100	0	0	0
Mvmt Flow	364	0	16	623	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	364	0	1019	364
Stage 1	-	-	-	-	364	-
Stage 2	-	-	-	-	655	-
Critical Hdwy	-	-	5.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	3.1	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	808	-	265	685
Stage 1	-	-	-	-	707	-
Stage 2	-	-	-	-	521	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	808	-	257	685
Mov Cap-2 Maneuver	-	-	-	-	257	-
Stage 1	-	-	-	-	707	-
Stage 2	-	-	-	-	505	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	808	-
HCM Lane V/C Ratio	-	-	-	0.02	-
HCM Control Delay (s)	0	-	-	9.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	0.1	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑	↱	
Traffic Vol, veh/h	335	0	0	588	0	15
Future Vol, veh/h	335	0	0	588	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	3	0	100
Mvmt Flow	364	0	0	639	0	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	1003	364
Stage 1	-	-	-	-	364	-
Stage 2	-	-	-	-	639	-
Critical Hdwy	-	-	-	-	6.4	7.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	-	-	3.5	4.2
Pot Cap-1 Maneuver	-	0	0	-	271	508
Stage 1	-	0	0	-	707	-
Stage 2	-	0	0	-	530	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	271	508
Mov Cap-2 Maneuver	-	-	-	-	271	-
Stage 1	-	-	-	-	707	-
Stage 2	-	-	-	-	530	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	508	-	-
HCM Lane V/C Ratio	0.032	-	-
HCM Control Delay (s)	12.3	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-

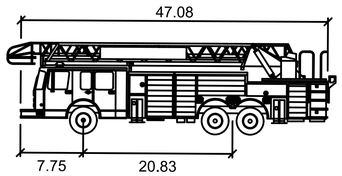
Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	345	5	10	567	21	14
Future Vol, veh/h	345	5	10	567	21	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	4	0	0	3	0	0
Mvmt Flow	375	5	11	616	23	15

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	380	0	1016	378
Stage 1	-	-	-	-	378	-
Stage 2	-	-	-	-	638	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1190	-	266	673
Stage 1	-	-	-	-	697	-
Stage 2	-	-	-	-	530	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1190	-	262	673
Mov Cap-2 Maneuver	-	-	-	-	262	-
Stage 1	-	-	-	-	697	-
Stage 2	-	-	-	-	523	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	16.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	347	-	-	1190	-
HCM Lane V/C Ratio	0.11	-	-	0.009	-
HCM Control Delay (s)	16.6	-	-	8.1	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0	-



RANDOLPH FIRE TRUCK

	feet
Width	: 8.33
Track	: 8.53
Lock to Lock Time	: 6.0
Steering Angle	: 32.6

PROPOSED YANKEE BUS HEADQUARTERS FFE=146

RANDOLPH FIRE TRUCK

HIGH STREET
1938 COUNTY LAYOUT
(PUBLIC - 66' WIDE)

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RANDOLPH FIRE TRUCK EXHIBIT 1

JOB # 53000.00	EX-FT1
DATE: 04.14.23	
SCALE: 1"=30'	
DRAWN BY: ???	
APPROVED BY: ???	

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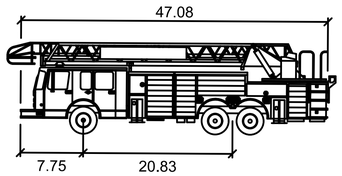

RANDOLPH FIRE TRUCK

	feet
Width	: 8.33
Track	: 8.53
Lock to Lock Time	: 6.0
Steering Angle	: 32.6

PROPOSED YANKEE BUS HEADQUARTERS FFE=146

RANDOLPH FIRE TRUCK

RANDOLPH FIRE TRUCK

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RANDOLPH FIRE TRUCK EXHIBIT 2

JOB # 53000.00	EX-FT2
DATE: 04.14.23	
SCALE: 1"=30'	
DRAWN BY: ???	
APPROVED BY: ???	

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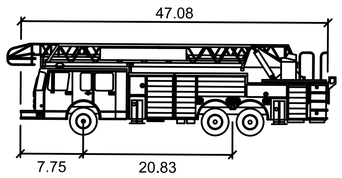

RANDOLPH FIRE TRUCK

	feet
Width	: 8.33
Track	: 8.53
Lock to Lock Time	: 6.0
Steering Angle	: 32.6

PROPOSED YANKEE BUS HEADQUARTERS FFE=146

RANDOLPH FIRE TRUCK

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RANDOLPH
FIRE TRUCK
EXHIBIT 3

JOB # 53000.00	EX-FT3
DATE: 04.14.23	
SCALE: 1"=30'	
DRAWN BY: ???	
APPROVED BY: ???	

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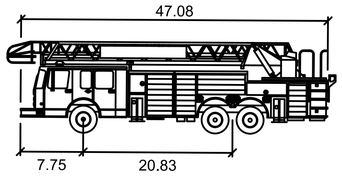

RANDOLPH FIRE TRUCK

	feet
Width	: 8.33
Track	: 8.53
Lock to Lock Time	: 6.0
Steering Angle	: 32.6

PROPOSED YANKEE BUS HEADQUARTERS FFE=146

RANDOLPH FIRE TRUCK

HIGH STREET
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RANDOLPH
FIRE TRUCK
EXHIBIT 4

JOB # 53000.00	EX-FT4
DATE: 04.14.23	
SCALE: 1"=30'	
DRAWN BY: ???	
APPROVED BY: ???	

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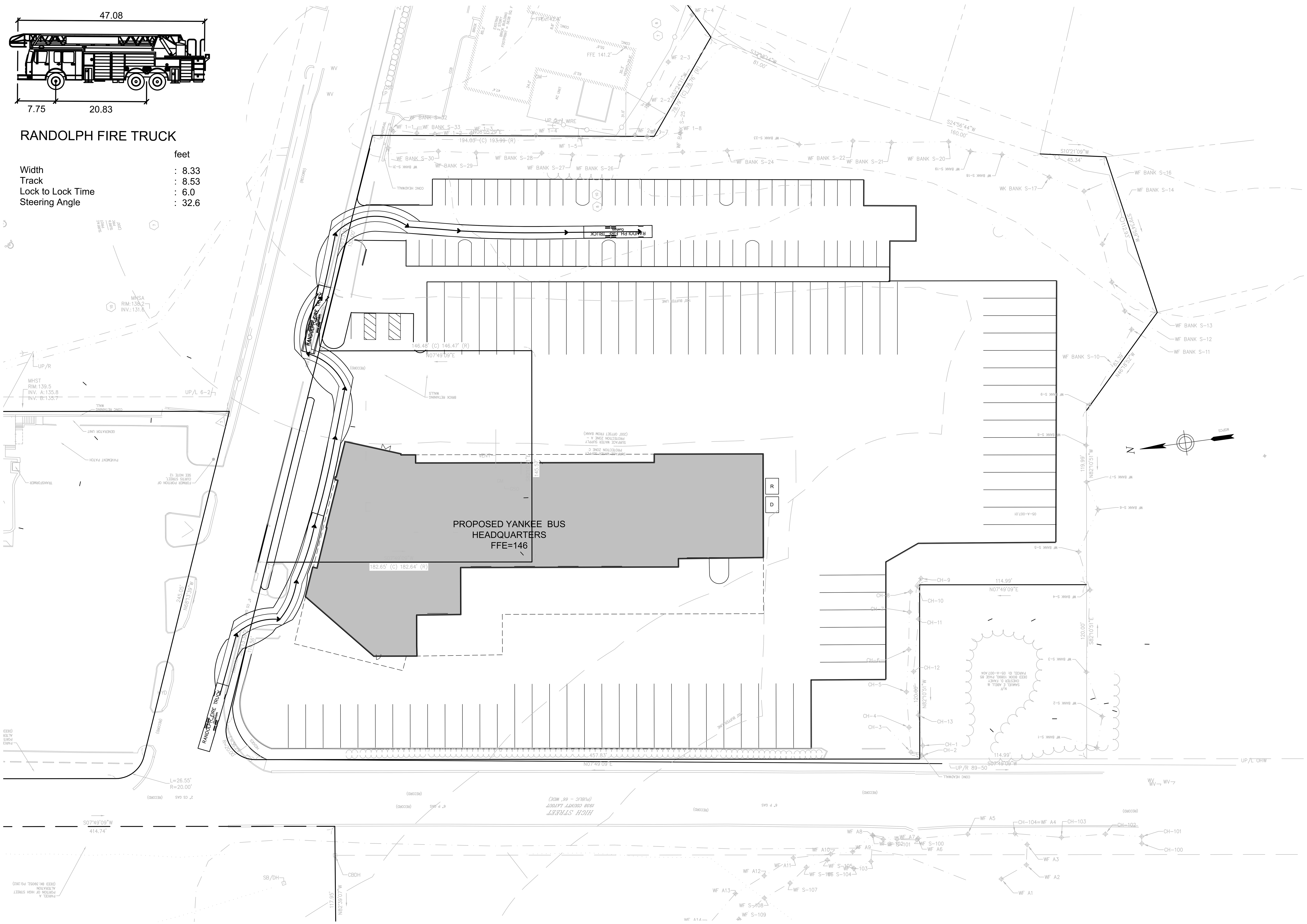

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RANDOLPH FIRE TRUCK EXHIBIT 5

JOB # 53000.00
DATE: 04.14.23
SCALE: 1"=30'
DRAWN BY: ???
APPROVED BY: ???

EX-FT5

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Yankee Line Bus HQ

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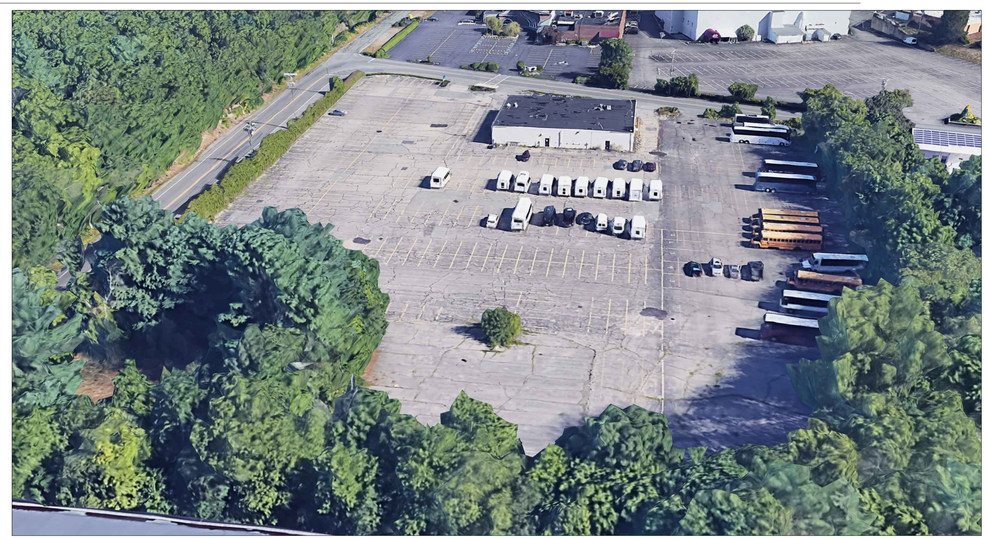
DRAWING INDEX



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N

Project Number
2221

Project Title
Yankee Bus Line HQ

34 Scanlon Drive
Randolph, MA 02368

Drawing Title
Existing Conditions

Date/Issued For
04.20.23

Planning Board Submission

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Print 24x36

Scale
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Drawing Number
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Project Number
2221

Project Title
Yankee Bus Line HQ

34 Scanlon Drive
Randolph, MA 02368

Drawing Title
Existing Conditions

Date/Issued For
04.20.23

Planning Board Submission

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Print 24x36

Scale
As Noted

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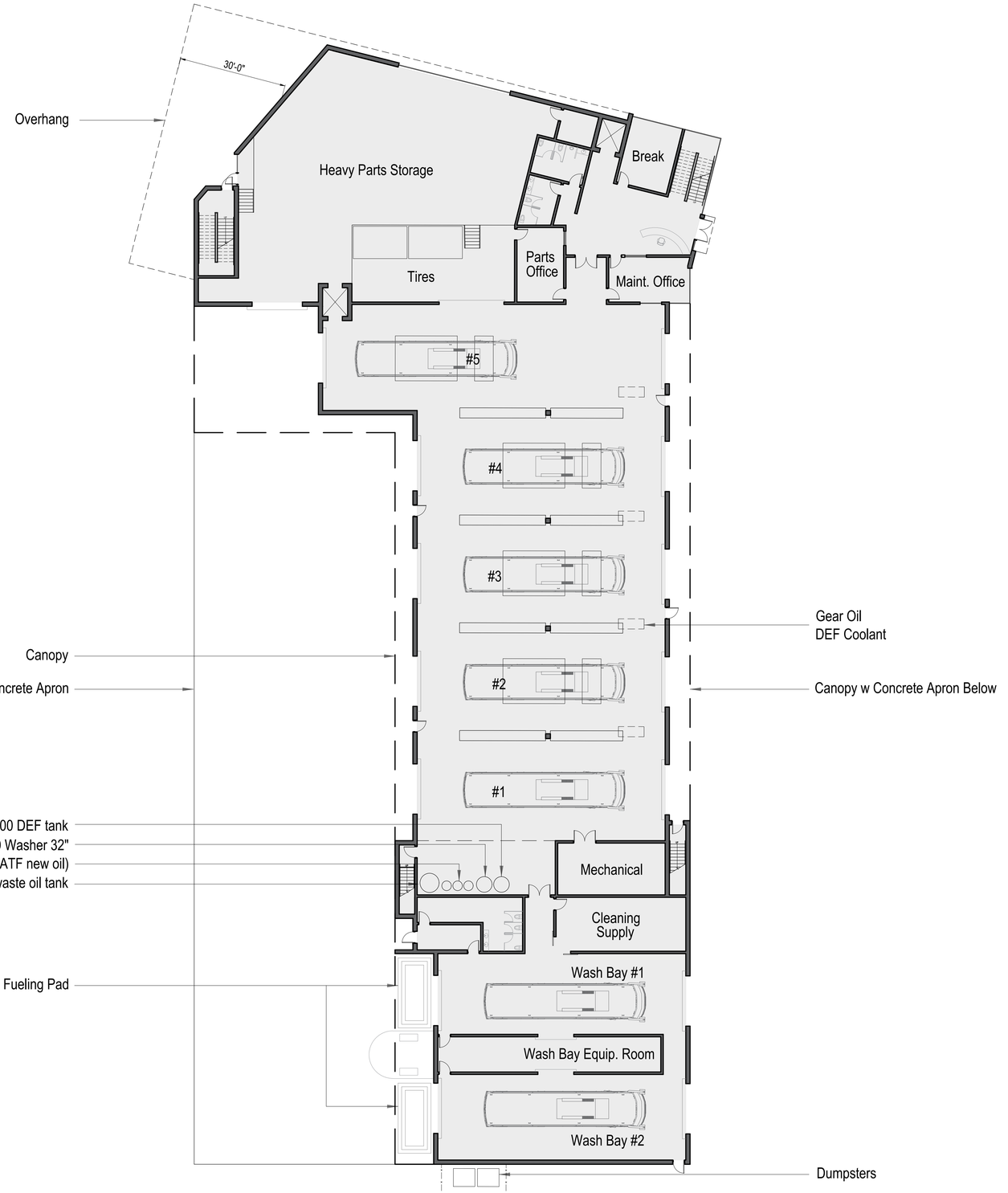
Drawing Number
AS-1



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Project Number
2221

Project Title
Yankee Bus Line HQ

34 Scanlon Drive
Randolph, MA 02368

Drawing Title
Ground Floor

Date/Issued For
04.20.23

Planning Board Application

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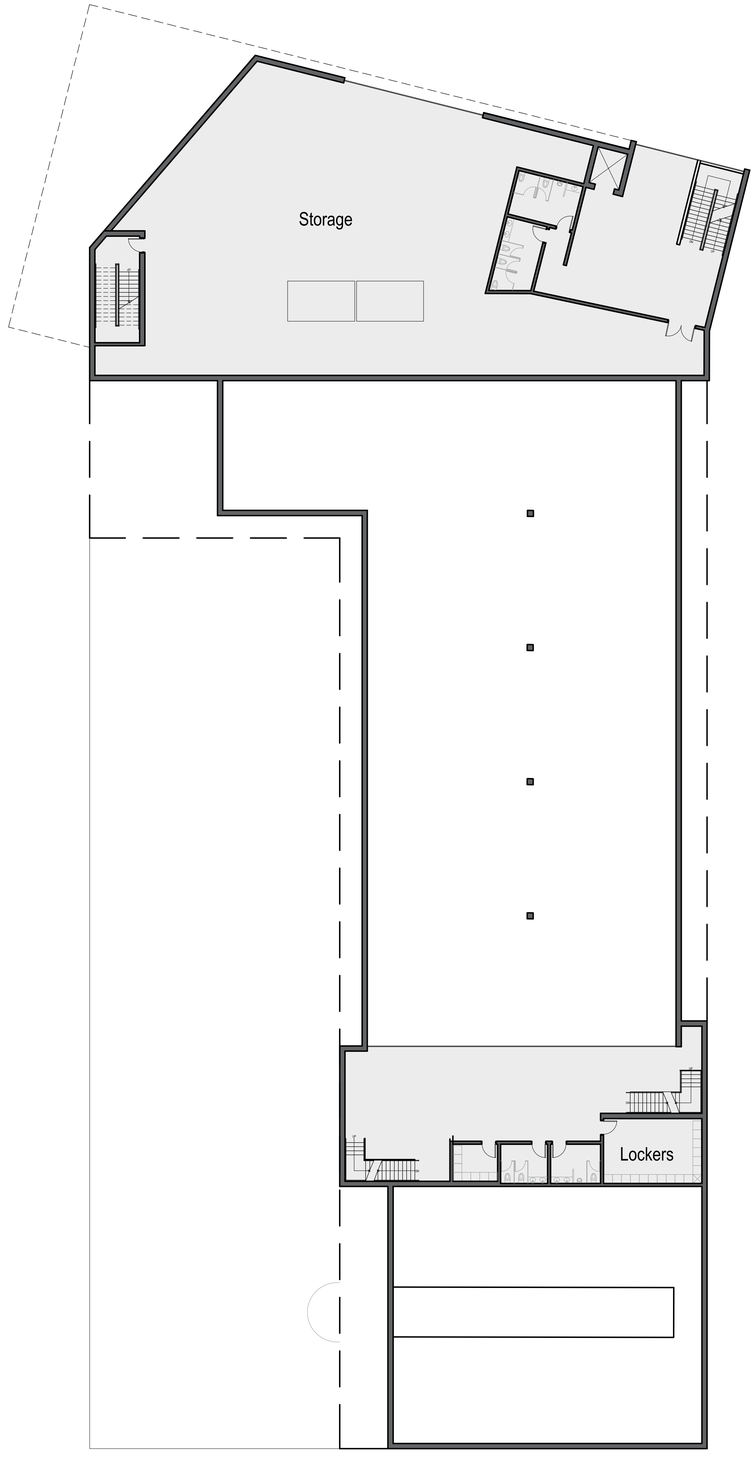
Print 24x36

Scale
1 / 16" = 1"

Drawn By
TGAS

Drawing Number
A-100



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Project Number
2221

Project Title
Yankee Bus Line HQ

34 Scanlon Drive
Randolph, MA 02368

Drawing Title
Second Floor

Date/Issued For
04.20.23

Planning Board Application

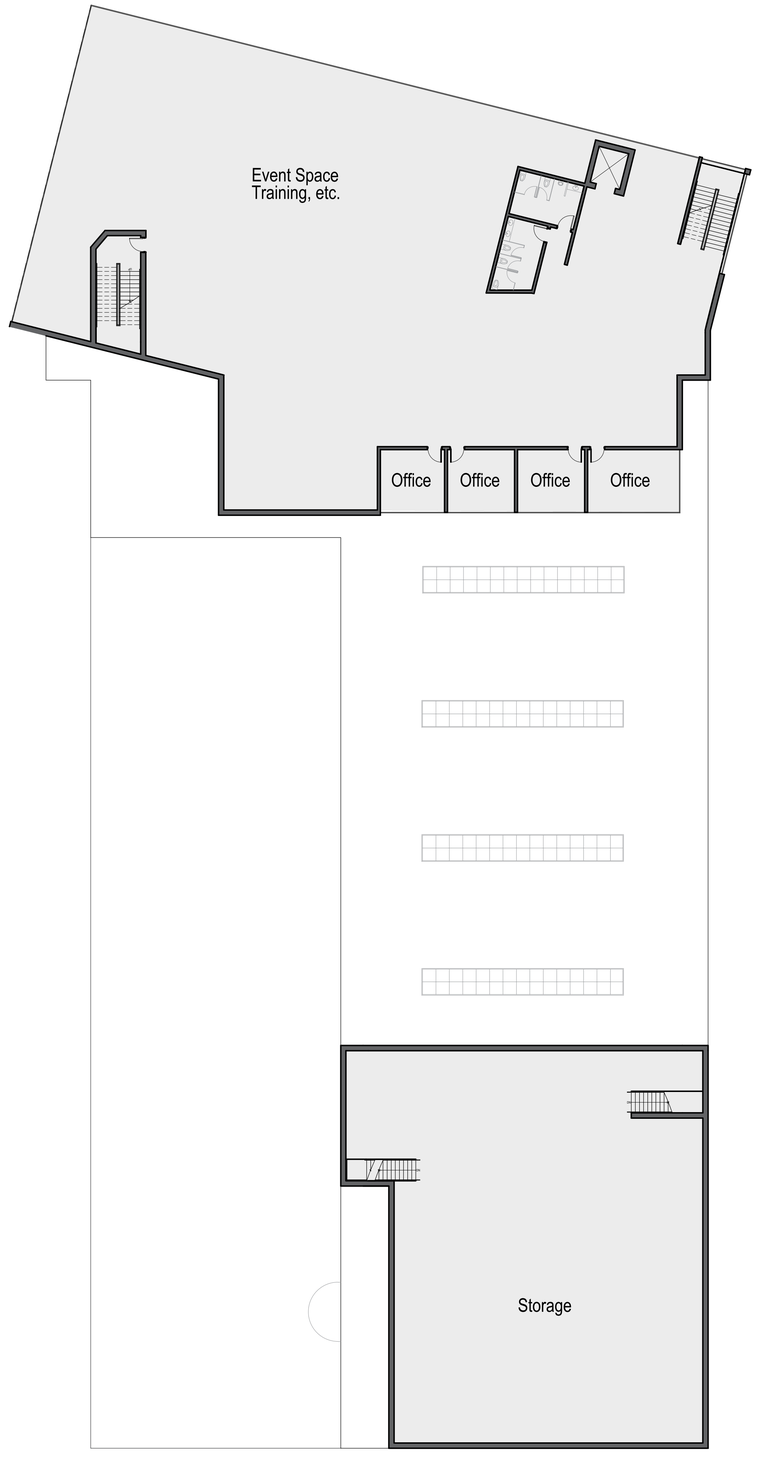
NOT FOR CONSTRUCTION

Print 24x36

Scale
1 / 16" = 1"

Drawn By
TGAS

Drawing Number
A-101



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Project Number
2221

Project Title
Yankee Bus Line HQ

34 Scanlon Drive
Randolph, MA 02368

Drawing Title
Third Floor

Date/Issued For
04.20.23

Planning Board Application

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Print 24x36

Scale
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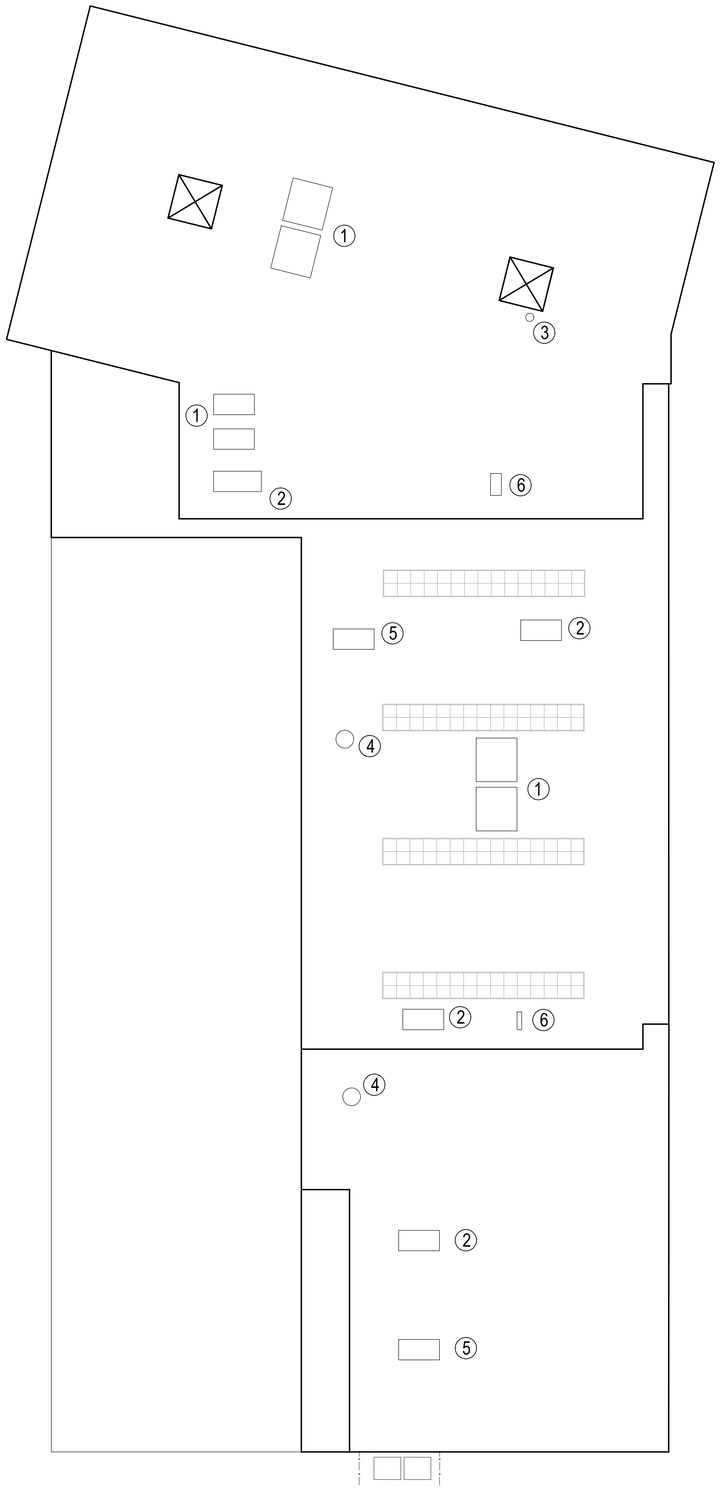
Drawn By
TGAS

Drawing Number
A-102

1. Packaged rooftop heat pumps with supply duct mounted hot water coils
2. Rooftop energy recovery ventilator
3. Restroom exhaust fan
4. Emergency exhaust for vehicle service / wash bays
5. Makeup air with gas furnace heating for vehicle service / wash bays
6. Rooftop variable refrigerant volume (VRF) condensing unit



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N

Project Number
2221

Project Title
Yankee Bus Line HQ

34 Scanlon Drive
Randolph, MA 02368

Drawing Title
Roof Plan

Date/Issued For
04.20.23

Planning Board Application

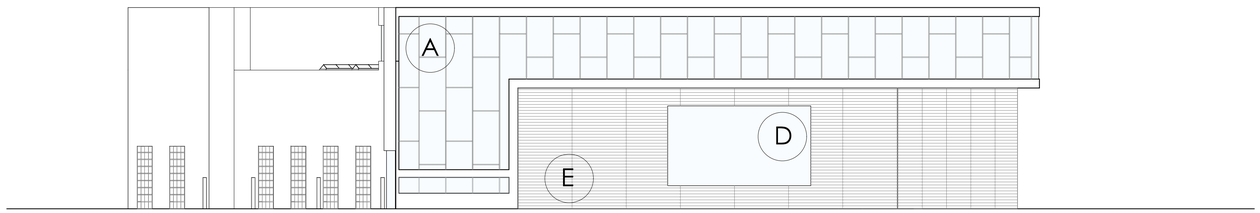
NOT FOR CONSTRUCTION

Print 24x36

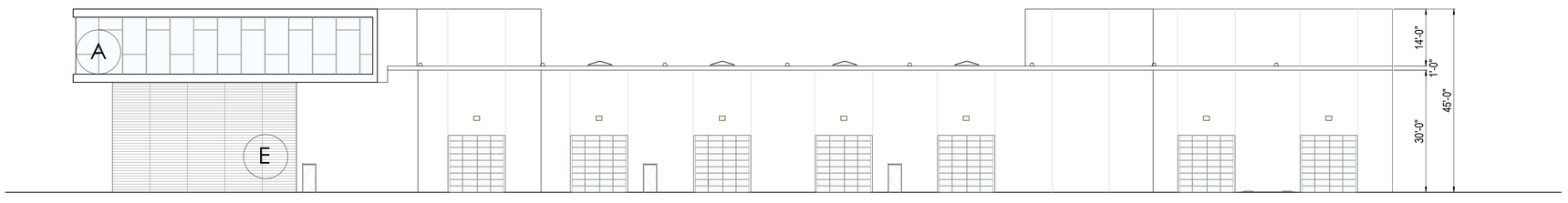
Scale
1 / 16" = 1"

Drawn By
TGAS

Drawing Number
A-103



North Elevations



West Elevations

A Glass curtain wall

B Terra cotta rainscreen

C Wood plank rainscreen

D Glass Bricks

E Metal panel rainscreen

Surface Mounted Lighting Fixture

Recessed Lighting Fixture

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2221

Project Title
Yankee Bus Line HQ

34 Scanlon Drive
Randolph, MA 02368

Drawing Title
North and West Elevations

Date/Issued For
04.20.23

Planning Board Submission

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Print 24x36

Scale
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Drawn By
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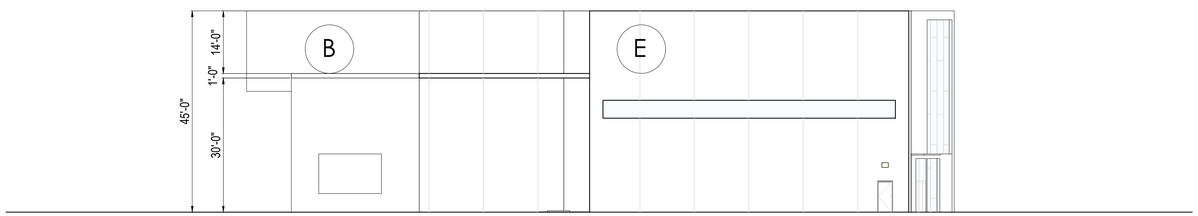
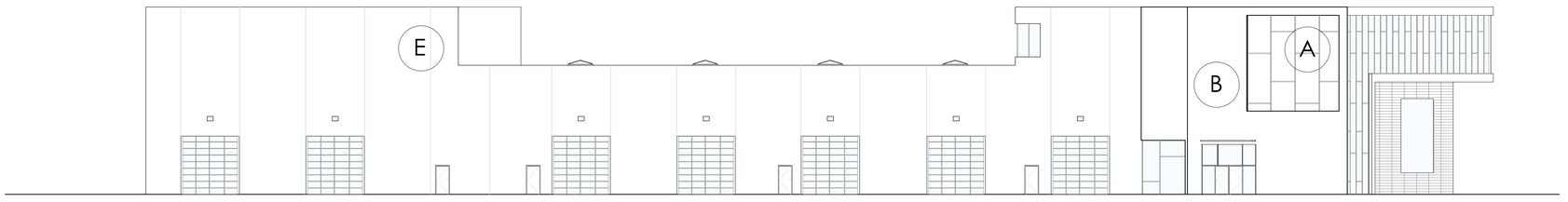


South Elevations



East Elevations

A Glass curtain wall

B Terra cotta rainscreen

C Wood plank rainscreen

D Glass Bricks

E Metal panel rainscreen

Surface Mounted Lighting Fixture

Recessed Lighting Fixture

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Project Number
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Project Title
Yankee Bus Line HQ

34 Scanlon Drive
Randolph, MA 02368

Drawing Title
South and East Elevations

Date/Issued For
04.20.23

Planning Board Submission

NOT FOR CONSTRUCTION

Print 24x36

Scale
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Drawn By
TGAS

Drawing Number
A-202

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Project Title
Yankee Bus Line HQ

34 Scanlon Drive
Randolph, MA 02368

Drawing Title
Rendering

Date/Issued For
04.20.23

Planning Board Submission

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Print 24x36

Scale
As Noted

Drawn By
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Drawing Number
A-104

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Project Title
Yankee Bus Line HQ

34 Scanlon Drive
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Drawing Title
Rendering

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Print 24x36

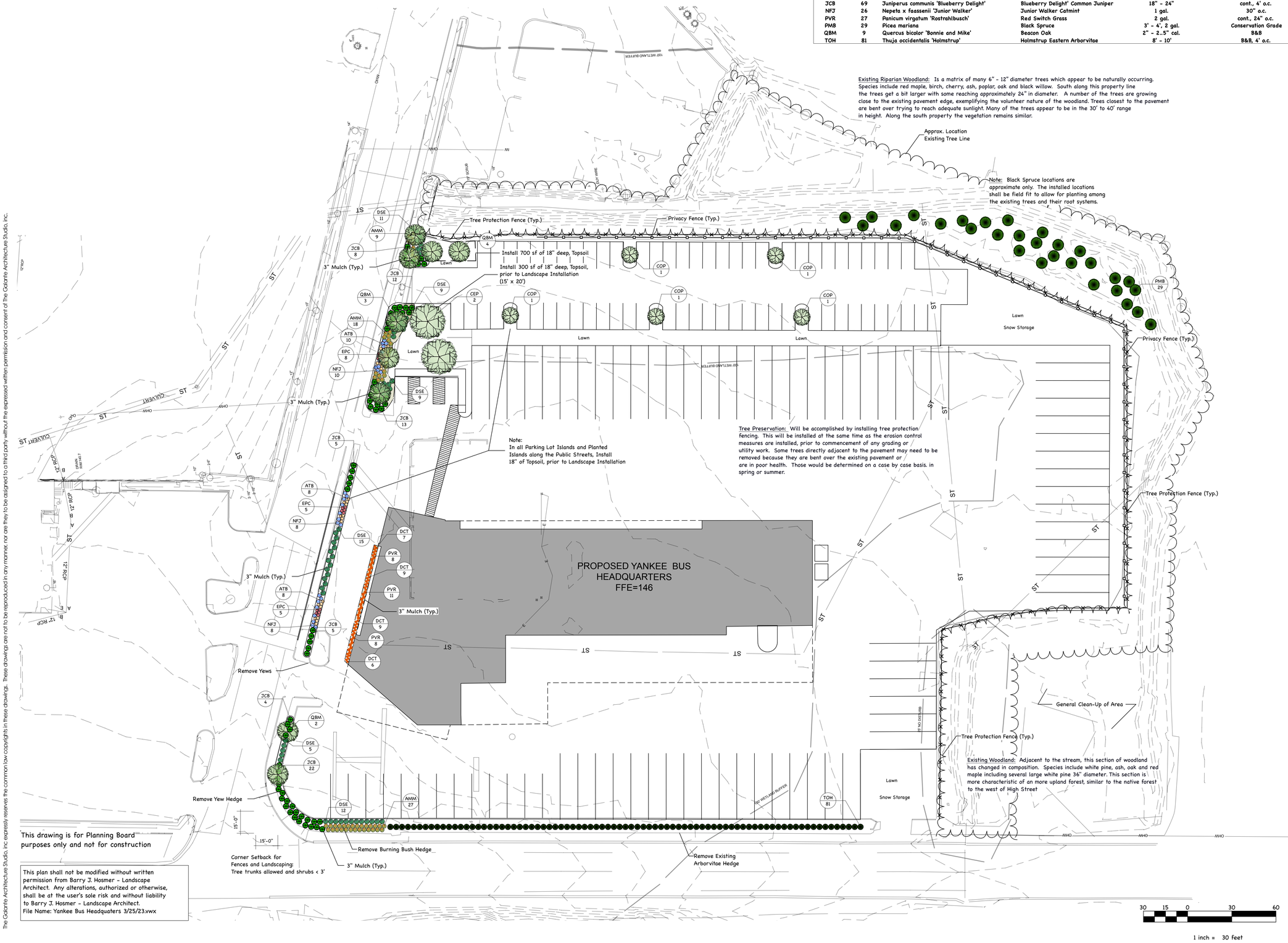
Scale
As Noted

Drawn By
TGAS

Drawing Number
A-105

Plant Species List

ID	Qty	Botanical Name	Common Name	Scheduled Size	Remarks
AMM	54	Aronia melanocarpa 'UCONNAM165'	Low Scape Mound Chokeberry	18" - 24"	cont.,3' o.c.
ATB	26	Asclepias tuberosa	Butterfly Weed	1 gal.	24" o.c.
CEP	2	Catalpa erubescens 'Purpurea'	Purple Leafed Catalpa	2" - 2.5" cal.	B&B
COP	5	Celtis occidentalis 'Prairie Sentinel'	Prairie Sentinel Hackberry	2" - 2.5" cal.	B&B
DCT	31	Deschampsia caespitosa	Tufted Hair Grass	2 gal.	cont., 18" o.c.
DSE	61	Diervilla splendens 'El Madrigal'	Firefly Nightglow Bush Honeysuckle	18" - 24"	cont., 3.5' o.c.
EPC	18	Echinacea purpurea	Purple Coneflower	1 gal.	24" o.c.
JCB	69	Juniperus communis 'Blueberry Delight'	Blueberry Delight' Common Juniper	18" - 24"	cont., 4' o.c.
NFJ	26	Nepeta x faassenii 'Junior Walker'	Junior Walker Catmint	1 gal.	30" o.c.
PVR	27	Panicum virgatum 'Rostrahlbusch'	Red Switch Grass	2 gal.	cont., 24" o.c.
PMB	29	Picea mariana	Black Spruce	3' - 4', 2 gal.	Conservation Grade
QBM	9	Quercus bicolor 'Bonnie and Mike'	Beacon Oak	2" - 2.5" cal.	B&B
TOH	81	Thuja occidentalis 'Holmstrup'	Holmstrup Eastern Arborvitae	8' - 10'	B&B, 4' o.c.



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N

Project Number
2221

Project Title
Yankee Bus Line HQ

34 Scanlon Drive
Randolph, MA 02368

Barry J. Hosmer ASLA
Landscape Architecture Land Planning
196 Whitney Avenue
Portland, Maine 04102
207-874-0248

Drawing Title
LANDSCAPE PLAN

Date/Issued For
04.20.23

Planning Board Submission

NOT FOR CONSTRUCTION

Scale
As Noted

Drawn By
BJH

Drawing Number
L-101

D-Series Size 0
LED Area Luminaire

Catalog Number

Notes

Type

Hit the Tab key or mouse over the page to see all interactive elements.

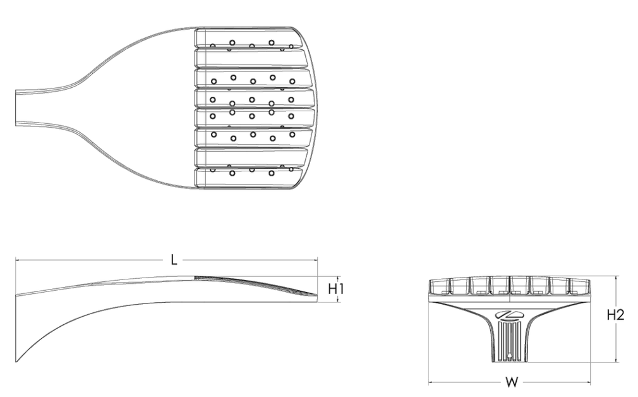
Introduction

The modern styling of the D-Series features a highly refined aesthetic that blends seamlessly with its environment. The D-Series offers the benefits of the latest in LED technology into a high performance, high efficacy, long-life luminaire.

The photometric performance results in sites with excellent uniformity, greater pole spacing and lower power density. D-Series outstanding photometry aids in reducing the number of poles required in area lighting applications, with typical energy savings of 70% and expected service life of over 100,000 hours.

Specifications

EPA:	0.44 ft² (0.04 m²)
Length:	26.18" (66.5 cm)
Width:	14.06" (35.7 cm)
Height H1:	2.26" (5.7 cm)
Height H2:	7.46" (18.9 cm)
Weight:	23 lbs (10.4 kg)



Ordering Information

EXAMPLE: DSX0 LED P6 40K 70CRI T3M MVOLT SPA NLTAIR2 PIRHN DDBXD

DSX0 LED

Series	LEDs	Color temperature[2]	Color Rendering Index[2]	Distribution		Voltage	Mounting
DSX0 LED	**Forward optics** P1 P5 P2 P6 P3 P7 P4 **Rotated optics** P10[1] P12[1] P11[1] P13[1]	(this section 70CRI only) 30K 3000K 40K 4000K 50K 5000K (this section 80CRI only, extended lead times apply) 27K 2700K 30K 3000K 35K 3500K 40K 4000K 50K 5000K	 70CRI 70CRI 70CRI 80CRI 80CRI 80CRI 80CRI 80CRI	AFR Automotive front row T1S Type I short T2M Type II medium T3M Type III medium T3LG Type III low glare[3] T4M Type IV medium T4LG Type IV low glare[3] TFTM Forward throw medium	T5M Type V medium T5LG Type V low glare T5W Type V wide BLC3 Type III backlight control[3] BLC4 Type IV backlight control[3] LCCO Left corner cutoff[3] RCCO Right corner cutoff[3]	MVOLT (120V-277V)[4] HVOLT (347V-480V)[5,6] XVOLT (277V-480V)[7,8]	**Shipped included** SPA Square pole mounting (#8 drilling, 3.5" min. SQ pole) RPA Round pole mounting (#8 drilling, 3" min. RND pole) SPA5 Square pole mounting (#5 drilling, 3" min. SQ pole)[9] RPA5 Round pole mounting (#5 drilling, 3" min. RND pole)[9] SPA8N Square narrow pole mounting (#8 drilling, 3" min. SQ pole) WBA Wall bracket[10] MA Mast arm adapter (mounts on 2 3/8" OD horizontal tenon)

Control options		Other options	Finish *(required)*
Shipped installed NLTAIR2 PIRHN nLight AIR gen 2 enabled with bi-level motion / ambient sensor, 8-40' mounting height, ambient sensor enabled at 2fc.[11,12,18,19] PIR High/low, motion/ambient sensor, 8-40' mounting height, ambient sensor enabled at 2fc[13,18,19] PER NEMA twist-lock receptacle only (controls ordered separate)[14] PER5 Five-pin receptacle only (controls ordered separate)[14,19]	PER7 Seven-pin receptacle only (controls ordered separate)[14,19] FAO Field adjustable output[15,19] BL30 Bi-level switched dimming, 30%[16,19] BL50 Bi-level switched dimming, 50%[16,19] DMG 0-10v dimming wires pulled outside fixture (for use with an external control, ordered separately)[17]	**Shipped installed** HS Houseside shield (black finish standard)[20] L90 Left rotated optics[1] R90 Right rotated optics[1] CCE Coastal Construction[21] HA 50°C ambient operation[22] **Shipped separately** EGSR External Glare Shield (reversible, field install required, matches housing finish) BSDB Bird Spikes (field install required)	DDBXD Dark Bronze DBLXD Black DNAXD Natural Aluminum DWHXD White DDBTXD Textured dark bronze DBLBXD Textured black DNATXD Textured natural aluminum DWHGXD Textured white

Ordering Information

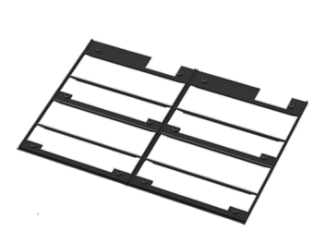
Accessories
Ordered and shipped separately.

DLL127F 1.5 JU	Photocell - SSL twist-lock (120-277V)[23]
DLL347F 1.5 CUL JU	Photocell - SSL twist-lock (347V)[23]
DLL480F 1.5 CUL JU	Photocell - SSL twist-lock (480V)[23]
DSHORT SBK	Shorting cap[23]
DSX0HS P#	House-side shield (enter package number P1-7, P10-13 in place of #)
DSXRPA (FINISH)	Round pole adapter (#8 drilling, specify finish)
DSXRPA5 (FINISH)	Round pole adapter #5 drilling (specify finish)
DSXSPA5 (FINISH)	Square pole adapter #5 drilling (specify finish)
DSX0EGSR (FINISH)	External glare shield (specify finish)
DSX0BSDB (FINISH)	Bird spike deterrent bracket (specify finish)

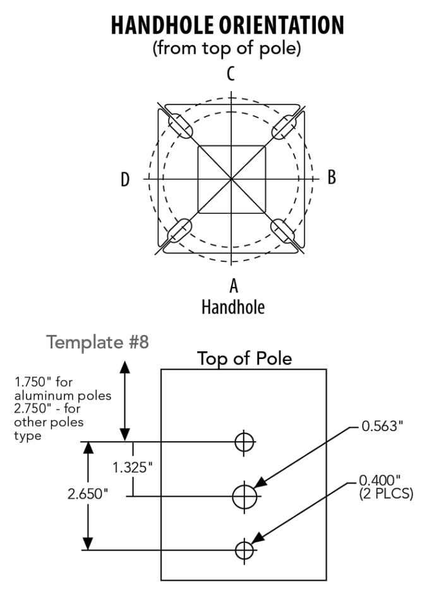
NOTES
1 Rotated optics available with packages P10, P11, P12 and P13. Must be combined with option L90 or R90.
2 30K, 40K, and 50K available in 70CRI and 80CRI. 27K and 35K only available with 80CRI. Contact Technical Support for other possible combinations.
3 T3LG, T4LG, BLC3, BLC4, LCCO, RCCO not available with option HS.
4 MVOLT driver operates on any line voltage from 120-277V (50/60 Hz).
5 HVOLT driver operates on any line voltage from 347-480V (50/60 Hz).
6 HVOLT not available with package P1, P2 and P10 when combined with option NLTAIR2 PIRHN or option PIR.
7 XVOLT operates with any voltage between 277V and 480V (50/60 Hz).
8 XVOLT not available in packages P1, P2 or P10.
9 SPA5 and RPA5 for use with #5 drilling only (Not for use with #8 drilling).
10 WBA cannot be combined with Type 5 distributions plus photocell (PER).
11 NLTAIR2 and PIRHN must be ordered together. For more information on nLight Air 2.
12 NLTAIR2 PIRHN not available with other controls including PIR, PER, PER5, PER7, FAO, BL30, BL50 and DMG. NLTAIR2 PIRHN not available with P1, P2 and P10 using HVOLT. NLTAIR2 PIRHN not available with P1, P2 and P10 using XVOLT.
13 PIR not available with NLTAIR2, PER, PER5, PER7, FAO BL30, BL50 and DMG. PIR not available with P1, P2 and P10 using HVOLT. PIR not available with P1, P2 and P10 using XVOLT.
14 PER/PER5/PER7 not available with NLTAIR2, PIR, BL30, BL50. Photocell ordered and shipped as a separate line item from Acuity Brands Controls. See accessories. Shorting Cap included.
15 FAO not available with other dimming control options NLTAIR2 PIRHN, PIR, PER5, PER7, BL30, BL50, or DMG.
16 BL30 and BL50 are not available with NLTAIR2 PIRHN, PIR, PER, PER5, PER7, FAO and DMG.
17 DMG not available with NLTAIR2 PIRHN, PIR, PER, PER5, PER7, BL30, BL50 and FAO.
18 Reference Motion Sensor Default Settings table on page 4 to see functionality.
19 Reference Controls Options table on page 4.
20 Option HS not available with T3LG, T4LG, BLC3, BLC4, LCCO and RCCO distribution. Also available as a separate accessory; see Accessories information.
21 CCE option not available with option BS and EGS. Contact Technical Support for availability.
22 Option HA not available with performance packages P6, P7, P12 and P13.
23 Requires luminaire to be specified with PER, PER5 or PER7 option. See Controls Table on page 4.

Shield Accessories


External Glare Shield (EGS)


House Side Shield (HS)

Drilling



Tenon Mounting Slipfitter

Tenon O.D.	Mounting	Single Unit	2 @ 180	2 @ 90	3 @ 90	3 @120	4 @ 90
2-3/8"	RPA	AS3-5 190	AS3-5 280	AS3-5 290	AS3-5 390	AS3-5 320	AS3-5 490
2-7/8"	RPA	AST25-190	AST25-280	AST25-290	AST25-390	AST25-320	AST25-490
4"	RPA	AST35-190	AST35-280	AST35-290	AST35-390	AST35-320	AST35-490

Mounting Option	Drilling Template	Single	2 @ 180	2 @ 90	3 @ 90	3 @ 120	4 @ 90
Head Location		Side B	Side B & D	Side B & C	Side B, C & D	Round Pole Only	Side A, B, C & D
Drill Nomenclature	#8	DM19AS	DM28AS	DM29AS	DM39AS	DM32AS	DM49AS
		Minimum Acceptable Outside Pole Dimension					
SPA	#8	3.5"	3.5"	3.5"	3.5"		3.5"
RPA	#8	3"	3"	3"	3"	3"	3"
SPA5	#5	3"	3"	3"	3"		3"
RPA5	#5	3"	3"	3"	3"	3"	3"
SPA8N	#8	3"	3"	3"	3"		3"

DSX0 Area Luminaire - EPA

*Includes luminaire and integral mounting arm. Other tenons, arms, brackets or other accessories are not included in this EPA data.

Fixture Quantity & Mounting Configuration	Single DM19	2 @ 180 DM28	2 @ 90 DM29	3 @ 90 DM39	3 @ 120 DM32	4 @ 90 DM49
Mounting Type						
DSX0 with SPA	0.44	0.88	0.96	1.18	---	1.16
DSX0 with SPA5, SPA8N	0.51	1.02	1.06	1.26	---	1.29
DSX0 with RPA, RPA5	0.51	1.02	1.06	1.26	1.24	1.29
DSX0 with MA	0.64	1.28	1.24	1.67	1.70	1.93

LITHONIA LIGHTING

Catalog Number

Notes

Type

FEATURES & SPECIFICATIONS

INTENDED USE — For walkways, plazas or pedestrian areas. **Certain airborne contaminants can diminish integrity of acrylic.** Click here for Acrylic Environmental Compatibility table for suitable uses.

CONSTRUCTION — Extruded one-piece aluminum, 0.188" wall thickness. Top cover is weldment of 0.188" wall extrusion and 0.250" top plate. 42" overall height standard. Closed-cell EPDM gasketing is included.

Finish: Standard finish is dark bronze (DDB) polyester powder, electrostatically applied and oven-cured. Other colors available as options.

OPTICS — Hydroformed, fluted, anodized, aluminum upper reflector combined with spun aluminum, anodized, flared cone is standard. Cylindrical lower reflectors available. Lens is clear, seamless 100% virgin acrylic, 1/4" wall, flush fitting.

ELECTRICAL — High pressure sodium and metal halide are high-reactance, high-power-factor ballasts. Ballasts are 100% factory-tested for reliable operation. Electrical components are tray-mounted with quick-disconnect plug and are accessible through bottom of bollard.

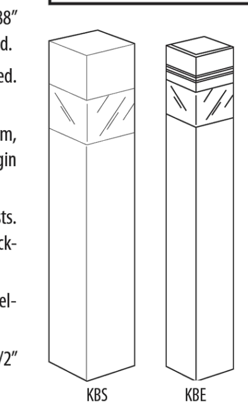
Socket: Porcelain, vertically oriented, medium-base pulse-rated porcelain socket with copper alloy, nickel-plated shell and center contact.

INSTALLATION — Four 1/2" x 11" anchor bolts with double nuts and washers (shipped separately). 4-1/2" bolt circle template included.

LISTINGS — UL listed for wet locations. Listed and labeled to comply with Canadian standards (see Options).

WARRANTY — 1-year limited warranty. Complete warranty terms located at www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

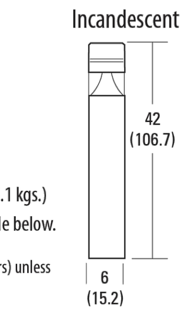
Note: Specifications subject to change without notice.



Architectural Bollard

KB6

6" Square
High Pressure Sodium
Metal Halide
Incandescent



*Weight: 23.9-33.2 lbs. (10.8-15.1 kgs.)
*Weight as configured in example below.

All dimensions are inches (centimeters) unless otherwise specified.

ORDERING INFORMATION For shortest lead times, configure products using **bolded options.**

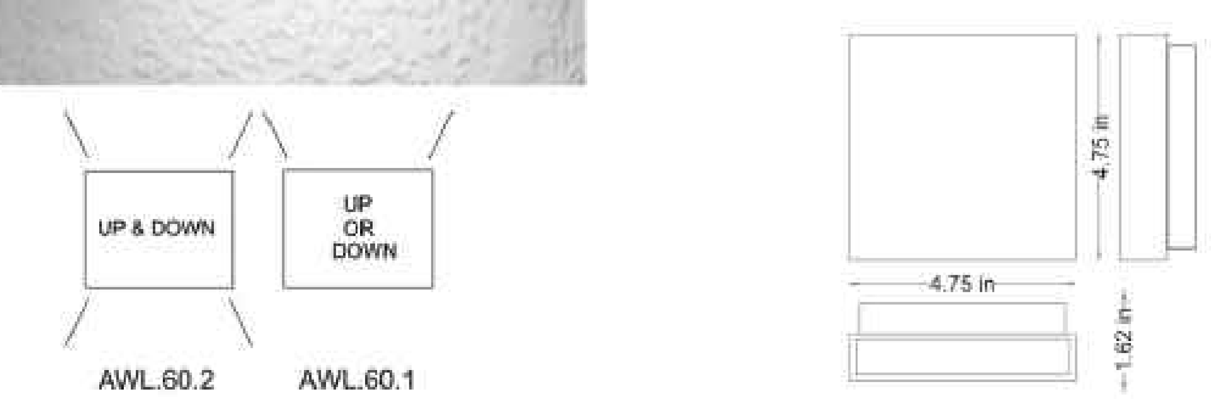
Example: KBE6 70M R5 120 LPI

Series	Wattage	Reflector	Voltage	Ballast	Options	Finish[7]		Lamp[9]
KBE6 **KBS6**	High pressure sodium 35S[1] 50S 70S Metal halide[2] 50M **70M** Incandescent[1,3] I	Standard flared cone **R5** Type V distribution Optional cylindrical reflectors CYA Specular CYB Black CYG Gold CYF Flat black	**120** 208 240 **277** **347**[4] **TB**[5]	HID **(blank)** Magnetic Incandescent (blank) None	Shipped installed in fixture SF Single fuse (120, 277, 347V; N/A TB) DF Double fuse (208, 240V; N/A TB) H24 24" overall height H30 30" overall height H36 36" overall height FD Festoon outlet FG Ground-fault festoon outlet XT Diode (incandescent only) **CSA** Listed and labeled to comply with Canadian standards (120, 277, 347V only) Shipped separately[6] S6S Half-shield for 6" square	**(blank)** Dark bronze **DBL** Black DMB Medium bronze **DNA** Natural aluminum DSS Sandstone DGC Charcoal gray Super Durable Finishes DDBXD Dark bronze DBLXD Black DGCXD Charcoal gray DNAXD Natural aluminum DSSXD Sandstone	Striping[8] SDDB Dark bronze SDWH White SDBL Black SDNA Natural aluminum SDTG Tennis green SDBR Bright red SDBUA Dark blue SDYLB Yellow	**LPI** Lamp included **L/LP** Less lamp

Notes
1 120V only.
2 Use coated lamp with metal halide sources.
3 116W/TS maximum. Not available with LPI.
4 347V available in 50W or 70W only.
5 Optional multi-tap ballast (120V, 208V, 240V, 277V; 120V, 277V, 347V in Canada).
6 May be ordered as an accessory. Must specify finish.
7 See www.lithonia.com/archcolors for additional color options.
8 Striping is available only on KBE6, and only in the colors listed.
9 Must be specified.

LumenArt LIGHTING SOLUTIONS

AWL.60 SERIES



SPECIFICATIONS

Material
Machined aluminum with opal acrylic lens and stainless steel fasteners.

Finish
Aluminium: Brushed aluminum with clear powdercoat. Matte black or white Tiger Drylac powdercoat.

Electrical
ETL wet location listed. Mounts to 4-0 octagon box or 4" square box with round plaster ring.

Fixture	LED	Color Temp	Voltage	Finish	
AWL.60.1 up or down	6w	3000k	UNV	Aluminium Black White	
AWL.60.2 up & down	8w				
AWL.60.		3000k	UNV		

LumenArt, Ltd. 3333 W. 47th St., Chicago, IL 60632
Phone 773-254-0744 Fax 773-254-0767 www.lumenart.com

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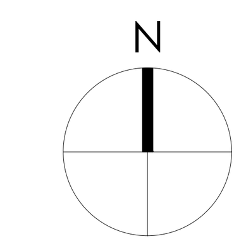

Project Number
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Project Title
Yankee Bus Line HQ

34 Scanlon Drive
Randolph, MA 02368

Drawing Title
Lighting Details

Date/Issued For
04.20.23

Planning Board Submission

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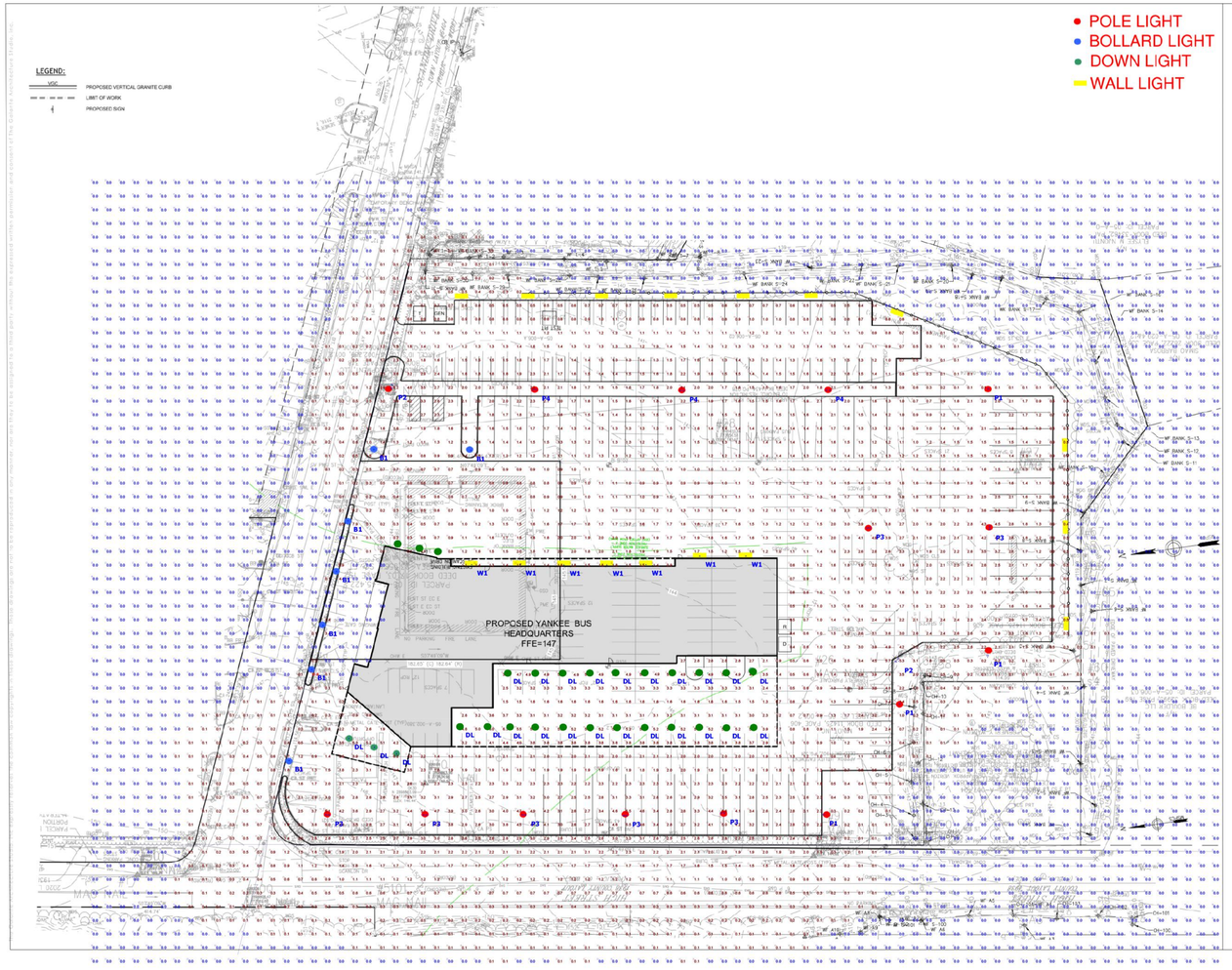
Drawing Number
L-102



Plan View
Scale - 1/64" = 0.5ft

SCHEDULE

SYMBOL	LABEL	QUANTITY	MANUFACTURER	CATALOG NUMBER	DESCRIPTION	LLF	WATTAGE
	B1	7	Lithonia Lighting	RADB LED P3 30K SYM DBLXD	RADB LED P3 30K SYM DBLXD	0.9	13.44
	DL	25	Paco Lighting	MD6-W30-30K-MW-FL-90CRI		0.9	46.2
	P1	4	Lithonia Lighting	DSX0 LED P5 30K 80CRI BLC4	D-Series Size 0 Area Luminaire P5 Performance Package 3000K CCT 80 CRI Type 4 Extreme Backlight Control	0.9	90.12
	P2	2	Lithonia Lighting	DSX0 LED P5 30K 80CRI TFTM	D-Series Size 0 Area Luminaire P5 Performance Package 3000K CCT 80 CRI Forward Throw	0.9	180.24
	P3	7	Lithonia Lighting	DSX0 LED P5 30K 80CRI TFTM	D-Series Size 0 Area Luminaire P5 Performance Package 3000K CCT 80 CRI Forward Throw	0.9	180.24
	P4	3	Lithonia Lighting	DSX0 LED P5 30K 80CRI T5W	D-Series Size 0 Area Luminaire P5 Performance Package 3000K CCT 80 CRI Type 5 Wide	0.9	180.24
	W1	0	Lithonia Lighting	WDGE2 LED P3 30K 80CRI TFTM	WDGE2 LED WITH P3 - PERFORMANCE PACKAGE, 3000K, 80CRI, TYPE FORWARD THROW MEDIUM OPTIC	0.9	32.1375
	W1	7	Lithonia Lighting	WDGE2 LED P4 30K 80CRI TFTM	WDGE2 LED WITH P4 - PERFORMANCE PACKAGE, 3000K, 80CRI, TYPE FORWARD THROW MEDIUM OPTIC	0.9	46.6589

NOTES:

-REFLECTANCES ASSUMED:
SURFACE: 50
GROUND: 20

- MOUNTING HEIGHTS: PER LABELS

- TASK HEIGHT: AT SURFACE

- CALCULATION POINT SPACING: 10'X10'OC

STATISTICS

DESCRIPTION	SYMBOL	AVG.	MAX	MIN.	MAX/MIN	AVG/MIN
Calc Zone #1		0.7 fc	15.6 fc	0.0 fc	N/A	N/A

DISCLAIMER:

-THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES ONLY AND ARE NOT INTENDED FOR CONSTRUCTION. VALUES REPRESENTED ARE AN APPROXIMATION GENERATED FROM MANUFACTURERS PHOTOMETRIC IN-HOUSE OR INDEPENDANT LAB TEST WITH DATA SUPPLIED BY LAMP MANUFACTURERS.

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146 MT AUBURN ST CAMBRIDGE, MA 02138
6 1 7 5 7 6 2 5 0 0
WWW.GALANTEARCHITECTURE.COM

N

Project Number
2221

Project Title
Yankee Bus Line HQ

34 Scanlon Drive
Randolph, MA 02368

Samiotes Consultants Inc.
Civil Engineers • Land Surveyors
20 A Street
Framingham, MA 01701
T 508.877.4688
F 508.877.3349
www.samiotes.com

Drawing Title

Date/Issued For
03.14.23

Planning Board Submission

NOT FOR CONSTRUCTION

Print 24x36

Scale

Drawn By

Drawing Number

VIRTUAL

Yankee Bus Line
REV 3
4-18-23

Designer
LAG
Date
04/19/2023
Scale
Not to Scale
Drawing No.
Summary

1 of 1

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Project Number
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Project Title
Yankee Bus Line HQ

34 Scanlon Drive
Randolph, MA 02368

Drawing Title
Photometric Study

Date/Issued For
04.20.23

Planning Board Submission

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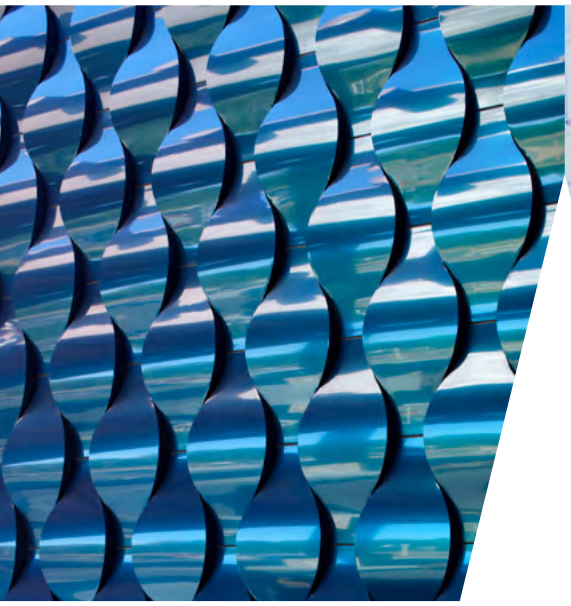
Scale
As Noted

Drawn By

Drawing Number

ALUCOBOND® PLUS

GIVING SHAPE TO GREAT IDEAS



As the original "aluminum composite material," ALUCOBOND PLUS consists of two sheets of smooth .020" aluminum thermo-bonded to a solid, fire retardant core and has been developed exclusively to allow architects and designers to meet today's fire performance requirements set by the International Building Code (IBC) while using ACM as the material of choice. Proven product properties and benefits of ALUCOBOND PLUS include:

- Flatness & Rigidity
- Durability
- Ability to be perforated
- Formability
- Ease of fabrication
- Wide range of colors & finishes

The versatile characteristics of ALUCOBOND PLUS provide for a plethora of applications such as exterior and interior cladding, column covers, canopies, soffits and even signage, allowing architects to offer inspiring, creative, and innovative designs while meeting the standards of sustainable planning.

ALUCOBOND PLUS is available in all of our current finishes and custom colors.

PRODUCT DESCRIPTION

MATERIAL COMPOSITION
- Aluminum interior and exterior facings in 0.020" nominal thickness
- 4mm total nominal thickness, including proprietary fire retardant core

SHEET WIDTHS
- Standard coil-coated width of 62"*
  *Some finishes are stocked in 40", 49.2" or 50". Please refer to stock material list
- Custom widths of 40" and 50" available on request

SHEET LENGTHS
- Standard coil-coated length of 196"
- Reflect Mirror is offered in 146"
- Custom lengths for coil coating: maximum 400"
- Custom lengths for anodized: maximum 216"

MINIMUM BENDING RADIUS
- The minimum bending radius of ALUCOBOND PLUS without routing the interior skin is 15 times the thickness
- The minimum bending radius for 4mm ALUCOBOND PLUS material without routing the back skin is 4"

MANUFACTURING
- ALUCOBOND PLUS is made in Benton, Kentucky USA

TECHNICAL SUMMARY

TEMPERATURE RESISTANCE
- Withstands environmental temperature changes from -55°F to +180°F
- Coefficient of linear expansion is governed by the aluminum sheet

TECHNICAL PROPERTIES

- Nominal thickness:	4mm
- Nominal weight:	1.56 lb/ft^2
- Moment of intertia:	.000212 in^4/in
- Section of modulus:	.00275 in^3/in
- Rigidity:	2143 lb-in^2/in

SUSTAINABILITY DESIGN
- LEED 3
- LEED v4/4.1
  - LCA Industry Standard
  - EPD Industry Standard

ACCEPTED EVALUATION REPORTS
- ICC-ES: 1185
- Florida Product Approval: FL29842
- Miami Dade County NOA: 15-0923.03
- Los Angeles Research Report: 24868
- Underwriters Laboratory: 19980

WALL ASSEMBLY FIRE TESTING
- CAN/ULC S134**
- NFPA 285**

To download PDF or AutoCAD details and specifications, visit our website.

ALUCOBOND® PLUS

GIVING SHAPE TO GREAT IDEAS

TECHNICAL DATA SHEET

Engineering Properties for ALUCOBOND PLUS Material

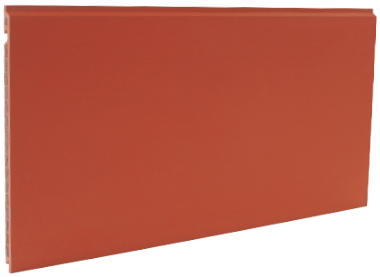
Standard Test Method*	Description	Category	4mm
ASTM C-365	Flatwise Compression Strength (Ultimate)	Mechanical	9291 psi
ASTM C-393	Core Shear Properties (Perpendicular) Ultimate Facing Bending Stress	Mechanical	24,720 psi
ASTM C-393	Core Shear Properties (Parallel) Ultimate Facing Bending Stress	Mechanical	22,732 psi
ASTM D-790	Flexural Modulus (Perpendicular)	Mechanical	1891 ksi
ASTM D-790	Ultimate Flexural (Perpendicular)	Mechanical	18,573 psi
ASTM D-790	Flexural Modulus (Parallel)	Mechanical	1815 ksi
ASTM D-790	Ultimate Flexural (Parallel)	Mechanical	17,703 psi
ASTM D-790	Yield Flexural Stress (Perpendicular)	Mechanical	6667 psi
ASTM D-790	Yield Flexural Stress (Parallel)	Mechanical	6930 psi
ASTM D-638	Modulus of Elasticity (Perpendicular)	Mechanical	2930 ksi
ASTM D-638	Tensile Strength (Perpendicular)	Mechanical	7750 psi
ASTM D-638	Tensile Yield at 0.2% Offset (Perpendicular)	Mechanical	6570 psi
ASTM D-638	Elongation (Perpendicular)	Mechanical	14.2%
ASTM D-732	Punching Shear (Maximum Shear Load)	Mechanical	2198 lbs.
ASTM D-732	Punching Shear (Shear Strength)	Mechanical	4615 psi
ASTM C-518	Thermal Conductivity	Thermal	U=6.5 Btu/hr ft^2 °F
ASTM C-518	Thermal Resistance	Thermal	R=0.16
ASTM C-518	Thermal Conductance	Thermal	6.25
ASTM D-648	Deflection Temperature - Perpendicular	Thermal	185°F
ASTM D-648	Deflection Temperature - Parallel	Thermal	189°F
ASTM C-273	Shear Test in Flatwise Plane (Ultimate Core Shear Strength)	Bond Integrity	765 psi
ASTM C-297	Tensile Bond Strength Test in Flatwise Plane (Ultimate)	Bond Integrity	1016 psi
ASTM D-1781	Bond Integrity	Bond Integrity	> 22.5 in-lb/in
ASTM E-90	Sound Transmission (STC)	Acoustical	30
ASTM E-90	Sound Transmission (OITC)	Acoustical	24
ASTM C-272	Water Absorption	Physical	0.003%
ASTM D-696	Coefficient of Linear Thermal Expansion	Physical	$1.11x10^{-5}$ in/in °F
ASTM D-635	Rate of Burning	Fire Performance	Classified CC1
ASTM D-1929	Ignition Temperature - Self	Fire Performance	783°F
ASTM D-1929	Ignition Temperature - Flash	Fire Performance	784°F
ASTM E-84	Surface Burning Characteristics (Flame Spread)	Fire Performance	< 25
ASTM E-84	Surface Burning Characteristics (Smoke Development)	Fire Performance	< 100
CAN/ULC-S102	Surface Burning Characteristics (Flame Spread)	Fire Performance	< 25
CAN/ULC-S102	Surface Burning Characteristics (Smoke Development)	Fire Performance	< 100
CAN/ULC-S134	Flame Spread of Exterior Wall Assemblies	Fire Performance	Meets Criteria**
NFPA 285	Flame Spread of Exterior Wall Assemblies	Fire Performance	Meets Criteria**

*The ASTM (American Society for Testing & Materials) Standard Test Method defines the way a test is performed and the precision of the result. The result of the test is then used to assess compliance with a standard specification.

** Results based upon tests made with ALUCOBOND PLUS panels in specific wall assemblies. For more information about assemblies that have been tested, please contact technical support: Thomas.rogers@3acomposites.com

XB PRO 17
VENTILATED FACADE SYSTEM

Sistemas de fachada ventilada



Altura Heigth	300 mm	$11^{13}/_{16}$ in	400 mm	$15\ ^{3}/_{4}$ in
Longitud Length*	<1200 mm	$47\ ^{1}/_{4}$ in	<1200 mm	$47\ ^{1}/_{4}$ in
Espesor Thickness		17 mm	$0^{43}/_{46}$ in	
Peso Weight		*25,5 kg/m²*	5,32 lb/sqft	

*Longitud máxima disponible en intervalos de 1 mm
* Maximum length available in 1 mm intervals

CARACTERÍSTICAS TÉCNICAS / TECHNICAL DATA

Clasificación / Classification	UNE-EN 14411:2007
Método de fabricación Manufacture method	Extrusión Extrusion
Absorción de agua Water absorption	3 ≤ E < 6 % (Grupo AIIa)

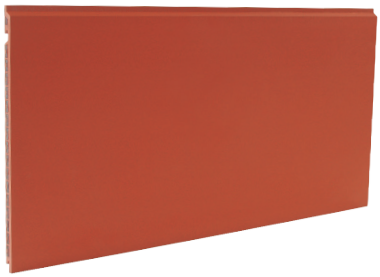
Tolerancias dimensionales / Dimensional tolerance	UNE-EN 14411:2007
Tolerancia, sobre longitud Tolerance on length	± 2 mm
Tolerancia, sobre anchura Tolerance on width	± 2 mm
Tolerancia, sobre el espesor Tolerance on thickness	± 1 mm
Rectitud en bordes Straightness on width	± 0,3 %
Ortogonalidad Orthogonality	± 0,5%
Planitud de la superficie Surface flatness	± 0,3%

Propiedades físicas / Phisical properties	UNE-EN 14411:2007
Densidad aparente Appareal density	≈2,3 g/cm³
Absorción de agua Water absorption	<4,5% (en peso)
Reacción al fuego Fire reaction	A1*
Resistencia a la flexión Flexion resistance	≥ 11 MPa
Coeficiente de dilatación térmica lineal Linear thermal expansion coefficient	$\leq 7 \cdot 10^{6}\ K^{-1}$
Resistencia al choque térmico Termal shock resistance	Cumple Complies
Resistencia a la helada Frost resistance	Cumple Complies
Conductividad térmica Thermal conductivity	1,04 W/(mk)
Durabilidad del aspecto superficial Durability of superficial aspect	Estabilidad del color satisfactoria a los rayos UVA Satisfactory color stability to UV radiation

*Según Decisión 96/603/CE se clasifican en Clase A (sin contribución al fuego) / According to Decision 96/603/CE clasificated in Class A (no contribution to fire)

XB PRO 17
VENTILATED FACADE SYSTEM

Sistemas de fachada ventilada



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Longitud Length*	<1200 mm	$47\ ^{1}/_{4}$ in	<1200 mm	$47\ ^{1}/_{4}$ in
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Peso Weight		*25,5 kg/m²*		5,32 lb/sqft

*Longitud máxima disponible en intervalos de 1 mm

* Maximum length available in 1 mm intervals

CARACTERÍSTICAS TÉCNICAS / TECHNICAL DATA

Características mecánicas / Mechanical characteristics					UNE-EN ISO10545-4:1997
Succión del viento Wind suction	Vertical Vertical	Hor. grapa goma Hor. clip with rubber	Hor. grapa mecánica Hor. mechanical clip	Hor. grapa y perfil junta Hor. clip and joint profile	Perfil horizontal Horizontal profile
≥ 2.400 Pa	2.600 Pa **	3.600 Pa	3.600 Pa	2.800 Pa	>4.000 Pa ***

Presión del viento Wind presure	4720 Pa
Impacto de cuerpo duro Hard body impact	**1J** - Sin daño / No obvious damage **3J** - Rotura sin desprendimiento / Cladding element not cracked **10J** - Rotura / Cracked
Impacto de cuerpo blando Soft body impact	**10J** - Sin daño / No obvious damage **60J** - Rotura sin desprendimiento / Cladding element not cracked **300J** - Rotura / Cracked

Propiedades físicas / Phisical properties	UNE-EN ISO 10545:1997
No evidencia de efluorescencias en esmaltados No evidence of efflorescences in glazed panels	Cumple Complies
Resistencia a las manchas Stain resistance	Cumple Complies
Anti-graffiti Graffiti resistance	Cumple Complies
Facilidad de limpieza Cleanability	Cumple Complies
Acabado fotocatalítico Active Plus Photocatalitic coating Active Plus	Disponible Available

**Distancia entre grapas 20 cm. / Distance between clips 20 cm.

***El sistema ha superado el valor máximo posible recreado en el ensayo. / This system has exceeded the maximum value recreated in the test.

PARKLEX PRODEMA

Products

Wood wall cladding MUSTARD

Sold by:

RTS REPS

North Andover, USA - Massachusetts

See contact information

wood, HPL

Location
interior, exterior

Installation type
glued

Style
contemporary

Finish
textured, natural finish

Color
brown

Aspect
wood look

Options
sustainable

Length
2,440 mm (96 in)

DESCRIPTION

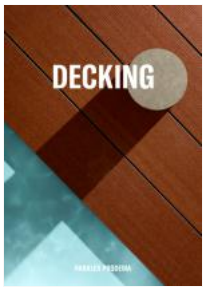
NATURCLAD-B coatings allow you to install a supertextured cladding without the need for maintenance in ventilated facades. They are composed of a high-density bakelite body, a unique texture on the surface which creates no repeated patterns and an outer film that provides greater durability to the panels and protects the board from solar radiation, atmospheric agents and dirt.

The PEFC certification seal guarantees that our wood boards have been made with raw materials of forest origin managed in a socially and environmentally responsible way.

Maintenance-free HPL panels
PEFC-certified raw material
Resistance to extreme atmospheric agents
UV-ray resistant tone
Complete installation system
On-demand project assistance service
10-year warranty

Panel dimensions: 2440 x 1220 mm
Thicknesses: 6, 8, 10, 12, 14, 16, 18, 20, 22 mm

CATALOGS



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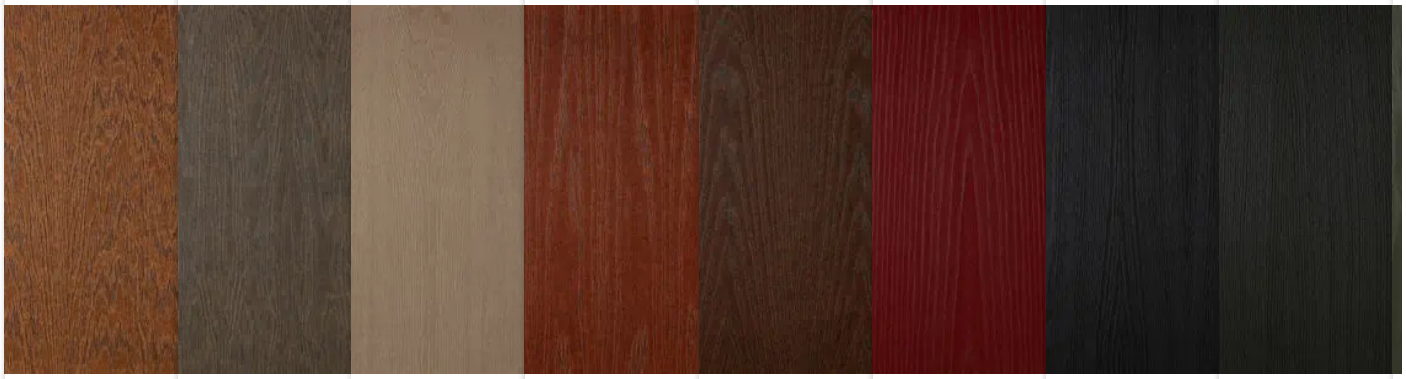
CLADDING



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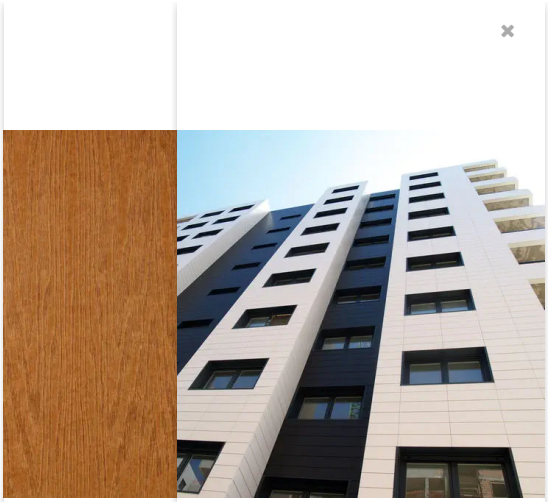

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WOOD WALL CLADDI
MUSTARD

Gresmanc GROUP
CERAMIC VENTILATED FACADE
XB PRO 17 FAVEMANC

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*Prices are pre-tax. They exclude delivery charges and customs duties and do not include additional charges for installation or activation options. Prices are indicative only and may vary by country, with changes to the cost of raw materials and exchange rates.

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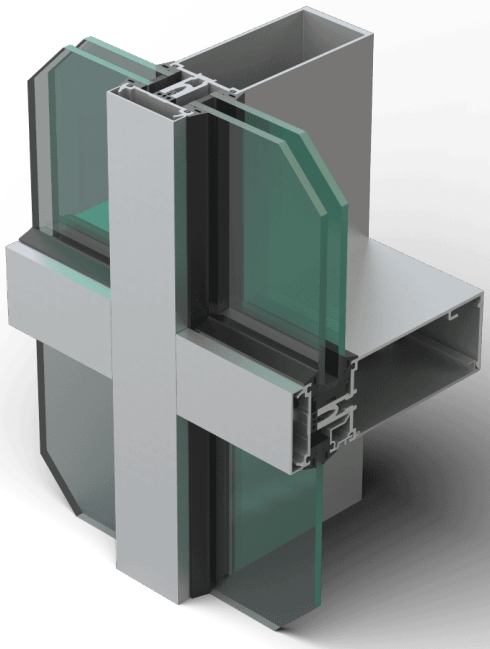
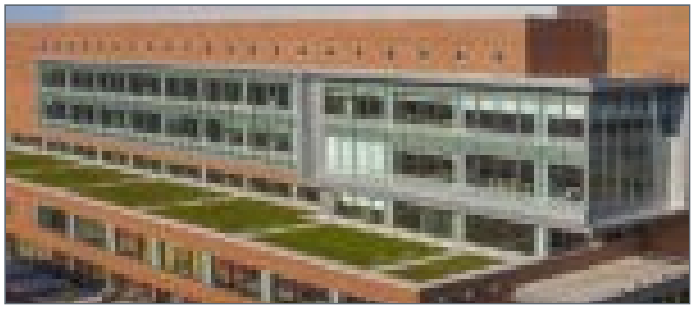




+5

CURTAIN WALL

1600 WALL SYSTEM®1 CURTAIN WALL

The 1600 Wall System®1 Curtain Wall is ideal for low- to mid-rise applications. Hurricane and impact resistant, the 1600 Wall System®1 can be used independently or integrated with 1600 Wall System®2 Curtain Wall for enhanced visual impact.

- 2-1/2″ (63.5mm) sightline
- 6″ (152.4mm), 7-1/2″ (190.5mm) or 10-1/2″ (267mm) depth
- Thermal performance
- Seismic (AAMA 501.4 and 501.6 standards)
- Low- to mid-rise applications
- Blast mitigation, hurricane resistance

Features

Sustainability

Documentation

Finishes

Specs

CAD Details

Revit / BIM

Warranty

Safety Data Sheets

- Concealed fastener joinery creates smooth, monolithic appearance
- Fillers produce uninterrupted seam lines by snapping onto optional open-back mullions
- Meets current codes requiring protection of openings in windborne debris regions
- Impact resistant framing options: 7-1/16″(177.8mm), 7-13/16″ (198.43mm), 10-1/16″ (255.58mm) and 10-13/16″ (274.63mm)

Cradle to Cradle Certified® Bronze: The 1600 Wall System®1 Curtain Wall has been certified for its material content, recyclability and manufacturing characteristics.

Learn more about Cradle to Cradle certification at www.c2ccertified.org. Cradle to Cradle Certified® is a certification mark of MBDC.

Optional Features

- Steel reinforcing
- Rain screen and backpans
- Deep profile covers and bull nose covers
- Deep and heavy-weight mullions
- Profit$Maker® Plus die sets
- Dual-color option

Product Applications

- Ideal for low- to mid-rise applications
- Integrates with Kawneer Entrances, GLASSvent® and sun control products

Thermal Technology

Find out more here.

Hurricane Resistant

Find out more here.

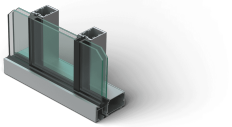
Blast Resistant

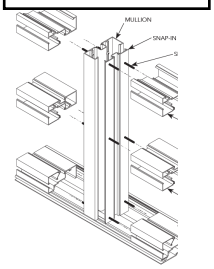
Find out more here.

Related Products

Explore our product portfolio and determine which products are most suitable for your project.

ALL PRODUCTS





Trifab® VersaGlaze® 451/451T Framing System →

190/350/500 Standard Entrances →

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Alexan on 8th

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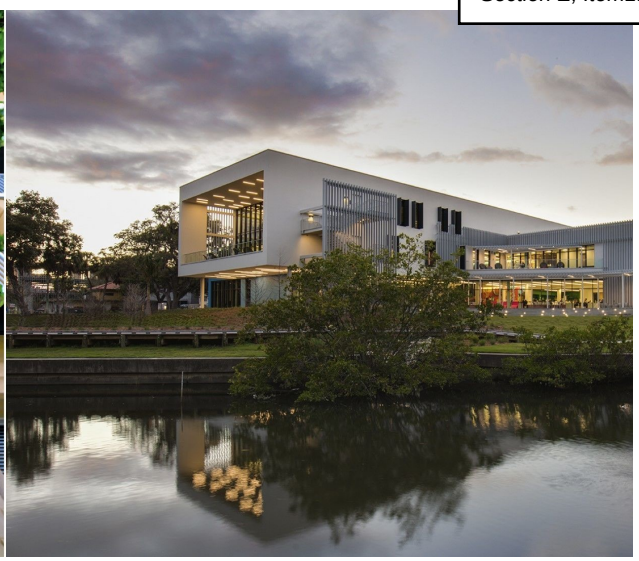

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Building our products and services around your exact needs, we can deliver expert support and training to ensure accurate and efficient installation on every project.

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S

Laws and building and safety codes governing the design and use of Kawneer products, such as glazed entrance, window, and curtain wall products, vary widely. Kawneer does not control the selection of product configurations, operating hardware, or glazing materials, and assumes no responsibility therefor.

KAWNEERDIRECT

SEVES
GLASS
BLOCK

VP 10/11 ENFRDE

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www.sevesglassblock.com

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Czech Republic
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Fax: +420 417 835 807

Vitrablok s.r.o.
Via delle Robinie, 12
50019 Sesto F.no
Florence - Italy
Tel: +39 055 449 51
Fax: +39 055 455 295

Seves Glassblock Inc.
10576 Broadview Road,
Broadview Heights,
Ohio 44147 – USA
Phone: +1-440-627-6257
Toll Free: +1-877-738-3711

ACME
BRICK
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SEVES
GLASS
BLOCK
DESIGN

The “VetroPieno” block
La brique “VetroPieno”
Der ziegel “VetroPieno”

Games of light and colour

Pure and clean aesthetics similar to those of ice and a captivating density full of delicate light and colour effects produced by the glassy matter inside the block.
The *VetroPieno* block is a 100% compact glass block that brings together the appeal of traditional blocks and the transparency and luminosity of glass. Unlike traditional products that are hollow inside, *VetroPieno* can count on visual effects and movement created deep within the block to add transparency, passage of light, new beauty and fascination to the usual properties of this construction element.
Introduced by Seves Glassblock as part of its collection, it comes in four versions: Neutral, Blue, Nordic and Siena, and provides another glass solution for decorating interiors and exteriors, focusing on more artistic and expressive qualities of the material.
An original alternative to classic blocks to create stunning dividing walls that allow light to pass through into each room, or special nuances and furnishing accessories to add a touch of style, individuality and colour.
The standard size and versatile shape allows it to be installed both horizontally and vertically for creating smooth surfaces, traditional designs, delicate frames or coloured light reflections.

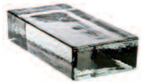
Des jeux de lumiere et de couleur

Une esthétique pure et nette comme celle de la glace et une séduisante densité riche de jeux de lumière et de couleur très délicats, ce sont les effets de la matière verre à l’intérieur de la brique.
VetroPieno est la brique de verre 100% compacte qui unit la transparence et la luminosité du verre au charme des briques traditionnelles. Contrairement aux produits classiques creux à l’intérieur, *VetroPieno* peut compter sur les effets visuels et de mouvement qui se créent en profondeur à l’intérieur. Ce qui permet d’ajouter aux propriétés habituelles de cet élément de construction transparence, et passage de la lumière, nouvelle beauté et suggestion.
Seves Glassblock l’a mise dans sa propre collection, dans les quatre versions Neutre, Bleu, Nordica et Siena ; il s’agit d’une autre solution en verre pour l’ameublement interne et externe, avec une insistance particulière sur la valeur artistique et expressive du matériau. C’est une solution alternative aux briques classiques pour créer des cloisons de séparation de grand effet qui favorisent le passage de la lumière d’une pièce à l’autre, ou pour ajouter une touche de style, individualité et couleur sous forme de nuance ou de détail d’ameublement.
Grâce aux dimensions standard et à sa forme, on peut l’installer aussi bien horizontalement que verticalement pour créer de cette manière des surfaces fluides, des dessins traditionnels, des encadrements délicats ou bien des reflets de lumière colorés.

Spiel von Licht und Farbe

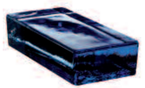
Eine reine und klare Ästhetik ähnlich der von Eis und eine einnehmende Dichte, die reich an zarten Spielen von Licht und Farbe ist, das sind die Effekte des Glases im Inneren des Ziegels.
Der Ziegel *VetroPieno* ist der zu 100 % kompakte Glasziegel, der die Faszination der herkömmlichen Ziegel mit der Transparenz und der Leuchtkraft des Glases vereint. Anders als das herkömmliche, innen hohle Produkt kann *VetroPieno* auf die Sicht- und Bewegungseffekte zählen, die tief in seinem Inneren entstehen, wodurch zu den üblichen Eigenschaften dieses Bauelementes Transparenz und Lichtdurchlässigkeit sowie eine neue Schönheit und Ausdruckskraft hinzukommen.
Er wurde von Seves Glassblock in den vier Versionen Neutral-Weiß, Blau, Nordisch-Anthrazit und Siena-Braun in die Kollektion aufgenommen und bietet eine weitere Lösung aus Glas für die Gestaltung von Innenräumen und Außenflächen, wobei auf die künstlerischsten und ausdrucksstärksten Wertigkeiten des Materials abgezielt wird. Eine originelle Alternative zu den klassischen Ziegeln für den Bau von sehr wirkungsvollen Trennwänden, die das Durchdringen des Lichtes zwischen den Zimmern begünstigt, oder als besonderer Touch und Ergänzung der Einrichtung, um dem Raum einen Hauch von Stil, Individualität und Farbe zu verleihen.
Dank seiner Standardmaße und der vielseitigen Form kann er sowohl waagrecht, als auch senkrecht verlegt werden, um so flüssige Oberflächen, herkömmliche Designs, oder zarte, von Lichtreflexen gefärbte Rahmen zu schaffen.

VETROPIENO



NEUTRO VETROPIENO - RETTANGOLARE

NEUTRO VETROPIENO - QUADRATO



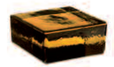
BLU VETROPIENO - RETTANGOLARE

BLU VETROPIENO - QUADRATO

NORDICA VETROPIENO - RETTANGOLARE

NORDICA VETROPIENO - QUADRATO

SIENA VETROPIENO - RETTANGOLARE



SIENA VETROPIENO - QUADRATO

VETROPIENO	Weight (Kg) Poids (Kg) Gewicht (Kg)	No. Pieces/ m² Nbre de pièces/m² Stückzahl/m²	N.Pieces/box Nbre de pièces/carton Stückzahl/Packung	N.Pieces/pallet Nbre de pièces/palette Stückzahl/Palette
RETTANGOLARE 24x11,7x5,3cm	**3,5**	**60**	**5**	**300**
QUADRATO 12x11,7x5,3cm	**1,7**	**120**	**10**	**600**

BASIC ELEMENTS FOR CALCULATING AND VERIFYING GLASS BLOCK STRUCTURES
Physical and mechanical properties of glass
Modulus of elasticity: ≈ 760.000 kg/cm²
Poisson’s coefficient: ≈ 0.20
Density / specific weight: ≈ 2.5 g/cm³ (2500 kg/m³)
Hardness (Mohs scale): ≈ 6.0
Linear expansion (between -20 and +50°C):
≈ 0.000007 cm/cm°C

The glass blocks, manufactured with clear sodium lime glass or coloured in paste, are annealed and **do not contain harmful substances**.
The **glass** block structures cannot have load-bearing functions, **but they should only be used as curtains or dividers**.
These structures are considered **self-supporting and therefore do not play any structural role**, since they are only capable of safely sustaining their own weight together with the horizontal load generated by the wind and any perpendicular impact.

For information and technical assistance, please contact directly the reference offices.

ELÉMENTS BASE POUR LE CALCUL ET LA VÉRIFICATION DE PRODUITS EN VETROARREDO
Propriétés physiques/mécaniques du verre
module d’élasticité : ≈ 760.000 kg/cm²
coefficient de Poisson : ≈ 0.20
densité/poids spécifique : ≈ 2.5 g/cm³ (2500 kg/m³)
dureté (Échelle de Mohs) : ≈ 6.0
dilatation linéaire (entre -20 et +50°C) :
≈ 0.000007 cm/cm°C

Les briques Vetro réalisées avec du verre de type calcium sodique neutre ou coloré en pâte sont soumises à un traitement de recuit et **ne contiennent pas de substances nocives**. Le projet ne doit pas attribuer aux structures en **Vetro** des fonctions portantes mais **seulement de colmatage et de séparation**.
Ces produits doivent être considérés comme **autoportants et ne collaborant donc pas au niveau statique** car ils sont en mesure de supporter exclusivement leur propre poids, la charge horizontale engendrée par le vent et d’éventuels impacts perpendiculaires aux surfaces visibles.

Pour toute informations et assistance technique contacter les sièges de référence.

GRUNDSÄTZLICHE PARAMETER ZUR BERECHNUNG UND GESTALTUNG VON GLASANWENDUNGEN MIT „VETROPIENO“
Druckfestigkeit: ≈ 760.000 kg/cm²
Querkontraktions-Koeffizient: ≈ 0.20
Dichte/Spezifisches Gewicht: ≈ 2.5 g/cm³ (2500 kg/m³)
Ritzhärte nach Mohs: ≈ 6.0
Lineare Ausdehnung (zwischen -20° und +50°C):
≈ 0.000007 cm/cm°C

Seves Glasprodukte werden aus geschmolzenem transparenten oder durchgefärbten Kalknatronglas gefertigt und enthalten keine schädlichen Substanzen.
Vetropieno können keine lasttragende Funktion haben und sollten daher nur als Raumteiler oder Trennelemente verwendet werden.
Diese Konstruktionen sind als selbsttragend zu betrachten, ohne strukturelle Funktion, da sie nur ihr Eigengewicht und eine seitliche Windlast tragen können.

Für Informationen und Kundendienst wenden Sie sich bitte an ihr lokales Büro.

TECHNICAL BRIEF

SHORT FORM GUIDE SPECIFICATIONS

PART I—GENERAL

1.1 Description

a. Work Include

These specifications cover precast, prestressed structural concrete construction including product design not shown on contract drawings, manufacture, transportation, and erection.

b. Related Work Specified Elsewhere

Flashing and sheet metal; sealants and caulking; painting.

c. Work Furnished and Installed by Others

Reglets for flashing.

1.2 Reference Standards

a. ACI 301 — Specifications for Structural Concrete; American Concrete Institute International; 2010 (Errata 2012).

b. ACI 318 — Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2011.

c. ASTM C260/C260M — Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

d. AWS D1.1/D1.1M — Structural Welding Code // Steel; American Welding Society; 2011 w/Errata.

e. PCI MNL 116 — Manual for Quality Control for Plants and Production of Precast Concrete Products;

f. PCI MNL 120 — PCI Design Handbook // Precast and Prestressed Concrete; Precast/Prestressed Concrete Institute; Seventh Edition, 2010.

g. PCI MNL 123 — Design and Typical Details of Connections for Precast and Prestressed Concrete; Precast/Prestressed Concrete Institute; 1988, Second Addition.

h. PCI MNL 135 — Tolerance Manual for Precast and Prestressed Concrete Construction; Precast/Prestressed Concrete Institute; 2000.

1.3 Submittals

a. Shop Drawings

Indicate layout, unit locations, configuration, unit identification marks, integral insulation, panel system connectors, connection details, support items, dimensions, openings, and relationship to adjacent materials. Provide erection drawings.

1.4 Quality Assurance

a. Manufacturer Qualification

The precast concrete manufacturing plant shall be certified by the PCI (Prestressed Concrete Institute), Plant Certification Program prior to the start of production. Precast concrete manufacturer must have produced product similar to what is being specified for a minimum of two years.

b. Design Engineer Qualifications

Design precast concrete units under direct supervision of a Professional Engineer experienced in design of precast concrete and licensed in the respective state.

c. Welder Qualifications

Qualified in accordance with AWS D1.1/D1.1M and AWS D1.4/D1.4M.

PART II—PRODUCTS

2.1 Manufacturers

a. Prestressed Structural Precast

Any manufacturer holding a PCI Group C3A Plant Certification for the types of products specified; see *www.pci.org*.

b. Integrally Insulated Panel System

2.2 Precast Units

a. Precast Concrete Units

Comply with PCI MNL-120, PCI MNL -122, PCI MNL 123, and PCI MNL-135.

TECHNICAL BRIEF

SHORT FORM GUIDE SPECIFICATIONS

(2.2 Precast Units, continued. . .)

b. Concrete Mix
Minimum 5000 psi, 28 day strength.

c. Design Loads
Static loads, anticipated dynamic loading, including positive and negative wind loads, thermal movement loads, and erection forces as defined by applicable code.

2.3 Concrete Materials

a. Cement
ASTM C150/C150M, Type I or III—Normal Portland type.

b. Admixtures
Air-entraining admixtures, ASTM C260; Water reducing, retarding accelerating, high-range water reducing admixtures, ASTM C494.

c. Aggregates | ASTM C33 or C330

d. Water
Potable and free from foreign materials in amounts harmful to concrete and embedded steel.

e. Reinforcing Steel
Bars—Deformed Billet Steel (ASTM A615), Deformed Rail Steel (ASTM A616), Deformed Axle Steel (ASTM A617), Deformed Low-Alloy Steel (ASTM A706);
Wire—Cold Drawn Steel (ASTM A82);
Wire Fabric— Welded Steel (ASTM A185), Welded Deformed Steel (ASTM A497).

f. Strand
Uncoated, 7 wire, stress-relieved or low relaxation strand (ASTM A416) (*including supplement*) Grade 250K or 270K;

g. Anchors and Inserts
Materials—Structural Steel (ASTM A36 minimum);
Finish—Manufacturer's Standards.

h. Grout
Cement grout—Portland cement, sand and water sufficient for placement and hydration.

2.4 Insulation

a. Integral Insulation
Expanded polystyrene insulation.

2.5 Accessories

a. Bearing Pads
High-density plastic in combination with hard board shims.

2.6 Fabrication

a. Fabricate in general conformance with PCI MNL 116 guidelines.

PART III—GENERAL

3.1 Erections

a. Installation
Installation of precast, prestressed concrete shall be performed by the manufacturer or a competent erector. Members shall be lifted by means of suitable lifting devices at points provided by the manufacturer. Temporary shoring and bracing, if necessary, as shown on the approved shop drawings, shall comply with the manufacturer's recommendations.

b. Alignment
Members shall be properly aligned and leveled as required by the approved shop drawings. Any variations between adjacent members that exceed industry standards shall be reasonably leveled out by jacking, loading or any other industry standard method as recommended by the manufacturer.

SHORT FORM GUIDE SPECIFICATIONS

3.2 Field Welding

a. Field welding is to be completed per the approved shop drawings in accordance with AWS D1.1/D1.1M and AWS D1.4/D1.4M.

3.3 Attachments

a. Subject to approval of the architect/engineer, and manufacturer, precast, prestressed products may be drilled or "shot" provided no contact is made with the prestressing steel. Should spalling occur, it shall be required by the trade doing the drilling or the shooting to make repairs.

— END OF SPECIFICATION —

April 20, 2023

Project Name: Yankee Line Bus Headquarters
Project Address: 34 Scanlon Dr
Randolph, MA 02368

Contractor POC: Adam Gray – Vice President – 978-375-4862

Construction Pest Control Plan

1. Engage a pest control service contractor to inspect site prior to demolition for evidence of infestation.
2. Remove existing refuse containers and clean area.
3. If determined place rodent traps sixty days before building and site demolition.
4. If determined maintain rodent traps during construction. Inspect and replace every thirty days.
5. Site will be maintained daily and debris will disposed of in functional, locking containers which will be emptied on regular bases.
6. Once the building is enclosed, it will be secured daily. Any temporary enclosures will be maintained, and any voids will be treated with boric acid dust.
7. Proper daily disposal of all food discards will be enforced within the building and any temporary structures such as trailers, sheds, and storage containers.
8. All procedures will be posted.

100 Conifer Hill Drive, Unit 315, Danvers, MA 01923 · O: 978.535.6399 F: 978.535.6494 Web: carrenterprises.com

Construction Stormwater Pollution Prevention Plan Template

To be covered under the U.S. Environmental Protection Agency's (EPA) Construction General Permit (CGP), all construction operators are required to develop a "Stormwater Pollution Prevention Plan" (or "SWPPP") prior to submitting a Notice of Intent (NOI) for permit coverage. EPA created this SWPPP Template to help you develop a SWPPP that is compliant with the minimum requirements of Part 7 of EPA's 2022 Construction General Permit ("2022 CGP"), and is customizable to your specific project and site.

Instructions for Using the SWPPP Template

Each section of the SWPPP Template includes instructions and space for your project and site information. Read the instructions for each section before you complete that section. Specific instructions on what information to include is indicated in each text field in blue text. Click on the blue text and the instructions will disappear once you start typing. The SWPPP Template is an editable document file so that you can easily add tables and additional text and delete unneeded or non-applicable fields. Note that some sections may require only a brief description while others may require several pages of explanation.

The following tips for using this template will help ensure that you meet the minimum permit requirements:

- Read the 2022 CGP thoroughly before you begin preparation of your SWPPP to ensure that you have a working understanding of the permit's underlying requirements. You will also need to consult Part 9 of the permit to determine if your State or Tribe has included additional requirements that affect you.
- Complete the SWPPP prior to submitting your NOI for permit coverage. This is required in Parts 1.4 and 7.1.
- If you prepared a SWPPP under a previous version of EPA's CGP, you must update your SWPPP to ensure that the 2022 CGP requirements are addressed prior to submitting your NOI.
- If there is more than one construction operator for your project, consider coordinating development of your SWPPP with the other operators.
- Once EPA has provided your site with coverage under the CGP, include your NOI, your authorization email, and a copy of the CGP as attachments to the SWPPP. See Appendices B and C of the SWPPP Template.

While EPA has made every effort to ensure the accuracy of all instructions contained in the SWPPP Template, it is the permit, not the template, that determines the actual obligations of regulated construction stormwater discharges. In the event of a conflict between the SWPPP Template and any corresponding provision of the 2022 CGP, you must abide by the requirements in the permit. EPA welcomes comments on the SWPPP Template at any time and will consider those comments in any future revision of this document. You may contact EPA for CGP-related inquiries at cgp@epa.gov.

Stormwater Pollution Prevention Plan (SWPPP)

For Construction Activities At:

Yankee Bus Line Headquarters
34 Scanlon Drive
Randolph, MA 02116
908-239-4642

SWPPP Prepared For:

Insert Operator Company or Organization Name
Insert Name
Insert Address
Insert City, State, Zip Code
Insert Telephone Number
Insert Fax/Email

SWPPP Prepared By:

Samiotes Consultants Inc.
Michelle Kayserman
20 A Street
Framingham, MA 01701
T: 508-877-6688
F: 508-877-8349

SWPPP Preparation Date:

03/28/2023

Estimated Project Dates:

Project Start Date: TBD

Project Completion Date: TBD

Contents

SECTION 1: CONTACT INFORMATION/RESPONSIBLE PARTIES

1.1 Operator(s) / Subcontractor(s)

Instructions (see definition of "operator" at CGP Part 1.1.1):

- Identify all site operators who will be engaged in construction activities at the site and the areas of the site over which each operator has control (Part 7.2.1). Indicate respective responsibilities, where appropriate. Also include the 24-hour emergency contact.
- List subcontractors expected to work on-site. Notify subcontractors of stormwater requirements applicable to their work.
- Consider using Subcontractor Agreements such as the type included as a sample in Appendix G of this Template.

Operator(s):

Insert Company or Organization Name
Insert Name
Insert Address
Insert City, State, Zip Code
Insert Telephone Number
Insert Fax/Email
Insert area of control (if more than one operator at site)

[Repeat as necessary.]

Subcontractor(s):

Insert Company or Organization Name
Insert Name
Insert Address
Insert City, State, Zip Code
Insert Telephone Number
Insert Fax/Email
Insert area of control (if more than one operator at site)

[Repeat as necessary.]

Emergency 24-Hour Contact:

Insert Company or Organization Name
Insert Name
Insert Telephone Number

1.2 Stormwater Team

Instructions (see CGP Parts 6 and 7.2.2):

- Identify the individuals (by name and position) that you have made part of the project's stormwater team pursuant to CGP Part 6.1, their individual responsibilities, and which members are responsible for inspections. At a minimum the stormwater team is comprised of individuals who are responsible for the design, installation, maintenance, and/or repair of stormwater controls; the application and storage of treatment chemicals (if applicable); conducting inspections as required in CGP Part 4.1; and taking corrective actions as required in Part 5.
- Each member of the stormwater team must have ready access to either an electronic or paper copy of applicable portions of the 2022 CGP and the SWPPP.
- Each member of the stormwater team must understand the requirements of the 2022 CGP and their specific responsibilities with respect to those requirements, including the information in Part 6.2.
- For projects that receive coverage under the 2022 CGP on or after February 17, 2023, to be considered a qualified person under Part 4.1 to conduct inspections under Part 4, you must, at a minimum, either:
  - ✓ Have completed the EPA construction inspection course developed for this permit and have passed the exam; or
  - ✓ Hold a current valid construction inspection certification or license from a program that, at a minimum, covers the following:
    - Principles and practices of erosion and sediment control and pollution prevention practices at construction sites;
    - Proper installation, and maintenance of erosion and sediment controls and pollution prevention practices used at construction sites; and
    - Performance of inspections, including the proper completion of required reports and documentation, consistent with the requirements of Part 4.

  Note that if one of the following topics (e.g., installation and maintenance of pollution prevention practices) is not covered by the non-EPA training program, you may consider supplementing the training with the analogous module of the EPA course (e.g., Module 4) that covers the missing topic.
- Include documentation showing completion of trainings in Appendix I of this SWPPP template.
- For projects that receive coverage under the 2022 CGP prior to February 17, 2023, any personnel conducting site inspections pursuant to Part 4 on your site must, at a minimum:
  - ✓ Be knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention,
  - ✓ Possess the appropriate skills and training in conditions at the construction site that could impact stormwater quality, and
  - ✓ Possess the appropriate skills and training in the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit.

Stormwater Team

Name and/or Position, and Contact	Responsibilities	I Have Completed Training Required by CGP Part 6.2	I Have Read the CGP and Understand the Applicable Requirements
Insert Name of Responsible Person Insert Position Insert Telephone Number Insert Email	Insert Responsibility	☐ Yes ☐ No	☐ Yes Date: Click here to enter a date.
Insert Name of Responsible Person Insert Position Insert Telephone Number Insert Email	Insert Responsibility	☐ Yes ☐ No	☐ Yes Date: Click here to enter a date.
Insert Name of Responsible Person Insert Position Insert Telephone Number Insert Email	Insert Responsibility	☐ Yes ☐ No	☐ Yes Date: Click here to enter a date.

[Insert or delete rows as necessary.]

Stormwater Team Members Who Conduct Inspections Pursuant to CGP Part 4

Name and/or Position and Contact	Training(s) Received	Date Training(s) Completed	If Training is a Non-EPA Training, Confirm that it Satisfies the Minimum Elements of CGP Part 6.3.b
Insert Name of Responsible Person Insert Position Insert Telephone Number Insert Email	Insert Title of Training Received	Date: Click here to enter a date.	☐ Principles and practices of erosion and sediment control and pollution prevention practices at construction sites ☐ Proper installation and maintenance of erosion and sediment controls and pollution prevention practices used at construction sites ☐ Performance of inspections, including the proper completion of required reports and documentation, consistent with the requirements of Part 4
Insert Name of Responsible Person Insert Position Insert Telephone Number Insert Email	Insert Title of Training Received	Date: Click here to enter a date.	☐ Principles and practices of erosion and sediment control and pollution prevention practices at construction sites ☐ Proper installation and maintenance of erosion and sediment controls and pollution prevention practices used at construction sites ☐ Performance of inspections, including the proper completion of required reports and documentation, consistent with the requirements of Part 4
Insert Name of Responsible Person Insert Position Insert Telephone Number Insert Email	Insert Title of Training Received	Date: Click here to enter a date.	☐ Principles and practices of erosion and sediment control and pollution prevention practices at construction sites ☐ Proper installation and maintenance of erosion and sediment controls and pollution prevention practices used at construction sites ☐ Performance of inspections, including the proper completion of required reports and documentation, consistent with the requirements of Part 4

[Insert or delete rows as necessary.]

SECTION 2: SITE EVALUATION, ASSESSMENT, AND PLANNING

2.1 Project/Site Information

Instructions (see "Project/Site Information," Section IV of Appendix H – NOI Form and Instructions):

- In this section, compile basic site information that will be helpful when you file your NOI.

Project Name and Address

Project/Site Name: Yankee Line Bus Headquarters
Street/Location: 34 Scanlon Drive
City: Randolph
State: Massachusetts
ZIP Code: 02116
County or Similar Government Division: Norfolk County

Project Latitude/Longitude

Latitude 42.20079 ° N
(decimal degrees)

Longitude: -72.06596 ° W
(decimal degrees)

Latitude/longitude data source: ☐ Map ☐ GPS ☒ Other (please specify): _____massmapper____

Horizontal Reference Datum: ☐ NAD 27 ☒ NAD 83 ☐ WGS 84

Additional Site Information

Is your site located on Indian country lands, or on a property of religious or cultural significance to an Indian Tribe? ☐ Yes ☒ No

If yes, provide the name of the Indian Tribe associated with the area of Indian country (including the name of Indian reservation if applicable), or if not in Indian country, provide the name of the Indian Tribe associated with the property: Insert Text Here

2.2 *Discharge Information*

Instructions (see "Discharge Information," Section V of Appendix H – NOI Form and Instructions):

- In this section, include information relating to your site's discharge. This information corresponds to the "Discharge Information" section of the NOI form.
- List all of the stormwater points of discharge from your site. Identify each point of discharge with a unique 3-digit ID (e.g., 001, 002).
- For each unique point of discharge you list, specify the name of the first receiving water that receives stormwater directly from the point of discharge and/or from the MS4 that the point of discharge discharges to. You may have multiple points of discharge that discharge to the same receiving water.
- Next, specify whether any waters of the U.S. that you discharge to are listed as "impaired" as defined in Appendix A, and the pollutants causing the impairment. Identify any Total Maximum Daily Loads (TMDL) that have been completed for any of the waters of the U.S. that you discharge to and the pollutants for which there is a TMDL. For more information on impaired waters and TMDLs, including a list of TMDL contacts and links by State, visit https://www.epa.gov/tmdl.
- Finally, indicate whether any receiving water that you discharge to is designated as a Tier 2, Tier 2.5, or Tier 3 water and if so, what the designation is (2, 2.5, or 3). A list of Tier 2, 2.5, and 3 waters located in the areas eligible for coverage under this permit can be found at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates.

Does your project/site discharge stormwater into a Municipal Separate Storm Sewer System (MS4)? ☐ Yes ☒ No

Are there any waters of the U.S. within 50 feet of your project's earth disturbances? ☒ Yes ☐ No

For each point of discharge, provide a point of discharge ID (a unique 3-digit ID, e.g., 001, 002), the name of the first receiving water that receives stormwater directly from the point of discharge and/or from the MS4 that the point of discharge discharges to, and the following receiving water information, if applicable:

Point of Discharge ID	Name of receiving water that receives stormwater discharge:	Is the receiving water impaired (on the CWA 303(d) list)?	If yes, list the pollutants that are causing the impairment:	Has a TMDL been completed for this receiving waterbody?	If yes, list TMDL Name and ID:	Pollutant(s) for which there is a TMDL:	Is this receiving water designated as a Tier 2, Tier 2.5, or Tier 3 water?	If yes, specify which Tier (2, 2.5, or 3)?
[001]	On-Site Wetlands resource area to Great Pond	☐ Yes ☒ No		☐ Yes ☐ No			☒ Yes ☐ No	Tier 2.5
[002]	Great pong to unassigned brook to Farm River	☒ Yes ☐ No	Escherichia Coli	☐ Yes ☐ No			☐ Yes ☒ No	
[003]	Insert Text Here	☐ Yes ☐ No		☐ Yes ☐ No			☐ Yes ☐ No	[INSERT "Tier 2", "Tier 2.5", or "Tier 3"]
[004]	Insert Text Here	☐ Yes ☐ No		☐ Yes ☐ No			☐ Yes ☐ No	[INSERT "Tier 2", "Tier 2.5", or "Tier 3"]
[005]	Insert Text Here	☐ Yes ☐ No		☐ Yes ☐ No			☐ Yes ☐ No	[INSERT "Tier 2", "Tier 2.5", or "Tier 3"]
[006]	Insert Text Here	☐ Yes ☐ No		☐ Yes ☐ No			☐ Yes ☐ No	[INSERT "Tier 2", "Tier 2.5", or "Tier 3"]

[Include additional rows or delete as necessary.]

2.3 *Nature of the Construction Activities*

Instructions (see CGP Parts 1.2.1.c and 7.2.3):

- Provide a general description of the nature of the construction activities at your site.
- Describe the size of the property (in acres or length in miles if a linear construction site), the total area expected to be disturbed by the construction activities (to the nearest quarter acre or quarter mile if a linear construction site), and the maximum area expected to be disturbed at any one time.
- A description of any on-site and off-site construction support activity areas covered by this permit;
- Indicate the type of construction site, whether there will be certain demolition activities, and whether the predevelopment land use was for agriculture.
- Provide a list and description of all pollutant-generating activities (e.g., paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal; and dewatering operations) and indicate for each activity the associated pollutants or pollutant constituents (e.g., sediment, fertilizers, pesticides, paints, caulks, sealants, fluorescent light ballasts, contaminated substrates, solvents, fuels) which could be discharged in stormwater from your construction site.
- Describe the construction support activities covered by this permit (see Part 1.2.1.c of

General Description of Project

Provide a general description of the nature of your construction activities, including the age or dates of past renovations for structures that are undergoing demolition:

The proposed project will consist of the construction of a new building to serve as Yankee Headquarters and service station for Yankee Line Bus's. This project will result in demolition of the existing site and redeveloping the existing site.

If you are conducting earth-disturbing activities in response to a public emergency, document the cause of the public emergency *(e.g., mud slides, earthquake, extreme flooding conditions, widespread disruption in essential public services)*, information substantiating its occurrence *(e.g., State disaster declaration or similar State or local declaration)*, and a description of the construction necessary to reestablish affected public services:

N/A

Business days and hours for the project: Insert Text Here

Size of Construction Site

Size of Property	5.63± Acres
Total Area Expected to be Disturbed by Construction Activities	5.63± Acres
Maximum Area Expected to be Disturbed at Any One Time, Including On-site and Off-site Construction Support Areas	N/A

Size of Construction Site

[Repeat as necessary for individual project phases.]

Type of Construction Site *(check all that apply):*

☐ Single-Family Residential ☐ Multi-Family Residential ☒ Commercial ☐ Industrial

☐ Institutional ☐ Highway or Road ☐ Utility ☐ Other _____

Will you be discharging dewatering water from your site? ☒ Yes ☐ No

If yes, will you be discharging dewatering water from a current or former Federal or State remediation site? ☐ Yes ☒ No

Pollutant-Generating Activities

List and describe all pollutant-generating activities and indicate for each activity the associated pollutants or pollutant constituents that could be discharged in stormwater from your construction site. Take into account where potential spills and leaks could occur that contribute pollutants to stormwater discharges, and any known hazardous or toxic substances, such as PCBs and asbestos, that will be disturbed during construction.

Pollutant-Generating Activity (e.g., paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal; and dewatering operations)	**Pollutants or Pollutant Constituents** (e.g., sediment, fertilizers, pesticides, paints, caulks, sealants, fluorescent light ballasts, contaminated substrates, solvents, fuels)
Grading/Earthwork	Sediment
Paving Operations	Petroleum
Concrete work	Concrete/Portland Cement
Construction Waste	Discarded C&D waste placed in Dumpsters
Portable Toilets	Biocides, Dye, Fragrance and Detergents
On-site Fueling operations – wet hose delivery	Diesel Fuel
Landscaping	Fertilizers and Sediment
Construction Vehicles	Diesel Fuel, Gasoline, and Oils
Interior Finishes	Paint and Solvents

[Include additional rows or delete as necessary.]

Construction Support Activities *(only provide if applicable)*

Describe any construction support activities for the project (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas):
Insert Description of Construction Support Activity

Contact information for construction support activity:
Insert Name
Insert Telephone No.
Insert Email
Insert Address And/Or Latitude/Longitude

[Repeat as necessary.]

2.4 Sequence and Estimated Dates of Construction Activities

Instructions (see CGP Part 7.2.3):

- Describe the intended construction sequence and duration of major activities.
- For each portion or phase of the construction site, include the following:
  - ✓ Commencement and duration of construction activities, including clearing and grubbing, mass grading, demolition activities, site preparation (i.e., excavating, cutting and filling), final grading, and creation of soil and vegetation stockpiles requiring stabilization;
  - ✓ Temporary or permanent cessation of construction activities in each portion of the site;
  - ✓ Temporary or final stabilization of exposed areas for each portion of the site. The dates for stabilization must reflect the applicable deadlines to which you are subject to in Part 2.2.14; and
  - ✓ Removal of temporary stormwater controls and construction equipment or vehicles, and cessation of any construction-related pollutant-generating activities.
- The construction sequence must reflect the following requirements:
  - ✓ Part 2.1.3 (installation of stormwater controls); and
  - ✓ Parts 2.2.14 (stabilization deadlines).

Phase I

Insert General Discription of Phase	
Estimated Start Date of Construction Activities for this Phase	Insert Estimated Date
Estimated End Date of Construction Activities for this Phase	Insert Estimated Date
Estimated Date(s) of Application of Stabilization Measures for Areas of the Site Required to be Stabilized	Insert Estimated Date *[Add additional dates as necessary]*

Estimated Date(s) when Stormwater Controls will be Removed	Insert Estimated Date *[Add additional dates as necessary]*

Phase II

Insert General Discription of Phase	
Estimated Start Date of Construction Activities for this Phase	Insert Estimated Date
Estimated End Date of Construction Activities for this Phase	Insert Estimated Date
Estimated Date(s) of Application of Stabilization Measures for Areas of the Site Required to be Stabilized	Insert Estimated Date *[Add additional dates as necessary]*
Estimated Date(s) when Stormwater Controls will be Removed	Insert Estimated Date *[Add additional dates as necessary]*

[Repeat as needed.]

2.5 Authorized Non-Stormwater Discharges

Instructions (see CGP Parts 1.2.2 and 7.2.5):

- Identify all authorized non-stormwater discharges. The authorized non-stormwater discharges identified in Part 1.2.2 of the 2022 CGP include:
  - ✓ Discharges from emergency fire-fighting activities;
  - ✓ Fire hydrant flushings;
  - ✓ Landscape irrigation;
  - ✓ Waters used to wash vehicles and equipment, provided that there is no discharge of soaps, solvents, or detergents used for such purposes;
  - ✓ Water used to control dust;
  - ✓ Potable water including uncontaminated water line flushings;
  - ✓ External building washdown, provided soaps, solvents and detergents are not used, and external surfaces do not contain hazardous substances as defined in CGP Appendix A (e.g., paint or caulk containing polychlorinated biphenyls (PCBs));
  - ✓ Pavement wash waters provided spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and detergents are not used. You are prohibited from directing pavement wash waters directly into any receiving water, storm drain inlet, or constructed or natural site drainage features, unless the conveyance is connected to a sediment basin, sediment trap, or similarly effective control;
  - ✓ Uncontaminated air conditioning or compressor condensate;
  - ✓ Uncontaminated, non-turbid discharges of ground water or spring water;
  - ✓ Foundation or footing drains where flows are not contaminated with process materials such as solvents or contaminated ground water; and
  - ✓ Uncontaminated construction dewatering water discharged in accordance with Part 2.4.

List of Authorized Non-Stormwater Discharges Present at the Site

Authorized Non-Stormwater Discharge	**Will or May Occur at Your Site?**
Discharges from emergency fire-fighting activities	☐ Yes ☒ No
Fire hydrant flushings	☐ Yes ☐ No
Landscape irrigation	☒ Yes ☐ No
Water used to wash vehicles and equipment	☒ Yes ☐ No
Water used to control dust	☒ Yes ☐ No
Potable water including uncontaminated water line flushings	☐ Yes ☒ No
External building washdown (soaps/solvents are not used and external surfaces do not contain hazardous substances)	☐ Yes ☒ No
Pavement wash waters	☒ Yes ☐ No
Uncontaminated air conditioning or compressor condensate	☐ Yes ☒ No
Uncontaminated, non-turbid discharges of ground water or spring water	☐ Yes ☒ No
Foundation or footing drains	☐ Yes ☒ No
Uncontaminated construction dewatering water	☒ Yes ☐ No

(Note: You are required to identify the likely locations of these authorized non-stormwater discharges on your site map. See Section 2.6, below, of this SWPPP Template.)

2.6 *Site Maps*

Instructions (see CGP Part 7.2.4):

- Attach site maps in Appendix A of the Template. For most projects, a series of site maps is necessary and recommended. The first should show the undeveloped site and its current features. An additional map or maps should be created to show the developed site or, for more complicated sites, show the major phases of development.

These maps must include the following features:

- Boundaries of the property and of the locations where construction will occur, including:
  - ✓ Locations where earth-disturbing activities will occur, noting any phasing of construction activities and any demolition activities;
  - ✓ Approximate slopes before and after major grading activities. Note any areas of steep slopes, as defined in CGP Appendix A;
  - ✓ Locations where sediment, soil, or other construction materials will be stockpiled;
  - ✓ Locations of any crossings of receiving waters;
  - ✓ Designated points where vehicles will exit onto paved roads;
  - ✓ Locations of structures and other impervious surfaces upon completion of construction; and
  - ✓ Locations of on-site and off-site construction support activity areas covered by the permit (see CGP Part 1.2.1.c).
- Locations of any receiving waters, including wetlands, within your site and all receiving waters within one mile downstream of the site's discharge point(s). Indicate which receiving waters are listed as impaired, and which are identified by your State, Tribe, or EPA as Tier 2, Tier 2.5, or Tier 3 waters.
- Any areas of Federally-listed critical habitat for endangered or threatened species within the action area of the site as defined in CGP Appendix A (Helpful resources: CGP Appendix D and www.epa.gov/npdes/construction-general-permit-cgp-threatened-and-endangered-species-eligibility).
- Type and extent of pre-construction cover on the site (e.g., vegetative cover, forest, pasture, pavement, structures).
- Drainage pattern(s) of stormwater and authorized non-stormwater before and after major grading activities.
- Stormwater and authorized non-stormwater discharge locations, including:
  - ✓ Locations where stormwater and/or authorized non-stormwater will be discharged to storm drain inlets, including a notation of whether the inlet conveys stormwater to a sediment basin, sediment trap, or similarly effective control; and
  - ✓ Locations where stormwater or allowable non-stormwater will be discharged directly to receiving waters, including wetlands (i.e., not via a storm drain inlet).
  - ✓ Locations where turbidity benchmark monitoring will take place to comply with Part 3.3, if applicable to your site.
- Locations of all potential pollutant-generating activities identified in Part 7.2.3g (note: you should have those identified in Section 2.3 (Nature of the Construction Activities) in this SWPPP Template).
- Designated areas where construction wastes that are covered by the exception in Part 2.3.3e.ii (i.e., they are not pollutant-generating) will be stored.

- Locations of stormwater controls, including natural buffer areas and any shared controls utilized to comply with the permit.
- Locations where polymers, flocculants, or other treatment chemicals will be used and stored.

SECTION 3: DOCUMENTATION OF COMPLIANCE WITH OTHER FEDERAL REQUIREMENTS

3.1 Endangered Species Protection

Instructions (see CGP Parts 1.1.5, 7.2.9.a, Appendix D, and the "Endangered Species Protection" section of the Appendix H – NOI Form and Instructions as well as resources available at www.epa.gov/npdes/construction-general-permit-cgp-threatened-and-endangered-species-eligibility):

Using the instructions in Appendix D of the permit, determine which criterion listed below (A-F) applies with respect to the protection of endangered species. To make this determination, you must use information from **BOTH** the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). Both the NMFS and USFWS maintain lists of Endangered Species Act-listed (ESA-listed) species and designated critical habitat. Operators must consult both when determining their eligibility.

- Check only 1 box, include the required information, and provide a sound basis for supporting the criterion selected. Select the most conservative criterion that applies.
- Include documentation supporting your determination of eligibility required in the Endangered Species Protection section of the NOI in NeT or the ESA worksheet in CGP Appendix D.

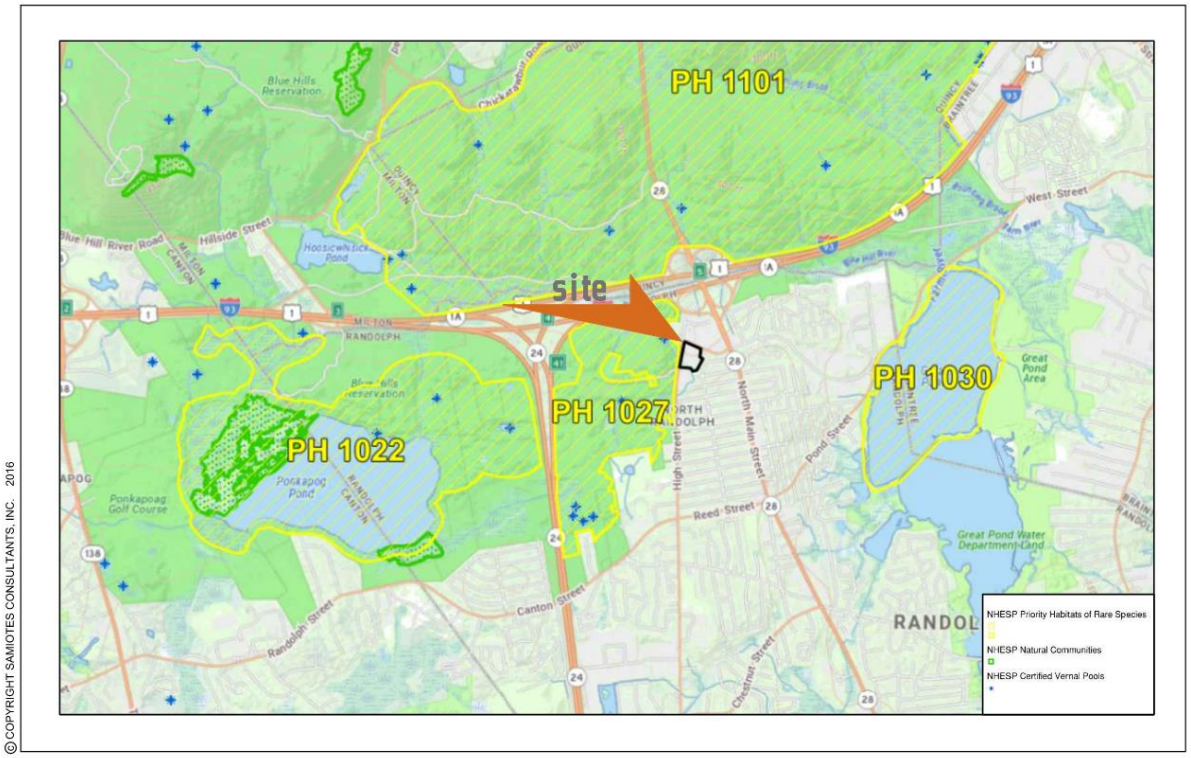
Eligibility Criterion

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

☒ **Criterion A**: <u>No ESA-listed species and/or designated critical habitat present in action area</u>. Using the process outlined in Appendix D of the CGP, you certify that ESA-listed species and designated critical habitat(s) under the jurisdiction of the USFWS or NMFS are not likely to occur in your site's "action area" as defined in Appendix A of the CGP. *Please Note: NMFS' jurisdiction includes ESA-listed marine and estuarine species that spawn in inland rivers.*

☒ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D (Note: reliance on State resources is not acceptable; see CGP Appendix D).

Documentation:



Sketch No. SKCE-004	Job #:	53000.00	Project: YANKEE BUS LINE
Reference Drawing -	Drawn by:	KAH	HEADQUATERS
	Scale:	NTS	Title: NHESP MAP
	Date:	02/15/23	

Samiotes Consultants Inc.
Civil Engineers + Land Surveyors
20 A Street
Framingham, MA 01701
T 508.877.6688
F 508.877.8349
www.samiotes.com

Eligibility Criterion

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

☐ **Criterion B:** Eligibility requirements met by another operator under the 2022 CGP. The construction site's discharges and discharge-related activities were already addressed in another operator's valid certification of eligibility for your "action area" under eligibility Criterion A, C, D, E, or F of the 2022 CGP and you have confirmed that no additional ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS not considered in the that certification may be present or located in the "action area." To certify your eligibility under this criterion, there must be no lapse of NPDES permit coverage in the other CGP operator's certification. By certifying eligibility under this criterion, you agree to comply with any conditions upon which the other CGP operator's certification was based. You must include in your NOI the NPDES ID from the other 2022 CGP operator's notification of authorization under this permit and list any measures that you must comply with. If your certification is based on another 2022 CGP operator's certification under criterion C, you must provide EPA with the relevant supporting information required of existing dischargers in Criterion C.

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

Documentation: Insert Text Here

☐ **Criterion C:** Discharges not likely to result in any short- or long-term adverse effects to ESA-listed species and/or designated critical habitat. ESA-listed species and/or designated critical habitat(s) under the jurisdiction of the USFWS and/or NMFS are likely to occur in or near your site's "action area," and you certify to EPA that your site's discharges and discharge-related activities are not likely to result in any short- or long-term adverse effects to ESA-listed threatened or endangered species and/or designated critical habitat. This certification may include consideration of any stormwater controls and/or management practices you will adopt to ensure that your discharges and discharge-related activities are not likely to result in any short- or long-term adverse effects to ESA-listed species and/or designated critical habitat. To certify your eligibility under this criterion, indicate 1) the ESA-listed species and/or designated habitat located in your "action area" using the process outlined in Appendix D of this permit; 2) the distance between the site and the listed species and/or designated critical habitat in the action area (in miles); and 3) a rationale describing specifically how short- or long-term adverse effects to ESA-listed species will be avoided from the discharges and discharge-related activities. (Note: You must include a copy of your site map from your SWPPP showing the upland and in-water extent of your "action area" with your NOI.)

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

Documentation: Insert Text Here

Eligibility Criterion

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

☐ **Criterion D**: Coordination with USFWS and/or NMFS has successfully concluded.

Coordination between you and the USFWS and/or NMFS has concluded. The coordination must have addressed the effects of your site's discharges and discharge-related activities on ESA-listed species and/or designated critical habitat under the jurisdiction of USFWS and/or NMFS, and resulted in a written confirmation from USFWS and/or NMFS that the effects of your site's discharges and discharge-related activities are not likely to result in any short- or long-term adverse effects. By certifying eligibility under this criterion, you agree to comply with any conditions you must meet for your site's discharges and discharge-related activities to not likely result in any short- or long-term adverse effects. You must include copies of the correspondence with the participating agencies in your SWPPP and this NOI.

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

Documentation: Insert Text Here

Eligibility Criterion

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

☐ **Criterion E:** ESA Section 7 consultation has successfully concluded. Consultation between a Federal agency and the USFWS and/or NMFS under section 7 of the ESA has concluded. Consultations can be either formal or informal, and would have occurred only as a result of a separate Federal action (e.g., during application for an individual wastewater discharge permit or the issuance of a wetlands dredge and fill permit), and the consultation must have addressed the effects of your construction activity's discharges and discharge-related activities on all ESA-listed threatened or endangered species and all designated critical habitat under the jurisdiction of each Service, as appropriate, in your action area. The result of this consultation must be either:

i. A biological opinion currently in effect that determined that the action in question (taking into account the effects of your facility's discharges and discharge-related activities) is likely to adversely affect, but is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The biological opinion must have included the effects of your facility's discharges and discharge-related activities on all the listed species and designated critical habitat in your action area under the jurisdiction of each Service, as appropriate. To be eligible under (i), any reasonable and prudent measures specified in the incidental take statement must be implemented;

ii. Written concurrence (e.g., letter of concurrence) from the applicable Service(s) with a determination that your facility's discharges and discharge-related activities are not likely to adversely affect ESA-listed species and/or designated critical habitat. The concurrence letter must have included the effects of your facility's discharges and discharge-related activities on all the ESA-listed species and/or designated critical habitat on your species list(s) acquired from USFWS and/or NMFS as part of this worksheet.

The consultation does not warrant reinitiation under 50 CFR §402.16; or, if reinitiation of consultation is required (e.g., due to a new species listing, critical habitat designation, or new information), the Federal action agency has reinitiated the consultation and the result of the consultation is consistent with the statements above. (Note: you must include any reinitiation documentation from the Services or consulting Federal agency with your NOI.) -

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

Documentation: Insert Text Here

Eligibility Criterion

Following the process outlined in Appendix D, under which criterion are you eligible for coverage under this permit?

☐ **Criterion F:** Issuance of section 10 permit. Potential take is authorized through the issuance of a permit under section 10 of the ESA by the USFWS and/or NMFS, and this authorization addresses the effects of the site's discharges and discharge-related activities on ESA-listed species and designated critical habitat. You must include copies of the correspondence between yourself and the participating agencies in your SWPPP and your NOI.

☐ Check to confirm you have provided documentation in your SWPPP as required by CGP Appendix D.

Documentation: Insert Text Here

3.2 Historic Property Screening Process

Instructions (see CGP Part 1.1.6, 7.2.9.b, Appendix E, and the "Historic Preservation" section of the Appendix H – NOI Form and Instructions):

Follow the screening process in Appendix E of the permit to determine whether your installation of subsurface earth-disturbing stormwater controls will have an effect on historic properties.

- Include documentation supporting your determination of eligibility.
- To contact your applicable State historic preservation office, information is available at *https://ncshpo.org/directory/*
- To contact your applicable Tribal historic preservation office, information is available at *https://grantsdev.cr.nps.gov/THPO_Review/index.cfm*

Appendix E, Step 1

Do you plan on installing any stormwater controls that require subsurface earth disturbance, including, but not limited to, any of the following stormwater controls at your site? Check all that apply below, and proceed to Appendix E, Step 2.

☐ Dike
☐ Berm
☒ Catch Basin
☐ Pond
☒ Constructed Site Drainage Feature (e.g., ditch, trench, perimeter drain, swale, etc.)
☐ Culvert
☐ Channel
☐ Other type of ground-disturbing stormwater control: Insert Specific Type of Stormwater Control

(Note: If you will not be installing any subsurface earth-disturbing stormwater controls, no further documentation is required for Section 3.2 of the Template.)

Appendix E, Step 2

If you answered yes in Step 1, have prior professional cultural resource surveys or other evaluations determined that historic properties do not exist, or have prior disturbances at the site have precluded the existence of historic properties? ☒ YES ☐ NO

- If yes, no further documentation is required for Section 3.2 of the Template and you may provide the prior documentation in your SWPPP.
  - Insert references and information sources relied upon to determine that prior to your project, no historic properties exist at your site based on available information, including information that may be provided by your applicable SHPO, THPO, or other Tribal representative or references and information sources relied upon to determine that prior earth disturbances may have eliminated he possibility that historic properties exist on your site.
- If no, proceed to Appendix E, Step 3.

Appendix E, Step 3

If you answered no in Step 2, have you determined that your installation of subsurface earth-disturbing stormwater controls will have no effect on historic properties? ☐ YES ☐ NO

- If yes, provide documentation of the basis for your determination. Insert references to documents, studies, or other sources relied upon
- If no, proceed to Appendix E, Step 4.

Appendix E, Steps 4 and 5

If you answered no in Step 3, did the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Office (THPO), or other Tribal representative (whichever applies) respond to you within 15 calendar days to indicate their views as to the likelihood that historic properties are potentially present on your site and may be impacted by the installation of stormwater controls that require subsurface earth disturbance? ☐ YES ☐ NO

- If yes, describe the nature of their response:
  - ☐ Written indication that no historic properties will be affected by the installation of stormwater controls. Insert copies of letters, emails, or other communication between you and the applicable SHPO, THPO, or other Tribal representative
  - ☐ Written indication that adverse effects to historic properties from the installation of stormwater controls can be mitigated by agreed upon actions. Insert copies of letters, emails, or other communication between you and the applicable SHPO, THPO, or other Tribal representative
  - ☐ No agreement has been reached regarding measures to mitigate effects to historic properties from the installation of stormwater controls. Provide a description of any significant remaining disagreements regarding mitigation measures and insert copies of letters, emails, or other communication between you and the applicable SHPO, THPO, or other Tribal representative

☐ Other: Insert copies of letters, emails, or other communication between you and the applicable SHPO, THPO, or other Tribal representative

- If no, no further documentation is required for Section 3.2 of the Template.

3.3 Safe Drinking Water Act Underground Injection Control Requirements

Instructions (see CGP Part 7.2.9.c):

- If you will use any of the identified controls in this section, document any contact you have had with the applicable State agency or EPA Regional Office responsible for implementing the requirements for underground injection wells in the Safe Drinking Water Act and EPA's implementing regulations at 40 CFR Parts 144-147.
- For State UIC program contacts, refer to the following EPA website: https://www.epa.gov/uic.

Do you plan to install any of the following controls? Check all that apply below.

☐ Infiltration trenches (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system)

☐ Commercially manufactured pre-cast or pre-built proprietary subsurface detention vaults, chambers, or other devices designed to capture and infiltrate stormwater flow

☐ Drywells, seepage pits, or improved sinkholes (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system)

If yes, insert copies of letters, emails, or other communication between you and the State agency or EPA regional office.

SECTION 4: EROSION AND SEDIMENT CONTROLS AND DEWATERING PRACTICES

General Instructions (See CGP Parts 2.2 and 7.2.6):

- Describe the erosion and sediment controls that will be implemented at your site to meet the requirements of CGP Part 2.2.
- Describe any applicable stormwater control design specifications (including references to any manufacturer specifications and/or erosion and sediment control manuals/ordinances relied upon).
- Describe any routine stormwater control maintenance specifications.
- Describe the projected schedule for stormwater control installation/implementation.

4.1 Natural Buffers or Equivalent Sediment Controls

Instructions (see CGP Parts 2.2.1 and 7.2.6.b.i, and Appendix F):

This section only applies to you if discharge to a receiving water is located within 50 feet of your site's earth disturbances. If this is the case, consult CGP Part 2.2.1 and Appendix F for information on how to comply with the buffer requirements.

- Describe the compliance alternative (CGP Part 2.2.1.a.i, ii, or iii) that you will implement to meet the buffer requirements, and include any required documentation supporting the alternative selected. For alternative 3, also include why it is infeasible for you to provide and maintain an undisturbed natural buffer of any size. For "linear construction sites" where it is infeasible to implement alternative 1, 2, or 3, also include a description of any buffer width retained and/or supplemental erosion and sediment controls installed. The compliance alternative selected must be maintained throughout the duration of permit coverage. However, if you select a different compliance alternative during your period of permit coverage, you must modify your SWPPP to reflect this change.
- If you qualify for one of the exceptions in CGP Part 2.2.1.b, include documentation related to your qualification for such exceptions.

Buffer Compliance Alternatives

Are there any receiving waters within 50 feet of your project's earth disturbances? ☒ YES ☐ NO

(Note: If no, no further documentation is required for Section 4.1 in the SWPPP Template. Continue to Section 4.2.)

Check the compliance alternative that you have chosen:

☐ (i) I will provide and maintain a 50-foot undisturbed natural buffer.

(Note 1: You must show the 50-foot boundary line of the natural buffer on your site map.)

(Note 2: You must show on your site map how all discharges from your construction disturbances through the natural buffer area will first be treated by the site's erosion and sediment controls. Also, show on the site map any velocity dissipation devices used to prevent erosion within the natural buffer area.)

☒ (ii) I will provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by additional erosion and sediment controls that achieve, in combination, the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.

(Note 1: You must show the boundary line of the natural buffer on your site map.)

(Note 2: You must show on your site map how all discharges from your construction disturbances through the natural buffer area will first be treated by the site's erosion and sediment controls. Also, show on the site map any velocity dissipation devices used to prevent erosion within the natural buffer area.)

- Insert width of natural buffer to be retained

  50' Buffer

  Due to the site constraint of an existing slope of less than or equal to 9 percent for sandy loam, as seen in table 1-3 from appendix F, we proposed the use of double perimeter control consisting of straw wattle and silt fence within the 50' buffer zone along with the 7-day site stabilization requirement.
- Insert either of the following:

  (1) The estimated sediment removal from a 50-foot buffer using applicable tables in Appendix F, Attachment 1. Include information about the buffer vegetation and soil type that predominate at your site

  OR

  (2) If you conducted a site-specific calculation for the estimated sediment removal of a 50-foot buffer, provide the specific removal efficiency, and information you relied upon to make your site-specific calculation
- Insert description of additional erosion and sediment controls to be used in combination with natural buffer area
- Insert the following information:
  - (1) Specify the model or other tool used to estimate sediment load reductions from the combination of the buffer area and additional erosion and sediment controls installed at your site, and
  - (2) Include the results of calculations showing that the combination of your buffer area and the additional erosion and sediment controls installed at your site will meet or exceed the sediment removal efficiency of a 50-foot buffer

Table F-4 Risk Levels for Sites with Average Slopes of > 6 Percent and ≤ 9 Percent

Location \ Soil Type	Clay	Silty Clay Loam or Clay-Loam	Sand	Sandy Clay Loam, Loamy Sand or Silty Clay	Loam, Silt, Sandy Loam or Silt Loam
CNMI / Guam	Moderate	High	Moderate	High	High
Puerto Rico	Moderate	High	Moderate	Moderate	High
Virgin Islands	Moderate	Moderate	Moderate	Moderate	High
American Samoa	High	High	High	High	High
Massachusetts and New Hampshire	Moderate	Moderate	Moderate	Moderate	High
Idaho	Low	Low	Low	Low	Low
New Mexico	Low	Low	Low	Low	Moderate
Washington D.C.	Moderate	Moderate	Moderate	Moderate	High

Table F-9 Estimated 50-foot Buffer Performance in Massachusetts and New Hampshire*

Type of Buffer Vegetation**	Estimated % Sediment Removal				
	Clay	Silty Clay Loam or Clay-Loam	Sand	Sandy Clay Loam, Loamy Sand or Silty Clay	Loam, Silt, Sandy Loam or Silt Loam
Warm-season Grass (i.e., Switchgrass, Lemongrass)	79	90	90	90	90
Cool-season Dense Grass (Kentucky Bluegrass, Smooth Bromegrass, Timothy)	78	90	90	90	90
Tall Fescue Grass	76	90	81	89	90
Medium-density Weeds	66	76	60	72	66

* Applicable for sites with less than nine percent slope
** Characterization focuses on the under-story vegetation

[5] The buffer performances were calculated based on a denuded slope upgradient of a 50-foot buffer and a perimeter controls, as perimeter controls are a standard requirement (see Part 2.2.3).

Table F-7. Alternative 2 Requirements[2]

Risk Level Based on Estimated Soil Erosion	Retain ≥ 50' Buffer	Retain <50' and >30' Buffer	Retain ≤30' and >10' Buffer	Retain ≤ 10' Buffer
Low Risk	No Additional Requirements	No Additional Requirements	Double Perimeter Control	Double Perimeter Control
Moderate Risk	No Additional Requirements	Double Perimeter Control	Double Perimeter Control	Double Perimeter Control and 7-Day Site Stabilization
High Risk	No Additional Requirements	Double Perimeter Control	Double Perimeter Control and 7-Day Site Stabilization	Double Perimeter Control and 7-Day Site Stabilization

☐ (iii) It is infeasible to provide and maintain an undisturbed natural buffer of any size, therefore I will implement erosion and sediment controls that achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.

- Insert rationale for concluding that it is infeasible to provide and maintain a natural buffer of any size
- Insert either one of the following:

  (1) The estimated sediment removal from a 50-foot buffer using applicable tables in Appendix F, Attachment 1. Include information about the buffer vegetation and soil type that predominate at your site

  OR

  (2) If you conducted a site-specific calculation for the estimated sediment removal of a 50-foot buffer, provide the specific removal efficiency, and information you relied upon to make your site-specific calculation
- Insert description of additional erosion and sediment controls to be used in combination with natural buffer area
- Insert the following information:
  - (1) Specify the model or other tool used to estimate sediment load reductions from the combination of the buffer area and additional erosion and sediment controls installed at your site, and
  - (2) Include the results of calculations showing that the combination of your buffer area and the additional erosion and sediment controls installed at your site will meet or exceed the sediment removal efficiency of a 50-foot buffer

☐ I qualify for one of the exceptions in Part 2.2.1.b. (If you have checked this box, provide information on the applicable buffer exception that applies, below.)

Buffer Exceptions

Which of the following exceptions to the buffer requirements applies to your site?

☐ There is no discharge of stormwater to waters of the U.S. through the area between the disturbed portions of the site and any waters of the U.S. located within 50 feet of your site .

(Note: If this exception applies, no further documentation is required for Section 4.1 of the Template.)

☒ No natural buffer exists due to preexisting development disturbances (e.g., structures, impervious surfaces) that occurred prior to the initiation of planning for this project.

(Note 1: If this exception applies, no further documentation is required for Section 4.1 of the Template.)

(Note 2: Where some natural buffer exists but portions of the area within 50 feet of the surface water are occupied by preexisting development disturbances, you must still comply with the one of the CGP Part 2.2.1.a compliance alternatives.)

☐ For "linear construction sites" (defined in Appendix A), site constraints (e.g., limited right-of-way) make it infeasible to meet any of the CGP Part 2.2.1.a compliance alternatives, provided that, to the extent feasible, you limit disturbances within 50 feet of the receiving water. Include documentation here of the following: (1) why it is infeasible for you to meet one of the buffer compliance alternatives, and (2) buffer width retained and/or supplemental erosion and sediment controls to treat discharges to the surface water

☐ The project qualifies as "small residential lot" construction (defined in Appendix A as "a lot being developed for residential purposes that will disturb less than 1 acre of land, but is part of a larger residential project that will ultimately disturb greater than or equal to 1 acre") (see Appendix F, Part F.3.2).

☐ For Alternative 1:

- Insert width of natural buffer to be retained
- Insert applicable requirements based on Table F-1
- Insert description of how you will comply with these requirements

☐ For Alternative 2:

- Insert (1) the assigned risk level based on Appendix F Applicable Table F-2 through F-6 and (2) the predominant soil type and average slope at your site
- Insert applicable requirements based on Appendix F, Table F-7
- Insert description of how you will comply with these requirements

(Note 1: If you alternatively choose to comply with any of the options that are available to other sites in Part 2.2.1.a and F.2.1 of this Appendix, then additional documentation may be needed.)

☐ Buffer disturbances are authorized under a CWA Section 404 permit. Insert description of any earth disturbances that will occur within the buffer area

(Note 1: If this exception applies, no further documentation is required for Section 4.1 of the Template.)

(Note 2: This exception only applies to the limits of disturbance authorized under the Section 404 permit and does not apply to any disturbances within 50 feet of a

receiving water that are adjacent to the disturbances authorized under Section 404 and that are covered by this permit.)

☐ Buffer disturbances will occur for the construction of a water-dependent structure or water access area (e.g., pier, boat ramp, and trail). Insert description of any earth disturbances that will occur within the buffer area

(Note: If this exception applies, no further documentation is required for Section 4.1 of the Template.)

4.2 Perimeter Controls

Instructions (see CGP Parts 2.2.3 and 7.2.6.b.ii):

- Describe sediment controls that will be used (e.g., silt fences, filter berms, compost filter socks, gravel barriers, temporary diversion dikes) to meet the Part 2.2.3 requirement to "install sediment controls along any perimeter areas of the site that are downslope from any exposed soil or other disturbed areas."
- For linear projects (as defined in Appendix A), where you have determined that the use of perimeter controls in portions of the site is infeasible (e.g. due to a limited or restricted right-of-way), document other practices that you will implement to minimize pollutant discharges to perimeter areas of the site.

General

- A system of siltation fences and compost filter socks will be used in unison to mitigate the accumulation of sedimentation off site as a result from construction activities.

Specific Perimeter Controls

Siltation Fence	
Description: The siltation fence shall be installed before the start of construction/ demolition. They shall be 48" high, with wood or metal posts and strong enough to support applied loads. Filter fabric shall be attached to wood posts. They shall be installed along the limit of excavation and as indicated on the drawings.	
Installation	Prior to construction.

Siltation Fence	
Maintenance Requirements	Erosion control devices shall be maintained until all disturbed earth has been paved or vegetated, at which time they shall be removed. After removal, areas disturbed by these devices shall be regraded and seeded. These devices shall be inspected regularly to make sure that they are in good condition. Sediments shall be cleared once they reach 1/3 of the height of the perimeter control. After a storm event, if there is evidence of stormwater circumventing or undercutting the perimeter control, extend controls and/or repair undercut areas to fix the problem To prevent stormwater from circumventing the edge of the perimeter control, install the perimeter control on the contour of the slope and extend both ends of the control up slope (e.g., at 45 degrees) forming a crescent rather than a straight line
Design Specifications	311100 – Erosion and Sediment Control.

[Repeat as needed for individual perimeter controls.]

Wattles	
Description: Wattles shall be placed in rows with ends overlapping each other by 36" minimum. Each row shall be securely anchored in place with stakes installed downstream the filter socks at sufficient spacing to prevent filter socks from moving	
Installation	Prior to construction.

Wattles	
Maintenance Requirements	Erosion control devices shall be maintained until all disturbed earth has been paved or vegetated, at which time they shall be removed. After removal, areas disturbed by these devices shall be regraded and seeded. These devices shall be inspected regularly to make sure that they are in good condition. Sediments shall be cleared once they reach 1/3 of the height of the perimeter control. After a storm event, if there is evidence of stormwater circumventing or undercutting the perimeter control, extend controls and/or repair undercut areas to fix the problem To prevent stormwater from circumventing the edge of the perimeter control, install the perimeter control on the contour of the slope and extend both ends of the control up slope (e.g., at 45 degrees) forming a crescent rather than a straight line
Design Specifications	311100 – Erosion and Sediment Control.

4.3 Sediment Track-Out

Instructions (see CGP Parts 2.2.4 and 7.2.6.b.iii):

- Describe stormwater controls that will be used to minimize sediment track-out.
- Describe location(s) of vehicle exit(s), procedures to remove accumulated sediment off-site (e.g., vehicle tracking), and stabilization practices (e.g., stone pads or wash racks or both) to minimize off-site vehicle tracking of sediment. Also include the design, installation, and maintenance specifications for each control.

General

- The construction entrance shall be placed at the parking lot entrance for The Smith Center, which located South East of the building. In addition to the construction entrance, an geotextile fabric shall be nonwoven fabric conforming to AASHTO M288, Grade C or better will be installed to ensure no debris leaves the site. A mechanical street sweeper shall be utilized clean the existing paved areas on an as-needed basis.

Specific Track-Out Controls

Construction Entrance
Description: The construction entrance shall be a minimum of 50-feet in length and 24-feet wide, and 2 in. of crushed stone. In addition to the construction entrance, a mechanical street sweeper shall be utilized to clean the existing paved areas on an as-needed basis.

Construction Entrance	
Installation	Prior to the start of construction
Maintenance Requirements	The entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto public rights-of-way. All sediment spoiled, dropped, washed, or tracked onto public rights of way must be removed immediately. The area of the construction entrance shall be cleared of all vegetation, roots, and other objectionable material. The filter fabric should be placed on the subgrade prior to the gravel placement. The gravel shall be placed to the specified dimensions depicted on the plans. The filter fabric should be placed on the subgrade prior to the gravel placement. The gravel shall be placed to the specified dimensions depicted on the plans. (Note: At a minimum, you must provide for maintenance that meets the following requirement in CGP Part 2.2.4.d: "Where sediment has been tracked-out from your site onto paved roads, sidewalks, or other paved areas outside of your site, remove the deposited sediment by the end of the same business day in which the track-out occurs or by the end of the next business day if track-out occurs on a non-business day. Remove the track-out by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal. You are prohibited from hosing or sweeping tracked-out sediment into any constructed or natural site drainage feature, storm drain inlet, or receiving water.")
Design Specifications	311100 – Erosion and Sediment Control. Stone shall be clean, crushed stone, ranging from [1 in. to 3 in.] in size. Stone shall not be less than 6 in. think. The rock shall be dumped and spread into position in approximately horizontal layers not to exceed 3 ft. in thickness. It shall be placed to produce a reasonably homogeneous stable fill that contains no segregated pockets of large or small fragments or large unfilled spaces caused by bridging of the larger rock fragments. No compaction is required beyond that resulting from the placing and spreading operations.

[Repeat as needed for individual track-out controls.]

4.4 Stockpiles or Land Clearing Debris Piles Comprised of Sediment or Soil

Instructions (see CGP Parts 2.2.5 and 7.2.6):

- Describe stormwater controls and other measures you will take to minimize the discharge of sediment or soil particles from stockpiled sediment or soil. Include a description of structural practices (e.g., diversions, berms, ditches, storage basins), including design, installation, and maintenance specifications, used to divert flows from stockpiled sediment or soil, retain or detain flows, or otherwise limit exposure and the discharge of pollutants from stockpiled sediment or soil.
- For piles that will be unused for 14 or more days, describe what cover or other appropriate temporary stabilization will be used.
- Also, describe any controls or procedures used to minimize exposure resulting from adding to or removing materials from the pile.

General

- Insert general description of how you will comply with CGP Part 2.2.5

Specific Stockpile Controls

Straw Wattles and Fencing	
Description: Straw wattles and silt fencing are to be placed around the perimeter of the stockpile for however long the stockpile sits on site before re-spreading.	
Installation	Once stockpile is created
Maintenance Requirements	Erosion control devices shall be maintained until all disturbed earth has been paved or vegetated, at which time they shall be removed. After removal, areas disturbed by these devices shall be regraded and seeded. These devices shall be inspected regularly to make sure that they are in good condition. Sediments shall be cleared once they reach 1/3 of the height of the perimeter control. After a storm event, if there is evidence of stormwater circumventing or undercutting the perimeter control, extend controls and/or repair undercut areas to fix the problem To prevent stormwater from circumventing the edge of the perimeter control, install the perimeter control on the contour of the slope and extend both ends of the control up slope (e.g., at 45 degrees) forming a crescent rather than a straight line
Design Specifications	311100 – Erosion and Sediment Control.

[Repeat as needed for individual stockpile controls.]

4.5 Minimize Dust

Instructions (see CGP Parts 2.2.6 and 7.2.6):

Describe controls and procedures you will use at your site to minimize the generation of dust.

General

- The contractor shall employ dust control methods and materials at all times using sprinkled water or other approved means. Do not use oil or similar penetrants. Chemical materials may not be used on subgrades of areas to be seeded or planted. Water used for dust control measure shall be applied using appropriate quantities and equipment.

- Insert general description of how you will comply with CGP Part 2.2.6

Specific Dust Controls

Water for dust control	
Description: On-site truck or sprinkler	
Installation	As Needed
Maintenance Requirements	Water used for dust control and equipment washes shall be clean and free of salt, oil, and other injurious materials. If water is not available on site, the contractor shall provide a source of water for dust control; either a water truck on-site or permitted connection to City Fire Hydrant throughout the period of construction. No calcium chloride may be used
Design Specifications	N/A

[Repeat as needed for individual dust controls.]

Temporary Seeding	
Description: ▪ Grass seed for temporary seed cover shall be previous year's crop. Not more than 0.5% by weight shall be weed seed and not more than 1.75% by weight crop seed. Seed shall be delivered to the site in sealed containers, labeled with name of seed grower and seed formula, in form stated below. Seed shall be dry and free of mold. ▪ During construction it may be necessary to temporarily stabilize areas that will not be brought to final grade for a period longer than 14 working days. Temporary seeding is accomplished using fast-growing grass seed species such as ryegrass.	
Installation	To be installed when grades are exposed for longer than 14 days. Grass seed shall be spread by mechanical spreader at a rate of 0.40 lb./100 sq. ft. Following seeding, area shall be lightly raked to mingle seed with the top 1/8 to 1/4 in. of soil. Areas shall then be smoothed and rolled. Following rolling, entire area shall be watered until equivalent of a 2 in. depth of water has been applied to entire seeded surface, at a rate which will not dislodge seed. Watering shall be repeated thereafter as frequently as required to prevent drying of surface, until grass attains an average height of 1-1/2 in.
Maintenance Requirements	• Inspect weekly to see if stands are adequate. • Check for damage after heavy rains. • Stands should be uniform and dense. • Fertilize, reseed, and mulch damaged and sparse areas immediately. Track or tie down mulch as necessary. • Seeds should be supplied with adequate moisture. • Furnish water as needed.

Temporary Seeding	
Design Specifications	See specification 31 25 00 Erosion and Sediment Control.

4.6 Minimize Steep Slope Disturbances

Instructions (see CGP Parts 2.2.7 and 7.2.6):

- Describe how you will minimize the disturbance to steep slopes (as defined by CGP Appendix A).
- Describe controls (e.g., erosion control blankets, tackifiers), including design, installation and maintenance specifications, that will be implemented to minimize sediment discharges from slope disturbances.

General

Steep slopes are not anticipated to occur on this project. Except where specified slope is indicated on Drawings, fill slopes shall be limited to a grade of 2:1 (horizontal: vertical), cut slopes shall be limited to a grade of 1.5:1.

Specific Steep Slope Controls

Insert name of steep slope control to be installed	
Description: Insert description of steep slope control to be installed	
Installation	Insert approximate date of installation
Maintenance Requirements	Insert maintenance requirements for the steep slope control
Design Specifications	Include copies of design specifications here

[Repeat as needed for individual steep slope controls.]

4.7 Topsoil

Instructions (see CGP Parts 2.2.8 and 7.2.6):

- Describe how topsoil will be preserved and identify these areas and associated control measures on your site map(s).
- If it is infeasible for you to preserve topsoil on your site, provide an explanation for why this is the case.

General

- All temporary stockpiles will be surrounded by wattles and silt fences to minimize erosion and limit the discharge of pollutants. Refer to stockpile controls in Section 4.4
- Insert general description of how you will comply with CGP Part 2.2.8. If it is infeasible for you to comply with the requirement, include an explanation of why this is the case.

Specific Topsoil Controls

Insert name of topsoil control to be installed	
Description: Insert description of topsoil control to be installed	
Installation	Insert approximate date of installation
Maintenance Requirements	Insert maintenance requirements for the topsoil control
Design Specifications	Include copies of design specifications here

[Repeat as needed for individual topsoil controls.]

4.8 Soil Compaction

Instructions (see CGP Parts 2.2.9 and 7.2.6):

- In areas where final vegetative stabilization will occur or where infiltration practices will be installed, describe the controls, including design, installation, and maintenance specifications that will be used to restrict vehicle or equipment access or condition the soil for seeding or planting.

General

- Insert general description of how you will comply with CGP Part 2.2.9

Areas with fill, backfill and subgrades will be required for compaction. This includes any earthwork, paving, drainage trenches and retaining walls. See respective specifications for all description and maintenance requirements.

Specific Soil Compaction Controls

Insert name of soil compaction control to be installed	
Description: Insert description of soil compaction control to be installed	
Installation	Insert approximate date of installation
Maintenance Requirements	Insert maintenance requirements for the soil compaction control
Design Specifications	Include copies of design specifications here

[Repeat as needed for individual soil compaction controls.]

4.9 Storm Drain Inlets

Instructions (see CGP Parts 2.2.10 and 7.2.6.iv):

- Describe controls (e.g., inserts, rock-filled bags, or block and gravel) including design, installation, and maintenance specifications that will be implemented to protect all inlets that carry stormwater flow from your site to a receiving water, provided you have the authority to access the storm drain inlet. Inlet protection measures are not required when storm drain inlets to which your site discharges are conveyed to a sediment basin, sediment trap, or similarly effective control.

General

- Catch Basin inserts shall be used to filter suspended sediments from entering stormwater flow.
- Insert general description of how you will comply with CGP Part 2.2.10
- Where inlet protection measures are not required because the storm drain inlets to which your site discharges are conveyed to a sediment basin, sediment trap, or similarly effective control, include a short description of the control that receives the stormwater flow from the site.

Specific Storm Drain Inlet Controls

Catch Basin	
Description: Catch Basin insert shall be installed in retained existing and proposed catch basins and area drains as shown on Construction Documents and as required by the Engineer of Record. Catch basin filters shall be manufactured from a woven polypropylene geotextile and sewn by a double needle machine, using a high strength nylon thread. Seams have a certified average wide width strength per ASTM D-4884 of 165.0 lbs./in. The filters will be manufactured to fit the opening of the catch basin or drop inlet. The filters will have the following features: two dump straps attached at the bottom to facilitate the emptying of the filters; the filters will also have lifting loops as an integral part of the system to be used to lift the filters from the basin. The filters will have a restraint cord approximately halfway up the sack to keep the sides away from the catch basin walls; this yellow cord shall also be a visual means of indicating when the sack should be emptied.	
Installation	Prior to the start of construction

Catch Basin	
Maintenance Requirements	Catch basin, filters shall be placed at all inlets to drainage structures as structures are installed and prior to construction. Outlet protection work shall be constructed before runoff is allowed to enter the drainage system. Construction and location of catch basin filters shall be as indicated on the Drawings. Once the strap is covered with sediment, the catch basin filter should be emptied, cleaned and placed back into the basin with a depth of 6 inches. The Contractor shall inspect the condition of catch basin insert after each rainstorm and during major rain events. Catch basin insert shall be cleaned periodically to remove and disposed of accumulated debris as required. Silt sacks, which become damaged during construction operations, shall be repaired or replaced immediately at no additional cost to the Department. When emptying the catch basin insert, the contractor shall take all due care to prevent sediment from entering the structure. Any silt or other debris found in the drainage system at the end of construction shall be removed at the Contractors expense. The silt and sediment from the catch basin insert shall be legally disposed of offsite. Under no condition shall silt and sediment from the insert be deposited on site and used in construction. All curb openings shall be blocked to prevent stormwater from bypassing the device. (Note: At a minimum, you must comply with following requirement in CGP Part 2.2.10.b: "Clean, or remove and replace, the inlet protection measures as sediment accumulates, the filter becomes clogged, and/or performance is compromised. Where there is evidence of sediment accumulation adjacent to the inlet protection measure, remove the deposited sediment by the end of the same business day in which it is found or by the end of the following business day if removal by the same business day is not feasible.")
Design Specifications	311100 – Erosion and Sediment Control.

[Repeat as needed for individual storm drain inlet controls.]

4.10 Constructed Site Drainage Feature

Instructions (see CGP Parts 2.2.11 and 7.2.6):

If you will be installing a constructed site drainage feature, describe control practices (e.g., erosion controls and/or velocity dissipation devices such as check dams and sediment traps), including design specifications and details (volume, dimensions, outlet structure), that will be implemented at the construction site.

General

- Check Dams , riprap , and/ or swales will be installed to control stormwater discharges, including both peak flowrates and total stormwater volume, to minimize channel and streambank erosion and scour in the immediate vicinity of discharge points

Specific Constructed Site Drainage Features

Insert name of constructed site drainage feature to be installed	
Description: Insert description of the constructed site drainage feature to be installed	
Installation	Insert approximate date of installation
Maintenance Requirements	Insert maintenance requirements for the constructed site drainage feature
Design Specifications	Include copies of design specifications here

[Repeat as needed for individual constructed site drainage features.]

4.11 Sediment Basins or Similar Impoundments

Instructions (see CGP Parts 2.2.12 and 7.2.6.b.v):

If you will install a sediment basin or similar impoundment, include design specifications and other details (volume, dimensions, outlet structure) that will be implemented in conformance with CGP Parts 2.2.12 and 7.2.6.b.iv.

- Sediment basins must be situated outside of receiving waters and any natural buffers established under CGP Part 2.2.1; and designed to avoid collecting water from wetlands.
- At a minimum, sediment basins provide storage for either (1) the calculated volume of runoff from the 2-year, 24-hour storm (see https://www.epa.gov/npdes/construction-general-permit-2-year-24-hour-storm-frequencies), or (2) 3,600 cubic feet per acre drained.
- Sediment basins must also utilize outlet structures that withdraw water from the surface, unless infeasible.
- Use erosion controls and velocity dissipation devices to prevent erosion at inlets and outlets.

General

- Insert general description of how you will comply with CGP Part 2.2.12. If you have determined that it is infeasible for you to utilize an outlet structure that discharges from the surface, provide an explanation for why this is the case.

Specific Sediment Basin Controls

Sediment Basin	
Description: Sediment Basin	
Installation	As needed

Sediment Basin	
Maintenance Requirements	Situate the basin or impoundment outside of any receiving water. and any natural buffers established Design the basin or impoundment to avoid collecting water from wetlands Basin to be sized to provide storage for either: The calculated volume of runoff from a 2-year, 24-hour storm; or 3,600 cubic feet per acre drained Utilize outlet structures that withdraw water from the surface of the sediment basin or similar impoundment, unless infeasible Use erosion controls and velocity dissipation devices to prevent erosion at inlets and outlets Remove accumulated sediment to maintain at least one-half of the design capacity and conduct all other appropriate maintenance to ensure the basin or impoundment remains in effective operating condition (Note: At a minimum, you must comply with following requirement in CGP Part 2.2.12.f: "Remove accumulated sediment to maintain at least one-half of the design capacity and conduct all other appropriate maintenance to ensure the basin or impoundment remains in effective operating condition.")
Design Specifications	Include copies of design specifications here

[Repeat as needed for individual sediment basin controls.]

4.12 Chemical Treatment

Instructions (see CGP Parts 2.2.13 and 7.2.6.b.vi):

If you are using treatment chemicals (e.g., polymers, flocculants, coagulants) at your site, provide details for each of the items below. This information is required as part of the SWPPP requirements in CGP Part 7.2.6.b.vi.

Soil Types
List all the soil types including soil types expected to be exposed during construction in areas of the project that will drain to chemical treatment systems and those expected to be found in fill material: N/A

Treatment Chemicals
List all treatment chemicals that will be used at the site and explain why these chemicals are suited to the soil characteristics: N/A
Describe the dosage of all treatment chemicals you will use at the site or the methodology you will use to determine dosage: N/A

Provide information from any applicable Safety Data Sheets (SDS): N/A

Describe how each of the chemicals will be stored consistent with CGP Part 2.2.13c: N/A

Include references to applicable State or local requirements affecting the use of treatment chemicals, and copies of applicable manufacturer's specifications regarding the use of your specific treatment chemicals and/or chemical treatment systems: N/A

Special Controls for Cationic Treatment Chemicals (if applicable)
If the applicable EPA Regional Office authorized you to use cationic treatment chemicals, include the official EPA authorization letter or other communication, and identify the specific controls and implementation procedures designed to ensure that your use of cationic treatment chemicals will not lead to a discharge that does not meet water quality standards: Insert (1) any letters or other documents sent from the EPA regional office concerning your use of cationic treatment chemicals, and (2) description of any specific controls you are required to implement

Schematic Drawings of Stormwater Controls/Chemical Treatment Systems
Provide schematic drawings of any chemically-enhanced stormwater controls or chemical treatment systems to be used for application of treatment chemicals: Insert drawings here

Training
Describe the training that personnel who handle and apply chemicals have received prior to permit coverage, or will receive prior to the use of treatment chemicals: Insert text here

4.13 Dewatering Practices

Instructions (see CGP Parts 2.4 and 7.2.6):

If you will be discharging accumulated stormwater and/or ground water drained from building foundations, vaults, trenches, or other similar points of accumulation, include design specifications and details of all dewatering practices that are installed and maintained to comply with CGP Part 2.4.

- Do not place dewatering controls on steep slopes.
- Use a suitable filtration device if dewatering water is found or expected to contain materials that cause a visible sheen on the water surface or visible oily deposits on the bottom or shoreline of the receiving water.
- Use well-vegetated, upland areas of the site to infiltrate dewatering water before discharging. Do not use receiving waters as part of the treatment area.
- Use stable, erosion-resistant surfaces to discharge from dewatering controls. Additionally, at all points where dewatering water is discharged, comply with the velocity dissipation requirements of Part 2.2.11.

General

- Dewatering: Prevent water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area. Under no circumstances shall pipe be installed in water. Keep all trenches free from water until they have been backfilled

Specific Dewatering Practices

Dewatering	
Description: Dewatering shall be used to prevent damages, reduce erosion and control runoff. The discharge water generated by the construction dewatering will be directed to a temporary detention basin or settling basin as permitted by state regulation. The pumping discharge shall not be allowed to enter directly into the wetlands. The water from the work areas shall be pumped to a temporary sedimentation and de-watering basin. Approximately 70 percent sedimentation trapping efficiency shall be achieved in sizing the basins to ensure that the basins are adequate to prevent overtopping from dewatering and to provide the required filtering. The outlet from the basin shall be located so as not to cause erosion of the surrounding area. Locations of the temporary sedimentation and de-watering basins are to be selected by the Contractor within Limit of Work Layout subject to approval from the Design Engineer.	
Installation	As Needed
Maintenance Requirements	Inspect basin at least twice daily during dewatering operations Repair any damages to the basin immediately. Clean basin outlet daily. Remove any debris immediately. Remove sediments frequently to maintain efficiency and function of the basin. Legally dispose sediments outside of wetland areas at a location approved by the Engineer. Monitor dewatering systems continuously. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations. Comply with governing EPA notification regulations before beginning dewatering. Comply with hauling and disposal regulations of authorities having jurisdiction. At the conclusion of construction dewatering activities, any and all well point and casings, and equipment will be removed from the site. Insert maintenance requirements for the dewatering practice. (Note: At a minimum, you must comply with following requirement in CGP Part 2.4: "For backwash water, either haul it away for disposal or return it to the beginning of the treatment process; replace and clean the filter media used in dewatering devices when the pressure differential equals or exceeds the manufacturer's specifications.")
Design Specifications	Include copies of design specifications here

[Repeat as needed for individual dewatering practices.]

4.14 Other Stormwater Controls

Instructions:

– Describe any other stormwater controls that do not fit into the above categories.

General

- Insert general description of the problem this control is designed to address

Specific Stormwater Control Practices

Insert name of other stormwater controls to be installed	
Description: Insert description of stormwater control to be installed	
Installation	Insert approximate date of installation
Maintenance Requirements	Insert maintenance requirements for the stormwater control
Design Specifications	If applicable, include copies of design specifications here

[Repeat as needed.]

4.15 Site Stabilization

Instructions (see CGP Parts 2.2.14 and 7.2.6.b.vii):

The CGP requires you to immediately initiate stabilization when work in an area of your site has permanently or temporarily stopped, and to complete certain stabilization activities within prescribed deadlines. Construction projects disturbing more than 5 acres at any one time have a different deadline than projects disturbing 5 acres or less at any one time. See CGP Part 2.2.14.a. Construction projects in arid, semi-arid, and drought-stricken areas during the seasonally dry period and projects discharging to a sediment- or nutrient-impaired water or a Tier 2, 2.5, or 3 water have different stabilization deadlines. See CGP Part 2.2.14.b. For your SWPPP, you must include the following:

– Describe the specific vegetative and/or non-vegetative practices that will be used to stabilize exposed soils where construction activities have temporarily or permanently ceased. Avoid using impervious surfaces for stabilization whenever possible.
– The stabilization deadline(s) that will be met in accordance with Part 2.2.14.a and 2.2.14.b.
– Once you begin construction, consider using the Grading/Stabilization Activities log in Appendix H of the Template to document your compliance with the stabilization requirements in CGP Part 2.2.14.

Total Amount of Land Disturbance Occurring at Any One Time

☒ *Five Acres or less*

☐ *More than Five Acres*

Use this template box if you are <u>not</u> located in an arid, semi-arid, or drought-stricken area and are not discharging to a sediment- or nutrient-impaired water or Tier 2, Tier 2.5, or Tier 3 water.

Temporary Seedin	
☒ *Vegetative* ☐ *Non-Vegetative* ☒ *Temporary* ☐ *Permanent*	
Description: • During construction it may be necessary to temporarily stabilize areas that will not be brought to final grade for a period longer than 14 working days. Temporary seeding is accomplished using fast-growing grass seed species such as ryegrass. Or, when not feasible either wood chips and straw mulch shall be applied. • All exposed soil finish grades shall be immediately landscaped, riprapped, loamed, seeded, mulched or otherwise protected and stabilized as shown on the drawings with a layer of straw mulch hay.	
Installation	To be installed when grades are exposed for longer than 14 days
Completion	As needed
Maintenance Requirements	· Inspect weekly to see if stands are adequate. · Check for damage after heavy rains. · Stands should be uniform and dense. · Fertilize, reseed, and mulch damaged and sparse areas immediately. · Track or tie down much as necessary. · Seeds should be supplied with adequate moisture. · Furnish water as needed. · Correct deficiencies as needed
Design Specifications	See specification 31 25 00 erosion and sediment control

Use this template box if you are discharging to a sediment- or nutrient-impaired water or to a water that is identified by your State, Tribe, or EPA as Tier 2, Tier 2.5, or Tier 3 for antidegradation purposes.

Straw	
☐ *Vegetative* ☐ *Non-Vegetative* ☒ *Temporary* ☐ *Permanent*	
Description: • All exposed soil finish grades shall be immediately landscaped, riprapped, loamed, seeded, mulched or otherwise protected and stabilized as shown on the drawings with a layer of straw mulch hay. • Outside of the growing season, exposed soil finish grade surfaces shall be stabilized with a layer of straw hay until climate conditions allow for seeding.	
Installation	Exposed grades for longer than 14 days
Completion	As Needed
Maintenance Requirements	• Inspect weekly • Correct deficiencies as needed
Design Specifications	N/A

[Repeat as needed for additional stabilization practices.]

Use this template box if unforeseen circumstances have delayed the initiation and/or completion of vegetative stabilization. Note: You will not be able to include this information in your initial SWPPP. If you are affected by circumstances such as those described in CGP Part 2.2.14.b.ii, you will need to modify your SWPPP to include this information.

Insert name of site stabilization practice	
☐ *Vegetative* ☐ *Non-Vegetative* ☐ *Temporary* ☐ *Permanent*	
Description: ▪ Insert description of stabilization practice to be installed ▪ Note how design will meet requirements of Part 2.2.14.b.ii	
Justification	Insert description of circumstances that prevent you from meeting the deadlines required in CGP CGP Parts 2.2.14.a
Installation and completion schedule	**Vegetative Measures:** Describe the schedule you will follow for initiating and completing vegetative stabilization ▪ Approximate installation date: Insert approximate date ▪ Approximate completion date: Insert the approximate date
	Non-Vegetative Measures: *(Must be completed within 14 days of the cessation of construction if disturbing 5 acres or less; within 7 days if disturbing more than 5 acres)* ▪ Approximate installation date: Insert the approximate date ▪ Approximate completion date: Insert the approximate date
Maintenance Requirements	Insert maintenance requirements for the stabilization practice
Design Specifications	Include copies of design specifications here

[Repeat as needed for additional stabilization practices.]

SECTION 5: POLLUTION PREVENTION CONTROLS

5.1 Potential Sources of Pollution

Instructions (see CGP Part 7.2.3.g):

- Identify and describe all pollutant-generating activities at your site (e.g., paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal).
- For each pollutant-generating activity, include an inventory of pollutants or pollutant constituents associated with that activity (e.g., sediment, fertilizers, and/or pesticides, paints, solvents, fuels), which could be exposed to rainfall or snowmelt, and could be discharged in stormwater from your construction site. You must take into account where potential spills and leaks could occur that contribute pollutants to stormwater discharges, and any known hazardous or toxic substances, such as PCBs and asbestos, that will be disturbed or removed during construction.

Construction Site Pollutants

Insert text or use table below

Pollutant-Generating Activity	**Pollutants or Pollutant Constituents** (That could be discharged if exposed to stormwater)	**Location on Site** (Or reference SWPPP site map where this is shown)
Paving	Petroleum	Parking and Driveways
Landscaping	Fertilizers, sediment	Within limit of works
Grading	Sediment	Within limits of work
Construction vehicles	Gasoline, diesel fuel, hydraulic fluids, grease	Within limits of work

[Include additional rows as necessary.]

5.2 Spill Prevention and Response

Instructions (see CGP Parts 2.3.6 and 7.2.6.b.viii):

- Describe procedures you will use to prevent and respond to leaks, spills, and other releases. You must implement the following at a minimum:
  - ✓ Procedures for expeditiously stopping, containing, and cleaning up spills, leaks, and other releases. Identify the name or title of the employee(s) responsible for detection and response of spills or leaks; and
  - ✓ Procedures for notification of appropriate facility personnel, emergency response agencies, and regulatory agencies where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity consistent with Part 2.3.6 and established under either 40 CFR part 110, 40 CFR part 117, or 40 CFR part 302, occurs during a 24-hour period. Contact information must be in locations that are readily accessible and available to all employees.
- Some projects/site may be required to develop a Spill Prevention Control and Countermeasure (SPCC) plan under a separate regulatory program (Section 311 of the CWA). If you are required to develop an SPCC plan, or you already have one, you should include references to the relevant requirements from your plan.

- **Material Management Practices:**
  The following are the material management practices that shall be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff.
- **Good Housekeeping:**
  The following good housekeeping practices will be followed on site during the construction project.
  1. A concerted effort shall be made to store only enough product required to complete a particular task.
  2. All materials stored on site shall be stored in a neat and orderly fashion in their appropriate containers and, if possible, under a roof or other secure enclosure.
  3. Products shall be kept in their original containers with the original manufacturer's label.
  4. Substances shall not be mixed with one another unless recommended by the manufacturer.
  5. Whenever possible, all of a product shall be used up before disposing of the container.
  6. Manufacturer's recommendations for proper use and disposal shall be followed.
  7. The site superintendent shall perform a daily site inspection to ensure proper use and disposal of materials on site.
- **Hazardous Products:**
  The following practices are intended to reduce the risks associated with hazardous materials.
  1. Products shall be kept in original containers unless they are not resealable.
  2. Where feasible, the original labels and material safety data shall be retained, whereas they contain important product information.
  3. If surplus product must be disposed, follow manufacturer's or local and state recommended methods for proper disposal.
- **Product Specific Practices:**
  The following product specific practices shall be followed on site:

Petroleum Products:
All on site vehicles shall be monitored for leaks and receive regular preventative maintenance to reduce the risk of leakage. Petroleum products shall be stored in tightly sealed containers which are clearly labeled. Any bituminous concrete or asphalt substances used on site shall be applied according to the manufacturer's recommendations.

Fertilizers:
Fertilizers shall be applied in the minimum amounts recommended by the manufacturer. Once applied, fertilizers shall be worked into the soil to limit exposure to stormwater. Storage shall be in a covered shed or trailer. The contents of any partially used bags of fertilizers shall be transferred to a sealable plastic bag or bin to avoid spills. Fertilizers shall be applied in the minimum amounts recommended by the manufacturer. Once applied, fertilizers shall be worked into the soil to limit exposure to stormwater. Storage shall be in a covered shed or trailer. The contents of any partially used bags of fertilizers shall be transferred to a sealable plastic bag or bin to avoid spills.

Paints:
All containers shall be tightly sealed and stored when not required for use. Excess paint shall not be discharged into any catch basin, drain manhole, or any portion of the stormwater management system. Excess paint shall be properly disposed of according to manufacturer's recommendations or State and local regulations.

Concrete Trucks:
Concrete trucks shall not be allowed to wash out or discharge surplus concrete or drum wash water on site.

- **Spill Control Practices:**
  In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices shall be followed for spill prevention and cleanup:
  1. Manufacturer's recommended methods for cleanup shall be readily available at the on site trailer and site personnel shall be made aware of the procedures and the location of the information.
  2. Materials and equipment necessary for spill cleanup shall be kept in the material storage area on site. Equipment and materials shall include, but not be limited to brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.
  3. All spills shall be cleaned up immediately after discovery.
  4. The spill area shall be kept well ventilated and personnel shall wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
  5. Spills of toxic or hazardous material shall be reported to the appropriate State and/or local authority in accordance with local and/or State regulations.
  6. The spill prevention plan shall be adjusted to include measures to prevent a particular type of spill from reoccurring and how to clean up the spill if there is another occurrence. A description of the spill, what caused it, and the clean up measures shall also be included.
  7. The Town of Needham or their assigned designee shall be the spill prevention and cleanup coordinator. The c Saugus shall designate at least three other site personnel who will be trained in the spill control practices identified above.

If a substantial release occurs that is equal to or exceeds a reportable quantity (RQ) as defined under either 40 CFR Part 110, 40 CFR Part 117, or 40 CFR Part 302, site personnel must notify the

National Response Center (NRC) at 1-800-424-8802 as soon as knowledge of the discharge is obtained.
Additionally, releases exceeding an RQ as identified in the Massachusetts Contingency Plan

(310 CMR 40.0000) must be reported to the MA DEP. The local fire department should also be informed.5.3 Fueling and Maintenance of Equipment or Vehicles

Instructions (see CGP Parts 2.3.1 and 7.2.6):

- Describe equipment/vehicle fueling and maintenance practices that will be implemented to eliminate the discharge of spilled or leaked chemicals (e.g., providing secondary containment *(examples: spill berms, dikes, spill containment pallets)* and cover where appropriate, and/or having spill kits readily available.)

General

- Several types of vehicles and equipment will be used on-site throughout the project, including but not limited to graders, scrapers, excavators, loaders, trucks and trailers, backhoes, and forklifts. All major equipment/vehicle maintenance will be performed off-site. When equipment fueling must occur on-site, the fueling activity will occur in the staging area.
- Insert general description of how you will comply with the CGP Part 2.3.1

Specific Pollution Prevention Practices

Fueling and Maintenance of Equipment or Vehicles	
Description: If necessary, only minor equipment maintenance will occur on-site. All equipment fluids generated from maintenance activities will be disposed of into designated drums stored on spill pallets. Absorbent, spill-cleanup materials and spill kits will be available at the combined staging and materials storage area.	
Implementation	As Needed
Maintenance Requirements	Equipment shall be inspected daily.
Design Specifications	N/A

[Repeat as needed.]

5.4 Washing of Equipment and Vehicles

Instructions (see CGP Parts 2.3.2 and 7.2.6):

- Describe equipment/vehicle washing practices that will be used to minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other types of wash waters (e.g., locating activities away from receiving waters and storm drain inlets or constructed or natural site drainage features and directing wash waters to a sediment basin or sediment trap, using filtration devices, such as filter bags or sand filters, or using other similarly effective controls).
- Describe how you will prevent the discharge of soaps, detergents, or solvents and provide storage by either (1) cover (*examples: plastic sheeting or temporary roofs*) to prevent these detergents from coming into contact with rainwater, or (2) a similarly effective means designed to minimize the discharge of pollutants from these areas.

General

- Construction equipment and vehicles shall be rinsed of dirt and debris before being stored or leaving the site

Specific Pollution Prevention Practices

Washing of Equipment and Vehicles	
Description: ▪ Construction vehicles shall be rinsed thoroughly of dirt and debris at the construction entrance before leaving the site. ▪ Concrete trucks will wash out, or discharge surplus concrete or drum wash water, at the site in the staging area. Concrete pours will not be conducted during or before an anticipated storm event. Concrete mixer trucks and chutes will be washed in the designated area or concrete will be properly disposed of off-site. ▪ A washout area will be constructed before concrete pours occur on the site, if required. It shall be lined with a plastic sheet (6 mils thick) free of any holes or tears. Signs shall be posted marking designated washout areas to ensure the concrete equipment operators use the proper facility. ▪ Washing requiring soap or solvents shall be conducted in a tub, bucket, or barrier to contain contaminated water runoff. Wash water shall be discarded in the concrete washout station.	
Implementation	Washout area will be installed before concrete is poured,
Maintenance Requirements	The washout area will be inspected daily to ensure all concrete washing is being discharges to the washout area, and no tears or leaks are present. When the temporary washout is full or no longer needed for the project, the hardened concrete be removed and disposed of legally.
Design Specifications	N/A

[Repeat as needed.]

5.5 Storage, Handling, and Disposal of Building Products, Materials, and Wastes

Instructions (see CGP Parts 2.3.3 and 7.2.6):

– For any of the types of building products, materials, and wastes in Sections 5.5.1-5.5.6 below that you expect to use or store at your site, provide the information on how you will comply with the corresponding CGP provision and the specific practices that you will employ.

5.5.1 Building Materials and Building Products

(Note: Examples include asphalt sealants, copper flashing, roofing materials, adhesives, concrete admixtures, and gravel and mulch stockpiles.)

General

- All building products shall be stored under temporary cover

Specific Pollution Prevention Practices

Building Products	
Description: Building products shall be covered with an impermeable barrier at the end of each working day.	
Implementation	When necessary, as building products arrive.
Maintenance Requirements	Materials shall be stored in a dry location, off the ground and in such manner as to prevent damage, and intrusion of foreign matter and weather. All materials which have become damaged or otherwise unfit for use during delivery or storage shall be replaced at the expense of the contractor.
Design Specifications	N/A

[Repeat as needed.]

5.5.2 Pesticides, Herbicides, Insecticides, Fertilizers, and Landscape Materials

General

- Insert general description of how you wil comply with CGP Part 2.3.3.b

Specific Pollution Prevention Practices

Pesticides, Herbicides, Insecticides, Fertilizers, and Landscape Materials	
Description: Pesticides, herbicides, insecticides, fertilizers, and landscape materials shall be implemented within lawn areas and athletic fields.	
Implementation	Fertilizer shall not be applied outside the growing season, defined as April 15th to October 31st. No late season fertilization is allowed. No fertilizer shall be applied during rainfall or before prediction of rain.

Pesticides, Herbicides, Insecticides, Fertilizers, and Landscape Materials	
Maintenance Requirements	Spraying of insecticides or herbicides shall be done by State-licensed professionals. Spraying for insects, pests and diseases shall conform to the National Arborist Association Standards under the section entitled "Standards for Pesticide Application Operations", as currently adopted and as approved by the Landscape Architect. All insecticides, pesticides, and herbicides shall be EPA-approved and shall conform to the requirements MCRG: Massachusetts Control Recommendation Guide for Insect, Disease, and Weed Pests of Shade Trees and Woody Ornamentals, latest edition, University of Massachusetts, Amherst, College of Food and Natural Resources. Absolutely no debris may be left on the site. Excavated material shall be removed, as directed. Repair any damage to the site or structures to restore them to their original condition, as directed by the Landscape Architect. Do not allow fertilizer to spill onto pavements or hard surfaces. Fertilizer inadvertently applied to impervious surfaces shall be swept or blown back into the target area or returned to its original container.
Design Specifications	N/A

[Repeat as needed.]

5.5.3 Diesel Fuel, Oil, Hydraulic Fluids, Other Petroleum Products, and Other Chemicals

General

Diesel fuel, oil, hydraulic fluids, other petroleum products and other chemicals shall not be stored on site. Truck beds shall be kept free of kerosene, gasoline, fuel, oil, solvents, or other materials. Contractor to provide off-site trucks to refuel on-site vehicles (backhoes, bulldozers, etc.).

Specific Pollution Prevention Practices

N/A	
Description: Insert description of practice to be implemented	
Implementation	Insert approximate date of implementation
Maintenance Requirements	Insert maintenance requirements for the pollution prevention practice
Design Specifications	If applicable include copies of design specifications here

[Repeat as needed.]

5.5.4 Hazardous or Toxic Waste

(Note: Examples include paints, caulks, sealants, fluorescent light ballasts, solvents, petroleum-based products, wood preservatives, additives, curing compounds, and acids.)

General

- Remove, haul from site, and legally dispose of all waste materials and debris not required to be saved. Accumulation is not permitted.

Specific Pollution Prevention Practices

Hazardous or Toxic Waste	
Description: The container storing hazardous and toxic materials shall be bolted or chained to a permanent structure and shall be locked with separate keys. If this container itself is not weather tight and is exposed to the weather, it shall be covered with an impermeable barrier at the end of each working day.	
Implementation	As Needed
Maintenance Requirements	• Maintain disposal routes clear, clean, and free of debris. • On-site burning of combustible cleared materials is not permitted. • Cover trucks used for hauling, follow approved routes, obtain disposal permits required and pay all fees in connection with disposal of materials removed. Upon completion of site preparation work. Clean areas of work, remove tools and equipment. Provide site clear, clean, and free of materials and debris and suitable for site construction operations.
Design Specifications	N/A

[Repeat as needed.]

5.5.5 Construction and Domestic Waste

(Note: Examples include packaging materials, scrap construction materials, masonry products, timber, pipe and electrical cuttings, plastics, styrofoam, concrete, demolition debris, and other trash or discarded materials.)

General

All waste materials will be collected and disposed of into metal trash dumpsters. Dumpsters will have a secure watertight lid, be placed away from stormwater conveyances and drains, and meet all federal, state, and municipal regulations. Only trash and construction debris from the site will be deposited in the dumpster. No construction materials will be buried on-site. All personnel will be instructed, during tailgate training sessions, regarding the correct disposal of trash and construction debris. Notices that state these practices will be posted in the office trailer and the individual who manages day-today site operations will be responsible for seeing that these practices are followed.

Specific Pollution Prevention Practices

Construction and Domestic Waste	
Description: Clean entire area daily. All trash and job-related debris shall be removed from the site or stored in an approved dumpster at the contractor's discretion, unless otherwise specified by City Officials. Dumpsters shall be covered at all times other than to provide adequate capacity for job related debris at all times.	
Implementation	Prior to the start of Construction
Maintenance Requirements	Dumpsters shall be inspected twice per week and immediately after storm events. Remove waste material promptly from premises. Store material and equipment in dry location, in neat and orderly fashion. Ensure adequate security for electrical material and equipment stored at job.
Design Specifications	N/A

[Repeat as needed.]

5.5.6 Sanitary Waste

General
Portable sanitary units will be provided for use by all workers throughout the life of the project. A licensed sanitary waste management contractor will regularly collect all sanitary waste from the portable units.

Specific Pollution Prevention Practices

Sanitary Waste	
Description: Portable toilets will be self-contained units meeting local, State and Federal requirements.	
Implementation	▪ Prior to the re-start of Construction ▪ The Contractor shall provide adequate sanitary facilities for the use of those employed on the Work. Such facilities shall be made available when the first employees arrive on the Site of the Work, shall be properly secluded from public observation, and shall be constructed and maintained during the progress of the Work.
Maintenance Requirements	▪ Waste for the portable toilets shall be collected a minimum of once a week. The toilets shall be inspected weekly for sign of leaking. Toilets that are leaking shall be removed from the site and replaced. ▪ The Contractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use. He/she shall vigorously prohibit the committing of nuisance on the Site of the Work, on lands of the Owner, or an adjacent property.
Design Specifications	N/A

[Repeat as needed.]

5.6 Washing of Applicators and Containers used for Stucco, Paint, Concrete, Form Release Oils, Cutting Compounds, or Other Materials

Instructions (see CGP Parts 2.3.4 and 7.2.6):

– Describe how you will comply with the CGP Part 2.3.4 requirement for washing applications and containers.

General
See Section 5.4.

Specific Pollution Prevention Practices

Containers used for Stucco, Paint, Concrete, Form Release Oils, Cutting Compounds, or Other Materials
Description: See Section 5.4.

Containers used for Stucco, Paint, Concrete, Form Release Oils, Cutting Compounds, or Other Materials	
Implementation	See Section 5.4.
Maintenance Requirements	See Section 5.4.
Design Specifications	See Section 5.4.

[Repeat as needed.]

5.7 Application of Fertilizers

Instructions (CGP Parts 2.3.5 and 7.2.6.x):

Describe how you will comply with the CGP Part 2.3.5 requirement for the application of fertilizers.

General

- The contractor shall provide all labor, materials, equipment and services necessary for, and incidental to, preparation of ground surfaces, fertilizing, liming, seeding, mulching, and maintenance of seeded areas as shown on the Drawings.

Specific Pollution Prevention Practices

Fertilizers	
Description: See Section 5.5.2	
Implementation	See Section 5.5.2
Maintenance Requirements	See Section 5.5.2
Design Specifications	See Section 5.5.2

[Repeat as needed for individual fertilizer practices.]

5.8 Other Pollution Prevention Practices

Instructions:

Describe any additional pollution prevention practices that do not fit into the above categories.

General

- Not applicable.

Specific Pollution Prevention Practices

N/A	
Description: N/A	
Implementation	N/A

N/A	
Maintenance Requirements	N/A
Design Specifications	N/A

[Repeat as needed.]

SECTION 6: INSPECTION, MAINTENANCE, AND CORRECTIVE ACTION

6.1 Inspection Personnel and Procedures

Instructions (see CGP Parts 4, 5, and 7.2.7):

Describe the procedures you will follow for maintaining your stormwater controls, conducting inspections, and, where necessary, taking corrective actions in accordance with CGP Parts 4, 5, and 7.2.7.

Site Inspection Schedule

Select the inspection frequency(ies) that applies, based on CGP Parts 4.2, 4.3, or 4.4

(Note: you may be subject to different inspection frequencies in different areas of the site. Check all that apply and indicate which portion(s) of the site it applies to.)

Standard Frequency:

☒ Every 7 calendar days

☐ Every 14 calendar days and within 24 hours of either:

- A storm event that produces 0.25 inches or more of rain within a 24-hour period (including when there are multiple, smaller storms that alone produce less than 0.25 inches but together produce 0.25 inches or more in 24 hours), or
- A storm event that produces 0.25 inches or more of rain within a 24-hour period on the first day of a storm and continues to produce 0.25 inches or more of rain on subsequent days (you conduct an inspection within 24 hours of the first day of the storm and within 24 hours after the last day of the storm that produces 0.25 inches or more of rain (i.e., only two inspections would be required for such a storm event)), or
- A discharge caused by snowmelt from a storm event that produces 3.25 inches or more of snow within a 24-hour period.

Increased Frequency (if applicable):

For areas of sites discharging to sediment or nutrient-impaired waters or to waters designated as Tier 2, Tier 2.5, or Tier 3

☐ Every 7 days and within 24 hours of either:

- A storm event that produces 0.25 inches or more of rain within a 24-hour period, or
- A discharge caused by snowmelt from a storm event that produces 3.25 inches or more of snow within a 24-hour period.

Reduced Frequency (if applicable)

For stabilized areas

☒ Twice during first month, no more than 14 calendar days apart; then once per month after first month until permit coverage is terminated consistent with Part 9 in any area of your site where the stabilization steps in 2.2.14.a have been completed.

- Specify locations where stabilization steps have been completed
- Insert date that they were completed

(Note: It is likely that you will not be able to include this in your initial SWPPP. If you qualify for this reduction (see CGP Part 4.4.1), you will need to modify your SWPPP to include this information. If construction activity resumes in this portion of the site at a later date, the inspection frequency immediately increases to that required in Parts 4.2 and 4.3, as applicable.)

For stabilized areas on "linear construction sites" (as defined in Appendix A)

☐ Twice during first month, no more than 14 calendar days apart; then once more within 24 hours of a storm event that produces 0.25 inches or more of rain within a 24-hour period, or within 24 hours of a snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period

- Specify locations where stabilization steps have been completed
- Insert date that they were completed

(Note: It is likely that you will not be able to include this in your initial SWPPP. If you qualify for this reduction (see CGP Part 4.4.1), you will need to modify your SWPPP to include this information.)

For arid, semi-arid, or drought-stricken areas during seasonally dry periods or during drought

☐ Once per month and within 24 hours of either:

- A storm event that produces 0.25 inches or more of rain within a 24-hour period, or
- A snowmelt discharge from a storm event that produces 3.25 inches or more of snow within a 24-hour period.

Insert beginning and ending month identified as the seasonally dry period for your area or the valid period of drought:

- Beginning month of the seasonally dry period: Insert approximate date
- Ending month of the seasonally dry period: Insert approximate date

For frozen conditions where construction activities are being conducted

☒ Once per month

Insert beginning and ending dates of frozen conditions on your site:

- Beginning date of frozen conditions: Insert approximate date
- Ending date of frozen conditions: Insert approximate date

For frozen conditions where construction activities are suspended

☒ Inspections are temporarily suspended

Insert beginning and ending dates of frozen conditions on your site:

- Beginning date of frozen conditions: Insert approximate date
- Ending date of frozen conditions: Insert approximate date

Dewatering Inspection Schedule

Select the inspection frequency that applies based on CGP Part 4.3.2

Dewatering Inspection
☐ Once per day on which the discharge of dewatering water occurs.

Rain Gauge Location (if applicable)
N/A

Inspection Report Forms
See Appendix D

- All area-drain, catch basins, drain manholes and other structures shall be inspected before and after construction. The condition of the structures shall be recorded.
- All stormwater control devices are to be inspected weekly (7 days) and within 24-hours of the occurrence of a storm even event of 0.25" depth or greater (even if the storm is still continuing.
- Litter and debris clean-up shall be performed daily.
- If a problem is observed with an erosion and sediment control (needs repair or replacement), work must be initiated immediately to fix the problem, and shall be completed by the end of the next work day. If the repair or replacement is more substantial, it shall be completed within 7 calendar days from the time of discovery. If a repair takes longer than 48-hours, the repair procedures should be documented and recorded.

If discharge of stormwater is occurring during an inspection, the location and quality of the discharge shall be noted as well as the effectiveness of erosion and sediment controls.

(Note: EPA has developed a sample inspection form that CGP operators can use. The form is available at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources)

6.2 *Corrective Action*

Instructions (CGP Parts 5 and 7.2.7):

- Describe the procedures for taking corrective action in compliance with CGP Part 5.

Personnel Responsible for Corrective Actions
Insert names of personnel or types of personnel responsible for corrective actions

Corrective Action Logs
See Appendix E
(Note: EPA has developed a sample corrective action log that CGP operators can use. The form is available at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources)

6.3 *Delegation of Authority*

Instructions:

- Identify the individual(s) or positions within the company who have been delegated authority to sign inspection reports.
- Attach a copy of the signed delegation of authority (see example in Appendix J of this SWPPP Template.)
- For more on this topic, see Appendix G, Subsection 11 of EPA's CGP.

Duly Authorized Representative(s) or Position(s):

Insert Company or Organization Name
Insert Name
Insert Position
Insert Address
Insert City, State, Zip Code
Insert Telephone Number
Insert Fax/Email

SECTION 7: TURBIDITY BENCHMARK MONITORING FOR DEWATERING DISCHARGES

Instructions (see CGP Part 3.3 and 7.2.8):

– If you are required to comply with the Part 3.3 turbidity benchmark monitoring requirements, describe the procedures you will follow to:
  - ✓ Collect and evaluate samples,
  - ✓ Report results to EPA and keep records of monitoring information, and
  - ✓ Take corrective action when necessary.

– Include the specific type of turbidity meter you will use for monitoring, as well as any manuals or manufacturer instructions on how to operate and calibrate the meter.

– Describe any coordinating arrangement you may have with any other permitted operators on the same site with respect to compliance with the turbidity monitoring requirements, including which parties are tasked with specific responsibilities.

– If EPA has approved of an alternate turbidity benchmark pursuant to Part 3.3.2.b, include any data and other documentation you relied on to request use of the specific alternative benchmark.

Procedures:

Collecting and evaluating samples	Dewatering is not required to complete the construction activities. If dewatering is required the SWPPP will be amended.
Reporting results and keeping monitoring information records	N/A
Taking corrective action when necessary	N/A

Turbidity Meter:

Type of turbidity meter	N/A

Turbidity meter manuals and manufacturer instructions
N/A

Coordinating Arrangements for Turbidity Monitoring (if applicable):

Permitted operator name	N/A
Permitted operator NPDES ID	N/A
Coordinating Arrangement	N/A

[Repeat as necessary.]

Alternate turbidity benchmark (if applicable):

Alternate turbidity benchmark (NTU)	N/A
Data and documentation used to request the alternate benchmark	N/A

SECTION 8: CERTIFICATION AND NOTIFICATION

Instructions (CGP Appendix G, Part G.11.2):

- The following certification statement must be signed and dated by a person who meets the requirements of Appendix G, Part G.11.2.
- This certification must be re-signed in the event of a SWPPP Modification.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: _____ Title: _____

Signature: _____ Date: _____

[Repeat as needed for multiple construction operators at the site.]

SWPPP APPENDICES

Attach the following documentation to the SWPPP:

Appendix A – Site Maps

Appendix B – Copy of 2022 CGP
(Note: The 2022 CGP is available at https://www.epa.gov/npdes/2022-construction-general-permit-cgp)

Appendix C – NOI and EPA Authorization Email

Appendix D – Site Inspection Form and Dewatering Inspection Form (if applicable)
(Note: EPA has developed a sample site inspection form template that CGP operators can use. The template is available at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates). Where the operator will be dewatering at the site, EPA has developed a separate dewatering inspection form template to use to document the required information. This template is available at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates.

Appendix E – Corrective Action Log
(Note: EPA has developed a sample corrective action log that CGP operators can use. The form is available at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates)

Appendix F – SWPPP Amendment Log

Appendix G – Subcontractor Certifications/Agreements

Appendix H – Grading and Stabilization Activities Log

Appendix I – Training Documentation

Appendix J – Delegation of Authority

Appendix K – Endangered Species Documentation

Appendix L – Historic Preservation Documentation

Appendix M – Rainfall Gauge Recording

Appendix N – Turbidity Meter Manual and Manufacturer's Instructions

Appendix A – Site Maps

INSERT SITE MAPS CONSISTENT WITH TEMPLATE SECTION 2.6

Appendix B – Copy of 2022 CGP

INSERT COPY OF 2022 CGP

(Note: The 2022 CGP is available at https://www.epa.gov/npdes/2022-construction-general-permit-cgp)

Appendix C – Copy of NOI and EPA Authorization Email

INSERT COPY OF NOI AND EPA'S AUTHORIZATION EMAIL PROVIDING COVERAGE UNDER THE CGP

Appendix D – Copy of Site and Dewatering Inspection Forms

INSERT COPIES OF SITE AND DEWATERING INSPECTION FORMS YOU WILL USE TO PREPARE INSPECTION REPORTS

(Note: EPA has developed a sample site inspection and dewatering inspection form templates that CGP operators can use. The template is available at https://www.epa.gov/npdes/construction-general-permit-resources-tools-and-templates)

Appendix E – Copy of Corrective Action Log

INSERT COPY OF CORRECTIVE ACTION LOG YOU WILL USE

(Note: EPA has developed a sample corrective action log that CGP operators can use. The form is available at https://www.epa.gov/npdes/stormwater-discharges-construction-activities#resources)

Appendix F – *Sample* SWPPP Amendment Log

Instructions (see CGP Part 7.4):

- Create a log here of changes and updates to the SWPPP. You may use the table below to track these modifications.
- SWPPP modifications are required pursuant to CGP Part 7.4.1 in the following circumstances:
  - ✓ Whenever new operators become active in construction activities on your site, or you make changes to your construction plans, stormwater controls, or other activities at your site that are no longer accurately reflected in your SWPPP (this includes changes made in response to corrective actions triggered under CGP Part 5);
  - ✓ To reflect areas on your site map where operational control has been transferred (and the date of transfer) since initiating permit coverage;
  - ✓ If inspections or investigations determine that SWPPP modifications are necessary for compliance with this permit;
  - ✓ Where EPA determines it is necessary to install and/or implement additional controls at your site in order to meet requirements of the permit;
  - ✓ To reflect any revisions to applicable Federal, State, Tribal, or local requirements that affect the stormwater control measures implemented at the site; and
  - ✓ If applicable, if a change in chemical treatment systems or chemically-enhanced stormwater control is made, including use of a different treatment chemical, different dosage rate, or different area of application.

No.	Description of the Amendment	Date of Amendment	Amendment Prepared by [Name(s) and Title]
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	
		INSERT DATE	

Appendix G – *Sample* Subcontractor Certifications/Agreements

SUBCONTRACTOR CERTIFICATION
STORMWATER POLLUTION PREVENTION PLAN

Project Number: _____

Project Title: _____

Operator(s): _____

As a subcontractor, you are required to comply with the Stormwater Pollution Prevention Plan (SWPPP) for any work that you perform on-site. Any person or group who violates any condition of the SWPPP may be subject to substantial penalties or loss of contract. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP. A copy of the SWPPP is available for your review at the office trailer.

Each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement:

I certify under the penalty of law that I have read and understand the terms and conditions of the SWPPP for the above designated project and agree to follow the practices described in the SWPPP.

This certification is hereby signed in reference to the above named project:

Company: _____

Address: _____

Telephone Number: _____

Type of construction service to be provided: _____

_____

_____

Signature: _____

Title: _____

Date: _____

Appendix H – *Sample* Grading and Stabilization Activities Log

Date Grading Activity Initiated	**Description of Grading Activity**	**Description of Stabilization Measure and Location**	**Date Grading Activity Ceased** (Indicate Temporary or Permanent)	**Date When Stabilization Measures Initiated**
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE
INSERT DATE			INSERT DATE ☐ Temporary ☐ Permanent	INSERT DATE

Appendix I –Training Documentation

INSERT DOCUMENTATION CONSISTENT WITH SWPPP TEMPLATE SECTION 1.2 AND CGP PART 7.2.2

Appendix J – *Sample* Delegation of Authority Form

Delegation of Authority

I, _____ (name), hereby designate the person or specifically described position below to be a duly authorized representative for the purpose of overseeing compliance with environmental requirements, including the EPA's Construction General Permit (CGP), at the _____ construction site. The designee is authorized to sign any reports, stormwater pollution prevention plans and all other documents required by the permit.

_____ (name of person or position)
_____ (company)
_____ (address)
_____ (city, State, zip)
_____ (phone)

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in Appendix G of EPA's CGP, and that the designee above meets the definition of a "duly authorized representative" as set forth in Appendix G.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: _____

Company: _____

Title: _____

Signature: _____

Date: _____

Appendix K – Endangered Species Documentation

INSERT DOCUMENTATION CONSISTENT WITH SWPPP TEMPLATE SECTION 3.1 AND CGP APPENDIX D

Appendix L – Historic Properties Documentation

INSERT DOCUMENTATION CONSISTENT WITH SWPPP TEMPLATE SECTION 3.2 AND CGP APPENDIX E

Appendix M – Rainfall Gauge Recording

Use the table below to record the rainfall gauge readings at the beginning and end of each work day. An example table follows.

Month/Year			Month/Year			Month/Year		
Day	Start time	End time	Day	Start time	End time	Day	Start time	End time
1			1			1		
2			2			2		
3			3			3		
4			4			4		
5			5			5		
6			6			6		
7			7			7		
8			8			8		
9			9			9		
10			10			10		
11			11			11		
12			12			12		
13			13			13		
14			14			14		
15			15			15		
16			16			16		
17			17			17		
18			18			18		
19			19			19		
20			20			20		
21			21			21		
22			22			22		
23			23			23		
24			24			24		
25			25			25		
26			26			26		
27			27			27		
28			28			28		
29			29			29		
30			30			30		
31			31			31		

Example Rainfall Gauge Recording

April 2022			May 2022			June 2022		
Day	7:00 am	4:400 pm	Day	7:00 am	4:00 pm	Day	7:00 am	4:00 pm
1	--	--	1	0.2	0	1	0	0.4
2	--	--	2	0	0	2	0	0
3	0	0	3	0.1	0.3	3	--	--
4	0	0.3	4	0	0	4	--	--
5	0	0	5	0	0	5	0	0

In this example (for only partial months), 0.25-inch rainfall inspections would have been conducted on April 4 and June 1.

Appendix N – Turbidity Monitoring Sampling Documentation

INSERT DOCUMENTATION CONSISTENT WITH SWPPP TEMPLATE SECTION 7.2.8 AND CGP PART 3.3.4

YANKEE BUS LINE HEADQUARTERS
34 SCANLON DRIVE
Randolph, MA 02368

STORMWATER REPORT
Pursuant to M.G.L c. 131 §40
& Randolph Ordinances Chapter 195

Submitted to:
Town of Randolph Stormwater Department
Town of Randolph Planning Board

Applicant:
Scanlon Suburban LLC/ 451 High Street LLC
800 Boylston Street
Boston, MA 02116

Architect:
TGAS
146 MT Auburn Street
Cambridge, MA 02138

Surveyor:
CHA
141 Longwater Drive
Suite 104
Norwell, MA 02061

Civil Engineer:
Samiotes Consultants, Inc.
20 A Street
Framingham, MA 01701

20 APRIL 2023

Town of Randolph
Department of Public Works
41 South Main Street
Randolph, MA 02368
781-961-0940

STORM WATER AUTHORITY
APPLICATION FOR STORMWATER MANAGEMENT PERMIT

SUBJECT PROPERTY							
Street Address	34 SCANLON DRIVE						
Map – Block - Parcel	05-A-002.389,001.2,007.01,006.04,006.02,006.A	Residential	☐	Commercial	☑	Industrial	☐

PROPERTY OWNER INFORMATION			
Name	Scanlon Suburban LLC/ 451 High Street LLC	Telephone	908-239-4642
Address	800 BOYLSTON ST		
City, ST, ZIP	BOSTON, MA 02116	Email	acampbell@coreinvestmentinc.com

APPLICANT INFORMATION (if different from owner)			
Name		Telephone	
Address			
City, ST, ZIP		Email	

CONSULTANT/AGENT INFORMATION (if applicable)			
Name	Samiotes Consultants, Inc.	Telephone	508-877-6688
Address	20 A Street		
City, ST, ZIP	Framingham, MA 01778	Email	SGarvin@samiotes.com

PROJECT TYPE (select all that apply)			
☐	Land disturbance 5,000 sq. ft. to 21,799 sq. ft.	☐	Amendment of Permit/Approval
☐	Land disturbance 21,780 sq. ft. to 5 acres	☐	Extension of Permit/Approval
☑	Land disturbance 5 to 10 acres	☐	Resubmittal after denial
☐	Land disturbance > 10 acres	☐	Certificate of Compliance
☐	Detention/Retention/Infiltration System	☐	Other

PROJECT DESCRIPTION (or attach a narrative description)
SEE ATTACHED NARRATIVE

By submitting an application for coverage under the Stormwater Management Permit, the Applicant agrees to the following:

1. **At a minimum, the proposed project complies with the performance standards of the most recent version of the Massachusetts Management Handbook including but not limited to:**

   a) Employing environmentally sensitive site design
   b) Evaluation of Low Impact Development practices
   c) Incorporation of source controls of contaminants and employing BMP's to minimize stormwater pollution
   d) Sizing of water quality of BMP's are based on 1-inch runoff
   e) Methodology for hydrologic analyses (if necessary) is based on TR-55/TR-20 methodology
   f) Designing redevelopment of existing sites must provide a net improvement to stormwater conditions.

2. **The activity shall not increase either the rate or volume of stormwater runoff leaving the site, nor shall it alter stormwater flow to any adjoining properties, public ways or any wetland resource areas, unless otherwise permitted based on improvements over existing conditions.**

   Check all that apply to this project:
   - [x] Roof drains emptying into dry wells/recharge basins
   - [ ] Vegetated swales constructed
   - [ ] Porous pavement installed; _____sq. ft.
   - [ ] Water quality swale
   - [ ] Rain barrels/cistern for irrigation
   - [x] Other methods (please list/describe):

3. **The Applicant shall provide and maintain Erosion and Sedimentation controls, in accordance with the latest edition of the MA DEP Stormwater Handbook, as necessary until the site is permanently stabilized. BMP's selected for erosion controls shall be chosen to minimize site disturbance from erosion control installation. As soon as the site is stabilized, such measures shall be removed.**

   Check all that apply to this project:
   - [x] Compost Sock
   - [x] Silt fencing
   - [x] Construction entrance
   - [x] Temporary vegetative cover – mulch, netting
   - [x] Permanent vegetative cover – hydro seeding, seeding, sodding
   - [x] Slope stabilization
   - [ ] Retaining walls
   - [ ] Slope drains
   - [x] Other methods (please list/describe): silt sacks

4. **The Applicant shall ensure that the site and stormwater management systems are perpetually inspected and maintained to function as designed.**

   Check all that apply to this project:
   - [x] Visual inspections by the contractor
   - [x] Visual inspections by the ~~homeowner~~ Property owner
   - [x] Operation and Maintenance Plan
   - [x] Maintenance contract for stormwater components
   - [ ] Other methods (please list/describe):

I certify that I have reviewed the design standards above and the information contained herein, including all attachments, is true, accurate and complete to the best of my knowledge. Further, I grant the Town of Randolph Stormwater Authority and its authorized agent's permission to enter the property to review this application and make inspections during and after construction.

Authorized Signature	Printed Name	Date
	Michael A. Cahill	04.19.23

SUBMISSION REQUIREMENTS

Materials (6 copies + 1 digital submission of all documents)

- ☒ **Completed application with original signatures of all owners**
- ☒ **Narrative describing the project**
- ☒ **Plans, drawings or specifications for the project**
- ☒ **Soil conditions where infiltration of stormwater is proposed**
- ☒ **Pre and Post development topography at 2-foot contour intervals**
- ☒ **Calculations demonstrating compliance with the design standards of the Ordinance. Calculations will be dependent on the disturbance activity contemplated in the application.**
- ☒ **Other materials as the SWMPC may require to determine whether the project as proposed meets the design standards of the Stormwater Ordinance**
- ☒ **Fee**

OFFICE USE ONLY:

□ Administrative Review □ Land Disturbance Permit

Comments:

_____

_____

_____

_____

Reviewed by: _____ Date: _____

Fee Paid: _____ □Cash □Check #_____

YANKEE LINE HEADQUARTERS
STORMWATER MANAGEMENT NARRATIVE
RANDOLPH, MA

APRIL 2023

Introduction

Project Description:
The new Yankee Bus Headquarters is proposed to be located at 34 Scanlon Drive. The subject site is currently home to multiple businesses. Including amongst these are Equipment Direct Sales, New Life Apostolic Church and Charles Transportation. Previously, the main site at 34 Scanlon, was owned by the neighboring, and now defunct, Lantana's Function and Events Center. Lantana's used the parking area at 34 Scanlon St. as overflow parking to accommodate large gatherings for functions being held at their facility across the street.

Day-to-day operations of the Yankee Line business vary each day due to the nature of Yankee's charter and special projects business. Though their stock is composed of 100+ coach busses and various other vehicles, the site in Randolph will be home to 66. Of these, roughly 40-60 are expected to depart and to arrive on a daily basis. Both the departure and arrival of coach busses will be staggered. Again, this is due to the nature of the operation being based on charter groups and special projects.

As is currently Yankee's practice in South Boston, the on-site activities will be carefully monitored to avoid excess light and noise pollution. Idling and backup beeping will be kept to a minimum, headlights will be dimmed, and horns are prohibited on-site. On-site activities that will occur during evening or early morning hours will be washing and fueling of the motorcoaches using a state-of-the-art wash bay system inside the maintenance garage.

The vast majority maintenance will occur during the daytime hours, but may occasionally run into the early evening. The proposed building plan allows for six maintenance bays to allow for plenty of room to bring buses inside for all required maintenance. Yankee typically performs preventive maintenance and light repair work while all heavy engine or transmission work is sent out to heavy repair shops as needed. Yankee's business model has always dictated maintaining a contemporary model fleet that results in a lack of heavy repair work, with much of the work being performed under warranty.

Soils:
Soils on the site consist of hydrological "A" "B" and "D" soils. The soils resource report, and test pit results, conducted on June 17, 2019 are located in the appendix of this report.

Existing Stormwater Management:
The existing site, consists of a one (1) story building surrounded by paved driveways, parking lots, landscaped areas. The developed area is abutted by a bordering vegetated wetlands to the southeast and areas on the perimeter of the site. The on-site impervious areas consist of the existing building, the driveways, parking lot, and associated sidewalks. In the existing condition, stormwater runoff sheets northwest to southeast where it is captured by a series of linked catch basins in the parking lot before it outlets via existing culverts to the wetlands southeast of the site.

Methodology/ Procedure

Objective:
The objective of the stormwater management for the site is to treat the stormwater runoff prior to discharge to the wetlands. The project is a redevelopment that decreases the amount of impervious which will decrease the peak storm runoff rates due to the construction of the proposed project, in addition to the Stormwater BMP's such as the rain garden and underground infiltrations ystems.

Outlined below are the numerous stormwater best management practices (BMP's) proposed to be used on site.

Proposed Stormwater Control Systems:
The following are the proposed Best Management Practices (BMP's) stormwater control system's to be used on the site to mitigate an increase in peak stormwater runoff and improve water quality:

Subsurface Structures (Infiltration Chambers): Subsurface structures are underground systems that capture runoff, and gradually infiltrate it into the groundwater. There are a number of underground infiltration systems that can be installed to enhance groundwater recharge. Subsurface structures are constructed to temporarily detain stormwater while it percolates into the underlying soil. Underground infiltration structures are feasible only where the soil is adequately permeable and the maximum water table and/or elevation is sufficiently low. They can be used to control the quantity, as well as quality, of stormwater runoff if properly designed and constructed. The structures serve as storage chambers for captured stormwater, while the surrounding soil matrix provides treatment.

Deep Sump Catch Basins: A deep sump catch basin (also known as oil and grease or hooded catch basins) acts as underground retention systems designed to remove trash, debris, and coarse sediment from stormwater runoff, and serve as temporary spill containment devices for floatables such as oil and grease that provides pretreatment. A 25% TSS removal is awarded to the deep sump catch basin when used as pre-treatment.

Water Quality Units (WQUs): Water Quality Units are a flow-through structure containing a settling or separation unit to remove sediments and other pollutants. These structures typically use the power of swirling or flowing water to separate floatables and coarser sediments, are typically designed and manufactured by private businesses, and come in different sizes to accommodate different design storms and flow conditions. Since proprietary separators can be placed in almost any location on a site, they are particularly useful when either site constraints prevent the use of other stormwater techniques or as part of a larger treatment train. Generally they are placed below ground and contain access ports so that they may be inspected and cleaned.

Rain Garden(s)/ Bioretention: Bioretention is a technique that uses soils, plants, and microbes to treat stormwater before it is infiltrated and/or discharged. Bioretention cells (also called rain gardens in residential applications) are shallow depressions filled with sandy soil topped with a thick layer of mulch and planted with dense native vegetation. Stormwater runoff is directed into the cell via piped or sheet flow. The runoff percolates through the soil media that acts as a filter. There are two types of bioretention cells: those that are designed solely as an organic filter. Filtering bioretention areas and those configured to recharge groundwater in addition to acting as a filter exfiltrating bioretention areas. Bioretention areas remove pollutants through filtration, microbe activity, and uptake by plants; contact with soil and roots provides water quality treatment better than conventional infiltration structures. Studies indicate that bioretention areas can remove from 80% to 90% of TSS. If properly designed and installed, bioretention areas remove phosphorus, nitrogen, metals, organics, and bacteria to varying degrees. Bioretention areas help reduce stress in watersheds that experience severe low flows due to excessive impervious cover.

Proposed Stormwater Management System:
The proposed stormwater management system consists of catch basins located throughout the sites impervious areas. The catch basins route the stormwater into water quality unts prior to discharging. Majority of the site discharges either to the underground infiltration systems or the rain garden. The overflow from the infiltration systems and rain garden outlet towards the wetlands via an existing 12-inch and 18-inch drain line. Portion of the parking lot runoff (due to high groundwater) is treated via catch basins and outlets. The building's roof runoff is routed to the rain garden.

Watershed Routing

Below is a summary of the various existing and proposed watersheds with a brief narrative describing the routing. The descriptions of the watersheds are depicted in sketches Ex-HYD and P-HYD located in the Appendix.

Existing Watersheds:

Existing Watershed-1: This watershed consists of majority of the site consisting of pervious areas (landscaped areas, and surrounding woods) as well as impervious areas (the building & parking lot). Stormwater runoff sheets directly towards the wetlands, and intermittent stream. Portions of the paved area sheets into catch basins that outlet directly into the resource area via a 12-inch drain line at a culvert located between wetland flags WF-S-22 and WF-S-21.

Proposed Watersheds:

P-Watershed-1: This watershed consists of the northeastern portion of the site. The watershed consists of paved parking lot and surrounding landscaped areas. Stormwater runoff from this watershed sheets into catch basins, and then routed through a water quality units prior to outletting into an underground infiltration system. Stormwater that doesn't infiltrate, overflows into the existing 12" culvert that crosses through the site.

P-Watershed-2: This watershed consists of the western portion of the site. The watershed consists of paved parking lot and surrounding landscaped areas. Stormwater runoff from this watershed sheets into catch basins, and then routed through a water quality units prior to outletting into an underground infiltration system. Stormwater that doesn't infiltrate, overflows into the existing 12" culvert that crosses through the site.

P-Watershed-3: This watershed consists of the southern portion of the site. The watershed consists of paved parking lot and surrounding landscaped areas. Stormwater runoff from this watershed sheets into catch basins, and then routed through a water quality units prior to outletting to the rain garden. Stormwater that doesn't infiltrate, overflows into the drainage ditch/ wetlands.

P-Watershed-4: This watershed consists of the eastern portion of the site. The watershed consists of paved parking lot and surrounding landscaped areas. Stormwater runoff from this watershed sheets into water quality units prior to outletting into the existing 12" culvert that crosses through the site.

P-Watershed-5: This watershed consists of the surrounding landscaped areas, existing woods, portions of the walkways on the perimeter of the site. Stormwater runoff from this watershed sheets off site.

Proposed Building (P-BLDG): The proposed building's roof runoff is routed towards the rain garden. Stormwater that doesn't infiltrate, overflows into the surrounding wetlands/ drainage ditch that is hydrologically connected via a 12" and 18" culvert to the intermittent stream.

Analysis:
The analysis was based on the pre and post development peak discharge rates at the point of analysis. The proposed construction of the Yankee Bus Headquarters facility will result in a **decrease** in impervious area, therefore the proposed stormwater management system has been designed to mitigate and improve stormwater quality, and retain volume per the Randolph by-laws.

Results/ Summary

Results of Analysis:
Through the use of the HydroCAD Software, the curve numbers, times of concentrations, and peak discharge rates were determined for both the existing conditions and the proposed conditions. The results of the study shows that both the post-development peak rates of runoff are equal or less than the existing rates.

As shown in Table A, the post development peak rates of runoff from the site will be mitigated.

	Table A – POA Peak Rates of Runoff (cfs)			
	2-year storm	**10-year storm**	**25-year storm**	**100-year storm**
Existing	13.30	20.71	25.84	34.88
Proposed	2.91	7.80	16.85	27.72

Stormwater Management Standards

The Department of Environmental Protection has implemented the Stormwater Management Standards as of November 18, 1996 and updated them in April 2008. The standards met are described below and in the Stormwater Management Form as provided by DEP.

Standard #1: Untreated Stormwater

The project is designed so that stormwater conveyances (outfalls/discharges) do not discharge untreated stormwater into, or cause erosion to, wetlands or waters.

Therefore Standard #1 is met.

Standard #2: Post-development peak discharge rates

The proposed project will result in a decrease in impervious area. The proposed stormwater management system has been designed so that there is no increase in post construction discharge rates from the site. See Table 1: Analysis Point Peak Rate of Runoff (cubic feet per second, cfs)

Therefore Standard #2 is met.

Standard #3: Recharge to groundwater

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post- development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

Soil types have been identified based on the information contained in the Soil Report. We have determined that the soils are consistent with Hydrologic soil type "A" "B" and "D" which requires runoff to be infiltrated (as listed in the table below) for new impervious areas.

Hydrologic Group Volume to Recharge (x Total Impervious Area)	
Hydrologic Group	Volume to Recharge x Total Impervious Area
A	0.60 inches of runoff
B	0.35 inches of runoff
C	0.25 inches of runoff
D	0.10 inches of runoff

The proposed development will result in a decrease in impervious area. therefore additional recharge is not required. However, the project is providing recharge per the Town of Randolph by-laws:

Infiltration System-1 (volume under outlet elev 142): 2,863 cf
Infiltration System-2: (volume under outlet elev 141.80): 2,385 cf
Rain Garden (volume under overflow weir elev 141.50): 6,159 cf
Total recharge volume: 11,407 cf

Total Impervious on site: 170,313 sf
Retain 0.80 inches (per by-law)
170,313 sf x 0.80 in. x (1ft/12in) =11,354 cf required
Provided: 11,407 cf

Therefore Standard #3 is met.

Standard #4: TSS removal

The BMP's selected to remove TSS from impervious areas for this include: water Quality Units (WQU), catch basins, underground infiltration chambers, rain gardens

Parking Lot (P-WS-1)
Catch Basin: (1.00)(1.00-0.25)= 0.75 TSS
WQU: (0.75)(1.00-0.80)=0.15 TSS
INF Syst: (0.15)(1.00-0.80)=0.03 TSS
Total TSS Removal= 97%

Parking Lot (P-WS-2)
Catch Basin: (1.00)(1.00-0.25)= 0.75 TSS
WQU: (0.75)(1.00-0.80)=0.15 TSS
INF Syst: (0.15)(1.00-0.80)=0.03 TSS
Total TSS Removal= 97%

Parking Lot (P-WS-3)
WQU: (1.00)(1.00-0.80)=0.20 TSS
Rain Garden: (0.20)(1.00-0.80)=0.04 TSS
Total TSS Removal= 96%

Parking Lot (P-WS-4)
WQU: (1.00)(1.00-0.80)=0.20 TSS
Total TSS Removal= 80%

*MASTEP and NJCAT Rating

Therefore Standard #4 is met.

Standard #5: Higher potential pollutant loads

The project site does contains Land Uses with Higher Potential Pollutant Loads.

The project has been designed to provide source control and pollution prevention implementation in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from land uses to the maximum extent practicable. The stormwater management system has been sized to treat for the 1" water quality volume and the 44% pre-treatment.

Therefore Standard #5 is met.

Standard #6: Protection of critical areas

The site is located within critical areas as defined by Critical areas are Outstanding Resource Waters (ORW) as designated in 314 CMR 4.00, Special Resource Waters as designated in 314 CMR 4.00, recharge areas for public water supplies as defined in 310 CMR 22.02 (Zone Is, Zone IIs and Interim Wellhead Protection Areas for groundwater sources and Zone As for surface water sources), bathing beaches as defined in 105 CMR 445.000, cold-water fisheries as defined in 314 CMR 9.02 and 310 CMR 10.04, and shellfish growing areas as defined in 314 CMR 9.02 and 310 CMR 10.04.

The stormwater management system has been sized to treat for the 1" water quality volume and the 44% pre-treatment.

Therefore Standard #6 is met.

Standard #7: Redevelopment projects

The project is a redevelopment.

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

Soil Erosion and Sediment Control Plan:
The objectives of the Soil Erosion and Sediment Control Plan are to control erosion at its source with temporary control structures, minimize the runoff from areas of disturbance, and de-concentrate and distribute stormwater runoff through natural vegetation before discharge to critical zones such as streams or wetlands. Soil erosion control does not begin with the perimeter sediment trap. It begins at the source of the sediment, the disturbed land areas, and extends down to the control structure.

The Soil Erosion and Sediment Control Plan will be enacted in order to protect the resource areas during construction. The erosion control devices will remain in place until all exposed areas have been stabilized with vegetation or impervious surfaces.

The objective of the Soil erosion & Sediment Control Plan that will be enacted on site is to control the vulnerability of the soil to the erosion process or the capability of moving water to detach soil particles during the construction phase(s).

The erosion and sediment control plan to be in place during the construction phase is detailed within the NOI narrative (under separate cover).

Therefore Standard #8 is met.

Standard #9: Operation/maintenance plan

An operation and maintenance plan for both construction and post-development stormwater controls has been developed. The plan includes owner(s); parties responsible for operation and maintenance; schedule for inspection and maintenance; routine and non-routine maintenance tasks. A copy of the O&M is included in the Appendix.

Therefore Standard #9 is met.

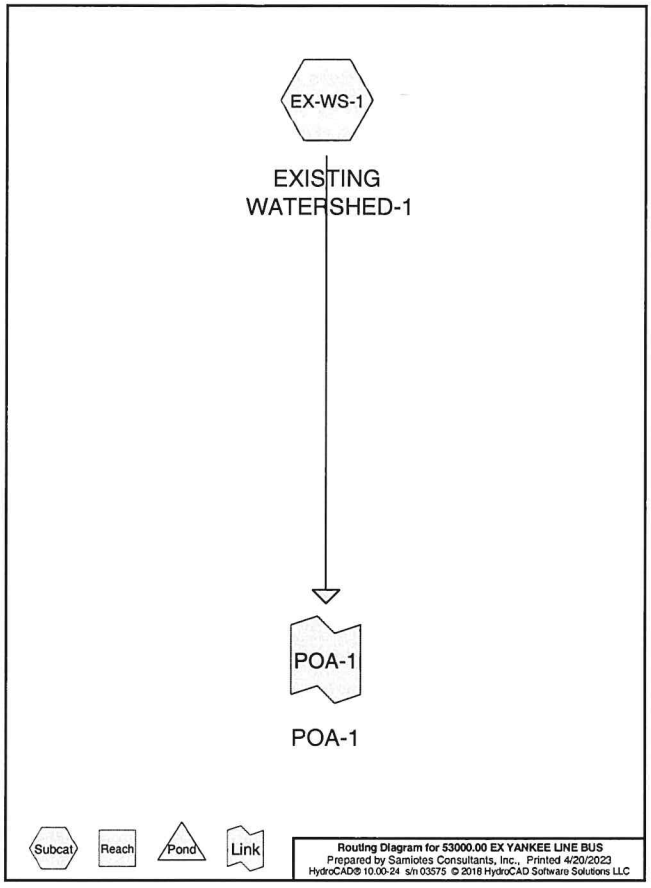
Standard #10: All illicit discharges to the stormwater management system are prohibited

It is not anticipated that there will be any Illicit discharges for the project.

Therefore Standard #10 is met.

TABLE OF CONTENTS FOR APPENDIX

APPENDIX 1:
EXISTING HYDROLOGY REPORT



Project Notes

Rainfall events imported from "HydroCAD ALMA PROPOSED - CA.hcp"

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
11,053	39	>75% Grass cover, Good (EX-WS-1)
185,582	98	Paved parking, (EX-WS-1)
702	98	Wetlands (EX-WS-1)
32,591	55	Woods, Good, HSG B (EX-WS-1)
9,045	98	roof (EX-WS-1)
238,973	**89**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
32,591	HSG B	EX-WS-1
0	HSG C	
0	HSG D	
206,382	Other	EX-WS-1
238,973		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
0	0	0	0	11,053	11,053	>75% Grass cover, Good
0	0	0	0	185,582	185,582	Paved parking,
0	0	0	0	702	702	Wetlands
0	32,591	0	0	0	32,591	Woods, Good
0	0	0	0	9,045	9,045	roof
0	**32,591**	**0**	**0**	**206,382**	**238,973**	**TOTAL AREA**

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

Subcatchment EX-WS-1: EXISTING Runoff Area=238,973 sf 81.74% Impervious Runoff Depth=2.08"
Tc=6.0 min CN=89 Runoff=13.30 cfs 41,453 cf

Link POA-1: POA-1 Inflow=13.30 cfs 41,453 cf
Primary=13.30 cfs 41,453 cf

Total Runoff Area = 238,973 sf Runoff Volume = 41,453 cf Average Runoff Depth = 2.08"
18.26% Pervious = 43,644 sf 81.74% Impervious = 195,329 sf

Summary for Subcatchment EX-WS-1: EXISTING WATERSHED-1

Runoff = 13.30 cfs @ 12.09 hrs, Volume= 41,453 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
*	185,582	98	Paved parking,
	32,591	55	Woods, Good, HSG B
*	11,053	39	>75% Grass cover, Good
*	702	98	Wetlands
*	9,045	98	roof
	238,973	89	Weighted Average
	43,644		18.26% Pervious Area
	195,329		81.74% Impervious Area

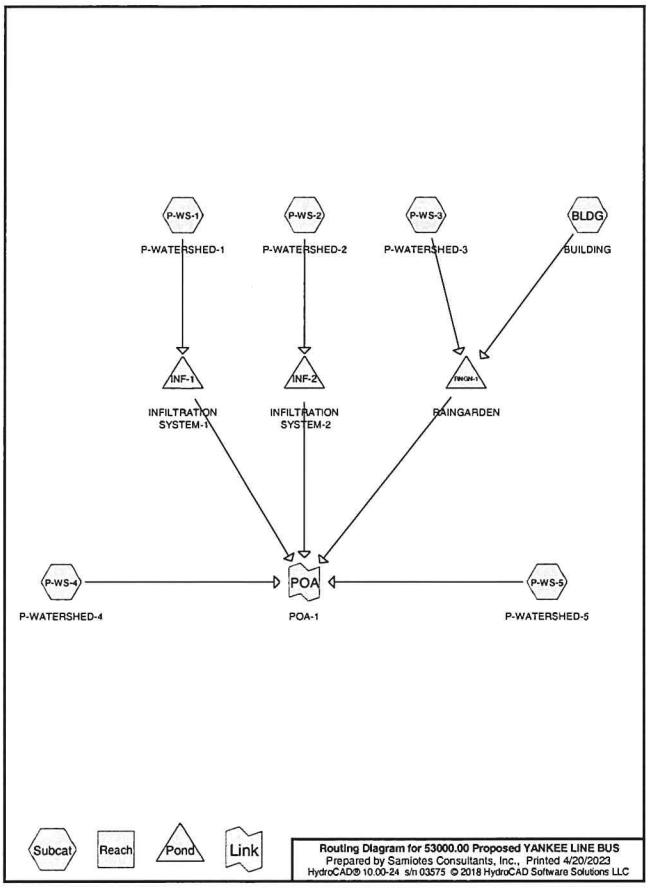
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Link POA-1: POA-1

Inflow Area = 238,973 sf, 81.74% Impervious, Inflow Depth = 2.08" for 2 yr event
Inflow = 13.30 cfs @ 12.09 hrs, Volume= 41,453 cf
Primary = 13.30 cfs @ 12.09 hrs, Volume= 41,453 cf, Atten= 0%, Lag= 0.0 min

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

APPENDIX 2:
PROPOSED HYDROLOGY REPORT



Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
2,413	39	>75% Grass cover, Good, HSG A (P-WS-2)
10,900	61	>75% Grass cover, Good, HSG B (P-WS-4)
310	80	>75% Grass cover, Good, HSG D (P-WS-4)
17,854	30	Brush, Good, HSG A (P-WS-3)
8,213	48	Brush, Good, HSG B (P-WS-5)
7,363	98	Paved (P-WS-5)
132,345	98	Paved parking (P-WS-1, P-WS-2, P-WS-3, P-WS-4)
37,873	98	ROOF (BLDG)
21,000	55	Woods, Good, HSG B (P-WS-5)
702	98	wetlands (P-WS-5)
238,973	**85**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
20,267	HSG A	P-WS-2, P-WS-3
40,113	HSG B	P-WS-4, P-WS-5
0	HSG C	
310	HSG D	P-WS-4
178,283	Other	BLDG, P-WS-1, P-WS-2, P-WS-3, P-WS-4, P-WS-5
238,973		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
2,413	10,900	0	310	0	13,623	>75% Grass cover, Good
17,854	8,213	0	0	0	26,067	Brush, Good
0	0	0	0	7,363	7,363	Paved
0	0	0	0	132,345	132,345	Paved parking
0	0	0	0	37,873	37,873	ROOF
0	21,000	0	0	0	21,000	Woods, Good
0	0	0	0	702	702	wetlands
20,267	**40,113**	**0**	**310**	**178,283**	**238,973**	**TOTAL AREA**

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	INF-1	142.00	136.30	100.0	0.0570	0.011	12.0	0.0	0.0
2	INF-2	141.80	136.30	150.0	0.0367	0.011	12.0	0.0	0.0

Summary for Subcatchment BLDG: BUILDING

Runoff = 2.70 cfs @ 12.08 hrs, Volume= 9,366 cf, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
*	37,873	98	ROOF
	37,873		100.00% Impervious Area

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

Summary for Subcatchment P-WS-1: P-WATERSHED-1

Runoff = 1.67 cfs @ 12.08 hrs, Volume= 5,783 cf, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
*	23,385	98	Paved parking
	23,385		100.00% Impervious Area

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

Summary for Subcatchment P-WS-2: P-WATERSHED-2

Runoff = 2.62 cfs @ 12.08 hrs, Volume= 8,465 cf, Depth= 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
*	37,520	98	Paved parking
	2,413	39	>75% Grass cover, Good, HSG A
	39,933	94	Weighted Average
	2,413		6.04% Pervious Area
	37,520		93.96% Impervious Area

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

Summary for Subcatchment P-WS-3: P-WATERSHED-3

Runoff = 1.63 cfs @ 12.09 hrs, Volume= 5,232 cf, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
*	36,650	98	Paved parking
	17,854	30	Brush, Good, HSG A
	54,504	76	Weighted Average
	17,854		32.76% Pervious Area
	36,650		67.24% Impervious Area

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

Summary for Subcatchment P-WS-4: P-WATERSHED-4

Runoff = 2.56 cfs @ 12.09 hrs, Volume= 7,979 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
	10,900	61	>75% Grass cover, Good, HSG B
	310	80	>75% Grass cover, Good, HSG D
*	34,790	98	Paved parking
	46,000	89	Weighted Average
	11,210		24.37% Pervious Area
	34,790		75.63% Impervious Area

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

Summary for Subcatchment P-WS-5: P-WATERSHED-5

Runoff = 0.37 cfs @ 12.11 hrs, Volume= 1,613 cf, Depth= 0.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
	21,000	55	Woods, Good, HSG B
	8,213	48	Brush, Good, HSG B
*	702	98	wetlands
*	7,363	98	Paved
	37,278	63	Weighted Average
	29,213		78.37% Pervious Area
	8,065		21.63% Impervious Area

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

Summary for Pond INF-1: INFILTRATION SYSTEM-1

Inflow Area = 23,385 sf,100.00% Impervious, Inflow Depth = 2.97" for 2 yr event
Inflow = 1.67 cfs @ 12.08 hrs, Volume= 5,783 cf
Outflow = 0.11 cfs @ 13.53 hrs, Volume= 5,783 cf, Atten= 94%, Lag= 86.6 min
Discarded = 0.06 cfs @ 9.57 hrs, Volume= 5,662 cf
Primary = 0.04 cfs @ 13.53 hrs, Volume= 121 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 142.11' @ 13.53 hrs Surf.Area= 1,144 sf Storage= 2,869 cf

Plug-Flow detention time= 381.2 min calculated for 5,782 cf (100% of inflow)
Center-of-Mass det. time= 381.2 min (1,137.6 - 756.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	139.00'	657 cf	**26.00'W x 44.00'L x 4.67'H Field A** 5,342 cf Overall - 3,699 cf Embedded = 1,643 cf x 40.0% Voids
#2A	139.00'	2,700 cf	**Shea Leaching Chamber 8x14x3.7** x 9 Inside #1 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf 9 Chambers in 3 Rows
		3,357 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	139.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	142.00'	**12.0" Round Culvert** L= 100.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 142.00' / 136.30' S= 0.0570 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Discarded OutFlow Max=0.06 cfs @ 9.57 hrs HW=139.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.04 cfs @ 13.53 hrs HW=142.11' (Free Discharge)
└**2=Culvert** (Inlet Controls 0.04 cfs @ 0.89 fps)

Pond INF-1: INFILTRATION SYSTEM-1 - Chamber Wizard Field A

Chamber Model = Shea Leaching Chamber 8x14x3.7 (Shea Galley)
Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf
Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf

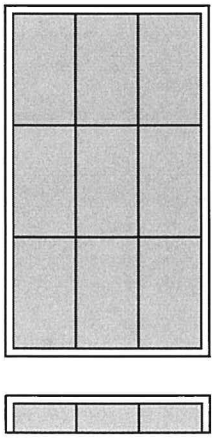
3 Chambers/Row x 14.00' Long = 42.00' Row Length +12.0" End Stone x 2 = 44.00' Base Length
3 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 26.00' Base Width
44.0" Chamber Height + 12.0" Cover = 4.67' Field Height

9 Chambers x 300.0 cf = 2,700.0 cf Chamber Storage
9 Chambers x 411.0 cf = 3,699.4 cf Displacement

5,342.5 cf Field - 3,699.4 cf Chambers = 1,643.1 cf Stone x 40.0% Voids = 657.2 cf Stone Storage

Chamber Storage + Stone Storage = 3,357.2 cf = 0.077 af
Overall Storage Efficiency = 62.8%
Overall System Size = 44.00' x 26.00' x 4.67'

9 Chambers
197.9 cy Field
60.9 cy Stone



Summary for Pond INF-2: INFILTRATION SYSTEM-2

Inflow Area = 39,933 sf, 93.96% Impervious, Inflow Depth = 2.54" for 2 yr event
Inflow = 2.62 cfs @ 12.08 hrs, Volume= 8,465 cf
Outflow = 0.89 cfs @ 12.36 hrs, Volume= 8,465 cf, Atten= 66%, Lag= 16.7 min
Discarded = 0.09 cfs @ 10.13 hrs, Volume= 6,219 cf
Primary = 0.80 cfs @ 12.36 hrs, Volume= 2,246 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 142.32' @ 12.36 hrs Surf.Area= 1,656 sf Storage= 3,074 cf

Plug-Flow detention time= 191.5 min calculated for 8,464 cf (100% of inflow)
Center-of-Mass det. time= 191.5 min (978.6 - 787.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	140.00'	1,120 cf	**36.00'W x 46.00'L x 4.67'H Field A** 7,734 cf Overall - 4,932 cf Embedded = 2,801 cf x 40.0% Voids
#2A	140.00'	3,600 cf	**Shea Leaching Chamber 8x14x3.7** x 12 Inside #1 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf 12 Chambers in 4 Rows
		4,720 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	141.80'	**12.0" Round Culvert** L= 150.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 141.80' / 136.30' S= 0.0367 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Discarded	140.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.09 cfs @ 10.13 hrs HW=140.05' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.80 cfs @ 12.36 hrs HW=142.32' (Free Discharge)
└**1=Culvert** (Inlet Controls 0.80 cfs @ 1.94 fps)

Pond INF-2: INFILTRATION SYSTEM-2 - Chamber Wizard Field A

Chamber Model = Shea Leaching Chamber 8x14x3.7 (Shea Galley)
Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf
Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf

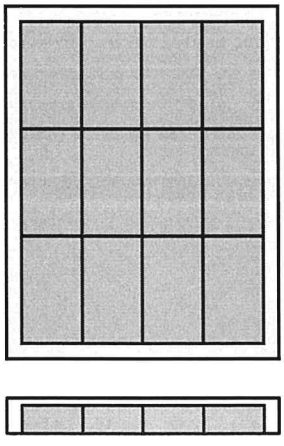
3 Chambers/Row x 14.00' Long = 42.00' Row Length +24.0" End Stone x 2 = 46.00' Base Length
4 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 36.00' Base Width
44.0" Chamber Height + 12.0" Cover = 4.67' Field Height

12 Chambers x 300.0 cf = 3,600.0 cf Chamber Storage
12 Chambers x 411.0 cf = 4,932.5 cf Displacement

7,733.5 cf Field - 4,932.5 cf Chambers = 2,801.0 cf Stone x 40.0% Voids = 1,120.4 cf Stone Storage

Chamber Storage + Stone Storage = 4,720.4 cf = 0.108 af
Overall Storage Efficiency = 61.0%
Overall System Size = 46.00' x 36.00' x 4.67'

12 Chambers
286.4 cy Field
103.7 cy Stone



Summary for Pond RNGN-1: RAINGARDEN

[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)

Inflow Area = 92,377 sf, 80.67% Impervious, Inflow Depth = 1.90" for 2 yr event
Inflow = 4.32 cfs @ 12.09 hrs, Volume= 14,598 cf
Outflow = 0.36 cfs @ 13.27 hrs, Volume= 14,598 cf, Atten= 92%, Lag= 71.1 min
Discarded = 0.36 cfs @ 13.27 hrs, Volume= 14,598 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 141.39' @ 13.27 hrs Surf.Area= 6,392 sf Storage= 6,082 cf

Plug-Flow detention time= 176.6 min calculated for 14,596 cf (100% of inflow)
Center-of-Mass det. time= 176.8 min (968.7 - 791.9)

Volume	Invert	Avail.Storage	Storage Description
#1	140.00'	21,056 cf	**RAIN GARDEN (Prismatic)** Listed below (Recalc)
#2	135.40'	8 cf	**1.50'D x 4.60'H AREA DRAIN**
		21,064 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
140.00	2,572	0	0
141.00	5,100	3,836	3,836
142.00	8,414	6,757	10,593
143.00	12,512	10,463	21,056

Device	Routing	Invert	Outlet Devices
#1	Primary	141.60'	**50.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#2	Discarded	135.40'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.36 cfs @ 13.27 hrs HW=141.39' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.36 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=135.40' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link POA: POA-1

Inflow Area = 238,973 sf, 74.60% Impervious, Inflow Depth = 0.60" for 2 yr event
Inflow = 2.91 cfs @ 12.09 hrs, Volume= 11,960 cf
Primary = 2.91 cfs @ 12.09 hrs, Volume= 11,960 cf, Atten= 0%, Lag= 0.0 min

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

Summary for Subcatchment BLDG: BUILDING

Runoff = 3.82 cfs @ 12.08 hrs, Volume= 13,458 cf, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	37,873	98	ROOF
	37,873		100.00% Impervious Area

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

Summary for Subcatchment P-WS-1: P-WATERSHED-1

Runoff = 2.36 cfs @ 12.08 hrs, Volume= 8,310 cf, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	23,385	98	Paved parking
	23,385		100.00% Impervious Area

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

Summary for Subcatchment P-WS-2: P-WATERSHED-2

Runoff = 3.84 cfs @ 12.08 hrs, Volume= 12,697 cf, Depth= 3.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	37,520	98	Paved parking
	2,413	39	>75% Grass cover, Good, HSG A
	39,933	94	Weighted Average
	2,413		6.04% Pervious Area
	37,520		93.96% Impervious Area

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

Summary for Subcatchment P-WS-3: P-WATERSHED-3

Runoff = 3.11 cfs @ 12.09 hrs, Volume= 9,674 cf, Depth= 2.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	36,650	98	Paved parking
	17,854	30	Brush, Good, HSG A
	54,504	76	Weighted Average
	17,854		32.76% Pervious Area
	36,650		67.24% Impervious Area

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

Summary for Subcatchment P-WS-4: P-WATERSHED-4

Runoff = 3.99 cfs @ 12.09 hrs, Volume= 12,631 cf, Depth= 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
	10,900	61	>75% Grass cover, Good, HSG B
	310	80	>75% Grass cover, Good, HSG D
*	34,790	98	Paved parking
	46,000	89	Weighted Average
	11,210		24.37% Pervious Area
	34,790		75.63% Impervious Area

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

Summary for Subcatchment P-WS-5: P-WATERSHED-5

Runoff = 1.09 cfs @ 12.10 hrs, Volume= 3,735 cf, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.50"

	Area (sf)	CN	Description
	21,000	55	Woods, Good, HSG B
	8,213	48	Brush, Good, HSG B
*	702	98	wetlands
*	7,363	98	Paved
	37,278	63	Weighted Average
	29,213		78.37% Pervious Area
	8,065		21.63% Impervious Area

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

Summary for Pond INF-1: INFILTRATION SYSTEM-1

Inflow Area = 23,385 sf,100.00% Impervious, Inflow Depth = 4.26" for 10 yr event
Inflow = 2.36 cfs @ 12.08 hrs, Volume= 8,310 cf
Outflow = 1.41 cfs @ 12.19 hrs, Volume= 8,310 cf, Atten= 40%, Lag= 6.2 min
Discarded = 0.06 cfs @ 8.50 hrs, Volume= 6,296 cf
Primary = 1.35 cfs @ 12.19 hrs, Volume= 2,013 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 142.71' @ 12.19 hrs Surf.Area= 1,144 sf Storage= 2,917 cf

Plug-Flow detention time= 305.0 min calculated for 8,308 cf (100% of inflow)
Center-of-Mass det. time= 305.0 min (1,054.8 - 749.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	139.00'	657 cf	**26.00'W x 44.00'L x 4.67'H Field A** 5,342 cf Overall - 3,699 cf Embedded = 1,643 cf x 40.0% Voids
#2A	139.00'	2,700 cf	**Shea Leaching Chamber 8x14x3.7** x 9 Inside #1 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf 9 Chambers in 3 Rows
		3,357 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	139.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	142.00'	**12.0" Round Culvert** L= 100.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 142.00' / 136.30' S= 0.0570 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Discarded OutFlow Max=0.06 cfs @ 8.50 hrs HW=139.05' (Free Discharge)
↳**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=1.34 cfs @ 12.19 hrs HW=142.71' (Free Discharge)
↳**2=Culvert** (Inlet Controls 1.34 cfs @ 2.26 fps)

Pond INF-1: INFILTRATION SYSTEM-1 - Chamber Wizard Field A

Chamber Model = Shea Leaching Chamber 8x14x3.7 (Shea Galley)
Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf
Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf

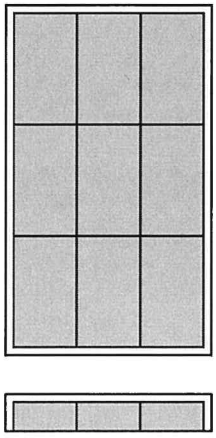
3 Chambers/Row x 14.00' Long = 42.00' Row Length +12.0" End Stone x 2 = 44.00' Base Length
3 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 26.00' Base Width
44.0" Chamber Height + 12.0" Cover = 4.67' Field Height

9 Chambers x 300.0 cf = 2,700.0 cf Chamber Storage
9 Chambers x 411.0 cf = 3,699.4 cf Displacement

5,342.5 cf Field - 3,699.4 cf Chambers = 1,643.1 cf Stone x 40.0% Voids = 657.2 cf Stone Storage

Chamber Storage + Stone Storage = 3,357.2 cf = 0.077 af
Overall Storage Efficiency = 62.8%
Overall System Size = 44.00' x 26.00' x 4.67'

9 Chambers
197.9 cy Field
60.9 cy Stone



Summary for Pond INF-2: INFILTRATION SYSTEM-2

Inflow Area = 39,933 sf, 93.96% Impervious, Inflow Depth = 3.82" for 10 yr event
Inflow = 3.84 cfs @ 12.08 hrs, Volume= 12,697 cf
Outflow = 2.32 cfs @ 12.19 hrs, Volume= 12,697 cf, Atten= 40%, Lag= 6.1 min
Discarded = 0.09 cfs @ 8.91 hrs, Volume= 7,156 cf
Primary = 2.23 cfs @ 12.19 hrs, Volume= 5,541 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 142.86' @ 12.19 hrs Surf.Area= 1,656 sf Storage= 3,784 cf

Plug-Flow detention time= 155.6 min calculated for 12,697 cf (100% of inflow)
Center-of-Mass det. time= 155.6 min (932.1 - 776.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	140.00'	1,120 cf	**36.00'W x 46.00'L x 4.67'H Field A** 7,734 cf Overall - 4,932 cf Embedded = 2,801 cf x 40.0% Voids
#2A	140.00'	3,600 cf	**Shea Leaching Chamber 8x14x3.7** x 12 Inside #1 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf 12 Chambers in 4 Rows
		4,720 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	141.80'	**12.0" Round Culvert** L= 150.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 141.80' / 136.30' S= 0.0367 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Discarded	140.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.09 cfs @ 8.91 hrs HW=140.05' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=2.23 cfs @ 12.19 hrs HW=142.86' (Free Discharge)
└**1=Culvert** (Inlet Controls 2.23 cfs @ 2.83 fps)

Pond INF-2: INFILTRATION SYSTEM-2 - Chamber Wizard Field A

Chamber Model = Shea Leaching Chamber 8x14x3.7 (Shea Galley)
Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf
Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf

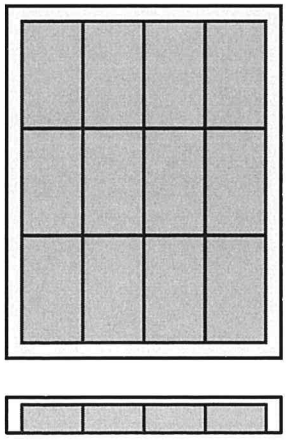
3 Chambers/Row x 14.00' Long = 42.00' Row Length +24.0" End Stone x 2 = 46.00' Base Length
4 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 36.00' Base Width
44.0" Chamber Height + 12.0" Cover = 4.67' Field Height

12 Chambers x 300.0 cf = 3,600.0 cf Chamber Storage
12 Chambers x 411.0 cf = 4,932.5 cf Displacement

7,733.5 cf Field - 4,932.5 cf Chambers = 2,801.0 cf Stone x 40.0% Voids = 1,120.4 cf Stone Storage

Chamber Storage + Stone Storage = 4,720.4 cf = 0.108 af
Overall Storage Efficiency = 61.0%
Overall System Size = 46.00' x 36.00' x 4.67'

12 Chambers
286.4 cy Field
103.7 cy Stone



Summary for Pond RNGN-1: RAINGARDEN

Inflow Area = 92,377 sf, 80.67% Impervious, Inflow Depth = 3.00" for 10 yr event
Inflow = 6.93 cfs @ 12.09 hrs, Volume= 23,131 cf
Outflow = 2.89 cfs @ 12.30 hrs, Volume= 23,131 cf, Atten= 58%, Lag= 13.0 min
Discarded = 0.41 cfs @ 12.30 hrs, Volume= 19,353 cf
Primary = 2.48 cfs @ 12.30 hrs, Volume= 3,778 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 141.67' @ 12.30 hrs Surf.Area= 7,325 sf Storage= 8,012 cf

Plug-Flow detention time= 176.5 min calculated for 23,128 cf (100% of inflow)
Center-of-Mass det. time= 176.6 min (963.1 - 786.4)

Volume	Invert	Avail.Storage	Storage Description
#1	140.00'	21,056 cf	**RAIN GARDEN (Prismatic)** Listed below (Recalc)
#2	135.40'	8 cf	**1.50'D x 4.60'H AREA DRAIN**
		21,064 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
140.00	2,572	0	0
141.00	5,100	3,836	3,836
142.00	8,414	6,757	10,593
143.00	12,512	10,463	21,056

Device	Routing	Invert	Outlet Devices
#1	Primary	141.60'	**50.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#2	Discarded	135.40'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.41 cfs @ 12.30 hrs HW=141.67' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.41 cfs)

Primary OutFlow Max=2.24 cfs @ 12.30 hrs HW=141.67' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 2.24 cfs @ 0.63 fps)

Summary for Link POA: POA-1

Inflow Area = 238,973 sf, 74.60% Impervious, Inflow Depth = 1.39" for 10 yr event
Inflow = 7.80 cfs @ 12.26 hrs, Volume= 27,698 cf
Primary = 7.80 cfs @ 12.26 hrs, Volume= 27,698 cf, Atten= 0%, Lag= 0.0 min

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

Summary for Subcatchment BLDG: BUILDING

Runoff = 4.60 cfs @ 12.08 hrs, Volume= 16,294 cf, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 yr Rainfall=5.40"

	Area (sf)	CN	Description
*	37,873	98	ROOF
	37,873		100.00% Impervious Area

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

Summary for Subcatchment P-WS-1: P-WATERSHED-1

Runoff = 2.84 cfs @ 12.08 hrs, Volume= 10,061 cf, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 yr Rainfall=5.40"

	Area (sf)	CN	Description
*	23,385	98	Paved parking
	23,385		100.00% Impervious Area

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

Summary for Subcatchment P-WS-2: P-WATERSHED-2

Runoff = 4.68 cfs @ 12.08 hrs, Volume= 15,650 cf, Depth= 4.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 yr Rainfall=5.40"

	Area (sf)	CN	Description
*	37,520	98	Paved parking
	2,413	39	>75% Grass cover, Good, HSG A
	39,933	94	Weighted Average
	2,413		6.04% Pervious Area
	37,520		93.96% Impervious Area

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

Summary for Subcatchment P-WS-3: P-WATERSHED-3

Runoff = 4.21 cfs @ 12.09 hrs, Volume= 13,029 cf, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 yr Rainfall=5.40"

	Area (sf)	CN	Description
*	36,650	98	Paved parking
	17,854	30	Brush, Good, HSG A
	54,504	76	Weighted Average
	17,854		32.76% Pervious Area
	36,650		67.24% Impervious Area

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

Summary for Subcatchment P-WS-4: P-WATERSHED-4

Runoff = 4.97 cfs @ 12.09 hrs, Volume= 15,931 cf, Depth= 4.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 yr Rainfall=5.40"

	Area (sf)	CN	Description
	10,900	61	>75% Grass cover, Good, HSG B
	310	80	>75% Grass cover, Good, HSG D
*	34,790	98	Paved parking
	46,000	89	Weighted Average
	11,210		24.37% Pervious Area
	34,790		75.63% Impervious Area

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

Summary for Subcatchment P-WS-5: P-WATERSHED-5

Runoff = 1.68 cfs @ 12.10 hrs, Volume= 5,492 cf, Depth= 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 yr Rainfall=5.40"

	Area (sf)	CN	Description
	21,000	55	Woods, Good, HSG B
	8,213	48	Brush, Good, HSG B
*	702	98	wetlands
*	7,363	98	Paved
	37,278	63	Weighted Average
	29,213		78.37% Pervious Area
	8,065		21.63% Impervious Area

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

Summary for Pond INF-1: INFILTRATION SYSTEM-1

Inflow Area = 23,385 sf,100.00% Impervious, Inflow Depth = 5.16" for 25 yr event
Inflow = 2.84 cfs @ 12.08 hrs, Volume= 10,061 cf
Outflow = 2.27 cfs @ 12.14 hrs, Volume= 10,061 cf, Atten= 20%, Lag= 3.5 min
Discarded = 0.06 cfs @ 7.84 hrs, Volume= 6,659 cf
Primary = 2.21 cfs @ 12.14 hrs, Volume= 3,402 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 143.05' @ 12.14 hrs Surf.Area= 1,144 sf Storage= 3,073 cf

Plug-Flow detention time= 271.2 min calculated for 10,059 cf (100% of inflow)
Center-of-Mass det. time= 271.3 min (1,018.1 - 746.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	139.00'	657 cf	**26.00'W x 44.00'L x 4.67'H Field A** 5,342 cf Overall - 3,699 cf Embedded = 1,643 cf x 40.0% Voids
#2A	139.00'	2,700 cf	**Shea Leaching Chamber 8x14x3.7** x 9 Inside #1 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf 9 Chambers in 3 Rows
		3,357 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	139.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	142.00'	**12.0" Round Culvert** L= 100.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 142.00' / 136.30' S= 0.0570 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Discarded OutFlow Max=0.06 cfs @ 7.84 hrs HW=139.05' (Free Discharge)
↳**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=2.21 cfs @ 12.14 hrs HW=143.05' (Free Discharge)
↳**2=Culvert** (Inlet Controls 2.21 cfs @ 2.81 fps)

Pond INF-1: INFILTRATION SYSTEM-1 - Chamber Wizard Field A

Chamber Model = Shea Leaching Chamber 8x14x3.7 (Shea Galley)
Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf
Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf

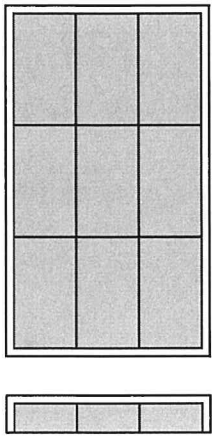
3 Chambers/Row x 14.00' Long = 42.00' Row Length +12.0" End Stone x 2 = 44.00' Base Length
3 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 26.00' Base Width
44.0" Chamber Height + 12.0" Cover = 4.67' Field Height

9 Chambers x 300.0 cf = 2,700.0 cf Chamber Storage
9 Chambers x 411.0 cf = 3,699.4 cf Displacement

5,342.5 cf Field - 3,699.4 cf Chambers = 1,643.1 cf Stone x 40.0% Voids = 657.2 cf Stone Storage

Chamber Storage + Stone Storage = 3,357.2 cf = 0.077 af
Overall Storage Efficiency = 62.8%
Overall System Size = 44.00' x 26.00' x 4.67'

9 Chambers
197.9 cy Field
60.9 cy Stone



Summary for Pond INF-2: INFILTRATION SYSTEM-2

Inflow Area = 39,933 sf, 93.96% Impervious, Inflow Depth = 4.70" for 25 yr event
Inflow = 4.68 cfs @ 12.08 hrs, Volume= 15,650 cf
Outflow = 3.69 cfs @ 12.15 hrs, Volume= 15,650 cf, Atten= 21%, Lag= 3.7 min
Discarded = 0.09 cfs @ 8.35 hrs, Volume= 7,676 cf
Primary = 3.60 cfs @ 12.15 hrs, Volume= 7,974 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 143.75' @ 12.15 hrs Surf.Area= 1,656 sf Storage= 4,112 cf

Plug-Flow detention time= 140.5 min calculated for 15,648 cf (100% of inflow)
Center-of-Mass det. time= 140.5 min (911.8 - 771.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	140.00'	1,120 cf	**36.00'W x 46.00'L x 4.67'H Field A** 7,734 cf Overall - 4,932 cf Embedded = 2,801 cf x 40.0% Voids
#2A	140.00'	3,600 cf	**Shea Leaching Chamber 8x14x3.7** x 12 Inside #1 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf 12 Chambers in 4 Rows
		4,720 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	141.80'	**12.0" Round Culvert** L= 150.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 141.80' / 136.30' S= 0.0367 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Discarded	140.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.09 cfs @ 8.35 hrs HW=140.05' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=3.59 cfs @ 12.15 hrs HW=143.75' (Free Discharge)
└**1=Culvert** (Inlet Controls 3.59 cfs @ 4.58 fps)

Pond INF-2: INFILTRATION SYSTEM-2 - Chamber Wizard Field A

Chamber Model = Shea Leaching Chamber 8x14x3.7 (Shea Galley)
Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf
Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf

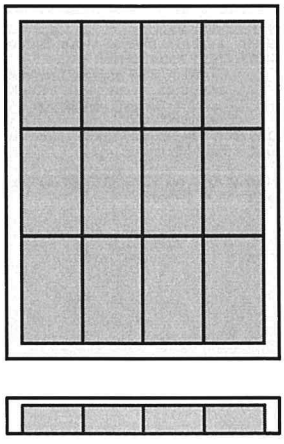
3 Chambers/Row x 14.00' Long = 42.00' Row Length +24.0" End Stone x 2 = 46.00' Base Length
4 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 36.00' Base Width
44.0" Chamber Height + 12.0" Cover = 4.67' Field Height

12 Chambers x 300.0 cf = 3,600.0 cf Chamber Storage
12 Chambers x 411.0 cf = 4,932.5 cf Displacement

7,733.5 cf Field - 4,932.5 cf Chambers = 2,801.0 cf Stone x 40.0% Voids = 1,120.4 cf Stone Storage

Chamber Storage + Stone Storage = 4,720.4 cf = 0.108 af
Overall Storage Efficiency = 61.0%
Overall System Size = 46.00' x 36.00' x 4.67'

12 Chambers
286.4 cy Field
103.7 cy Stone



Summary for Pond RNGN-1: RAINGARDEN

Inflow Area = 92,377 sf, 80.67% Impervious, Inflow Depth = 3.81" for 25 yr event
Inflow = 8.80 cfs @ 12.09 hrs, Volume= 29,323 cf
Outflow = 6.31 cfs @ 12.16 hrs, Volume= 29,323 cf, Atten= 28%, Lag= 4.6 min
Discarded = 0.42 cfs @ 12.16 hrs, Volume= 21,158 cf
Primary = 5.89 cfs @ 12.16 hrs, Volume= 8,165 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 141.73' @ 12.16 hrs Surf.Area= 7,531 sf Storage= 8,472 cf

Plug-Flow detention time= 156.4 min calculated for 29,319 cf (100% of inflow)
Center-of-Mass det. time= 156.5 min (939.7 - 783.2)

Volume	Invert	Avail.Storage	Storage Description
#1	140.00'	21,056 cf	**RAIN GARDEN (Prismatic)** Listed below (Recalc)
#2	135.40'	8 cf	**1.50'D x 4.60'H AREA DRAIN**
		21,064 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
140.00	2,572	0	0
141.00	5,100	3,836	3,836
142.00	8,414	6,757	10,593
143.00	12,512	10,463	21,056

Device	Routing	Invert	Outlet Devices
#1	Primary	141.60'	**50.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#2	Discarded	135.40'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.42 cfs @ 12.16 hrs HW=141.73' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.42 cfs)

Primary OutFlow Max=5.73 cfs @ 12.16 hrs HW=141.73' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 5.73 cfs @ 0.86 fps)

Summary for Link POA: POA-1

Inflow Area = 238,973 sf, 74.60% Impervious, Inflow Depth = 2.06" for 25 yr event
Inflow = 16.85 cfs @ 12.14 hrs, Volume= 40,964 cf
Primary = 16.85 cfs @ 12.14 hrs, Volume= 40,964 cf, Atten= 0%, Lag= 0.0 min

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

Summary for Subcatchment BLDG: BUILDING

Runoff = 5.97 cfs @ 12.08 hrs, Volume= 21,338 cf, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	37,873	98	ROOF
	37,873		100.00% Impervious Area

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

Summary for Subcatchment P-WS-1: P-WATERSHED-1

Runoff = 3.69 cfs @ 12.08 hrs, Volume= 13,175 cf, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	23,385	98	Paved parking
	23,385		100.00% Impervious Area

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

Summary for Subcatchment P-WS-2: P-WATERSHED-2

Runoff = 6.15 cfs @ 12.08 hrs, Volume= 20,926 cf, Depth= 6.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	37,520	98	Paved parking
	2,413	39	>75% Grass cover, Good, HSG A
	39,933	94	Weighted Average
	2,413		6.04% Pervious Area
	37,520		93.96% Impervious Area

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

Summary for Subcatchment P-WS-3: P-WATERSHED-3

Runoff = 6.23 cfs @ 12.09 hrs, Volume= 19,337 cf, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	36,650	98	Paved parking
	17,854	30	Brush, Good, HSG A
	54,504	76	Weighted Average
	17,854		32.76% Pervious Area
	36,650		67.24% Impervious Area

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

Summary for Subcatchment P-WS-4: P-WATERSHED-4

Runoff = 6.71 cfs @ 12.08 hrs, Volume= 21,881 cf, Depth= 5.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
	10,900	61	>75% Grass cover, Good, HSG B
	310	80	>75% Grass cover, Good, HSG D
*	34,790	98	Paved parking
	46,000	89	Weighted Average
	11,210		24.37% Pervious Area
	34,790		75.63% Impervious Area

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

Summary for Subcatchment P-WS-5: P-WATERSHED-5

Runoff = 2.87 cfs @ 12.09 hrs, Volume= 9,011 cf, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
	21,000	55	Woods, Good, HSG B
	8,213	48	Brush, Good, HSG B
*	702	98	wetlands
*	7,363	98	Paved
	37,278	63	Weighted Average
	29,213		78.37% Pervious Area
	8,065		21.63% Impervious Area

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

Summary for Pond INF-1: INFILTRATION SYSTEM-1

Inflow Area = 23,385 sf,100.00% Impervious, Inflow Depth = 6.76" for 100 yr event
Inflow = 3.69 cfs @ 12.08 hrs, Volume= 13,175 cf
Outflow = 3.12 cfs @ 12.13 hrs, Volume= 13,175 cf, Atten= 15%, Lag= 3.0 min
Discarded = 0.06 cfs @ 6.75 hrs, Volume= 7,177 cf
Primary = 3.06 cfs @ 12.13 hrs, Volume= 5,998 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 143.55' @ 12.13 hrs Surf.Area= 1,144 sf Storage= 3,303 cf

Plug-Flow detention time= 230.7 min calculated for 13,174 cf (100% of inflow)
Center-of-Mass det. time= 230.7 min (973.7 - 743.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	139.00'	657 cf	**26.00'W x 44.00'L x 4.67'H Field A** 5,342 cf Overall - 3,699 cf Embedded = 1,643 cf x 40.0% Voids
#2A	139.00'	2,700 cf	**Shea Leaching Chamber 8x14x3.7** x 9 Inside #1 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf 9 Chambers in 3 Rows
		3,357 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	139.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	142.00'	**12.0" Round Culvert** L= 100.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 142.00' / 136.30' S= 0.0570 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Discarded OutFlow Max=0.06 cfs @ 6.75 hrs HW=139.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=3.06 cfs @ 12.13 hrs HW=143.55' (Free Discharge)
└**2=Culvert** (Inlet Controls 3.06 cfs @ 3.89 fps)

Pond INF-1: INFILTRATION SYSTEM-1 - Chamber Wizard Field A

Chamber Model = Shea Leaching Chamber 8x14x3.7 (Shea Galley)
Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf
Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf

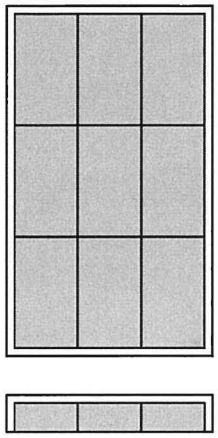
3 Chambers/Row x 14.00' Long = 42.00' Row Length +12.0" End Stone x 2 = 44.00' Base Length
3 Rows x 96.0" Wide + 12.0" Side Stone x 2 = 26.00' Base Width
44.0" Chamber Height + 12.0" Cover = 4.67' Field Height

9 Chambers x 300.0 cf = 2,700.0 cf Chamber Storage
9 Chambers x 411.0 cf = 3,699.4 cf Displacement

5,342.5 cf Field - 3,699.4 cf Chambers = 1,643.1 cf Stone x 40.0% Voids = 657.2 cf Stone Storage

Chamber Storage + Stone Storage = 3,357.2 cf = 0.077 af
Overall Storage Efficiency = 62.8%
Overall System Size = 44.00' x 26.00' x 4.67'

9 Chambers
197.9 cy Field
60.9 cy Stone



Summary for Pond INF-2: INFILTRATION SYSTEM-2

Inflow Area = 39,933 sf, 93.96% Impervious, Inflow Depth = 6.29" for 100 yr event
Inflow = 6.15 cfs @ 12.08 hrs, Volume= 20,926 cf
Outflow = 4.58 cfs @ 12.15 hrs, Volume= 20,926 cf, Atten= 26%, Lag= 4.2 min
Discarded = 0.09 cfs @ 7.24 hrs, Volume= 8,415 cf
Primary = 4.49 cfs @ 12.15 hrs, Volume= 12,511 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 144.56' @ 12.15 hrs Surf.Area= 1,656 sf Storage= 4,647 cf

Plug-Flow detention time= 122.0 min calculated for 20,923 cf (100% of inflow)
Center-of-Mass det. time= 122.0 min (886.6 - 764.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	140.00'	1,120 cf	**36.00'W x 46.00'L x 4.67'H Field A** 7,734 cf Overall - 4,932 cf Embedded = 2,801 cf x 40.0% Voids
#2A	140.00'	3,600 cf	**Shea Leaching Chamber 8x14x3.7** x 12 Inside #1 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf 12 Chambers in 4 Rows
		4,720 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	141.80'	**12.0" Round Culvert** L= 150.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 141.80' / 136.30' S= 0.0367 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Discarded	140.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.09 cfs @ 7.24 hrs HW=140.05' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=4.49 cfs @ 12.15 hrs HW=144.56' (Free Discharge)
└**1=Culvert** (Inlet Controls 4.49 cfs @ 5.71 fps)

Pond INF-2: INFILTRATION SYSTEM-2 - Chamber Wizard Field A

Chamber Model = Shea Leaching Chamber 8x14x3.7 (Shea Galley)
Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf
Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf

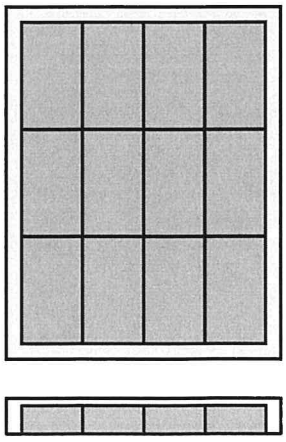
3 Chambers/Row x 14.00' Long = 42.00' Row Length +24.0" End Stone x 2 = 46.00' Base Length
4 Rows x 96.0" Wide + 24.0" Side Stone x 2 = 36.00' Base Width
44.0" Chamber Height + 12.0" Cover = 4.67' Field Height

12 Chambers x 300.0 cf = 3,600.0 cf Chamber Storage
12 Chambers x 411.0 cf = 4,932.5 cf Displacement

7,733.5 cf Field - 4,932.5 cf Chambers = 2,801.0 cf Stone x 40.0% Voids = 1,120.4 cf Stone Storage

Chamber Storage + Stone Storage = 4,720.4 cf = 0.108 af
Overall Storage Efficiency = 61.0%
Overall System Size = 46.00' x 36.00' x 4.67'

12 Chambers
286.4 cy Field
103.7 cy Stone



Summary for Pond RNGN-1: RAINGARDEN

Inflow Area = 92,377 sf, 80.67% Impervious, Inflow Depth = 5.28" for 100 yr event
Inflow = 12.20 cfs @ 12.09 hrs, Volume= 40,675 cf
Outflow = 11.61 cfs @ 12.11 hrs, Volume= 40,675 cf, Atten= 5%, Lag= 1.6 min
Discarded = 0.43 cfs @ 12.11 hrs, Volume= 23,883 cf
Primary = 11.18 cfs @ 12.11 hrs, Volume= 16,792 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 141.80' @ 12.11 hrs Surf.Area= 7,769 sf Storage= 9,022 cf

Plug-Flow detention time= 132.1 min calculated for 40,675 cf (100% of inflow)
Center-of-Mass det. time= 132.1 min (910.4 - 778.4)

Volume	Invert	Avail.Storage	Storage Description
#1	140.00'	21,056 cf	**RAIN GARDEN (Prismatic)** Listed below (Recalc)
#2	135.40'	8 cf	**1.50'D x 4.60'H AREA DRAIN**
		21,064 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
140.00	2,572	0	0
141.00	5,100	3,836	3,836
142.00	8,414	6,757	10,593
143.00	12,512	10,463	21,056

Device	Routing	Invert	Outlet Devices
#1	Primary	141.60'	**50.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#2	Discarded	135.40'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.43 cfs @ 12.11 hrs HW=141.80' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.43 cfs)

Primary OutFlow Max=10.99 cfs @ 12.11 hrs HW=141.80' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 10.99 cfs @ 1.07 fps)

Summary for Link POA: POA-1

Inflow Area = 238,973 sf, 74.60% Impervious, Inflow Depth = 3.32" for 100 yr event
Inflow = 27.72 cfs @ 12.11 hrs, Volume= 66,194 cf
Primary = 27.72 cfs @ 12.11 hrs, Volume= 66,194 cf, Atten= 0%, Lag= 0.0 min

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

APPENDIX 3:
SOILS REPORT

Commonwealth of Massachusetts
City/Town of RANDOLPH

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

34 SCANLON DRIVE - JACK OLEARY SE - 17835 - JUNE 17, 2019

C. On-Site Review (continued)

Deep Observation Hole Number: 17-1

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-3"	FILL										ASPHALT
3"-72"	FILL	2.5Y6/4		LOAMY SAND		LOAMY SAND,	20	5	SINGLE	LOOSE	
						SILT LOAM INCLUSIONS			GRAIN		

Additional Notes:

WATER WEEPING @ 56" ± ESHGW

NO REDOXIMORPHIC FEATURES

BASE COURSE INCLUDED IN FILL 3"-12"±

Commonwealth of Massachusetts
City/Town of RANDOLPH

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

34 SCANLON DRIVE - JACK O'LEARY SE 1785 - JUNE 17, 2019

C. On-Site Review (continued)

Deep Observation Hole Number: 17-2

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-3"	FILL										ASPHALT
3"-46"	FILL	2.5Y 6/4				LOAMY SAND	5		SINGLE GRAIN	LOOSE	
46"-64"	FILL	2.5Y 5/3				LOAMY SAND	20		SINGE GRAIN	LOOSE	

Additional Notes:

GROUNDWATER WEEPING @ 56" ← ESHGW
NO REDOXIMORPHIC FEATURES

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

34 SCANLON DRIVE — JACK OLEARY / SE 1785 — JUNE 17, 2019

C. On-Site Review (continued)

Deep Observation Hole Number: 17-3

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-3"	FILL										ASPHALT
3"-59"	FILL	2.5Y 6/4				LOAMY SAND	20	5	SINGLE GRAIN	LOOSE	SILT INCLUSIONS
59"-60"	^C1	10Y 3/1	59"	GLEY COLOR		CLAY LOAM			MASSIVE	FIRM	TOPSOIL LENS *

Additional Notes:

GROUNDWATER WEEPING AT 56" ← ESHGW
REDOXIMORPHIC FEATURES AT 59" (GLEY COLOR)
*^C1 HORIZON INDICATIVE OF BORDER WETLAND

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

34 SCANLON DRIVE – JACK OVERN / SE 1785 - JUNE 17, 2019

C. On-Site Review (continued)

Deep Observation Hole Number: 17-4

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-3"	FILL										ASPHALT
3"-55"	FILL	2.5Y 6/4				SANDY LOAM	20	5	SINGLE GRAIN	LOOSE	SAND INCLUSIONS
55"-67"	^A	2.5YR 3/3				SAPRIC			MASSIVE	FIRM	*
67"-84"	^C1	10Y 3/1	67"	GLEY COLOR		CLAY LOAM			MASSIVE	FIRM	*

Additional Notes:

GROUNDWATER WELLING AT 56" ← ESHGW

REDOXIMORPHIC FEATURES AT 67"

* ^A AND ^C1 HORIZONS INDICATIVE OF BORDER WETLAND

Commonwealth of Massachusetts
City/Town of RANDOLPH

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

34 SCANLON DRIVE - JACK OLSON SE 1785 - JUNE 17, 2019

C. On-Site Review (continued)

Deep Observation Hole Number: 17-5

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-3"	FILL										ASPHALT
3"-84"	FILL	2.5Y 4/4				SAND	20	5	SINGLE GRAIN	LOOSE	

Additional Notes:

NO GROUNDWATER OBSERVED

NO REDOXIMORPHIC FEATURES NOTED

EXCAVATION STOPPED DUE TO HOLE COLLAPSE

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

34 SCHOOL DRIVE – JACK O'CONNELL SE 1785 – JUNE 17, 2019

C. On-Site Review (continued)

Deep Observation Hole Number: 17-6

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-3"	FILL										ASPHALT
3"-38"	FILL	2.5Y 6/4				SANDY LOAM	20	20	SINGLE GRAIN	LOOSE	
38"-50"	A	2.5Y 3/3	38"	HYDRIC		SAPRIC			MASSIVE	FIRM	*
50"-64"	C1	10Y 3/1				CLAY LOAM			MASSIVE	FIRM	*
64"-120"	C2	10YR 4/4				SANDY LOAM	30	10	SINGLE GRAIN	LOOSE	*

Additional Notes:

BURIED HYDRIC SOIL = ESHGL = 38"

* BURIED SOIL HORIZONS INDICATIVE OF WETLANDS

Commonwealth of Massachusetts
City/Town of RANDOLPH

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

34 SCANLON DRIVE - JACK O'LEARY/SE 1785 - JUNE 17, 2019

C. On-Site Review (continued)

Deep Observation Hole Number: 17-7

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-3"	FILL										ASPHALT
3"-108"	FILL	2.5Y 6/4				LOAMY SAND	30	10	MASSIVE	FIRM	*

Additional Notes:

* SILTY LENSES, 10% COBBLES IN UPPER 3'
GROUNDWATER SEEPING @ 72"
NO REDOXIMORPHIC FEATURES NOTED

Commonwealth of Massachusetts
City/Town of RANDOLPH

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

34 SCANLON DRIVE – JACK O'LEARY SE 1705 – JUNE 17, 2019

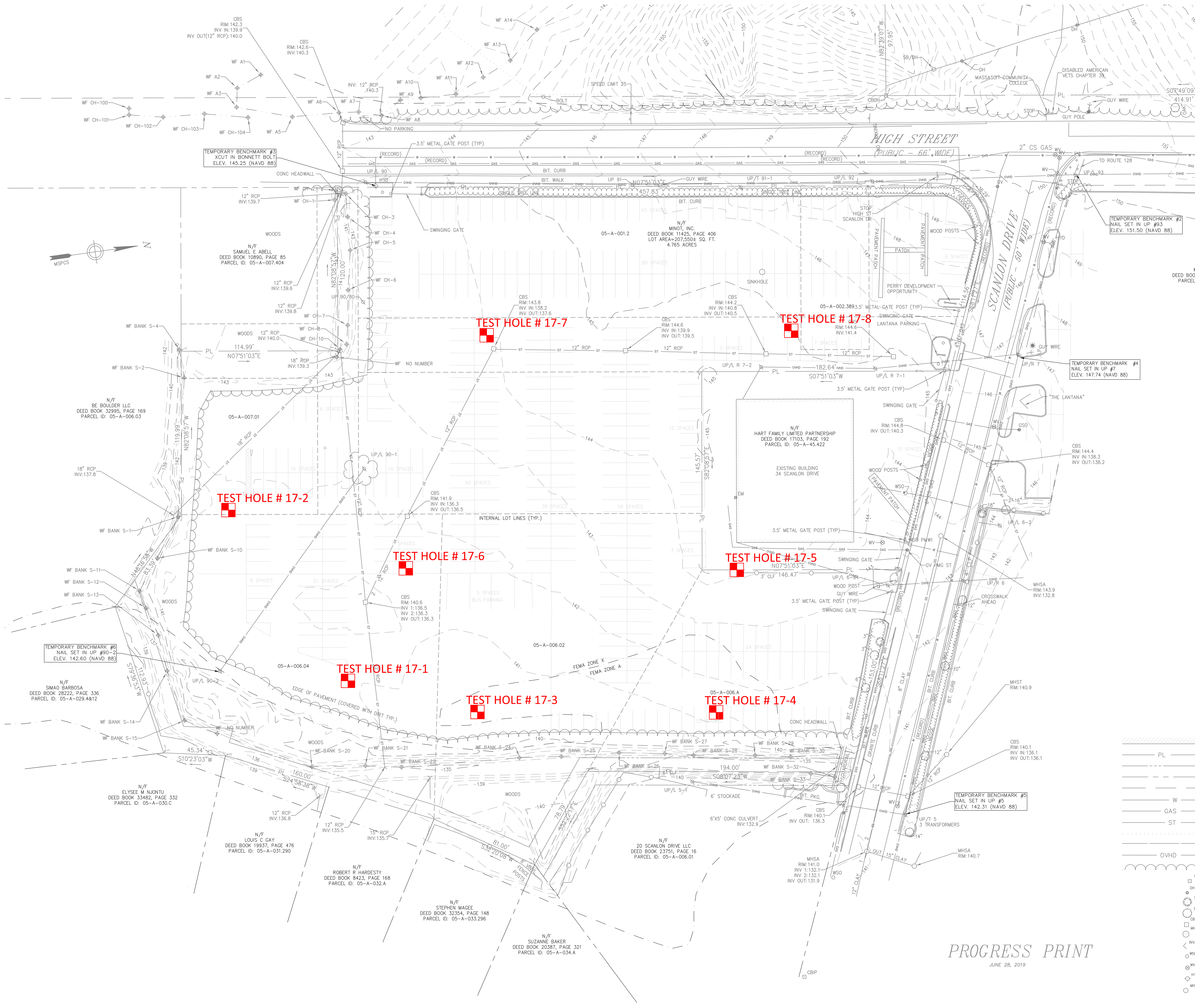
C. On-Site Review (continued)

Deep Observation Hole Number: 17-8

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0"-3"	FILL										ASPHALT
3"-14"	FILL										BASE COURSE
14"-20"	^A										BURIED TOPSOIL
20"-29"	^B										BURIED SUBSOIL
29"-84"	^C	2.5Y 6/4				SANDY LOAM	30	20	MASSIVE	FIRM	

Additional Notes:

NO GROUNDWATER ENCOUNTERED
NO REDOXIMORPHIC FEATURES NOTED
EXCAVATION STOPPED DUE TO HOLE COLLAPSE



GENERAL NOTES:

1. THE EXISTING CONDITIONS INFORMATION SHOWN HEREON IS THE RESULT OF AN ON–THE–GROUND SURVEY PERFORMED BY CHA CONSULTING, INC. IN JUNE OF 2019.

2. ALL DEED REFERENCES ARE TO NORFOLK COUNTY REGISTRY OF DEEDS UNLESS OTHERWISE NOTED.

3. LOCUS OWNER OF RECORD:

   MINOT INC
   DEED BOOK 11425 PAGE 406
   MAP 5, LOTS 05–A–006.A, 05–A–006.02, 05–A–006.04, 05–A–001.2, 05–A–002.389 & 05–A–007.01

4. TOPOGRAPHY, CONTOURS AND BENCHMARKS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). TEMPORARY BENCHMARKS, REFERENCED TO THE DATUM ARE INDICATED ON THE SURVEY.

   IN THE EVENT THAT BENCHMARKS (TBM'S), ESTABLISHED FOR THIS PROJECT AND PUBLISHED ON THIS SURVEY ARE DESTROYED, NOT RECOVERABLE OR A DISCREPANCY IS FOUND, THE USER SHOULD NOTIFY THIS FIRM IN WRITING PRIOR TO COMMENCING OR CONTINUING ANY WORK.

5. THE PROJECT AREA IS LOCATED IN FLOOD ZONES "X & A" AS SHOWN ON FLOOD INSURANCE RATE MAP FOR NORFOLK COUNTY, COMMUNITY PANEL NUMBER 25021C0204E, EFFECTIVE DATE JULY 17, 2012.

6. THE LOCUS PARCEL IS LOCATED IN THE TOWN OF RANDOLPH BLUE HILL RIVER HIGHWAY DISTRICT AS DEFINED BY THE TOWN OF RANDOLPH ZONING MAP.
   MINIMUM SETBACK REQUIREMENTS ARE:

   FRONT SETBACK:...............15'
   SIDE SETBACK:..................6'
   REAR SETBACK:.................15'

7. LOCATION OF SUBSURFACE UTILITIES SHOWN HEREON ARE APPROXIMATE AND ADDITIONAL UTILITIES MAY EXIST THAT ARE NOT SHOWN ON THIS PLAN. LOCATIONS ARE COMPILED FROM UTILITY PLANS OF RECORD AND DIG–SAFE FIELD MARKINGS. RIM AND INVERT INFORMATION HAS BEEN COMPILED AND FIELD VERIFIED WHERE POSSIBLE. THIS INFORMATION IS NOT TO BE USED FOR CONSTRUCTION. PRIOR TO ANY CONSTRUCTION, CONTACT DIG–SAFE (1–800–344–7233) TO FIELD VERIFY LOCATION OF ALL UTILITIES.

8. PLAN REFERENCES:

   LAND COURT PLAN 4921S
   PLAN BOOK 382 PAGE 570
   PLAN BOOK 437 PAGE 117
   PLAN BOOK 541 PAGE 682
   PLAN BOOK 67 PAGE 3227
   PLAN BOOK 4915 PAGE 153
   PLAN BOOK 4998 PAGE 667
   PLAN BOOK 221 PAGE 683
   PLAN BOOK 1773 PAGE END
   PLAN BOOK 4813 PAGE 209

9. WETLAND FLAGS SHOWN HEREON ARE BASED ON FIELD LOCATIONS BY CHA CONSULTING, INC. IN JUNE, 2019.

   WETLAND FLAGS WERE DELINEATED BY PARE CORP. ON MAY 15, 2018.

LEGEND:

- BUILDING LINE
- PL — PARCEL BOUNDARY LINE
- EASEMENT LINE
- ADJOINING PARCEL LINE
- STREET/HIGHWAY LINE
- W — UNDERGROUND WATER LINE
- GAS — UNDERGROUND GAS LINE
- ST — DRAIN LINE
- STONE WALL
- CHAIN LINK FENCE
- OVHD — OVERHEAD UTILITY LINE
- TREE LINE
- CBD – CONCRETE BOUND
- DH – DRILL HOLE
- TREE – PINE TREE
- TREE – DECIDUOUS TREE
- CB – SQUARE CATCH BASIN
- MHST – STORM MANHOLE
- INV. – INVERT
- WSO – WATER SHUT OFF
- WV – WATER VALVE
- HYD – HYDRANT
- MHSA – SEWER MANHOLE
- GSO – GAS SHUT OFF
- GV – GAS VALVE
- UTILITY POLE
- GUY POLE – GUY POLE
- GUY WIRE
- EB – ELECTRIC BOX
- WETLAND FLAG
- BOL – BOLLARD
- MBX – MAILBOX
- SINGLE POST SIGN

30 15 0 30 60
SCALE: 1" = 30'

Know what's **below.** Call before you dig. 811

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TEST HOLE LOCATION PLAN

SITE: 34 SCANLON DRIVE
RANDOLPH, MA

FOR: VERTEX COMPANIES, INC.
400 LIBBEY INDUSTRIAL PARKWAY
WEYMOUTH, MA 02189

NO.	REVISIONS
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10	

DATE: 7/23/2019	1 of 1
DRAWN BY: CHA	
CHECKED BY: JDO	
JOB #: 57186	

APPENDIX 4:
LONG TERM OPERATION AND MAINTENANCE PLAN

YANKEE BUS LINE HEADQUARTERS
LONG-TERM POLLUTION PREVENTION PLAN
March 2023

Maintenance Contact Information:

Area Drains, Catch Basins, Drain Manholes, Drywells, and Infiltration Chambers

(Private companies capable of performing maintenance)

1. Stormwater Compliance (South Portland, ME):
   Phone Number: 508-505-8723
2. Clean Harbors (Norwell, MA):
   Phone Number: 781-849-1800

General Material Storage

Provisions for storing materials and waste products inside or under cover: All materials stored on site shall be stored in a neat and orderly fashion in their appropriate containers and under a roof or other secure enclosure separate from an occupied structure. Waste products shall be placed in secure receptacles until they are emptied by a solid waste management company that is licensed in Massachusetts.

Spill prevention and response plans:

1. Prevention: All materials stored on site shall be stored in a neat and orderly fashion in their appropriate containers and under a roof or other secure enclosure. Products will be kept in their original containers with the original manufacturer's label. Products shall not be mixed with one another unless recommended by the manufacturer. If possible, all of the product shall be used before disposing of the container. The manufacturer's recommendations for proper use and disposal shall be followed.
2. Equipment: Materials and equipment necessary for spill cleanup will be present on the site all times. Equipment and materials will include but not be limited to; brooms, shovels, rags, gloves, goggles, absorbent materials (sand, sawdust, etc.), and plastic or metal trash containers specifically designed for this purpose. The materials and equipment necessary for spill cleanup are dependent upon the nature and quantity of the material stored on the site.
3. Response: Manufacturer's recommended methods for cleanup shall be followed. Spills shall be cleaned up immediately after discovery. The spill area shall be kept well ventilated and personnel shall wear appropriate protective clothing to prevent injury from contact with a hazardous substance. Spills of toxic or hazardous material shall be reported to the appropriate State and/or local authority in accordance with local and/or State regulations.

General Land Grading and Slopes Stabilization

Provisions for maintenance of lawns, gardens and other landscaped areas: The Housing Authority is responsible for these activities. General lawn areas shall be cut weekly during the growing season. Grassed swale and rain garden area shall be maintained as outlined.

Requirements for storage and use of fertilizers, herbicides, and pesticides will be in compliance with all applied laws:

1. Fertilizers: Fertilizers shall be applied in the minimum quantities recommended by the manufacturer.
2. Herbicides and Pesticides: All herbicide application shall conform to Massachusetts Pesticide Laws and Regulations per the Massachusetts Department of Agricultural Resources (MDAR) Pesticide Bureau.

3. Store herbicides and pesticides in original containers that are closed and labeled, in a secure area out of reach of children and pets. Avoid storing herbicide and pesticides in damp areas where containers may become moist or rusted.
4. Herbicides and pesticides shall not be sprayed 2 hours prior to or during precipitation and during rain. The Town shall be responsible for monitoring weather conditions and adjusting the work schedule as appropriate for the herbicide and application method to be used.
5. Herbicides & Pesticides shall not be stored outside Conservation Commissions Jurisdictional areas (within 100-ft of the wetland or 200-ft of the riverfront)

All surfaces and slopes shall be checked bi-annually to see that vegetation is in good condition. Any rills or damage from erosion shall be repaired immediately to avoid further damage. If seeps develop on the slopes, the area will be evaluated to determine if the seep will cause an unstable condition and shall be stabilized immediately if necessary. Problems found during the inspections by the DPW shall be repaired promptly. Areas requiring re-vegetation shall be replanted immediately. Slopes and other exposed surfaces receiving vegetation will be maintained as necessary to support healthy vegetation.

Areas of steep slopes (2.5:1 or greater) shall be stabilized using jute mesh or a similar approved erosion blanket.

Street Sweeping

It is proposed that the parking and drive areas be swept with a vacu-brush street sweeper on a semi-annual basis, with at least two sweepings per year. One sweep shall be done at the end of the winter season (prior to the heavy rains), and the other sweep at the end of autumn (prior to snowfall).

Small areas such as walkways shall be cleaned with a suitable walk-behind vacuum, or broom.

Stormwater Management System

Area Drains, Catch Basins, Drain Manholes, Drywells:
All area drains, catch basins, drain manholes, and drywells shall be inspected annually, and cleaned out when sumps are approximately one foot full. The use of "clam shells" for sediment removal shall not be allowed; a vacuum truck shall be the approved method of cleaning. Integrity and functionality of oil hoods shall also be checked at the time of the inspection.

Water Quality Unit (WQU):
Water Quality Unit shall be as follows per manufacturer's recommendations:

- Units should be inspected post-construction, prior to being put into service.
- Inspect every six months for the first year of operation to determine the oil and sediment accumulation rate. In subsequent years, inspections can be based on first-year observations
- Cleaning is required once the sediment depth reaches 15% of storage capacity, (generally taking one year or longer).
- Inspect the unit immediately after an oil, fuel or chemical spill.
- A licensed waste management company should remove captured petroleum waste products from any oil, chemical or fuel spills and dispose responsibly

Rain Garden/ Bioretention Area:
For the first year inspect soil and repair eroded areas monthly. Re-mulch void areas as needed. Remove litter and debris monthly. Treat diseased vegetation as needed. Remove and replace dead vegetation twice per year (spring and fall).

Proper selection of plant species and support during establishment of vegetation should minimize—if not eliminate—the need for fertilizers and pesticides. Remove invasive species as needed to prevent these species from spreading into the bioretention area. Upon failure, excavate bioretention area, scarify bottom and sides, replace filter fabric and soil, replant, and mulch. Never store snow in bioretention areas.

Because the soil media filters contaminants from runoff, the cation exchange capacity of the soil media will eventually be exhausted. When the cation exchange capacity of the soil media decreases, change the soil media to prevent contaminants from migrating to the groundwater, or from being discharged via an underdrain outlet. Using small shrubs and plants instead of larger trees will make it easier to replace the media with clean material when needed. Plant maintenance is critical. Concentrated salts in roadway runoff may kill plants, necessitating removal of dead vegetation each spring and replanting.

Maintenance Schedule:

Activity	Time of Year	Frequency
Inspect and remove trash	Year round	Monthly
Mulch	Spring	Annually
Remove dead vegetation	Fall or spring	Annually
Replace dead vegetation	Spring	Annually
Prune	Spring or fall	Annually

INSPECTION REPORT FORM FOR STORM WATER SYSTEM

Project: Tyngsborough Middle School - Tyngsborough, MA
50 Norris Road, Tyngsborough, MA

INSPECTOR:_____ **DATE:**_____

Regular Inspection: ☐
Inspection after Rainfall: ☐ **Amount of Rainfall:**_____**inches**

BMP	Functioning Correctly	Notes/Action Taken
	Y/N	
	Y/N	
	Y/N	
	Y/N	
	Y/N	
	Y/N	
	Y/N	

Additional Observations: _____

_____

_____

Action Required: _____

_____

_____

To be performed by:_____ **On or Before:**_____

ILLICIT DISCHARGE COMPLIANCE STATEMENT

SITE ADDRESS: 34 Scanlon Drive, Randolph, MA 02368

OWNER/APPLICANT:

PLAN REFERENCE: Yankee Bus Line Headquarters C401 Civil Utilities Plans

DATE:

As required by Standard 10 of the Massachusetts Stormwater Standards, I, the undersigned, being the authorized owner/responsible party of the above referenced property do hereby certify that no illicit discharges exist on the site and that the stormwater management system, as shown on the above referenced plan, does not contain or permit any illicit discharges to enter the stormwater management system.

Through the implementation of the Long-Term Pollution Prevention Plan and Operation and Maintenance Plan, measures are set forth to prevent illicit discharges from entering the stormwater management drainage system. Further, I certify that the stormwater management system as shown on the referenced plan will be maintained in accordance with the conditions of the Long-Term Pollution Prevention Plan.

NAME: MICHAEL A. CAHILL

SIGNED: _____

DATE: 04.19.23

YANKEE BUS HEADQUARTERS
OPERATION AND MAINTENANCE PLAN
April 2023

During Construction the General Contractor shall be responsible for the following:

1. Erosion Control

Erosion control barriers will be placed along down-gradient portion of the site as indicated on the project plans. Additional erosion control barriers will be placed at the limit of work as needed and in any sensitive areas as work progresses. A stockpile of additional erosion control barriers shall be kept on site at all times

Erosion control shall be left in place until directed by the Conservation Commission to remove it.

2. Site Access

Site access, for construction equipment will be from the existing driveway entrance. Site access, for construction equipment will be via a new construction entrance which will be installed at the onset of the project by the general contractor per construction entrance detail on Civil Details sheet C-500)

3. Construction Staging

A construction staging area will be established on the existing pavement within the site adjacent to the existing building. All construction materials, supplies, trailers and offices, portable toilets, and equipment shall be stored within the limits of the staging area. Temporary trailers and offices may also be located within the developed portion of the site. All temporary stockpiles will be surrounded with straw wattles and silt fencing as required.

4. Site Grading/Site Work

The site grading related site activities may only commence when the site is stable from erosion and all required control measures are in place and functional. Site work during wet periods should be avoided if possible and limited to only those areas that will not have adverse impacts on wetland resource areas.

5. Permanent Stabilization

Disturbed portions of the site where construction activities permanently cease shall be stabilized with permanent seed no later than 5 days after the last construction activity. Stabilization shall be done by hydroseeding all graded and exposed areas as soon as possible. If hydroseeding in performed during non-growing season then newly hydroseeded areas shall be covered with a thick layer of straw. Newly seeded areas shall be inspected on a monthly basis and the hay replaced, as required, until the vegetation is well established.

6. Dust and Sediment Control

Silt Sacks:
Catch basin filters shall be placed at all inlets to drainage structures and prior to pavement removal. Outlet protection work shall be constructed before runoff is allowed to enter the drainage system. Construction and location of catch basin filters shall be as indicated on the Drawings.

Straw wattles and silt fence:
Straw wattles and silt fence shall be installed as indicated on the Drawings.

Wattles shall be placed in a row with ends tightly abutting the adjacent wattles. Each wattle shall be securely anchored in place by 2 stakes or re-bars driven through the wattles. The first stake in each wattle shall be angled toward the previously laid wattle to force the wattles together.

Construction Entrance:
The area of the construction entrance should be cleared of all vegetation, roots, and other objectionable material. The filter fabric should be placed on the subgrade prior to the gravel placement. The gravel shall be placed to the specified dimensions depicted on the plans.

The Construction Entrance shall be a minimum of 50-feet in length and 20-feet wide.

Dust Control:
A mechanical street sweeper shall be utilized to clean the existing paved areas on an as-needed basis.

For emergency control of dust apply water to affected areas. The source of supply and the method of application for water are the responsibility of the contractor.

Pollution Prevention Measures

1. Before, during, and after construction, functional erosion and sedimentation controls shall be implemented to prevent the siltation of the wetland areas down-gradient of the site. Wattles, crushed stone, siltation fencing, temporary stabilization and other controls shall be properly maintained and are not to be removed until the site is permanently stabilized. Other controls shall be added as warranted during construction to protect environmentally-sensitive areas. Sufficient extra materials (e.g., wattles and other control materials) shall be stored on site for emergencies.

2. Casting of excavated materials shall be stored away from wetland areas and sensitive land areas.

3. Any stockpiling of loose materials shall be properly stabilized to prevent erosion and siltation. Preventative controls such as hay bales, temporary seeding/mulching and jute covering shall be implemented to prevent such an occurrence.

4. There shall be no flooding, ponding, or flood related damage caused by the project or surface run-off emanating from the project on lands of an abutter, nearby or down-gradient of the site.

5. There shall be no contaminant migration caused by the project to nearby and down-gradient properties, nearby aquifers, and nearby resource areas.

6. The Site Operator shall make sufficient provisions to control any unexpected drainage and erosion conditions that may arise during construction that may create damage on abutting properties. Said control measures are to be implemented at once.

7. During construction flood prevention, erosion, and sedimentation controls shall be in place before the natural ground cover is disturbed. Said controls shall be in place prior to other construction work and shall be

monitored and approved by the Site Operator. They shall be properly maintained and are not to be removed until the site is stabilized.

8. The Site Operator shall designate a person or persons to inspect and supervise the drainage and erosion controls for the project. The Conservation Commission shall be notified as to the means to contact said individual or individuals on a 24-hour basis on all working and non-working days of the project. Said means of contact shall include at least 2 separate telephone number of said designated person or persons.

9. There shall be periodic inspection of wattles, and other erosion controls by the Operator's Designee to assure there continued effectiveness.

10. Street sweeping shall be used to keep public ways free and clear of sediment and dirt from the site activities.

Other Control Measures

Waste Materials. All trash and construction debris from the site will be hauled to an approved landfill or recycling facility. No construction waste material will be buried on the site. All personnel will receive instructions regarding the correct procedure for waste disposal. Notices describing these practices will be posted in the construction office. The site superintendent will be responsible for seeing that these procedures are followed. Employee waste and other loose materials will be collected so as to prevent the release of floatables during rainfall events.

After Construction the Owner (Yankee Bus) shall be responsible for the following:

Erosion Controls

Erosion controls shall not be removed or dismantled without approval from the Engineer or Conservation Commission. Sediment deposits that are removed or left in place after the barriers have been dismantled shall be graded manually to conform to the existing topography and vegetated using seeding or other long term cover as approved in the Landscape Plan. Bare ground that cannot be permanently stabilized within 30 days shall be stabilized by temporary measures.

Street Sweeping ($500 per sweeping)

It is proposed that the parking and drive areas be swept with a wet brush street sweeper on a semi-annual basis, with at least two sweepings per year. One sweep shall be done at the end of the winter season (prior to the heavy rains), and the other sweep at the end of autumn (prior to snowfall).

Stormwater Management System

Catch Basins, Area Drains, and Drain Manholes ($500 per structure per inspection/cleaning):
The catch basins, drain manholes, roof drains, and area drains shall be inspected semi-annually, and cleaned out when sumps are approximately 15% full or at a minimum of once per year. The use of "clam shells" for sediment removal shall not be allowed; a vacuum truck shall be the approved method of cleaning. Integrity and functionality of oil hoods shall also be checked at the time of the inspection.

Water Quality Unit (WQU) ($1,000 per structure per inspection/cleaning):
Water Quality Unit shall be as follows and per manufacturer's recommendations:

- Units should be inspected and cleaned/emptied post-construction, prior to being put into service.
- Inspect every six months for the first year of operation to determine the oil and sediment accumulation rate. In subsequent years, inspections can be based on first-year observations
- Cleaning is required once the sediment depth reaches 15% of storage capacity or at a minimum of once per year.
- Inspect the unit immediately after an oil, fuel, or chemical spill.
- A licensed waste management company should remove captured petroleum waste products from any oil, chemical, or fuel spills and dispose responsibly.
- Owner to follow the requirements of the manufacturer for maintenance and cleaning of the units with a frequency as noted above, and where the requirements of this Operations and Maintenance Plan are more rigorous than manufacturer's requirements, defer to this Operations and Maintenance Plan.

Rain Garden/ Bioretention Area
For the first year inspect soil and repair eroded areas monthly. Re-mulch void areas as needed. Remove litter and debris monthly. Treat diseased vegetation as needed. Remove and replace dead vegetation twice per year (spring and fall).

Proper selection of plant species and support during establishment of vegetation should minimize—if not eliminate—the need for fertilizers and pesticides. Remove invasive species as needed to prevent these species from spreading into the bioretention area. Upon failure, excavate bioretention area, scarify bottom and sides, replace filter fabric and soil, replant, and mulch. Never store snow in bioretention areas.

Because the soil media filters contaminants from runoff, the cation exchange capacity of the soil media will eventually be exhausted. When the cation exchange capacity of the soil media decreases, change the soil media to prevent contaminants from migrating to the groundwater, or from being discharged via an underdrain outlet. Using small shrubs and plants instead of larger trees will make it easier to replace the media with clean material when needed. Plant maintenance is critical. Concentrated salts in roadway runoff may kill plants, necessitating removal of dead vegetation each spring and replanting.

Maintenance Schedule:

Activity	Time of Year	Frequency
Inspect and remove trash	Year round	Monthly
Mulch	Spring	Annually
Remove dead vegetation	Fall or spring	Annually
Replace dead vegetation	Spring	Annually
Prune	Spring or fall	Annually

Snow Storage

No snow shall be stored within stormwater BMP's or wetlands.

INSPECTION REPORT FORM FOR STORM WATER SYSTEM

Project: Yankee Bus Headquarters - Randolph, MA
34 Scanlon Drive, Randolph, MA

INSPECTOR:_____ **DATE:**_____

Regular Inspection: ☐
Inspection after Rainfall: ☐ **Amount of Rainfall:**_____**inches**

BMP	Functioning Correctly	Notes/Action Taken
	Y/N	
	Y/N	
	Y/N	
	Y/N	
	Y/N	
	Y/N	
	Y/N	

Additional Observations: _____

Action Required: _____

To be performed by:_____ **On or Before:**_____

APPENDIX 5:
WATERSHED SKETCHES

TGAS

THE GALANTE ARCHITECTURE STUDIO INC

146 MT AUBURN ST CAMBRIDGE, MA 02138

6 1 7 5 7 6 2 5 0 0

WWW.GALANTEARCHITECTURE.COM

N

Project Number
2221

Project Title
Yankee Bus Line HQ

34 Scanlon Drive
Randolph, MA 02368

samiotes

Samiotes Consultants Inc.
Civil Engineers + Land Surveyors

20 A Street
Framingham, MA 01701

T 508.877.6688
F 508.877.8349
www.samiotes.com

Drawing Title

EXISTING WATERSHED

Date/Issued For
03.14.23

Planning Board Submission

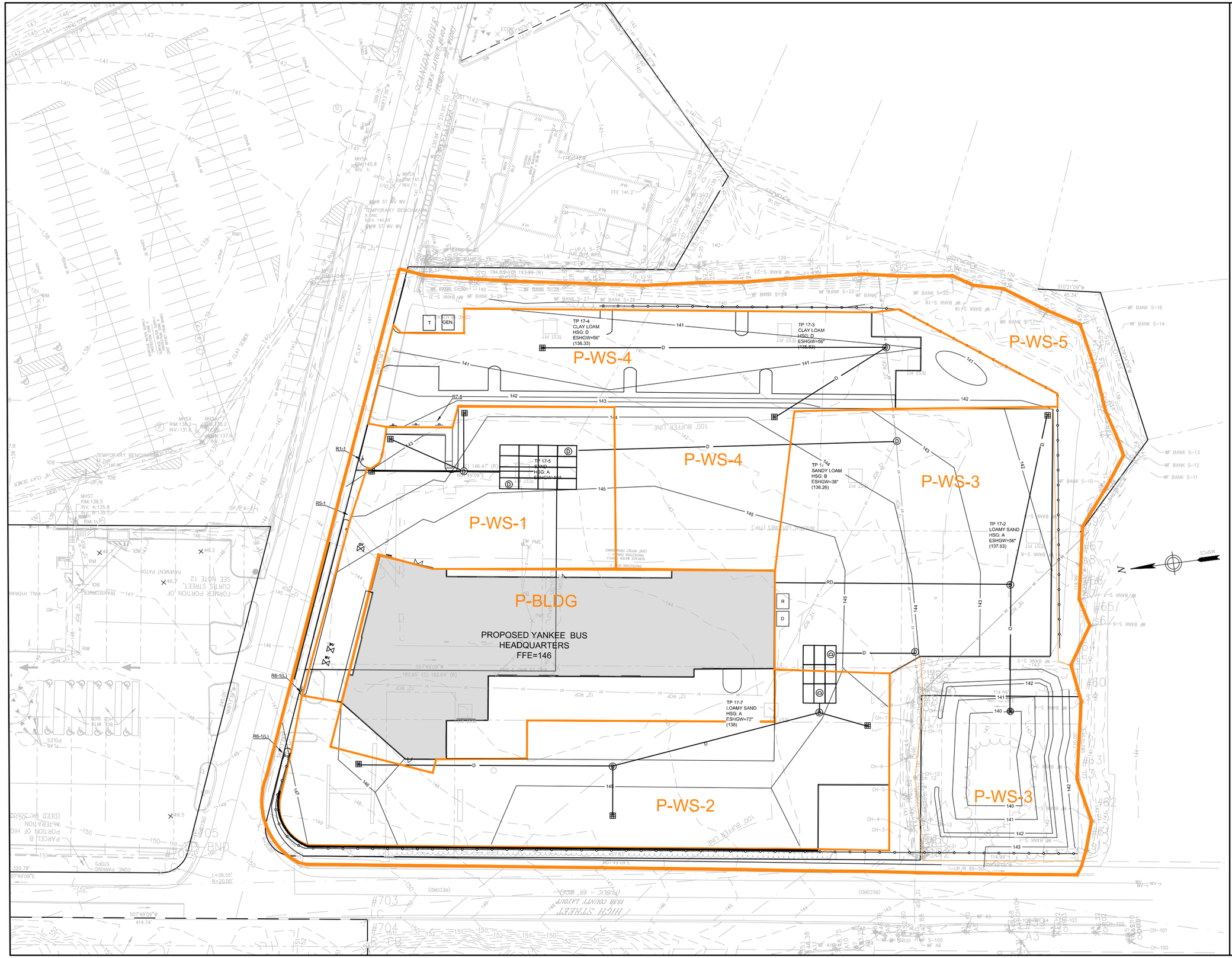
NOT FOR CONSTRUCTION

Print 24x36

Scale
As Noted

Drawn By
MEK

Drawing Number
EX-WS



THE GALANTE ARCHITECTURE STUDIO INC

146 MT AUBURN ST CAMBRIDGE, MA 02138

6 1 7 5 7 6 2 5 0 0

WWW.GALANTEARCHITECTURE.COM

Project Number
2221

Project Title
Yankee Bus Line HQ

34 Scanlon Drive
Randolph, MA 02368

Samiotes Consultants Inc.
Civil Engineers + Land Surveyors

20 A Street
Framingham, MA 01701

T 508.877.6688
F 508.877.8349
www.samiotes.com

Drawing Title

PROPOSED WATERSHED

Date/Issued For
04.xx.23
Planning Board
Submission

NOT FOR CONSTRUCTION

Print 24x36

Scale
As Noted

Drawn By
MEK

Drawing Number

April 10, 2023

DeCelle-Burke-Sala & Associates, Inc.

Ms. Michelle Tyler, Director of Planning
Town of Randolph Planning Department
41 South Main Street
Randolph, MA 02368

Re: 217 Mill Street, Randolph, MA
Peer Review for Definitive Subdivision Plan
Nitsch Project #11123.10

Dear Ms. Tyler,

DeCelle-Burke-Sala & Associates, Inc. (DBS) has revised the site design for the project located at 217 Mill Street based on recent public hearings and the Peer Review Letter prepared by Nitsch Engineering (NEI) dated March 28, 2023. DBS has prepared a written response to each item listed in the NEI letter where our responses to NEI's recommendations include making revisions to DBS's site plans and engineering report. These revised documents are attached to this letter with a revision date of April 7, 2023. Our responses for each item are in a bold font following the EBI narrative from the referenced letter. DBS's responses are as follows:

Waivers

1. *Section VIII Design Standards under B3 states that the Intersection Spacing and Offset measured between the nearest curb returns shall follow the minimum intersection spacing distance of 200-feet in Residential Districts.*
   A waiver has been requested for the minimum intersection spacing. Given the proximity of the locus to Curran Terrace the 200 foot minimum separation between intersections cannot be met.

2. *Section VIII.D19 states that drainage facilities in the form of detention or retention basins or subsurface infiltration systems may not be located within any street right-of-way, nor on any proposed building lot, nor within any open space area intended to be conveyed to the Town. Such facilities, if required as part of a subdivision, shall be located on separate parcels which are to be retained by the Applicant or conveyed to a successor organization.*
   A waiver has been requested for the construction of the drainage facilities within easements instead of separate lots as required. Creating separate lots for the proposed drainage facilities is not feasible for this project.

3. *Section VIII.D3 states that the design storm should have a rainfall frequency of occurrence of once in ten (10) years shall be used for design computations for street drainage.*
   DBS has designed stormwater drainage systems and conveyance measures to be able to handle the 10-yr recurrence interval storm. Calculations supporting this are included in the revised engineering report.

4. *Section VIII.D4 states that runoff for any area shall be calculated using the Rational Formula.*
   The Rational Formula was used to determine the rainfall intensity for the pipe sizing calculations. The drainage program HydroCAD was used in calculating the peak flow rates for the existing and proposed conditions for the 2-, 10-, 25- and 100-year storm events. HydroCAD is based on the SCS TR-20 method and is used by engineering firms throughout the country.

PLANNING BOARD SITE PLAN RULES AND REGULATIONS
Section V. Definitive Subdivision Plans
Section A. Submission

5. *Section V.A4 states that two (2) sets of logs of results of all test pits made shall be submitted. No test pits appear to have been performed. Nitsch recommends the Applicant performs test pits within the footprint of the proposed subsurface infiltration systems and detention basins.*
   Four (4) test pits have been performed on-site to confirm soil conditions. Drainage design was initially done utilizing a infiltration rate of 2.41 in./hr. for sandy loam soils. Test pits conducted on-site revealed a sandy C layer. Drainage design was revised to reflect the sandy material by utilizing a 8.27 in./hr. infiltration rate. Given the location of proposed underground infiltration system 1 being located within the footprint of the existing driveway, a soil test pit was not conducted. Prior to installation of underground infiltration system 1, soil conditions in this area will be confirmed.

6. *Section V.A5 states that a written narrative describing methods to be used during construction to control erosion and sedimentation shall be submitted. It appears that a narrative was not provided. Nitsch recommends the Applicant submit the narrative or request a waiver.*
   A Stormwater Pollution Prevention Plan is provided in Appendix C of the Engineering Report describing methods to be used during construction to control erosion and sedimentation.

7. *Section V.A6 requires a certified list of abutters within three hundred feet of the subject property. The Applicant shall submit the certified list of abutters as requested.*
   The certified list of abutters was obtained by the Town of Randolph Director of Planning.

8. *Section V.A7 requires the submission of a Designers Certificate (Form E). The Applicant shall submit the Form E or request a waiver.*
   The Designers Certificate (Form E) was provided with the initial submittal package.

9. *Section V.A8 requires an application fee as part of Appendix A. The Applicant shall submit the Application fee if they have not already done so.*
   The Applicant has submitted the required Application fee with the initial submittal.

Section C. Review by Town Departments

10. *Section V.C.1 states the applicant shall also file with the Board of Health one (1) print of the Definitive Plan, and in unsewered areas, shall submit a topographic plan with two foot contour intervals and comply with the Board of Health requirements. The Applicant shall submit to the Board of Health or request a waiver.*
It is DBS's understanding that the Board of Health has received a copy of the Definitive Plan. DBS will provide the revised submittal package to the Board of Health, including a topographic plan with two-foot contour intervals.

Section D. Preparation of Plan

11. *Section V.D.1 states the definitive subdivision plan shall be drawn to a scale of 1"=40'. The scale provided appears to be 1"=30'. Nitsch recommends the Applicant request a waiver.*
DBS will be requesting a waiver for this requirement. A horizontal scale of 1"=30' is easier to read and was able to fit on the plan sheets, hence why it was utilized.

12. *Section V.D.1 states that the plan shall include a cover sheet that includes a zoning compliance table. The Applicant shall include the zoning compliance table on the cover sheet as required.*
A zoning table and waiver request table have been added to the cover sheet.

<u>Section VIII. Design Standards</u>
Section B. Streets

13. *Section VIII.D states the applicant shall provide drainage information pertaining to the site. The applicant is proposing that existing conditions are intended to remain, no work is proposed. The applicant submitted a stormwater assessment of the site in 2020 per the applicable town bylaw which was reviewed by the town.*
DBS has no further comment at this time.

SITE PLAN CONTENT

1. *Section V.A6 requires the Applicant submit a certified list of abutters within 300 feet of the subject property. Nitsch recommends the Applicant submit the required information.*
A certified list of abutters was prepared by the Town Planner within 300-ft. of the subject property.

2. *Section V.D1 requires the plans be drawn to a horizontal scale of 1"=40' and vertical scale of 1"=4'. In addition it requires a cover sheet that includes a locus at a scale of 1"=800', subdivision name, zoning compliance table, etc. The plans appear to be drawn at a horizontal scale of 1"=30' and the profile is drawn at an irregular scale. Nitsch recommends the Applicant request a waiver for this requirement, or update the plans to be the scale required by the regulations.*

DBS will be requesting a waiver for this requirement. A horizontal scale of 1"=30' is easier to read and was able to fit on the plan sheets, hence why it was utilized. A vertical scale of 1"=3' was utilized to maintain a 10:1 vertical exaggeration of the profile.

3. *Section VIII.C2 requires that secondary streets in Residential Zoning Districts shall have a minimum radius for a circular turnaround of 50 feet. The Applicant is providing a 42-foot radius. Nitsch recommends the Applicant submit a fire truck turning radius plan for Nitsch and the Randolph Fire Department to review. The Applicant should also request a waiver from this requirement if the Fire Department agrees the turning template is appropriate.*
The site plan has been revised to increase the circular turnaround from 42-ft. to the required 50-ft. A waiver will not be required.

4. *Section E1 Lighting states that the subdivision shall provide sufficient lighting. Nitsch recommends the Applicant provide lighting on the plan or request a waiver. IF lighting is provided Nitsch recommends that all lighting shall be Dark Sky compliant.*
Proposed light pole locations are provided on the plan and have been noted more clearly. The proposed lighting will utilize the Town of Randolph required street lights and post as detailed in Appendix B of the Planning Board Rules and Regulations Governing the Subdivision of Land.

5. *Section VIII.E3f requires a 1000 gallon per minute minimum flow shall be required for all new subdivisions. Nitsch recommends the Applicant confirm this requirement is met.*
A hydrant flow test will be performed prior to construction to confirm adequate flow rates are met. This office asks that the board allows this requirement to be a condition upon approval of the definitive subdivision.

6. *Section VIII.E4c requires all residential units shall be serviced by a water supply that provides a minimum flow in gallons per minute at 20 psi or current ISO and NFPA standards, whichever is more restrictive. In addition, Nitsch recommends the Applicant confirm the minimum flow requirement is met.*
DBS will confirm adequate pressure will be met prior to construction. This office asks that the board allows this requirement to be a condition upon approval of the definitive subdivision.

7. *Section VIIIJ4 states that all work regarding structural walls shall be certified after completion by a Structural Engineer.*
As noted in Section VIIIJ2, a structural Engineer will be consulted for any walls taller than 4-ft. in height prior to construction.

8. *Section VIII.K states that prior to submission of a Definitive Plan to the Planning Board, the Applicant should contact the local postmaster to determine the location of collection units and note the approved location on the plans. Nitsch recommends the Applicant confirm this was completed.*
DBS will reach out to the Postmaster to determine the location of collection units. This office asks that the board allows this requirement to be a condition upon approval of the definitive subdivision.

9. *Section M Street Trees and specifically under Section M2, states that street trees shall be planted on both sides of the new street at every 40-feet. The Applicant should review Section M and provide the required street trees in a revised plan or request a waiver.*
DBS has added proposed street tree locations on the revised plans. A waiver will not be requested.

10. *Section N indicates that the Department of Public Works must sign off on cuts (or fills) that are greater than six (6) feet. The proposed grading will provide an approximate 10-foot cut for the basin.*
The DPW receives a copy of the definite plans when they are submitted. This office has not received any comments regarding the cuts on site. DBS will follow up with the Randolph DPW to ensure there are no comments from their department.

DRAINAGE

11. *Section VIII.D5 states that the proper drain size shall be calculated by using the "Manning's Formula" with a Kutter's n value of 0.013 for concrete pipe, and 0.024 for corrugated metal pipe. Nitsch notes that there is only one 12-inch pipe which appear satisfactory for the application.*
Pipe sizing calculations have been performed and are included in the revised Engineering Report. The site plan has also been updated to note the size and material of all drain pipes.

12. *Section VIII.D6 states that all storm drains shall be reinforced concrete except that in off-street locations bituminous coated, galvanized, corrugated metal pipe or pipe arch may be used if approved by the Planning Board. All pipes shall conform to the Massachusetts Highway Department Standard Specifications for Highstreets and Bridges. Nitsch notes that the Applicant proposes HDPE pipe in the drainage easements and does not take exception to HDPE. The Applicant shall call out the drainage pipe in the roadway as Reinforced Concrete Pipe (RCP).*
All storm drain pipes have been labeled with the size and material.

13. *Nitsch recommends that the basin on Lot 3 should be redesigned so that there is at least a 10-foot separation from the edge of the basin and highest water elevation and the Lot 3 building foundation.*
The proposed 100-year storm elevation for the basin on Lot 3 is 127.52. The closest building foundation to the 100-year storm elevation is the conceptual building on Lot 2 with a separation distance of 13.1'. The conceptual building foundation on lot 3 has a separation of 13.3'. Both conceptual buildings meet the 10-separation as requested.

14. *Nitsch recommends that the drainage easements have conditions and agreements established between the Lot owners and the Town indicating that no fences, structures or other obstructions that would impact the easement, drainage system, or maintenance of the drainage systems, both underground and surface basin.*
The applicant agrees to any drainage easement requirement conditions imposed by the Planning Board as a condition of Subdivision approval.

15. *If easement agreements are not preferred, Nitsch recommends that the Home Owner Association (HOA) be established to maintain the drainage systems in the easement and that these systems are not conveyed to the Town as part of any street acceptance by the Town.*
The applicant will establish an HOA if it is required as a condition of Subdivision approval.

16. *Nitsch recommends that all test pits for drainage be provided for review to determine that infiltration systems and basin are at least 2-feet higher than estimated seasonal high groundwater or groundwater, whichever is higher. If estimated groundwater is within 4-feet of the bottom of the system, a mounding analysis shall be submitted for review.*
All proposed drainage systems have greater than 2-ft. of separation to groundwater. Subsurface system 3 has greater than 2-ft. of separation to groundwater but less than 4-ft. of separation to groundwater, a mounding analysis is included in the revised engineering ewport.

GENERAL COMMENTS

17. *Provide shut off valves for the water services for each lot, within the roadway layout.*
The utility sheet of the site plan has been revised to note water service shut off valve locations.

18. *Nitsch recommends sewer manholes where changes in sewer service directions are proposed. The Applicant should consider straight sewer service runs to sewer manholes to prevent possibilities of clogs at bends specifically at Lots 3 and 4. The plans should be revised so that the services do not have bends.*
A sewer manhole has been added, for a total of three (3) proposed sewer manholes. The added sewer manhole eliminates any bends in the sewer services for Lots 3 and 4.

19. *Section 200-10.C of the zoning regulations state that in a residential district, no one-family dwelling house shall cover more than twenty percent of the lot area. Please confirm that this requirement is met.*
All proposed conceptual buildings are proposed to have a footprint of 1,880 SF. With the smallest lot being 12,001 SF, the building coverage would be 15.7%, meeting the maximum requirement.

20. *Nitsch recommends the Applicant revise the pavement detail to match the Typical Road Cross-Section so that the stone depths match. Nitsch recommends 4-inch dense grade above 8-inches of gravel but is not opposed to 12-inches of only gravel material given the A-soils on the site.*
The pavement detail has been revised to utilize a 12-in. gravel base.

21. *Nitsch recommends the Applicant coordinate the sidewalk construction for the subdivision with the sidewalk in Mill Street.*
The applicant will coordinate the sidewalk construction of the subdivision with the sidewalk in Mill Street.

Michelle Tyler, Director of Planning
April 10, 2023

Please reach out to this office with any additional questions or comments you may have. We look forward to presenting these answers to these concerns raised by the peer review engineer to the Board at the April 25th Planning Board Meeting.

Sincerely,
DeCelle-Burke-Sala & Associates, Inc.

Kameron Campbell, E.I.T.
Project Manager

DeCelle-Burke-Sala & Associates, Inc.

ENGINEERING REPORT

Definitive Subdivision
Clifton Court Development
217 Mill Street
Randolph, MA 02368

CLIENT:
217 Mill St, LLC
228 Park Avenue S, PMB35567
New York, NY 10003

PREPARED BY:
DeCelle-Burke-Sala & Associates, Inc.
1266 Furnace Brook Parkway, Suite 401
Quincy, MA 02169

FEBRUARY 6, 2023
REVISED: APRIL 10, 2023

Table of Contents

Section 1.0 Existing Conditions

1.1 Site Location

The subject property is located at 217 Mill Street in the Town of Randolph. The Town of Randolph Assessor's office currently identifies the as Assessors ID 51-H-8.01 with a total area of approximately 77,512± square feet (SF). The property is located within the Residential Single Family High Density (RSFHD) zoning district.

Figure 1 - Aerial Map (MassGIS)

1.2 Existing Site Conditions

The site is bounded by Mill Street to the northeast, and is abutted by single-family residential properties to the east, south, and west. The dead end of Prospect Avenue is close to the locus, however, the property does not have any frontage on Prospect Avenue. The lot contains a 675± S.F. residential single-family dwelling that was constructed around 1950 per the Town's online property record database. In addition to the dwelling, there are two sheds located on the property. Vehicular access to the site is provided off Mill Street by a single-lane asphalt driveway to the west of the dwelling. The dwelling improvements include a deck on the westerly side of the building adjacent to the driveway, a concrete patio in the backyard and a concrete walkway along the front of the house. The vegetation in the northerly portion of the lot closest to Mill Street is predominately lawn, with several hedges and trees. The majority of the lot is covered by trees and considered wooded. A vinyl and chain-link fence traverse the rear of the property near the abutters

located on Hart Circle. Topography on the site varies throughout the property. Elevations along the frontage of the property on Mill Street range from approximately elevation 126 in the northeasterly corner, to elevation 132 in the northerly corner. Topography slopes up roughly 27% from the northeasterly corner at elevation 126 up to the house at elevation 136. The driveway slopes approximately 13% up from Mill Street to the peak of the driveway. The high elevation on-site is located towards the center of the property within the woods. From the high point, the topography generally slopes down to the abutters to the east down to a low elevation of approximately 122. All elevations refer to the North American Vertical Datum of 1988 (NAVD 88).

The existing building is serviced by sewer, domestic water and gas services, which connect to the respective mains in Mill Street. Overhead wires connect from the dwelling to the existing overhead wires in Mill Street to provide power and communication services to the existing dwelling. A roof gutter system on the existing dwelling captures the majority of roof runoff and downspouts direct the water to flow overland. No other stormwater controls are located on-site, as flows from the asphalt driveway are not collected and runoff to Mill Street. The site is not located within a Special Flood Hazard Zone as delineated on FIRM 25021C0217E, effective 07/17/2012. There do not appear to be any jurisdictional wetlands within 100-feet of the project locus.

1.3 Existing Soil Conditions

The on-site soils were identified using the USDA Natural Resources Conservation Services (NRCS) Soil Survey.

Figure 2 - Soil's Map

The site and surrounding soil types have been identified along with the corresponding Hydrologic Soil Groups (HSG) to include:

- 245B – Hinckley loamy sand, 3 to 8 percent slopes – HSG A
- 255B – Windsor loamy sand, 3 to 8 percent slopes – HSG A

The Natural Resources Conservation Service (NRCS) has mapped the local soils as predominately 245B Hinckley loamy sand 3-8% slopes, with a small portion of the lot adjacent to Mill Street as 255B Windsor loam sand 3-8% slopes. Four (4) test pits were performed on site in February, 2023. Each test pit contained sandy loam subsoils over top a coarse gravelly sand. Groundwater was observed in one of the four test pits. A rawls rate of 8.27 in/hr has been used due to a coarse gravelly sand being found in the location of each of the infiltration systems.

Section 2.0 Proposed Conditions

2.1 Proposed Site Conditions

The proposed project is a subdivision, which will include the construction of four (4) new single-family houses and a proposed roadway. Access to the subdivision will be provided off Mill Street by a 40-ft. wide private way, which ends at a cul-de-sac with a 42-ft. pavement radius. The proposed street layout will have 24-ft. of pavement with vertical granite curbing on both sides. Each proposed single-family house will be provided vehicular access to the proposed road by a curb cut and asphalt driveway.

The street will be graded to have a 2.9% grade for the first approximately 19-ft. before transition to a 100-ft. Type IV Sag Vertical Curve. The roadway will have a slope of approximately 7% for approximately 10-ft. before transitioning to a 150-ft. Type I Crest Vertical Curve. The highpoint of the roadway will be located towards the front of the cul-de-sac and will slope down toward the end of the road. A retaining wall is proposed along the easterly side of the roadway from approximately station 0+55 to approximately station 1+75. The retaining wall is approximately 5-ft. tall at its highest point.

The proposed subdivision will be improved by public utilities for the use of the four (4) proposed dwellings. A proposed 8-in. PVC gravity sewer main is proposed to be installed for the length of the roadway. The proposed sewer main will tie into the existing 8-in. PVC sewer main in Mill Street by constructing a doghouse manhole in Mill Street. A sewer manhole is proposed at the end of the proposed sewer main in the cul-de-sac of the proposed roadway. Each house will tie into the proposed sewer main by gravity with proposed 4-in. PVC sewer services. An 8-in. CLDI (cement-lined ductile iron) water main will be installed for the length of the roadway. The proposed water main will tie into the existing water main in Mill Street. Each house will be provided water service by a 1-in. “type K” copper pipe. A fire hydrant is proposed at the end of the proposed 8-in. water main and will be located within the cul-de-sac of the proposed roadway. A proposed gas main shall be installed by the local utility purveyor’s standards to provide gas service to each dwelling. Power and communication services will be provided by underground wires. A transformer will be installed within the subdivision.

2.2 Proposed Stormwater

Proposed stormwater controls shall comply with local, state and federal regulations. Stormwater generated by the proposed street will be collected, treated, and infiltrated to protect the down gradient abutting properties. The proposed stormwater management systems is comprised of a total of five (5) deep sump catch basins, two (2) proprietary water quality units, three (3) subsurface

infiltration systems constructed of precast concrete leaching galleys and two surface infiltration basins. The majority of the stormwater runoff on site is produced by the asphalt roadway and proposed buildings.

Subsurface Infiltration System 1 consists of nine (9) 4'x4'x4' precast concrete leaching galleys and surrounding stone. System 1 collects the majority of the roadway by two deep sump catch basins located near the intersection of the proposed roadway and Mill Street. The catch basins convey the stormwater runoff to a proprietary water quality unit which pretreats the runoff prior to it being released to the subsurface infiltration system. System 1 has been designed to infiltrate the required recharge volume, decrease the peak runoff flows leaving the site and contain the entirety of the 10-year storm event. In the event of a larger storm event the stormwater runoff will by-pass the proposed catch basins and be collected by the existing drainage system in Mill Street. Subsurface System 2 is centrally located on the site and collects the stormwater runoff from the remainder of the twenty four (24) foot wide roadway. Stormwater runoff is captured by two (2) deep sump catch basins and conveyed to a proprietary water quality unit for pretreatment before it is release to Subsurface System 2. System 2 consists of twelve (12) 4'x4'x4' precast concrete leaching galleys and surrounding stone. System 2 has been designed to infiltrate the required recharge volume, decrease the peak runoff flows leaving the site and contain the entirety of the 10-year storm event. In the event of larger storm events, System 2 has been fitted with a 12 inch outlet pipe which extends to Surface Basin 2 where it is released onto a riprap outlet protection apron. Subsurface system 3 collects the entirety of the cul-de-sac through a single deep sump catch basin. The deep sump catch basin conveys the stormwater runoff to a proprietary water quality unit for pretreatment before it is released to Subsurface System 3. System 3 consists of forty eight (48) 4'x4'x4' precast concrete leaching galleys and surrounding stone. System 2 has been designed to infiltrate the required recharge volume, decrease the peak runoff flows leaving the site and contain the entirety of the 10-year storm event. In the event of larger storm events, System 2 has been fitted with a 12 inch outlet pipe which extends to Surface Basin 1 where it is released onto a riprap outlet protection apron.

Surface Basin 1 is a 2,456± S.F. surface infiltration basin which contains and infiltrates stormwater runoff from overland flow, the proposed roofs and overflow from Subsurface System 3. Basin 1 has been designed to infiltrate the entirety of the 2-, 10-, and 25-year storm events with allowing a minor amount of sheet flow released for the 100-year storm event. Surface Basin 2 is a 1,435± S.F. surface infiltration basin which detains and infiltrates stormwater runoff from overland flow, the proposed roofs and overflow from Subsurface System 2. Basin 2 has been designed to infiltrate the entirety of the 2-, 10-, and 25-year storm events with allowing a minor amount of sheet flow released for the 100-year storm event. The basins shall be grassed with an emergency riprap outlet weir as an overflow.

Section 3.0 Stormwater Management

3.1 MassDEP Stormwater Performance Standards

It is the intent of this report to show compliance with the Massachusetts Stormwater Management Standards (the "Standards"). This office generated hydrographs for both existing and proposed conditions to compare overall storm water offsite for various storms. We calculated land coverage numbers (CN) using Hydrologic Group "A" soils and used minimums for Times of Concentration for proposed conditions for hydrograph generation. A Rawl's Rate of 2.41 in./hr. was used for exfiltration. Through the use of stormwater control BMP's, proposed peak stormwater discharge rates decrease in comparison to the peak existing discharge rates.

Stormwater Best Management Practices have been incorporated into the design of the project to mitigate the anticipated pollutant loading. An Operations and Maintenance Plan has been developed for the project, which addresses the long-term maintenance requirements of the proposed system.

Temporary erosion and sedimentation controls will be incorporated into the construction phase of the project. These temporary controls may include straw wattles and/or silt fence barriers, inlet sediment traps, slope stabilization, and stabilized construction entrances.

The Massachusetts Department of Environmental Protection has established ten (10) Stormwater Management Standards. A project that meets or exceeds the standards is presumed to satisfy the regulatory requirements regarding stormwater management. The Standards are enumerated below as well as descriptions and supporting calculations as to how the Project will comply with the Standards:

Standard 1

No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

All stormwater runoff with the potential for collecting suspended solids and pollutants is treated through the use of stormwater infiltration structures prior to its discharge to the surrounding environment.

Standard 2

Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

Post-development discharge rates do not exceed pre-development through the use of underground and surface infiltration. The proposed site has been graded to capture the majority of the stormwater runoff so that it can be treated and released to best match the existing site hydraulics. The design points analyzed when comparing the pre- and post-development peak discharge rates are the flows to Mill Street, flows to the northeasterly abutters and flows to the easterly abutter. Through grading and stormwater BMP's, this

office was able to reduce the pre-development peak discharge rates to all three design points. A comparison chart for the pre- and post-development peak flows are included further in this report, and HydroCAD analyses included in Appendix A of this report.

Standard 3

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

The proposed site was designed to ensure that the annual recharge for the post-development site shall approximate or exceed the annual recharge from the pre-development conditions based on the soil type. Calculations showing that this development meets the criteria for Standard 3, which includes the required recharge volume and that the infiltration systems will drain fully within 72 hours have been included in Appendix D of this report.

Standard 4

Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This standard is met when:

- *Suitable practices for source control and pollution prevention are identified in a longterm pollution prevention plan, and thereafter are implemented and maintained;*
- *Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and*
- *Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.*

This site meets all aspects of Standard 4 by utilizing proprietary stormwater structures for TSS removal, sizing the infiltration system adequately to handle the required water quality volume, and providing a long-term pollution prevention plan.

Standard 5

For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

This project is not classified as a land with higher potential pollutant loads.

Standard 6

Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

This project is not located within a Zone II, IWPA, or any other critical area.

Standard 7

A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

This project does not qualify as a redevelopment project due to the proposed increase in impervious area.

Standard 8

A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

A plan to control construction related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities has been included in Appendix C.

Standard 9

A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

A long term operation and maintenance plan has been developed for this property to ensure the stormwater management systems function as designed and is included in Appendix B.

Standard 10

All illicit discharges to the stormwater management system are prohibited.

No illicit discharges will be allowed to the proposed stormwater management system and a signed illicit discharge statement has been included in the Operation and Maintenance Plan.

Stormwater Runoff Comparison Chart for Pre- and Post-Construction Flows to Mill Street

2 Year Storm (3.40”)			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	0.05	Flow off-site	0.00

10 Year Storm (5.20”)			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	0.30	Flow off-site	0.00

25 Year Storm (6.33”)			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	0.50	Flow off-site	0.20

100 Year Storm (8.06”)			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	0.85	Flow off-site	0.63

Stormwater Runoff Comparison Chart for Pre- and Post-Construction Flows to Northeasterly Abutters

2 Year Storm (3.40")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	0.00	Flow off-site	0.00

10 Year Storm (5.20")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	0.00	Flow off-site	0.00

25 Year Storm (6.33")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	0.01	Flow off-site	0.00

100 Year Storm (8.06")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	0.04	Flow off-site	0.02

Stormwater Runoff Comparison Chart for Pre- and Post-Construction Flows to Easterly Abutters

2 Year Storm (3.40")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	0.00	Flow off-site	0.00

10 Year Storm (5.20")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	0.00	Flow off-site	0.00

25 Year Storm (6.33")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	0.02	Flow off-site	0.02

100 Year Storm (8.06")			
Existing Conditions		Proposed Conditions	
Area Description	Flow (CFS)	Area Description	Flow (CFS)
Flow off-site	0.13	Flow off-site	0.12

3.2 MassDEP Stormwater Checklist

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.[1] 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[2]
- 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.

[1] 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.

[2] 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.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

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.

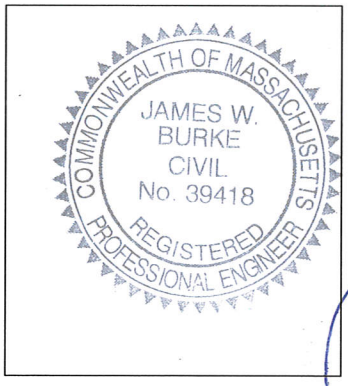
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the 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 Long-term 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



4/10/23

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

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

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:

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☐ 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): Stormwater Infiltration

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.

Massachusetts Department of Environmental Protection
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Checklist for Stormwater Report

Checklist (continued)

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 pre-development 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 24-hour 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[1]

☒ 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.

☒ Recharge BMPs 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 M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☒ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 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.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ 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.

Standard 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 ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☒ The NPDES Multi-Sector General Permit does ***not*** 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 ***not*** 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.

Standard 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.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for 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.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for 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

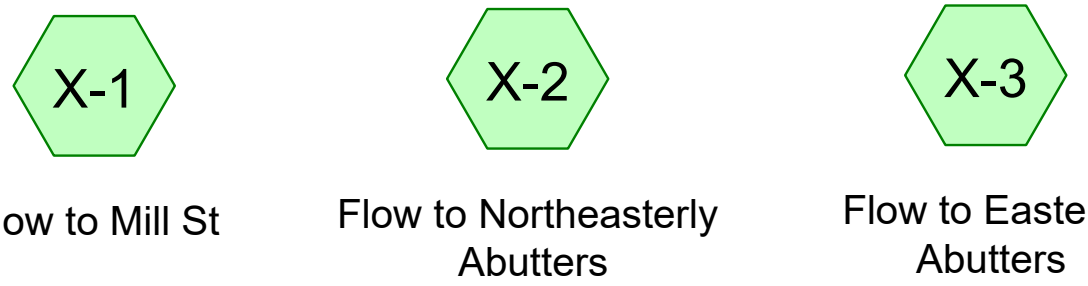
☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

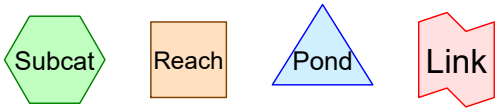
☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Appendix A HydroCAD Reports

Existing HydroCAD Report





Routing Diagram for 217 Mill St - Existing Drainage (rev 2-6-23)
Prepared by DeCelle-Burke-Sala & Associates, Inc., Printed 4/10/2023
HydroCAD® 10.00-26 s/n 07920 © 2020 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
9,090	39	>75% Grass cover, Good, HSG A (X-1, X-2, X-3)
3,190	98	Paved parking, HSG A (X-1)
919	98	Roofs, HSG A (X-1)
64,313	30	Woods, Good, HSG A (X-1, X-2, X-3)

Summary for Subcatchment X-1: Flow to Mill St

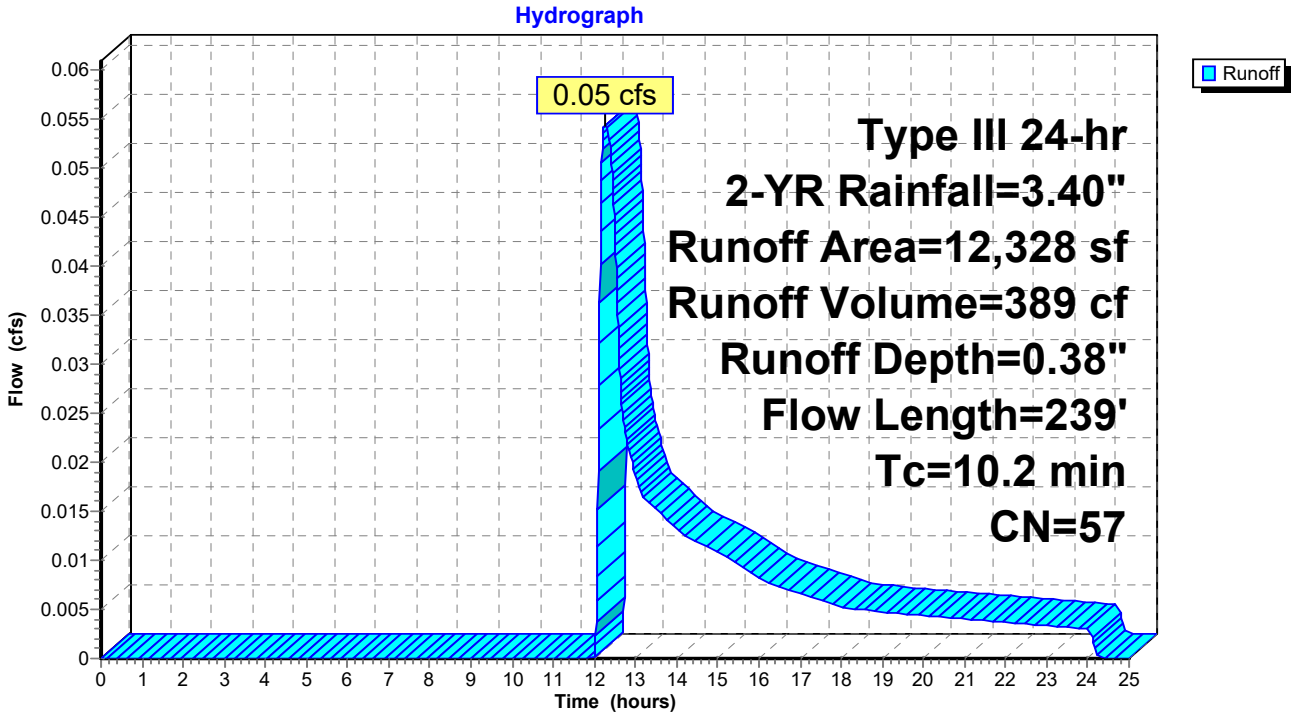
Runoff = 0.05 cfs @ 12.27 hrs, Volume= 389 cf, Depth= 0.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.40"

Area (sf)	CN	Description
3,190	98	Paved parking, HSG A
919	98	Roofs, HSG A
5,640	39	>75% Grass cover, Good, HSG A
2,579	30	Woods, Good, HSG A
12,328	57	Weighted Average
8,219		66.67% Pervious Area
4,109		33.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	50	0.0460	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	53	0.0530	1.15		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.4	22	0.0040	1.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	114	0.0700	5.37		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
10.2	239	Total			

Subcatchment X-1: Flow to Mill St



Summary for Subcatchment X-2: Flow to Northeasterly Abutters

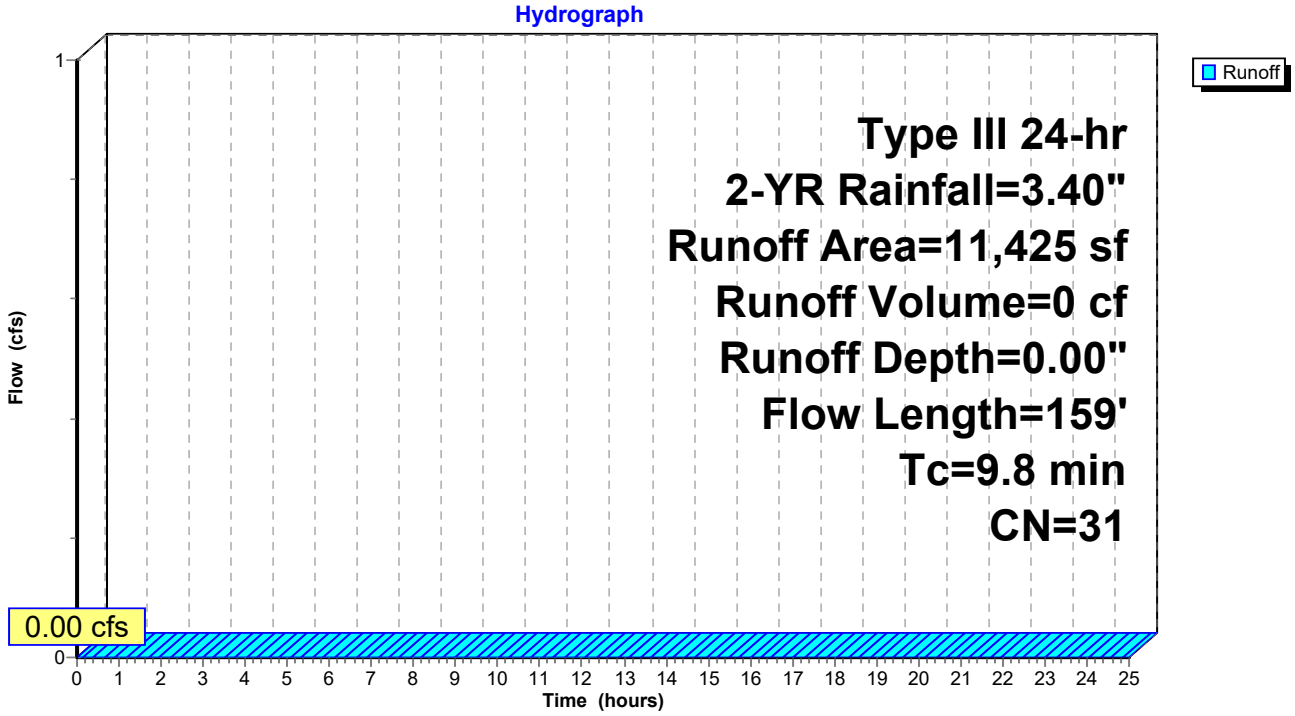
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.40"

Area (sf)	CN	Description
0	98	Paved parking, HSG A
0	98	Roofs, HSG A
1,467	39	>75% Grass cover, Good, HSG A
9,958	30	Woods, Good, HSG A
11,425	31	Weighted Average
11,425		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	50	0.0420	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.9	109	0.1670	2.04		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.8	159	Total			

Subcatchment X-2: Flow to Northeasterly Abutters



Summary for Subcatchment X-3: Flow to Easterly Abutters

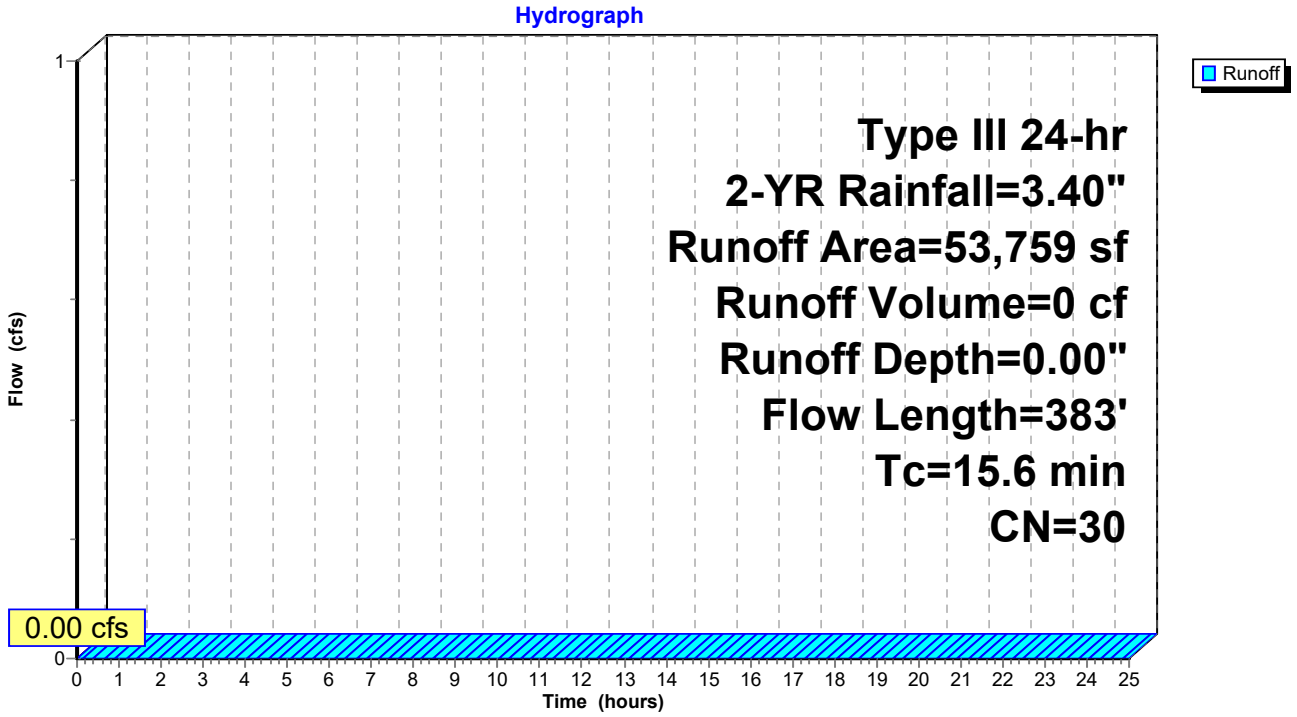
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.40"

Area (sf)	CN	Description
0	98	Paved parking, HSG A
0	98	Roofs, HSG A
1,983	39	>75% Grass cover, Good, HSG A
51,776	30	Woods, Good, HSG A
53,759	30	Weighted Average
53,759		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0760	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.4	92	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.7	61	0.0030	0.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.8	78	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.7	102	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
15.6	383	Total			

Subcatchment X-3: Flow to Easterly Abutters



Summary for Subcatchment X-1: Flow to Mill St

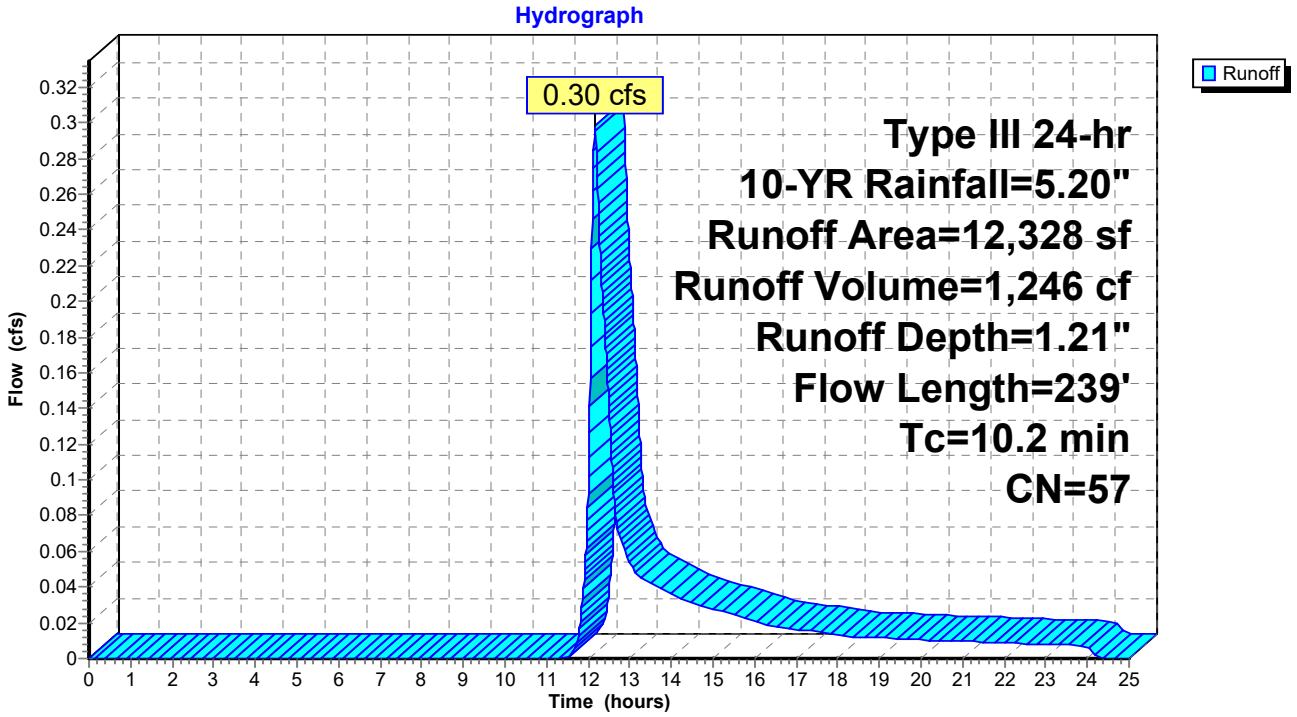
Runoff = 0.30 cfs @ 12.16 hrs, Volume= 1,246 cf, Depth= 1.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.20"

Area (sf)	CN	Description
3,190	98	Paved parking, HSG A
919	98	Roofs, HSG A
5,640	39	>75% Grass cover, Good, HSG A
2,579	30	Woods, Good, HSG A
12,328	57	Weighted Average
8,219		66.67% Pervious Area
4,109		33.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	50	0.0460	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	53	0.0530	1.15		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.4	22	0.0040	1.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	114	0.0700	5.37		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
10.2	239	Total			

Subcatchment X-1: Flow to Mill St



Summary for Subcatchment X-2: Flow to Northeasterly Abutters

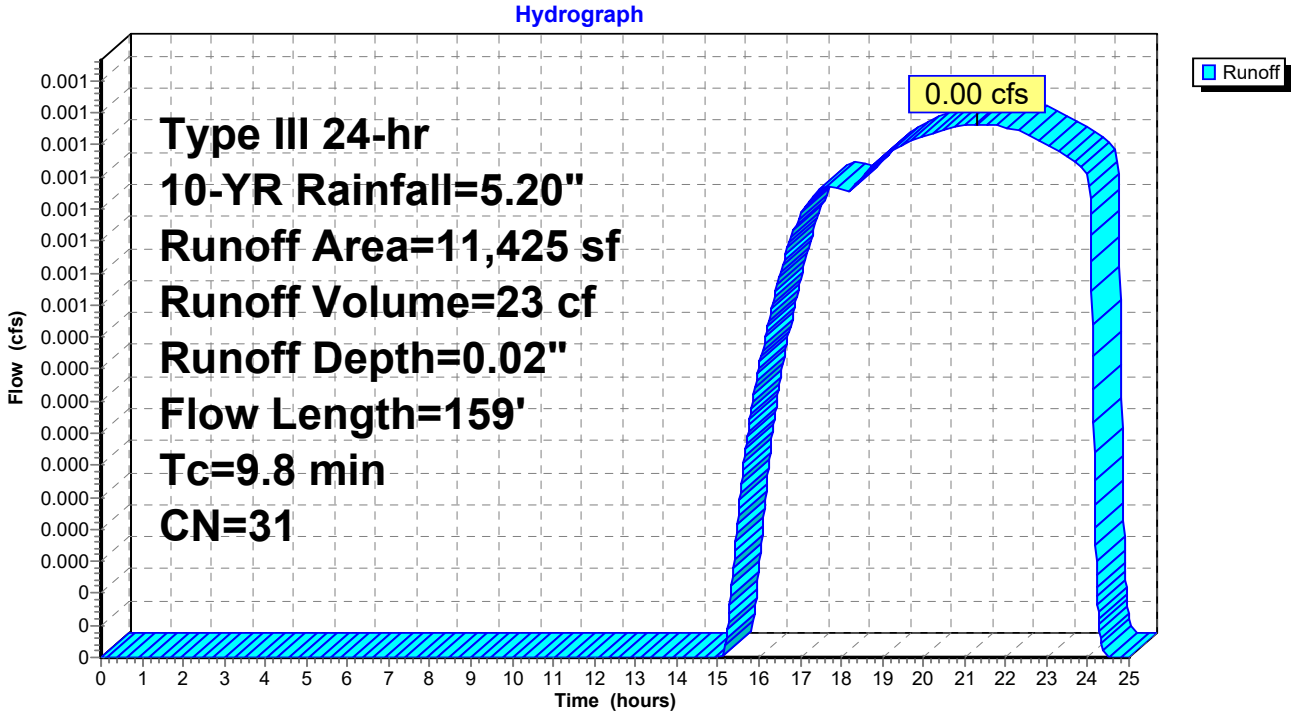
Runoff = 0.00 cfs @ 21.31 hrs, Volume= 23 cf, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.20"

Area (sf)	CN	Description
0	98	Paved parking, HSG A
0	98	Roofs, HSG A
1,467	39	>75% Grass cover, Good, HSG A
9,958	30	Woods, Good, HSG A
11,425	31	Weighted Average
11,425		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	50	0.0420	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.9	109	0.1670	2.04		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.8	159	Total			

Subcatchment X-2: Flow to Northeasterly Abutters



Summary for Subcatchment X-3: Flow to Easterly Abutters

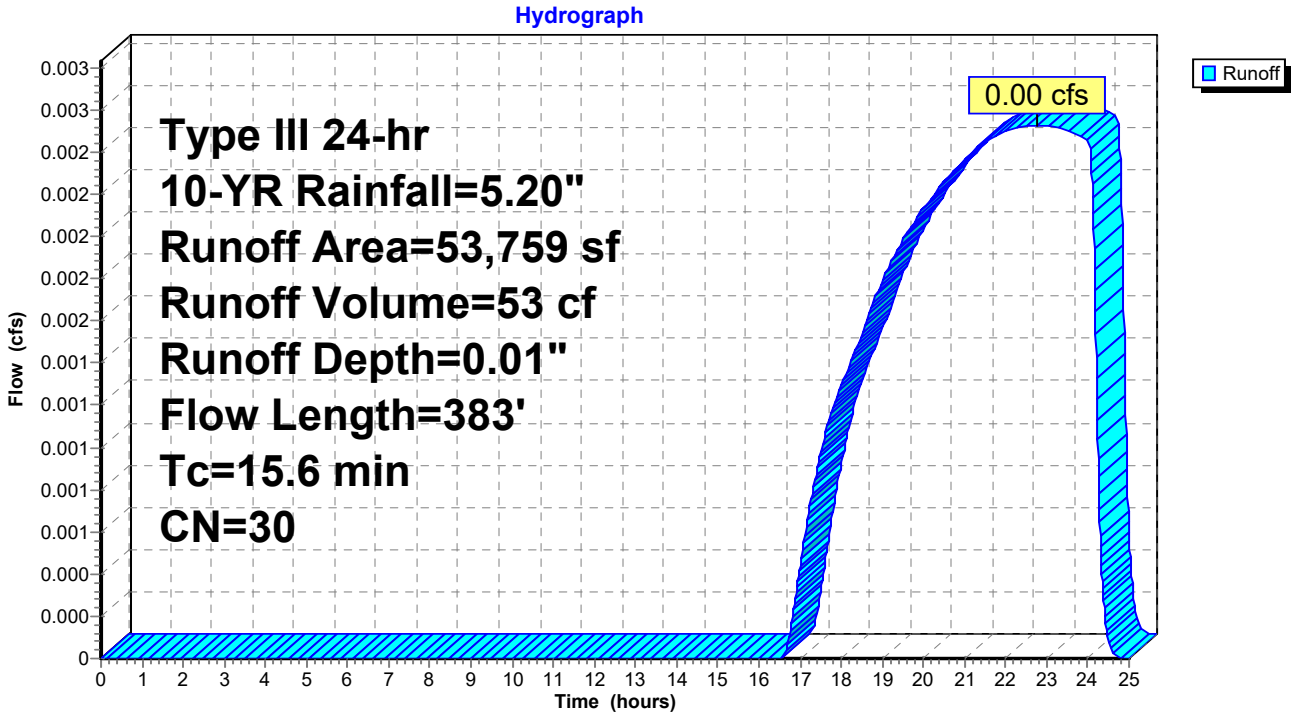
Runoff = 0.00 cfs @ 22.76 hrs, Volume= 53 cf, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.20"

Area (sf)	CN	Description
0	98	Paved parking, HSG A
0	98	Roofs, HSG A
1,983	39	>75% Grass cover, Good, HSG A
51,776	30	Woods, Good, HSG A
53,759	30	Weighted Average
53,759		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0760	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.4	92	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.7	61	0.0030	0.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.8	78	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.7	102	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
15.6	383	Total			

Subcatchment X-3: Flow to Easterly Abutters



Summary for Subcatchment X-1: Flow to Mill St

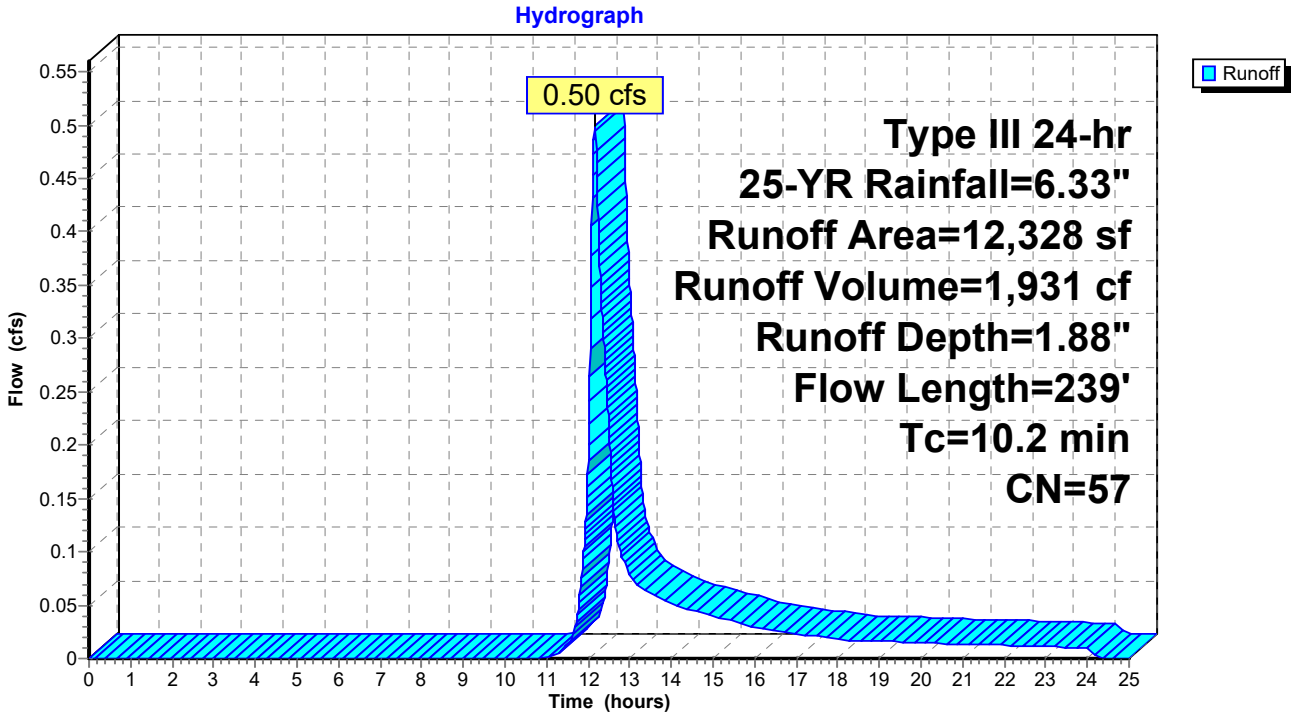
Runoff = 0.50 cfs @ 12.16 hrs, Volume= 1,931 cf, Depth= 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.33"

Area (sf)	CN	Description
3,190	98	Paved parking, HSG A
919	98	Roofs, HSG A
5,640	39	>75% Grass cover, Good, HSG A
2,579	30	Woods, Good, HSG A
12,328	57	Weighted Average
8,219		66.67% Pervious Area
4,109		33.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	50	0.0460	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	53	0.0530	1.15		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.4	22	0.0040	1.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	114	0.0700	5.37		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
10.2	239	Total			

Subcatchment X-1: Flow to Mill St



Summary for Subcatchment X-2: Flow to Northeasterly Abutters

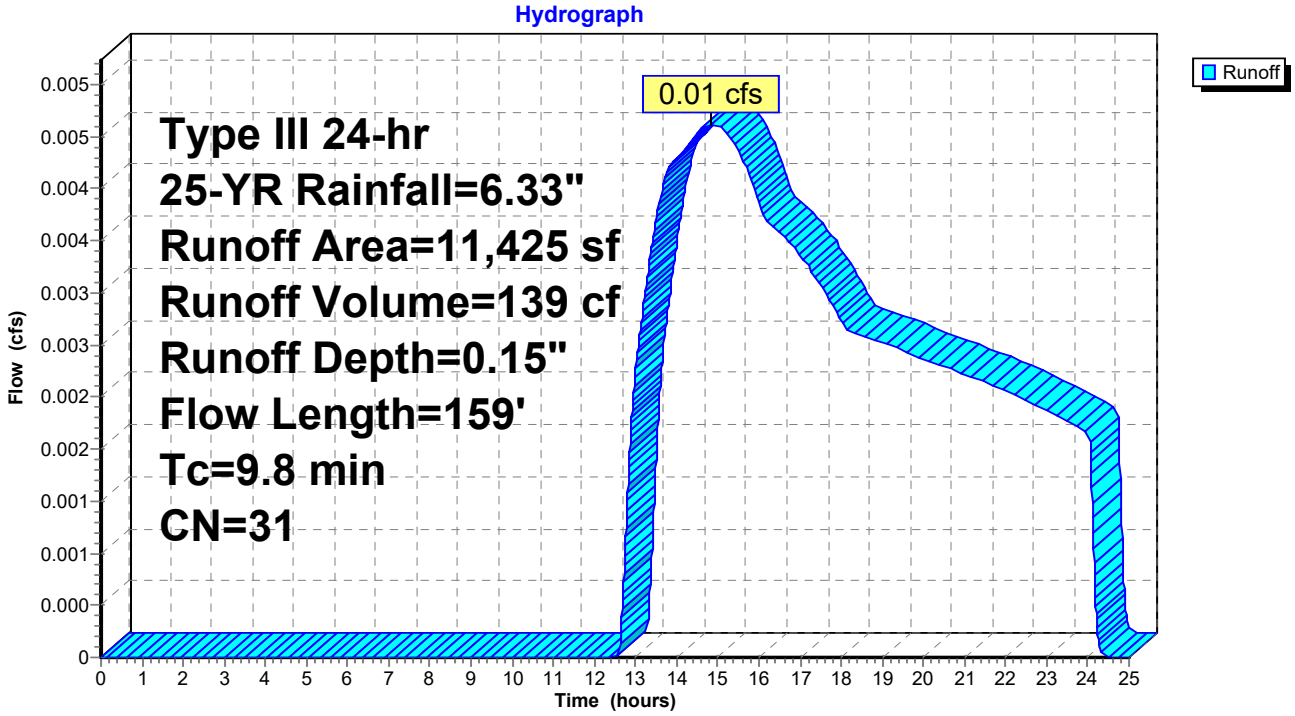
Runoff = 0.01 cfs @ 14.84 hrs, Volume= 139 cf, Depth= 0.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.33"

Area (sf)	CN	Description
0	98	Paved parking, HSG A
0	98	Roofs, HSG A
1,467	39	>75% Grass cover, Good, HSG A
9,958	30	Woods, Good, HSG A
11,425	31	Weighted Average
11,425		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	50	0.0420	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.9	109	0.1670	2.04		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.8	159	Total			

Subcatchment X-2: Flow to Northeasterly Abutters



Summary for Subcatchment X-3: Flow to Easterly Abutters

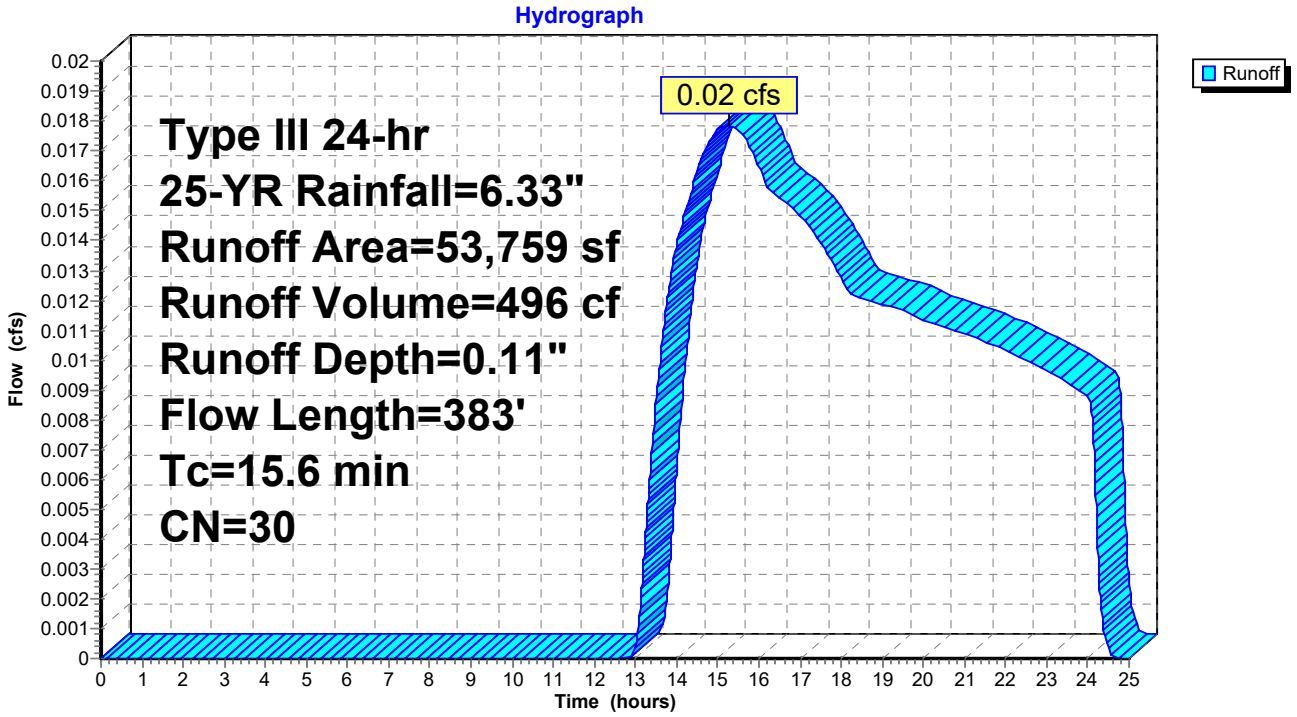
Runoff = 0.02 cfs @ 15.27 hrs, Volume= 496 cf, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.33"

Area (sf)	CN	Description
0	98	Paved parking, HSG A
0	98	Roofs, HSG A
1,983	39	>75% Grass cover, Good, HSG A
51,776	30	Woods, Good, HSG A
53,759	30	Weighted Average
53,759		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0760	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.4	92	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.7	61	0.0030	0.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.8	78	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.7	102	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
15.6	383	Total			

Subcatchment X-3: Flow to Easterly Abutters



Summary for Subcatchment X-1: Flow to Mill St

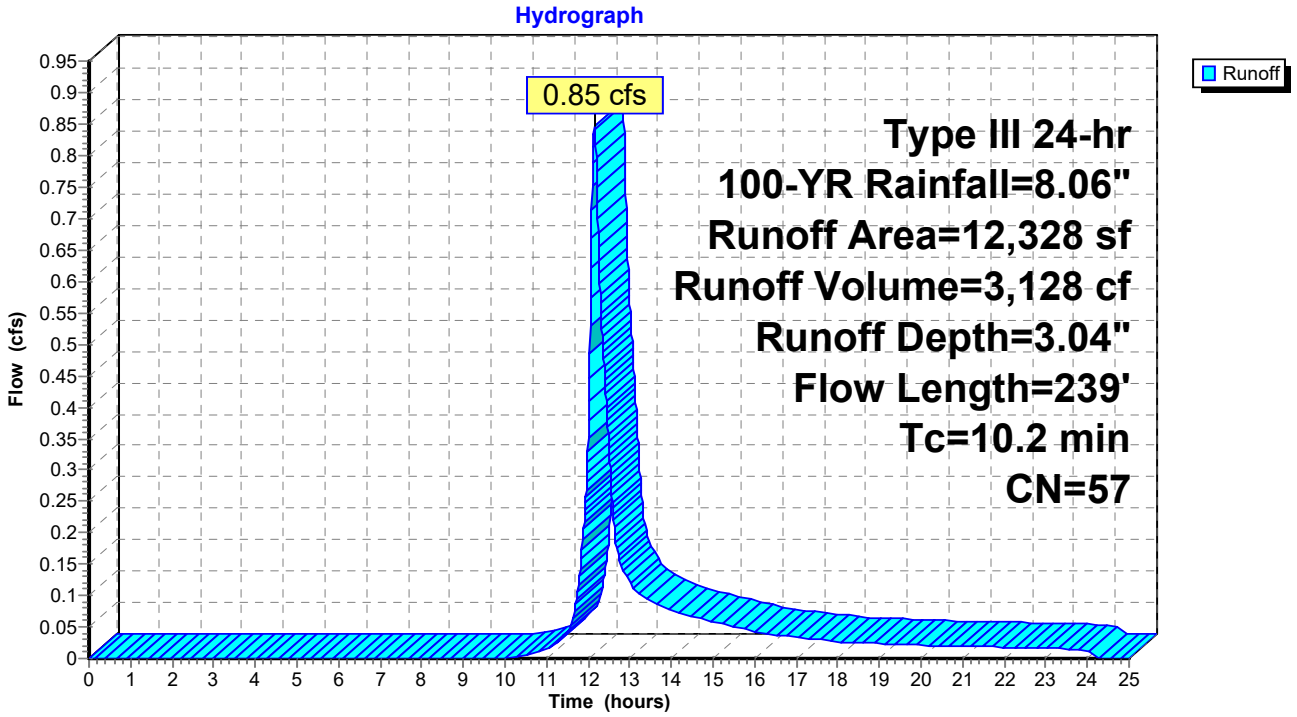
Runoff = 0.85 cfs @ 12.15 hrs, Volume= 3,128 cf, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=8.06"

Area (sf)	CN	Description
3,190	98	Paved parking, HSG A
919	98	Roofs, HSG A
5,640	39	>75% Grass cover, Good, HSG A
2,579	30	Woods, Good, HSG A
12,328	57	Weighted Average
8,219		66.67% Pervious Area
4,109		33.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	50	0.0460	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.8	53	0.0530	1.15		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.4	22	0.0040	1.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	114	0.0700	5.37		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
10.2	239	Total			

Subcatchment X-1: Flow to Mill St



Summary for Subcatchment X-2: Flow to Northeasterly Abutters

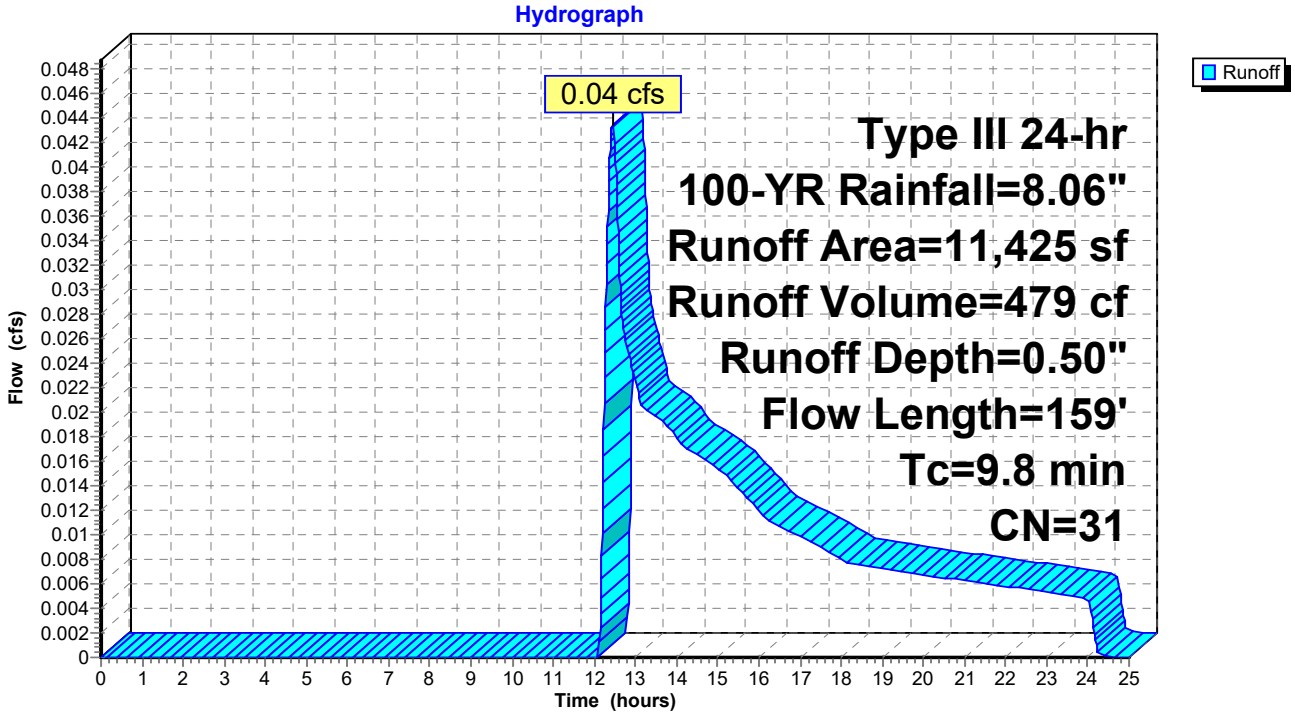
Runoff = 0.04 cfs @ 12.44 hrs, Volume= 479 cf, Depth= 0.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=8.06"

Area (sf)	CN	Description
0	98	Paved parking, HSG A
0	98	Roofs, HSG A
1,467	39	>75% Grass cover, Good, HSG A
9,958	30	Woods, Good, HSG A
11,425	31	Weighted Average
11,425		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	50	0.0420	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.9	109	0.1670	2.04		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.8	159	Total			

Subcatchment X-2: Flow to Northeasterly Abutters



Summary for Subcatchment X-3: Flow to Easterly Abutters

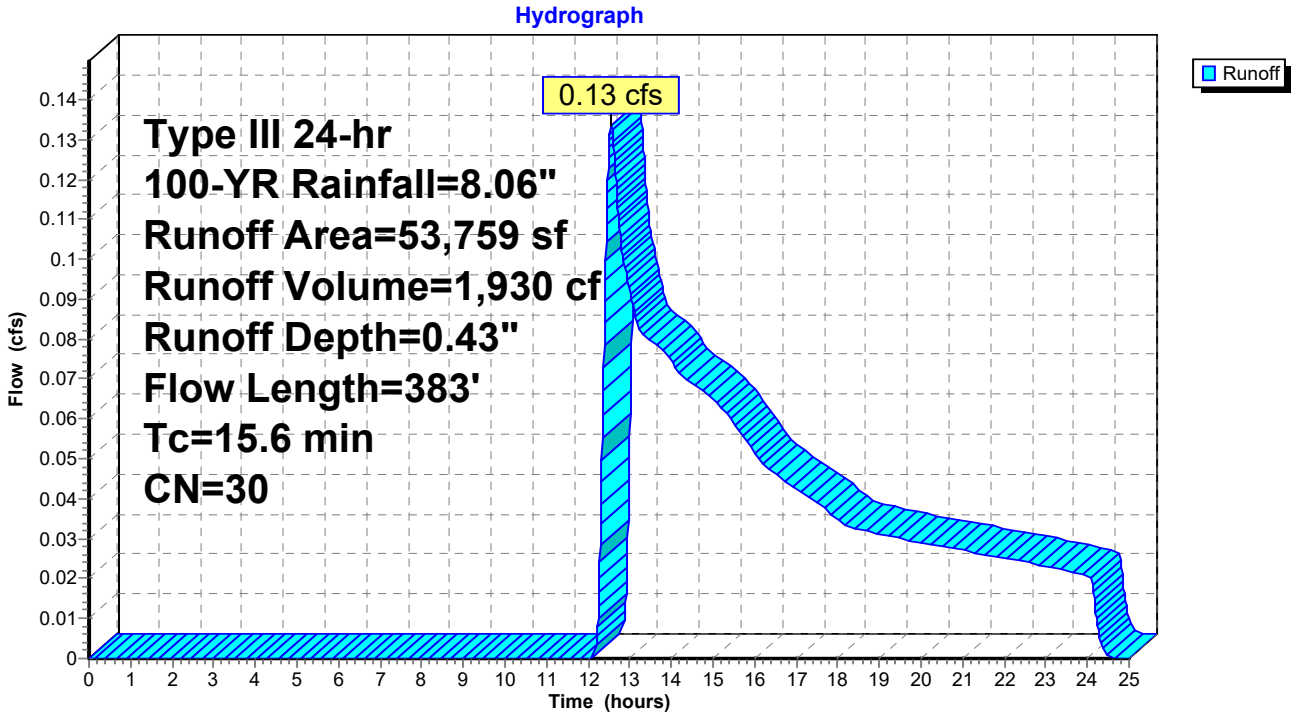
Runoff = 0.13 cfs @ 12.56 hrs, Volume= 1,930 cf, Depth= 0.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=8.06"

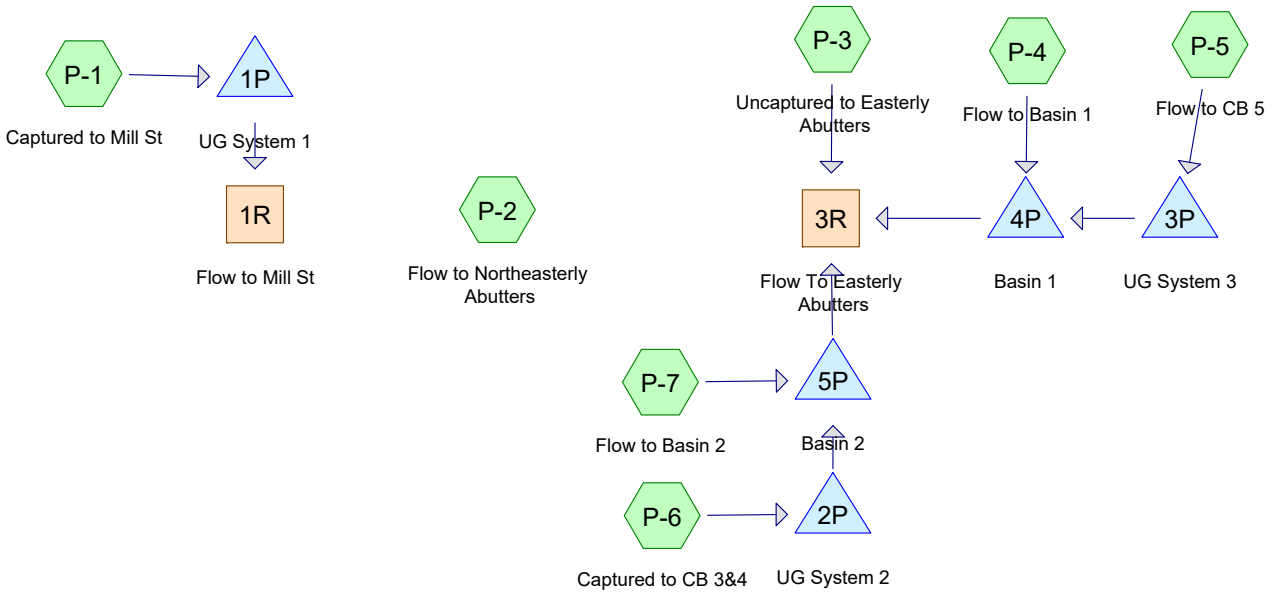
Area (sf)	CN	Description
0	98	Paved parking, HSG A
0	98	Roofs, HSG A
1,983	39	>75% Grass cover, Good, HSG A
51,776	30	Woods, Good, HSG A
53,759	30	Weighted Average
53,759		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0760	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
1.4	92	0.0500	1.12		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
3.7	61	0.0030	0.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.8	78	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.7	102	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
15.6	383	Total			

Subcatchment X-3: Flow to Easterly Abutters



Proposed HydroCAD Report



Subcat Reach Pond Link

Routing Diagram for 217 Mill St - Proposed Drainage (rev 4-6-23)
Prepared by DeCelle-Burke-Sala & Associates, Inc., Printed 4/10/2023
HydroCAD® 10.00-26 s/n 07920 © 2020 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
47,887	39	>75% Grass cover, Good, HSG A (P-1, P-2, P-3, P-4, P-5, P-6, P-7)
19,668	98	Paved parking, HSG A (P-1, P-5, P-6)
7,520	98	Roofs, HSG A (P-4, P-7)
2,437	30	Woods, Good, HSG A (P-2, P-3, P-4)

Summary for Subcatchment P-1: Captured to Mill St

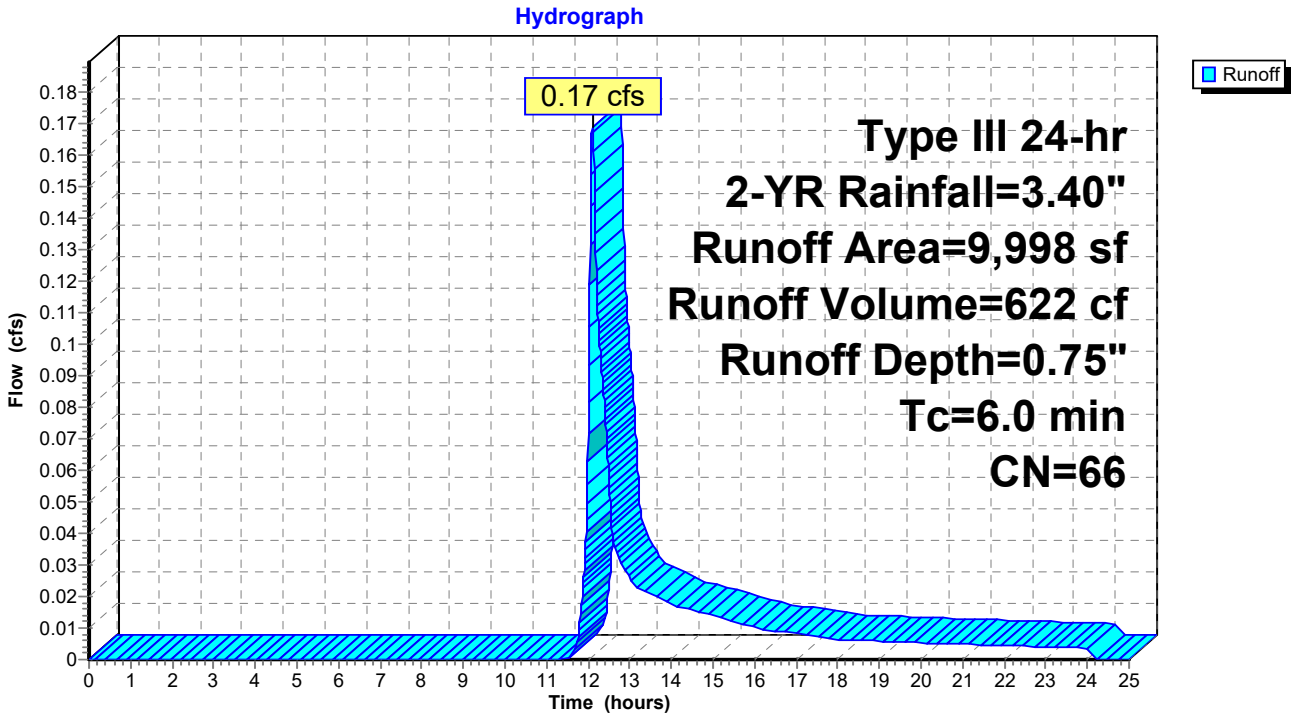
Runoff = 0.17 cfs @ 12.10 hrs, Volume= 622 cf, Depth= 0.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.40"

Area (sf)	CN	Description
4,541	98	Paved parking, HSG A
5,457	39	>75% Grass cover, Good, HSG A
9,998	66	Weighted Average
5,457		54.58% Pervious Area
4,541		45.42% Impervious Area

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

Subcatchment P-1: Captured to Mill St



Summary for Subcatchment P-2: Flow to Northeasterly Abutters

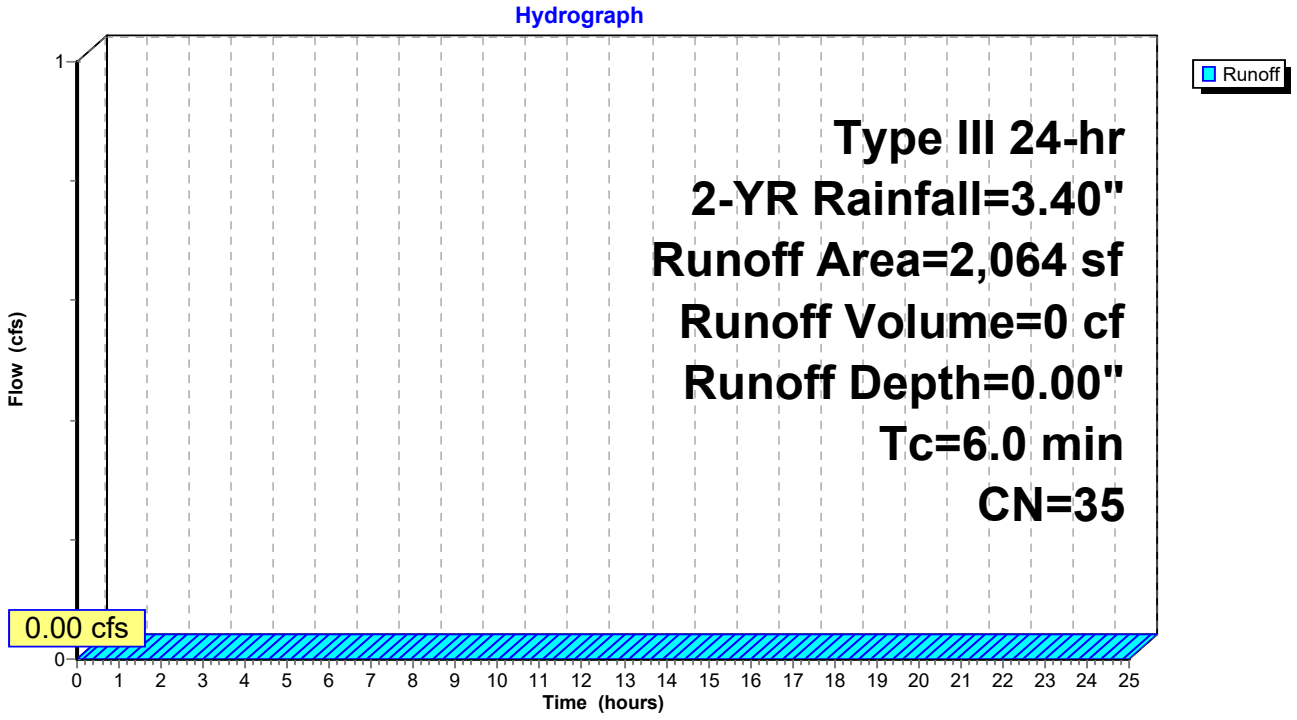
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.40"

Area (sf)	CN	Description
0	98	Paved parking, HSG A
1,033	39	>75% Grass cover, Good, HSG A
0	98	Roofs, HSG A
1,031	30	Woods, Good, HSG A
2,064	35	Weighted Average
2,064		100.00% Pervious Area

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

Subcatchment P-2: Flow to Northeasterly Abutters



Summary for Subcatchment P-3: Uncaptured to Easterly Abutters

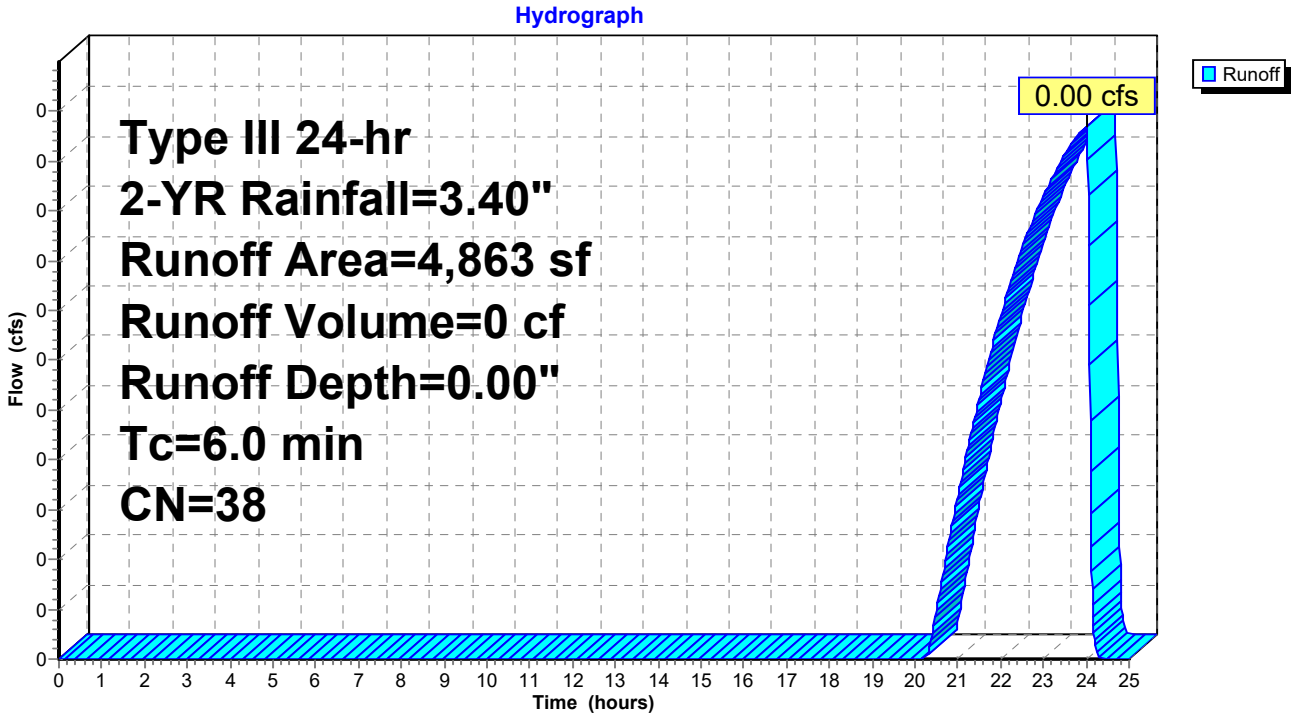
Runoff = 0.00 cfs @ 24.01 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.40"

Area (sf)	CN	Description
0	98	Paved parking, HSG A
4,429	39	>75% Grass cover, Good, HSG A
0	98	Roofs, HSG A
434	30	Woods, Good, HSG A
4,863	38	Weighted Average
4,863		100.00% Pervious Area

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

Subcatchment P-3: Uncaptured to Easterly Abutters



Summary for Subcatchment P-4: Flow to Basin 1

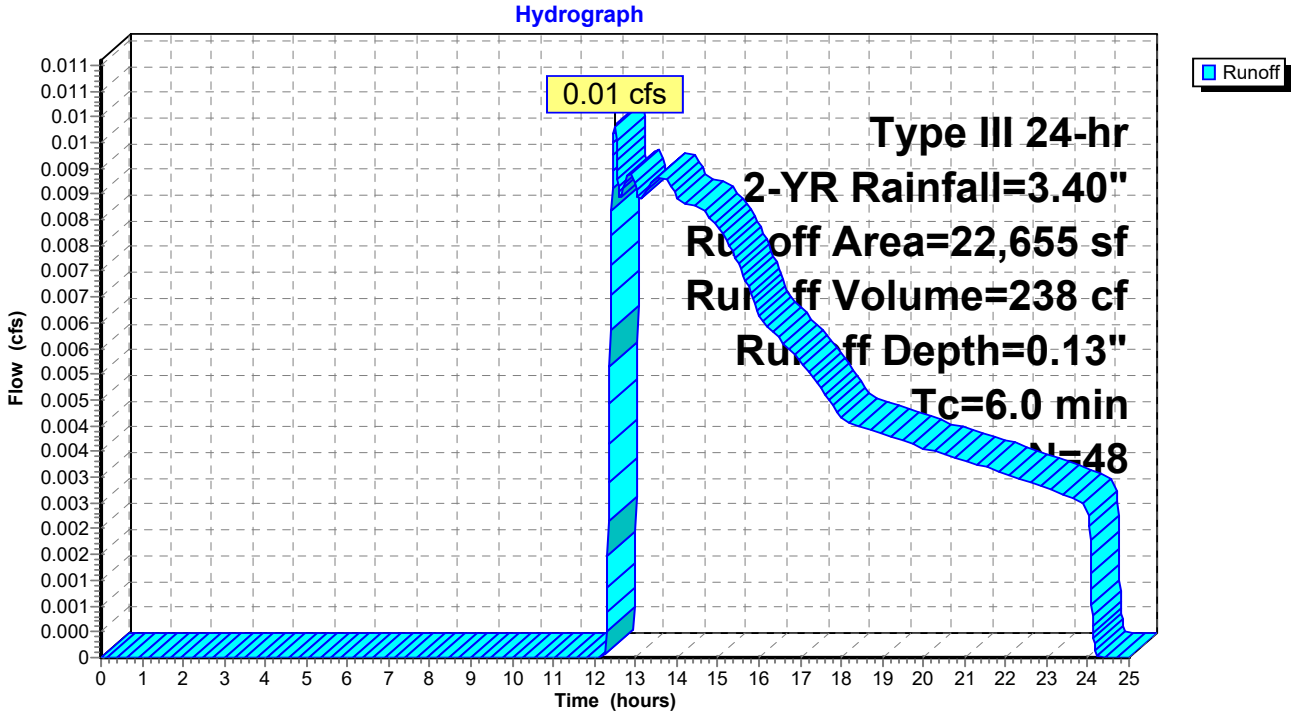
Runoff = 0.01 cfs @ 12.49 hrs, Volume= 238 cf, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.40"

Area (sf)	CN	Description
3,760	98	Roofs, HSG A
17,923	39	>75% Grass cover, Good, HSG A
0	98	Paved parking, HSG A
972	30	Woods, Good, HSG A
22,655	48	Weighted Average
18,895		83.40% Pervious Area
3,760		16.60% Impervious Area

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

Subcatchment P-4: Flow to Basin 1



Summary for Subcatchment P-5: Flow to CB 5

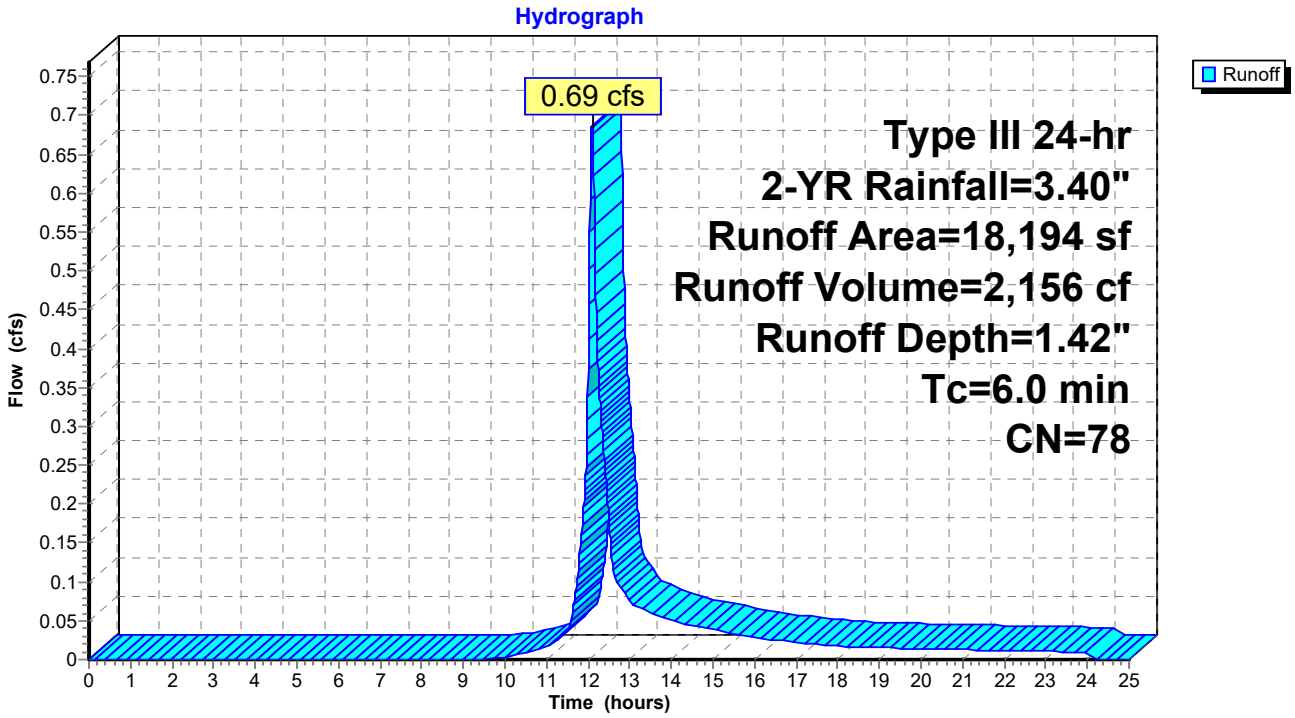
Runoff = 0.69 cfs @ 12.09 hrs, Volume= 2,156 cf, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.40"

Area (sf)	CN	Description
11,917	98	Paved parking, HSG A
6,277	39	>75% Grass cover, Good, HSG A
18,194	78	Weighted Average
6,277		34.50% Pervious Area
11,917		65.50% Impervious Area

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

Subcatchment P-5: Flow to CB 5



Summary for Subcatchment P-6: Captured to CB 3&4

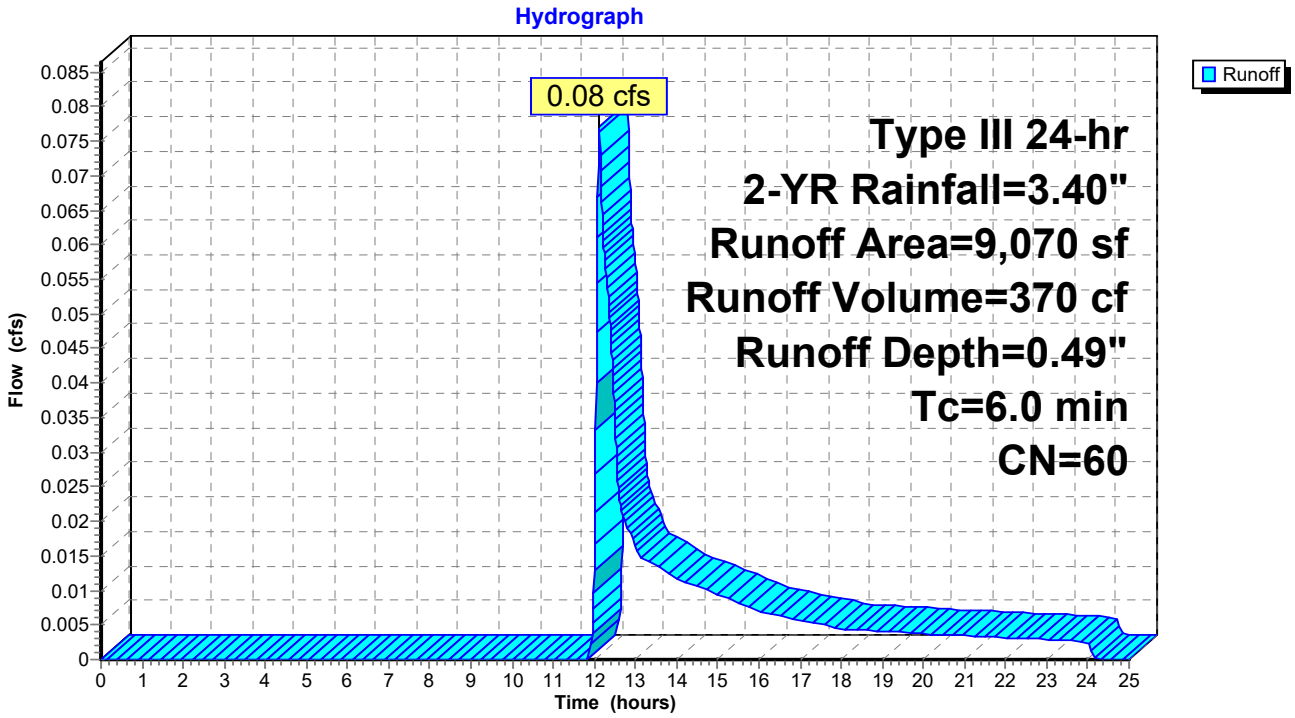
Runoff = 0.08 cfs @ 12.12 hrs, Volume= 370 cf, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.40"

Area (sf)	CN	Description
3,210	98	Paved parking, HSG A
5,860	39	>75% Grass cover, Good, HSG A
9,070	60	Weighted Average
5,860		64.61% Pervious Area
3,210		35.39% Impervious Area

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

Subcatchment P-6: Captured to CB 3&4



Summary for Subcatchment P-7: Flow to Basin 2

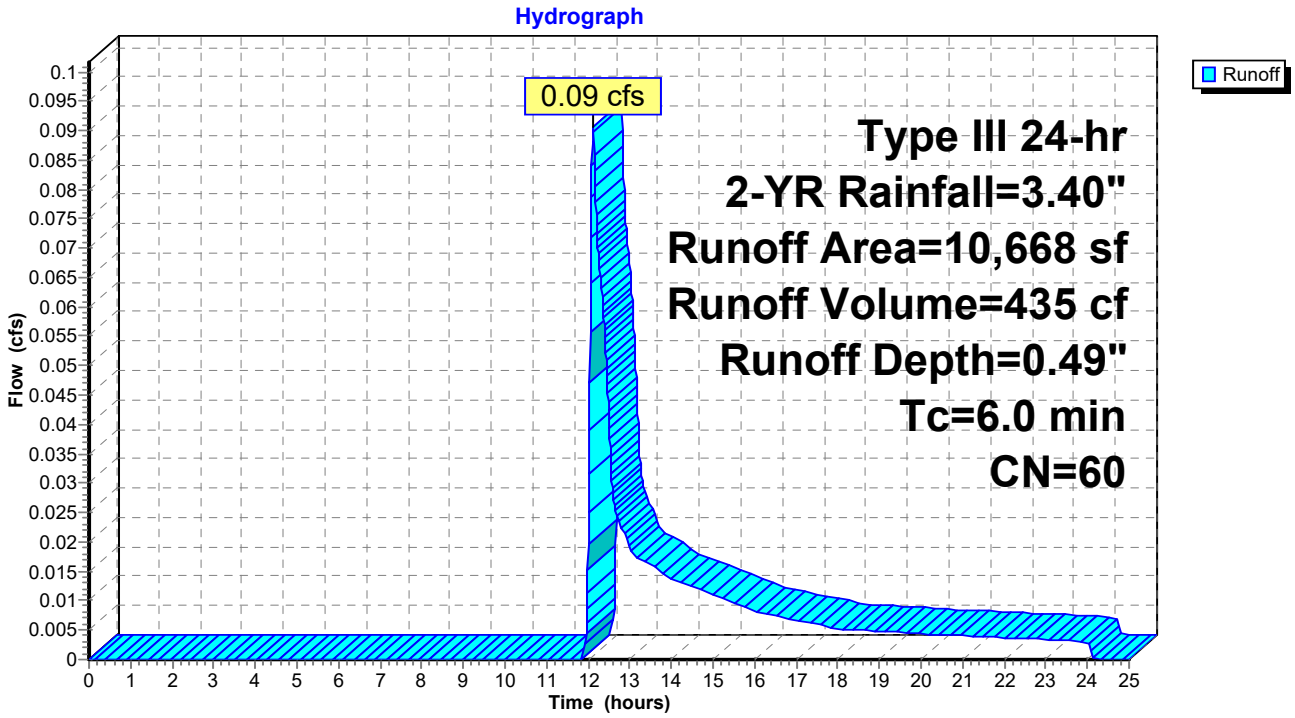
Runoff = 0.09 cfs @ 12.12 hrs, Volume= 435 cf, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR Rainfall=3.40"

Area (sf)	CN	Description
3,760	98	Roofs, HSG A
6,908	39	>75% Grass cover, Good, HSG A
10,668	60	Weighted Average
6,908		64.75% Pervious Area
3,760		35.25% Impervious Area

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

Subcatchment P-7: Flow to Basin 2

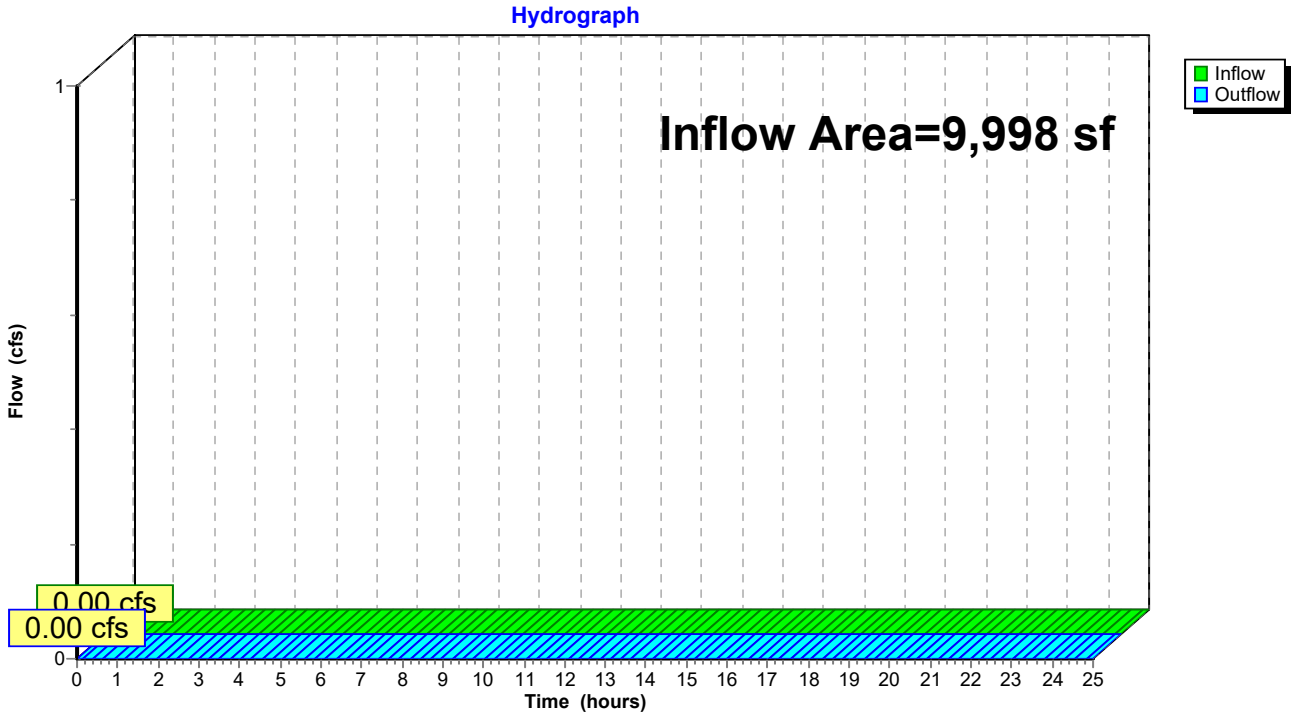


Summary for Reach 1R: Flow to Mill St

Inflow Area = 9,998 sf, 45.42% Impervious, Inflow Depth = 0.00" for 2-YR event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Reach 1R: Flow to Mill St

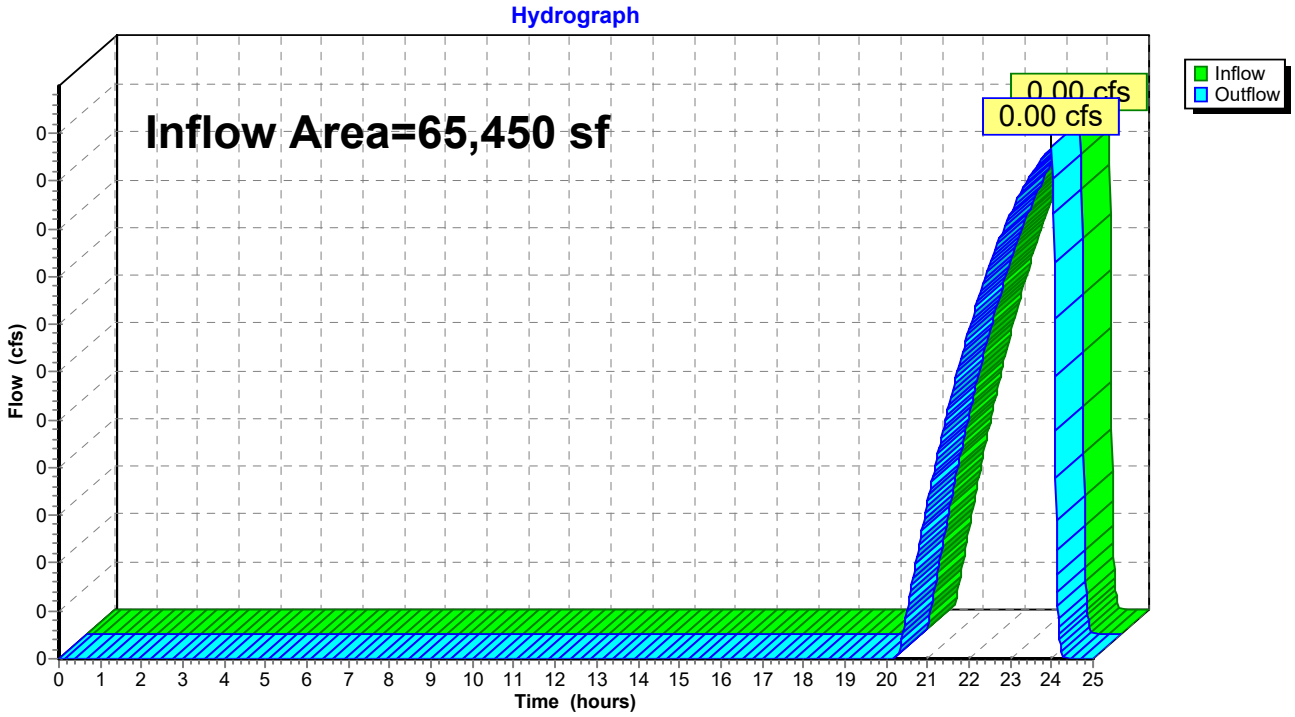


Summary for Reach 3R: Flow To Easterly Abutters

Inflow Area = 65,450 sf, 34.60% Impervious, Inflow Depth = 0.00" for 2-YR event
Inflow = 0.00 cfs @ 24.01 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 24.01 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Reach 3R: Flow To Easterly Abutters



Summary for Pond 1P: UG System 1

Inflow Area = 9,998 sf, 45.42% Impervious, Inflow Depth = 0.75" for 2-YR event
Inflow = 0.17 cfs @ 12.10 hrs, Volume= 622 cf
Outflow = 0.06 cfs @ 12.01 hrs, Volume= 622 cf, Atten= 67%, Lag= 0.0 min
Discarded = 0.06 cfs @ 12.01 hrs, Volume= 622 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 123.06' @ 12.50 hrs Surf.Area= 293 sf Storage= 98 cf

Plug-Flow detention time= 9.2 min calculated for 622 cf (100% of inflow)
Center-of-Mass det. time= 9.2 min (894.9 - 885.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	122.00'	292 cf	**7.50'W x 39.00'L x 5.25'H Field A** 1,536 cf Overall - 561 cf Embedded = 975 cf x 30.0% Voids
#2A	123.00'	417 cf	**Shea Leaching Chamber 4x4x4** x 9 Inside #1 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf
#3	123.34'	5 cf	**10.0" Round Pipe Storage**-Impervious L= 9.3' S= 0.0050 '/'
#4	123.39'	11 cf	**10.0" Round Pipe Storage**-Impervious L= 20.1' S= 0.0050 '/'
#5	123.50'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**-Impervious
#6	126.50'	22 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) -Impervious
		785 cf	Total Available Storage

Storage Group A created with Chamber Wizard

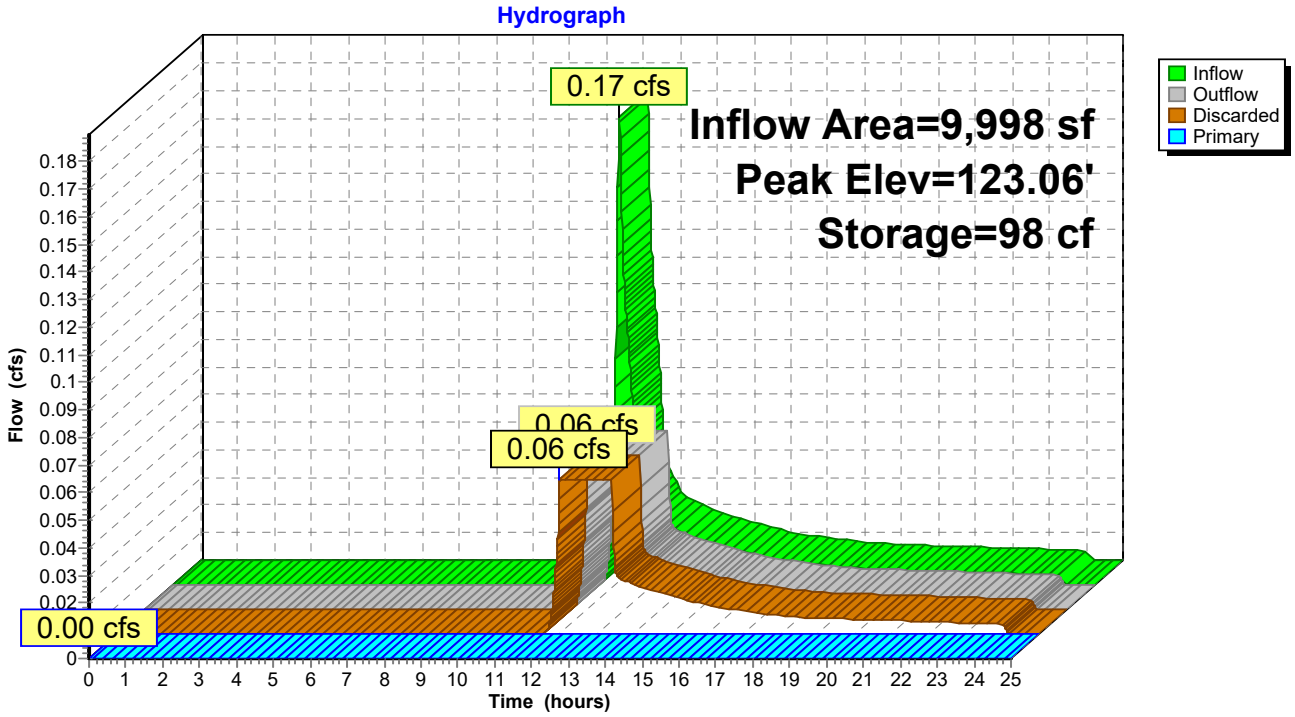
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
126.50	4	0	0
128.00	25	22	22

Device	Routing	Invert	Outlet Devices
#1	Discarded	122.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	126.50'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.06 cfs @ 12.01 hrs HW=122.07' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=122.00' (Free Discharge)
↑**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: UG System 1



Summary for Pond 2P: UG System 2

Inflow Area = 9,070 sf, 35.39% Impervious, Inflow Depth = 0.49" for 2-YR event
Inflow = 0.08 cfs @ 12.12 hrs, Volume= 370 cf
Outflow = 0.07 cfs @ 12.11 hrs, Volume= 370 cf, Atten= 13%, Lag= 0.0 min
Discarded = 0.07 cfs @ 12.11 hrs, Volume= 370 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 128.82' @ 12.18 hrs Surf.Area= 350 sf Storage= 7 cf

Plug-Flow detention time= 1.4 min calculated for 369 cf (100% of inflow)
Center-of-Mass det. time= 1.4 min (913.8 - 912.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	128.75'	327 cf	**17.50'W x 20.00'L x 5.25'H Field A** 1,838 cf Overall - 748 cf Embedded = 1,090 cf x 30.0% Voids
#2A	129.75'	557 cf	**Shea Leaching Chamber 4x4x4** x 12 Inside #1 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf 12 Chambers in 3 Rows
		883 cf	Total Available Storage

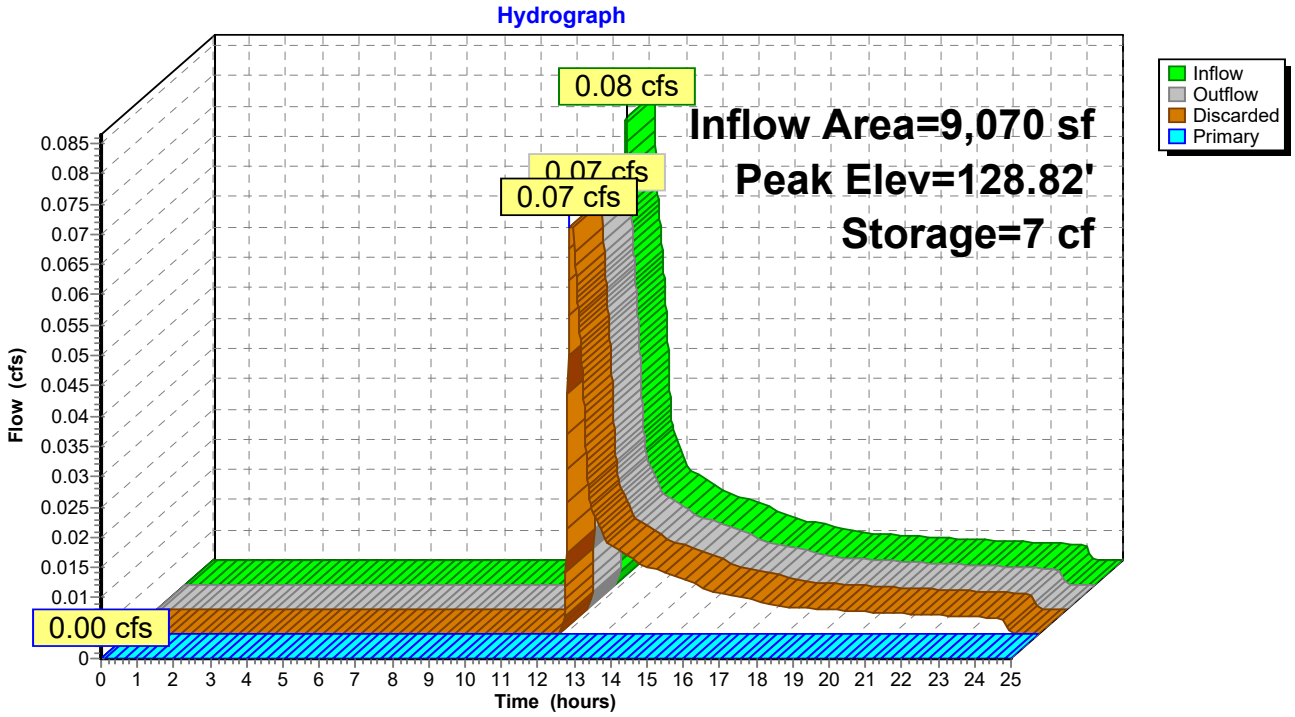
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	128.75'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	131.00'	**12.0" Round Culvert** L= 84.2' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 131.00' / 126.00' S= 0.0594 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.07 cfs @ 12.11 hrs HW=128.80' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=128.75' (Free Discharge)
↑—**2=Culvert** (Controls 0.00 cfs)

Pond 2P: UG System 2



Summary for Pond 3P: UG System 3

Inflow Area = 18,194 sf, 65.50% Impervious, Inflow Depth = 1.42" for 2-YR event
Inflow = 0.69 cfs @ 12.09 hrs, Volume= 2,156 cf
Outflow = 0.21 cfs @ 11.93 hrs, Volume= 2,156 cf, Atten= 70%, Lag= 0.0 min
Discarded = 0.21 cfs @ 11.93 hrs, Volume= 2,156 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 130.09' @ 12.46 hrs Surf.Area= 1,072 sf Storage= 385 cf

Plug-Flow detention time= 9.9 min calculated for 2,155 cf (100% of inflow)
Center-of-Mass det. time= 9.9 min (855.8 - 845.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	129.00'	835 cf	**15.76'W x 68.00'L x 4.50'H Field A** 4,823 cf Overall - 2,039 cf Embedded = 2,784 cf x 30.0% Voids
#2A	130.00'	1,464 cf	**Shea Leaching Chamber 4x4x3** x 48 Inside #1 Inside= 41.0"W x 30.0"H => 8.72 sf x 3.50'L = 30.5 cf Outside= 47.0"W x 36.0"H => 10.62 sf x 4.00'L = 42.5 cf 48 Chambers in 3 Rows
		2,299 cf	Total Available Storage

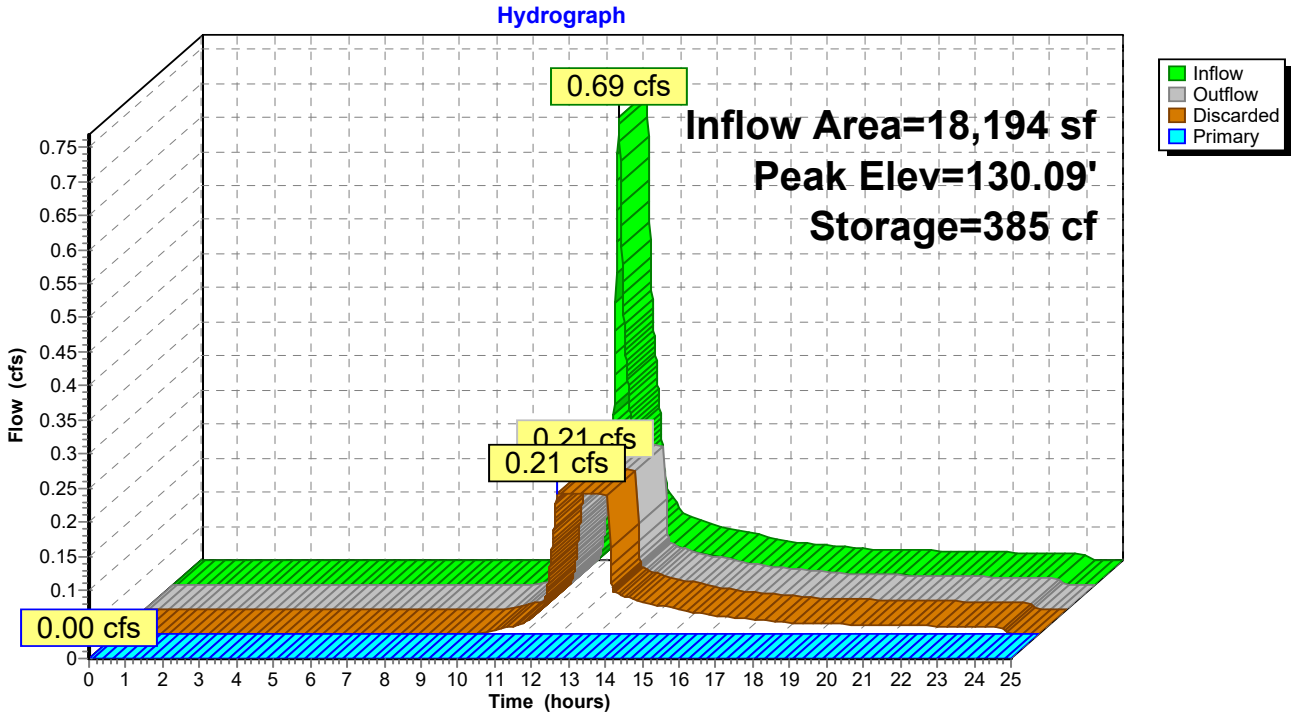
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	129.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	131.50'	**10.0" Round Culvert** L= 56.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 131.50' / 128.00' S= 0.0619 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.21 cfs @ 11.93 hrs HW=129.05' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.21 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=129.00' (Free Discharge)
↑**2=Culvert** (Controls 0.00 cfs)

Pond 3P: UG System 3



Summary for Pond 4P: Basin 1

Inflow Area = 40,849 sf, 38.38% Impervious, Inflow Depth = 0.07" for 2-YR event
Inflow = 0.01 cfs @ 12.49 hrs, Volume= 238 cf
Outflow = 0.01 cfs @ 12.52 hrs, Volume= 238 cf, Atten= 2%, Lag= 1.8 min
Discarded = 0.01 cfs @ 12.52 hrs, Volume= 238 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 126.00' @ 12.52 hrs Surf.Area= 941 sf Storage= 1 cf

Plug-Flow detention time= 1.7 min calculated for 238 cf (100% of inflow)
Center-of-Mass det. time= 1.7 min (1,018.7 - 1,017.0)

Volume	Invert	Avail.Storage	Storage Description
#1	126.00'	3,407 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

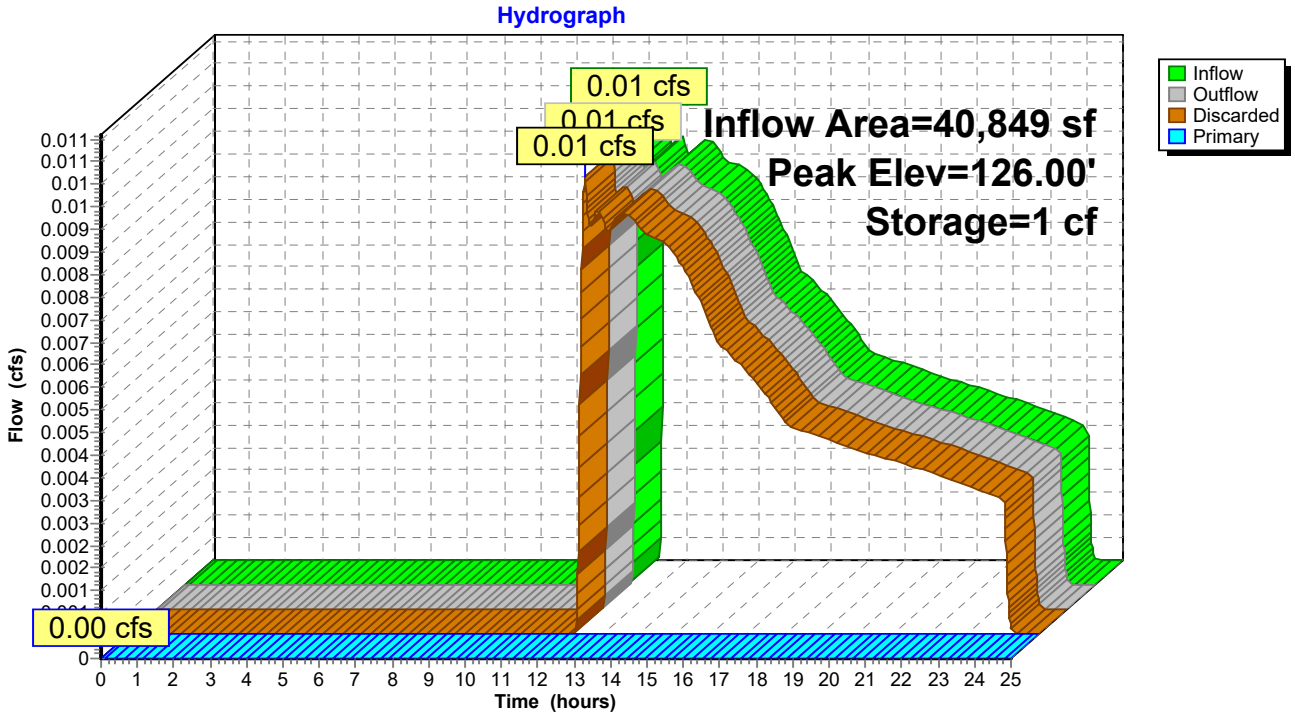
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
126.00	940	0	0
128.00	2,467	3,407	3,407

Device	Routing	Invert	Outlet Devices
#1	Discarded	126.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	127.50'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.18 cfs @ 12.52 hrs HW=126.00' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=126.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 4P: Basin 1



Summary for Pond 5P: Basin 2

Inflow Area = 19,738 sf, 35.31% Impervious, Inflow Depth = 0.26" for 2-YR event
Inflow = 0.09 cfs @ 12.12 hrs, Volume= 435 cf
Outflow = 0.09 cfs @ 12.15 hrs, Volume= 435 cf, Atten= 5%, Lag= 1.9 min
Discarded = 0.09 cfs @ 12.15 hrs, Volume= 435 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 124.02' @ 12.15 hrs Surf.Area= 514 sf Storage= 9 cf

Plug-Flow detention time= 1.7 min calculated for 435 cf (100% of inflow)
Center-of-Mass det. time= 1.7 min (914.1 - 912.4)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	1,971 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

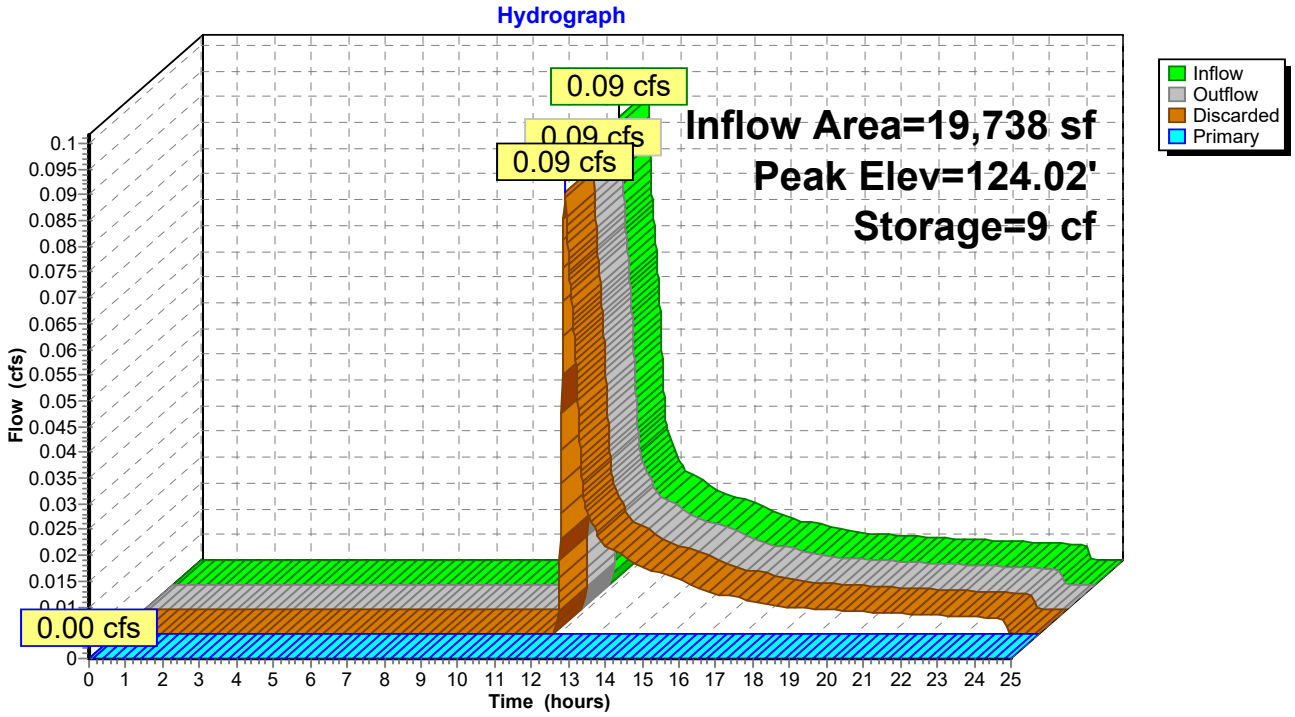
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	506	0	0
126.00	1,465	1,971	1,971

Device	Routing	Invert	Outlet Devices
#1	Discarded	124.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	125.50'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.10 cfs @ 12.15 hrs HW=124.02' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=124.00' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: Basin 2



Summary for Subcatchment P-1: Captured to Mill St

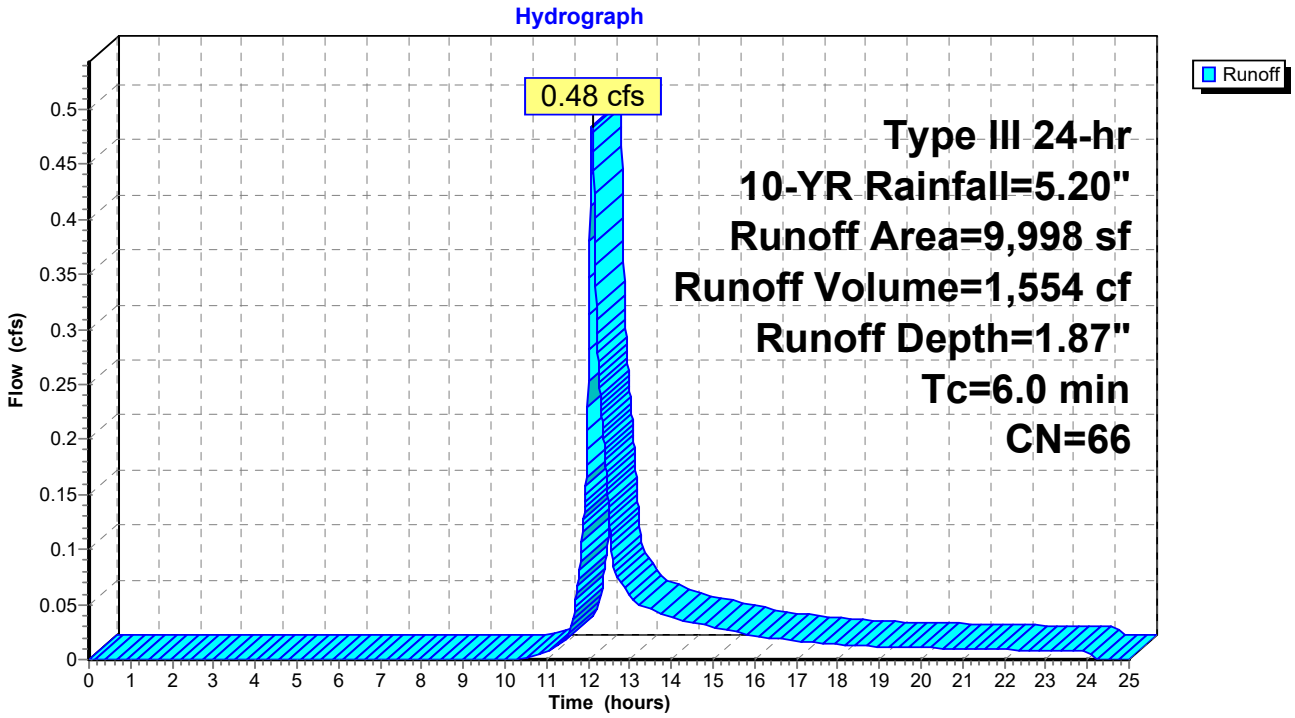
Runoff = 0.48 cfs @ 12.09 hrs, Volume= 1,554 cf, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.20"

Area (sf)	CN	Description
4,541	98	Paved parking, HSG A
5,457	39	>75% Grass cover, Good, HSG A
9,998	66	Weighted Average
5,457		54.58% Pervious Area
4,541		45.42% Impervious Area

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

Subcatchment P-1: Captured to Mill St



Summary for Subcatchment P-2: Flow to Northeasterly Abutters

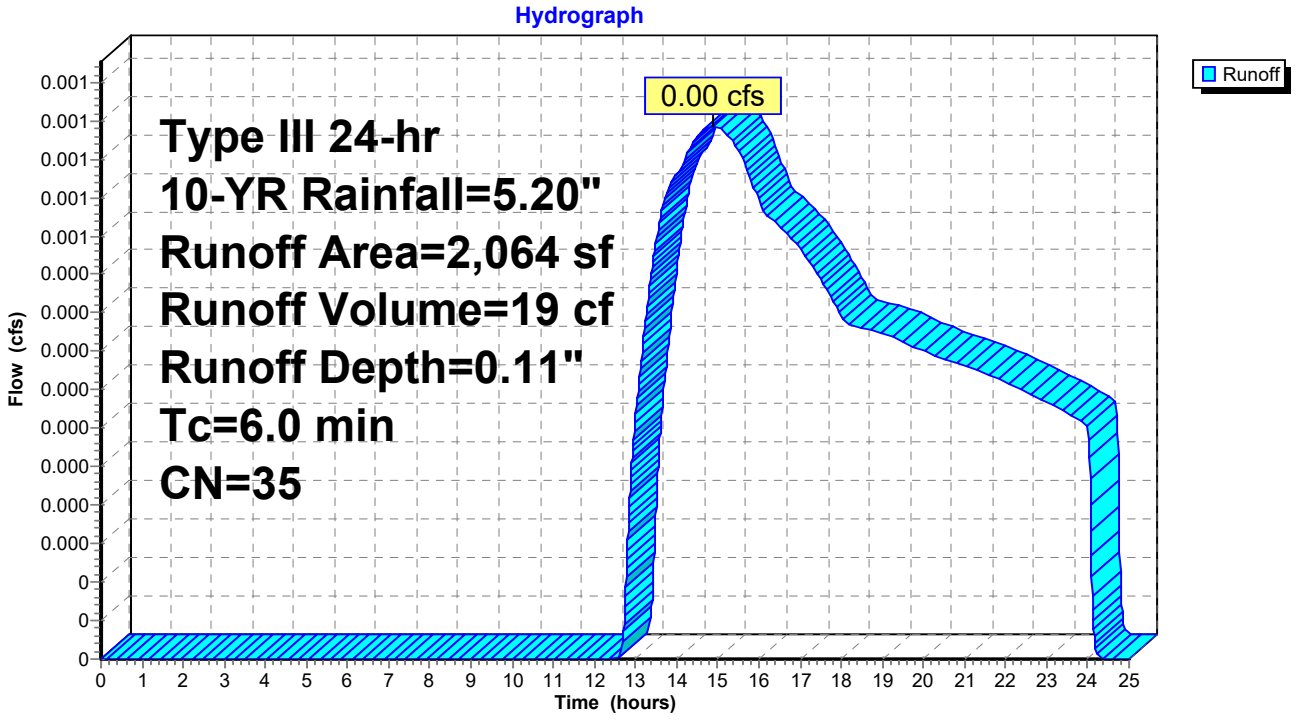
Runoff = 0.00 cfs @ 14.86 hrs, Volume= 19 cf, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.20"

Area (sf)	CN	Description
0	98	Paved parking, HSG A
1,033	39	>75% Grass cover, Good, HSG A
0	98	Roofs, HSG A
1,031	30	Woods, Good, HSG A
2,064	35	Weighted Average
2,064		100.00% Pervious Area

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

Subcatchment P-2: Flow to Northeasterly Abutters



Summary for Subcatchment P-3: Uncaptured to Easterly Abutters

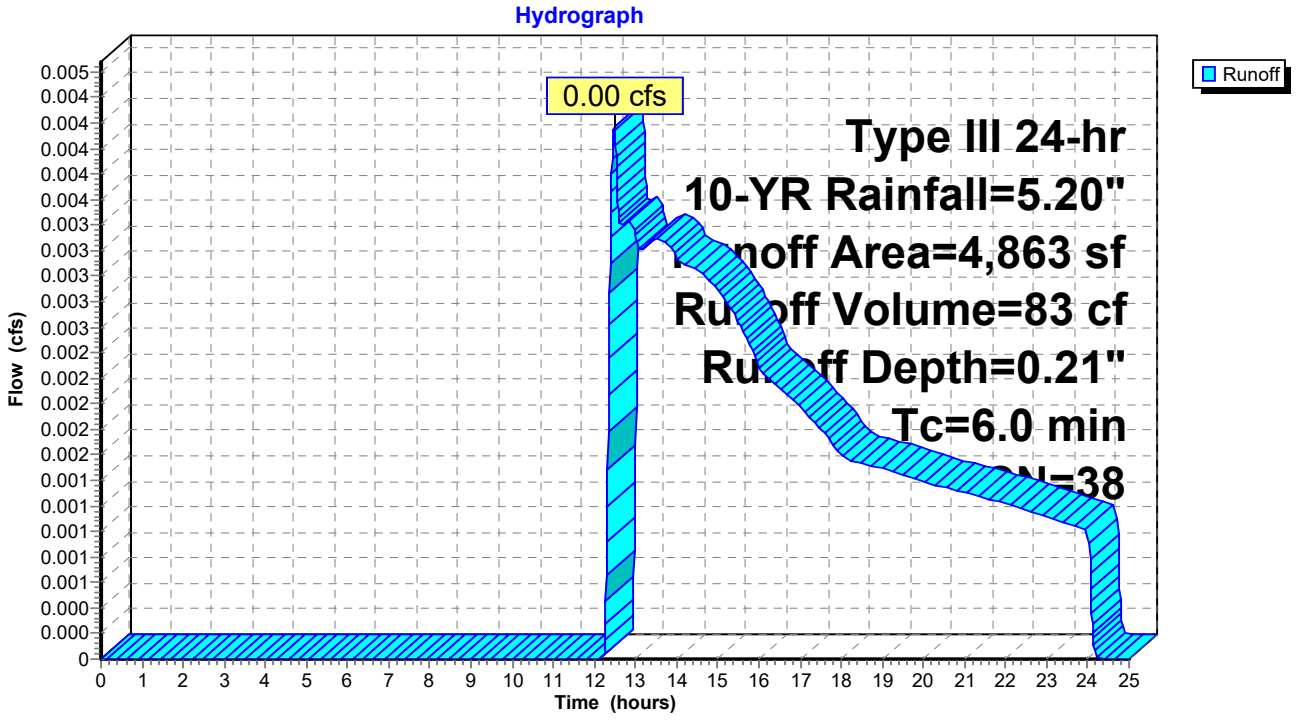
Runoff = 0.00 cfs @ 12.48 hrs, Volume= 83 cf, Depth= 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.20"

Area (sf)	CN	Description
0	98	Paved parking, HSG A
4,429	39	>75% Grass cover, Good, HSG A
0	98	Roofs, HSG A
434	30	Woods, Good, HSG A
4,863	38	Weighted Average
4,863		100.00% Pervious Area

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

Subcatchment P-3: Uncaptured to Easterly Abutters



Summary for Subcatchment P-4: Flow to Basin 1

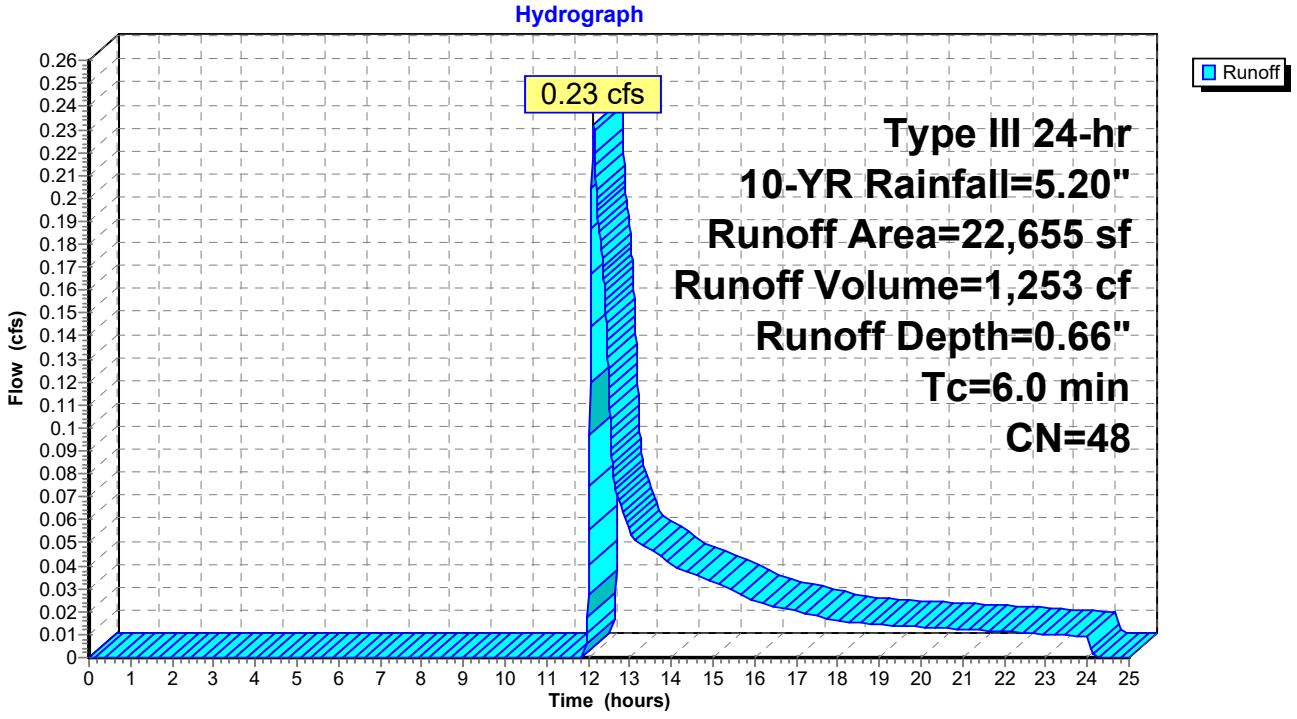
Runoff = 0.23 cfs @ 12.13 hrs, Volume= 1,253 cf, Depth= 0.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.20"

Area (sf)	CN	Description
3,760	98	Roofs, HSG A
17,923	39	>75% Grass cover, Good, HSG A
0	98	Paved parking, HSG A
972	30	Woods, Good, HSG A
22,655	48	Weighted Average
18,895		83.40% Pervious Area
3,760		16.60% Impervious Area

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

Subcatchment P-4: Flow to Basin 1



Summary for Subcatchment P-5: Flow to CB 5

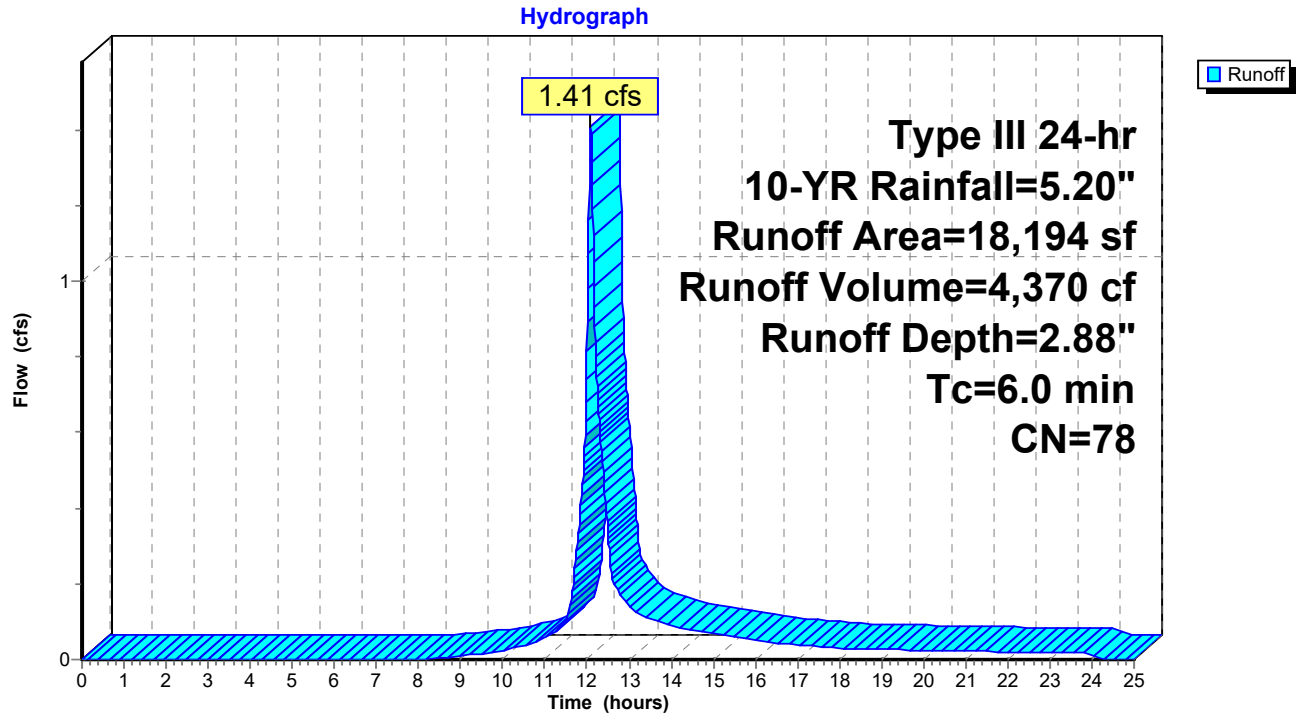
Runoff = 1.41 cfs @ 12.09 hrs, Volume= 4,370 cf, Depth= 2.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.20"

Area (sf)	CN	Description
11,917	98	Paved parking, HSG A
6,277	39	>75% Grass cover, Good, HSG A
18,194	78	Weighted Average
6,277		34.50% Pervious Area
11,917		65.50% Impervious Area

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

Subcatchment P-5: Flow to CB 5



Summary for Subcatchment P-6: Captured to CB 3&4

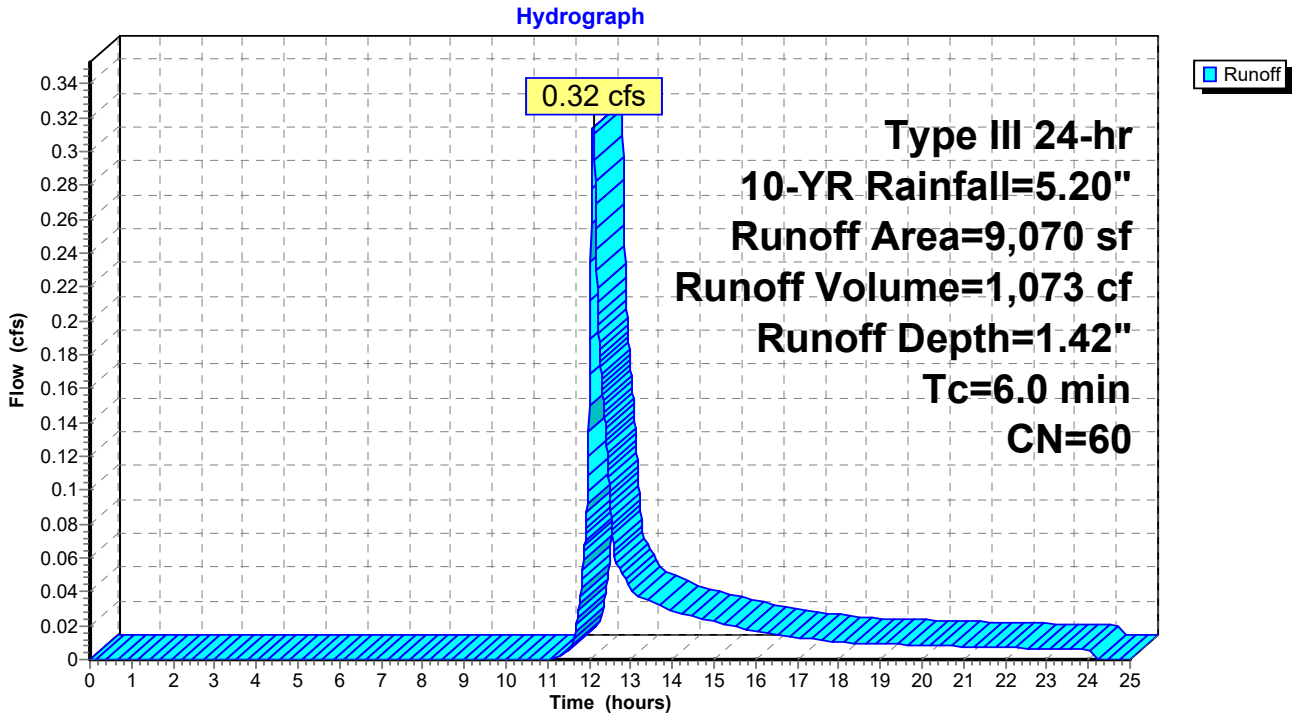
Runoff = 0.32 cfs @ 12.10 hrs, Volume= 1,073 cf, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.20"

Area (sf)	CN	Description
3,210	98	Paved parking, HSG A
5,860	39	>75% Grass cover, Good, HSG A
9,070	60	Weighted Average
5,860		64.61% Pervious Area
3,210		35.39% Impervious Area

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

Subcatchment P-6: Captured to CB 3&4



Summary for Subcatchment P-7: Flow to Basin 2

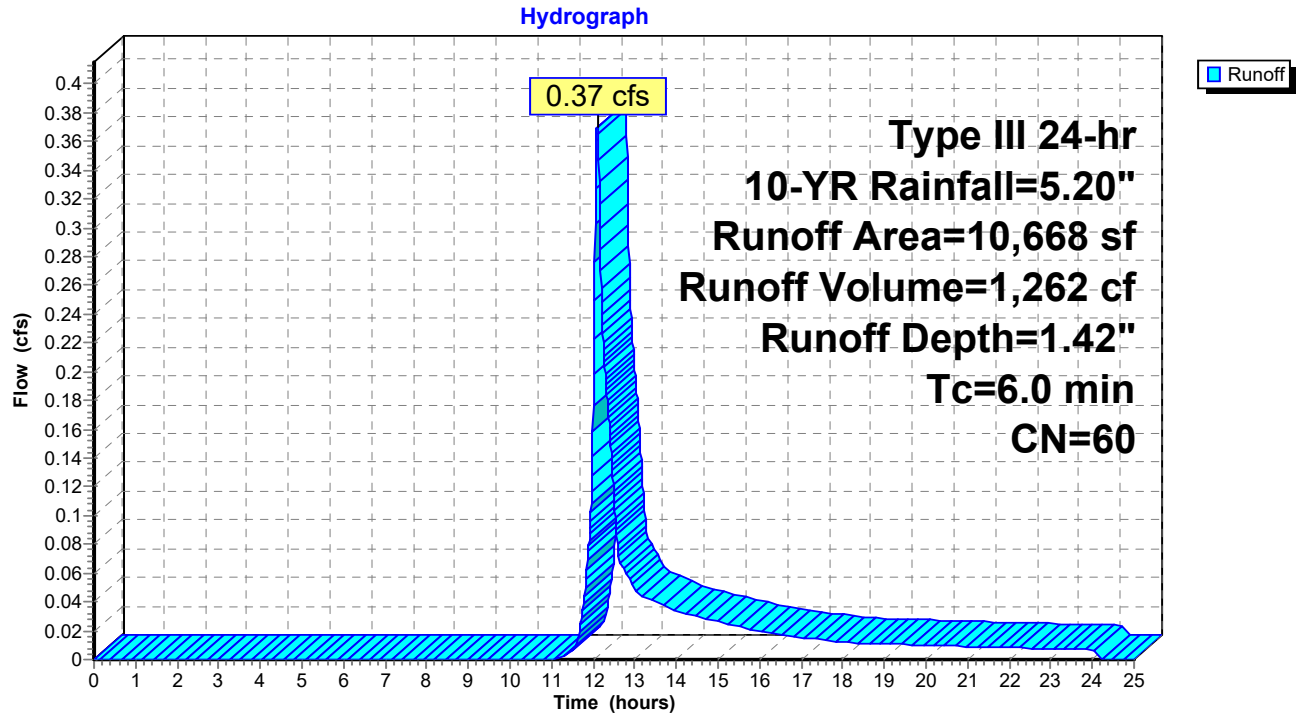
Runoff = 0.37 cfs @ 12.10 hrs, Volume= 1,262 cf, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR Rainfall=5.20"

Area (sf)	CN	Description
3,760	98	Roofs, HSG A
6,908	39	>75% Grass cover, Good, HSG A
10,668	60	Weighted Average
6,908		64.75% Pervious Area
3,760		35.25% Impervious Area

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

Subcatchment P-7: Flow to Basin 2

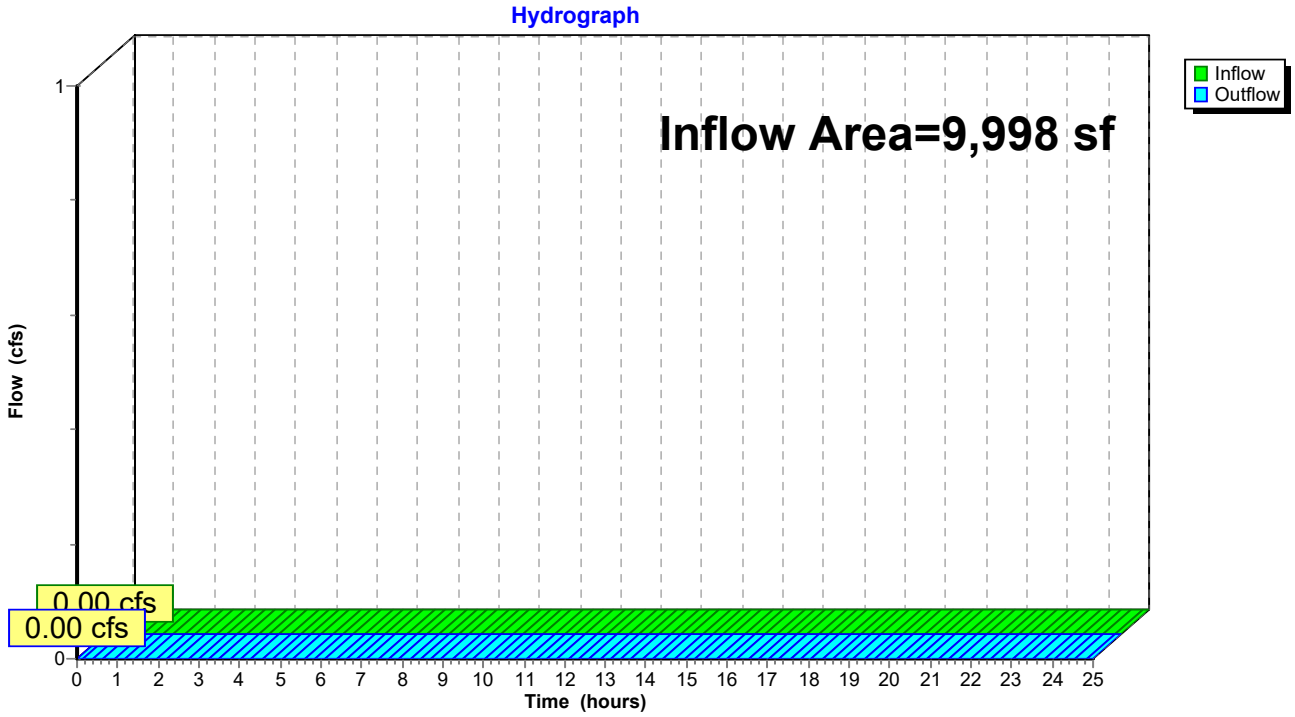


Summary for Reach 1R: Flow to Mill St

Inflow Area = 9,998 sf, 45.42% Impervious, Inflow Depth = 0.00" for 10-YR event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Reach 1R: Flow to Mill St

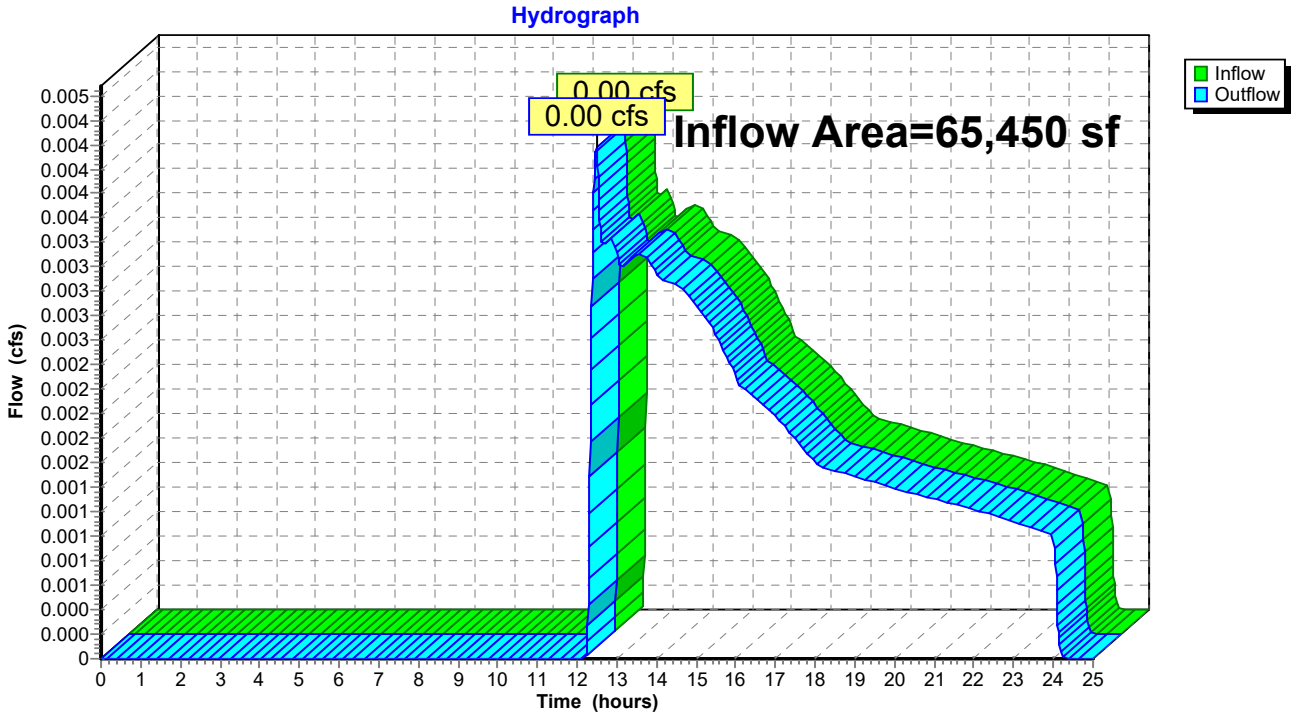


Summary for Reach 3R: Flow To Easterly Abutters

Inflow Area = 65,450 sf, 34.60% Impervious, Inflow Depth = 0.02" for 10-YR event
Inflow = 0.00 cfs @ 12.48 hrs, Volume= 83 cf
Outflow = 0.00 cfs @ 12.48 hrs, Volume= 83 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Reach 3R: Flow To Easterly Abutters



Summary for Pond 1P: UG System 1

Inflow Area = 9,998 sf, 45.42% Impervious, Inflow Depth = 1.87" for 10-YR event
Inflow = 0.48 cfs @ 12.09 hrs, Volume= 1,554 cf
Outflow = 0.06 cfs @ 11.74 hrs, Volume= 1,554 cf, Atten= 88%, Lag= 0.0 min
Discarded = 0.06 cfs @ 11.74 hrs, Volume= 1,554 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 125.48' @ 13.02 hrs Surf.Area= 293 sf Storage= 525 cf

Plug-Flow detention time= 80.2 min calculated for 1,553 cf (100% of inflow)
Center-of-Mass det. time= 80.2 min (936.0 - 855.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	122.00'	292 cf	**7.50'W x 39.00'L x 5.25'H Field A** 1,536 cf Overall - 561 cf Embedded = 975 cf x 30.0% Voids
#2A	123.00'	417 cf	**Shea Leaching Chamber 4x4x4** x 9 Inside #1 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf
#3	123.34'	5 cf	**10.0" Round Pipe Storage**-Impervious L= 9.3' S= 0.0050 '/'
#4	123.39'	11 cf	**10.0" Round Pipe Storage**-Impervious L= 20.1' S= 0.0050 '/'
#5	123.50'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**-Impervious
#6	126.50'	22 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) -Impervious
		785 cf	Total Available Storage

Storage Group A created with Chamber Wizard

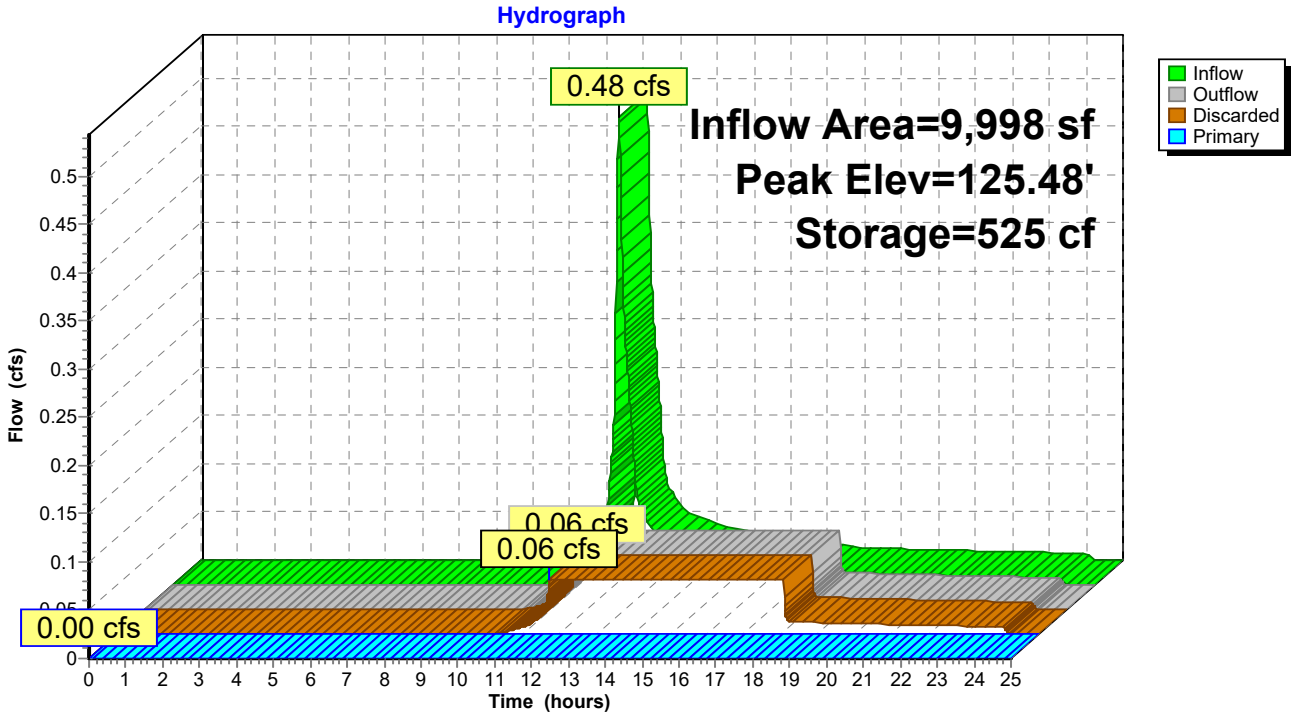
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
126.50	4	0	0
128.00	25	22	22

Device	Routing	Invert	Outlet Devices
#1	Discarded	122.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	126.50'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.06 cfs @ 11.74 hrs HW=122.06' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=122.00' (Free Discharge)
↑**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: UG System 1



Summary for Pond 2P: UG System 2

Inflow Area = 9,070 sf, 35.39% Impervious, Inflow Depth = 1.42" for 10-YR event
Inflow = 0.32 cfs @ 12.10 hrs, Volume= 1,073 cf
Outflow = 0.07 cfs @ 11.92 hrs, Volume= 1,073 cf, Atten= 79%, Lag= 0.0 min
Discarded = 0.07 cfs @ 11.92 hrs, Volume= 1,073 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 130.46' @ 12.58 hrs Surf.Area= 350 sf Storage= 248 cf

Plug-Flow detention time= 23.3 min calculated for 1,072 cf (100% of inflow)
Center-of-Mass det. time= 23.3 min (895.8 - 872.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	128.75'	327 cf	**17.50'W x 20.00'L x 5.25'H Field A** 1,838 cf Overall - 748 cf Embedded = 1,090 cf x 30.0% Voids
#2A	129.75'	557 cf	**Shea Leaching Chamber 4x4x4** x 12 Inside #1 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf 12 Chambers in 3 Rows
		883 cf	Total Available Storage

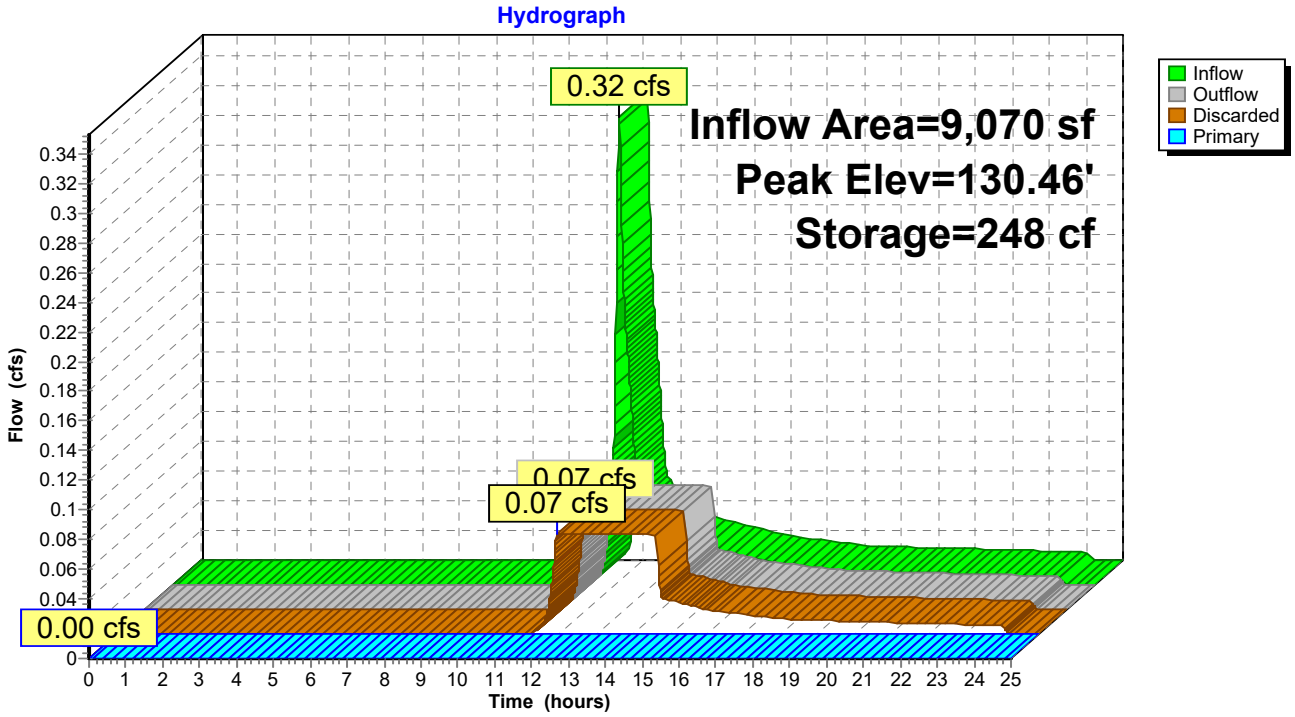
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	128.75'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	131.00'	**12.0" Round Culvert** L= 84.2' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 131.00' / 126.00' S= 0.0594 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.07 cfs @ 11.92 hrs HW=128.81' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=128.75' (Free Discharge)
↑—**2=Culvert** (Controls 0.00 cfs)

Pond 2P: UG System 2



Summary for Pond 3P: UG System 3

Inflow Area = 18,194 sf, 65.50% Impervious, Inflow Depth = 2.88" for 10-YR event
Inflow = 1.41 cfs @ 12.09 hrs, Volume= 4,370 cf
Outflow = 0.21 cfs @ 11.70 hrs, Volume= 4,370 cf, Atten= 85%, Lag= 0.0 min
Discarded = 0.21 cfs @ 11.70 hrs, Volume= 4,370 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 131.44' @ 12.63 hrs Surf.Area= 1,072 sf Storage= 1,342 cf

Plug-Flow detention time= 45.4 min calculated for 4,368 cf (100% of inflow)
Center-of-Mass det. time= 45.4 min (870.7 - 825.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	129.00'	835 cf	**15.76'W x 68.00'L x 4.50'H Field A** 4,823 cf Overall - 2,039 cf Embedded = 2,784 cf x 30.0% Voids
#2A	130.00'	1,464 cf	**Shea Leaching Chamber 4x4x3** x 48 Inside #1 Inside= 41.0"W x 30.0"H => 8.72 sf x 3.50'L = 30.5 cf Outside= 47.0"W x 36.0"H => 10.62 sf x 4.00'L = 42.5 cf 48 Chambers in 3 Rows
		2,299 cf	Total Available Storage

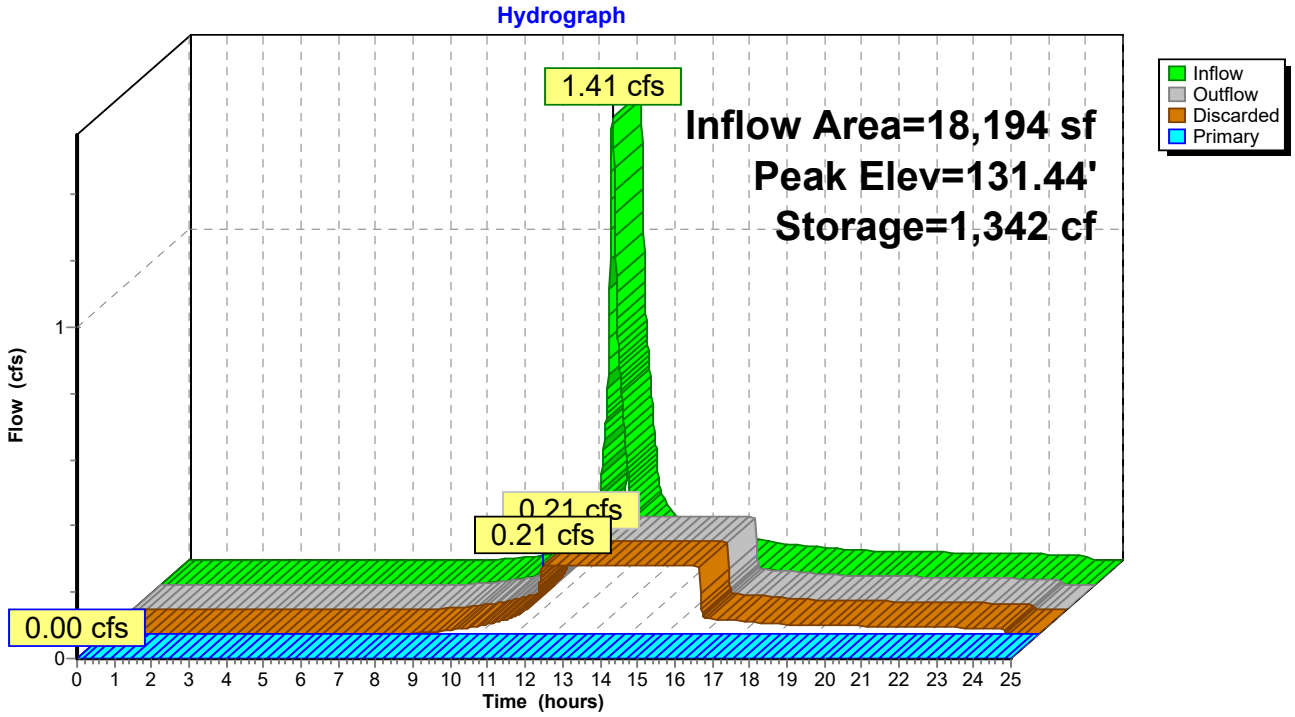
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	129.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	131.50'	**10.0" Round Culvert** L= 56.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 131.50' / 128.00' S= 0.0619 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.21 cfs @ 11.70 hrs HW=129.05' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.21 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=129.00' (Free Discharge)
↑**2=Culvert** (Controls 0.00 cfs)

Pond 3P: UG System 3



Summary for Pond 4P: Basin 1

Inflow Area = 40,849 sf, 38.38% Impervious, Inflow Depth = 0.37" for 10-YR event
Inflow = 0.23 cfs @ 12.13 hrs, Volume= 1,253 cf
Outflow = 0.18 cfs @ 12.28 hrs, Volume= 1,253 cf, Atten= 20%, Lag= 8.9 min
Discarded = 0.18 cfs @ 12.28 hrs, Volume= 1,253 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 126.03' @ 12.28 hrs Surf.Area= 966 sf Storage= 32 cf

Plug-Flow detention time= 1.9 min calculated for 1,253 cf (100% of inflow)
Center-of-Mass det. time= 1.9 min (922.3 - 920.4)

Volume	Invert	Avail.Storage	Storage Description
#1	126.00'	3,407 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

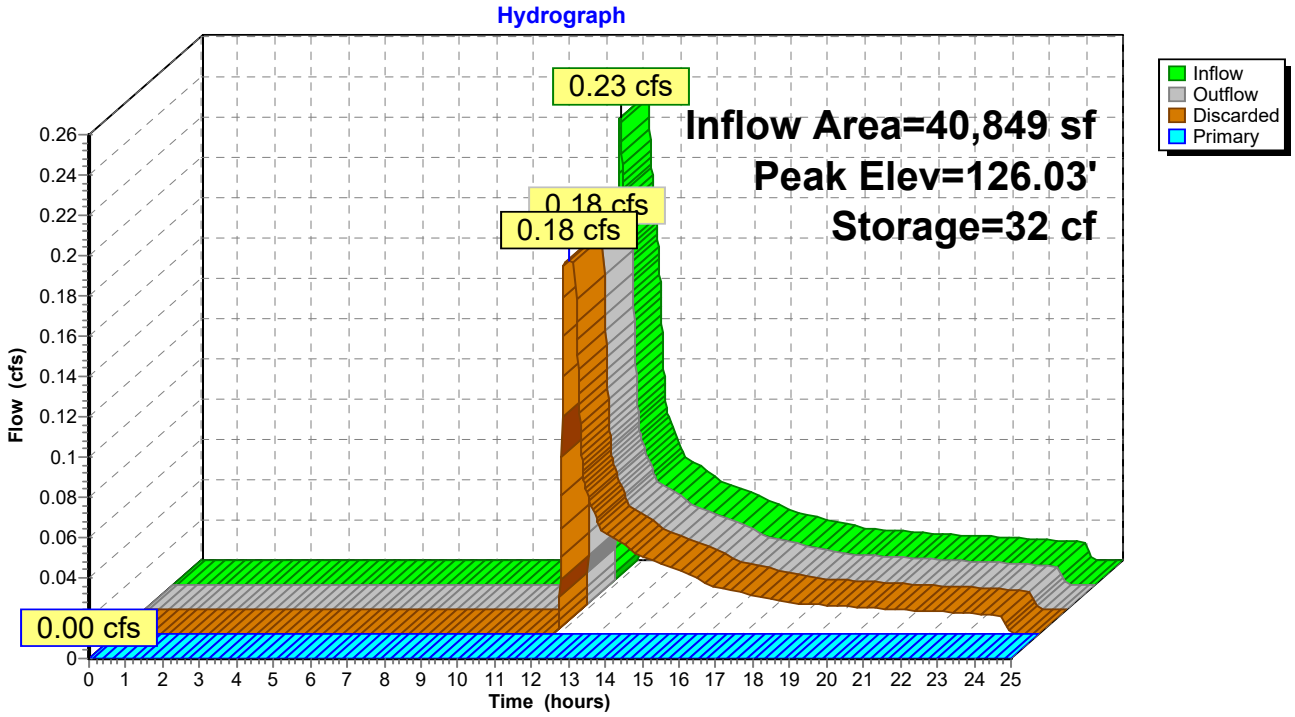
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
126.00	940	0	0
128.00	2,467	3,407	3,407

Device	Routing	Invert	Outlet Devices
#1	Discarded	126.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	127.50'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.18 cfs @ 12.28 hrs HW=126.03' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=126.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 4P: Basin 1



Summary for Pond 5P: Basin 2

Inflow Area = 19,738 sf, 35.31% Impervious, Inflow Depth = 0.77" for 10-YR event
Inflow = 0.37 cfs @ 12.10 hrs, Volume= 1,262 cf
Outflow = 0.13 cfs @ 12.46 hrs, Volume= 1,262 cf, Atten= 65%, Lag= 21.9 min
Discarded = 0.13 cfs @ 12.46 hrs, Volume= 1,262 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 124.35' @ 12.46 hrs Surf.Area= 676 sf Storage= 209 cf

Plug-Flow detention time= 9.5 min calculated for 1,261 cf (100% of inflow)
Center-of-Mass det. time= 9.5 min (882.0 - 872.5)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	1,971 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

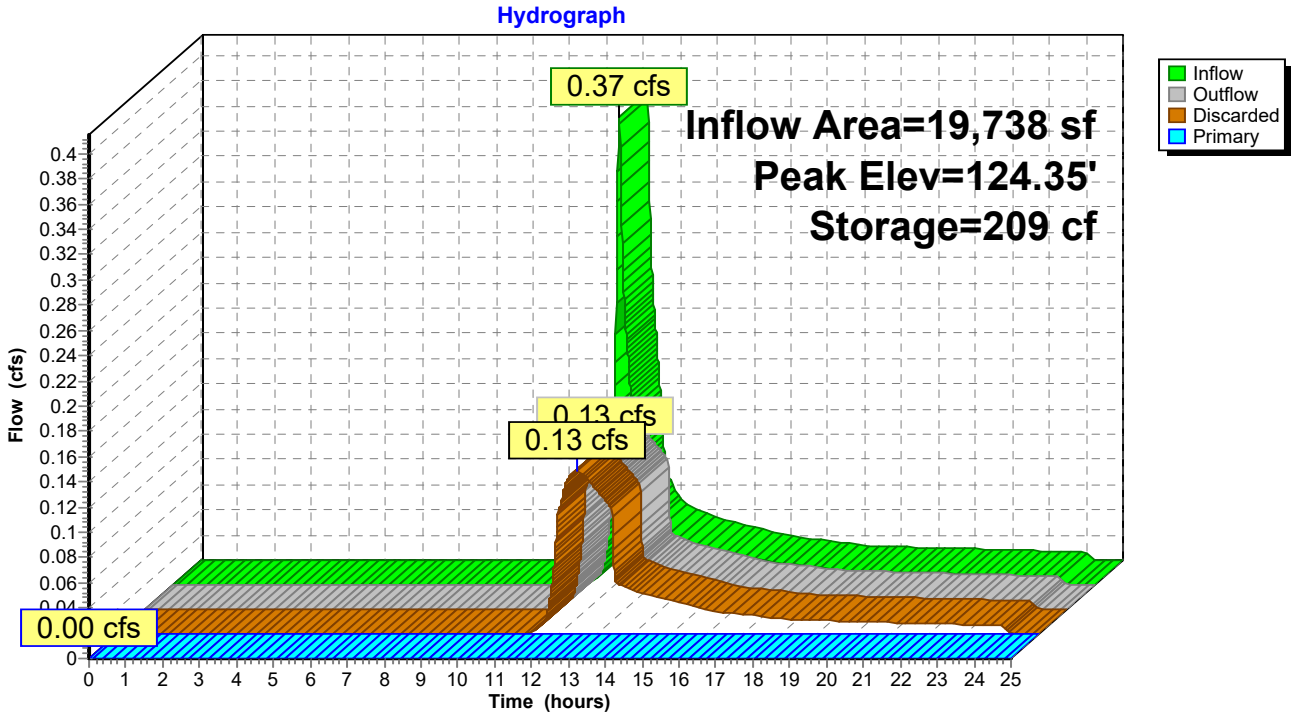
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	506	0	0
126.00	1,465	1,971	1,971

Device	Routing	Invert	Outlet Devices
#1	Discarded	124.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	125.50'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.13 cfs @ 12.46 hrs HW=124.35' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=124.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 5P: Basin 2



Summary for Subcatchment P-1: Captured to Mill St

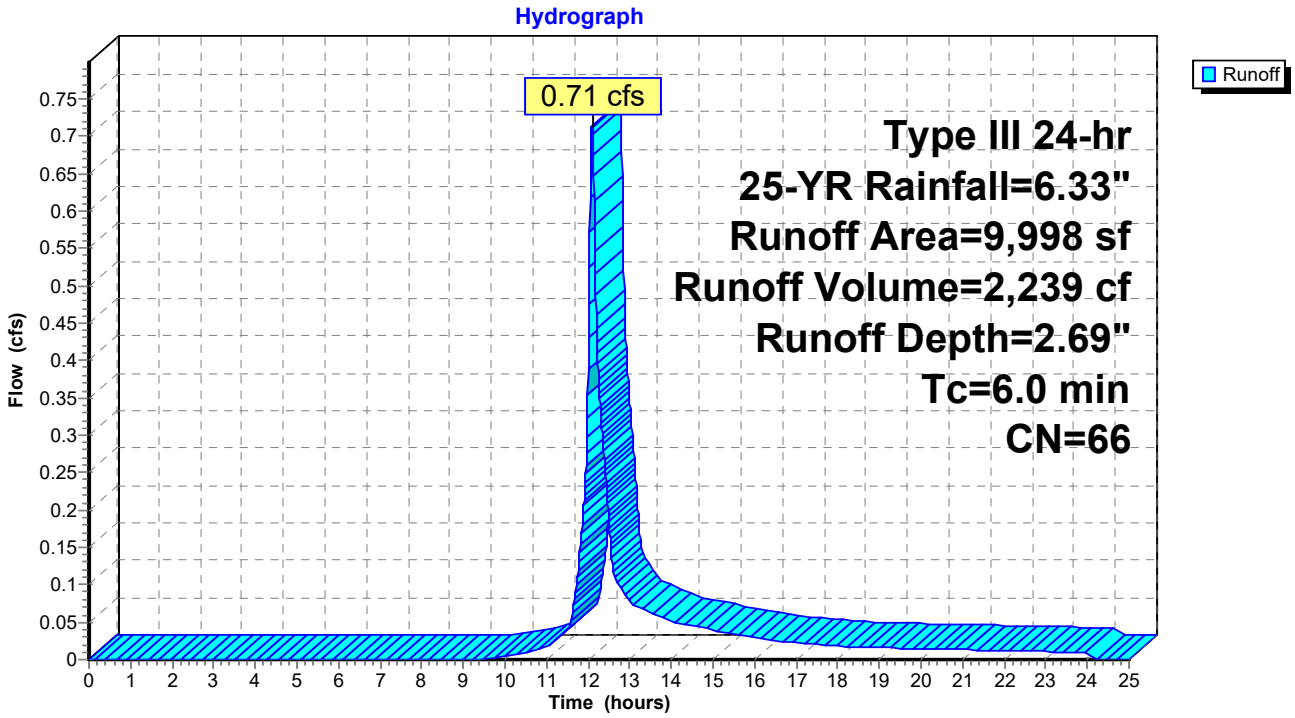
Runoff = 0.71 cfs @ 12.09 hrs, Volume= 2,239 cf, Depth= 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.33"

Area (sf)	CN	Description
4,541	98	Paved parking, HSG A
5,457	39	>75% Grass cover, Good, HSG A
9,998	66	Weighted Average
5,457		54.58% Pervious Area
4,541		45.42% Impervious Area

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

Subcatchment P-1: Captured to Mill St



Summary for Subcatchment P-2: Flow to Northeasterly Abutters

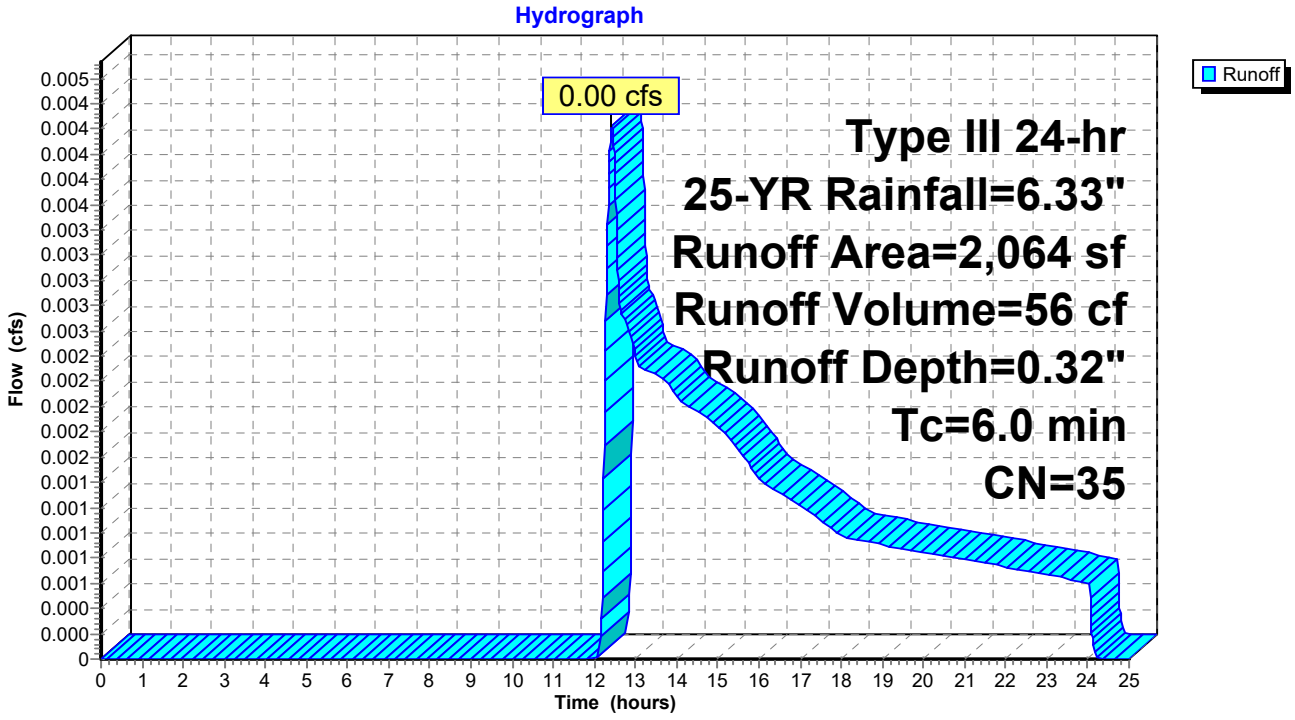
Runoff = 0.00 cfs @ 12.42 hrs, Volume= 56 cf, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.33"

Area (sf)	CN	Description
0	98	Paved parking, HSG A
1,033	39	>75% Grass cover, Good, HSG A
0	98	Roofs, HSG A
1,031	30	Woods, Good, HSG A
2,064	35	Weighted Average
2,064		100.00% Pervious Area

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

Subcatchment P-2: Flow to Northeasterly Abutters



Summary for Subcatchment P-3: Uncaptured to Easterly Abutters

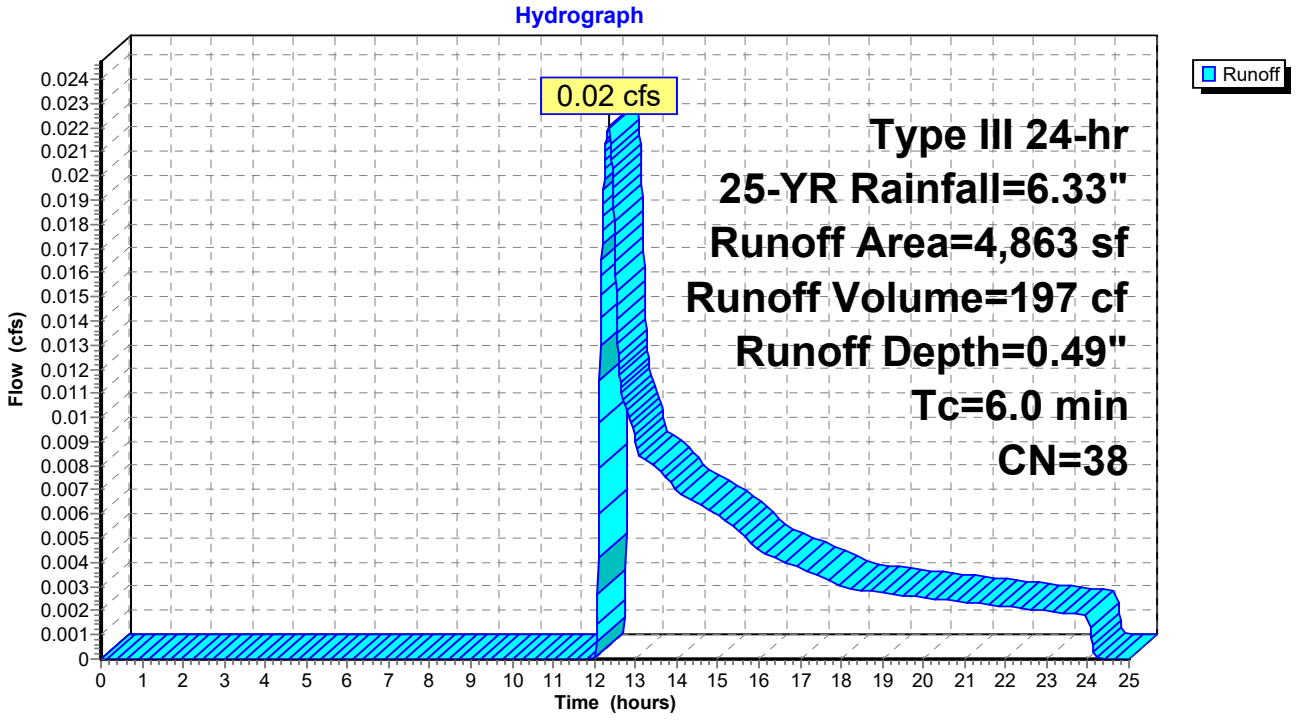
Runoff = 0.02 cfs @ 12.34 hrs, Volume= 197 cf, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.33"

Area (sf)	CN	Description
0	98	Paved parking, HSG A
4,429	39	>75% Grass cover, Good, HSG A
0	98	Roofs, HSG A
434	30	Woods, Good, HSG A
4,863	38	Weighted Average
4,863		100.00% Pervious Area

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

Subcatchment P-3: Uncaptured to Easterly Abutters



Summary for Subcatchment P-4: Flow to Basin 1

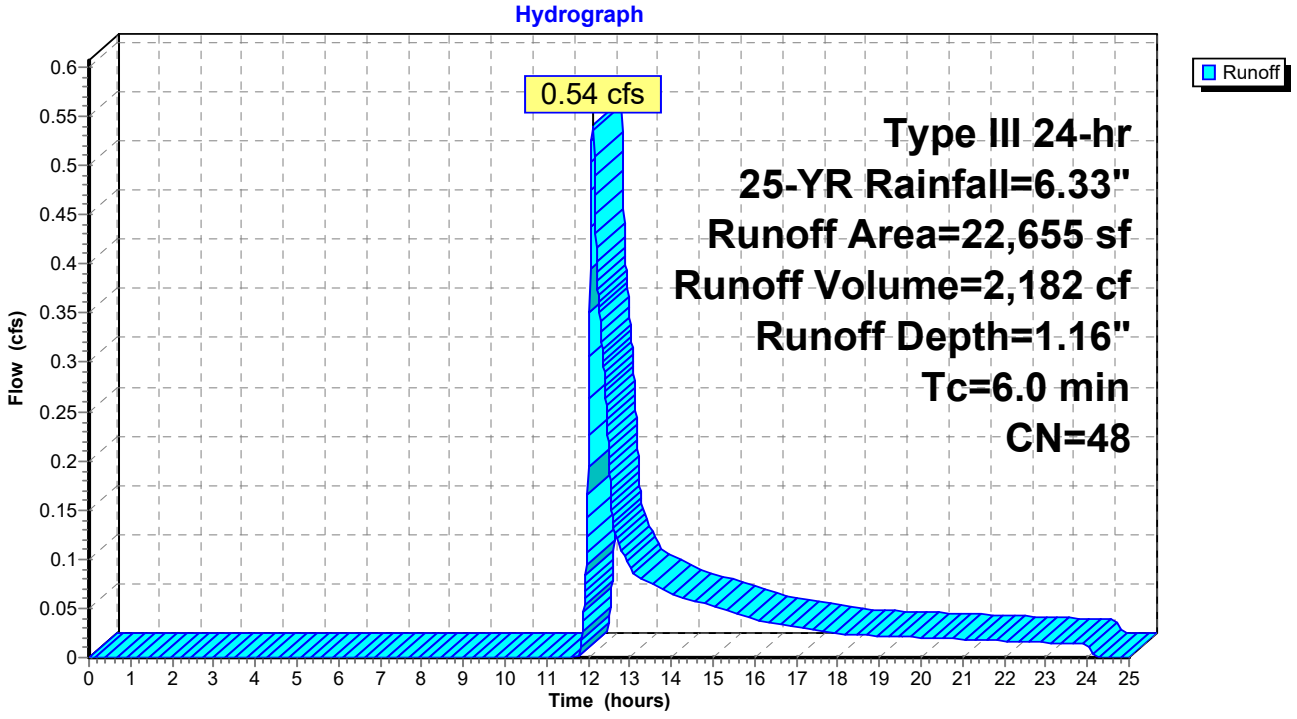
Runoff = 0.54 cfs @ 12.11 hrs, Volume= 2,182 cf, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.33"

Area (sf)	CN	Description
3,760	98	Roofs, HSG A
17,923	39	>75% Grass cover, Good, HSG A
0	98	Paved parking, HSG A
972	30	Woods, Good, HSG A
22,655	48	Weighted Average
18,895		83.40% Pervious Area
3,760		16.60% Impervious Area

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

Subcatchment P-4: Flow to Basin 1



Summary for Subcatchment P-5: Flow to CB 5

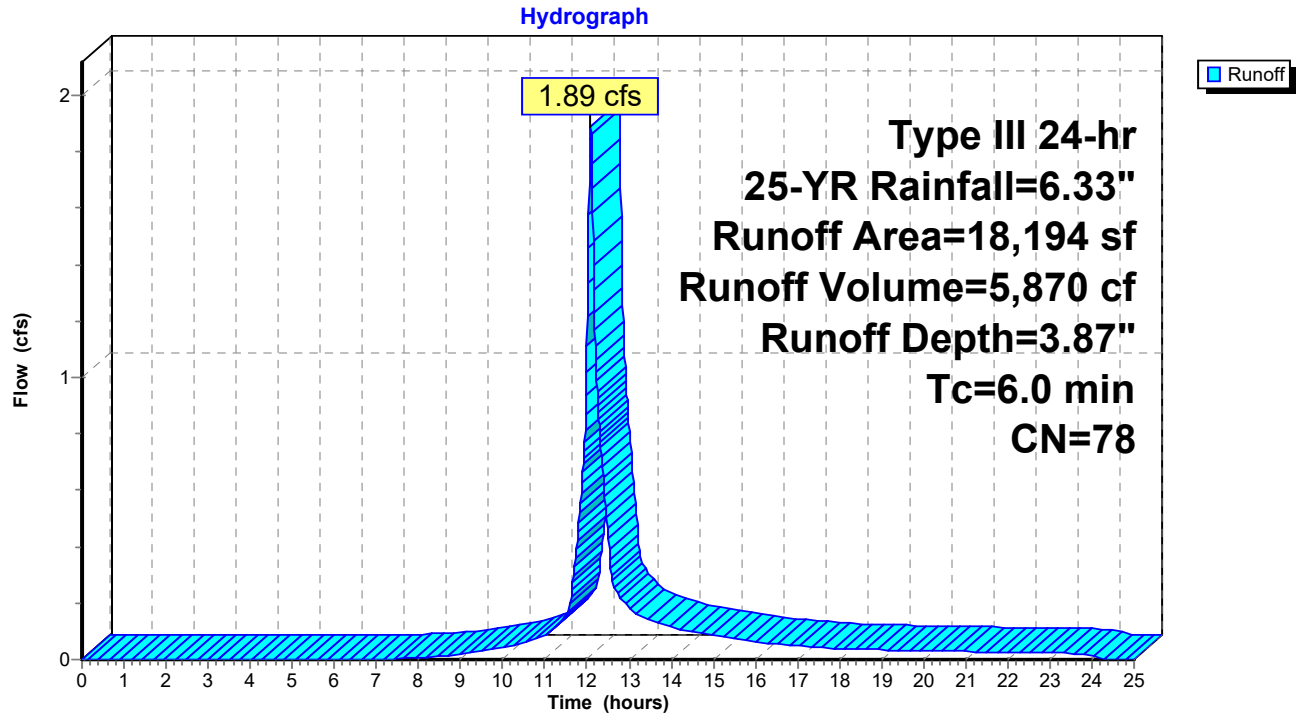
Runoff = 1.89 cfs @ 12.09 hrs, Volume= 5,870 cf, Depth= 3.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.33"

Area (sf)	CN	Description
11,917	98	Paved parking, HSG A
6,277	39	>75% Grass cover, Good, HSG A
18,194	78	Weighted Average
6,277		34.50% Pervious Area
11,917		65.50% Impervious Area

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

Subcatchment P-5: Flow to CB 5



Summary for Subcatchment P-6: Captured to CB 3&4

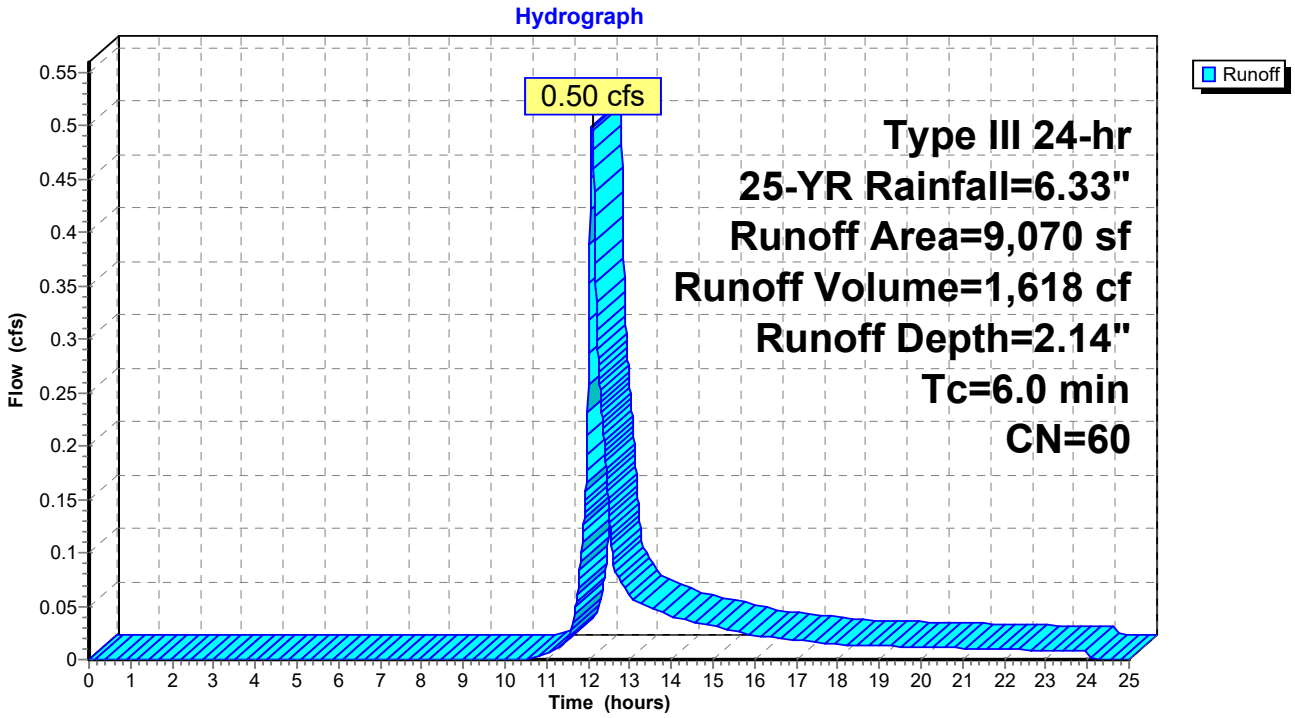
Runoff = 0.50 cfs @ 12.10 hrs, Volume= 1,618 cf, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.33"

Area (sf)	CN	Description
3,210	98	Paved parking, HSG A
5,860	39	>75% Grass cover, Good, HSG A
9,070	60	Weighted Average
5,860		64.61% Pervious Area
3,210		35.39% Impervious Area

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

Subcatchment P-6: Captured to CB 3&4



Summary for Subcatchment P-7: Flow to Basin 2

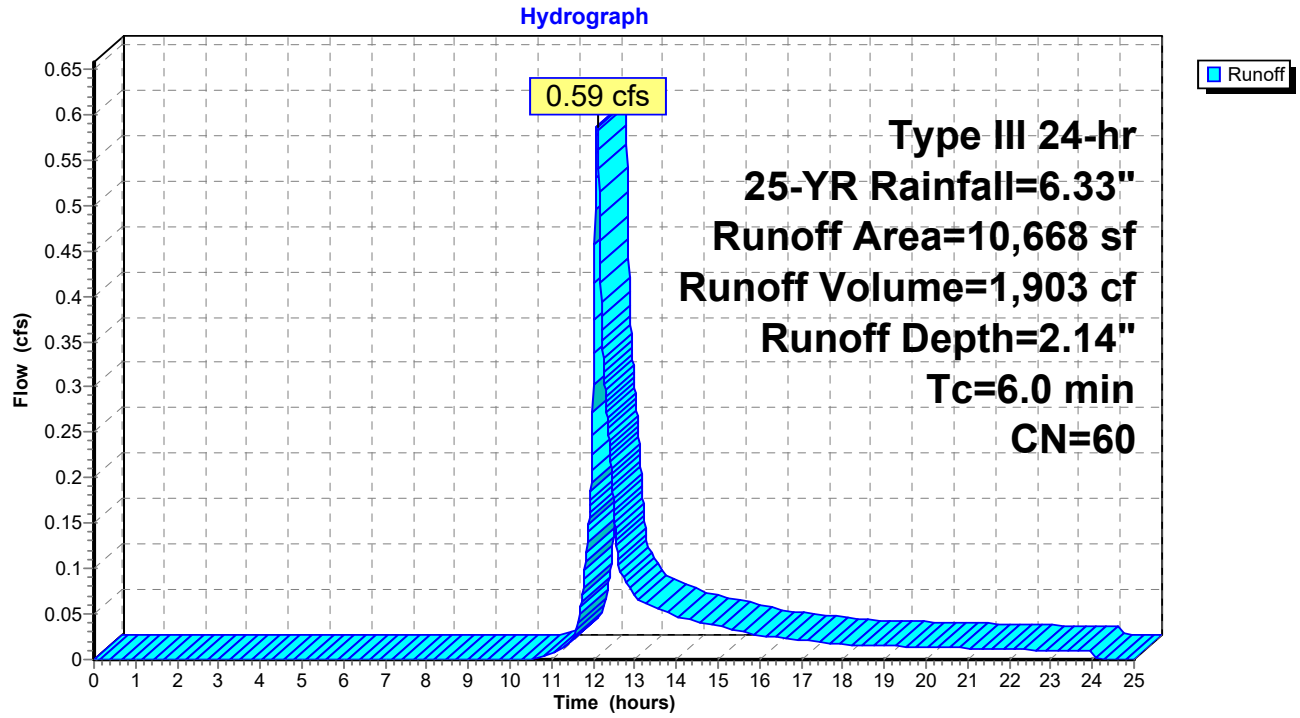
Runoff = 0.59 cfs @ 12.10 hrs, Volume= 1,903 cf, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR Rainfall=6.33"

Area (sf)	CN	Description
3,760	98	Roofs, HSG A
6,908	39	>75% Grass cover, Good, HSG A
10,668	60	Weighted Average
6,908		64.75% Pervious Area
3,760		35.25% Impervious Area

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

Subcatchment P-7: Flow to Basin 2

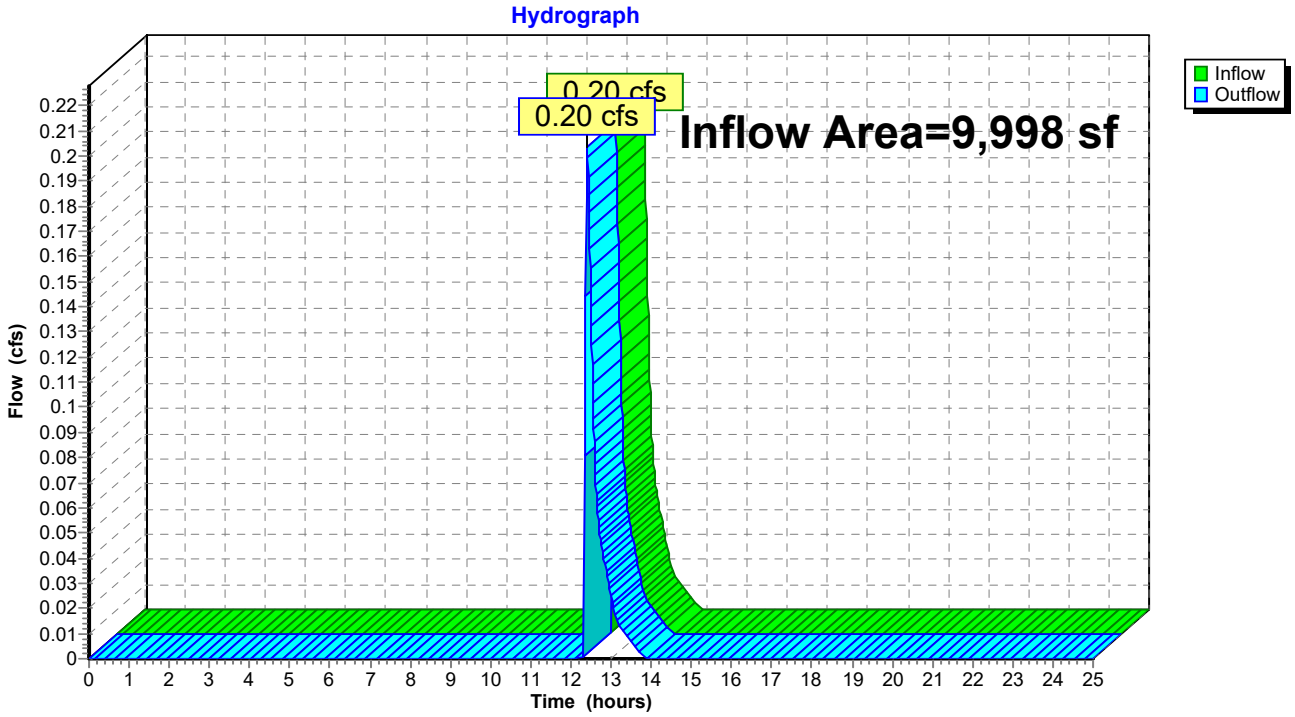


Summary for Reach 1R: Flow to Mill St

Inflow Area = 9,998 sf, 45.42% Impervious, Inflow Depth = 0.26" for 25-YR event
Inflow = 0.20 cfs @ 12.40 hrs, Volume= 218 cf
Outflow = 0.20 cfs @ 12.40 hrs, Volume= 218 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Reach 1R: Flow to Mill St

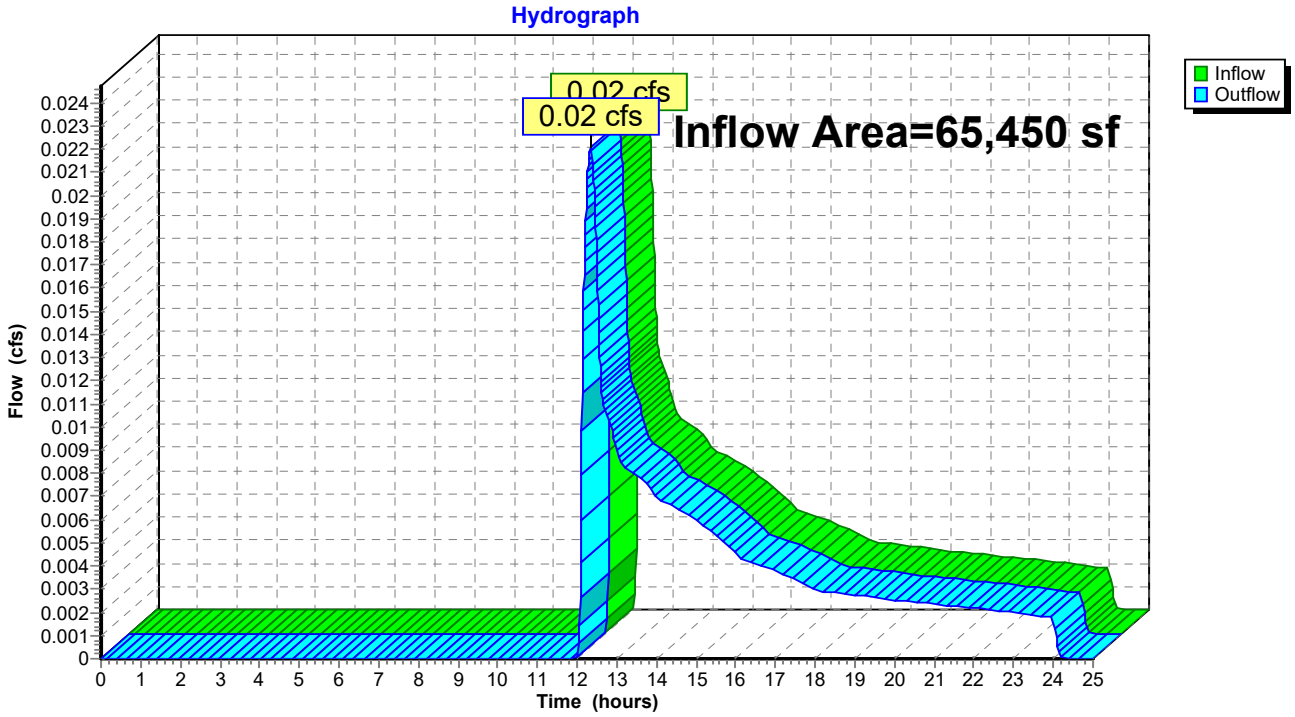


Summary for Reach 3R: Flow To Easterly Abutters

Inflow Area = 65,450 sf, 34.60% Impervious, Inflow Depth = 0.04" for 25-YR event
Inflow = 0.02 cfs @ 12.34 hrs, Volume= 197 cf
Outflow = 0.02 cfs @ 12.34 hrs, Volume= 197 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Reach 3R: Flow To Easterly Abutters



Summary for Pond 1P: UG System 1

Inflow Area = 9,998 sf, 45.42% Impervious, Inflow Depth = 2.69" for 25-YR event
Inflow = 0.71 cfs @ 12.09 hrs, Volume= 2,239 cf
Outflow = 0.26 cfs @ 12.40 hrs, Volume= 2,239 cf, Atten= 64%, Lag= 18.6 min
Discarded = 0.06 cfs @ 11.64 hrs, Volume= 2,021 cf
Primary = 0.20 cfs @ 12.40 hrs, Volume= 218 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 126.60' @ 12.40 hrs Surf.Area= 293 sf Storage= 715 cf

Plug-Flow detention time= 107.3 min calculated for 2,238 cf (100% of inflow)
Center-of-Mass det. time= 107.2 min (952.1 - 844.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	122.00'	292 cf	**7.50'W x 39.00'L x 5.25'H Field A** 1,536 cf Overall - 561 cf Embedded = 975 cf x 30.0% Voids
#2A	123.00'	417 cf	**Shea Leaching Chamber 4x4x4** x 9 Inside #1 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf
#3	123.34'	5 cf	**10.0" Round Pipe Storage**-Impervious L= 9.3' S= 0.0050 '/'
#4	123.39'	11 cf	**10.0" Round Pipe Storage**-Impervious L= 20.1' S= 0.0050 '/'
#5	123.50'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**-Impervious
#6	126.50'	22 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) -Impervious
		785 cf	Total Available Storage

Storage Group A created with Chamber Wizard

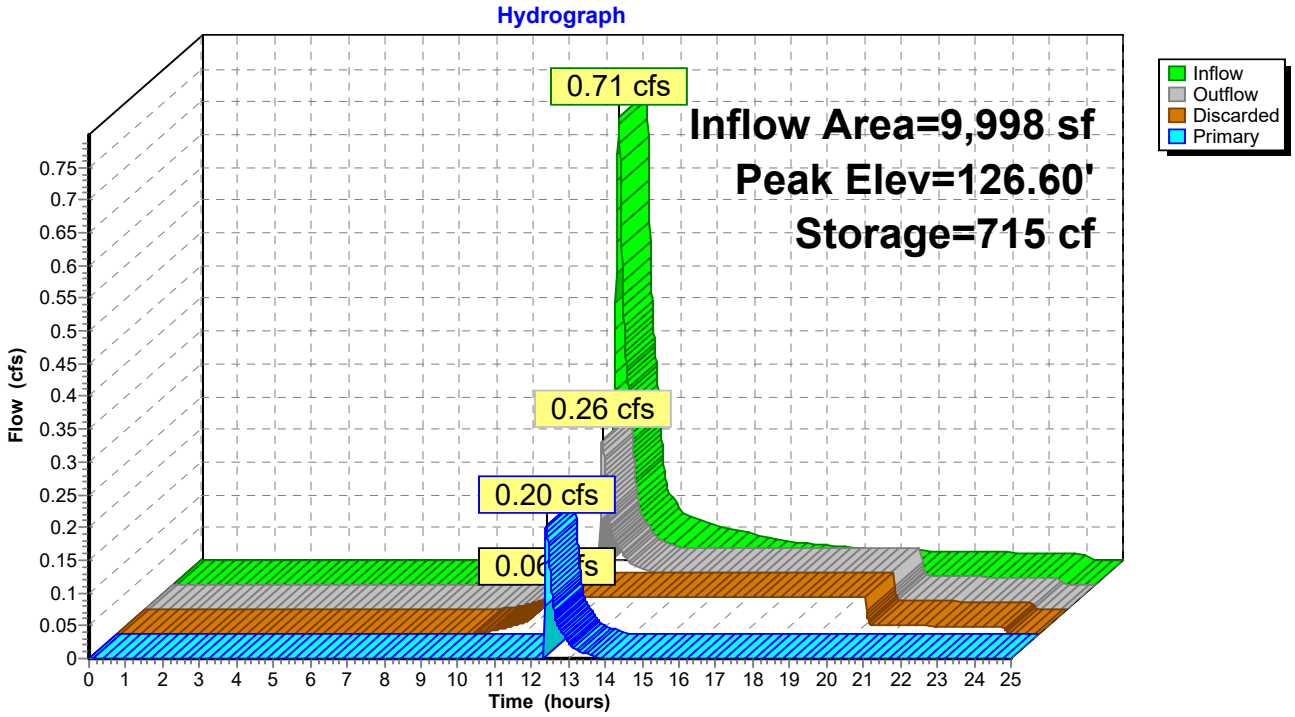
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
126.50	4	0	0
128.00	25	22	22

Device	Routing	Invert	Outlet Devices
#1	Discarded	122.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	126.50'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.06 cfs @ 11.64 hrs HW=122.06' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.20 cfs @ 12.40 hrs HW=126.60' (Free Discharge)
↑**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.20 cfs @ 1.03 fps)

Pond 1P: UG System 1



Summary for Pond 2P: UG System 2

Inflow Area = 9,070 sf, 35.39% Impervious, Inflow Depth = 2.14" for 25-YR event
Inflow = 0.50 cfs @ 12.10 hrs, Volume= 1,618 cf
Outflow = 0.20 cfs @ 12.39 hrs, Volume= 1,618 cf, Atten= 60%, Lag= 17.8 min
Discarded = 0.07 cfs @ 11.78 hrs, Volume= 1,479 cf
Primary = 0.13 cfs @ 12.39 hrs, Volume= 139 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 131.20' @ 12.39 hrs Surf.Area= 350 sf Storage= 398 cf

Plug-Flow detention time= 38.8 min calculated for 1,617 cf (100% of inflow)
Center-of-Mass det. time= 38.8 min (898.3 - 859.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	128.75'	327 cf	**17.50'W x 20.00'L x 5.25'H Field A** 1,838 cf Overall - 748 cf Embedded = 1,090 cf x 30.0% Voids
#2A	129.75'	557 cf	**Shea Leaching Chamber 4x4x4** x 12 Inside #1 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf 12 Chambers in 3 Rows
		883 cf	Total Available Storage

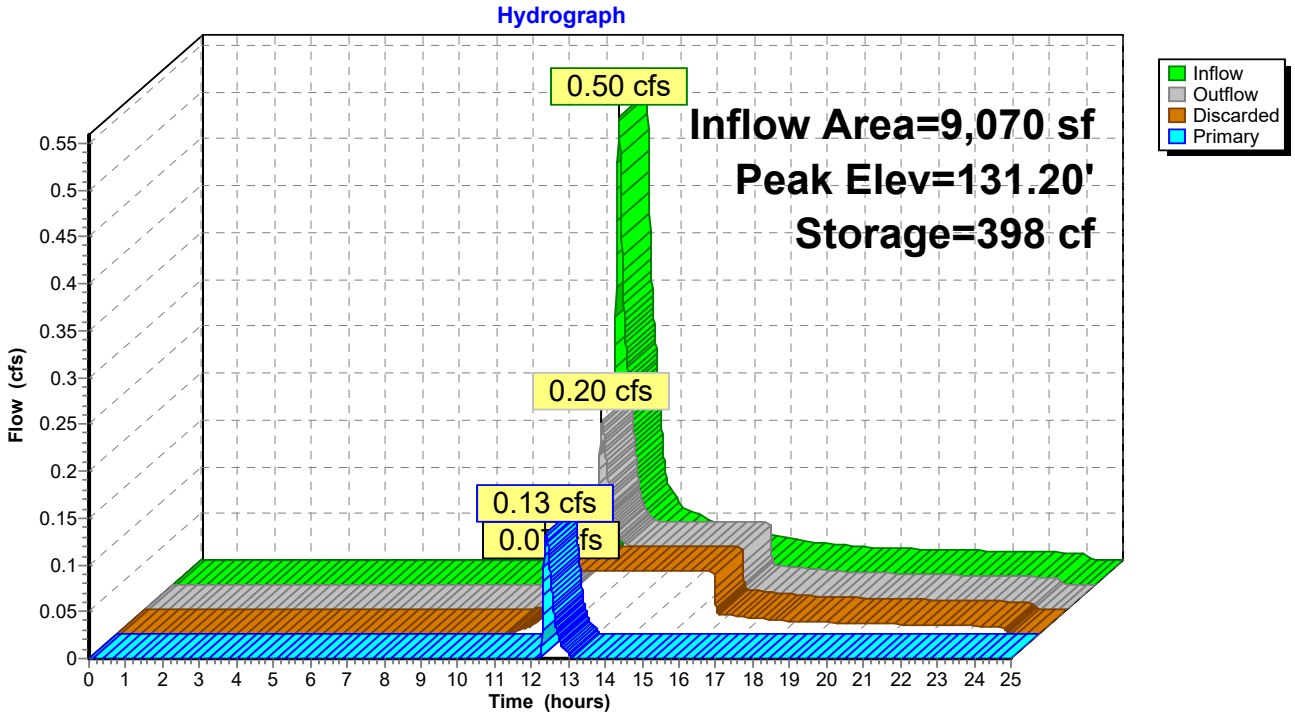
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	128.75'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	131.00'	**12.0" Round Culvert** L= 84.2' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 131.00' / 126.00' S= 0.0594 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.07 cfs @ 11.78 hrs HW=128.80' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.13 cfs @ 12.39 hrs HW=131.20' (Free Discharge)
↑**2=Culvert** (Inlet Controls 0.13 cfs @ 1.19 fps)

Pond 2P: UG System 2



Summary for Pond 3P: UG System 3

Inflow Area = 18,194 sf, 65.50% Impervious, Inflow Depth = 3.87" for 25-YR event
Inflow = 1.89 cfs @ 12.09 hrs, Volume= 5,870 cf
Outflow = 0.64 cfs @ 12.39 hrs, Volume= 5,870 cf, Atten= 66%, Lag= 18.1 min
Discarded = 0.21 cfs @ 11.63 hrs, Volume= 5,247 cf
Primary = 0.44 cfs @ 12.39 hrs, Volume= 623 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 131.90' @ 12.39 hrs Surf.Area= 1,072 sf Storage= 1,660 cf

Plug-Flow detention time= 47.7 min calculated for 5,868 cf (100% of inflow)
Center-of-Mass det. time= 47.7 min (864.6 - 816.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	129.00'	835 cf	**15.76'W x 68.00'L x 4.50'H Field A** 4,823 cf Overall - 2,039 cf Embedded = 2,784 cf x 30.0% Voids
#2A	130.00'	1,464 cf	**Shea Leaching Chamber 4x4x3** x 48 Inside #1 Inside= 41.0"W x 30.0"H => 8.72 sf x 3.50'L = 30.5 cf Outside= 47.0"W x 36.0"H => 10.62 sf x 4.00'L = 42.5 cf 48 Chambers in 3 Rows
		2,299 cf	Total Available Storage

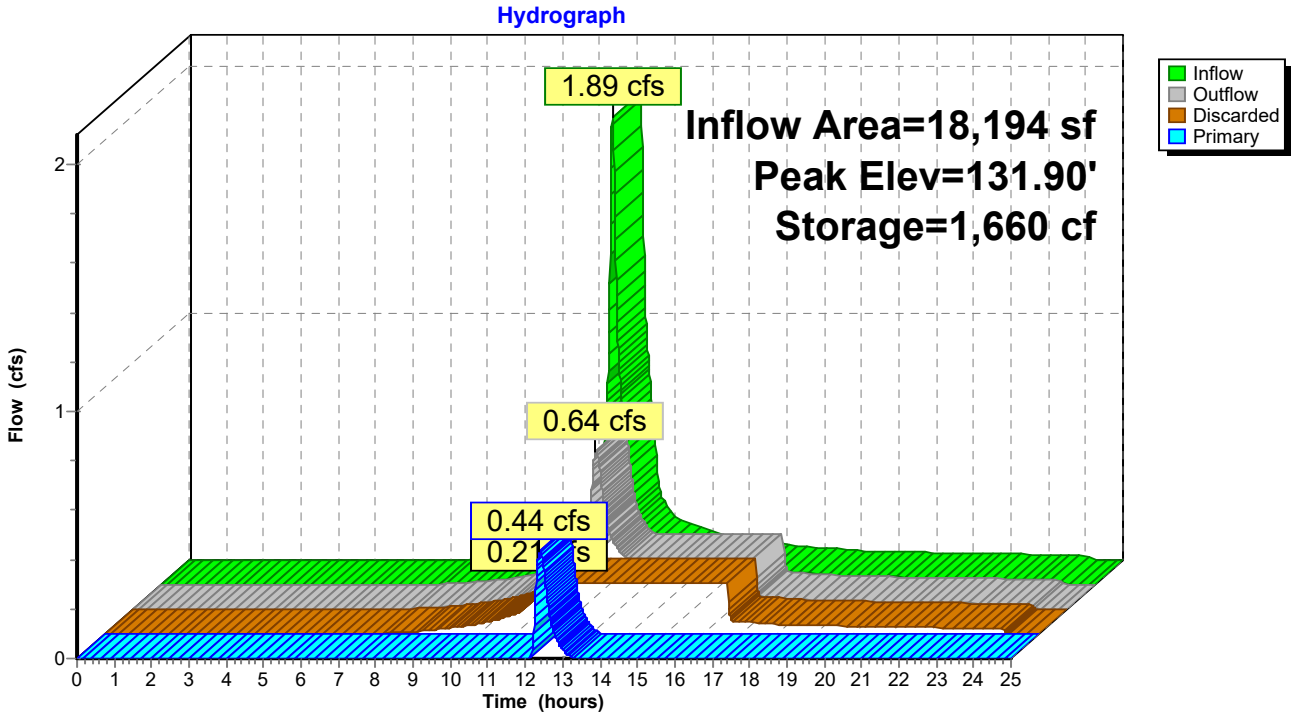
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	129.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	131.50'	**10.0" Round Culvert** L= 56.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 131.50' / 128.00' S= 0.0619 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.21 cfs @ 11.63 hrs HW=129.05' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.21 cfs)

Primary OutFlow Max=0.43 cfs @ 12.39 hrs HW=131.90' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 0.43 cfs @ 1.69 fps)

Pond 3P: UG System 3



Summary for Pond 4P: Basin 1

Inflow Area = 40,849 sf, 38.38% Impervious, Inflow Depth = 0.82" for 25-YR event
Inflow = 0.73 cfs @ 12.36 hrs, Volume= 2,805 cf
Outflow = 0.27 cfs @ 12.69 hrs, Volume= 2,805 cf, Atten= 63%, Lag= 19.5 min
Discarded = 0.27 cfs @ 12.69 hrs, Volume= 2,805 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 126.60' @ 12.69 hrs Surf.Area= 1,399 sf Storage= 704 cf

Plug-Flow detention time= 18.4 min calculated for 2,804 cf (100% of inflow)
Center-of-Mass det. time= 18.4 min (882.9 - 864.5)

Volume	Invert	Avail.Storage	Storage Description
#1	126.00'	3,407 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

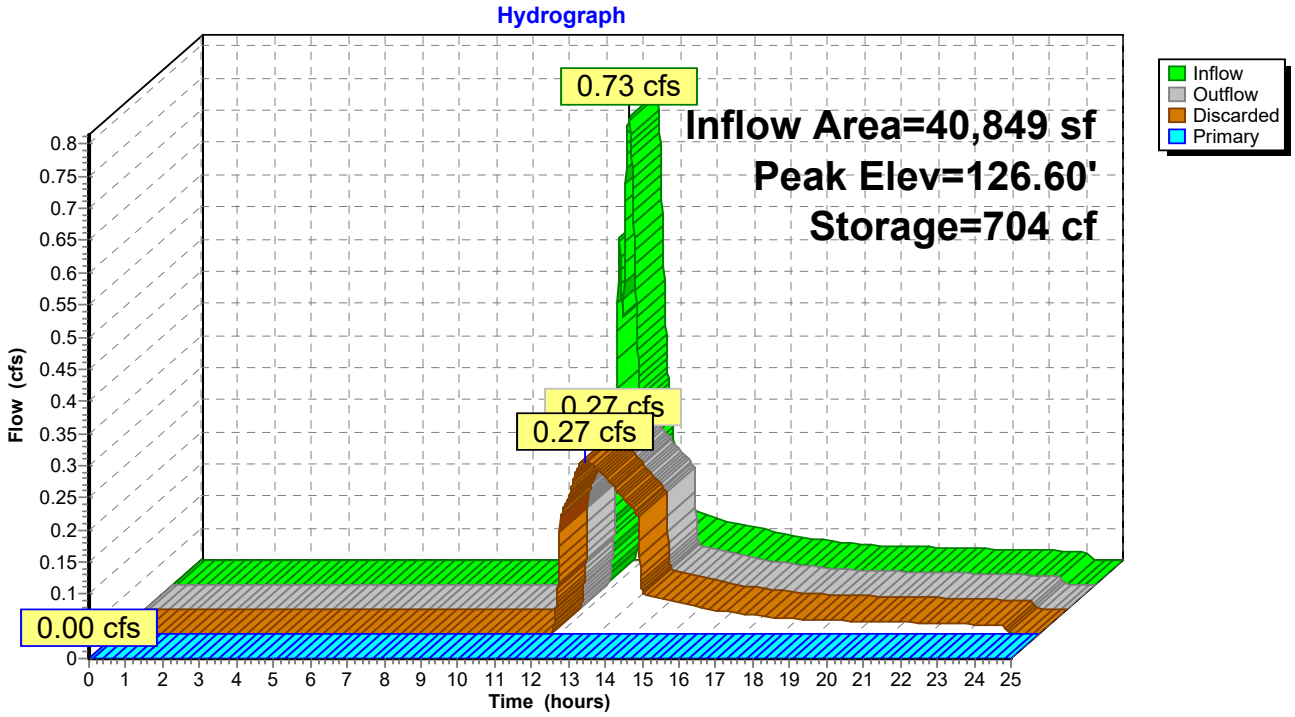
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
126.00	940	0	0
128.00	2,467	3,407	3,407

Device	Routing	Invert	Outlet Devices
#1	Discarded	126.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	127.50'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.27 cfs @ 12.69 hrs HW=126.60' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=126.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 4P: Basin 1



Summary for Pond 5P: Basin 2

Inflow Area = 19,738 sf, 35.31% Impervious, Inflow Depth = 1.24" for 25-YR event
Inflow = 0.59 cfs @ 12.10 hrs, Volume= 2,042 cf
Outflow = 0.17 cfs @ 12.59 hrs, Volume= 2,042 cf, Atten= 72%, Lag= 29.6 min
Discarded = 0.17 cfs @ 12.59 hrs, Volume= 2,042 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 124.76' @ 12.59 hrs Surf.Area= 873 sf Storage= 527 cf

Plug-Flow detention time= 22.7 min calculated for 2,042 cf (100% of inflow)
Center-of-Mass det. time= 22.7 min (874.7 - 852.0)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	1,971 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

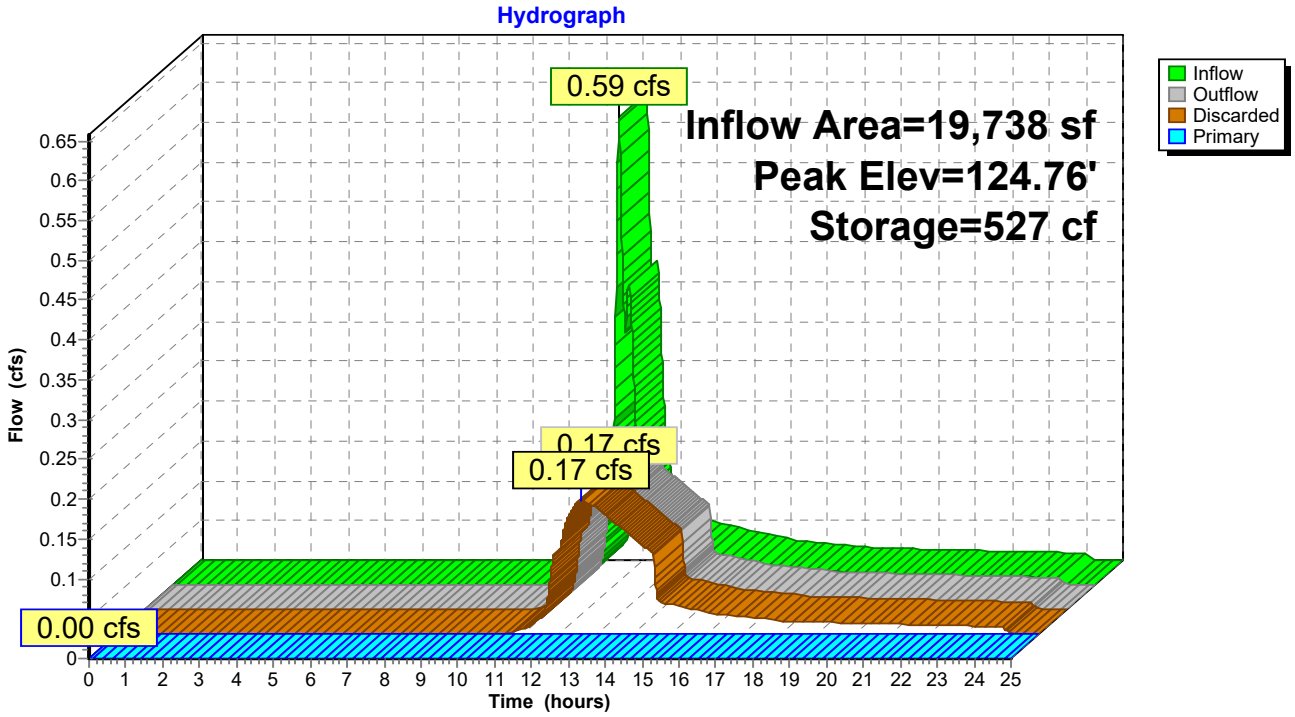
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	506	0	0
126.00	1,465	1,971	1,971

Device	Routing	Invert	Outlet Devices
#1	Discarded	124.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	125.50'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.17 cfs @ 12.59 hrs HW=124.76' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=124.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 5P: Basin 2



Summary for Subcatchment P-1: Captured to Mill St

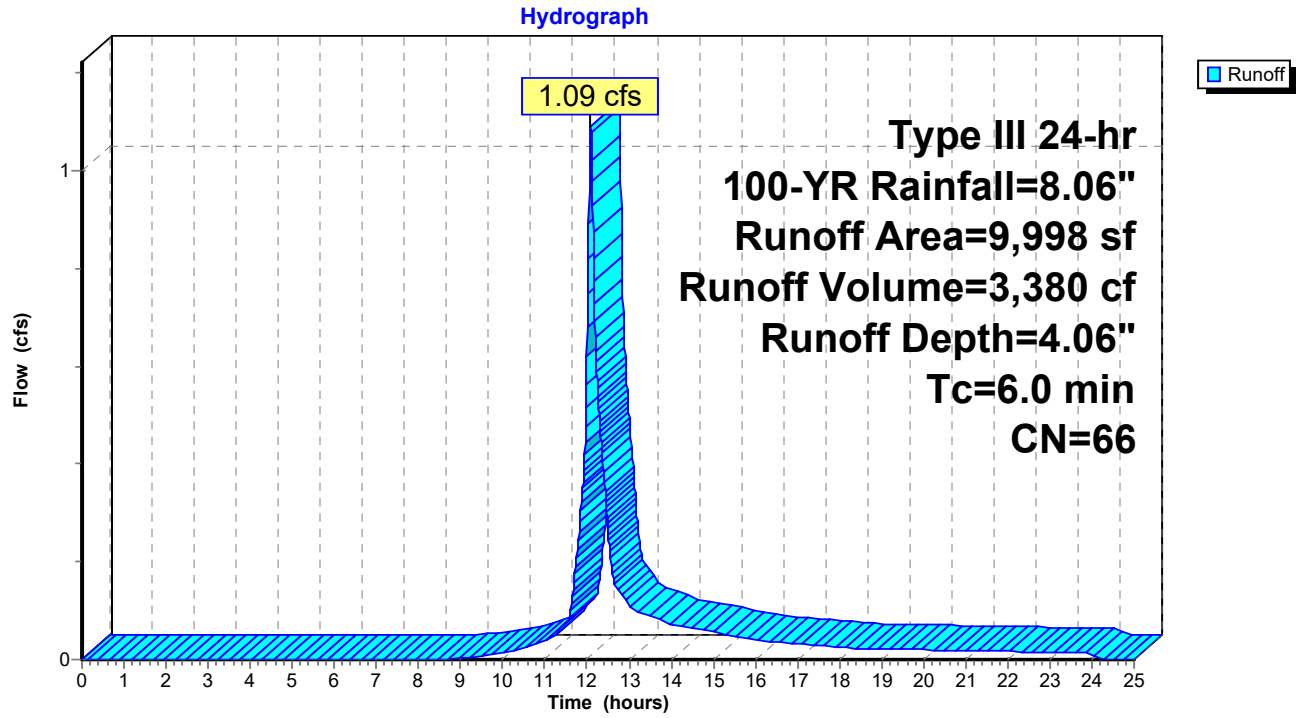
Runoff = 1.09 cfs @ 12.09 hrs, Volume= 3,380 cf, Depth= 4.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=8.06"

Area (sf)	CN	Description
4,541	98	Paved parking, HSG A
5,457	39	>75% Grass cover, Good, HSG A
9,998	66	Weighted Average
5,457		54.58% Pervious Area
4,541		45.42% Impervious Area

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

Subcatchment P-1: Captured to Mill St



Summary for Subcatchment P-2: Flow to Northeasterly Abutters

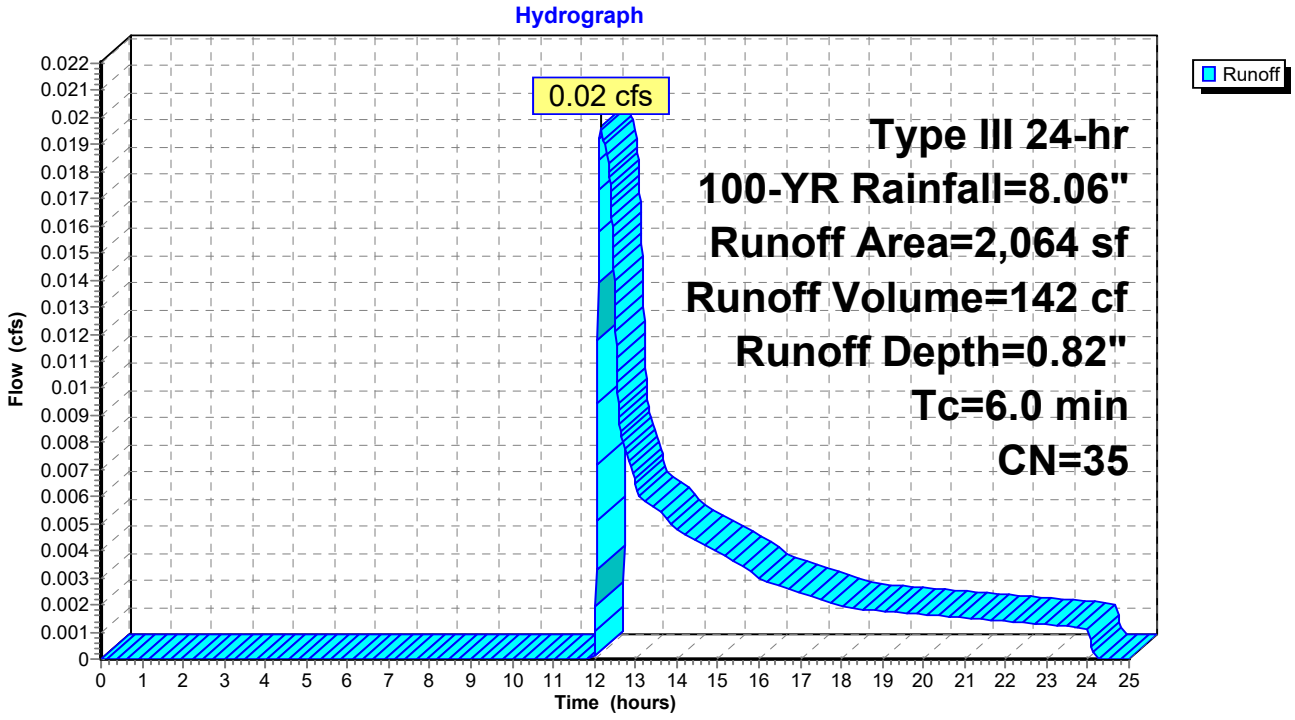
Runoff = 0.02 cfs @ 12.15 hrs, Volume= 142 cf, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=8.06"

Area (sf)	CN	Description
0	98	Paved parking, HSG A
1,033	39	>75% Grass cover, Good, HSG A
0	98	Roofs, HSG A
1,031	30	Woods, Good, HSG A
2,064	35	Weighted Average
2,064		100.00% Pervious Area

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

Subcatchment P-2: Flow to Northeasterly Abutters



Summary for Subcatchment P-3: Uncaptured to Easterly Abutters

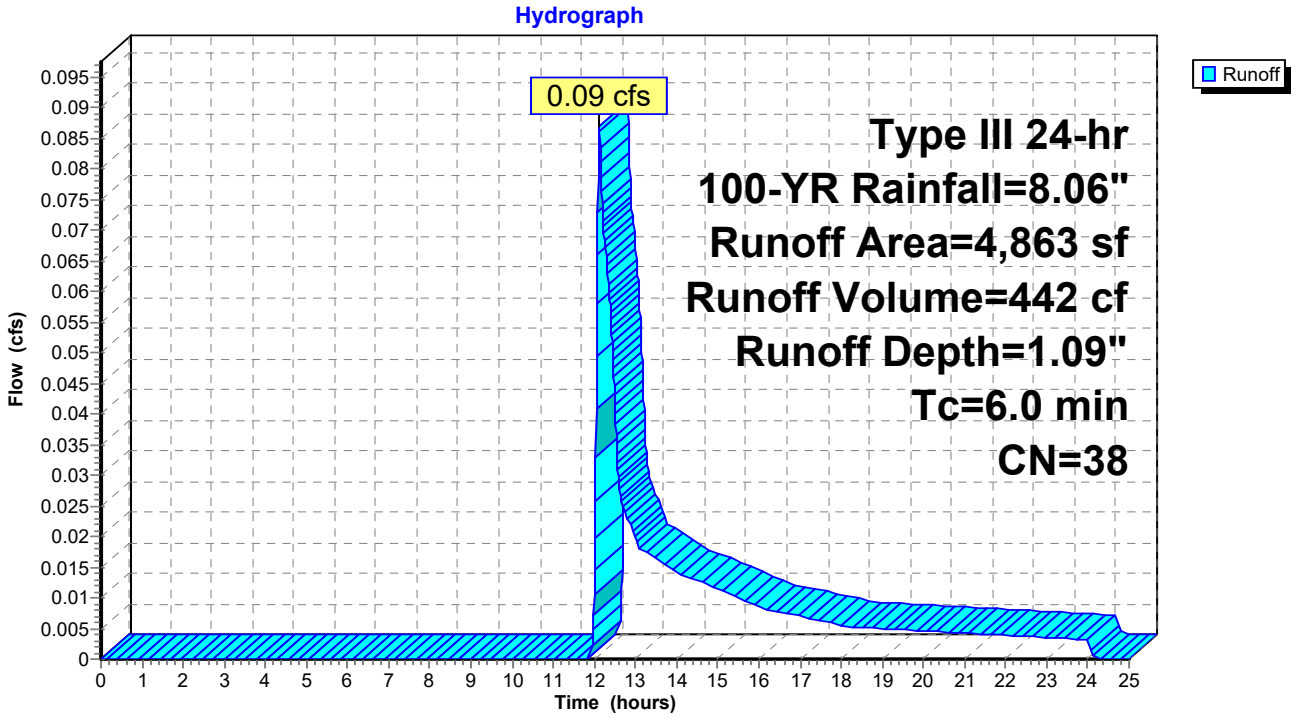
Runoff = 0.09 cfs @ 12.12 hrs, Volume= 442 cf, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=8.06"

Area (sf)	CN	Description
0	98	Paved parking, HSG A
4,429	39	>75% Grass cover, Good, HSG A
0	98	Roofs, HSG A
434	30	Woods, Good, HSG A
4,863	38	Weighted Average
4,863		100.00% Pervious Area

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

Subcatchment P-3: Uncaptured to Easterly Abutters



Summary for Subcatchment P-4: Flow to Basin 1

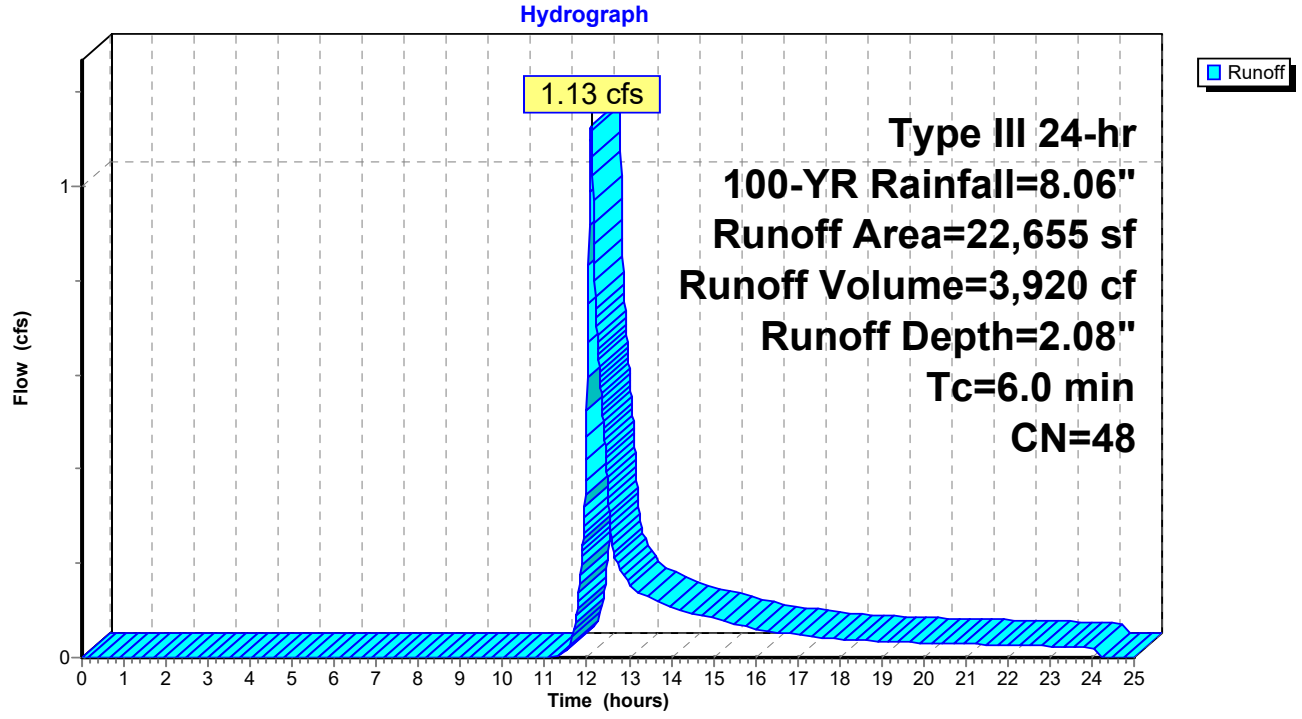
Runoff = 1.13 cfs @ 12.10 hrs, Volume= 3,920 cf, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=8.06"

Area (sf)	CN	Description
3,760	98	Roofs, HSG A
17,923	39	>75% Grass cover, Good, HSG A
0	98	Paved parking, HSG A
972	30	Woods, Good, HSG A
22,655	48	Weighted Average
18,895		83.40% Pervious Area
3,760		16.60% Impervious Area

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

Subcatchment P-4: Flow to Basin 1



Summary for Subcatchment P-5: Flow to CB 5

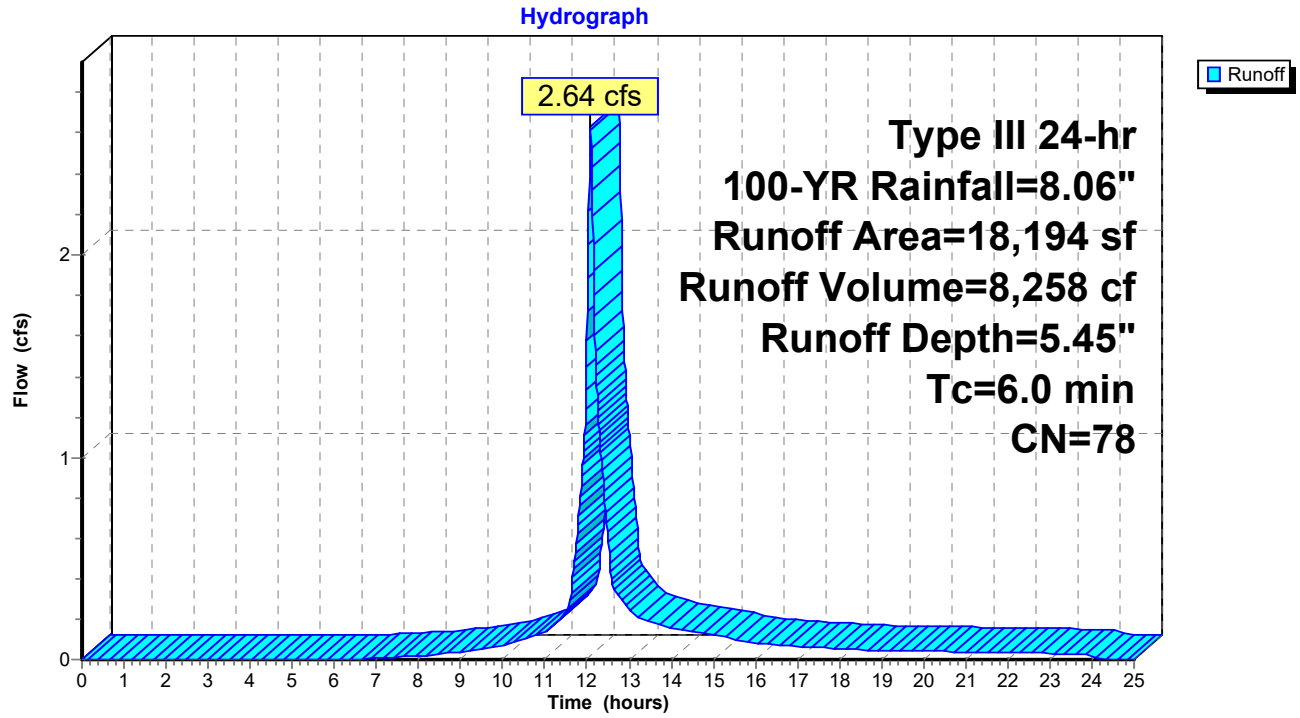
Runoff = 2.64 cfs @ 12.09 hrs, Volume= 8,258 cf, Depth= 5.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=8.06"

Area (sf)	CN	Description
11,917	98	Paved parking, HSG A
6,277	39	>75% Grass cover, Good, HSG A
18,194	78	Weighted Average
6,277		34.50% Pervious Area
11,917		65.50% Impervious Area

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

Subcatchment P-5: Flow to CB 5



Summary for Subcatchment P-6: Captured to CB 3&4

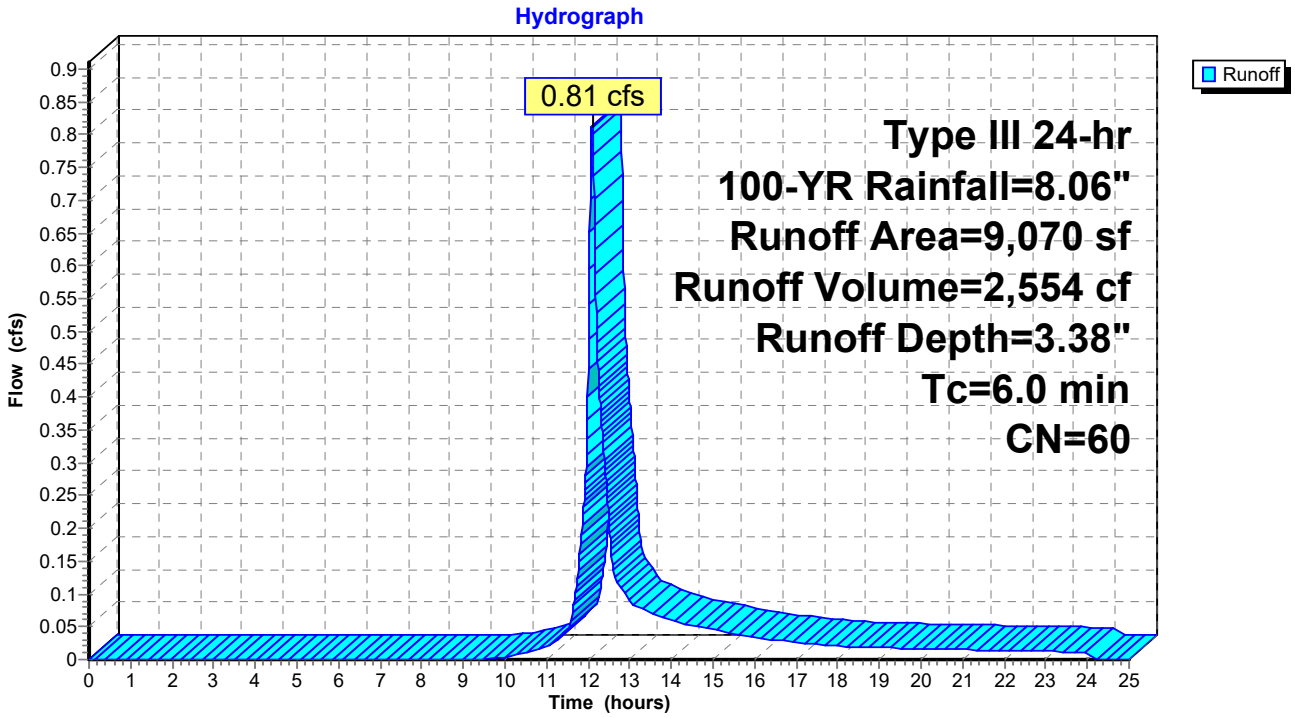
Runoff = 0.81 cfs @ 12.09 hrs, Volume= 2,554 cf, Depth= 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=8.06"

Area (sf)	CN	Description
3,210	98	Paved parking, HSG A
5,860	39	>75% Grass cover, Good, HSG A
9,070	60	Weighted Average
5,860		64.61% Pervious Area
3,210		35.39% Impervious Area

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

Subcatchment P-6: Captured to CB 3&4



Summary for Subcatchment P-7: Flow to Basin 2

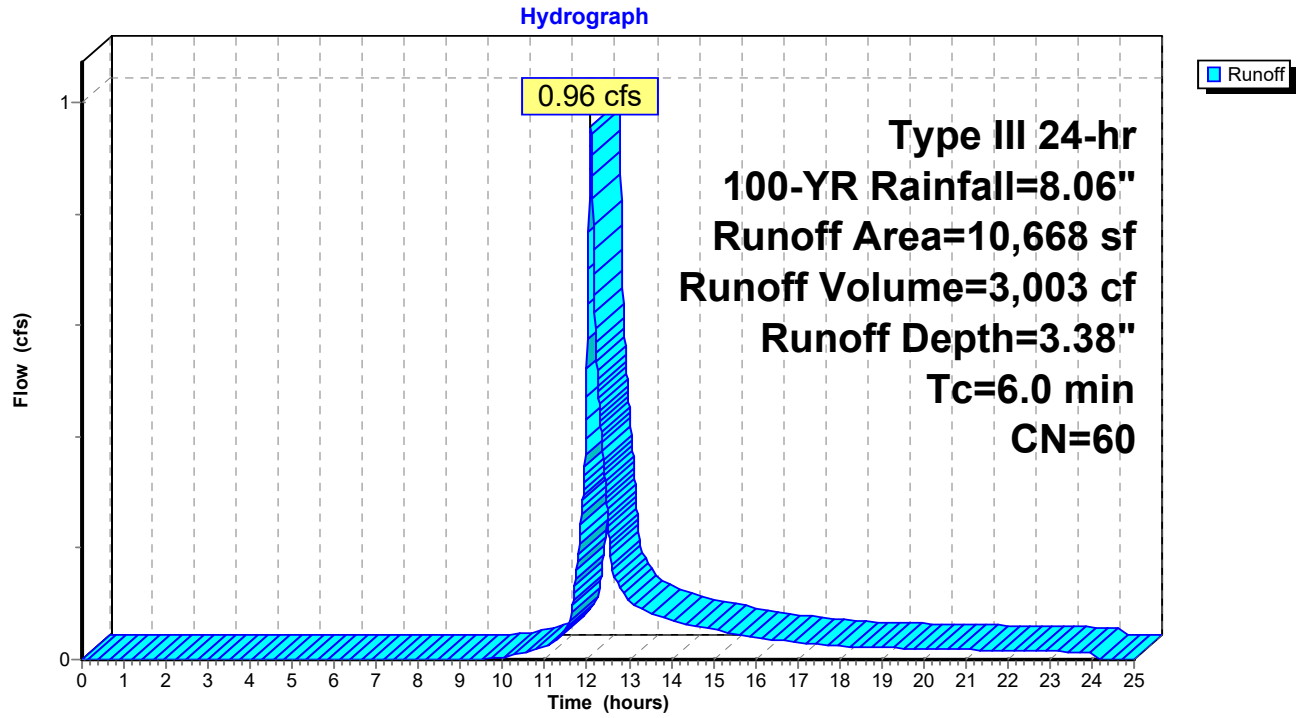
Runoff = 0.96 cfs @ 12.09 hrs, Volume= 3,003 cf, Depth= 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR Rainfall=8.06"

Area (sf)	CN	Description
3,760	98	Roofs, HSG A
6,908	39	>75% Grass cover, Good, HSG A
10,668	60	Weighted Average
6,908		64.75% Pervious Area
3,760		35.25% Impervious Area

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

Subcatchment P-7: Flow to Basin 2

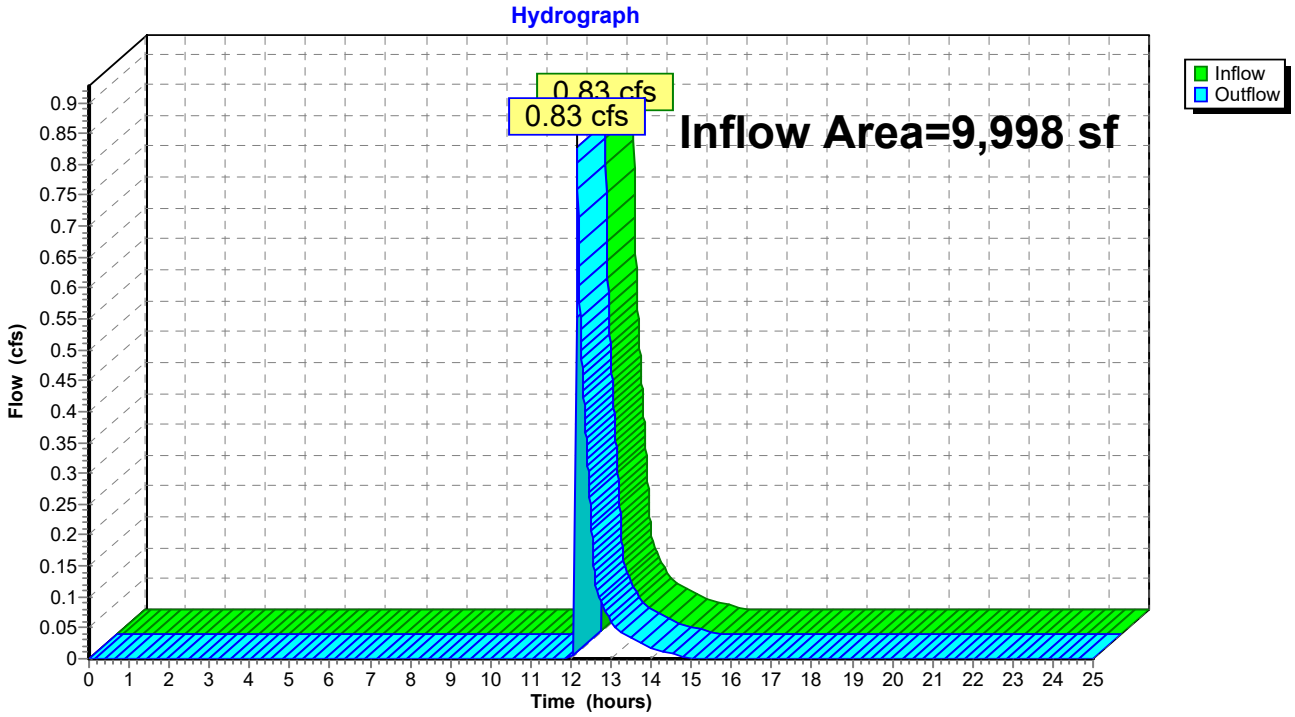


Summary for Reach 1R: Flow to Mill St

Inflow Area = 9,998 sf, 45.42% Impervious, Inflow Depth = 1.16" for 100-YR event
Inflow = 0.83 cfs @ 12.15 hrs, Volume= 969 cf
Outflow = 0.83 cfs @ 12.15 hrs, Volume= 969 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Reach 1R: Flow to Mill St

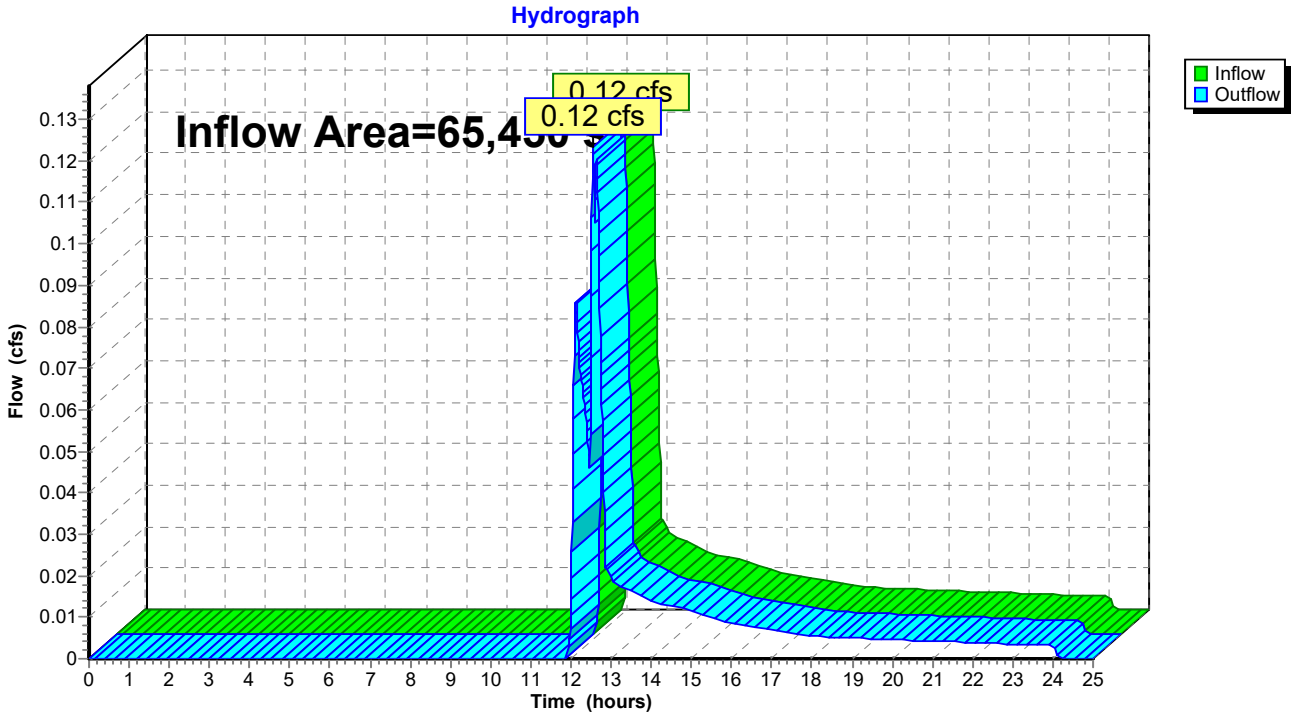


Summary for Reach 3R: Flow To Easterly Abutters

Inflow Area = 65,450 sf, 34.60% Impervious, Inflow Depth = 0.10" for 100-YR event
Inflow = 0.12 cfs @ 12.55 hrs, Volume= 523 cf
Outflow = 0.12 cfs @ 12.55 hrs, Volume= 523 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs

Reach 3R: Flow To Easterly Abutters



Summary for Pond 1P: UG System 1

Inflow Area = 9,998 sf, 45.42% Impervious, Inflow Depth = 4.06" for 100-YR event
Inflow = 1.09 cfs @ 12.09 hrs, Volume= 3,380 cf
Outflow = 0.88 cfs @ 12.15 hrs, Volume= 3,380 cf, Atten= 19%, Lag= 3.7 min
Discarded = 0.06 cfs @ 11.33 hrs, Volume= 2,411 cf
Primary = 0.83 cfs @ 12.15 hrs, Volume= 969 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 126.75' @ 12.15 hrs Surf.Area= 293 sf Storage= 740 cf

Plug-Flow detention time= 89.2 min calculated for 3,379 cf (100% of inflow)
Center-of-Mass det. time= 89.2 min (922.1 - 832.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	122.00'	292 cf	**7.50'W x 39.00'L x 5.25'H Field A** 1,536 cf Overall - 561 cf Embedded = 975 cf x 30.0% Voids
#2A	123.00'	417 cf	**Shea Leaching Chamber 4x4x4** x 9 Inside #1 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf
#3	123.34'	5 cf	**10.0" Round Pipe Storage**-Impervious L= 9.3' S= 0.0050 '/'
#4	123.39'	11 cf	**10.0" Round Pipe Storage**-Impervious L= 20.1' S= 0.0050 '/'
#5	123.50'	38 cf	**4.00'D x 3.00'H Vertical Cone/Cylinder**-Impervious
#6	126.50'	22 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) -Impervious
		785 cf	Total Available Storage

Storage Group A created with Chamber Wizard

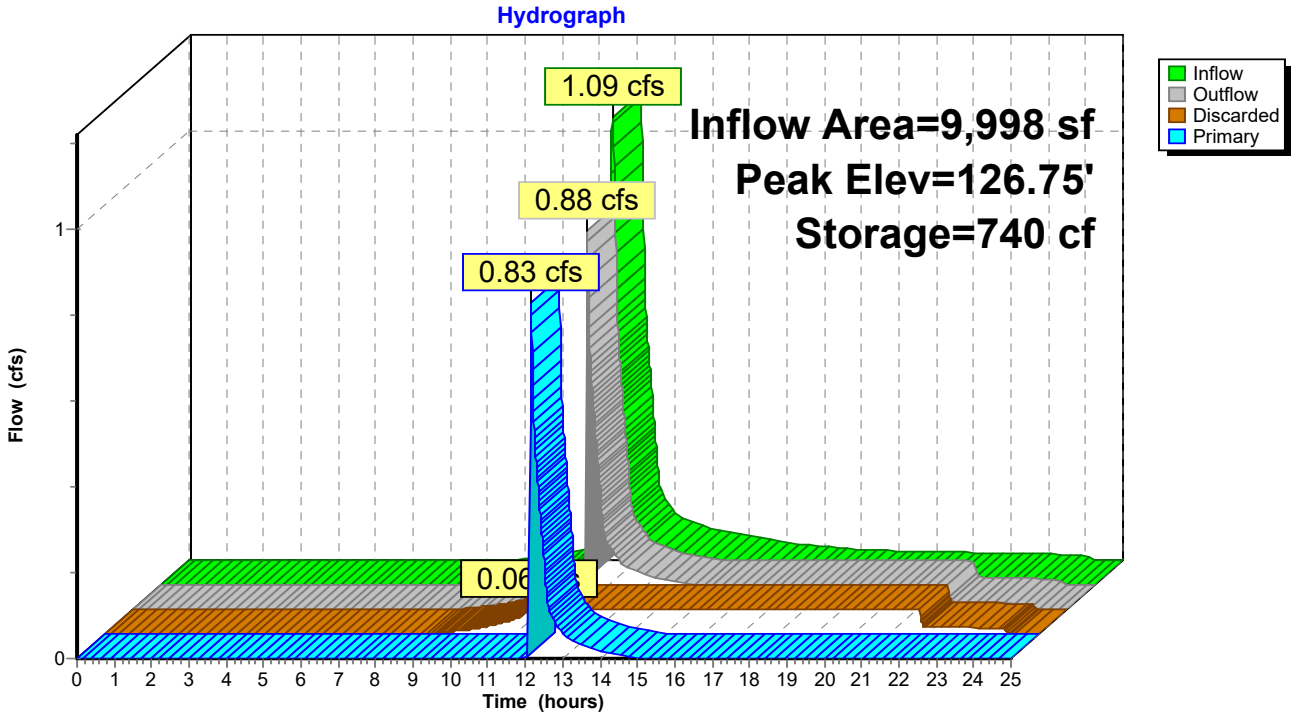
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
126.50	4	0	0
128.00	25	22	22

Device	Routing	Invert	Outlet Devices
#1	Discarded	122.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	126.50'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.06 cfs @ 11.33 hrs HW=122.06' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.82 cfs @ 12.15 hrs HW=126.75' (Free Discharge)
↑**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.82 cfs @ 1.72 fps)

Pond 1P: UG System 1



Summary for Pond 2P: UG System 2

Inflow Area = 9,070 sf, 35.39% Impervious, Inflow Depth = 3.38" for 100-YR event
Inflow = 0.81 cfs @ 12.09 hrs, Volume= 2,554 cf
Outflow = 0.63 cfs @ 12.16 hrs, Volume= 2,554 cf, Atten= 23%, Lag= 4.0 min
Discarded = 0.07 cfs @ 11.65 hrs, Volume= 1,893 cf
Primary = 0.56 cfs @ 12.16 hrs, Volume= 660 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 131.43' @ 12.16 hrs Surf.Area= 350 sf Storage= 444 cf

Plug-Flow detention time= 35.9 min calculated for 2,552 cf (100% of inflow)
Center-of-Mass det. time= 35.9 min (881.7 - 845.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	128.75'	327 cf	**17.50'W x 20.00'L x 5.25'H Field A** 1,838 cf Overall - 748 cf Embedded = 1,090 cf x 30.0% Voids
#2A	129.75'	557 cf	**Shea Leaching Chamber 4x4x4** x 12 Inside #1 Inside= 42.2"W x 45.0"H => 13.25 sf x 3.50'L = 46.4 cf Outside= 54.0"W x 51.0"H => 15.58 sf x 4.00'L = 62.3 cf 12 Chambers in 3 Rows
		883 cf	Total Available Storage

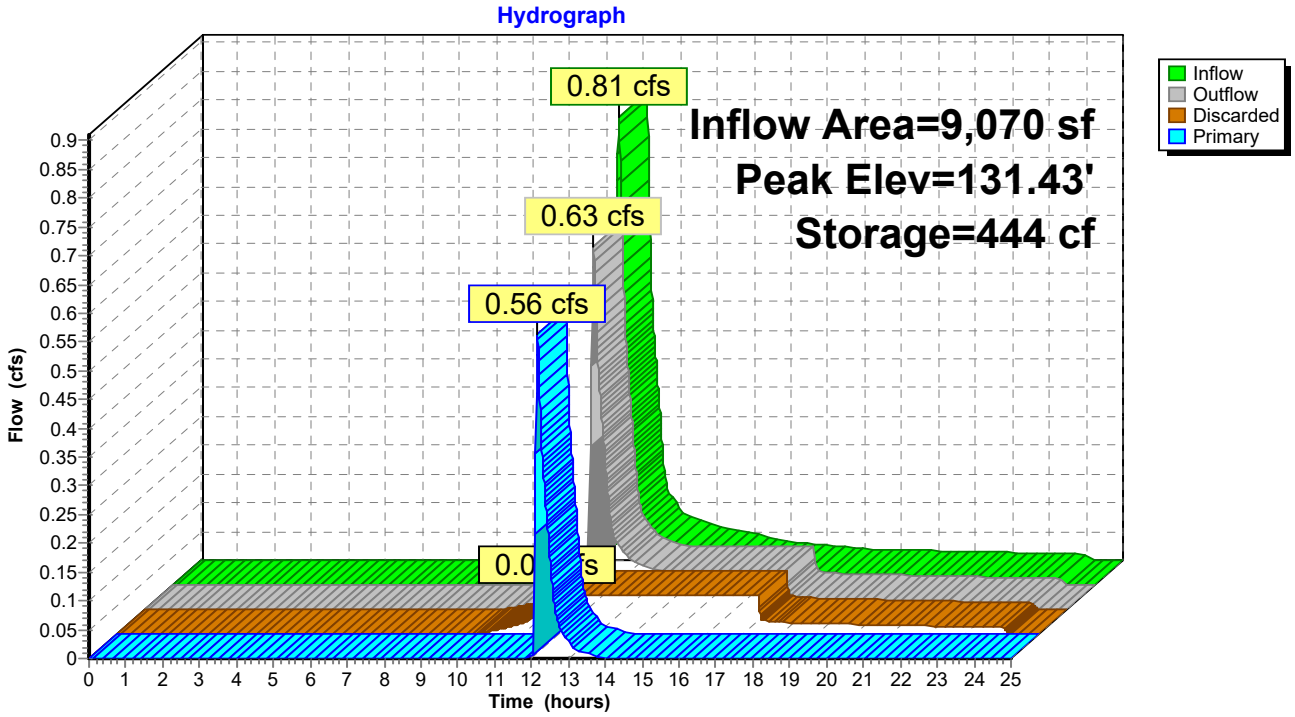
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	128.75'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	131.00'	**12.0" Round Culvert** L= 84.2' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 131.00' / 126.00' S= 0.0594 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf

Discarded OutFlow Max=0.07 cfs @ 11.65 hrs HW=128.81' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.56 cfs @ 12.16 hrs HW=131.43' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 0.56 cfs @ 1.76 fps)

Pond 2P: UG System 2



Summary for Pond 3P: UG System 3

Inflow Area = 18,194 sf, 65.50% Impervious, Inflow Depth = 5.45" for 100-YR event
Inflow = 2.64 cfs @ 12.09 hrs, Volume= 8,258 cf
Outflow = 1.42 cfs @ 12.22 hrs, Volume= 8,258 cf, Atten= 46%, Lag= 7.8 min
Discarded = 0.21 cfs @ 11.41 hrs, Volume= 6,369 cf
Primary = 1.21 cfs @ 12.22 hrs, Volume= 1,889 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 132.26' @ 12.22 hrs Surf.Area= 1,072 sf Storage= 1,909 cf

Plug-Flow detention time= 43.6 min calculated for 8,255 cf (100% of inflow)
Center-of-Mass det. time= 43.6 min (850.8 - 807.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	129.00'	835 cf	**15.76'W x 68.00'L x 4.50'H Field A** 4,823 cf Overall - 2,039 cf Embedded = 2,784 cf x 30.0% Voids
#2A	130.00'	1,464 cf	**Shea Leaching Chamber 4x4x3** x 48 Inside #1 Inside= 41.0"W x 30.0"H => 8.72 sf x 3.50'L = 30.5 cf Outside= 47.0"W x 36.0"H => 10.62 sf x 4.00'L = 42.5 cf 48 Chambers in 3 Rows
		2,299 cf	Total Available Storage

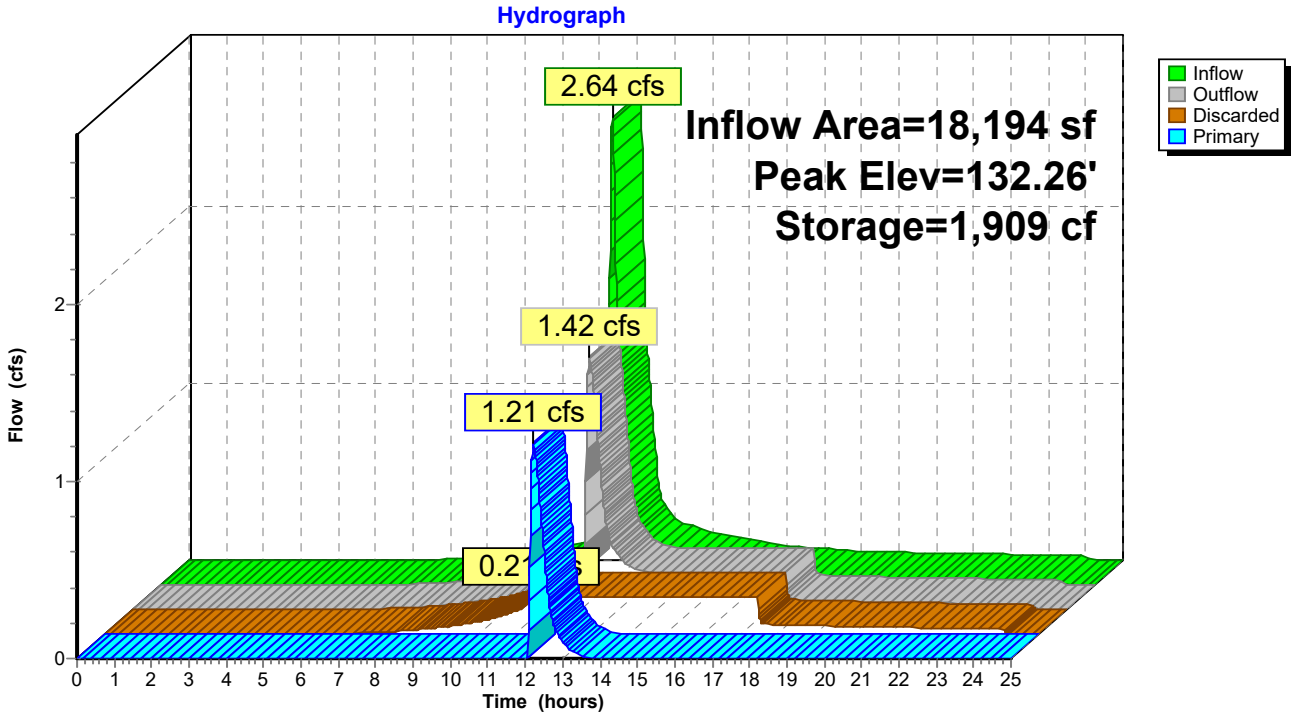
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	129.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	131.50'	**10.0" Round Culvert** L= 56.5' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 131.50' / 128.00' S= 0.0619 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Discarded OutFlow Max=0.21 cfs @ 11.41 hrs HW=129.05' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.21 cfs)

Primary OutFlow Max=1.22 cfs @ 12.22 hrs HW=132.26' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 1.22 cfs @ 2.34 fps)

Pond 3P: UG System 3



Summary for Pond 4P: Basin 1

Inflow Area = 40,849 sf, 38.38% Impervious, Inflow Depth = 1.71" for 100-YR event
Inflow = 2.00 cfs @ 12.18 hrs, Volume= 5,809 cf
Outflow = 0.46 cfs @ 12.69 hrs, Volume= 5,809 cf, Atten= 77%, Lag= 30.5 min
Discarded = 0.40 cfs @ 12.69 hrs, Volume= 5,774 cf
Primary = 0.06 cfs @ 12.69 hrs, Volume= 35 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 127.52' @ 12.69 hrs Surf.Area= 2,098 sf Storage= 2,303 cf

Plug-Flow detention time= 51.9 min calculated for 5,806 cf (100% of inflow)
Center-of-Mass det. time= 51.9 min (885.5 - 833.6)

Volume	Invert	Avail.Storage	Storage Description
#1	126.00'	3,407 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

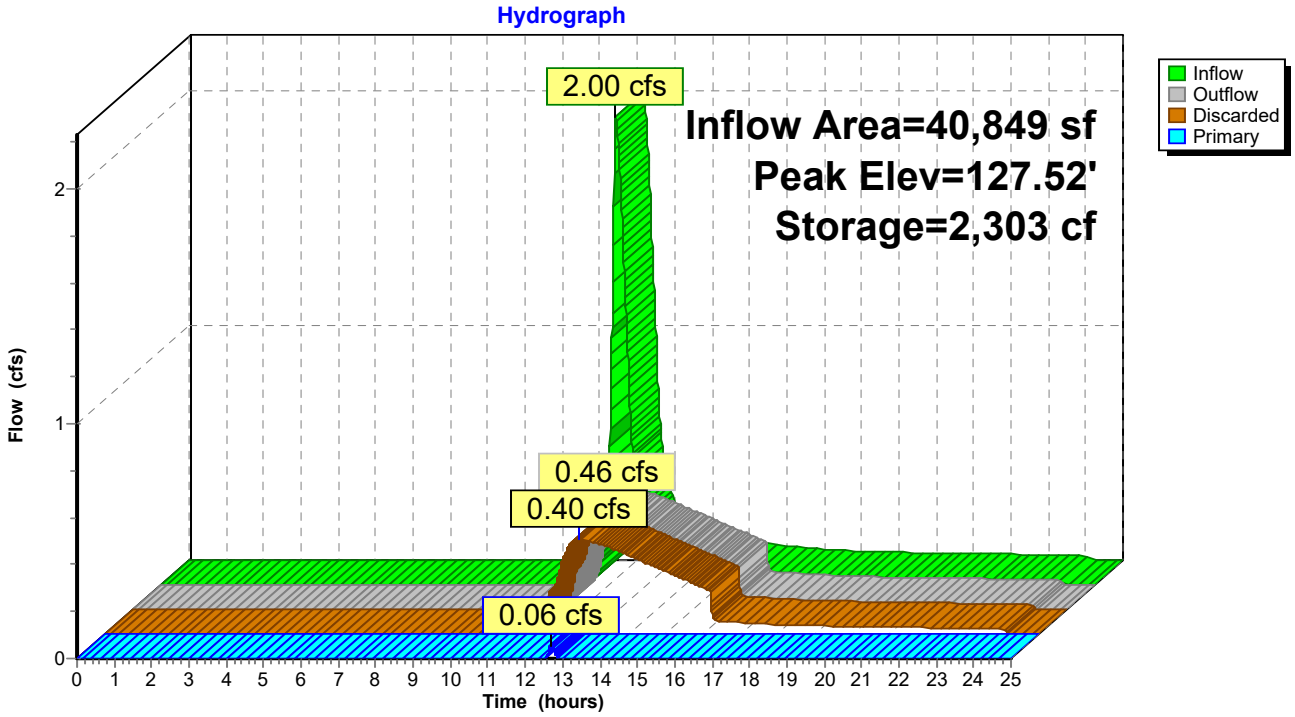
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
126.00	940	0	0
128.00	2,467	3,407	3,407

Device	Routing	Invert	Outlet Devices
#1	Discarded	126.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	127.50'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.40 cfs @ 12.69 hrs HW=127.52' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.40 cfs)

Primary OutFlow Max=0.05 cfs @ 12.69 hrs HW=127.52' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 0.05 cfs @ 0.31 fps)

Pond 4P: Basin 1



Summary for Pond 5P: Basin 2

Inflow Area = 19,738 sf, 35.31% Impervious, Inflow Depth = 2.23" for 100-YR event
Inflow = 1.35 cfs @ 12.14 hrs, Volume= 3,664 cf
Outflow = 0.33 cfs @ 12.55 hrs, Volume= 3,664 cf, Atten= 76%, Lag= 24.8 min
Discarded = 0.24 cfs @ 12.55 hrs, Volume= 3,617 cf
Primary = 0.09 cfs @ 12.55 hrs, Volume= 47 cf

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.01 hrs
Peak Elev= 125.52' @ 12.55 hrs Surf.Area= 1,236 sf Storage= 1,327 cf

Plug-Flow detention time= 48.9 min calculated for 3,664 cf (100% of inflow)
Center-of-Mass det. time= 48.9 min (876.4 - 827.5)

Volume	Invert	Avail.Storage	Storage Description
#1	124.00'	1,971 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

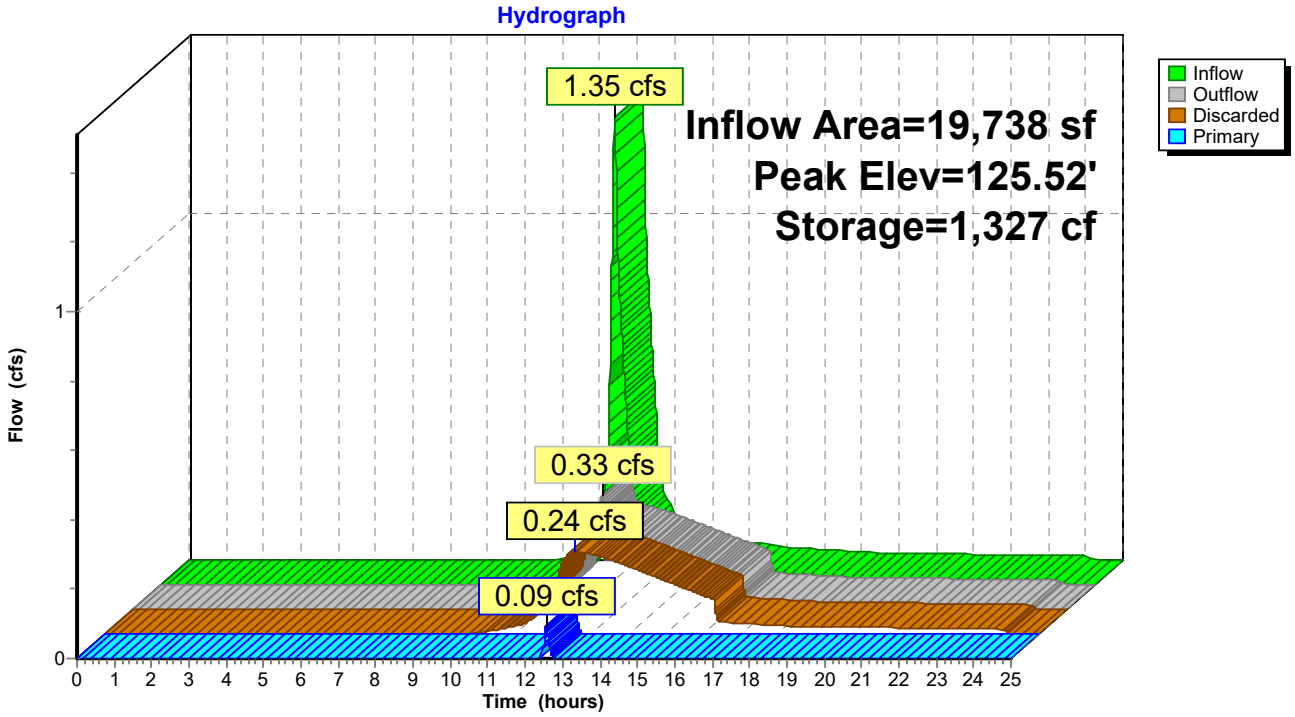
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
124.00	506	0	0
126.00	1,465	1,971	1,971

Device	Routing	Invert	Outlet Devices
#1	Discarded	124.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	125.50'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.24 cfs @ 12.55 hrs HW=125.52' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.24 cfs)

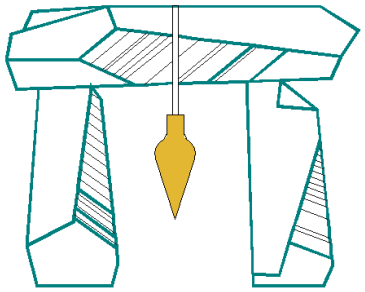
Primary OutFlow Max=0.09 cfs @ 12.55 hrs HW=125.52' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 0.09 cfs @ 0.37 fps)

Pond 5P: Basin 2



Appendix B Stormwater Operation & Maintenance Plan

DeCelle-Burke-Sala



& Associates, Inc.

Stormwater Operation & Site Maintenance Plan
for
Proposed Definitive Subdivision
at
217 Mill Street
Randolph, Massachusetts

Prepared by:
DeCelle-Burke-Sala & Associates, Inc.
1266 Furnace Brook Parkway
Suite 401
Quincy, MA 02169

Prepared for:
217 Mill St, LLC
228 Park Avenue S, PMB 35567
New York, NY 89135

Revised: April 10, 2023
February 6, 2023

Introduction

This Stormwater Operation & Maintenance Plan (SOMP) is for the definitive subdivision located at 217 Mill Street in Randolph, Massachusetts. The SOMP is outlined below to provide long term operation and maintenance procedures of the stormwater controls installed to manage the stormwater flow generated on the site. The landowners are required to implement the procedures and ensure the long term benefits of the stormwater controls approved and installed for this project. The SOMP provides simple operational and maintenance procedures for the stormwater control structures as well as perform various tasks to remove pollutants from areas that would have potential to be picked up on site and moved via stormwater offsite.

The landowners shall be responsible to implement this SOMP which requires them to inspect, maintain, and operate the stormwater management system as well as inspect the grounds for eroded areas and collected pollutants. The purpose of the SOMP is to maintain the long term benefits from the Stormwater Management features constructed that support groundwater recharge and pollution prevention.

Responsible Party -

217 Mill St, LLC
228 Park Avenue S, PMB 35567
New York, NY 89135

The responsible party listed above is responsible for inspecting, maintaining and keeping copies of maintenance records for the following plan and will be referred to as the Site Manager for the remainder of this report. The responsible party can expect a yearly budget of $1,500 to $2,000 per year to maintain this site.

All future property owners shall inherit the responsibility of implanting this SOMP. The current deed reference is found in the Norfolk County Registry of Deeds Book 14059 Page 498. This document shall be recorded at the Norfolk County Registry of Deeds with the deed reference. Upon any future transfer of ownership all future owners will be obligated to use, maintain, and continue to adhere to this Operation and Maintenance Plan in accordance with the manufacturers recommendations and all inspection records will be maintained and made available to the Town of Randolph upon request.

Illicit Discharge Statement

Per Standard No. 10 of the MassDEP Stormwater Management Standards, there shall be no illicit discharges to the stormwater management system. The Property Manager is responsible for implementing the Operation and Maintenance Plan and overseeing activities at the facility to prevent illicit discharges to the drainage system from occurring.

It is strictly prohibited to discharge any products or substances onto the ground surface into any drainage structures, such as catch basin inlets, manholes, water quality units, forebays, basin or drainage outlets that would be a detriment to the environment.

Signature Date

Non-Structural Operations

Pavement Sweeping

Pavement sweeping will be performed by hand twice during the year, in April-May and in September-October. The Site Manager shall contract with a property management company that provides pavement sweeping services. The company shall be in good standing in the Commonwealth of Massachusetts and experienced in performing these services. All sweepings shall be disposed of by the hired company off-site in a legal manner.

Snow Management

Proper snow management practices will be implemented to maximize access and egress into the property. Plowed or shoveled snow will be placed in pervious areas at the edges of driveways and the roadway where it can slowly infiltrate. Snow will be placed on to pervious areas that are not subject to excessive shade from buildings or vegetation. All accumulated sediment from snowmelt shall be removed each spring.

Structural Operations

Deep Sump Catch Basins

The catch basins are installed to capture stormwater runoff and provide pretreatment for TSS and oils. The catch basin is fitted with a proprietary water quality outlet control assembly called a SNOUT® to assist in the efficiency of capturing TSS and oils. To ensure maximum capacity and efficiency, the deep sump catch basin sump will be cleaned when half of the available capacity of the sump has been used or at a minimum of once per year. The Manager shall inspect the sump on a quarterly basis. The Site Manager shall hire a contractor in good standing in the Commonwealth of Massachusetts with experience in cleaning stormwater sumps with a vacuum truck. All sediment and water retrieved from the sumps shall be disposed of by the hired company off-site in a legal manner. The Manager shall provide a written inspection report of which an example form is attached.

SNOUT®

The SNOUT® is a locally manufactured stormwater treatment product that is a vented fiberglass water quality hood that is installed over the outlet pipe in a storm water structure with a sump that skims oils, floatables and trash off of the surface water while letting settleable solids sink to the bottom. The cleaner water exits from beneath the SNOUT, which is lower than the bottom of the pipe, but above the bottom of the structure allowing both floatable material and solids that sink to stay in the structure. The catch basin structure is fitted with the SNOUT®. The Manager shall inspect the SNOUT® quarterly, the same time the sump is inspected. The Site Manager shall hire a contractor in good standing in the Commonwealth of Massachusetts with experience in inspecting the SNOUT® and make sure it is operating as intended. If damaged, the SNOUT® shall be repaired or replaced entirely. The Manager shall provide a written inspection report of each SNOUT® which an example form is attached.

Contech CS-3 Cascade Separator Water Quality Manhole

The Cascade Separator (CS-3) water quality manholes were installed to provide additional pretreatment for the stormwater prior to infiltration. To ensure maximum capacity and efficiency, the CS-3 units should be inspected and cleaned in accordance with the manufacturer's specifications which have been included in Appendix A.

Underground Concrete Leaching Galleys

The underground concrete leaching galleys were installed to recharge stormwater runoff from the roadway, the driveways, and portions of landscaping area runoff. The roof runoff does not generate sediment, and with at grade flows captured by a deep sump catch basin with outlet hood treating the driveway and landscape runoff, the infiltration chambers shall remain effective for a long period of time. Inspection manholes are brought to grade to allow the Site Manager to observe if the chambers are ponding or accumulating sediment and to clean if necessary. To ensure maximum capacity and efficiency, the concrete chambers should be inspected and cleaned in accordance with the manufacturer's specifications.

Surface Infiltration Basin

Two surface infiltration basins have been constructed within the subdivision to allow for the attenuation of stormwater. The berm shall be stabilized and protected from erosion through the use of vegetation. The berm shall be inspected quarterly and after large storm events and maintained as necessary. If erosion is identified in the basin, the affected area will be stabilized and reseeded as required to maintain vegetative cover. This will prevent further instability occurring on the berm. The Manager shall hire a contractor that provides basin cleaning services for the entire stormwater management infrastructure. The contractor shall be a company in good standing in the Commonwealth of Massachusetts and experienced in performing the requested services. The debris and silt laden stormwater collected from the facilities shall be disposed of in a legal manner.

Site Management

The site shall be inspected on a quarterly basis for rutting, potholes, broken berms, depressions eroded areas and any other site damage caused by vehicular or human activity. Landscaped areas shall be raked as necessary to maintain their grade. Grassed areas shall be raked out and seeded as needed to maintain an even vegetated surface. A slow release natural fertilizer and a minimal amount of insecticides and herbicides shall be used for landscaping maintenance. The homeowner shall hire a contractor, if necessary, in good standing in the Commonwealth of Massachusetts with experience in site management to repair any potholes, broken berms, or other damaged exterior area. The homeowner shall hire a contractor, if necessary, in good standing in the Commonwealth of Massachusetts with experience in re-vegetating eroded areas and repairing vehicular surfaces and edges.

Record Keeping

Records of the inspections and maintenance for the Non-Structural and Structural Operations performed or organized by the homeowner for the property shall be up to date, available for review and inspection on-site and submitted to the Town of Randolph Conservation Department for review and record. Records shall be backlogged for three years before they are disposed of. An example record keeping sheet is attached.

Definitive Subdivision

217 Mill Street, Randolph, Massachusetts

Stormwater Operation & Site Maintenance Plan

INSPECTION SCHEDULE AND EVALUATION CHECKLIST

Best Management Practice	Inspection Frequency	Date Inspected	Contractor	Current Conditions and Minimum Maintenance / Repairs, if necessary	Completed Maintenance / Repair (i.e. date, contractor, tasks complete, etc...)
Pavement Sweeping	Biannually				
Deep Sump Catch Basins	Quarterly				
Snout®	Quarterly				
Contech CS-3 Cascade Separators	Per manufacturer's specs.				
Concrete Galleys	Per manufacturer's specs.				
Surface Infiltration Basins	Quarterly				
Overall Site Condition	Quarterly				

Per Standard No. 10 of the MassDEP Stormwater Management Standards, there shall be no illicit discharges to the stormwater management system. The Property Manager is responsible for implementing the Operation and Maintenance Plan and overseeing activities at the facility to prevent illicit discharges to the drainage system from occurring. It is strictly prohibited to discharge any products or substances onto the ground surface or into any drainage structures, such as catch basin inlets, manholes, water quality units, forebays, basin or drainage outlets that would be a detriment to the environment.

Property Manager: _____ **Date** _____

Appendix A

CONTECH®
ENGINEERED SOLUTIONS

Cascade Separator™ Inspection and Maintenance Guide

CASCADE
separato

Maintenance

The Cascade Separator™ system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects sediment and debris will depend upon on-site activities and site pollutant characteristics. For example, unstable soils or heavy winter sanding will cause the sediment storage sump to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

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

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

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

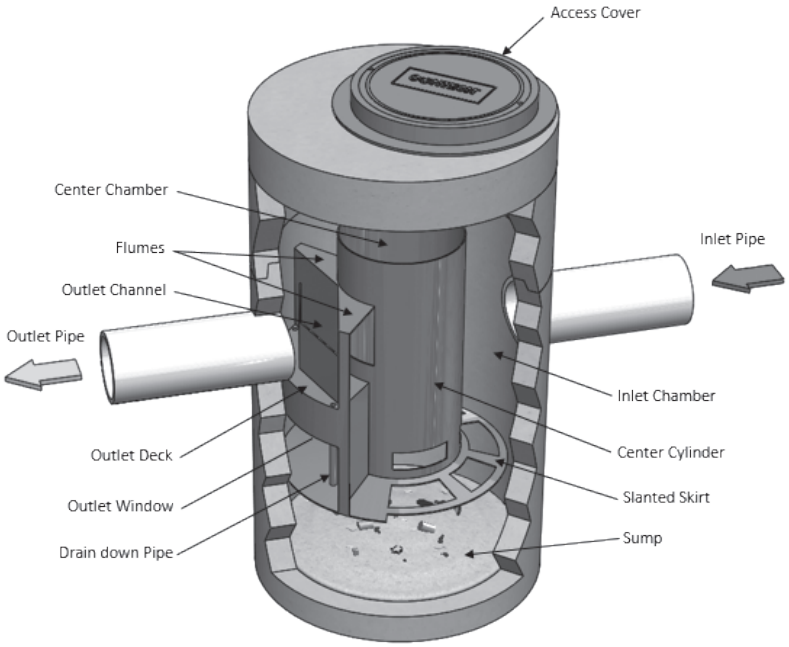
The Cascade Separator system should be cleaned before the level of sediment in the sump reaches the maximum sediment depth and/or when an appreciable level of hydrocarbons and trash has accumulated. If sorbent material is used, it must be replaced when significant discoloration has occurred. Performance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

Cleaning

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

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

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



Cascade Separator Inspection & Maintenance Log

Cascade Model:			Location:		
Date	Water Depth to Sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The depth to sediment is determined by taking a measurement from the manhole opening to the top of the sediment pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine if the height of the sediment pile off the bottom of the sump floor exceeds 50% of the total height of sediment storage sump. Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.
2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

A Cascade Separator unit can be easily cleaned in less than 30 minutes.

A vacuum truck excavates pollutants from the systems.

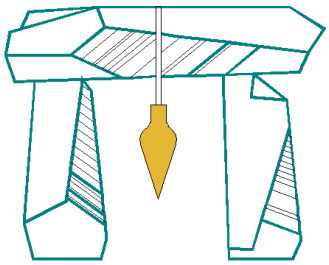
SUPPORT

- Drawings and specifications are available at www.ContechES.com.
- Site-specific design support is available from our engineers.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, and earth stabilization products. For information, visit www.ContechES.com or call 800.338.1122

Appendix C Stormwater Pollution Prevention Plan

DeCelle-Burke-Sala



& Associates, Inc.

Stormwater Pollution Prevention Plan

for

217 Mill Street

a Definitive Subdivision
in
Randolph, Massachusetts

Prepared by:
DeCelle-Burke-Sala & Associates, Inc.
1266 Furnace Brook Parkway
Suite 401
Quincy, MA 02169

Prepared for:
McDermott Builders, Inc.
7 Whitelawn Avenue
Milton, MA 02186

Revised: April 10, 2023
February 6, 2023

Table of Contents

1.0 - Plan Objectives

- To protect abutting properties, public ways and drainage infrastructure from construction related pollutant impacts generated from land disturbance and construction activities;

- Control existing, and potential erosion, sediment transport and pollutant impact events by installing and maintaining construction related Best Management Practices (BMP's) to reduce and/or prevent the discharge of stormwater pollutants into wetland resources of the Commonwealth of Massachusetts;

- To protect surface stormwater quality, ground water quality, and minimize off-site sediment transport offsite during construction;

- To prevent local and off-site flooding by controlling peak rates and volumes of stormwater runoff during construction; and

- To eliminate illicit discharges to stormwater drainage systems that causes pollution during construction.

2.0 - Introduction

This Erosion and Sedimentation Control Plan (The "Plan") has been devised for the construction of a new rehabilitation building located at 217 Mill Street in Randolph, Massachusetts. The purpose of the Plan is to protect the surrounding environment from contaminated stormwater during construction of the development. The stormwater will be treated before release and surfaces stabilized to minimize erosive events by implementing, installing and maintaining construction related Best Management Practices (BMP's) to reduce and/or prevent the discharge of stormwater pollutants into wetland resources of the Commonwealth of Massachusetts. The BMP's are described in the Stormwater Management Standards developed by the Massachusetts Department for Environmental Protection and it is our belief that short term construction related pollution prevention generated from this site can be achieved.

3.0 - Current Site Conditions

The subject property is located at 217 Mill Street in the Town of Randolph. The Town of Randolph Assessor's office currently identifies the as Assessors ID 51-H-8.01 with a

total area of approximately 77,512± square feet (SF). The property is located within the Residential Single Family High Density (RSFHD) zoning district.

The site is bounded by Mill Street to the northeast, and is abutted by single-family residential properties to the east, south, and west. The dead end of Prospect Avenue is close to the locus, however, the property does not have any frontage on Prospect Avenue. The lot contains a 675± S.F. residential single-family dwelling that was constructed around 1950 per the Town's online property record database. In addition to the dwelling, there are two sheds located on the property. Vehicular access to the site is provided off Mill Street by a single-lane asphalt driveway to the west of the dwelling. The dwelling improvements include a deck on the westerly side of the building adjacent to the driveway, a concrete patio in the backyard and a concrete walkway along the front of the house. The vegetation in the northerly portion of the lot closest to Mill Street is predominately lawn, with several hedges and trees. The majority of the lot is covered by trees and considered wooded. A vinyl and chain-link fence traverse the rear of the property near the abutters located on Hart Circle. Topography on the site varies throughout the property. Elevations along the frontage of the property on Mill Street range from approximately elevation 126 in the northeasterly corner, to elevation 132 in the northerly corner. Topography slopes up roughly 27% from the northeasterly corner at elevation 126 up to the house at elevation 136. The driveway slopes approximately 13% up from Mill Street to the peak of the driveway. The high elevation on-site is located towards the center of the property within the woods. From the high point, the topography generally slopes down to the abutters to the east down to a low elevation of approximately 122. All elevations refer to the North American Vertical Datum of 1988 (NAVD 88).

The existing building is serviced by sewer, domestic water, and gas services that connect to the respective mains in Mill Street. Overhead wires connect from the dwelling to the existing overhead wires in Mill Street to provide power and communication services to the existing dwelling. A roof gutter system on the existing dwelling captures the majority of roof runoff and downspouts direct the water to flow overland. No other stormwater controls are located on-site, as flows from the asphalt driveway are not collected and runoff to Mill Street. The site is not located within a Special Flood Hazard Zone as delineated on FIRM 25021C0217E, effective 07/17/2012. There do not appear to be any jurisdictional wetlands within 100-feet of the project locus.

4.0 - Project Description

The proposed project is a subdivision, which will include the construction of four (4) new single-family houses and a proposed roadway. Access to the subdivision will be provided off Mill Street by a 40-ft. wide private way, which ends at a cul-de-sac with a 42-ft. pavement radius. The proposed street layout will have 24-ft. of pavement with vertical granite curbing on both sides. Each proposed single-family house will be provided vehicular access to the proposed road by a curb cut and asphalt driveway.

The street will be graded to have a 2.9% grade for the first approximately 19-ft. before transition to a 100-ft. Type IV Sag Vertical Curve. The roadway will have a slope of approximately 7% for approximately 10-ft. before transitioning to a 150-ft. Type I Crest Vertical Curve. The highpoint of the roadway will be located towards the front of the cul-de-sac and will slope down toward the end of the road. A retaining wall is proposed along the easterly side of the roadway from approximately station 0+55 to approximately station 1+75. The retaining wall is approximately 5-ft. tall at its highest point.

The proposed subdivision will be improved by public utilities for the use of the four (4) proposed dwellings. A proposed 8-in. PVC gravity sewer main is proposed to be installed for the length of the roadway. The proposed sewer main will tie into the existing 8-in. PVC sewer main in Mill Street by constructing a doghouse manhole in Mill Street. A sewer manhole is proposed at the end of the proposed sewer main in the cul-de-sac of the proposed roadway. Each house will tie into the proposed sewer main by gravity with proposed 4-in. PVC sewer services. An 8-in. CLDI (cement-lined ductile iron) water main will be installed for the length of the roadway. The proposed water main will tie into the existing water main in Mill Street. Each house will be provided water service by a 1-in. “type K” copper pipe. A fire hydrant is proposed at the end of the proposed 8-in. water main and will be located within the cul-de-sac of the proposed roadway. A proposed gas main shall be installed by the local utility purveyor’s standards to provide gas service to each dwelling. Power and communication services will be provided by underground wires. A transformer will be installed within the subdivision.

Proposed stormwater controls shall comply with local, state and federal regulations. Stormwater generated by the proposed street will be collected, treated, and infiltrated to protect the down gradient abutting properties. The proposed stormwater management systems is comprised of a total of five (5) deep sump catch basins, two (2) proprietary water quality units, three (3) subsurface infiltration systems constructed of precast concrete leaching galleys and two surface infiltration basins. The majority of the stormwater runoff on site is produced by the asphalt roadway and proposed buildings.

Subsurface Infiltration System 1 consists of nine (9) 4'x4'x4' precast concrete leaching galleys and surrounding stone. System 1 collects the majority of the roadway by two deep sump catch basins located near the intersection of the proposed roadway and Mill Street. The catch basins convey the stormwater runoff to a proprietary water quality unit which pretreats the runoff prior to it being released to the subsurface infiltration system. System 1 has been designed to infiltrate the required recharge volume, decrease the peak runoff flows leaving the site and contain the entirety of the 10-year storm event. In the event of a larger storm event the stormwater runoff will by-pass the proposed catch basins and be collected by the existing drainage system in Mill Street. Subsurface System 2 is centrally located on the site and collects the stormwater runoff from the remainder of the twenty four (24) foot wide roadway. Stormwater runoff is captured by two (2) deep sump catch basins and conveyed to a proprietary water quality unit for pretreatment before it is release to Subsurface System 2. System 2 consists of twelve (12) 4'x4'x4' precast concrete leaching galleys and surrounding stone. System 2 has been designed to infiltrate the required recharge volume, decrease the peak runoff flows leaving the site and contain the entirety of the 10-year storm event. In the event of larger storm events, System 2 has been fitted with a 12 inch outlet pipe which extends to Surface Basin 2 where it is released onto a riprap outlet protection apron. Subsurface system 3 collects the entirety of the cul-de-sac through a single deep sump catch basin. The deep sump catch basin conveys the stormwater runoff to a proprietary water quality unit for pretreatment before it is released to Subsurface System 3. System 3 consists of forty eight (48) 4'x4'x4' precast concrete leaching galleys and surrounding stone. System 2 has been designed to infiltrate the required recharge volume, decrease the peak runoff flows leaving the site and contain the entirety of the 10-year storm event. In the event of larger storm events, System 2 has been fitted with a 12 inch outlet pipe which extends to Surface Basin 1 where it is released onto a riprap outlet protection apron.

Surface Basin 1 is a 2,456± S.F. surface infiltration basin which contains and infiltrates stormwater runoff from overland flow, the proposed roofs and overflow from Subsurface System 3. Basin 1 has been designed to infiltrate the entirety of the 2-, 10-, and 25-year storm events with allowing a minor amount of sheet flow released for the 100-year storm event. Surface Basin 2 is a 1,435± S.F. surface infiltration basin which detains and infiltrates stormwater runoff from overland flow, the proposed roofs and overflow from Subsurface System 2. Basin 2 has been designed to infiltrate the entirety of the 2-, 10-, and 25-year storm events with allowing a minor amount of sheet flow released for the 100-year storm event. The basins shall be grassed with an emergency riprap outlet weir as an overflow.

5.0 - Erosion & Sedimentation Control Plan

The contractor shall implement an Erosion and Sedimentation Control Plan that protects the surrounding environment from sediment laden stormwater runoff generated during construction activities and from other pollutants generated from construction activities such as litter and dust. Construction sequencing is part of managing a site as is implementing many BMP's that assist in controlling construction related pollutants.

5.1 - Major Construction Sequence for Site

The sequence is developed to contain all potential sedimentation and erosion incidents that could occur during the construction of the project. The contractor however is responsible to manage the site effectively to control offsite sediment transport which may not be included in this plan. The sequence will coordinate the work within the erosion barrier and coordinate other sedimentation control features to reduce the stress upon a silt fence as well as limit off-site sediment transport. The sequencing is as follows:

- Place safety fence around property to limit access and protect the public.
- Place erosion control barrier at limit of work where possible. The barrier shall be 12" diameter mulch wattles.
- Provide inlet protection for existing drainage structures on and off-site to minimize sediment buildup in the catch basins.
- Install crushed stone construction entrance to reduce soil tracking off-site by construction vehicles.
- Cut and cap/disconnect all existing utilities as shown on the plans.
- Raze existing buildings.
- Grub site, stockpile loam on site, and surround in erosion control barrier and cover to minimize sediment transport from stormwater runoff.
- Rough grade the site.
- Rough grade surface detention basins. Limit construction activities around the surface detention basins to minimize compaction of existing soils.
- Install proposed roadway utilities. Install silt sacks in catch basins as soon as they have been installed.
- Install concrete Infiltration Systems 1, 2 & 3.
- Final grade the proposed roadway.
- Install asphalt binder course for roadway.
- Install vertical granite curbing.
- Connect roadway drainage to the underground infiltration structures.
- Excavate for proposed foundations.

- Construct proposed foundations.
- Extend utility services to the proposed foundations.
- Begin vertical construction.
- Final grade the site.
- Install asphalt binder course for driveways.
- Install final landscaping, including hydroseed, plantings, light poles, walkways, handicap ramps and stairs.
- Place final asphalt top coat on roadway and driveways.
- Clean up site.

The contractor has several procedures to perform to maintain the site. They include but are not limited to:

- Clean pavement of sediment as needed.
- Replace erosion control barrier at limit of work as needed. Barrier to be inspected on a weekly basis.
- Empty silt sacks after each rain event. Catch basins and manholes to be cleaned once sediment occupies 1/2 the sump available. Structures to be inspected on a weekly basis.
- Any stockpiled soils to be covered to minimize fugitive dust.
- Maintain a covered dumpster on site to minimize wind blown debris from littering neighborhood and resource areas.
- Have a water truck onsite during the excavation for the project and during rough grading to minimize fugitive dust.

5.2 - Best Management Practices

The contractor shall use various types of structural and non-structural methodologies to minimize offsite polluting from construction activities. The following is a list of some BMP's that can be utilized; however, it is the contractor's responsibility to implement his strategies to minimize offsite sediment transport and fugitive dust and trash.

5.2.1 - Dumpster

The contractor shall have a dumpster on-site for the disposal of construction debris. The contractor shall cover the dumpster as needed to prevent wind blown debris from becoming litter in the environment.

5.2.2 - Silt Collection and Filter Bags

The contractor shall install filter sacks in all catch basins which may collect construction site stormwater runoff. The filter sacks will be inspected periodically for effectiveness and serviceability.

5.2.3 - Mechanical or Hand Sweeper

The contractor shall sweep the site by mechanical means or by hand to reduce the sediment build-up on-site. This will reduce the surrounding area becoming impacted from construction related offsite sediment pollution.

5.2.4 - Crushed Stone Construction Apron

A crushed stone apron shall be installed at the entrance to the site to assist in removing caked soil on construction vehicle tires. The apron shall be twenty five by twenty five foot wide. The contractor shall inspect the apron on a daily basis and supplement new stone as needed.

5.2.5 - Erosion Control Barrier

An erosion control barrier shall be installed at the downgradient Limit of Work and used around the site as needed. A barrier shall also be used around soil stockpiles and localized excavations on site. The barrier needs to be effective in controlling sediment transport and not becoming strained as the project moves forward. The contractor shall inspect the barrier weekly or after a large storm event to identify any stressed areas and replace the barrier as needed. The barrier can be one or many of several types. Staked haybales, a geotextile fabric or a geotextile erosion control sock are typical types of barriers. The contractor shall inspect the barriers on a daily basis and repair the barriers as needed.

5.2.6 - Dust Control

The use of a water truck or other method to spray water over the site during the dry season to minimize blown dust shall be implemented. The water shall not be excessively spread so erosive forces occur. The contractor shall sweep the pavement once installed and cover stockpiled soils as needed to minimize dust.

5.2.7 - Disturbed Surface Maintenance

The contractor shall stabilize the ground surface as needed to prevent erosion. Stabilization of surfaces includes the placement of pavement, rip rap, wood bark mulch and the establishment of vegetated surfaces. Upon the completion of construction of a particular phase, all surfaces should be stabilized even though it is apparent that future construction efforts will cause their disturbance. Vegetated cover should be established during the proper growing season and should be

enhanced by soil adjustment for proper pH, nutrients and moisture content. Surfaces that are disturbed by erosion processes or vandalism should be stabilized as soon as possible. Areas where construction activities have permanently or temporarily ceased should be stabilized within 14 days from the date of last construction activity, except when construction activity will resume within 21 days (e.g., the total time period that construction activity is temporarily ceased is less than 21 days). Hydro-mulching of grass surfaces is recommended, especially if seeding of the surfaces is required outside the normal growing season. Mulching may be used for temporary stabilization. Haybale dikes or silt fences should be set where required to trap products of erosion and should be maintained on a continuing basis during the construction process. Wheel ruts should be filled in and graded to prevent concentration of stormwater runoff. Vehicle tracks leading downhill should be blocked during periods of intense precipitation by hay bales, dikes or silt fences which should be constructed to entrap the sediment.

5.2.8 - Temporary Stormwater Controls

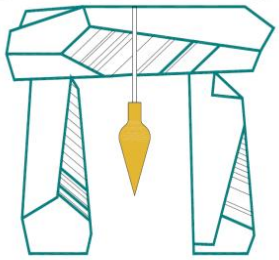
The contractor shall rough grade the site as to not concentrate the stormwater runoff and cause erosive forces. The contractor shall use a level spreader or other temporary stormwater control device to treat construction site runoff for suspended solids. The catch basins and manholes can be installed to assist in capturing the construction site runoff once installed but the tanks will need to be cleaned out of all sediment before connecting the tanks to the recharge system and final paving. The use of silt sacks on the catch basin will help minimize the cleaning of the sumps. The contractor shall sweep the pavement once installed as needed to minimize suspended solids in the stormwater.

Appendix D Supporting Information

Standard 3 & 4–Groundwater Recharge & Water Quality Volume Calculations

Required Recharge/Water Quality Volume Calculations

DECELLE-BURKE-SALA



& Associates, Inc.

Project: Clifton Court Development
217 Mill Street
Randolph, MA

Client: 217 Mill St, LLC

Date: 4/11/2023

Given:

Total Impervious Area (A): 27,188 s.f.

Target Depth Factor (F): 0.6 inches over impervious area

Required Water Quality Volume (R_{wqv}): 1 inches over impervious area

Solve:

Required Recharge/Water Quality Volume
= A x F or R_{wqv} (whichever is greater)

2,265.7 c.f

Proposed Recharge Volume (V): (*based on HydroCAD volumes)

				A per system		R_{wqv} per system		
Subsurface System 1	=	700	c.f.	4,541	s.f.	376.9	c.f.	V>Rwqv
Subsurface System 2	=	358	c.f.	3,210	s.f.	266.4	c.f.	V>Rwqv
Subsurface System 3	=	1,383	c.f.	11,917	s.f.	989.1	c.f.	V>Rwqv
Surface Basin 1	=	2,269	c.f.	3,760	s.f.	312.0	c.f.	V>Rwqv
Surface Basin 2	=	1,298	c.f.	3,760	s.f.	312.0	c.f.	V>Rwqv
Total	=	6,008	c.f.	Proposed Volume > Required Volume				

DeCelle-Burke-Sala and Associates, Inc.
1266 Furnace Brook Parkway #401 Quincy, MA 02169
617-405-5100 (o) 617-405-5101 (f)

Standard 3 – Groundwater Mounding Calculations

Groundwater Mounding Inputs for Subsurface System 3

DECELLE-BURKE-SALA & Associates, Inc.

Project: Clifton Court Development
217 Mill Street
Randolph, MA

Client: 217 Mill St, LLC

Date: 4/10/2023

Specific Yield Values (Sy)

Water Laid Deposits:	0.2	
(Lacustrine Deposits)		
Wind Blown Deposits:	0.2	
(Eolian Deposits)		
(conservative)		
Ice Laid Deposits:	0.15	*(Typical Sy value for New England)*
(Compact/Ablation Till)		

per "Summary of Hydrologic and Physical Properties of Rock and Soil Materials, as Analyzed by the Hydrologic Laboratory of the U.S. Geoligical Survey 1948-60, D.A. Morris and A.I. Johnson

Rawls Rate = 8.27 in/hr

Horizontal Hydraulic Conductivity (Kh)

Kh=Rawls Rate (in/hr) x 1 ft. / 12 in. x 24 hr / 1 day x 10

Kh= 8.27 x 20 ft-hr/in-day

= 165.4 ft/day

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617-405-5100 (o) 617-405-5101 (f)

Recharge Rate Calculation (R)= 16.54 ft/day

Length of Field= 68 ft 1/2 Length= 34
Width of Field= 15.75 ft 1/2 Width= 7.875

Duration of Infiltration, (t)

t= Basin Depth (ft) / Recharge Rate (ft/day)

t= 24.15 hours

*If designing a system with an outlet then the duration of infiltration (t) shall be taken from the HydroCAD model and should equal the time when the discarded volume equals 0. Make sure to set the time span for 0-72 hours.

** If the initial mound is above the bottom of the inifltration basin then increase the duration of infiltration to a maximum of 3 days to see if it decreases the mound height. This is allows for more horizontal flow away from the basin before the mound hight peaks and is a more conservative approach according to Glen Carleton (creator of simulation).

Initial Saturated Thickness (hi)=Depth from ESHGW to Bedrock
= 30' based on well information in the surrounding area

(yellow) Input Data

(green) Solutions to be input into Hantush Excel Spreadsheet

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)

Conversion Table

	inch/hour	**feet/day**
	0.67	1.33
	2.00	4.00
hours		**days**
	36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

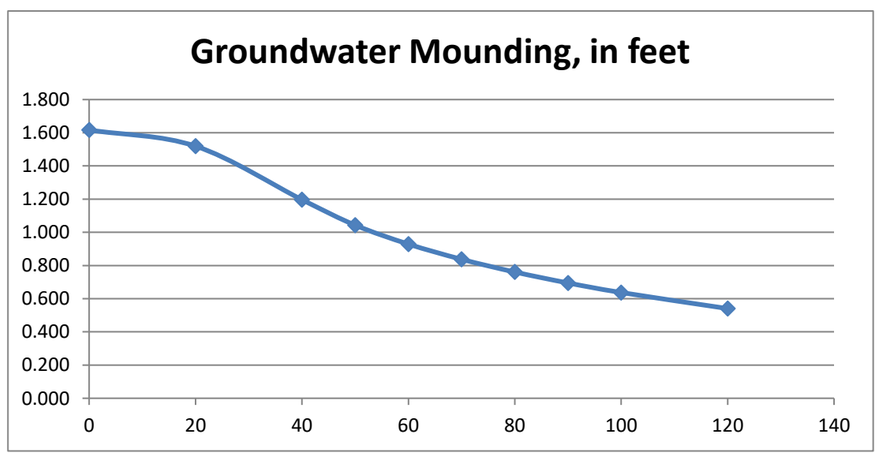
Input Values

16.5400	***R***	**Recharge (infiltration) rate (feet/day)**
0.150	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
165.40	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
34.000	**x**	**1/2 length of basin (x direction, in feet)**
7.875	**y**	**1/2 width of basin (y direction, in feet)**
1.006	**t**	**duration of infiltration period (days)**
30.000	**hi(0)**	**initial thickness of saturated zone (feet)**

31.617	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
1.617	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
1.617	**0**
1.519	**20**
1.197	**40**
1.043	**50**
0.929	**60**
0.837	**70**
0.761	**80**
0.695	**90**
0.637	**100**
0.541	**120**

Re-Calculate Now

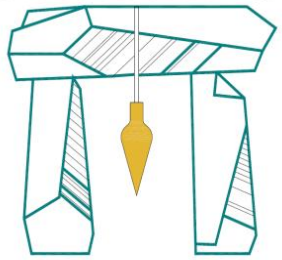


Disclaimer

Standard 3 – Drawdown Time Calculations

Calculation Sheet

DECELLE-BURKE-SALA



& Associates, Inc.

Project: Clifton Court Development
217 Mill Street
Randolph, MA

Client: 217 Mill St, LLC
228 Park Ave S, PMB 35567, New York, NY

Date: 4/10/23

100-Yr Storm Event Drawdown Time Calculation
Subsurface System 1

Find: T= Infiltration System Volume / (K)(Bottom Area)

Given:

Bottom Area = Length x Width

= 39.00 x 7.50 = 292.5 s.f.

System Volume= 700.00 c.f. (*volume of system below outlet from HydroCAD)

K= 8.27 in/hr K (Hydraulic Conductivity-use Rawls Rate)

Solve:

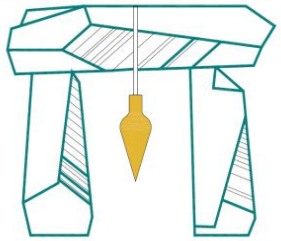
$$Time_{drawdown} = \frac{700 \text{ c.f.}}{(8.27 \text{ in/hr}/12 \text{ in/ft}) \times 292.5 \text{ s.f.}}$$

$Time_{drawdown}$ = 3.5 hrs < 72 hrs **CHECKS OK**

DeCelle-Burke-Sala and Associates, Inc.
1266 Furnace Brook Parkway #401 Quincy, MA 02169
617-405-5100 (o) 617-405-5101 (f)

Calculation Sheet

DECELLE-BURKE-SALA



& Associates, Inc.

Project: Clifton Court Development
217 Mill Street
Randolph, MA

Client: 217 Mill St, LLC
228 Park Ave S, PMB 35567, New York, NY

Date: 4/10/23

100-Yr Storm Event Drawdown Time Calculation
Subsurface System 3

Find: T= Infiltration System Volume / (K)(Bottom Area)

Given:

Bottom Area = Length x Width

= 68.00 x 15.75 = 1071 s.f.

System Volume= 1383.00 c.f. (*volume of system below outlet from HydroCAD)

K= 8.27 in/hr K (Hydraulic Conductivity-use Rawls Rate)

Solve:

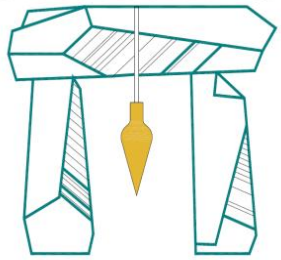
$$Time_{drawdown} = \frac{1383 \text{ c.f.}}{(8.27 \text{ in/hr}/12 \text{ in/ft}) \times 1071 \text{ s.f.}}$$

$Time_{drawdown}$ = 1.9 hrs < 72 hrs **CHECKS OK**

DeCelle-Burke-Sala and Associates, Inc.
1266 Furnace Brook Parkway #401 Quincy, MA 02169
617-405-5100 (o) 617-405-5101 (f)

Calculation Sheet

DECELLE-BURKE-SALA



& Associates, Inc.

Project: Clifton Court Development
217 Mill Street
Randolph, MA

Client: 217 Mill St, LLC
228 Park Ave S, PMB 35567, New York, NY

Date: 4/10/23

100-Yr Storm Event Drawdown Time Calculation
Subsurface System 2

Find: T= Infiltration System Volume / (K)(Bottom Area)

Given:

Bottom Area = Length x Width

= 20.00 x 17.50 = 350 s.f.

System Volume= 358.00 c.f. (*volume of system below outlet from HydroCAD)

K= 8.27 in/hr K (Hydraulic Conductivity-use Rawls Rate)

Solve:

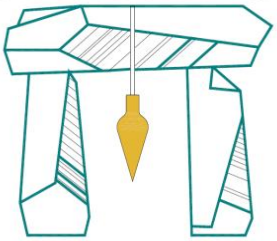
$$Time_{drawdown} = \frac{358 \text{ c.f.}}{(8.27 \text{ in/hr}/12 \text{ in/ft}) \times 350 \text{s.f.}}$$

$Time_{drawdown}$ = 1.5 hrs < 72 hrs **CHECKS OK**

DeCelle-Burke-Sala and Associates, Inc.
1266 Furnace Brook Parkway #401 Quincy, MA 02169
617-405-5100 (o) 617-405-5101 (f)

Calculation Sheet

DECELLE-BURKE-SALA



& Associates, Inc.

Project: Clifton Court Development
217 Mill Street
Randolph, MA

Client: 217 Mill St, LLC
228 Park Ave S, PMB 35567, New York, NY

Date: 4/10/23

100-Yr Storm Event Drawdown Time Calculation
Surface Basin 1

Find: T= Infiltration System Volume / (K)(Bottom Area)

Given:

Bottom Area = From HydroCAD

= 2085.00

System Volume= 2269.00 c.f. (*volume of system below outlet from HydroCAD)

K= 8.27 in/hr K (Hydraulic Conductivity-use Rawls Rate)

Solve:

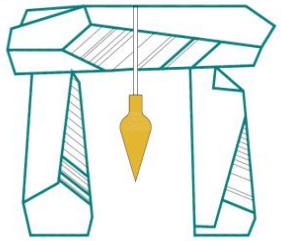
$Time_{drawdown}$ = 2269 c.f. / (8.27 in/hr/12 in/ft) x 2085s.f.

$Time_{drawdown}$ = 1.6 hrs < 72 hrs **CHECKS OK**

DeCelle-Burke-Sala and Associates, Inc.
1266 Furnace Brook Parkway #401 Quincy, MA 02169
617-405-5100 (o) 617-405-5101 (f)

Calculation Sheet

DECELLE-BURKE-SALA



& Associates, Inc.

Project: Clifton Court Development
217 Mill Street
Randolph, MA

Client: 217 Mill St, LLC
228 Park Ave S, PMB 35567, New York, NY

Date: 4/10/23

100-Yr Storm Event Drawdown Time Calculation
Surface Basin 2

Find: T= Infiltration System Volume / (K)(Bottom Area)

Given:

Bottom Area = From HydroCAD

= 1225.00

System Volume= 1298.00 c.f. (*volume of system below outlet from HydroCAD)

K= 8.27 in/hr K (Hydraulic Conductivity-use Rawls Rate)

Solve:

$Time_{drawdown}$ = 1298 c.f. / (8.27 in/hr/12 in/ft) x 1225s.f.

$Time_{drawdown}$ = 1.5 hrs < 72 hrs **CHECKS OK**

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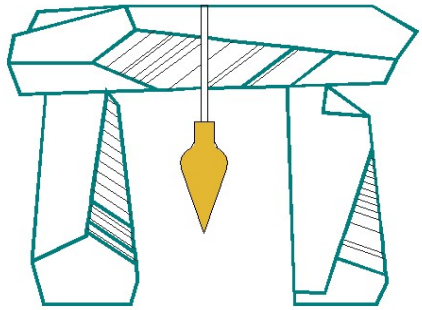
617-405-5100 (o) 617-405-5101 (f)

Standard 4 – TSS Removal Calculations

DeCelle-Burke



& Associates, Inc.

Project: **Proposed Definitive Subdivision**
Location: **217 Mill Street, Randolph, MA**
Date: **1/24/2023**

Pretreatment Tss Removal Calculation

BMP	TSS Removal	Start Load	Amount Removed	Remaining Load
Contech CS3	50%	100%	50%	50%
Infiltration Systems	80%	50%	40%	10%
Remaining Load		10%	0%	10%

DeCelle-Burke-Sala Associates, Inc.
1266 Furnace Brook Parkway, Quincy, MA 02169
PH:(617)-405-5100 FX:(617)-405-5101

Standard 4 - Equivalent Flow Rate Calculations

Calculation Sheet

DECELLE-BURKE-SALA & Associates, Inc.

Project: Clifton Court Development
217 Mill Street
Randolph, MA

Client: 217 Mill Street, LLC
228 Park Avenue S, New York, NY

Date: 4/10/2023

Required WQV to a Discharge Rate Calculation

Proposed CS-3 (1) Maximum Treatment Flow Rate (MTFR)= 1.02 cfs

Time of Concentration (Tc)=	6.0 mins.= 0.1 hrs					
Unit Peak Discharge (qu)=	774	csm/in				
Water Quality Volume (WQV)=	1	in.				
Impervious Surface Drainage Area (A)=	4,541	sf	=	0.00016	mi²	
$Q_{0.5}$=(qu)(A)(WQV)	=	0.13	cfs			

CHECKS OK

Proposed CS-3 (2) Maximum Treatment Flow Rate (MTFR)= 1.02 cfs

Time of Concentration (Tc)=	6.0 mins.= 0.1 hrs					
Unit Peak Discharge (qu)=	774	csm/in				
Water Quality Volume (WQV)=	1	in.				
Impervious Surface Drainage Area (A)=	3,210	sf	=	0.00012	mi²	
$Q_{0.5}$=(qu)(A)(WQV)	=	0.09	cfs			

CHECKS OK

DeCelle-Burke-Sala and Associates, Inc.
1266 Furnace Brook Parkway #401 Quincy, MA 02169
617-405-5100 (o) 617-405-5101 (f)

Calculation Sheet

DECELLE-BURKE-SALA & Associates, Inc.

Project: Definitive Subdivision Plan
217 Mill Street
Randolph, MA

Client: 217 Mill Street, LLC
228 Park Avenue S, New York, NY

Date: 2/6/2023

Required WQV to a Discharge Rate Calculation

Proposed CS-3 (3) — Maximum Treatment Flow Rate (MTFR)= 1.02 cfs

Time of Concentration (Tc)=	6.0 mins.= 0.1 hrs			
Unit Peak Discharge (qu)=	774	csm/in		
Water Quality Volume (WQV)=	1	in.		
Impervious Surface Drainage Area (A)=	11,917	sf	=	0.00043 mi²
$Q_{0.5}$=(qu)(A)(WQV) =	0.33	cfs		

CHECKS OK

DeCelle-Burke-Sala and Associates, Inc.
1266 Furnace Brook Parkway #401 Quincy, MA 02169
617-405-5100 (o) 617-405-5101 (f)

Standard 4 - Proprietary BMP Data

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Nonpoint Pollution Control
Division of Water Quality
401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

PHILIP D. MURPHY
Governor

SHEILA Y. OLIVER
Lt. Governor

CATHERINE R. MCCABE
Commissioner

May 18, 2020

Derek M. Berg
Director – Stormwater Regulatory Management - East
Contech Engineered Solutions LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Re: MTD Lab Certification
Cascade Separator™
On-line Installation

TSS Removal Rate 50%

Dear Mr. Berg:

This revised certification letter supersedes the Department's prior certification dated October 1, 2019. This revision was completed to reflect Contech's enhanced fabrication capability to manufacture a smaller-size unit of its the Cascade Separator™ Manufactured Treatment Device (MTD), while still meeting the scaling methodology as agreed upon by the manufacturers' working group on September 19, 2016. Based on this modification, Table A-1 of the New Jersey Corporation for Advanced Technology (NJCAT) Verification report located at http://www.njcat.org/uploads/newDocs/NJCATTechnologyVerificationFinal.pdf has been revised to specify this smaller unit and associated maximum treatment flow rate. Table 1 below has been revised to reflect this same updated model size and flow rate.

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Contech Engineered Solutions, LLC (Contech) has requested an MTD Laboratory Certification for the Cascade Separator™ stormwater treatment system.

The project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25,

2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated September 2019) for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the Cascade Separator™ stormwater treatment system at a TSS removal rate of 50% when designed, operated, and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.

2. The Cascade Separator™ shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in item 6 below.

3. This Cascade Separator™ cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual, which can be found online at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the Cascade Separator™. A copy of the maintenance plan is attached to this certification. However, it is recommended to review the maintenance website at https://www.conteches.com/Portals/0/Documents/Maintenance%20Guides/Cascade-Maintenance%20Guide.pdf?ver=2018-11-05-093254-300. for any changes to the maintenance requirements.

6. Sizing Requirement:

   The example below demonstrates the sizing procedure for the Cascade Separator™:

   Example: A 0.25-acre impervious site is to be treated to 50% TSS removal using a Cascade Separator™. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

   Maximum Treatment Flow Rate (MTFR) Evaluation:

   The site runoff (Q) was based on the following:

time of concentration = 10 minutes
i = 3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
c = 0.99 (runoff coefficient for impervious)
Q = ciA = 0.99 x 3.2 x 0.25 = 0.79 cfs

Given the site runoff is 0.79 cfs and based on Table A-1 below, the Cascade Separator™ Model CS-3 with an MTFR of 1.02 cfs would be the smallest model approved that could be used for this site to remove 50% of the TSS from the impervious area without exceeding the MTFR.

The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the Verification Appendix under Table A-1.

Table A-1 Cascade Separator™ Models and Associated MTFRs

Model	Manhole Diameter (ft)	MTFR (cfs)	50% Maximum Sediment Storage Area Volume (ft^3)
CS-3	3	1.02	5.3
CS-4	4	1.80	9.4
CS-5	5	2.81	14.7
CS-6	6	4.05	21.2
CS-8	8	7.20	37.7
CS-10	10	11.3	58.9
CS-12	12	16.2	84.8

A detailed maintenance plan is mandatory for any project with a stormwater BMP subject to the Stormwater Management rules under N.J.A.C. 7:8. The plan must include all of the items identified in the Maintenance requirements section of the Stormwater Management rules under N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Brian Salvo of my office at (609) 633-7021.

Sincerely,

Gabriel Mahon

Gabriel Mahon, Chief
Bureau of Nonpoint Pollution Control

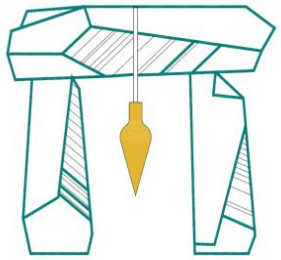
Attachment: Maintenance Plan

cc: Chron File
Richard Magee, NJCAT
Jim Murphy, NJDEP-BNPC
Vince Mazzei, NJDEP-DLUR
Brian Salvo, NJDEP-BNPC

Soil Information

Soil Log

DECELLE-BURKE-SALA



& Associates, Inc.

Location: Clifton Court Development
217 Mill Street
Randolph, MA

S.E.: Kameron Campbell, S.E. 14227

Date: 2/22/2023

Test Pit 1 : 8:30 am

Depth	Horizon	Texture	Color	Structure	Consistence
0-12	Ap	SL	10YR3/2	Granular	Very Friable
12-24	Bw	SL	10YR5/6	Massive	Friable
24-41	C1	Sand	2.5Y5/3	Single Grained	Loose
41-75	C2	Sand	2.5Y5/3	Single Grained	Loose
75-114+	C3	Sand	2.5Y5/3	Single Grained	Loose

Redox @ 72"

Standing Water @ 114"

C1 - gravelly coarse sand

C2 - medium sand, very little to no gravel

C3 - gravelly, coarse sand with cobbles present

Test Pit 2 : 9:08 am

Depth	Horizon	Texture	Color	Structure	Consistence
0-12	Ap	SL	10YR3/2	Granular	Very Friable
12-30	Bw	SL	10YR5/6	Massive	Friable
30-84+	C	Sand	2.5Y5/4	Single Grained	Loose

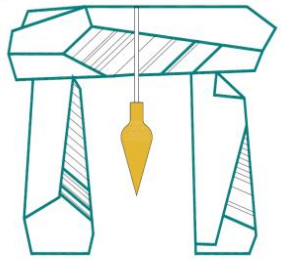
C - gravelly coarse sand with large cobbles present

*hit a large boulder that the mini excavator could not get past

No Groundwater Observed

Soil Log

DECELLE-BURKE-SALA



& Associates, Inc.

Location: Clifton Court Development
217 Mill Street
Randolph, MA

S.E.: Kameron Campbell, S.E. 14227

Date: 2/22/2023

Test Pit 3 : 9:50 am

Depth	Horizon	Texture	Color	Structure	Consistence
0-9	Ap	SL	10YR3/2	Granular	Very Friable
9-24	Bw	SL	10YR5/6	Massive	Friable
24-84	C	Sand	2.5Y5/4	Single Grained	Loose

C3 - gravelly, coarse sand with cobbles present

Cobbles tight in place, small mahine had difficulty moving them due to size

No Groundwater Observed

Test Pit 4 : 10:09 am

Depth	Horizon	Texture	Color	Structure	Consistence
0-10	Ap	SL	10YR3/2	Granular	Very Friable
10-24	Bw	SL	10YR5/6	Massive	Friable
24-120^{+}	C	Sand	2.5Y5/4	Single Grained	Loose

C - gravelly coarse sand with cobbles present

No Groundwater Observed

DeCelle-Burke-Sala and Associates, Inc.
1266 Furnace Brook Parkway #401 Quincy, MA 02169
617-405-5100 (o) 617-405-5101 (f)

Supporting Maps

Assessors Map

USGS Map

Soils Map

FEMA Map

View Details

Google Maps Link

Town of Randolph

Property Record Card

Property

Address	217 MILL ST
ID	51-H-8.01

Ownership

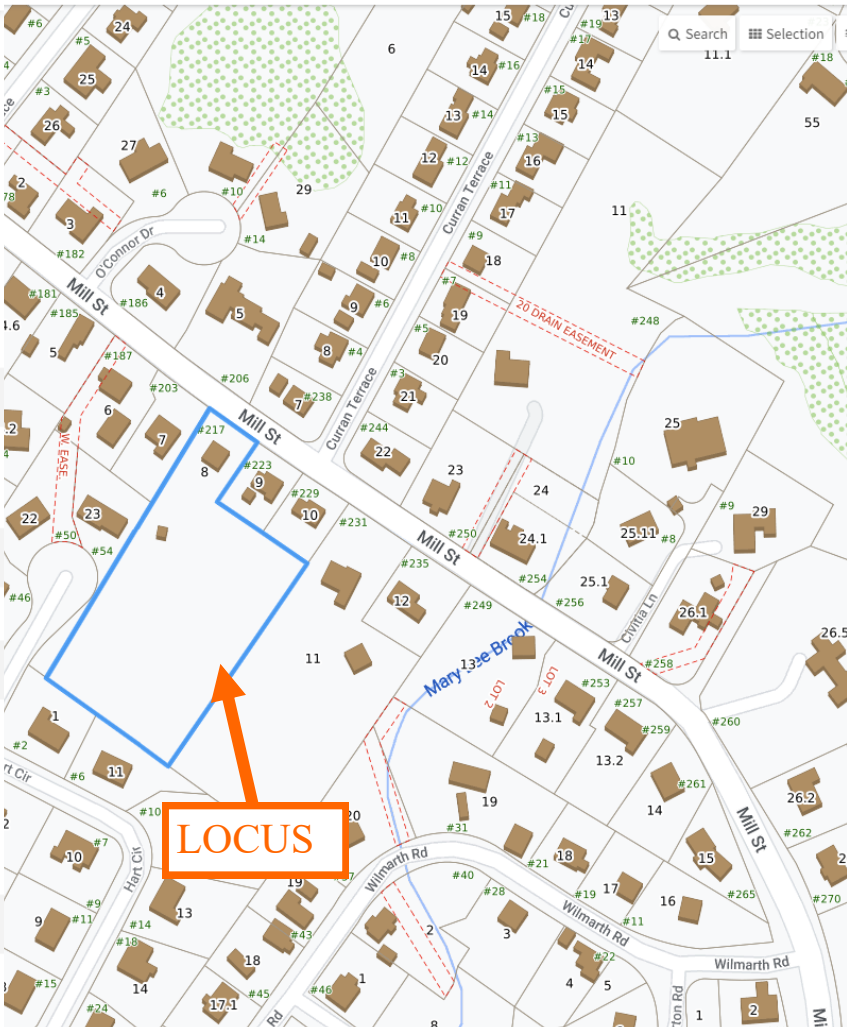
Name	ARSENAULT FAMILY TRUST

Valuation

Total	$440,700
Land	$251,600
Last Sale	$100 on 2000-03-21
Book/Page	14059/498

Land

Area	1.78



DATE:	TITLE:	SCALE:
April 10, 2023	***Assessors Map***	***NOT TO SCALE***

PREPARED FOR:

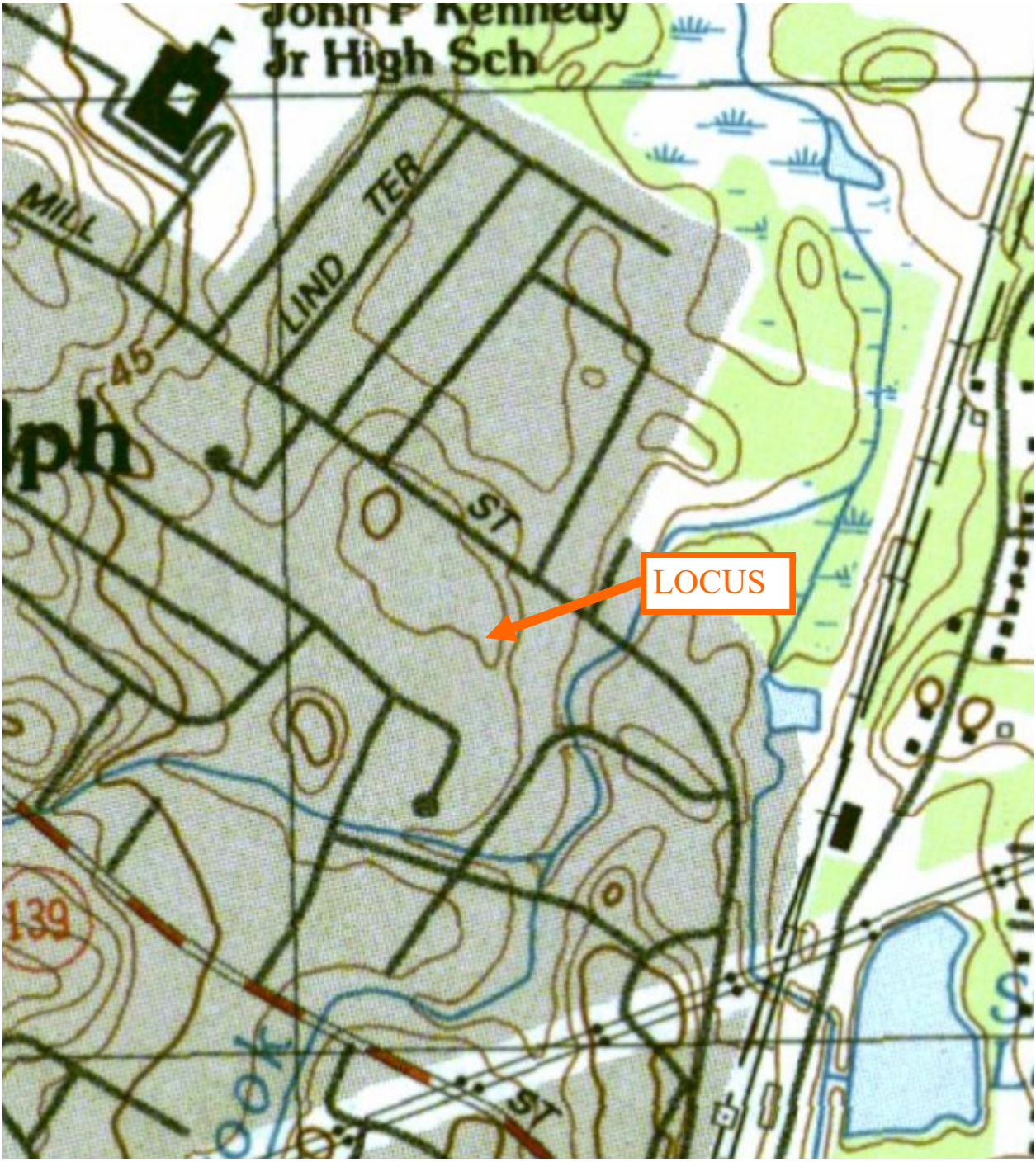
217 Mill St, LLC
228 Park Avenue S, PMB 35567
New York, NY 89135

DeCelle-Burke-Sala & Associates, Inc.

1266 Furnace Brook Parkway, Suite 401 Quincy, MA 02169
(617) 405-5100 (O) (617) 405-5101 (F)

PROJECT TITLE:

Proposed Definitive Subdivision
217 Mill Street
Randolph, Mass.



DATE:	TITLE:	SCALE:
April 10, 2023	**USGS Map**	*NOT TO SCALE*

PREPARED FOR:

217 Mill St, LLC
228 Park Avenue S, PMB 35567
New York, NY 89135

DeCelle-Burke-Sala
& Associates, Inc.

1266 Furnace Brook Parkway, Suite 401 Quincy, MA 02169
(617) 405-5100 (O) (617) 405-5101 (F)

PROJECT TITLE:

Proposed Definitive Subdivision
217 Mill Street
Randolph, Mass.

Hinckley loamy sand, 3 to 8 percent slopes (245B)

▲ Map Unit Composition

85% - ***Hinckley***
Geomorphic Position: *kame terraces*

8% - ***Windsor***
Geomorphic Position: *kame terraces*

5% - ***Sudbury***
Geomorphic Position: *kame terraces*

2% - ***Agawam***
Geomorphic Position: *kame terraces*

▲ Map Unit Data

Map Unit Key: *791714* *[Graphical Summary]*

National Map Unit Symbol: *2svm8*

Map Unit Type: *Consociation*

Farmland Class: *Farmland of statewide importance*

Available Water Storage (0-100cm): *6.61 cm*

Flood Frequency (Dominant Condition): *None*

Flood Frequency (Maximum): *None*

Ponding Frequency: *0*

Drainage Class (Dominant Condition): *Excessively drained*

Drainage Class (Wettest Component): *Excessively drained*

Proportion of Hydric Soils: *0%*

Min. Water Table Depth (Annual): *n/a*

Min. Water Table Depth (April-June): *n/a*

Min. Bedrock Depth: *n/a*

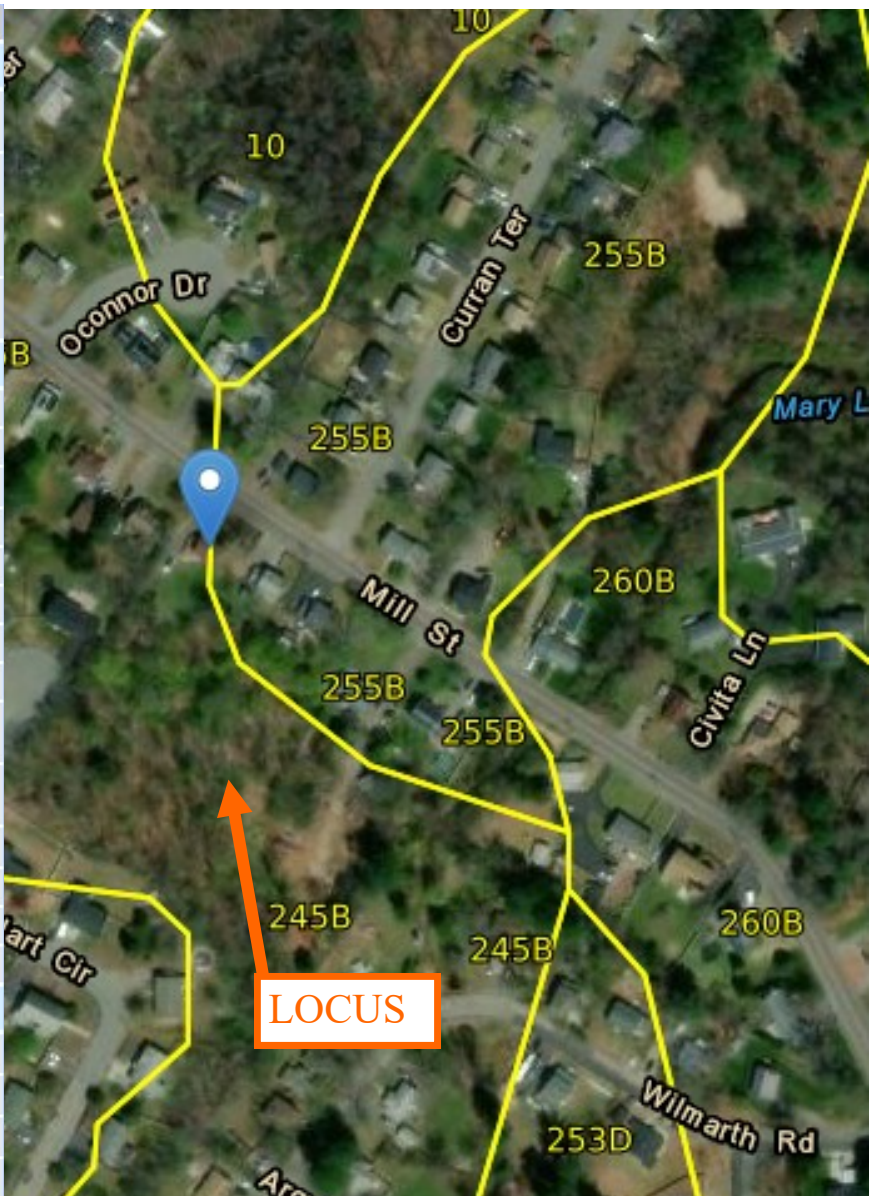
▲ Survey Metadata

Soil Survey Area: *MA616*

Scale: *1:25,000*

Published: *1985*

Last Export: *Sep 9 2022*



DATE:	TITLE:	SCALE:
April 10, 2023	***Soils Map***	***NOT TO SCALE***

PREPARED FOR:

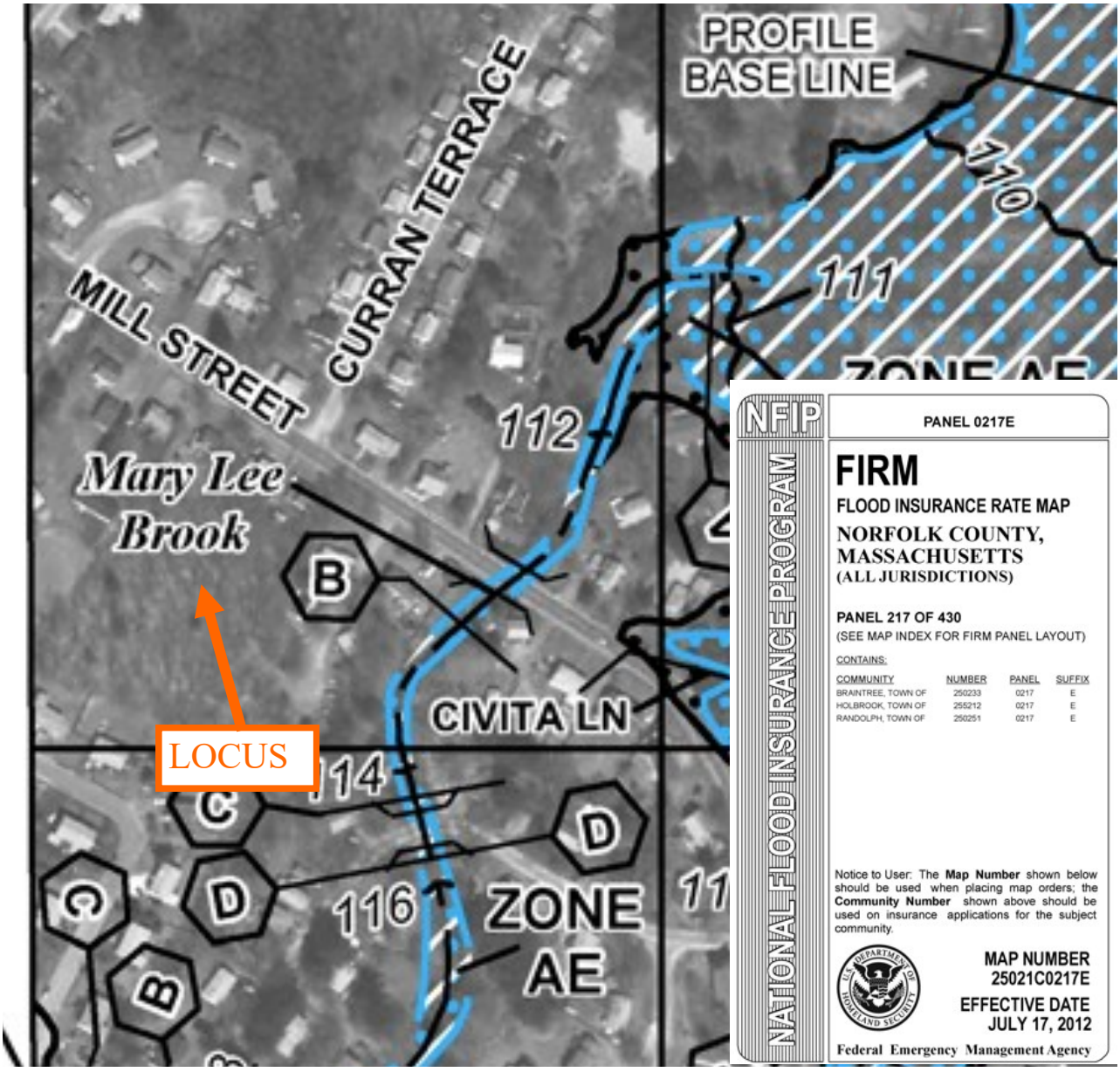
217 Mill St, LLC
228 Park Avenue S, PMB 35567
New York, NY 89135

DeCelle-Burke-Sala
& Associates, Inc.

1266 Furnace Brook Parkway, Suite 401 Quincy, MA 02169
(617) 405-5100 (O) (617) 405-5101 (F)

PROJECT TITLE:

Proposed Definitive Subdivision
217 Mill Street
Randolph, Mass.



DATE:	TITLE:	SCALE:
April 10, 2023	***FEMA Flood Map***	NTS

PREPARED FOR:

217 Mill St, LLC
228 Park Avenue S, PMB 35567
New York, NY 89135

DeCelle-Burke-Sala & Associates, Inc.

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217 Mill Street
Randolph, Mass.

Appendix E Watershed Delineation Plans

LEGEND:

EXISTING:

- LOCUS PROPERTY LINE
- TREE LINE
- SEWER MANHOLE (SMH)
- DRAIN MANHOLE (DMH)
- CATCH BASIN (CB)
- STONEWALL
- GAS VALVE
- WATER VALVE
- WATER SERVICE
- HYDRANT
- UTILITY POLE
- N/F – NOW OR FORMERLY
- D – DRAIN PIPE
- W – WATER MAIN
- G – GAS SERVICE
- UGE – UNDERGROUND POWER
- OHW – OVERHEAD WIRES
- S – SEWER MAIN
- LSA – LANDSCAPED AREA
- 25 – ELEVATION CONTOUR
- x25.7 – SPOT GRADE
- CHAIN LINK FENCE
- STOCKADE FENCE
- TEST PIT
- HAND HOLES FOR UTILITIES
- LIGHT POLE
- DECIDUOUS TREE
- CONIFEROUS TREE

DESCRIPTION	X-1	X-2	X-3	TOTAL
PAVEMENT	3,190 S.F.	0 S.F.	0 S.F.	3,190 S.F.
ROOF	919 S.F.	0 S.F.	0 S.F.	919 S.F.
LAWN	5,640 S.F.	1,467 S.F.	1,983 S.F.	9,090 S.F.
WOODS	2,579 S.F.	9,958 S.F.	51,776 S.F.	64,313 S.F.
TOTAL	12,328 S.F.	11,425 S.F.	53,759 S.F.	77,512 S.F.
Tc	10.2 MIN.	9.8 MIN.	9.8 MIN.	

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COMMONWEALTH OF MASSACHUSETTS
JAMES W. BURKE
No. 40191
REGISTERED PROFESSIONAL ENGINEER

JAMES W. BURKE, P.E. DATE

GENERAL NOTES:

1. LOCUS:

ASSESSORS ID: 51-H-8.01
RECORD OWNER: ARSENAULT FAMILY TRUST
DEED REFERENCE: BOOK 14059 PAGE 498
PLAN REFERENCE: PLAN No. 204 of 1997

2. THIS PLAN IS THE RESULT OF AN ON THE GROUND SURVEY PERFORMED BY THIS OFFICE DURING JUNE 2022. ELEVATIONS SHOWN REFER TO NAVD-88.

3. EXISTING UTILITIES WHERE SHOWN IN THE DRAWINGS ARE FROM SURFACE OBSERVATION AND RECORD INFORMATION AND SHOULD BE CONSIDERED APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY LOCATING AND COORDINATING THE PROPOSED CONSTRUCTION ACTIVITY WITH DIG-SAFE AND THE APPLICABLE UTILITY COMPANIES AND MAINTAINING THE EXISTING UTILITY SYSTEM IN SERVICE.

DIG-SAFE SHALL BE NOTIFIED PER THE STATE OF MASSACHUSETTS STATUTE CHAPTER 82, SECTION 409 AT TEL. 1-888-344-7233. THE ENGINEER DOES NOT GUARANTEE THEIR ACCURACY OR THAT ALL UTILITIES AND SUBSURFACE STRUCTURES ARE SHOWN. LOCATIONS AND ELEVATIONS OF UNDERGROUND UTILITIES WERE TAKEN FROM RECORD PLANS. THE CONTRACTOR SHALL VERIFY SIZE, LOCATION, AND INVERTS OF UTILITIES AND STRUCTURES AS REQUIRED PRIOR TO THE START OF CONSTRUCTION.

4. LOCUS IS LOCATED WITHIN A ZONE X, AS DELINEATED ON FIRM 25021C0217E, EFFECTIVE 07/17/2012.

5. PARCEL IS ZONED RSFHD.

PROJECT TITLE & LOCATION:

CLIFTON COURT DEVELOPMENT
DEFINITIVE SUBDIVISION
217 MILL STREET
RANDOLPH, MA

PLAN TITLE:

EXISTING WATERSHED DELINEATION PLAN

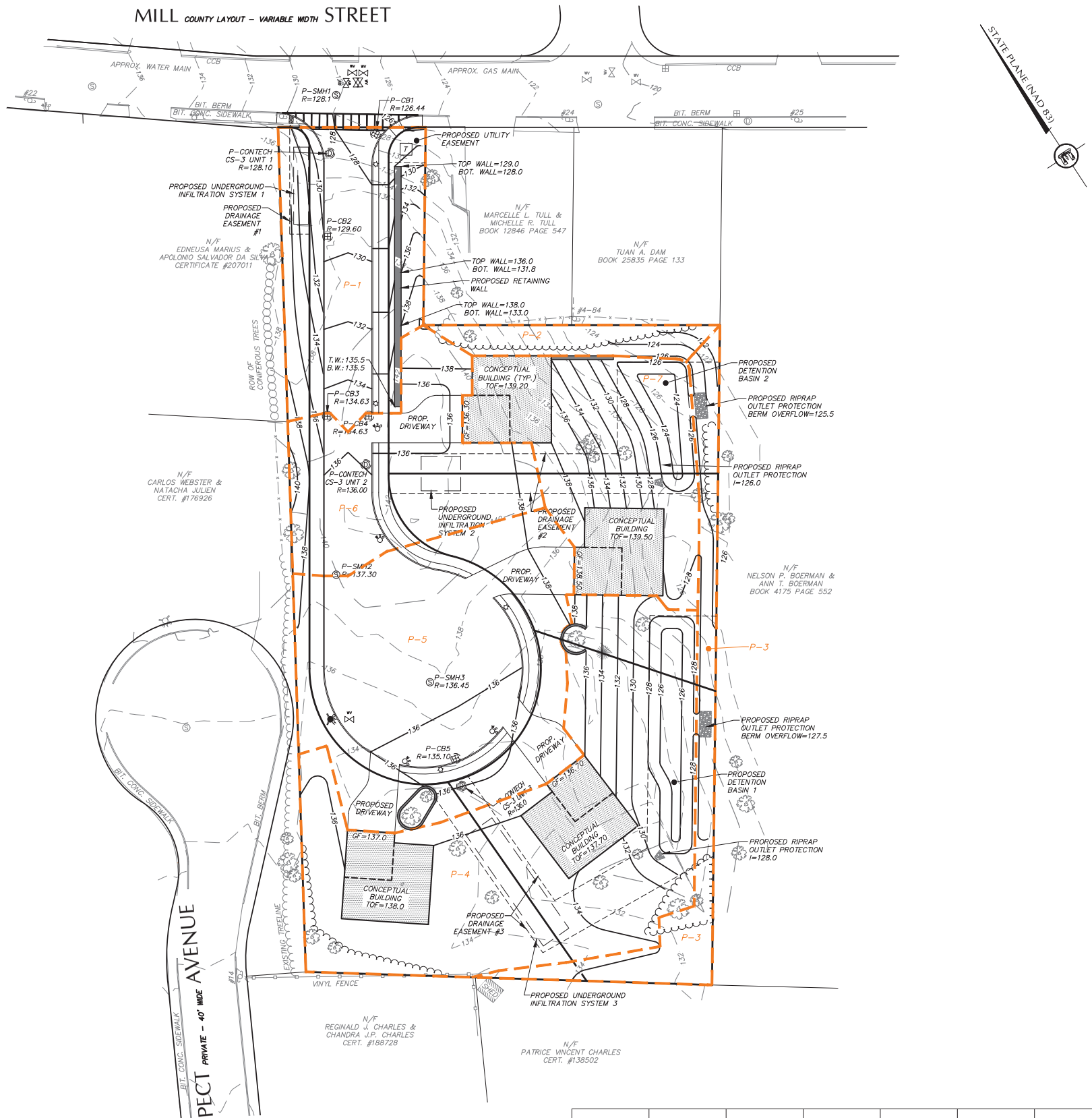
PREPARED FOR:

217 MILL ST, LLC
228 PARK AVENUE S, PMB 35567
NEW YORK, NY 89135

DATE: FEBRUARY 6, 2023
REVISED: APRIL 10, 2023
REVISED:
REVISED:
REVISED:

JOB NUMBER: 2022.030 | SHEET 1 OF 2

30 15 0 30 60
SCALE: 1" = 30'



LEGEND:

EXISTING:		EXISTING:
	– LOCUS PROPERTY LINE	
	– TREE LINE	
S	– SEWER MANHOLE (SMH)	S
D	– DRAIN MANHOLE (DMH)	D
	– CATCH BASIN (CB)	
	– STONEWALL	
GV	– GAS VALVE	GV
WV	– WATER VALVE	WV
	– WATER SERVICE	
	– HYDRANT	
	– UTILITY POLE	
N/F	– NOW OR FORMERLY	
D	– DRAIN PIPE	D
W	– WATER MAIN	W
G	– GAS SERVICE	G
UGE	– UNDERGROUND POWER	UGE
OHW	– OVERHEAD WIRES	OHW
S	– SEWER MAIN	S
LSA	– LANDSCAPED AREA	LSA
25	– ELEVATION CONTOUR	25
x25.7	– SPOT GRADE	x25.7
x x x x	– CHAIN LINK FENCE	x x x x
	– STOCKADE FENCE	
	– HAND HOLES FOR UTILITIES	
	– LIGHT POLE	
CCB	– CAPE COD BERM	CCB
VGC	– VERTICAL GRANITE CURB	VGC
SGC	– SLOPED GRANITE CURB	SGC
FF	– FIRST FLOOR	FF
BF	– BASEMENT FLOOR	BF
TOF	– TOP OF FOUNDATION	TOF
GF	– GARAGE FLOOR	GF
	– DECIDUOUS TREE	
	– CONIFEROUS TREE	

DESCRIPTION	P-1	P-2	P-3	P-4	P-5	P-6	P-7	TOTAL
PAVEMENT	4,541 S.F.	0 S.F.	0 S.F.	0 S.F.	11,917 S.F.	3,210 S.F.	0 S.F.	19,668 S.F.
ROOF	0 S.F.	0 S.F.	0 S.F.	3,760 S.F.	0 S.F.	0 S.F.	3,760 S.F.	7,520 S.F.
LAWN	5,457 S.F.	1,033 S.F.	4,429 S.F.	17,923 S.F.	6,277 S.F.	5,860 S.F.	6,908 S.F.	47,887 S.F.
WOODS	0 S.F.	1,031 S.F.	434 S.F.	972 S.F.	0 S.F.	0 S.F.	0 S.F.	2,437 S.F.
TOTAL	9,998 S.F.	2,064 S.F.	4,863 S.F.	22,655 S.F.	18,194 S.F.	9,070 S.F.	10,668 S.F.	77,512 S.F.
Tc	6 MIN.	6 MIN.	6 MIN.	6 MIN.	6 MIN.	6 MIN.	6 MIN.	

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COMMONWEALTH OF MASSACHUSETTS
JAMES W. BURKE
No. 40961
REGISTERED PROFESSIONAL ENGINEER

JAMES W. BURKE, P.E. DATE

GENERAL NOTES:

1. LOCUS:

ASSESSORS ID: 51-H-8.01
RECORD OWNER: ARSENAULT FAMILY TRUST
DEED REFERENCE: BOOK 14059 PAGE 498
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4. LOCUS IS LOCATED WITHIN A ZONE X, AS DELINEATED ON FIRM 25021C0217E, EFFECTIVE 07/17/2012.

5. PARCEL IS ZONED RSFHD.

PROJECT TITLE & LOCATION:

CLIFTON COURT DEVELOPMENT
DEFINITIVE SUBDIVISION
217 MILL STREET
RANDOLPH, MA

PLAN TITLE:

PROPOSED WATERSHED DELINEATION PLAN

PREPARED FOR:

217 MILL ST, LLC
228 PARK AVENUE S, PMB 35567
NEW YORK, NY 89135

DATE: FEBRUARY 6, 2023
REVISED: APRIL 10, 2023
REVISED:
REVISED:
REVISED:

JOB NUMBER: 2022.030 | SHEET 2 OF 2

30 15 0 30 60
SCALE: 1" = 30'

PLANNING DEPARTMENT

FORM D
REQUEST FOR WAIVERS IN A DEFINITIVE SUBDIVISION PLAN

Subdivision Name	Clifton Court Development				
Assessor Parcel ID	51-H-8.01	**Norfolk County Registry of Deeds**	*Book/Page or Certificate #* Book 14059 Page 498		
Parcel Location	217 Mill Street	**Existing Way**	☑ **Public Way** ☐ **Private Way**	**Zoning**	RSFHD
Parcel Size (sq. ft.)	77,512+/-	**Total proposed lots**	4		
Definitive plan date	02 / 06 / 2023	**Revision Date** **Revision Date**	04 / 10 / 2023 ___/___/___		
Proposed Way #1 to be used as frontage		☐ **Public Way** ☑ **Private Way**	**Est Length**	350+/- Feet	
Proposed Way #2 to be used as frontage		☐ **Public Way** ☐ **Private Way**	**Est Length**		

Applicant	217 Mill St, LLC		
Contact person	Francis Sun		
Address	228 Park Avenue s, PMB35567, New York, NY 89135		
Address2			
Phone	617-949-0451	**Email**	francis.sun@owncoral.com

☑ *Check if Applicant is equitable owner (purchaser on a purchase and sales agreement)*

I hereby request that the Planning Board waive the requirements of the Sections of the Randolph S Rules and Regulations referenced below and as the aforementioned Applicant, affirm that without the Planning Board granting said waiver(s), it would pose an unnecessary hardship upon me and, due to specific circumstances relative to the subdivision, or conditions of the land in such subdivision, the granting of this waiver(s) would not be contrary to the spirit and intent of the Town of Randolph Subdivision Rules and Regulations. *(Attach additional sheets if necessary)*

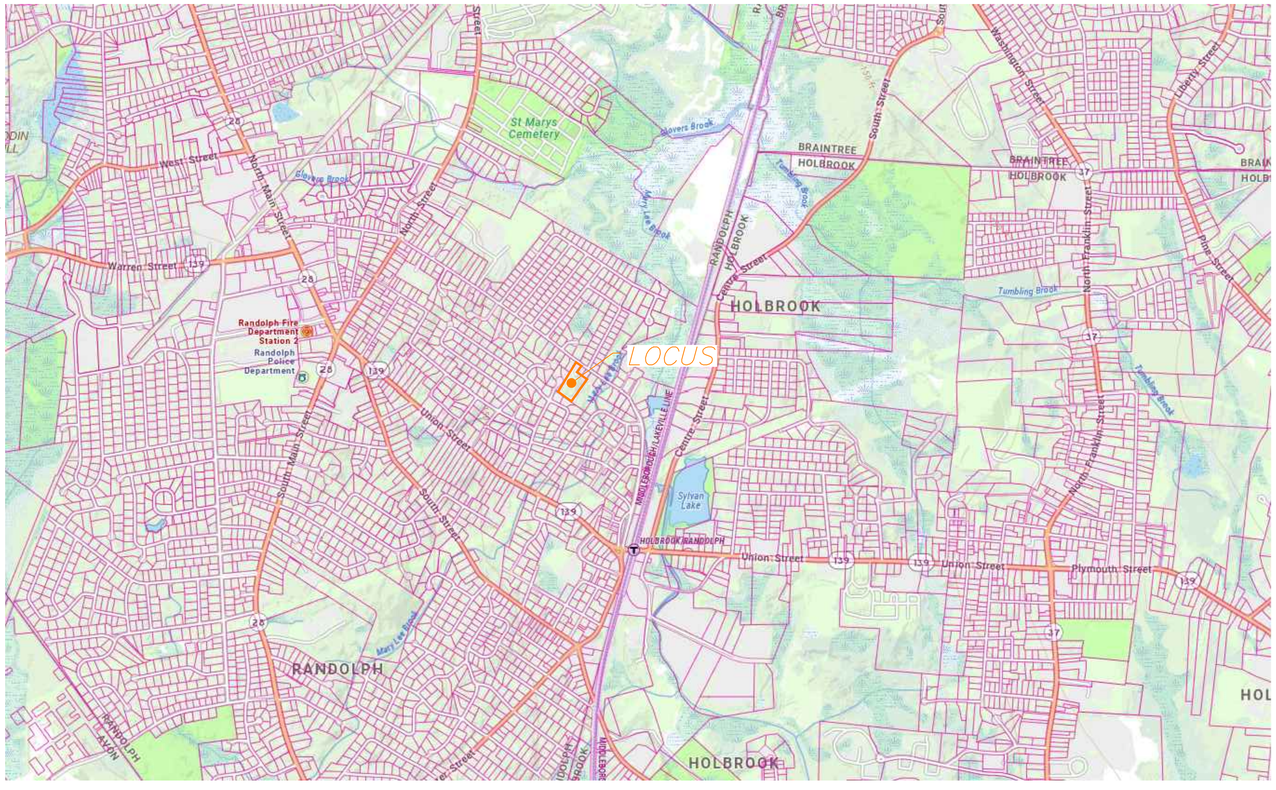
Regulation	**Reason for Waiver**	
Section and/or subsection requested to be waived	Proposed alternative	Explanation of why the regulation cannot be accomplished.
VIII.B3	129+/- feet	The locus property is located closer than 200' from Curran Terrace and there is no way to meet the 200' minimum between intersections requirement.
VIII.D19	Drainage facilities are located on easements	Given the lot areas, it is not feasible to avoid putting drainage facilities on the building lots.
V.D.1	1" = 30' horizontal scale 1"=3' vertical scale	The required 1"=40' horizontal scale would be too small to relay all of the proposed information in a readable manner. A 1"=30' scale allows for a more legible plan and fits the 24"x36" sheet in a nicer manner. A 1"=3' vertical scale was used to maintain the 1:10 vertical exaggeration on the profiles. 1:10 vertical exaggeration is a common practice.

I acknowledge, as the Applicant, that this waiver is requested in accordance with the provisions set forth in the Subdivision Control Law of the Commonwealth of Massachusetts and the Rules and Regulations Governing the Subdivision of Land by the Planning Board of the Town of Randolph.

Applicant	He "Francis" Sun	04/13/2023
	Printed Name	Date

CLIFTON COURT DEVELOPMENT
DEFINITIVE SUBDIVISION
217 MILL STREET
RANDOLPH, MASSACHUSETTS

FEBRUARY 6, 2023



LOCUS MAP

IMAGE FROM MASSGIS 2022
1" = 800'

SHEETS

ZONING SCHEDULE
(TOWN OF RANDOLPH ZONING CODE DATED AUGUST 9, 2021)

LOT ZONING CLASSIFICATION : RSHDD a/k/a RSFHD

ZONING REQUIREMENT	REQUIRED
MIN. LOT AREA	– 12,000 S.F.
MIN. LOT FRONTAGE	– 100 FEET
MIN. LOT WIDTH	– 75 FEET
MIN. LOT DEPTH	– 100 FEET
MIN. FRONT SETBACK	– 25 FEET
MIN. SIDE SETBACK	– 15 FEET
MIN. REAR SETBACK	– 15 FEET
MAX. BUILDING HEIGHT	– 2.5 STORIES/40 FEET

LIST OF WAIVERS
(TOWN OF RANDOLPH SUBDIVISION REGULATIONS EFFECTIVE JANUARY 28, 2020)

SUBDIVISION REQUIREMENT	REQUIRED	PROPOSED	SUBDIVISION REGULATION SECTION
MIN. INTERSECTION OFFSET	200 FEET	129± FEET	SECTION VIII.B3
DRAINAGE STRUCTURES ON SEPARATE LOTS			SECTION VIII.D19
DRAINAGE STRUCTURES ON SEPARATE LOTS	1" = 40' SCALE (HORIZONTAL) 1" = 4' SCALE (VERTICAL)	1" = 30' SCALE (HORIZONTAL) 1" = 3' SCALE (VERTICAL)	SECTION V.D.1

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APPLICANT
217 MILL ST, LLC
228 PARK AVENUE S, PMB35567
NEW YORK, NY 89135

OWNER
ARSENAULT FAMILY TRUST
217 MILL STREET
RANDOLPH, MA 02368

ARCHITECT
DONAHUE ARCHITECTS, INC.
21 McGRATH HIGHWAY
QUINCY, MA 02169

CIVIL/SURVEY
DECELLE-BURKE-SALA & ASSOCIATES
1266 FURNACE BROOK PKWY., SUITE 401
QUINCY, MA 02169

COMMONWEALTH OF MASSACHUSETTS
JAMES W. ROPKO
No. 49041
REGISTERED PROFESSIONAL ENGINEER

COMMONWEALTH OF MASSACHUSETTS
CLAUDIO SALA
No. 38391
PROFESSIONAL LAND SURVEYOR

Project No. 2022.030

REVISIONS

NO.	DATE	COMMENT
1.	04-10-2023	PEER REVIEW & PLANNING BOARD COMMENT REVISIONS

SOIL TEST PIT DATA:

TEST PIT 1
GRD. EL. 132.8
GW. EL. 126.8

0"	Ap, Sandy Loam 10YR3/2, Granular, Very Friable
12"	Bw, Sandy Loam 10YR5/6, Massive, Friable
24"	C_g SAND 2.5Y5/3, Single Grained, Loose Coarse gravelly sand with cobbles
41"	C_{g2} SAND 2.5Y5/3, Single Grained, Loose medium sand, little to no gravel
	Redox. @ 72" 7.5YR5/8
75"	C_{g3} SAND 2.5Y5/3, Single Grained, Loose Coarse gravelly sand with cobbles Standing water
114"+	

TEST PIT 2
GRD. EL. 128.3
GW. EL. NGWO

0"	Ap, Sandy Loam 10YR3/2, Granular, Very Friable
12"	Bw, Sandy Loam 10YR5/6, Massive, Friable
30"	C, SAND 2.5Y5/4, Single Grained, Loose Coarse gravelly sand with cobbles,
84"+	

TEST PIT 3
GRD. EL. 127.0
GW. EL. NGWO

0"	Ap, Sandy Loam 10YR3/2, Granular, Very Friable
9"	Bw, Sandy Loam 10YR5/6, Massive, Friable
24"	C, SAND 2.5Y5/4, Single Grained, Loose Coarse gravelly sand with cobbles,
84"+	

TEST PIT 4
GRD. EL. 141.5
GW. EL. NGWO

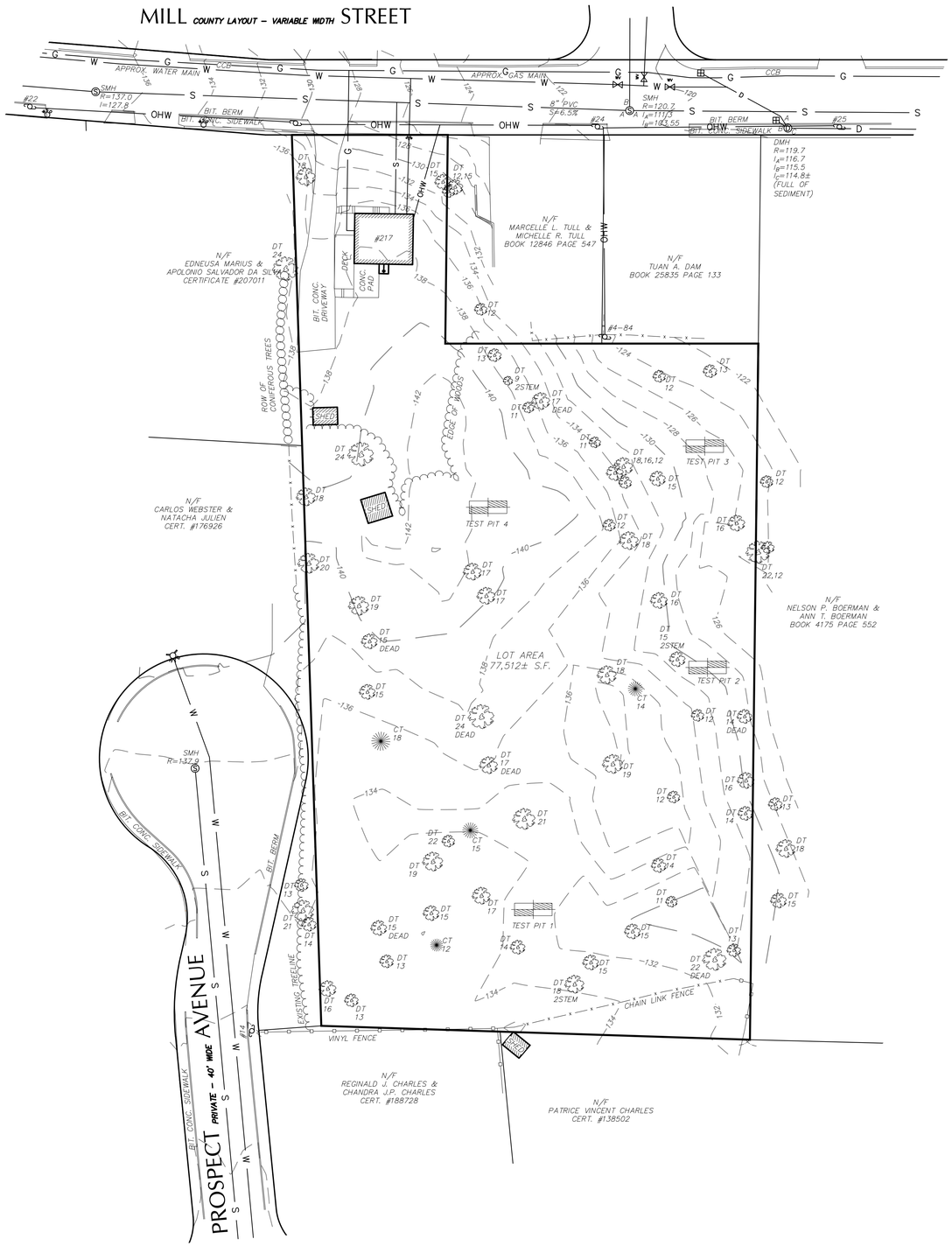
0"	Ap, Sandy Loam 10YR3/2, Granular, Very Friable
10"	Bw, Sandy Loam 10YR5/6, Massive, Friable
24"	C, SAND 2.5Y5/4, Single Grained, Loose Coarse gravelly sand with cobbles,
120"+	

DATE:
02/22/2023
TEST BY:
Kameron Campbell, SE #14227

INDICATES ESTIMATED SEASONAL HIGH GROUND WATER

INDICATES OBSERVED GROUND WATER

MA STATE PLANE (NAD 83)



LEGEND:

EXISTING:

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COMMONWEALTH OF MASSACHUSETTS
CLAUDIO SALA No. 38391
PROFESSIONAL LAND SURVEYOR

CLAUDIO SALA, PLS — DATE

GENERAL NOTES:

1. LOCUS:

ASSESSORS ID: 51-H-8.01
RECORD OWNER: ARSENAULT FAMILY TRUST
DEED REFERENCE: BOOK 14059 PAGE 498
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5. PARCEL IS ZONED RSFHD.

PROJECT TITLE & LOCATION:

CLIFTON COURT DEVELOPMENT
DEFINITIVE SUBDIVISION
217 MILL STREET
RANDOLPH, MA

PLAN TITLE:

EXISTING CONDITIONS

PREPARED FOR:

217 MILL ST, LLC
228 PARK AVENUE S, PMB 35567
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DATE: FEBRUARY 6, 2023
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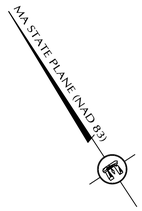
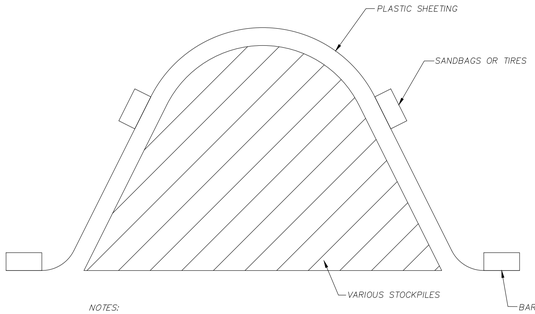
30 15 0 30 60
SCALE: 1" = 30'



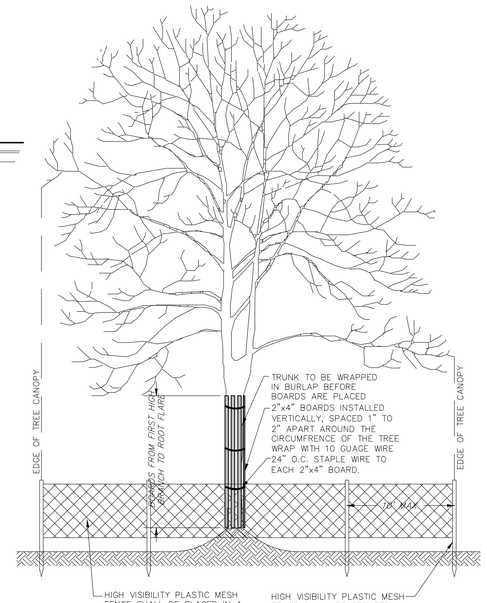


NOTES:

1. MINIMUM 12" OVERLAP OF ALL SEAMS REQUIRED.
2. BARRIER REQUIRED AT TOE OF SLOPE
3. COVERING MAINTAINED TIGHTLY IN PLACE USING SANDBAGS OR TIRES ON ROPE WITH A MAXIMUM 10' SPACING IN ALL DIRECTIONS

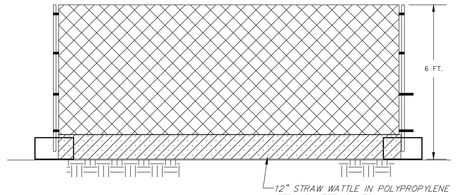
PLASTIC SHEETING OVER STOCKPILED MATERIALS

NOT TO SCALE



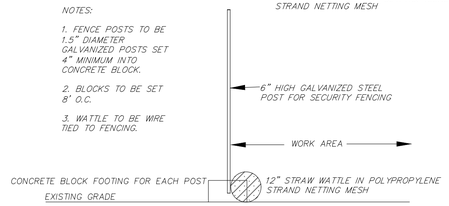
TREE PROTECTION DETAIL

NOT TO SCALE



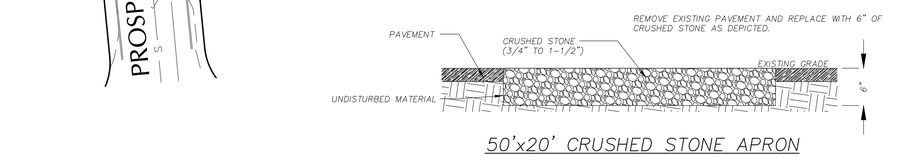
NOTES:

1. FENCE POSTS TO BE 1.5" DIAMETER GALVANIZED POSTS SET 4" MINIMUM INTO CONCRETE BLOCK.
2. BLOCKS TO BE SET 8' O.C.
3. WATTLE TO BE WIRE TIED TO FENCING.



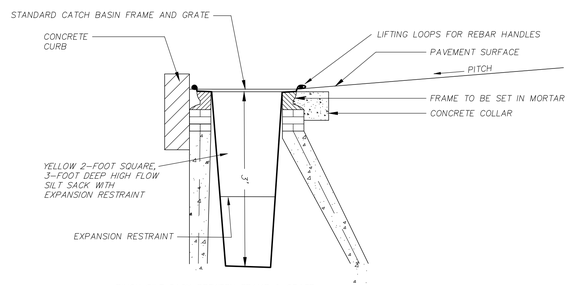
SECURITY FENCING W/ EROSION CONTROL

NOT TO SCALE



50'x20' CRUSHED STONE APRON

NOT TO SCALE



PINCH SILT SACK BETWEEN FRAME & GRATE.
INSPECT SILT SACK AFTER EACH STORM EVENT
PERFORM MAINTENANCE WHEN SILT AND DEBRIS IS 12" DEEP

CATCH BASIN SILT SACK

NOT TO SCALE

LEGEND:

EXISTING:		PROPOSED:
	– LOCUS PROPERTY LINE	
	– TREE LINE	
S	– SEWER MANHOLE (SMH)	S
D	– DRAIN MANHOLE (DMH)	D
	– CATCH BASIN (CB)	
	– STONEWALL	
GV	– GAS VALVE	GV
W	– WATER VALVE	W
	– WATER SERVICE	
	– HYDRANT	
	– UTILITY POLE	
N/F	– NOW OR FORMERLY	
D	– DRAIN PIPE	D
W	– WATER MAIN	W
G	– GAS SERVICE	G
UGE	– UNDERGROUND POWER	UGE
OHW	– OVERHEAD WIRES	OHW
S	– SEWER MAIN	S
LSA	– LANDSCAPED AREA	LSA
25	– ELEVATION CONTOUR	25
x25.7	– SPOT GRADE	x25.7
x x x x	– CHAIN LINK FENCE	x x x x
	– STOCKADE FENCE	
	– HAND HOLES FOR UTILITIES	
	– LIGHT POLE	
CCB	– CAPE COD BERM	CCB
VGC	– VERTICAL GRANITE CURB	VGC
SGC	– SLOPED GRANITE CURB	SGC
FF	– FIRST FLOOR	FF
BF	– BASEMENT FLOOR	BF
TOF	– TOP OF FOUNDATION	TOF
GF	– GARAGE FLOOR	GF
	– DECIDUOUS TREE	
	– CONIFEROUS TREE	

DeCelle-Burke-Sala & Associates, Inc.
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617-405-5100 (o) 617-405-5101 (f)
www.decelle-burke-sala.com

COMMONWEALTH OF MASSACHUSETTS
JAMES W. BURKE
No. 24081
REGISTERED PROFESSIONAL ENGINEER

JAMES W. BURKE, P.E. DATE

GENERAL NOTES:

1. LOCUS:

ASSESSORS ID: 51-H-8.01
RECORD OWNER: ARSENAULT FAMILY TRUST
DEED REFERENCE: BOOK 14059 PAGE 498
PLAN REFERENCE: PLAN No. 204 of 1997

2. THIS PLAN IS THE RESULT OF AN ON THE GROUND SURVEY PERFORMED BY THIS OFFICE DURING JUNE 2022. ELEVATIONS SHOWN REFER TO NAVD-88.

3. EXISTING UTILITIES WHERE SHOWN IN THE DRAWINGS ARE FROM SURFACE OBSERVATION AND RECORD INFORMATION AND SHOULD BE CONSIDERED APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY LOCATING AND COORDINATING THE PROPOSED CONSTRUCTION ACTIVITY WITH DIG-SAFE AND THE APPLICABLE UTILITY COMPANIES AND MAINTAINING THE EXISTING UTILITY SYSTEM IN SERVICE.

DIG-SAFE SHALL BE NOTIFIED PER THE STATE OF MASSACHUSETTS STATUTE CHAPTER 82, SECTION 409 AT TEL. 1-888-344-7233. THE ENGINEER DOES NOT GUARANTEE THEIR ACCURACY OR THAT ALL UTILITIES AND SUBSURFACE STRUCTURES ARE SHOWN. LOCATIONS AND ELEVATIONS OF UNDERGROUND UTILITIES WERE TAKEN FROM RECORD PLANS. THE CONTRACTOR SHALL VERIFY SIZE, LOCATION, AND INVERTS OF UTILITIES AND STRUCTURES AS REQUIRED PRIOR TO THE START OF CONSTRUCTION.

4. LOCUS IS LOCATED WITHIN A ZONE X, AS DELINEATED ON FIRM 25021C0217E, EFFECTIVE 07/17/2012.

5. PARCEL IS ZONED RSFHD.

PROJECT TITLE & LOCATION:

CLIFTON COURT DEVELOPMENT
DEFINITIVE SUBDIVISION
217 MILL STREET
RANDOLPH, MA

PLAN TITLE:

CONSTRUCTION MANAGEMENT

PREPARED FOR:

217 MILL ST, LLC
228 PARK AVENUE S, PMB 35567
NEW YORK, NY 89135

DATE: FEBRUARY 6, 2023
REVISED: APRIL 10, 2023
REVISED:
REVISED:
REVISED:

JOB NUMBER: 2022.030 | SHEET 3 OF 11

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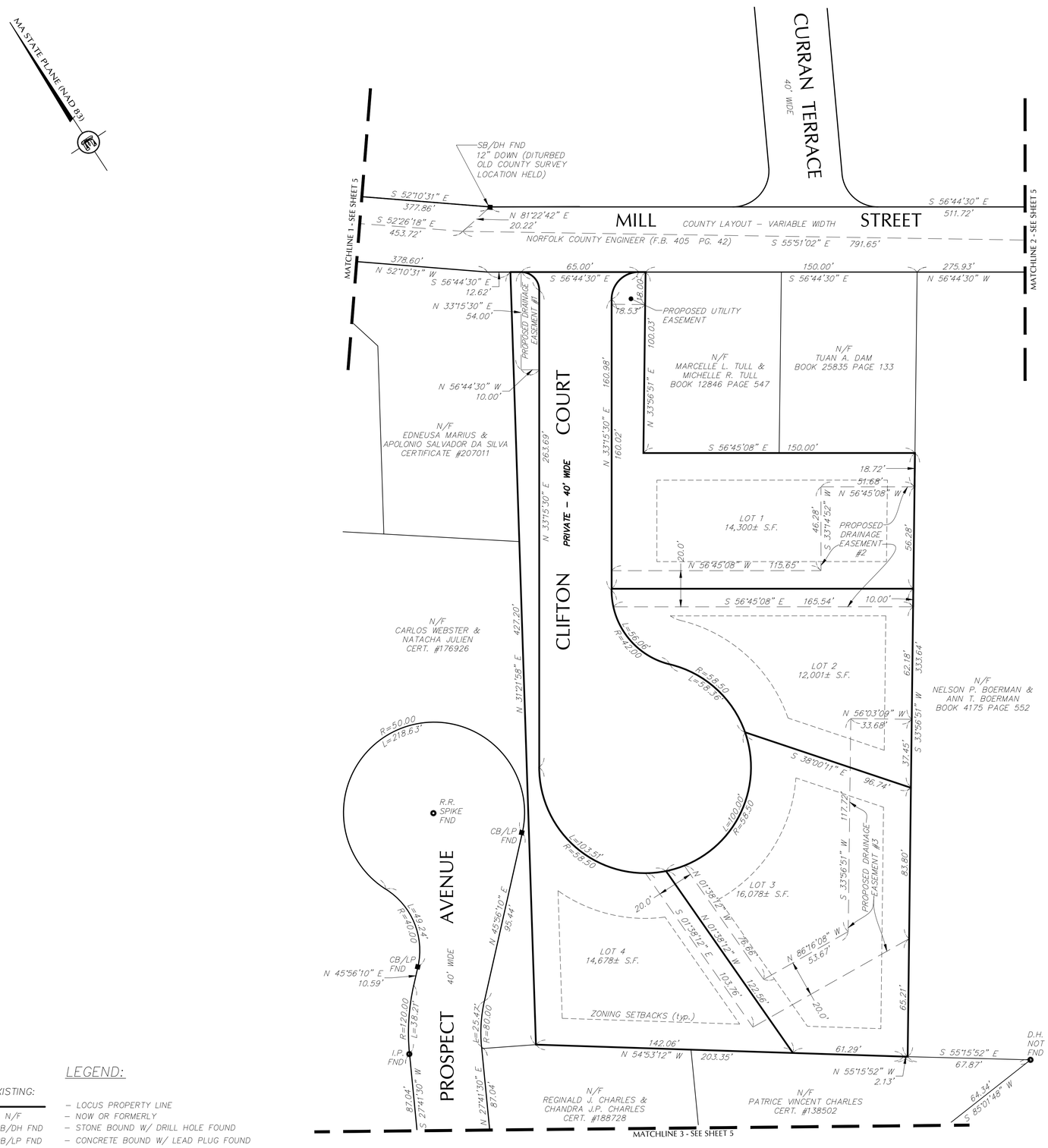
SCALE: 1" = 30'



LEGEND:

EXISTING:

	– LOCUS PROPERTY LINE
N/F	– NOW OR FORMERLY
■ SB/DH FND	– STONE BOUND W/ DRILL HOLE FOUND
■ CB/LP FND	– CONCRETE BOUND W/ LEAD PLUG FOUND
■ CB/DH FND	– CONCRETE BOUND W/ DRILL HOLE FOUND
◉ DH/FND	– DRILL HOLE FOUND
○ PIPE/FND	– PIPE FOUND

FOR REGISTRY USE ONLY

I CERTIFY THAT THIS PLAN CONFORMS WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS IN THE COMMONWEALTH OF MASSACHUSETTS

CLAUDIO SALA, PLS DATE

APPROVED BY

PLANNING BOARD
TOWN OF RANDOLPH

Date:

PLANNING BOARD ENDORSEMENT UNDER THE SUBDIVISION CONTROL LAW SHOULD NOT BE CONSIDERED AS EITHER AN ENDORSEMENT OR APPROVAL OF ZONING REQUIREMENTS.

ZONING SCHEDULE

(TOWN OF RANDOLPH ZONING CODE DATED AUGUST 9, 2021)

LOT ZONING CLASSIFICATION : RSHDD a/k/a RSFHD

ZONING REQUIREMENT	REQUIRED
MIN. LOT AREA	– 12,000 S.F.
MIN. LOT FRONTAGE	– 100 FEET
MIN. LOT WIDTH	– 75 FEET
MIN. LOT DEPTH	– 100 FEET
MIN. FRONT SETBACK	– 25 FEET
MIN. SIDE SETBACK	– 15 FEET
MIN. REAR SETBACK	– 15 FEET
MAX. BUILDING HEIGHT	– 2.5 STORIES/40 FEET

OWNED BY:

ARSENAULT FAMILY TRUST
217 MILL STREET, RANDOLPH, MA 02368
DEED REFERENCE: BOOK 14059 PAGE 498

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& Associates, Inc.
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Quincy, MA 02169
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COMMONWEALTH OF MASSACHUSETTS
CLAUDIO SALA
No. 38391
PROFESSIONAL LAND SURVEYOR

CLAUDIO SALA, PLS DATE

GENERAL NOTES:

1. LOCUS:

ASSESSORS ID: 51-H-8.01
RECORD OWNER: ARSENAULT FAMILY TRUST
DEED REFERENCE: BOOK 14059 PAGE 498
PLAN REFERENCE: PLAN No. 204 of 1997

2. THIS PLAN IS THE RESULT OF AN ON THE GROUND SURVEY PERFORMED BY THIS OFFICE DURING JUNE 2022. ELEVATIONS SHOWN REFER TO NAVD-88.

3. LOCUS IS LOCATED WITHIN A ZONE X, AS DELINEATED ON FIRM 25021C0217E, EFFECTIVE 07/17/2012.

PLAN REFERENCES:

NORFOLK COUNTY REGISTRY OF DEEDS

PL. BK. 96 PLAN No. 4658
PL. BK. 319 PLAN No. 207 of 1985
PL. BK. 383 PLAN No. 682 of 1989
PL. BK. 406 PLAN No. 638 OF 1992
PL. BK. 446 PLAN No. 204 of 1997
PL. BK. 449 PLAN No. 515 of 1997
PL. BK. 491 PLAN No. 693 of 2001
PLAN No. 770 of 1957
PLAN No. 267 of 1972
PLAN No. 529 of 1976

LAND COURT

LC PLAN 24454
LC PLAN 29830
LC PLAN 30039
LC PLAN 35883

NORFOLK COUNTY ENGINEERING DEPARTMENT

FIELD BOOK 15 PAGES 18-25
FIELD BOOK 405 PAGES 13-24
FIELD BOOK 405 PAGES 35-55
PLAN BOOK 8 PAGE 529

PROJECT TITLE & LOCATION:

CLIFTON COURT DEVELOPMENT
DEFINITIVE SUBDIVISION
217 MILL STREET
RANDOLPH, MA

PLAN TITLE:

DEFINITIVE SUBDIVISION PLAN
SHEET 1

PREPARED FOR:

217 MILL ST, LLC
228 PARK AVENUE S, PMB 35567
NEW YORK, NY 89135

DATE: FEBRUARY 6, 2023
REVISED: APRIL 10, 2023
REVISED:
REVISED:
REVISED:
JOB NUMBER: 2022.030 | SHEET 4 OF 11

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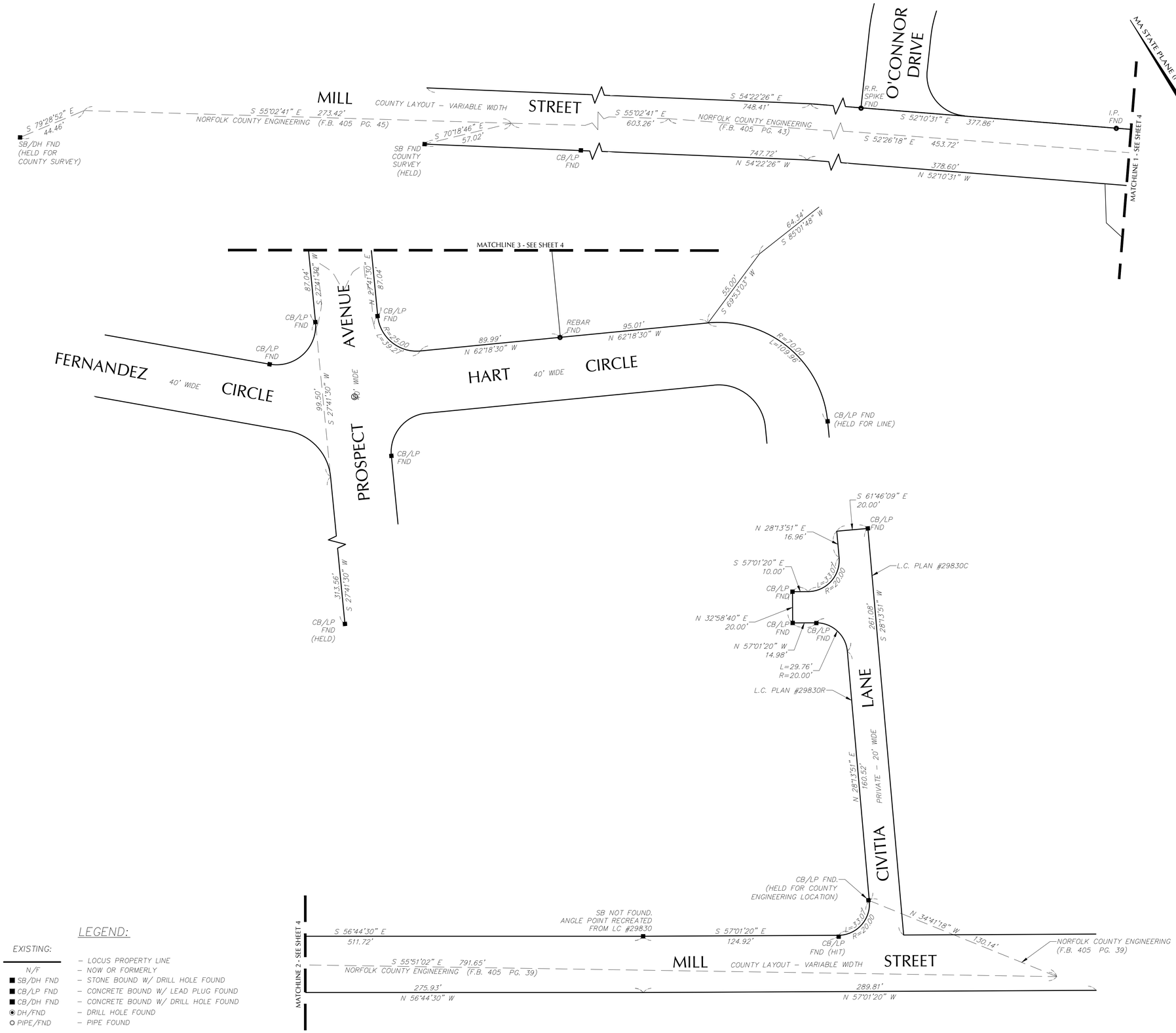

LEGEND:

EXISTING:

N/F	– NOW OR FORMERLY
■ SB/DH FND	– STONE BOUND W/ DRILL HOLE FOUND
■ CB/LP FND	– CONCRETE BOUND W/ LEAD PLUG FOUND
■ CB/DH FND	– CONCRETE BOUND W/ DRILL HOLE FOUND
◉ DH/FND	– DRILL HOLE FOUND
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FOR REGISTRY USE ONLY

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CLAUDIO SALA, PLS DATE

APPROVED BY

PLANNING BOARD
TOWN OF RANDOLPH

Date:

PLANNING BOARD ENDORSEMENT UNDER THE SUBDIVISION CONTROL LAW SHOULD NOT BE CONSIDERED AS EITHER AN ENDORSEMENT OR APPROVAL OF ZONING REQUIREMENTS.

OWNED BY:

ARSENAULT FAMILY TRUST
217 MILL STREET, RANDOLPH, MA 02368
DEED REFERENCE: BOOK 14059 PAGE 498

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COMMONWEALTH OF MASSACHUSETTS
CLAUDIO SALA
No. 38391
PROFESSIONAL LAND SURVEYOR

CLAUDIO SALA, PLS DATE

GENERAL NOTES:

1. LOCUS:

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NORFOLK COUNTY ENGINEERING DEPARTMENT

FIELD BOOK 15 PAGES 18-25
FIELD BOOK 405 PAGES 13-24
FIELD BOOK 405 PAGES 35-55
PLAN BOOK 8 PAGE 529

PROJECT TITLE & LOCATION:

CLIFTON COURT DEVELOPMENT
DEFINITIVE SUBDIVISION
217 MILL STREET
RANDOLPH, MA

PLAN TITLE:

DEFINITIVE SUBDIVISION PLAN
SHEET 2

PREPARED FOR:

217 MILL ST, LLC
228 PARK AVENUE S, PMB 35567
NEW YORK, NY 89135

DATE: FEBRUARY 6, 2023	
REVISED: APRIL 10, 2023	
REVISED:	
REVISED:	
REVISED:	
JOB NUMBER: 2022.030	SHEET 5 OF 11

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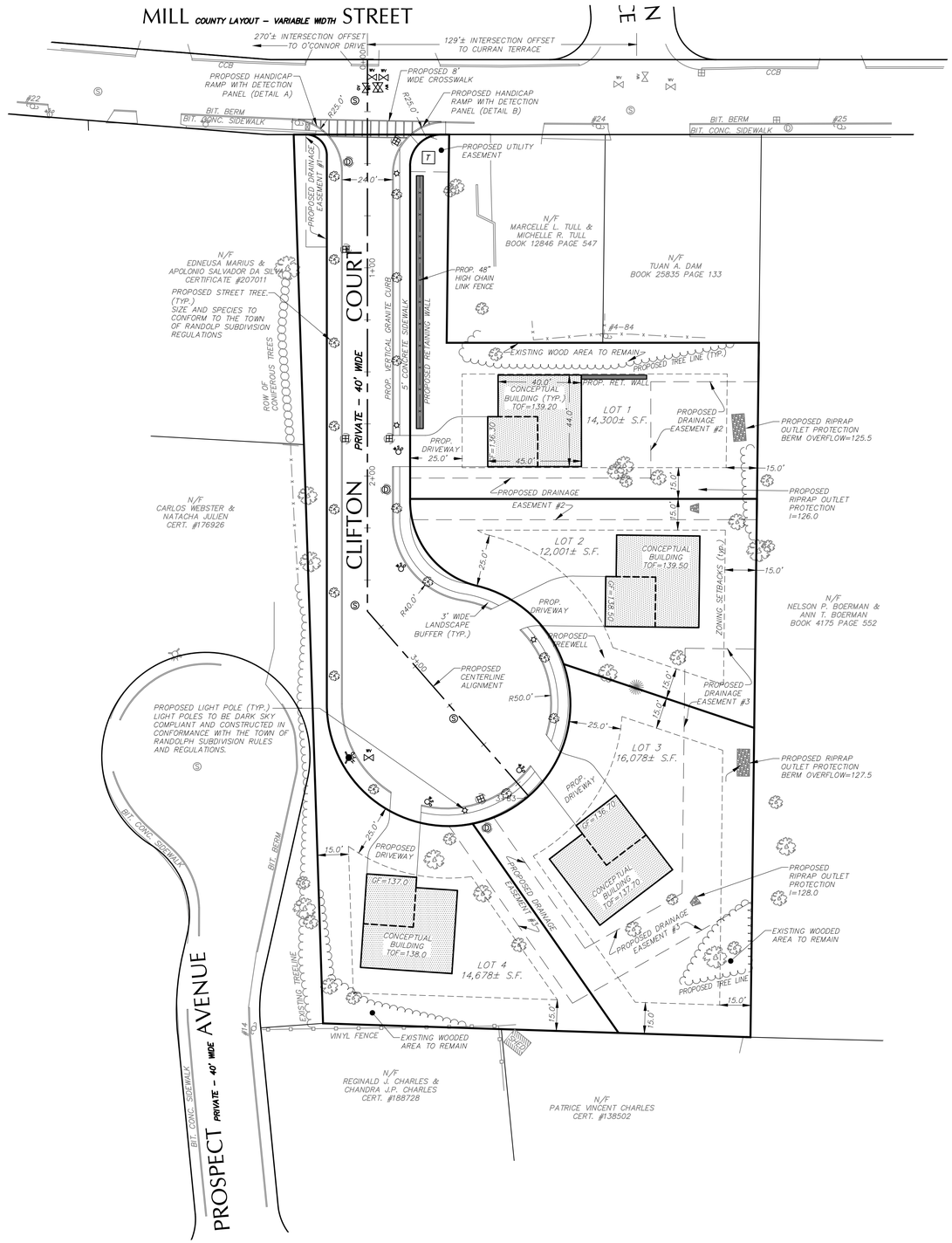
SCALE: 1" = 30'



LEGEND:

EXISTING:		PROPOSED:
	– LOCUS PROPERTY LINE	
	– TREE LINE	
Ⓢ	– SEWER MANHOLE (SMH)	Ⓢ
Ⓓ	– DRAIN MANHOLE (DMH)	Ⓓ
	– CATCH BASIN (CB)	
	– STONEWALL	
GV	– GAS VALVE	GV
WV	– WATER VALVE	WV
	– WATER SERVICE	
	– HYDRANT	
	– UTILITY POLE	
N/F	– NOW OR FORMERLY	
D	– DRAIN PIPE	D
W	– WATER MAIN	W
G	– GAS SERVICE	G
UGE	– UNDERGROUND POWER	UGE
OHW	– OVERHEAD WIRES	OHW
S	– SEWER MAIN	S
LSA	– LANDSCAPED AREA	LSA
25	– ELEVATION CONTOUR	25
x25.7	– SPOT GRADE	x25.7
– x – x – x –	– CHAIN LINK FENCE	– x – x – x –
	– STOCKADE FENCE	
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CCB	– CAPE COD BERM	CCB
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SGC	– SLOPED GRANITE CURB	SGC
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BF	– BASEMENT FLOOR	BF
TOF	– TOP OF FOUNDATION	TOF
GF	– GARAGE FLOOR	GF
	– DECIDUOUS TREE	
	– CONIFEROUS TREE	

ZONING SCHEDULE

(TOWN OF RANDOLPH ZONING CODE DATED AUGUST 9, 2021)

LOT ZONING CLASSIFICATION : RSHDD a/k/a RSFHD

ZONING REQUIREMENT	REQUIRED
MIN. LOT AREA	– 12,000 S.F.
MIN. LOT FRONTAGE	– 100 FEET
MIN. LOT WIDTH	– 75 FEET
MIN. LOT DEPTH	– 100 FEET
MIN. FRONT SETBACK	– 25 FEET
MIN. SIDE SETBACK	– 15 FEET
MIN. REAR SETBACK	– 15 FEET
MAX. BUILDING HEIGHT	– 2.5 STORIES/40 FEET

LIST OF WAIVERS

(TOWN OF RANDOLPH SUBDIVISION REGULATIONS EFFECTIVE JANUARY 28, 2020)

SUBDIVISION REQUIREMENT	REQUIRED	PROPOSED
MIN. INTERSECTION OFFSET DRAINAGE STRUCTURES ON SEPARATE LOTS	200 FEET	129± FEET

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COMMONWEALTH OF MASSACHUSETTS
JAMES W. BURKE
No. 34868
REGISTERED PROFESSIONAL ENGINEER

JAMES W. BURKE, P.E. DATE

GENERAL NOTES:

1. LOCUS:

ASSESSORS ID: 51-H-8.01
RECORD OWNER: ARSENAULT FAMILY TRUST
DEED REFERENCE: BOOK 14059 PAGE 498
PLAN REFERENCE: PLAN No. 204 of 1997

2. THIS PLAN IS THE RESULT OF AN ON THE GROUND SURVEY PERFORMED BY THIS OFFICE DURING JUNE 2022. ELEVATIONS SHOWN REFER TO NAVD-88.

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4. LOCUS IS LOCATED WITHIN A ZONE X, AS DELINEATED ON FIRM 25021C0217E, EFFECTIVE 07/17/2012.

5. PARCEL IS ZONED RSFHD.

PROJECT TITLE & LOCATION:

CLIFTON COURT DEVELOPMENT
DEFINITIVE SUBDIVISION
217 MILL STREET
RANDOLPH, MA

PLAN TITLE:

PROPOSED SITE LAYOUT

PREPARED FOR:

217 MILL ST, LLC
228 PARK AVENUE S, PMB 35567
NEW YORK, NY 89135

DATE: FEBRUARY 6, 2023
REVISED: APRIL 10, 2023
REVISED:
REVISED:
REVISED:
JOB NUMBER: 2022.030 SHEET 6 OF 11

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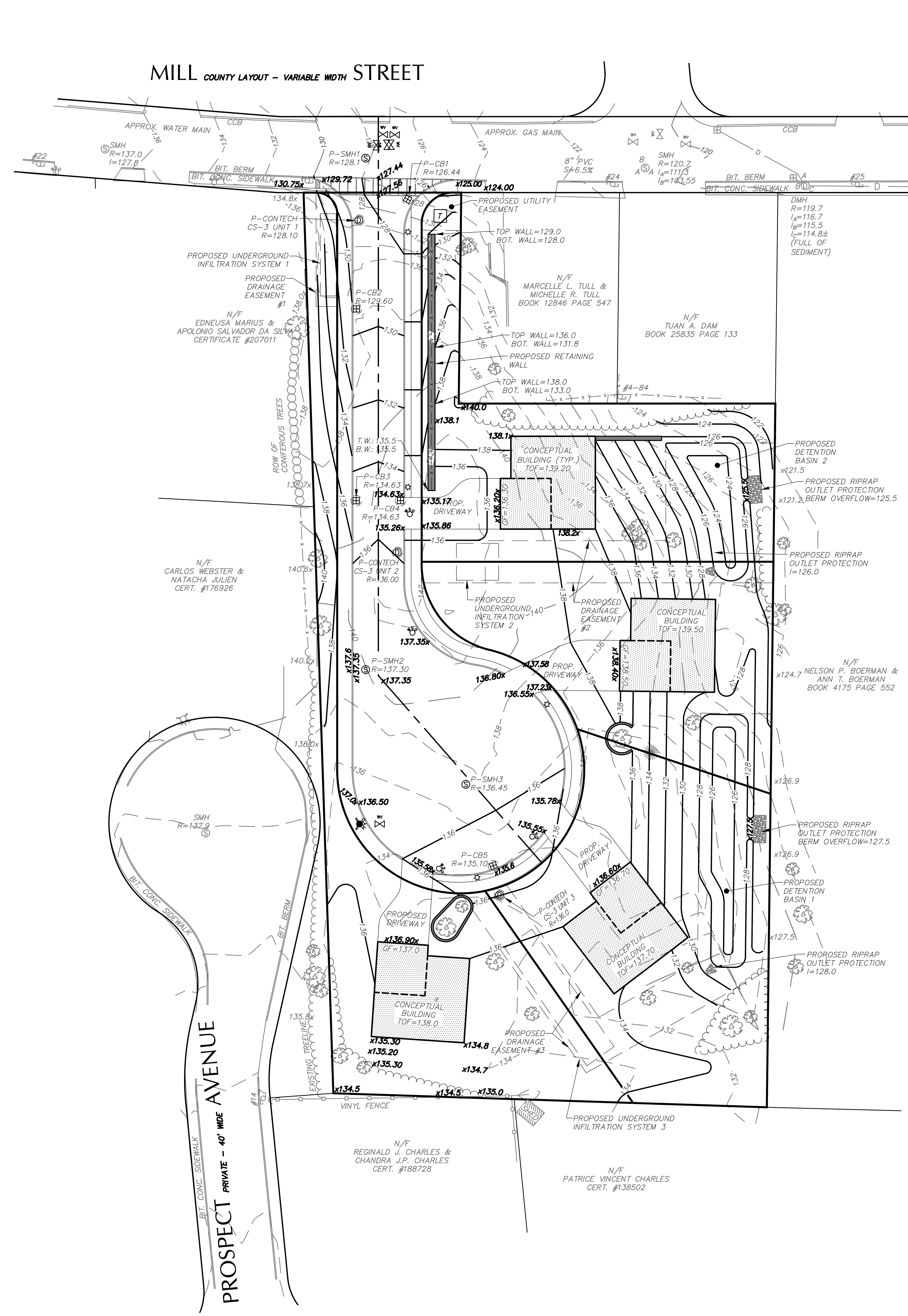
SCALE: 1" = 30'



LEGEND:

EXISTING:		PROPOSED:
	LOCUS PROPERTY LINE	
	TREE LINE	
	SEWER MANHOLE (SMH)	
	DRAIN MANHOLE (DMH)	
	CATCH BASIN (CB)	
	STONEWALL	
	GAS VALVE	
	WATER VALVE	
	WATER SERVICE	
	HYDRANT	
	UTILITY POLE	
N/F	NOW OR FORMERLY	
D	DRAIN PIPE	D
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LSA	LANDSCAPED AREA	LSA
25	ELEVATION CONTOUR	25
x25.7	SPOT GRADE	x25.7
	CHAIN LINK FENCE	
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	HAND HOLES FOR UTILITIES	
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TOF	TOP OF FOUNDATION	TOF
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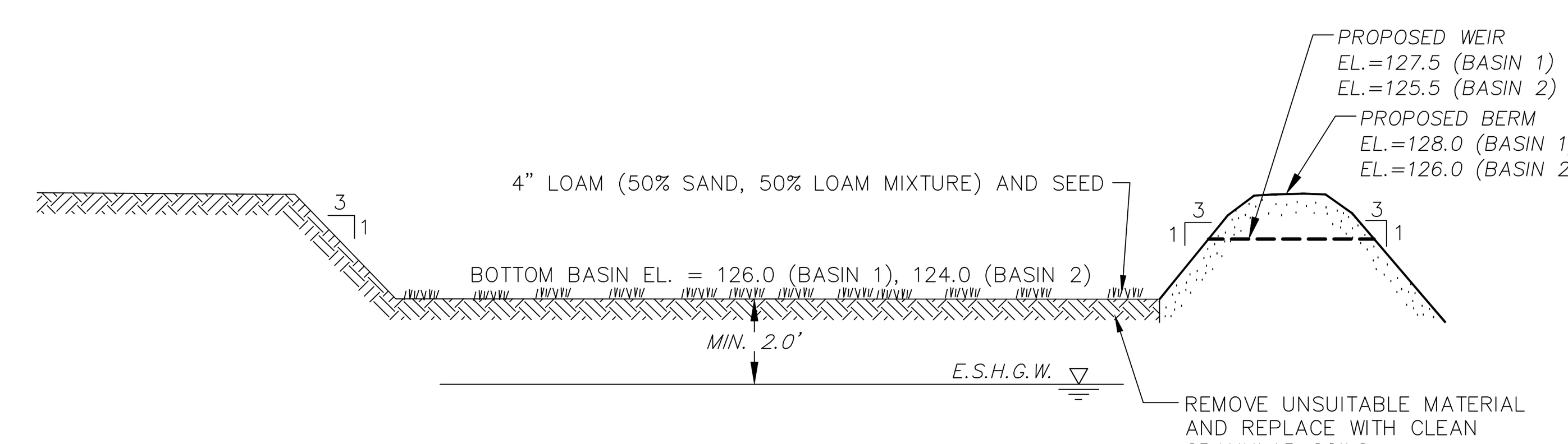

CROSS SECTION

NOTES:

1. DETENTION BASIN IS DESIGNED TO INFILTRATE
2. 12" OF 1 1/2" DOUBLE WASHED STONE IS TO BE USED IN THE INFILTRATION AREA OF DETENTION BASIN.
3. LIGHT EARTH MOVING EQUIPMENT IS TO BE USED DURING CONSTRUCTION TO REDUCE COMPACTION OF BASIN BOTTOM.
4. BASIN FLOOR IS TO BE DEEPLY TILLED AFTER FINAL GRADING.
5. PROPER EROSION SEDIMENT CONTROLS SHOULD BE UTILIZED DURING CONSTRUCTION TO PREVENT SEDIMENT AND/OR DEBRIS FROM ENTERING THE BASIN.

INFILTRATION / DETENTION BASIN

NOT TO SCALE

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Quincy, MA 02169
617-405-5100 (o) 617-405-5101 (f)
www.decelle-burke-sala.com

JAMES W. BURKE, P.E. DATE

GENERAL NOTES:

1. LOCUS:

ASSESSORS ID: 51-H-8.01
RECORD OWNER: ARSENAULT FAMILY TRUST
DEED REFERENCE: BOOK 14059 PAGE 498
PLAN REFERENCE: PLAN No. 204 of 1997

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4. LOCUS IS LOCATED WITHIN A ZONE X, AS DELINEATED ON FIRM 25021C0217E, EFFECTIVE 07/17/2012.

5. PARCEL IS ZONED RSFHD.

PROJECT TITLE & LOCATION:

CLIFTON COURT DEVELOPMENT
DEFINITIVE SUBDIVISION
217 MILL STREET
RANDOLPH, MA

PLAN TITLE:

PROPOSED SITE GRADING

PREPARED FOR:

217 MILL ST, LLC
228 PARK AVENUE S, PMB 35567
NEW YORK, NY 89135

DATE: FEBRUARY 6, 2023
REVISED: APRIL 10, 2023
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JOB NUMBER: 2022.030 SHEET 7 OF 11

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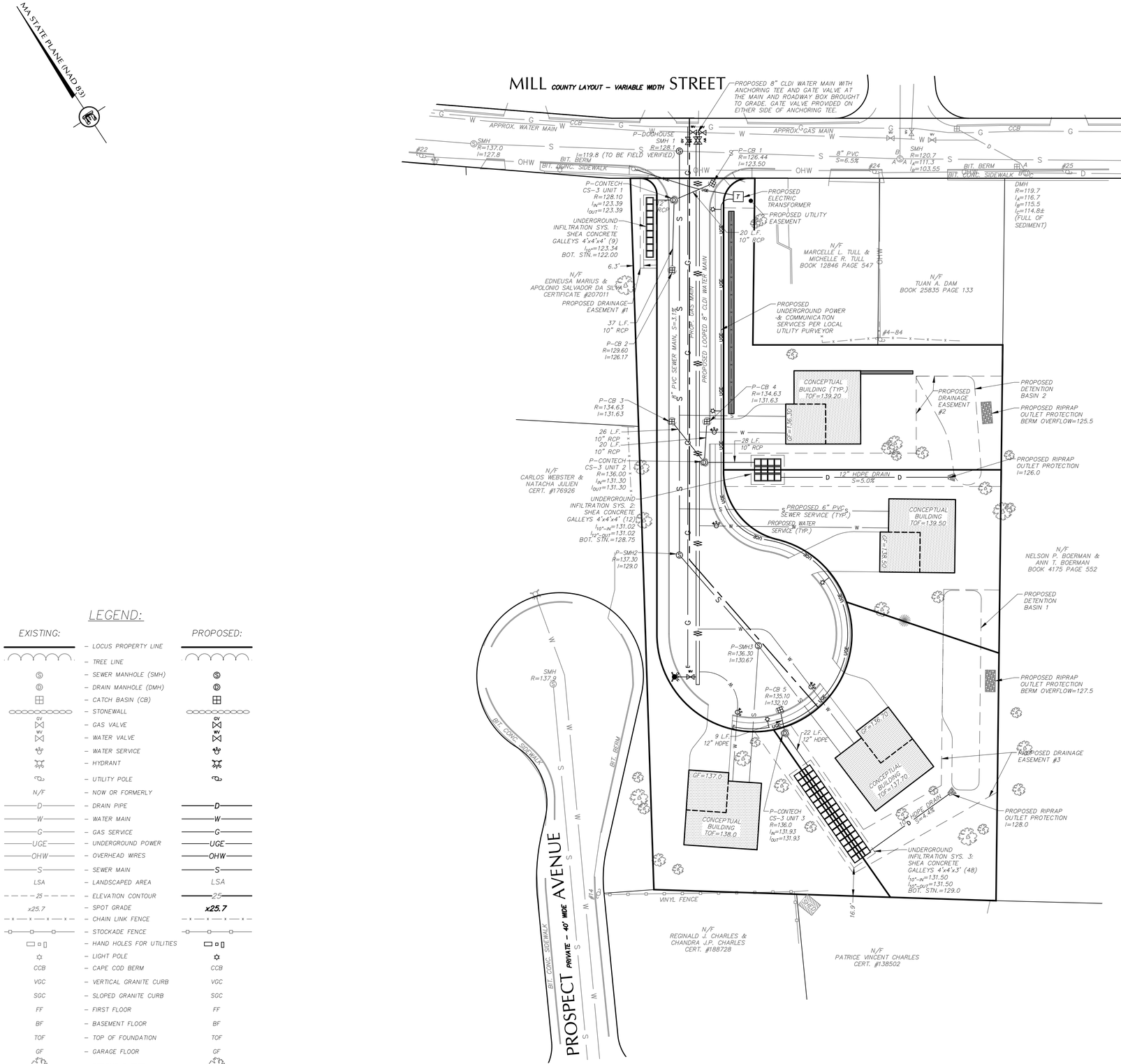

LEGEND:

EXISTING:		PROPOSED:
	– LOCUS PROPERTY LINE	
	– TREE LINE	
S	– SEWER MANHOLE (SMH)	S
D	– DRAIN MANHOLE (DMH)	D
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	– STONEWALL	
GV	– GAS VALVE	GV
W	– WATER VALVE	W
	– WATER SERVICE	
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N/F	– NOW OR FORMERLY	
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COMMONWEALTH OF MASSACHUSETTS
JAMES W. BURKE No. 34017
REGISTERED PROFESSIONAL ENGINEER

JAMES W. BURKE, P.E. DATE

GENERAL NOTES:

1. LOCUS:

ASSESSORS ID: 51-H-8.01
RECORD OWNER: ARSENAULT FAMILY TRUST
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4. LOCUS IS LOCATED WITHIN A ZONE X, AS DELINEATED ON FIRM 250210217E, EFFECTIVE 07/17/2012.

5. PARCEL IS ZONED RSFHD.

PROJECT TITLE & LOCATION:

CLIFTON COURT DEVELOPMENT
DEFINITIVE SUBDIVISION
217 MILL STREET
RANDOLPH, MA

PLAN TITLE:

PROPOSED SITE UTILITIES

PREPARED FOR:

217 MILL ST, LLC
228 PARK AVENUE S, PMB 35567
NEW YORK, NY 89135

DATE: FEBRUARY 6, 2023	
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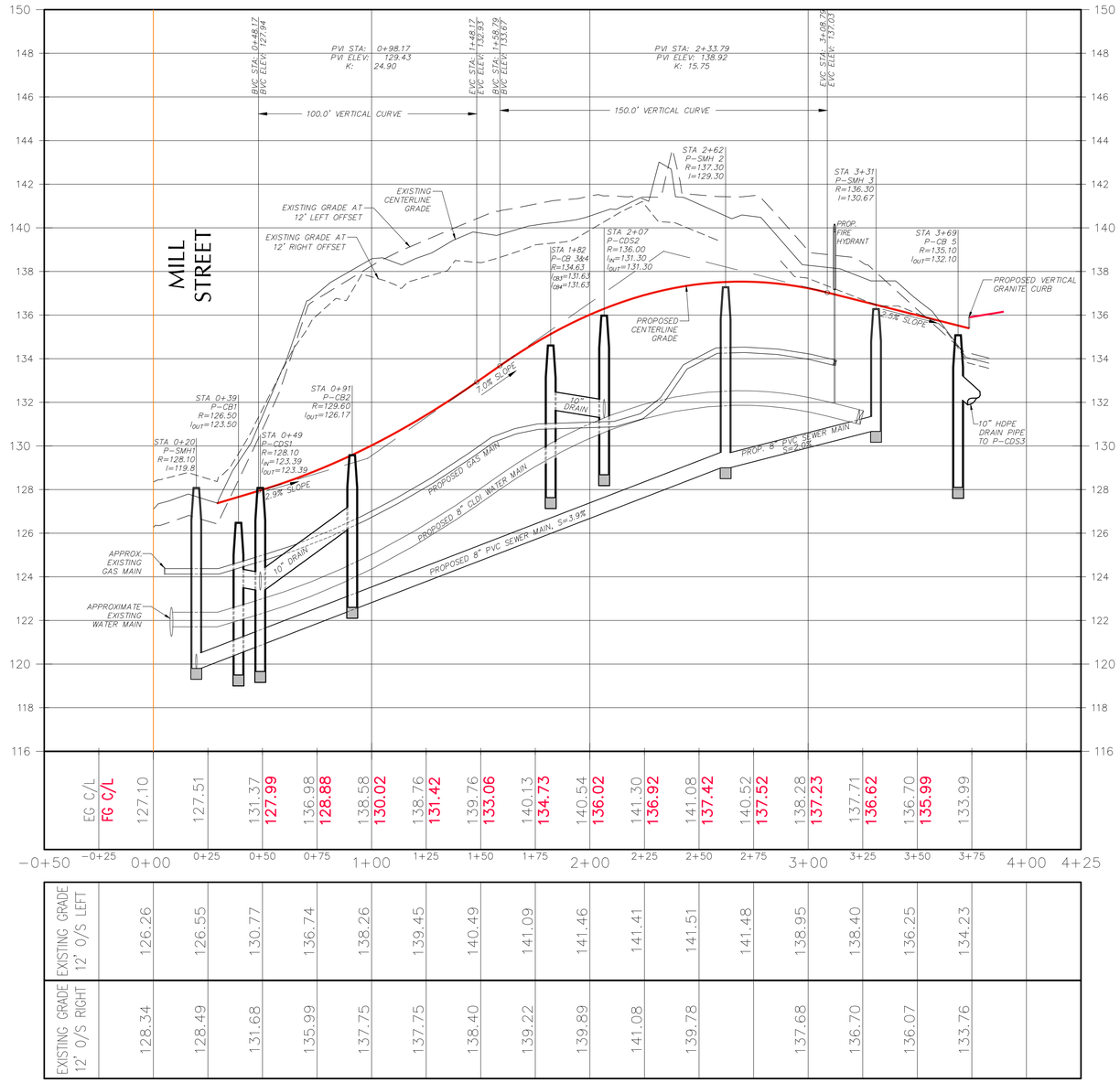
SCALE: 1" = 30'



EG C/L		127.10		127.51		131.37	127.99	136.98	128.88	138.58	130.02	138.76	131.42	139.76	133.06	140.13	134.73	140.54	136.02	141.30	136.92	141.08	137.42	140.52	137.52
FG C/L																									
EXISTING GRADE 12' O/S LEFT		126.26		126.55		130.77		136.74		138.26		139.45		140.49		141.09		141.46		141.41		141.51		141.48	
EXISTING GRADE 12' O/S RIGHT		128.34		128.49		131.68		135.99		137.75		137.75		138.40		139.22		139.89		141.08		139.78			

EG C/L	138.28	137.23	137.71	136.62	136.70	135.99	133.99																		
FG C/L																									
EXISTING GRADE 12' O/S LEFT	138.95		138.40		136.25		134.23																		
EXISTING GRADE 12' O/S RIGHT	137.68		136.70		136.07		133.76																		

-0+50 -0+25 0+00 0+25 0+50 0+75 1+00 1+25 1+50 1+75 2+00 2+25 2+50 2+75 3+00 3+25 3+50 3+75 4+00 4+25

PROPOSED ROAD PROFILE

VERTICAL SCALE: 1" = 3'
HORIZONTAL SCALE: 1" = 30'

DeCelle-Burke-Sala
& Associates, Inc.
1266 Furnace Brook Parkway #401
Quincy, MA 02169
617-405-5100 (o) 617-405-5101 (f)
www.decelle-burke-sala.com

COMMONWEALTH OF MASSACHUSETTS
JAMES W. BURKE
No. 34868
REGISTERED PROFESSIONAL ENGINEER

JAMES W. BURKE, P.E. DATE

GENERAL NOTES:

1. LOCUS:

ASSESSORS ID: 51-H-8.01
RECORD OWNER: ARSENAULT FAMILY TRUST
DEED REFERENCE: BOOK 14059 PAGE 498
PLAN REFERENCE: PLAN No. 204 of 1997

2. THIS PLAN IS THE RESULT OF AN ON THE GROUND SURVEY PERFORMED BY THIS OFFICE DURING JUNE 2022. ELEVATIONS SHOWN REFER TO NAVD-88.

3. EXISTING UTILITIES WHERE SHOWN IN THE DRAWINGS ARE FROM SURFACE OBSERVATION AND RECORD INFORMATION AND SHOULD BE CONSIDERED APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY LOCATING AND COORDINATING THE PROPOSED CONSTRUCTION ACTIVITY WITH DIG-SAFE AND THE APPLICABLE UTILITY COMPANIES AND MAINTAINING THE EXISTING UTILITY SYSTEM IN SERVICE.

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4. LOCUS IS LOCATED WITHIN A ZONE X, AS DELINEATED ON FIRM 25021C0217E, EFFECTIVE 07/17/2012.

5. PARCEL IS ZONED RSFHD.

PROJECT TITLE & LOCATION:

CLIFTON COURT DEVELOPMENT
DEFINITIVE SUBDIVISION
217 MILL STREET
RANDOLPH, MA

PLAN TITLE:

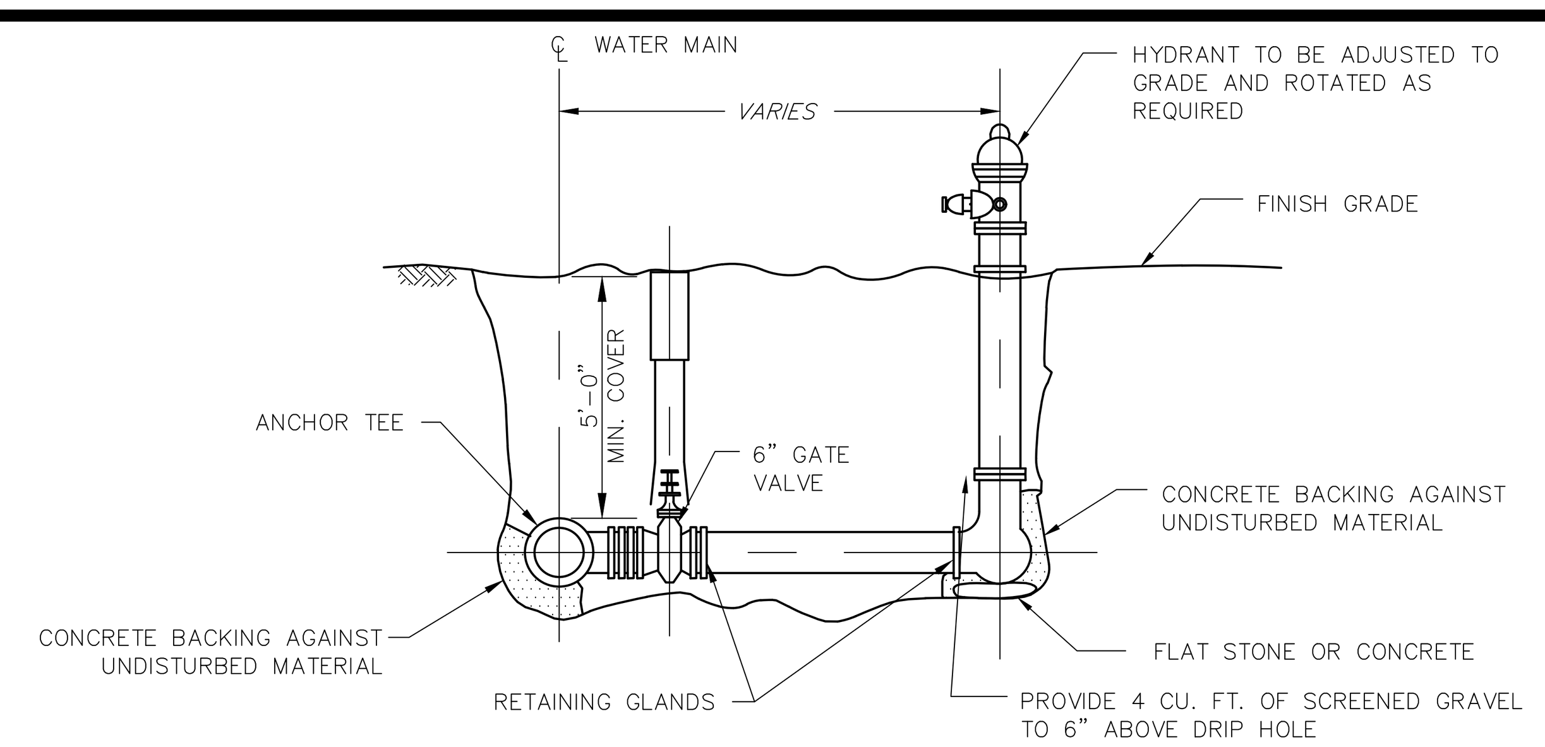
PROPOSED ROAD PROFILE

PREPARED FOR:

217 MILL ST, LLC
228 PARK AVENUE S, PMB 35567
NEW YORK, NY 89135

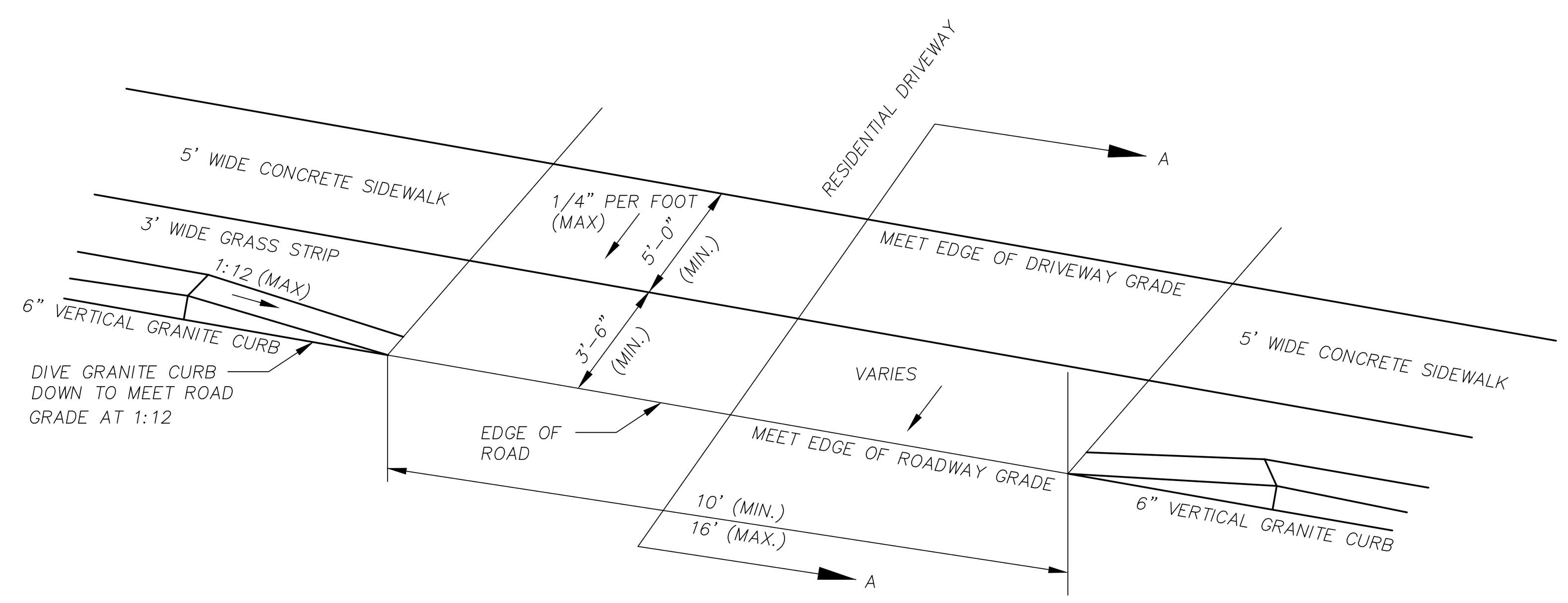
DATE: FEBRUARY 6, 2023	
REVISED: APRIL 10, 2023	
REVISED:	
REVISED:	
REVISED:	
JOB NUMBER: 2022.030	SHEET 9 OF 11

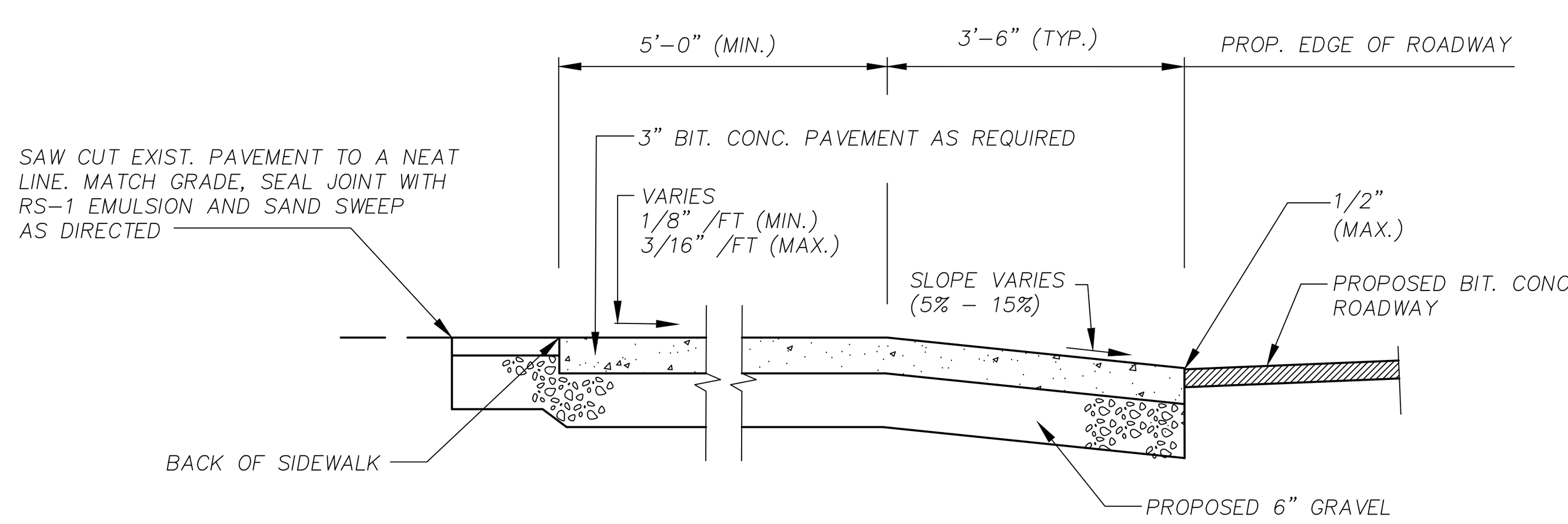
30 15 0 30 60
SCALE: 1" = 30'



TYPICAL HYDRANT AND VALVE DETAIL

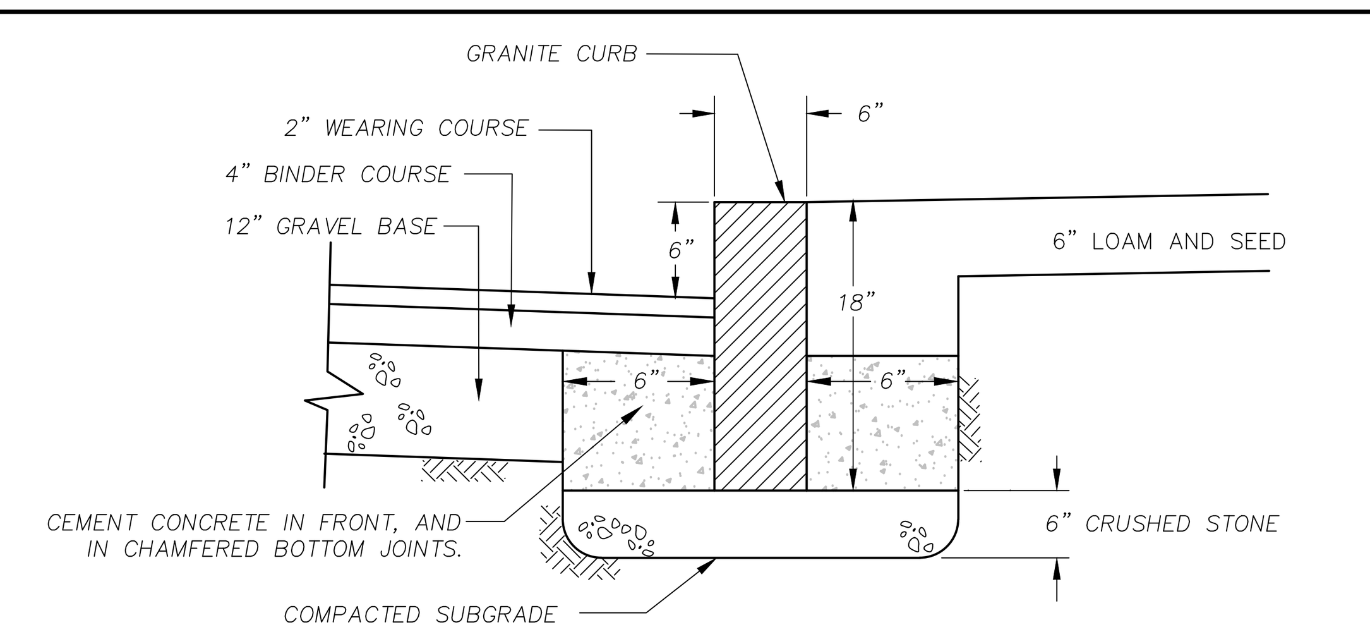
NOT TO SCALE





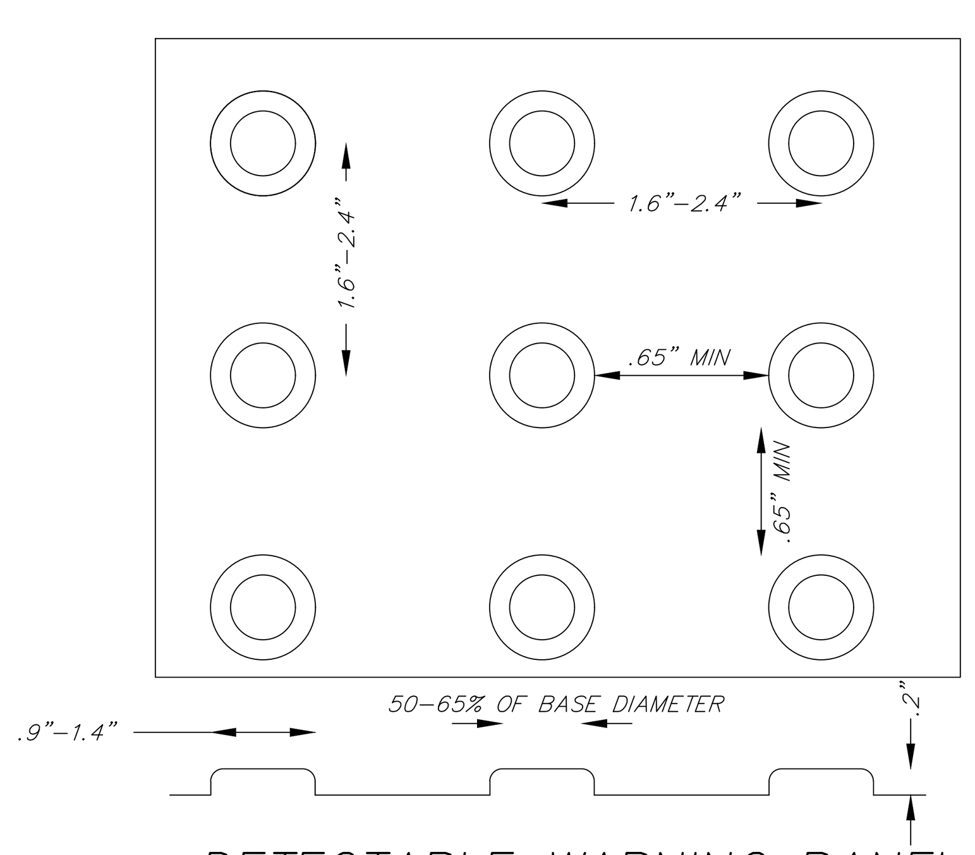
DRIVEWAY DETAIL W/ CURB OPENING

NOT TO SCALE



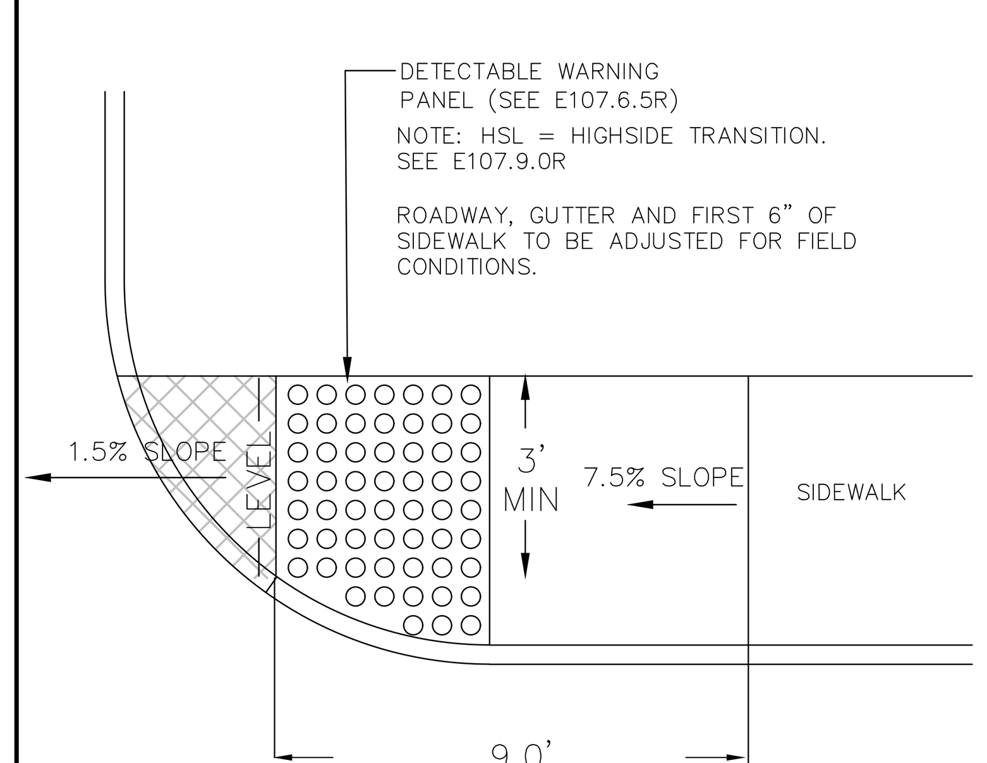
GRANITE CURB

NOT TO SCALE



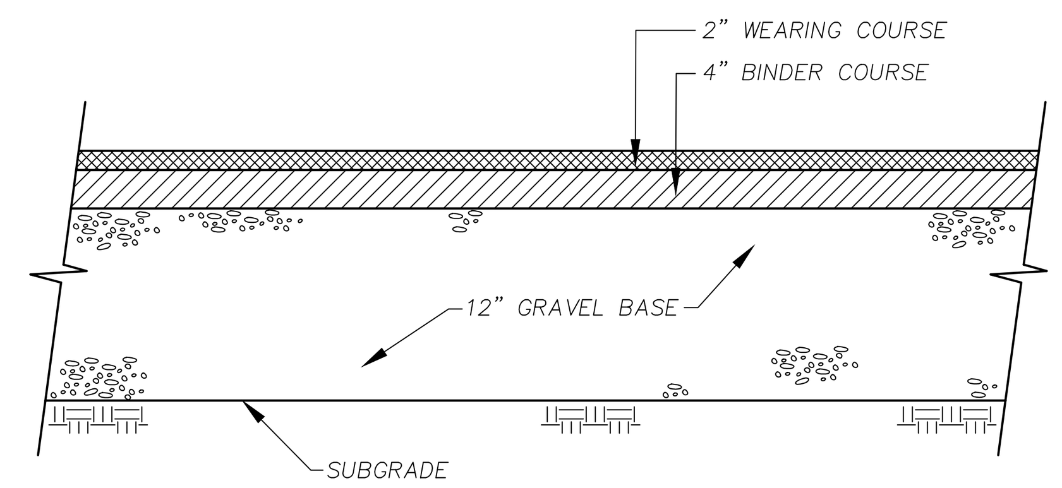
DETECTABLE WARNING PANEL
SEE MassDOT (E107.6.5R)

NOT TO SCALE



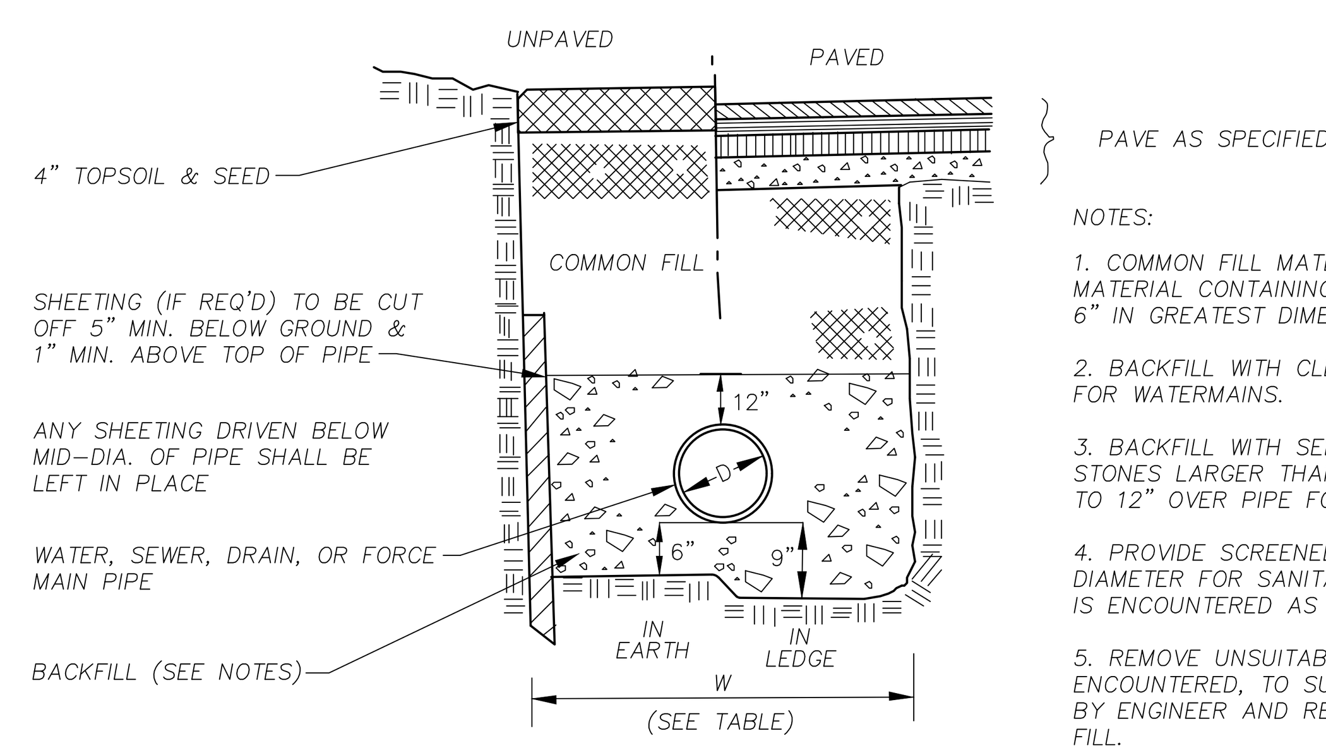
HANDICAP RAMP A DETAIL

NOT TO SCALE



PAVEMENT SECTION

NOT TO SCALE



NOTES:

1. COMMON FILL MATERIAL TO CONSIST OF GRANULAR MATERIAL CONTAINING NO STONES LARGER THAN 6" IN GREATEST DIMENSION.
2. BACKFILL WITH CLEAN SAND TO 12" OVER PIPE FOR WATERMAINS.
3. BACKFILL WITH SELECT MATERIAL CONTAINING NO STONES LARGER THAN 3" IN GREATEST DIMENSION TO 12" OVER PIPE FOR SEWER AND DRAIN PIPES.
4. PROVIDE SCREENED GRAVEL BEDDING TO MID PIPE DIAMETER FOR SANITARY SEWERS AND WHERE GROUNDWATER IS ENCOUNTERED AS DIRECTED BY THE ENGINEER.
5. REMOVE UNSUITABLE MATERIAL BELOW GRADE IF ENCOUNTERED, TO SUITABLE DEPTHS AS DIRECTED BY ENGINEER AND REPLACE WITH CLEAN GRANULAR FILL.

TRENCH WIDTH

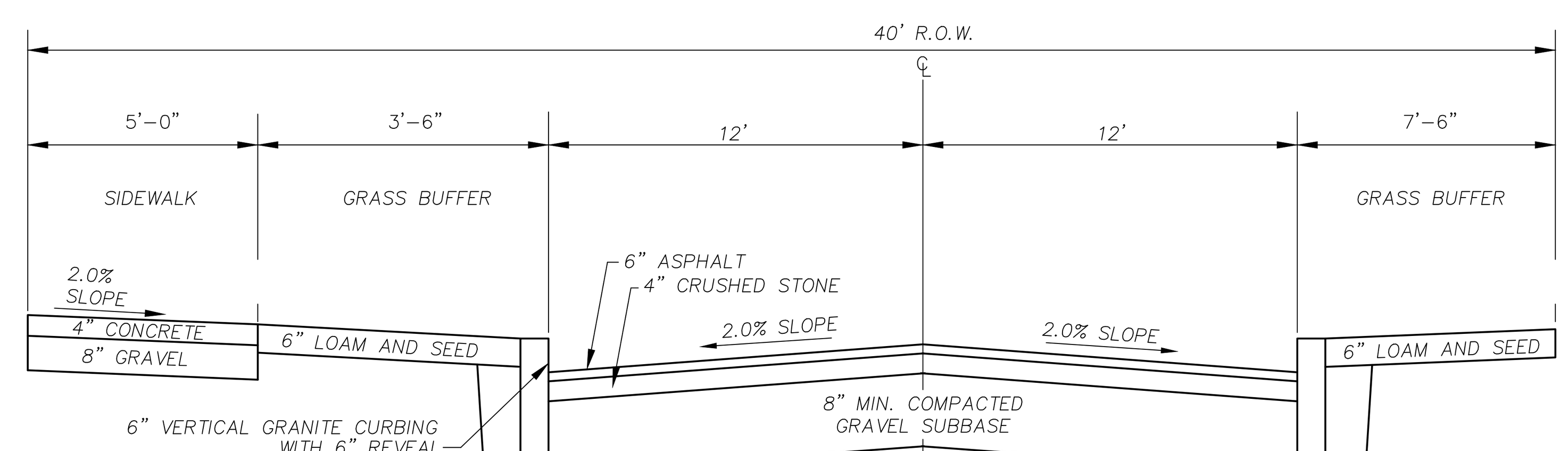
D DIAMETER OF PIPE	W UNSHEETED	W SHEETED
1" TO 12"	3'	4'
14" TO 24"	4'	5'
30" TO 36"	5'	6'

NOTES:

1. ALL TRENCH CONSTRUCTION TO CONFORM TO APPLICABLE FEDERAL, STATE AND LOCAL REQULATIONS.
2. COMPACT FILL AND TAMP PIPE TO 93% MAX. DENSITY UNLESS OTHERWISE SPECIFIED.

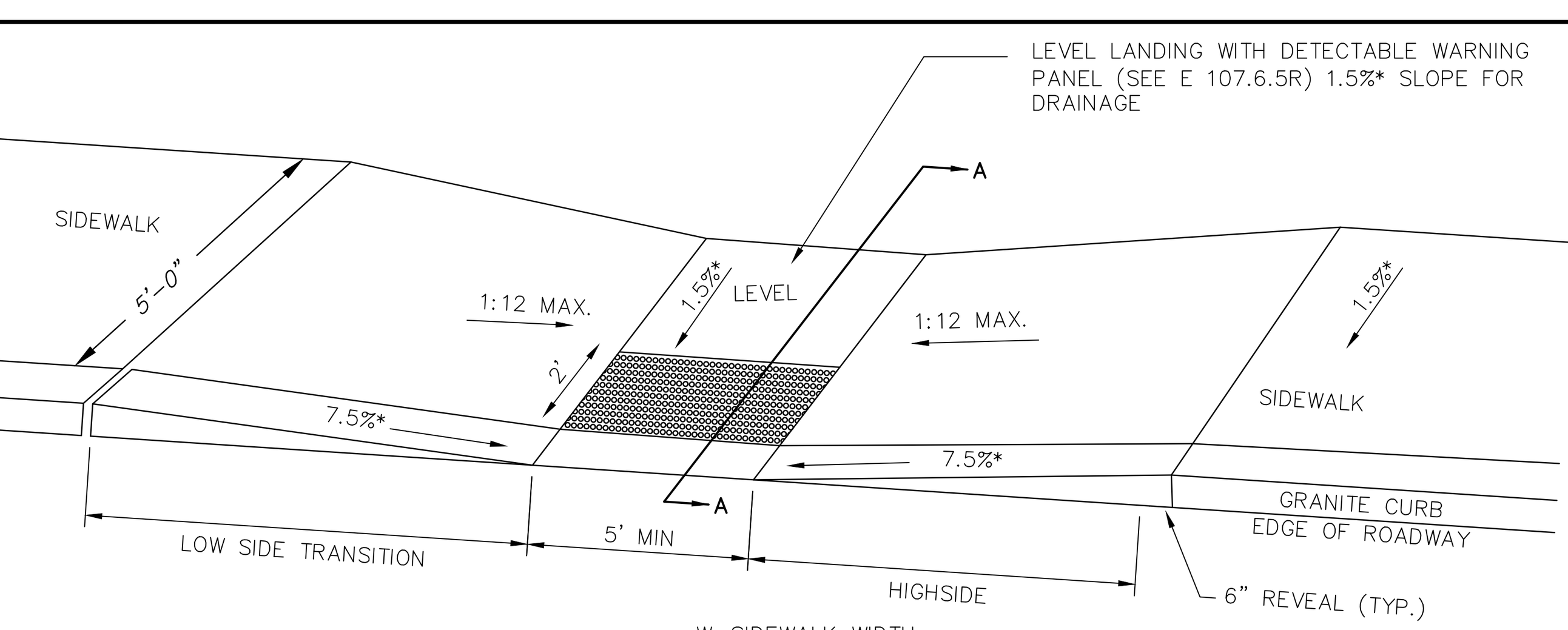
TYPICAL TRENCH SECTIONS

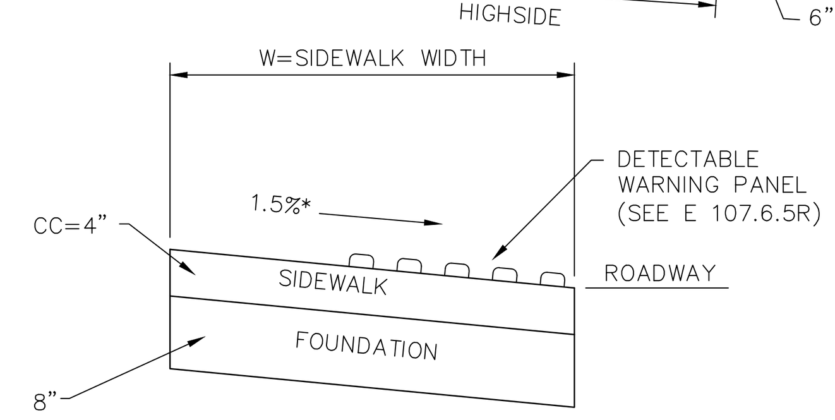
NOT TO SCALE



TYPICAL ROAD CROSS-SECTION

NOT TO SCALE





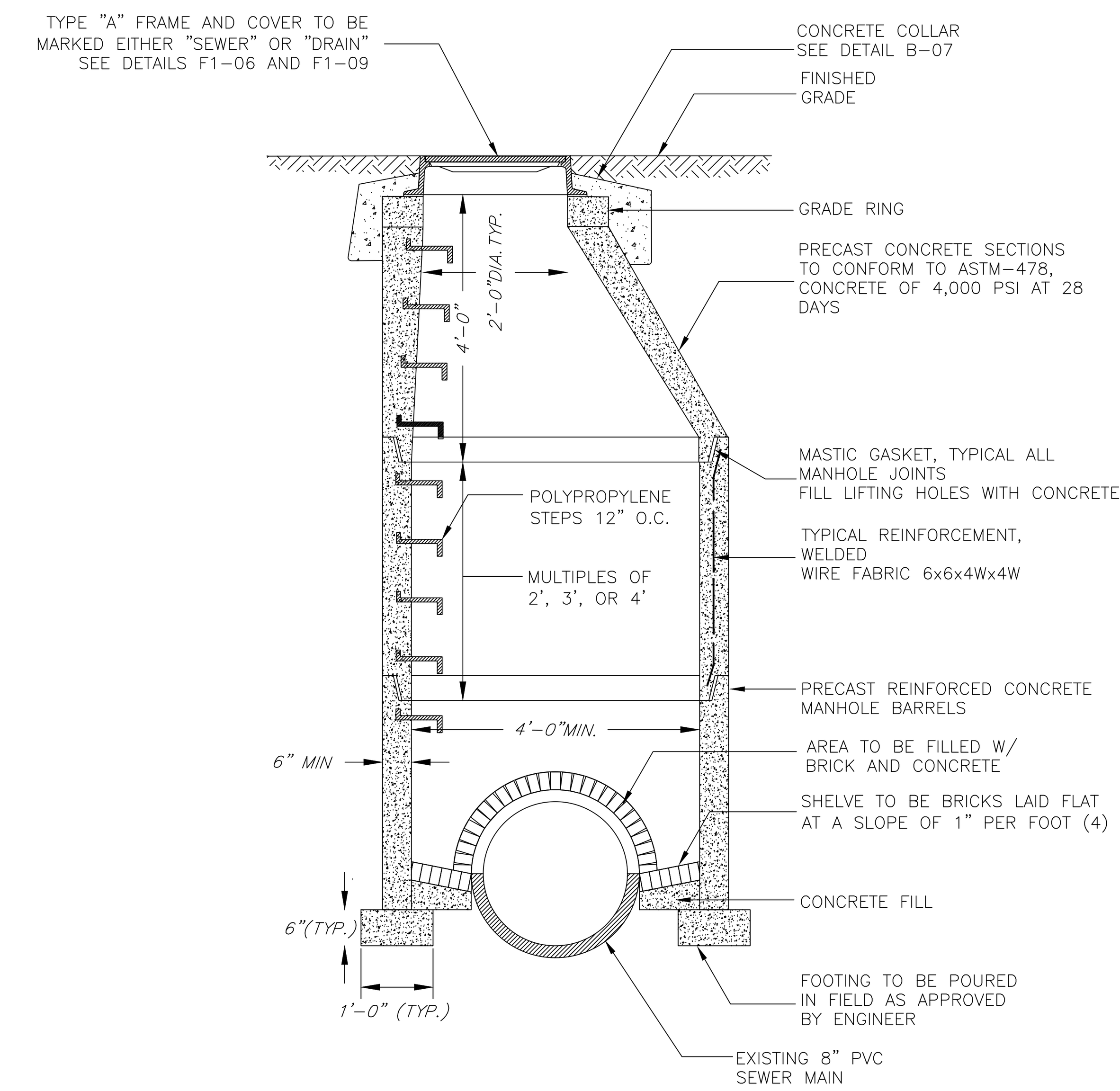
SECTION A-A

NOTE:

ROADWAY, GUTTER, AND FIRST 6" OF SIDEWALK TO BE ADJUSTED FOR FIELD CONDITIONS.

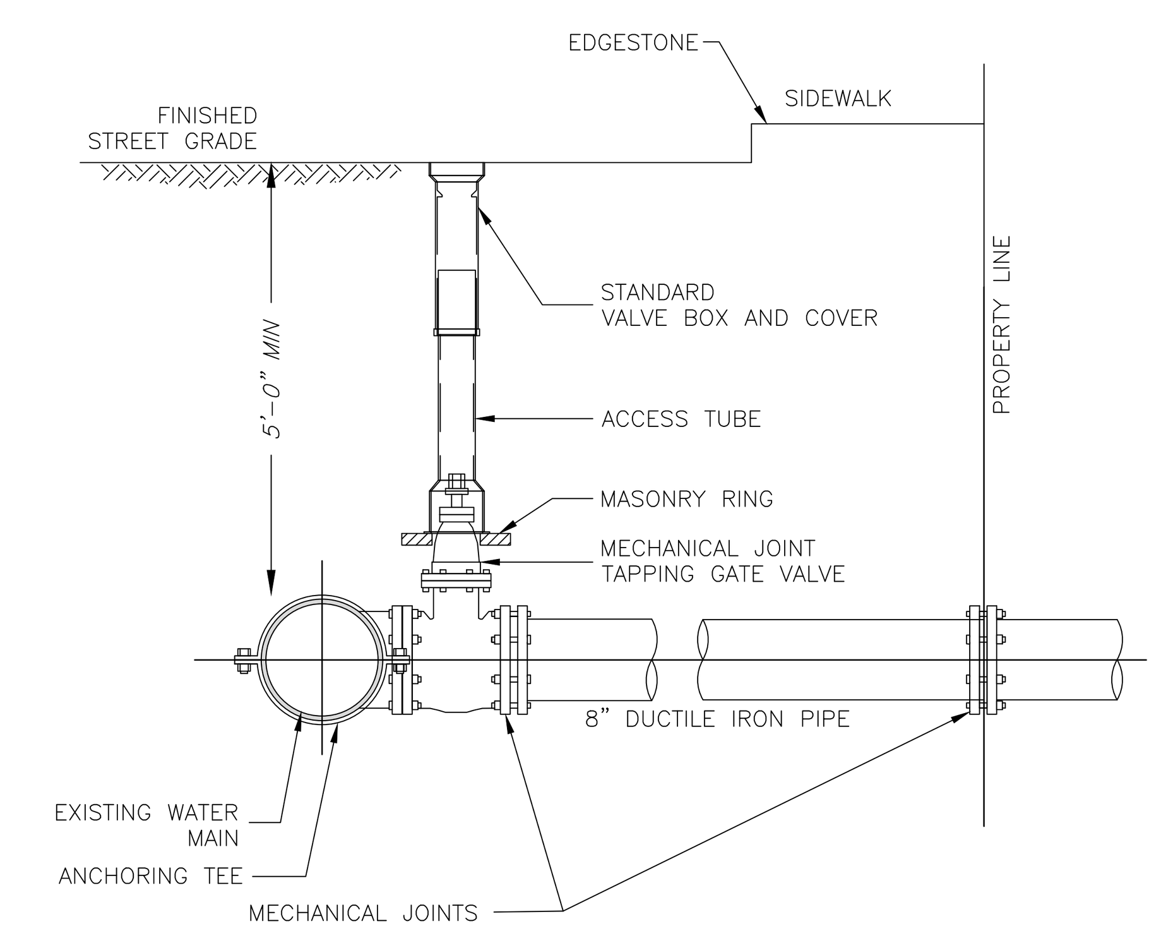
HANDICAP RAMP B DETAIL

NOT TO SCALE



TYPICAL DOGHOUSE SEWER MANHOLE

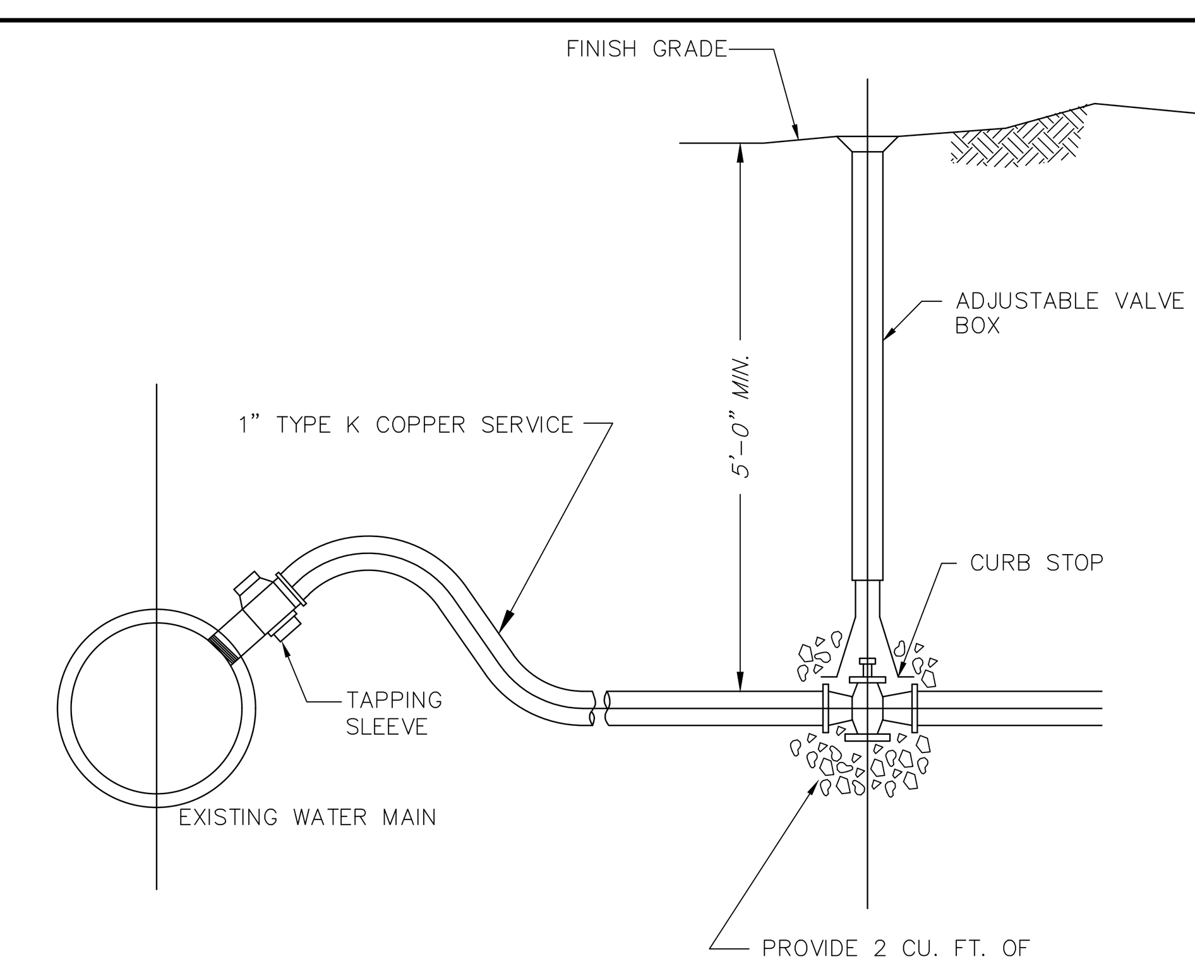
NOT TO SCALE



NOTES:
- CONCRETE THRUST BLOCK TO BE USED ONLY WHERE IT WILL BEAR ON UNDISTURBED EARTH.
- USE RESTRAINED JOINT FITTINGS OR TIE RODS WHERE CONCRETE THRUST BLOCK IS UNACCEPTABLE.
- SIZE OF BLOCK OR MEGALUG TO BE DESIGNED FOR SPECIFIC CONDITIONS.

8" WATER MAIN CONNECTION

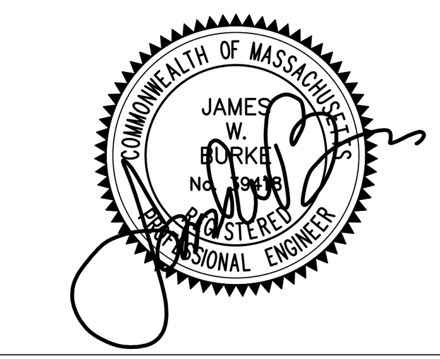
NOT TO SCALE



WATER SERVICE CONNECTION DETAIL

NOT TO SCALE

DeCelle-Burke-Sala
& Associates, Inc.
1266 Furnace Brook Parkway #401
Quincy, MA 02169
617-405-5100 (o) 617-405-5101 (f)
www.decelle-burke-sala.com



JAMES W. BURKE, P.E. DATE

GENERAL NOTES:

1. LOCUS:

ASSESSORS ID: 51-H-8.01
RECORD OWNER: ARSENAULT FAMILY TRUST
DEED REFERENCE: BOOK 14059 PAGE 498
PLAN REFERENCE: PLAN No. 204 of 1997

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5. PARCEL IS ZONED RSFHD.

PROJECT TITLE & LOCATION:

CLIFTON COURT DEVELOPMENT
DEFINITIVE SUBDIVISION
217 MILL STREET
RANDOLPH, MA

PLAN TITLE:

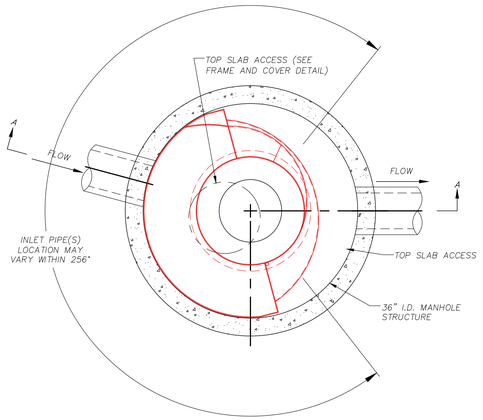
CONSTRUCTION DETAILS

PREPARED FOR:

217 MILL ST, LLC
228 PARK AVENUE S, PMB 35567
NEW YORK, NY 89135

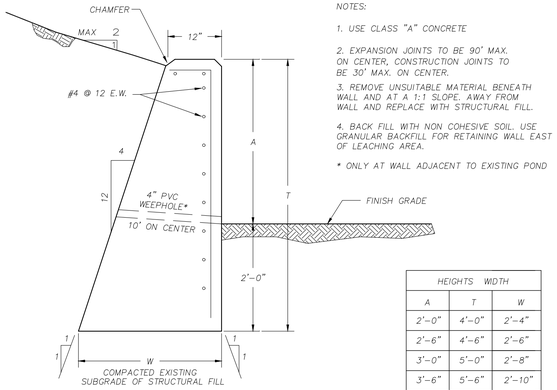
DATE: FEBRUARY 6, 2023
REVISED: APRIL 10, 2023
REVISED:
REVISED:
REVISED:

JOB NUMBER: 2022.030 SHEET 10 OF 11



PLAN VIEW B–B

NOT TO SCALE



NOTES:

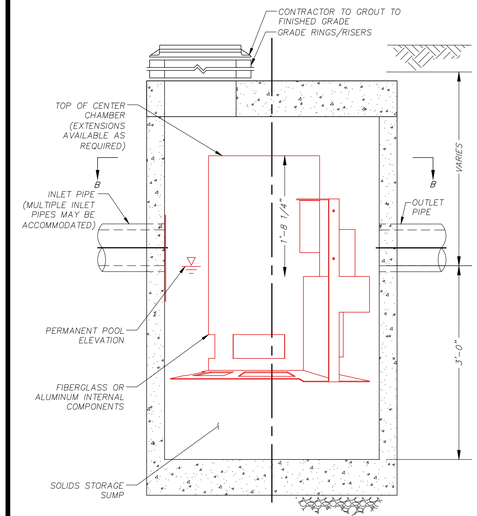
1. USE CLASS "A" CONCRETE
2. EXPANSION JOINTS TO BE 90' MAX. ON CENTER, CONSTRUCTION JOINTS TO BE 30' MAX. ON CENTER.
3. REMOVE UNSUITABLE MATERIAL BENEATH WALL AND AT A 1:1 SLOPE, AWAY FROM WALL AND REPLACE WITH STRUCTURAL FILL.
4. BACK FILL WITH NON COHESIVE SOIL. USE GRANULAR BACKFILL FOR RETAINING WALL EAST OF LEACHING AREA.

* ONLY AT WALL ADJACENT TO EXISTING POND

HEIGHTS		WIDTH
A	T	W
2'–0"	4'–0"	2'–4"
2'–6"	4'–6"	2'–6"
3'–0"	5'–0"	2'–8"
3'–6"	5'–6"	2'–10"
4'–0"	6'–0"	3'–0"
4'–6"	6'–6"	3'–2"
5'–0"	7'–0"	3'–4"

RETAINING WALL

NOT TO SCALE



ELEVATION A–A

NOT TO SCALE

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
3. CASCADE SEPARATOR WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. CASCADE SEPARATOR STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0'-2' AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
5. CASCADE SEPARATOR STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C478 AND AASHTO LOAD FACTOR DESIGN METHOD.

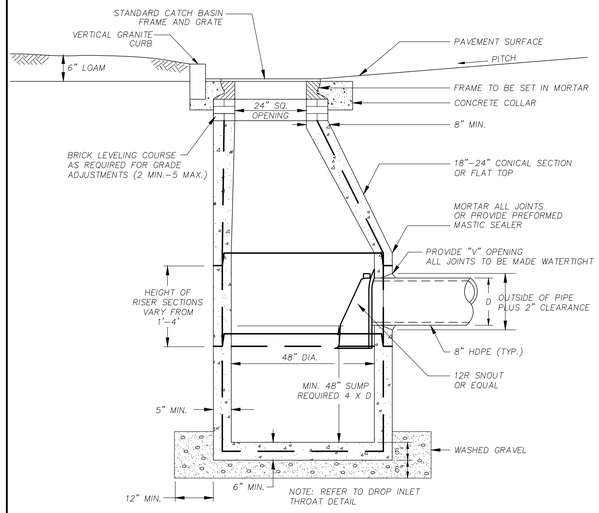
INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CASCADE SEPARATOR MANHOLE STRUCTURE.
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,788,849; 6,641,720; 6,911,595; 6,581,793; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

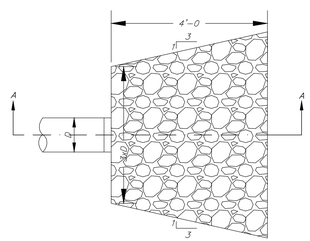
CONTECH CS–3 CASCADE SEPARATOR

NOT TO SCALE

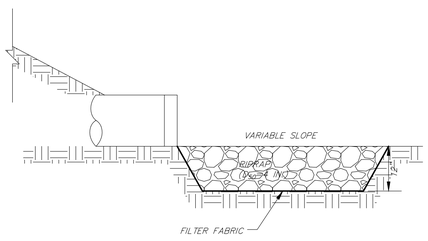


PRECAST CONCRETE CATCH BASIN

NOT TO SCALE



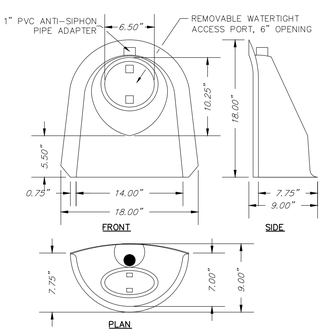
PLAN VIEW



SECTION A–A

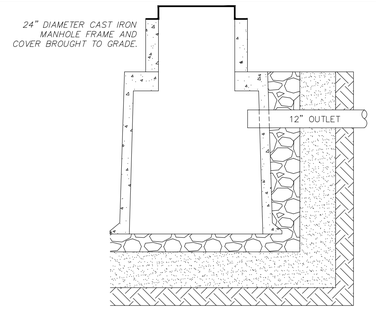
RIP–RAP AT OUTLET

NOT TO SCALE



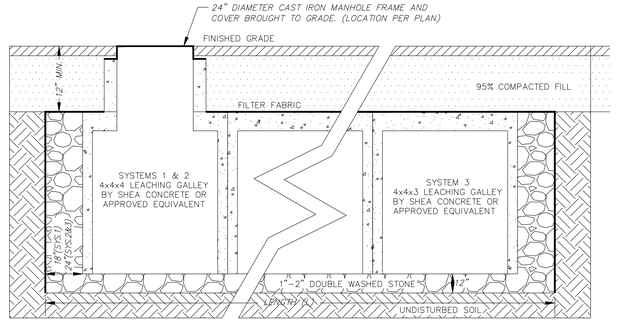
12R SNOUT OUTLET HOOD

NOT TO SCALE



UNDERGROUND INFILTRATION SYSTEMS 2 & 3 OUTLET DETAIL

NOT TO SCALE

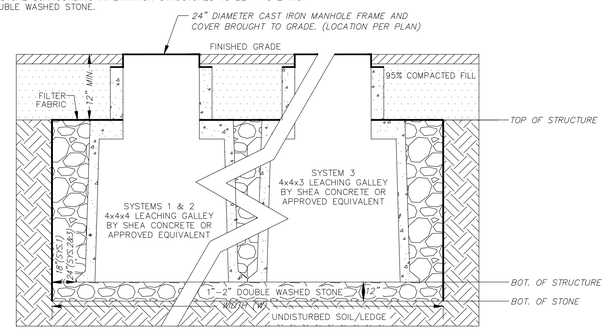


UNDERGROUND INFILTRATION SYSTEMS 1, 2 & 3 PROFILE

NOT TO SCALE

INFILTRATION NOTES:

1. ALL LEDGE AND DELETERIOUS MATERIAL TO BE REMOVED WITHIN A MINIMUM OF 36 INCHES OF THE LIMIT OF STONE FOR THE INFILTRATION SYSTEMS. 36" MINIMUM BETWEEN LEDGE AND DELETERIOUS MATERIAL SHALL BE BACKFILLED WITH CLEAN SAND.
2. STRUCTURES TO BE INSTALLED PER MANUFACTURER SPECIFICATIONS.
3. CONTRACTOR SHALL CONTACT THE DESIGN ENGINEER FOR AN INSPECTION OF THE EXCAVATION FOR THE INFILTRATION SYSTEMS PRIOR TO INSTALLATION.
4. STONE SURROUNDING INFILTRATION STRUCTURES TO BE 1 TO 2 INCH DOUBLE WASHED STONE.



UNDERGROUND INFILTRATION SYSTEMS 1, 2 & 3 SECTION

NOT TO SCALE

	SYSTEM 1	SYSTEM 2	SYSTEM 3
# OF GALLIES	9	12	48
WIDTH OF FIELD (W) (FT.)	7.50'	17.50'	15.76'
LENGTH OF FIELD (L) (FT.)	39.00'	20.00'	68.00'
TOP OF STRUCTURE (ELEVATION)	127.25	134.00	133.50
10" INVERT IN (ELEVATION)	123.34	131.02	131.50
INVERT OUT (ELEVATION)	X	12" HDPE 131.02	10" HDPE 131.50
BOTTOM OF STRUCTURE (ELEVATION)	123.00	129.75	130.00
BOTTOM OF STONE (ELEVATION)	122.00	128.75	129.00

UNDERGROUND INFILTRATION SYSTEMS 1, 2 & 3 DIMENSION SCHEDULE

DeCelle-Burke-Sala
& Associates, Inc.
1266 Furnace Brook Parkway #401
Quincy, MA 02169
617-405-5100 (o) 617-405-5101 (f)
www.decelle-burke-sala.com

COMMONWEALTH OF MASSACHUSETTS
JAMES W. BURKE
No. 24034
REGISTERED PROFESSIONAL ENGINEER

JAMES W. BURKE, P.E. DATE

GENERAL NOTES:

1. LOCUS:

ASSESSORS ID: 51–H–8.01
RECORD OWNER: ARSENAULT FAMILY TRUST
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5. PARCEL IS ZONED RSFHD.

PROJECT TITLE & LOCATION:

CLIFTON COURT DEVELOPMENT
DEFINITIVE SUBDIVISION
217 MILL STREET
RANDOLPH, MA

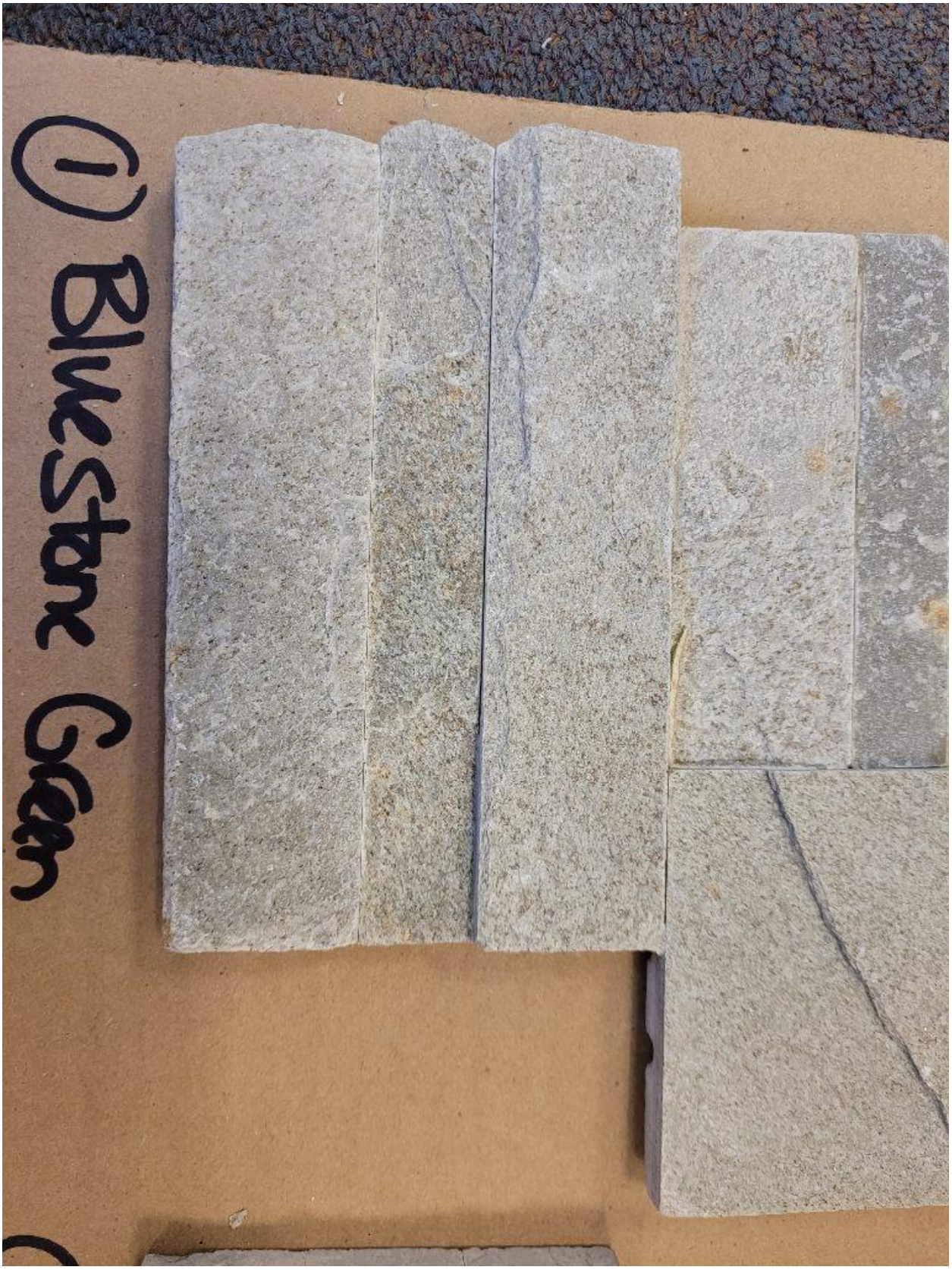
PLAN TITLE:

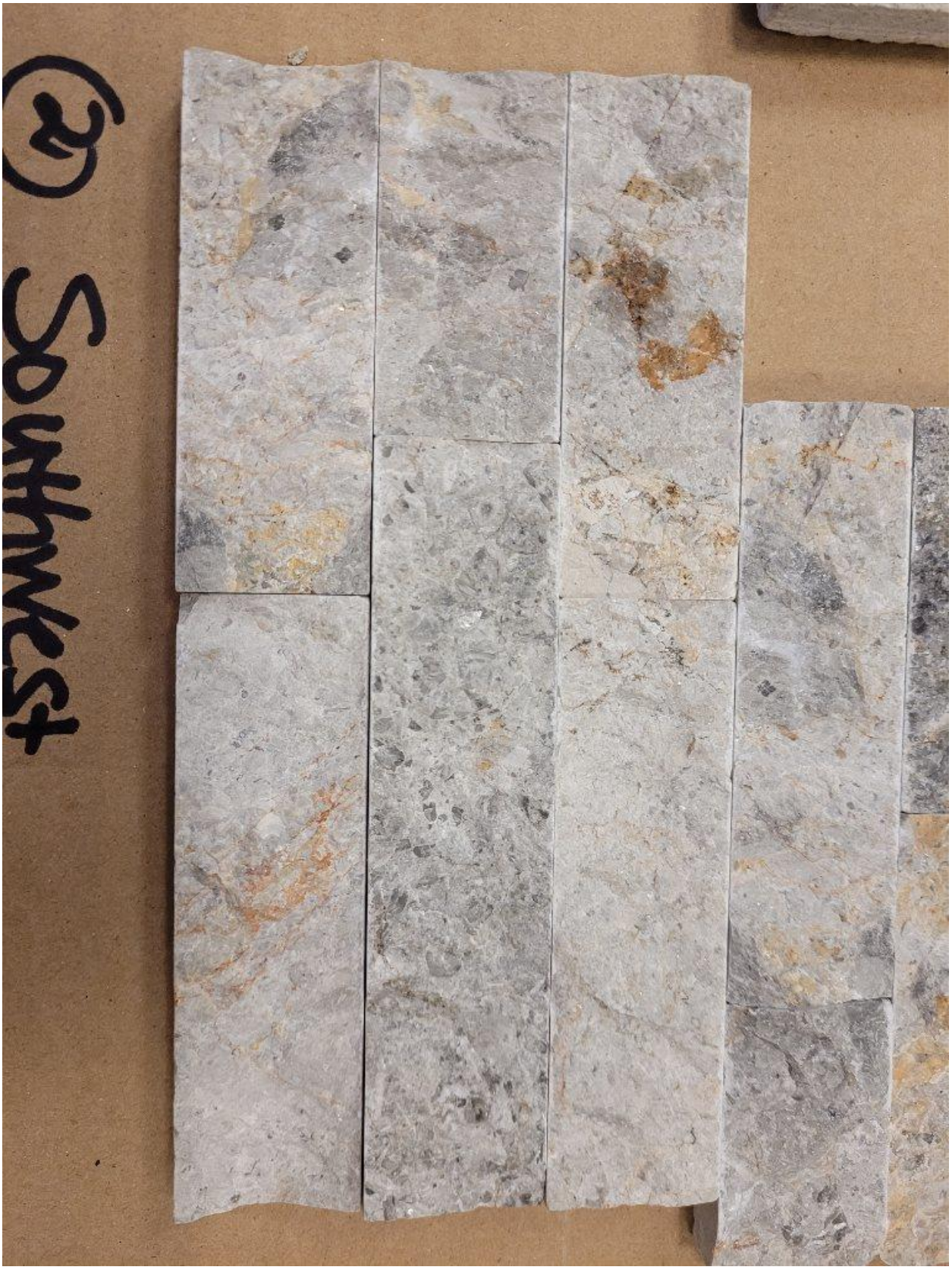
CONSTRUCTION DETAILS

PREPARED FOR:

217 MILL ST, LLC
228 PARK AVENUE S, PMB 35567
NEW YORK, NY 89135

DATE: FEBRUARY 6, 2023	
REVISED: APRIL 10, 2023	
REVISED:	
REVISED:	
REVISED:	
JOB NUMBER: 2022.030	SHEET 11 OF 11


1) Bluestar Grey


(2) Southwest


③ Gobi Mix

Grey A

5 Rustic Yellow


④ A Gray
⑤ Rustic Yellow
① Bluestone Green
② Southwest
③ Gobi Mix

GREENBAUM, NAGEL, FISHER & PALIOTTI, LLP

ATTORNEYS AT LAW

200 HIGH STREET, 5TH FLOOR
BOSTON, MASSACHUSETTS 02110
(617) 423-4300
FACSIMILE (617) 482-5067

STEPHEN A. GREENBAUM
sagreenbaum@greenbaumnagel.com

April 13, 2023

By E-Mail: mtyler@randolph-ma.gov
And First-Class Mail

Town of Randolph
Planning Department
41 South Main Street
Randolph, MA 02368
Attention: Michelle R. Tyler
Director of Planning

Re: Randolph Development, LLC and Popeye's Louisiana Kitchen, Inc.
84 Mazzeo Drive, Randolph, MA 02368

Dear Ms. Tyler:

Please be advised this office and the undersigned represent Grow Associates, Inc ("Grow" or my "Client") who are the owners of 68 Mazzeo Drive, Randolph, MA 02368. Grow owns the 12.5 feet right of way and easement along Circuit Drive from 68 Mazzeo Drive to Mazzeo Drive (the "Private Way").

I am writing to you regarding Randolph Development, LLC ("Randolph") which is the owner of 84 Mazzeo Drive, Randolph, MA 02368 and Popeye's Louisiana Kitchen, Inc. ("Popeye's") which operates its business at 84 Mazzeo Drive. Neither Randolph nor Popeye's have any legal right to use the Private Way. Grow instructed Randolph and Popeye's to cease using the Private Way. Thereafter, Grow filed an action in the Land Court, which is pending as Docket No. 22MISC000572.

Randolph and Popeye's have recently represented that are/will stop using the Private Way, and have placed cones and a sign stating, "This Entrance is Closed". Please see attached photos marked as Exhibit "A". However, in 2017 when Randolph Development, LLC applied to the Randolph Planning Department for site plan review and design review for construction of Popeye's, they submitted plans which erroneously represented that they had an entrance/exit onto the Private Way and the right to use the Private Way. Randolph also provided plans for fire apparatus to use and turn on the Private Way.

My Client is requesting the Planning Board review the permit and plans for 84 Mazzeo Drive based upon the material misrepresentations made with the application and the basis on the Board's Decision. Copies of the Site Plan, Fire Apparatus Plan and Site Plan & Design Review Decision (previously provided to this office by the Planning Board) are jointly attached hereto as Exhibit "B". I am copying the Randolph Fire Department on this letter as the Private Way is not legally available for use by fire apparatus as originally represented by Randolph.

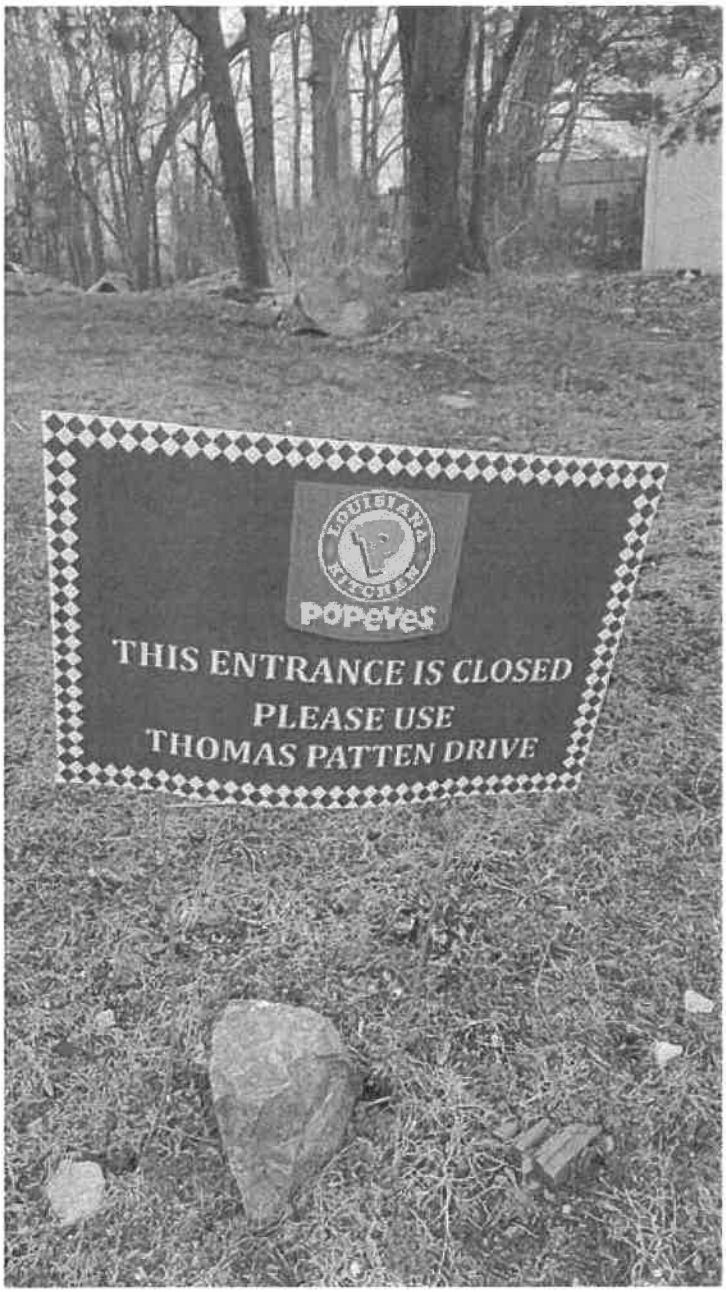
Please advise what action either the Planning Board or Fire Department will take in this regard. Feel free to contact me with any questions. Thank you, in advance, for your attention to this matter.

Sincerely,

Stephen A. Greenbaum

Cc: Client
Randolph Fire Department
10 Memorial Parkway
Randolph, MA 02368

EXHIBIT “A”


LOUISIANA KITCHEN
POPEYES
THIS ENTRANCE IS CLOSED
PLEASE USE
THOMAS PATTEN DRIVE

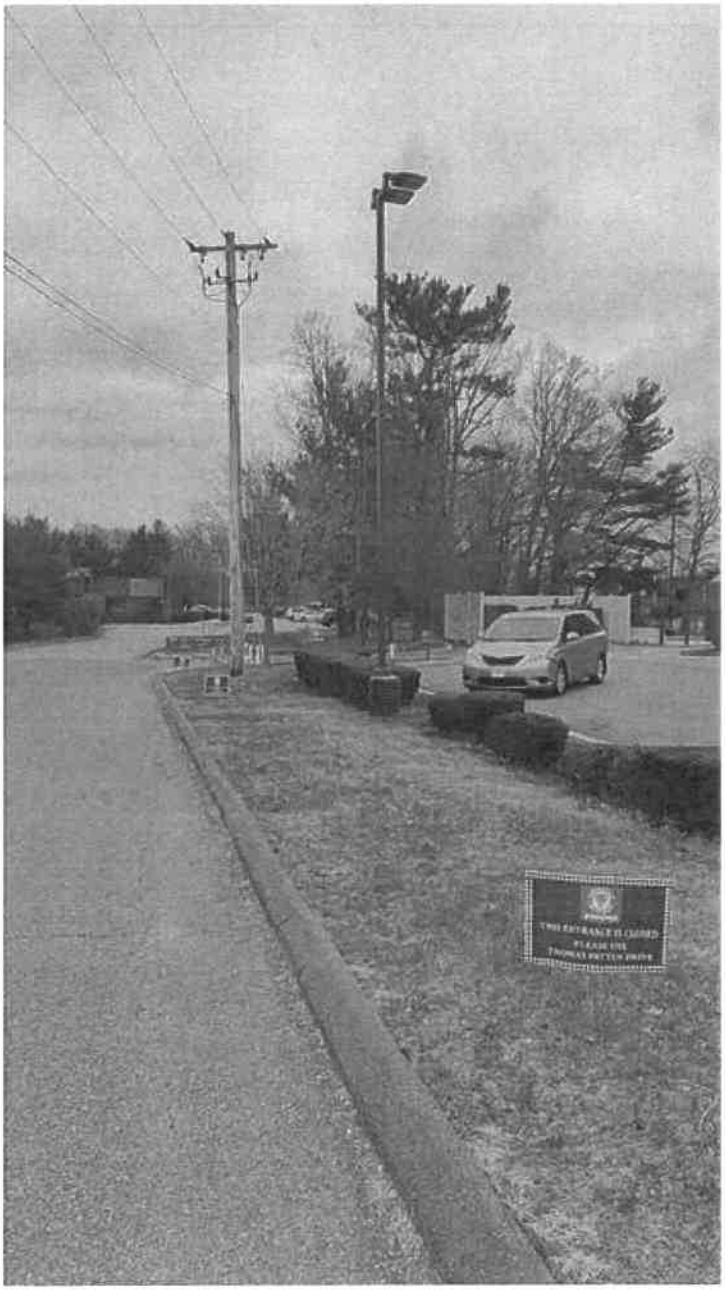
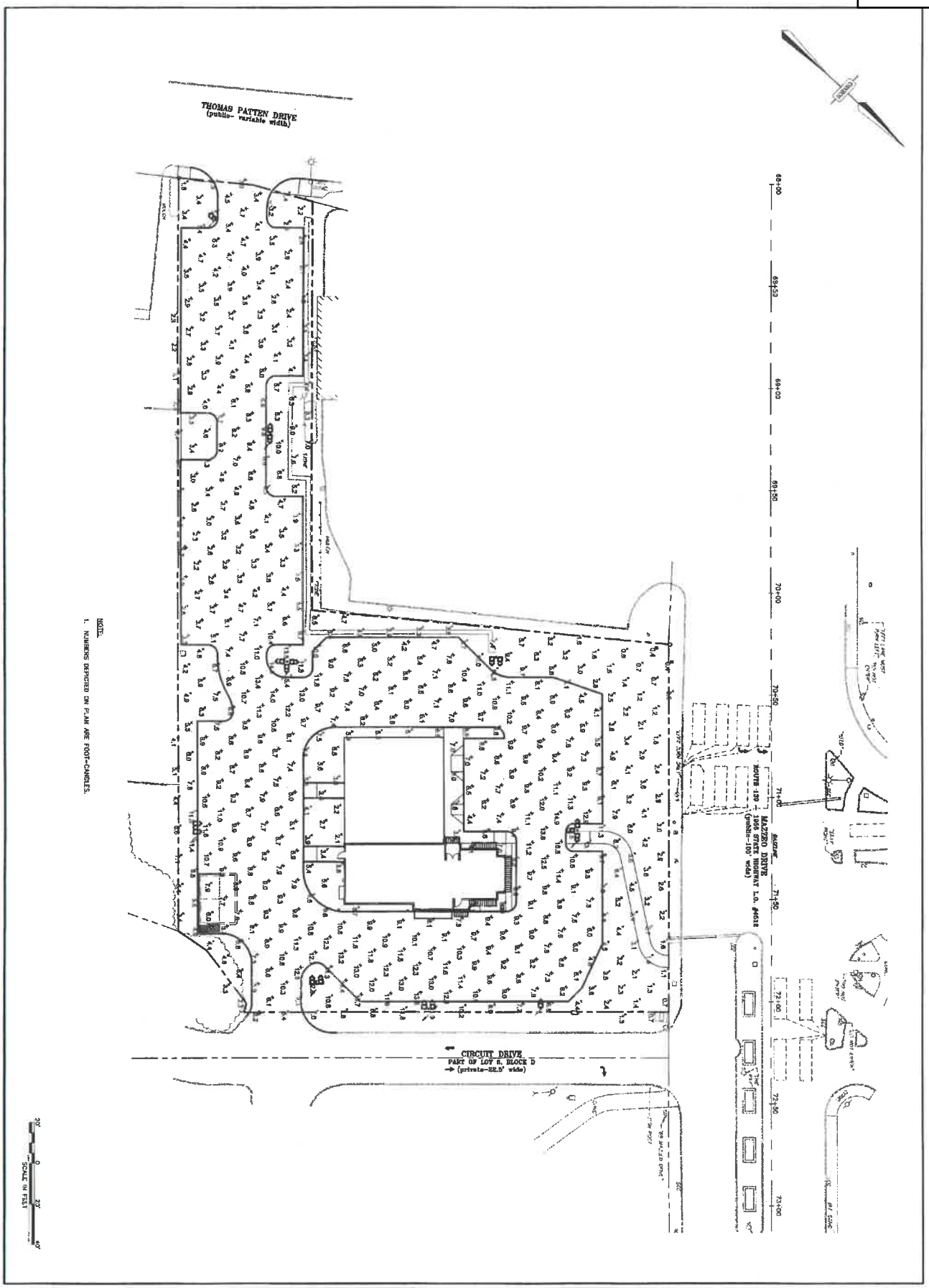


EXHIBIT “B”



CONECO
Engineers & Scientists
4 FIRST STREET, BRIDGEWATER, MASSACHUSETTS 02324
PHONE 508-697-3191 OR 800-540-3355 FAX 508-697-3696
WEBSITE: www.coneco.com

PROJECT: POPEYE'S LOUISIANA KITCHEN
84 MAZZEO DRIVE
RANDOLPH, MA 02368

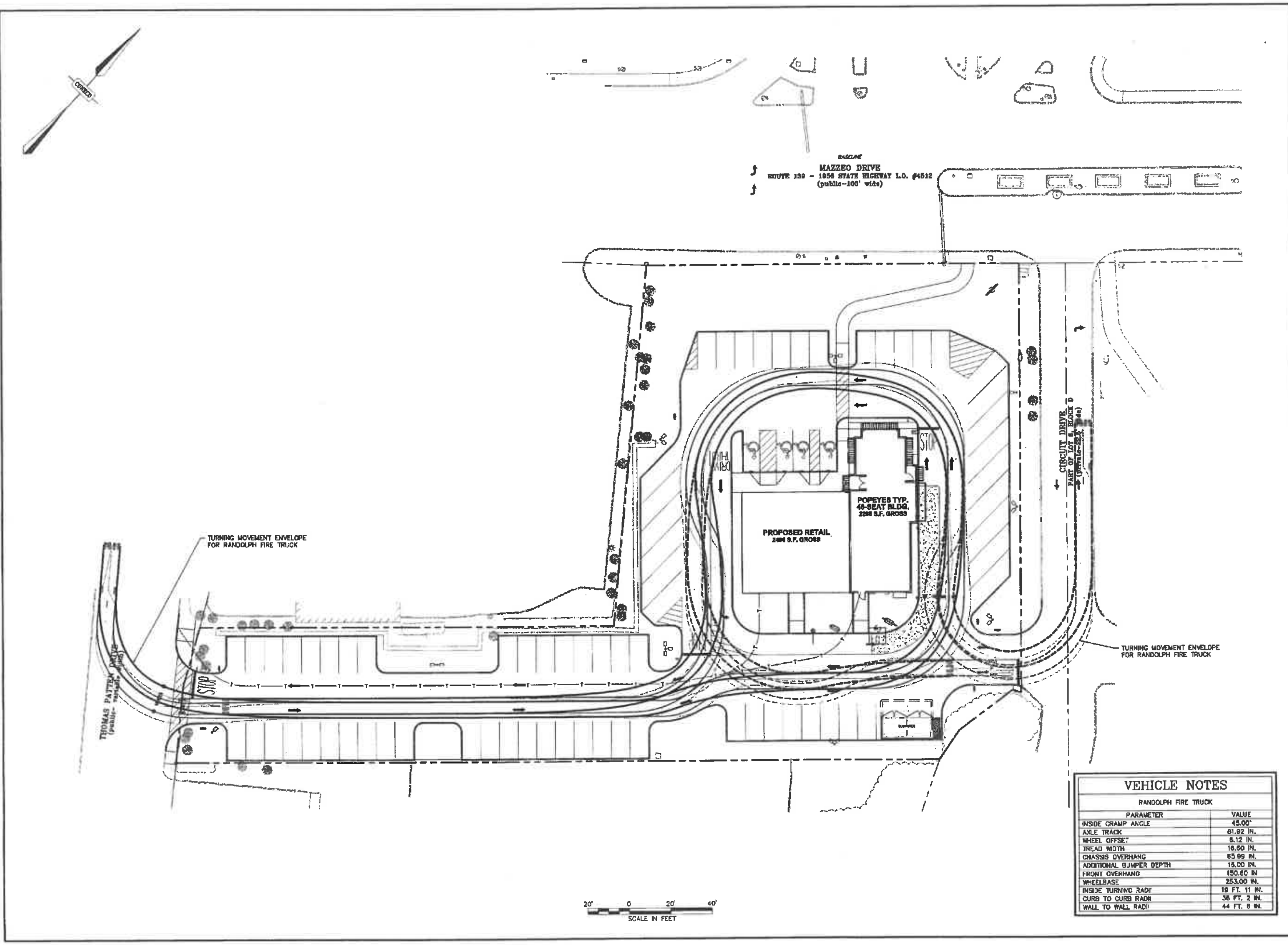
PREPARED FOR: THE PARIKH NETWORK
100 MENLO PARK MALL, SUITE 500
EDISON, NEW JERSEY 08837

PLAN SET: SITE DEVELOPMENT PLANS

PLAN TITLE: PHOTOMETRICS PLAN

REVISIONS			
NO.	DATE	DESCRIPTION	DR/CK

DATE: 09/26/2017
DESIGNED: N/A
DRAFTED: N/A
CHECKED: TLD
IN CHARGE: RTL
SCALE: 1" = 20'
PROJECT NO.: 07015
SHEET NO.: 10 OF 17



VEHICLE NOTES

RANDOLPH FIRE TRUCK

PARAMETER	VALUE
INSIDE CRAMP ANGLE	45.00°
AXLE TRACK	81.92 IN.
WHEEL OFFSET	5.12 IN.
TREAD WIDTH	16.50 IN.
CHASSIS OVERHANG	65.99 IN.
ADDITIONAL BUMPER DEPTH	15.00 IN.
FRONT OVERHANG	150.60 IN.
WHEELBASE	253.00 IN.
INSIDE TURNING RADII	19 FT. 11 IN.
CURB TO CURB RADII	36 FT. 2 IN.
WALL TO WALL RADII	44 FT. 8 IN.

POPEYE'S LOUISIANA KITCHEN
84 MAZZEO DRIVE
RANDOLPH, MA 02368

SITE DEVELOPMENT PLANS

THE PARIKH NETWORK
100 MENLO PARK MARLL, SUITE 500
EDISON, NEW JERSEY 08837

FIRE APPARATUS
AUTOTURN SIMULATION PLAN

REVISIONS			
NO.	DATE	DESCRIPTION	DR/CK.

CONECO
Engineers & Scientists
4 FIRST STREET, BRIDGEWATER, MASSACHUSETTS 02324
PHONE 508-697-3191 OR 800-548-3355; FAX 508-697-5996
WEBSITE: www.coneco.com

DATE: 08/28/2017
DESIGNED: DJD CHECKED: RTL
DRAFTED: DJD IN CHARGE: RTL
SCALE: 1" = 30'
PROJECT NO. 9702.0
SHEET NO. 11 OF 17

9/26/17

Town of Randolph
Planning Department
41 South Main Street
Randolph, MA 02368

SITE PLAN & DESIGN REVIEW DECISION

I. **Applicant**
Randolph Development, LLC
84 Parkhurst Road
Chelmsford, MA 01824

II. **Agent for Applicant**
Richard Lewis
Coneco Engineers & Scientists, Inc.
4 First Street
Bridgewater, MA 02324

III. **Property Location**
84 Mazzeo Drive
Randolph, MA 02368

IV. **Property Owner**
Randolph Development, LLC
84 Parkhurst Road
Chelmsford, MA 01824

V. **Zoning District**
The subject property is located within the Great Bear Highway District (GBHD))

VI. **Action Sought**
The applicant seeks site plan and design review for proposed construction of an Popeye's Restaurant and adjacent commercial retail space.

VII. **Hearing/Meeting**
The proposed actions are subject to a Tier 2 review by the Randolph Planning Board.

VIII. **Referenced Documents**
Project plan sheets issued 9/26/2017 by Coneco Engineers & Scientists
Plan sheets issued 8/27/2017 by Wyrosdic Design & Construction
Hydrant location map dated 9/27/2017 by Coneco Engineers & Scientists
Stormwater Management Report dated 9/27/2017 by Coneco Engineers & Scientists

IX. **Decision & Conditions**
The site plan was reviewed by the Randolph Planning Board on October 3, 2017. On

a motion made by Alexandra Alexopoulos and duly seconded by Patrick Harrison, the board voted 4-0-0 to approve the project subject to the following conditions:

a. Façade colors shall be as specified on the referenced documents. Any modifications must be prior approved by the Planning Board or designee.
b. Site details shall be as specified on the referenced documents. Any modifications must be prior approved by the Planning Board or designee.
c. Proposed light poles at entrance from Thomas Patten Drive shall be double optic model No OLRY-UNLV-FO-4-MA-BZ
d. Rip-rap at northeast corner (reference plan page #6) shall be replaced with a 2 foot block wall and modified landscaping. Such landscaping to be reviewed and approved by the Planning Board designee prior to installation.
e. Install a six (6) foot concrete pad at the rear of the restaurant to facilitate access to the grease tank
f. On the adjacent retail structure, ensure that all rooftop mounted HVAC units are sufficiently screened from view either through appropriate location at the center/back of the roof or through other screening methods
g. Vinyl fencing for dumpster pad shall be almond/beige.
h. Landscaping plan as presented is approved. Existing healthy trees along Mazzeo Drive are to be replanted within the parcel or donated to the Town of Randolph.
i. Sign content/size must be approved through standard permitting procedures.
j. Aggregate signage is limited to that allowed by the Zoning Bylaw unless variance is granted by the Zoning Board of Appeals.
k. Proposed development requires a special permit from the Randolph Town Council to operate a drive-through.
l. Minor modifications to the plans may be approved by the Planning Board designee
m. Major modifications to the plans must be approved by the Planning Board.

X. **Appeal**

Any person aggrieved by the decision of the Planning Board may appeal said decision to the Zoning Board of Appeals within 20 days.

Michelle R. Tyler
Town Planner


EXIT ONLY
DRIVE THRU
WELCOME


DRIVE THRU
THANK YOU