Town of Mashpee — Planning Board

16 Great Neck Road North
Mashpee, Massachusetts 02649

Meeting of the Mashpee Planning Board
Wednesday, March 1, 2023
Waquoit Meeting Room
Mashpee Town Hall
16 Great Neck Road North
Mashpee, MA 02649
7:00 PM
Broadcast Live on Local Channel 18
Streamed Live on the Town of Mashpee Website: https://www.mashpeema.gov/channel-18

Call Meeting to Order
- Pledge of Allegiance

Approval of Minutes
- Review of Meeting Minutes from February 1, 2023

Public Hearings
7:10 PM (Continued from 01/18/2023)

Applicant: Southworth Mashpee Properties LLC
Location: 275 Quinaquisset Avenue (Map 69 Block 32)
Request: Applicant proposes to modify the Willowbend Country Club Special Permit to construct a 14-unit single family cottage community immediately contiguous to the Willowbend Golf Course. With these changes the total unit count for the Willowbend project would be increased to 287 if the Board authorizes the annexation of 275 Quinaquisset into the Willowbend Special Permit as allowed. 287 dwelling units is the maximum number of dwelling units authorized under the Special Permit. All units will be connected to and served by the existing privately owned wastewater treatment plant which serves the entire Willowbend project.

Old Business
- Zoning Bylaw Amendments Proposed for May 2023 Town Meeting
- Local Comprehensive Plan Updates with Weston and Sampson
  - Survey and Workshop Data Analysis
- Affordable and Workforce Housing
  - ADU Workshop
  - HPP
  - Regional Housing Strategy
- Clean Water Initiative
  - Floodplain Development Zoning
  - Tree Protection bylaw

Board Engineer Report
- Project Reviews and Inspections

Chariman's Report

Town Planner Report

- Affordable Housing Project- 209 Old Barnstable Road
- Ockway Highlands Tripartite Agreement Update and Process to Enforce

Board Member Committee Reports

- Cape Cod Commission, Community Preservation Committee, Design Review, Plan Review, Environmental Oversight Committee, Historic Disctric Commission

Public Comment

Correspondence

- Town of Falmouth Notices
- Town of Sandwich Notices
- Town of Barnstable Notices
- January 2023 Discharge Monitoring Report for South Cape Village – N = 5.1
- December 2022 Discharge Monitoring Report for South Cape Village – N = 6.9

Additional Topics (not reasonably anticipated by Chair)

Adjournment

Mashpee Planning Board
Minutes of Meeting
Wednesday, February 1, 2023 at 7:00PM
Mashpee Town Hall - Waquoit Meeting Room
16 Great Neck Road North
Mashpee, Ma 02649

Broadcast Live on Local Channel 18
Call-in Conference Number: (508)-539-1400 x 8585
Streamed Live on the Town of Mashpee website
https://www.mashpeema.gov/channel -18

Present: Chair Mary Waygan, Dennis Balzarini, Mike Richardson, John Fulone, Karen Faulkner

Also Present: Evan Lehrer – Town Planner

Absent: Rob Hansen

CALL TO ORDER
Chairwoman Waygan called the meeting of the Planning Board to order at 7:00P.M. The Pledge of Allegiance was recited.

APPROVAL OF MEETING MINUTES – January 18, 2023
No comments were made regarding the meeting minutes for January 18, 2023.

MOTION:
Mr. Balzarini made a motion to accept the meeting minutes for January 18, 2023 as written. Seconded by Mr. Richardson. All in favor.

PUBLIC HEARING
7:10PM (Continued from 1/18/2023)

Applicant: **Pleasantwood Homes LLC**
Location: **20 Tudor Terrace (Map 29, Block 198)**
Request: **The applicant requests approval of a modification to Spring Hill West Definitive Subdivision Plan of land that would modify the lot lines of Lots 40, 41, and 42, to give adequate frontage for three new building lots proposed for incorporation into the subdivision. The three proposed lots to be created and incorporated into the cluster subdivision are on a parcel of land totaling 6.024 acres. This proposal will continue the**

cluster configuration of the existing subdivision and will add 2.49 acres to open space consistent with the requirements of the Mashpee Zoning Bylaw at the time of cluster subdivision's approval in 1989.

7:15PM (Continued from 1/18/2023)

Applicant: **Pleasantwood Homes LLC**
Location: **20 Tudor Terrace (Map 29, Block 198)**
Request: **The applicant requests approval of a modification to a special permit approved October 6, 2022 that approved the creation of 45 single-family building lots in cluster configuration on 23.738 acres of land and preserved 17.153 acres of open space. The applicant seeks to modify the special permit decision to incorporate the additional three building lots proposed.**

Ms. Faulkner read the correspondence from Attorney Kirrane dated 1/31/23. He noted from the 12/21/22 meeting, a procedural question arose about the existing special permit being modified to include the adjacent 6 acres. After discussion with his client and Town Planner, he requests the application to modify the special permit be withdrawn without prejudice. He asked that the hearing on the modification to the subdivision plan be continued until 3/15/23 to allow the applicant time to submit a new application for a special permit. Additionally, he is requesting a 90 day extension of the 135 day time period the Board has to file its decision on the definitive subdivision plan with the Town Clerk.

MOTION:
Mr. Balzarini made a motion to grant the 90 day extension of the 135 day time period the Board has to file the decision on the definitive subdivision plan with the Town Clerk. Seconded by Ms. Faulkner. All in favor.

MOTION:
Mr. Richardson made a motion for the 7:10p.m. Public Hearing, regarding the subdivision, be continued until March 15, 2023 at 7:20pm. Seconded by Mr. Balzarini. All in favor.

MOTION:
Mr. Richardson made a motion to allow the applicant to withdraw the application for the special permit without prejudice. Seconded by Mr. Balzarini. All in favor.

Ms. Waygan noted they have to wait for their application to come in before setting a Public Hearing date and time. Abutters will be notified and a legal ad will be in the newspaper.

MOTION:
Mr. Balzarini made a motion to close the 7:15 Public Hearing regarding the special permit application. Seconded by Ms. Faulkner. All in favor.

NEW BUSINESS
Update and discussion with Jacques Morin of Bayberry Building Company Inc. relative to construction progress at the subdivision referred to as Ockway Highlands
Mr. Lehrer included the original agreed upon tripartite agreement in the packet. This included the schedule of performance and a correspondence sent by Mr. Morin. He was unable to appear this evening but provided comments for the Board. Mr. Pesce has been out to this subdivision inspecting drainage issues occurring towards the end of Blue Castle Drive in front of properties not subject to this subdivision. The base coat pavement is graded, so much of the runoff is going past the drains and collecting in front yards. The grading is correct, and Mr. Morin still has 3-4 homes to complete and he is uncertain of a completion timeline. However, this drainage issue will be ongoing until the top coat of pavement goes on. He was invited here to discuss an update, as the condition for completion is outlined as 4/1/22 with a condition that he would provide annual reports. It being 2/1/23 and the project is incomplete, Mr. Lehrer felt it be prudent for Mr. Morin to provide a schedule of work remaining and have a dialogue with the Board about the drainage issue. It is his intention to deal with slopes of retention basins, reloaming, reseeding, and correcting drainage issues. It was asked they allow silt sacks as opposed to filter fabric due to the regular plugging.

Mr. Lehrer went during a heavy storm and there was a lot of water built up. They are missing two drains and it is collecting at the end of the subdivision. There were some hay bales but he is unsure how much of an improvement has been made. Mr. Balzarini stated it looks the same.

Mr. Fulone suggested the Town Engineer recommend remediation that will have to be adhered to.

Mr. Lehrer understands the solution is the top course of pavement and the hesitation before houses are built. He's a year overdue and Mr. Lehrer would hate to see this issue continue. He noted it is worth a conversation with Mr. Morin for the Board to be able to make solutions.

PUBLIC COMMENT
Joanne Dorsey- She is a homeowner who has been dealing with this for the past three years. The water completely goes from one side of the street to the other and it is almost like a pond. During rainfall the water comes up to the car door, there is no way to walk if she doesn't want to drive through it, and it sits there two days past the rainfall. During these past three years she has had to spray her yard for mosquitos. This summer it was as if she never sprayed. She was unsure if they were using new chemicals that weren't as effective, she even called to have them spray a second time. She cannot be outside at all at dusk. Since this construction started

her phone line has been cut four different times. The phone is dead and the alarm system is set up to that. They don't even call dig safe. They finally just got their phone line back on. They seem to have no regard for anyone else. This has been going on for 3-4 years now. They left a huge hole in the ground after the construction for the phone line. She has pictures to show the Board.

Mr. Lehrer stated it has been going on for closer to 4-5 years.

Ms. Waygan wants to enforce the tripartite agreement and get advice from Legal Counsel on how to enforce it. She does not think another meeting with the contractor will do anything. He has been invited before and has not attended. The most they've gotten was a response by email and she wants to get legal advice on how to execute, with the intention of getting the final course of pavement installed, regardless of best practice. He promised April 2022 and it is not the homeowners problem that the houses are not built. Further, she would like DPW and town inspection of these roads to ensure they can be traveled in emergency when flooded.

Mr. Fulone reiterated the three lots have not even been sold yet, so it will be a while before this is completed.

Vote to set public hearing date for special permit modification requested by Southworth Mashpee Properties LLC
Ms. Waygan stated the draft is in the packet. She is fine to move forward with a Public Hearing date of Wednesday, March 1, 2023 at 7:10p.m.

MOTION:
Mr. Balzarini made a motion to set the Public Hearing date for special permit modification to March 1, 2023 at 7:10p.m. Seconded by Mr. Richardson. All in favor.

Discussion and possible vote to accept the request to withdraw without prejudice of the special permit application filed by Longfellow Design Build Inc. for a retail grocery at 647 Falmouth Road
Ms. Waygan reminded the Board this was an auto referral to Cape Cod Commission for review as DRI. In the packet there is correspondence dated 1/21/23 addressed to the Board asking to withdraw the 9 Shellback Way / 647 Falmouth Road matter without prejudice.

MOTION:
Mr. Balzarini made a motion to accept the withdrawal without prejudice for the retail grocery store at 647 Falmouth Road. Seconded by Mr. Fulone. All in favor.

Review draft Planning Board Annual Report 2022 and potential vote to submit to Town Managers Office for February 13, 2023 submission deadline.

Ms. Waygan wrote this annual report based on previous reports. Mr. Lehrer stated there were 28 meetings held, including a couple special meetings. Ms. Waygan asked the Board for input. He included every action taken for special permits, subdivisions, and zoning contemplations in the report. The Board approved Mr. Lehrer the go ahead to add further details. No vote was needed for such authorization.

OLD BUSINESS

Zoning Bylaw Amendments Proposed for May 2023 Town Meeting

-Review and discuss current zoning regulations pertaining to Solar Energy Systems, recently submitted amendments to the zoning bylaw for Solar Energy, and contemplate amendment pathways that are consistent with MGL Chapter 40A Section 3 in consideration of Tracer Lane II Realty, LLC vs. City of Waltham case.

There is a Solar Energy Systems bylaw memo summarizing the industrial land in town. There are 1,394 acres zoned I1 in Mashpee. However, 1,160 of those acres are located on JBCC. That leaves 234 acres (1.7%) of total acreage in the industrial district for medium or large ground mounted solar energy of overall land for by site plan review. This solar is affectively prohibited in 98.3%. Right now they are allowed by site plan review, he would maintain plan review. Ms. Waygan stated that would be a change to the draft. Any medium or large scale shall be allowed after special permit for any other zoning district other than I1. Right now on I1, solar energy is allowed by site plan review.

Mr. Lehrer stated this is only the special provision section and the draft has all zoning districts. Ms. Waygan would like to fill in the chart to see where everyone is comfortable putting medium and large scale systems.

Ms. Faulkner commented the bylaw proposal will be for medium and large scale solar systems in R3, R5, C1, C2, C3, and Industrial will allow all sizes. She would like to dissect the Tracer Case up through the Supreme Court and give an understanding and her reasons why they should not have solar in residential. When that case came about, the first thing they looked at was 1985 General Law Chapter 40A Section 3. “It was amended to include solar energy systems as a protected use. No zoning ordinance or bylaw shall prohibit or unreasonably regulate the installation of solar energy systems, or the building of structures that facilitate solar energy, except where necessary to protect public health, safety, or welfare.” The developer owned commercial land in Lexington and owned residential land contiguous with that in Waltham. He wanted to build an access road on the residential land in Waltham to get to the solar job site. The Building Inspector in Waltham would not allow that because the access road would be in residential and used to access commercial. When he brought suit in Land Court, Land Court interpreted MA law as saying the structures that facilitate the collection of solar energy would need an access road, which would be within the law. Judgement acted in favor of the developer. The developer further argued even though solar facilities were allowed in the industrial zone, the regulation was unreasonable because they only had 2% industrial land in Waltham. Waltham lost in Land Court and took it to the Appellate Court and they bumped it right up to the Supreme Court. The access road was deemed necessary and protected under Ch40. The Court held that the municipality had greater discretion to regulate solar where necessary to protect public health, safety, or welfare, and there was no showing in this case. The court did not say solar must be allowed in every zone or the town needing to have a certain percentage to be deemed reasonable. Preservation of residential character of neighborhoods is legitimate. The Court did not show any limitation to preservation of character. Ms. Faulkner argued they can restrict solar in residential if it interferes with any of those three things: health, safety, or welfare. Our citizen's welfare can be defined as overall wellbeing, comfort, happiness, and quiet enjoyment. Having a comfortable place to live is important. We have limited residential land left, as well as an affordable housing shortage. We shouldn't take residential land away from people to build solar farms. She is advocating for C1, C2, C3, and I.

Mr. Balzarini does not want solar in residential.

Ms. Waygan asked if anyone was comfortable with medium and large scale in R3 and R5.

Mr. Fulone wanted the Town Planner's opinion. He noted part of his argument last time was by not including residential could exacerbate some of the housing issues.

Mr. Lehrer's point he was trying to make was some of the adequate acreage for the use is in the residential districts where there is enough land area for the form to be functional. There is enough land area for 100 ft. buffers and large setbacks from water and wetlands. There would be competing interests for redevelopment in the commercial districts. A point of interest that Ms. Faulkner pointed out was the silence about restrictions being reasonable in for the purpose of respecting health, safety, and welfare. Mashpee zoning is also silent in that regard. He is intrigued about crafting an argument and maintaining the restriction as it currently is. Case law changes all the time and it would take an appeal to determine reasonability. The only other thing he has been considering is the approximately 400 +/- building lots divisible in the R3 and R5 where cluster subdivisions could occur and get open space. Although we are making investments in sewer, that's also 400 septic systems in the ground. There could be an opportunity to consider those parcels as an overlay district for solar to be consistent with criteria for developing a cluster subdivision. Our zoning currently incentivizes land for houses we could encourage solar use with no additional single family dwelling with nitrogen septics. He is hesitant to recommend a particular pathway. He would like to understand where the community wants to go. He is not married to any particular pathway but would like an education and engagement opportunity.

Mr. Balzarini stated there is little incentive for the town as they sell the energy back to the grid and the town gets little tax money. A house or business property is getting more taxes.

Ms. Waygan would like to continue to fill out the chart and go forward with I1 remaining as site plan review. She would like to get a consensus for the allowance of medium or large scale solar through special permit in R3, R5, C1, C2, and C3. This bylaw can change and the Town Planner can do his engagement, but there are performance standards that are needed that are currently missing such as no glare on residential areas or street, serious vegetative buffers, etc.

Mr. Fulone prefers the Town Planner's recommendation and thinks it can wait until October.

Mr. Richardson is in agreement with allowing solar in all districts.

Ms. Faulkner is not comfortable with medium or large scale solar in R3 or R5. She is comfortable with allowing it in the C1, C2, and C3.

Mr. Balzarini is not comfortable with medium or large scale solar in R3 or R5 but he is in C1, C2, and C3.

Ms. Waygan is not comfortable with medium or large scale solar in residential at this time, but she is comfortable with the C1, C2, and C3. Parcels or owners can come forward, but she would like to get the C1, C2, and C3 in this modification passed through the Select Board and Town Meeting, then go forward.

Mr. Lehrer wanted to note C3 is the limited commercial along Main St. where the depth is 300 feet with limited uses. You would want to encourage other uses for Main Street.

Mr. Balzarini, Ms. Waygan, and Ms. Faulkner are comfortable with removing C3 as well.

Ms. Waygan stated they would have three votes for C1 and C2. Mr. Balzarini noted it could be amended and Ms. Waygan affirmed they will be amending it.

Mr. Lehrer also wanted to inform the Board they will be creating a provision in the performance standards that states any panel approved by this Board will abstain from PFAs chemical compounds, or any forever chemical, thus causing potential leaching.

Mr. Fulone asked if he had time for his public outreach and education between now and the Town Meeting in May. Regarding the scope, he can educate, but identification of an overlay district will require time. The article is relatively simple, he can educate people on what it does.

MOTION:
Mr. Balzarini made a motion to submit this article and any other related articles such as use table, footnote modifications in the land space requirement with frontage component, ensure appropriate definitions are added, clearance not exceeding 6

inches, and no approval for panels containing PFAs. The following changes will include striking R3, R5, C3, and noting I1 permitting is through Site Plan Review. Seconded by Ms. Faulkner.

Roll Call Vote:
Mr. Fulone: No, Mr. Richardson: No, Ms. Faulkner: Yes, Mr. Balzarini: Yes, Ms. Waygan: Yes (3-2)

Ms. Waygan stated it will come back to them for updates of performance standards for systems permitted via an overlay district for October. It there are people who have come forward with parcels, those should be considered as part of an overlay. You cannot spot zone, you have to have more than one grouping. Because of the court case, we need to include these protective provisions in our bylaw now.

Mr. Lehrer noted one criteria would be pre disturbed parcels. He would like to consider the other allowable land uses. If tree protection or forest protection is something of importance we want to encourage that, we would also prefer not to have any new septic systems. Sub-divisible parcels might serve a better purpose for solar use, where impacts are less detrimental. He noted the best way to identify an overlay district would be through an engagement process. Ms. Faulkner asked if he would identify and explain why a lot would be better suited for solar. He went on to say from a technical standpoint, the lot already being cleared or pre –disturbed, isolated from a developed residential neighborhood, or land locked. Zoning is often about incentivizing uses.

Ms. Waygan would like this submitted, with the caveat the Board will review it one more time. They will look at it one last time on 3/1/23, she would like Mr. Lehrer to speak with Mr. Collins and she will speak with the Select Board Chair, just to ensure typos are corrected.

PUBLIC COMMENT
Lynne Barbee- She feels strongly that Mashpee does not want solar, except small, in residential areas, allowing even medium, much less large, allows land owners to rent or sell to solar. That’s not what we want with residentially zoned land. She knows one person in particular where this would apply. He could expand existing development and put more spaces for housing not solar. She thinks it makes sense to distinguish medium from large. Having a bylaw for large, a bylaw for medium, and a bylaw for small clarifies it for people, they may want medium in commercial but not large. She did her own research. She spoke to people in the town of Waltham about their experience. Her position is based on advice given to her from those citizens. There needs to be controls and regulations about buffers and preserving residential land for the desperately needed residential housing.

Ms. Waygan asked Mr. Lehrer if he knew of any other town having an overlay district. He responded that Falmouth and Sandwich both do, numerous Cape towns have taken that approach. She inquired how they chose their overlay. He will phone some colleagues to get an idea. He stated Falmouth just redeveloped Cape Cod Golf Course with a fair amount of solar.

Mr. Lehrer answered a question about taxes generated by solar verses a cluster subdivision and he noted the revenues from taxes on residential are more substantial. Cluster subdivision produces more square foot value to the town than the solar, but then there are questions about impacts. Mr. Balzarini noted if the family had kids in school that adds money, so there are other costs associated as well.

Local Comprehensive Plan Updates with Weston & Sampson
- Survey, Updating Vision Statement, Workshops on Proposed Actions, & Review of Chapter drafts
Mr. Lehrer wants the Board to send him comments within the next week.

Ms. Waygan made a comment at the meeting, she is going to have trouble finishing this without W&S analysis of the survey and the materials/ opinions collected at workshops. She cannot finish her review and give comments unless she sees data. There is no reason to have a workshop without the ability to review that data. She is looking for trends. She knows what the highest ranked serious problem in town is, but they haven't seen any report on that from W&S. There is no way they can move forward without input from five workshops, surveys, or focus groups such as Southport, the business communities, and the Tribal focus group.

Affordable and Workforce Housing
-ADU, HPP, & Regional Housing Strategy
Mr. Lehrer will cover this under his Town Planner Report.

Clean Water Initiative
- Floodplain Development Zoning, Tree Protection Bylaw, & Fertilizer Restrictions and other wetlands protection regulation
The fertilizer restrictions are under bylaws, there is nothing in zoning for that. Ms. Waygan asked if they wanted to keep that item on the agenda, it was deemed unnecessary. There will be no articles submitted by this Board.

Mr. Lehrer has been discussing increasing fertilizer restrictions with his colleagues but first it is important to understand how we currently enforce those restrictions. If they are going to consider increasing they want to know how it is currently being managed. There are some short term actions because there is a nutrient control bylaw, they want to expand the scope to include phosphorus as well as nitrogen fertilizer, especially pertaining to resource areas. They need to understand how we currently enforce and how to remain consistent with policy objectives today. We have had these restrictions on the books for years and wants to be able to respond to questions asking why it has not been a priority.

BOARD ENGINEER REPORT
Project Reviews and Inspections
Nothing to report.

CHAIRMANS REPORT
Ms. Waygan went to the Conservation Committee meeting last week. She provided them with an update and encouraged them to watch the Planning Board's January 18th meeting where Drew McManus spoke about the Clean Water Initiative at a staff level. On February 9, 2023 at 5:00p.m. the ConCom is having a public forum about water quality held at the Town Hall. They are thinking of increasing their meeting times to either start earlier or meet an additional day. They get a lot of applications that take up meeting time. They want to set aside more time for water quality issues.

TOWN PLANNER REPORT
Affordable Housing Project – 209 Old Barnstable road
Mr. Lehrer stated he has no major updates. He did receive an email today from Quashnet Valley residents who summarized their survey results. He read in the newspaper, he did request a traffic study for the project at the request of the neighborhood, but the newspaper reported Mr. Collins approved those funds, and he does not believe that to be true. The Trust has taken no action on that item, it would come from the Trust or as an additional line item from the town. The financial commitment has not been figured out.

Ms. Waygan asked what sort of data comes out of a traffic study.

Mr. Lehrer commented it would determine intersection delays, safety issues, and mitigation strategies to correct those issues. If deemed detrimental, it could bear impact to the development. The major concerns are traffic related with limited sidewalks and the school buses. The traffic focus is something he can begin right now.

Ms. Faulkner asked about some of their other concerns.

Mr. Lehrer stated density on 3+/- acre parcel, concentration of affordable housing projects in the area with Mashpee Village up the street, and the ongoing construction of the nearby subdivision. He wants to get the traffic study authorized and that scope of work underway then he will reconvene with stakeholders and discuss mitigation and pathways forward. He needs to understand the traffic issues before getting into site design, infrastructure, architecture, and building types.

PUBLIC COMMENT

Donald Allen- They learned a lot about the affordable housing process when they met with Mr. Lehrer a week ago. They surveyed 100 homes within their neighborhood and there was not one feedback that was against affordable housing in Mashpee, the need was recognized. The real question was if this was the right location given traffic concerns, but more specifically traffic safety. Old Barnstable Road in the morning, afternoon, or evening has trucks diverted down a 30MPH road, it is a dangerous road. That road is not designed for heavy traffic. There are no sidewalks so it is especially dangerous for pedestrians. By adding 24 more homes will exacerbate that issue.

New Seabury Cottages Phase 3

Mr. Pesce's associate has been out shooting elevations. He is still engaging on that scope and will get a report back to the Planning Board and HOA relatively shortly.

COMMITTEE REPORTS

Cape Cod Commission-	Released their annual report for 2022. There is a lot about ponds and their expanding pond network and pond programs.
Community Preservation Committee-	Meet on 2/2/23 at 6:30p.m. There are 3 open applications. The Affordable Housing Trust requested to increase their ask to $550,000. Disc golf is still on the agenda and a spot has been identified on Ashumet Road. Executive Session will meet regarding 751 Main Street.
Design Review-	No Meeting
Plan Review-	No Meeting
Environmental Oversight Committee-	No Meeting
Historic District Commission-	No Meeting

PUBLIC COMMENT

Michael Perkins – He wanted to comment on the disc golf, given the previous discussion on affordable housing, if they are in such a crisis for land and a shortage of affordable housing, he is concerned about investing in disc golf in certain areas of town. He is unsure of the sense, but he is all about recreational activities.

Ms. Waygan elaborated this was her street. It is on town owned land. Due to the runway being at the end of the street, the FAA regulates no structure can exceed 15ft. The condos and houses predate the FAA regulation. This parcel of land is better suited than others suggested.

Mr. Balzarini wanted to comment about something that has been on his mind. He went to the recycle center and saw all the trees being cut down. He was thinking why couldn't they give them to the Tribe, recycle them for fire wood, or pay someone to chop them up and put them in chords, they could sell them and make enough to pay the company who cut them. All they do is grind the trees up. He spoke to a few Tribal members but a lot of people need wood, and his heat bill was very high. He said there is not enough gas coming to this state. It comes on a ship where it's three times the cost because the pipelines were stopped. A lot of electricity is natural gas and it is being shipped from the Gulf all the way here.

Mr. Lehrer will mention the tree cutting to the DPW Director.

LIST OF DOCUMENTS

Additional documents may be available in the Planning Department.

- 2023 District Local Technical Assistance Announcement (DLTA):

  Ms. Waygan would like to apply for money towards the HPP. Mr. Lehrer stated they applied last year and were turned down. The deadline is 2/13/23. The state provides these funds through the Cape Cod Commission. The application would be to the CCC for approval of DLTA funds towards the HPP costs. She is asking for $25,000.

  MOTION:

  Mr. Balzarini made a motion to recommend the Planning Board apply to the Cape Cod Commission for approval of DLTA funds to be used towards the HPP in the amount of $25,000. Seconded by Mr. Richardson. All in favor.
- Town of Falmouth Notices
- Town of Sandwich Notices
- Town of Barnstable Notices
- November 2022 Discharge Monitoring Report for South Cape Village – N= 5.5
- October 2022 Discharge Monitoring Report for South Cape Village – N= 2.9

ADJOURNMENT

Mr. Balzarini made a motion to adjourn the meeting of the Planning Board at 8:37p.m. Seconded by Ms. Faulkner. All in favor.

Next Meeting: Wednesday, March 1, 2023 @ 7:00P.M.

Respectfully Submitted,

Christine M. MacDonald
Board Secretary

Town of Mashpee

Planning Board

16 Great Neck Road North
Mashpee, Massachusetts 02649

APPLICATION FOR SPECIAL PERMIT MODIFICATION

Date received by Town Clerk: 2/1/23 Town Clerk Signature / Seal: DKaye

The undersigned hereby applies for a Modification of the Special Permit approved by the Mashpee Planning Board on April 15, 1987 for a project entitled Willowbend Country Club.

The original Special Permit and any Modifications have been recorded in the Barnstable County Registry of Deeds at the following Book(s) and Page(s): Book 5707, Page 290.

Name of Applicant Southworth Mashpee Properites LLC Phone 508-539-5200

Address 130 Willowbend Drive, Mashpee MA

Owner, if different Same Phone

Address

Attach copies of (a) most recent recorded deed and (b) tax bill or Assessors' certification.
Deed of property recorded in Barnstable County Registry Book 32022 Page 219
or Land Court Certificate of Title No.

Location and description of property: 275 Quinaquisset Avenue

Mashpee Assessors Map(s) and Block(s): 69-169, 69-32
Zoning District(s) in which property is located: R-3

How long have you owned the property? Four Years
Section(s) of the Zoning Bylaw which require(s) the permit you seek: 174-24(C)(9)(g)

Present use of property: Single Family Residence

Description of proposed modification (*attach plans and documents as required by the Zoning By-law and Special Permit Regulations*):
See attached Project Description

Signature of Owner or Authorized Representative [signature] 1/24/23

Attach written authorization signed by owner.

JACK McELHINNEY
Attorney at Law

63 Shore Road, Suite 23
Winchester, MA 01890
jmcelhin@aol.com

Office: 781.729.7299
Cell: 617.816.4092

January 23, 2023

By Hand Delivery

Planning Board
Town of Mashpee
16 Great Neck Road North
Mashpee, MA 02649

Attn: Evan Lehrer, Town Planner

Re: Willowbend Country Club – Request for Modification No. 37 of Special Permit

Dear Members of the Planning Board:

Enclosed please find the applications of Southworth Mashpee Properties LLC for a modification of the Special Permit for Willowbend Country Club. A check in the amounts of $500 is included to cover application fees. The application is submitted pursuant to Section 174-24C(9)(g) of the Mashpee Zoning By-law and seeks approval to include within the Special Permit the 5.03 acre parcel known as 275 Quinnaquisset Avenue immediately contiguous to the golf course and to demolish the existing single family home currently served by a septic system and to construct thereon 14 single family cottages. All units would be connected to the existing Willowbend Sewage Treatment plant. A brief project description is included with the application. Plans, prepared by Baxter Nye Engineering & Survey, Inc. are included with this submittal and have also been transmitted electronically to the Planning office.

Please feel free to contact me should you have any questions.

Sincerely yours,

Jack McElhinney, attorney for
Southworth Mashpee Properties LLC

cc: Town Clerk
Matthew Eddy, P.E.

Project Description

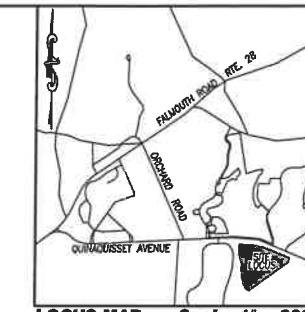
The proposed project, known as Cranberry Point, will consist of the construction of fourteen single family cottages on a 5.06 acre parcel known as 275 Quinaquisset Avenue. The parcel is triangular in shape and is bounded on two sides by the existing golf course and on the third side by Quinaquisset Avenue. The cottages will each be designed for three bedrooms and contain approximately 2500 s.f. on average and would be offered for sale. The new neighborhood would be served by a sixteen foot paved driveway with an additional seven foot shell shoulder. All units will be connected to the Willowbend Sewer Treatment plant. Cranberry Point will also include a community putting area and golf cart path which will connect the neighborhood with pedestrian access to the existing first hole of the "Bay" course and the existing golf cart crossing on Quinaquisset. In order to construct the project, the owner will be seeking approval from the Conservation Commission to fill portions of two old bog areas on the property. As mitigation for the wetland impacts, the proponent is proposing to "naturalize" one and a half acres of contiguous bogs along the channel of Quaker Run. The proponent has met informally with the Commission and the agent to discuss this part of the work.

Requested Relief

Although the parcel is not currently subject to the terms of the Willowbend Special Permit, under the terms of Section 174-24C.(9)(g) of the By-law, the Planning Board may modify the Special Permit to include this land under the terms of the Special Permit provided that the project does not increase the overall number of units for the project or otherwise result in any loss of protected open space. The proposed project is eligible for approval under this section as the existing Special Permit provides for a maximum cap of 287 permits for the entire Willowbend Project. As of the most recent modification in 2021 for the six lot Willow Circle subdivision, the overall number of residential permits approved by the Planning Board for Willowbend stands at 274, leaving 13 remaining permits available under the 287 unit cap. The fourteenth permit would be made available by re-assigning a permit previously approved for the parcel at 24 North Glen Drive which parcel has since been permanently restricted and cannot be built on. [1]

1

By way of background, in 2009, two approved building sites at 24 and 26 North Glen Drive (approved by Modification 15 in April, 1996 attached) were permanently merged into a single building site now known as 24A North Glen. As part of that merger, the development rights pertaining to the two parcels were permanently relinquished by the parcel owner and converted to the right to construct a single home on the two merged parcels along with an adjacent pool. Copies of the relevant documents have been provided to the Planning office. Willowbend is now requesting that the existing approval for 27 lots granted in the 1996 Modification No. 15 for North Glen Drive be reduced from 27 to 26 thereby increasing the number of permits currently available under the 287 overall cap from 13 to 14.



LOCUS MAP **Scale: 1" = 2000'**

GENERAL NOTES:

1. THE INTENT OF THIS PLAN IS TO DETAIL EXISTING SITE CONDITIONS AT 0 QUINAQUISSET AVE. AND 275 QUINAQUISSET AVE, MASHPEE, MA 02649.
2. LOCUS AREA IS COMPRISED OF:
PER CURRENT ASSESSOR'S RECORDS:

OWNER: SOUTHWORTH MASHPEE PROPERTIES, LLC
130 WILLOWBEND DRIVE, MASHPEE, MA 02649
DEED BOOK 32022 PAGE 219
RECORD PLAN BOOK 448 PAGE 38 LOT 1 AND 2
ASSESSOR'S MAP 69, PARCEL 32 AND 169

3. BENCHMARK AS SHOWN ON THIS PLAN.
4. ZONING INFORMATION:

ZONING DISTRICT: R3
CURRENT MINIMUM ZONING REQUIREMENTS:
MIN. LOT AREA = 40,000 SF.
MIN. LOT FRONTAGE = 150 FEET
MIN. YARD SETBACKS: FRONT = 40 FEET, SIDE = 15 FEET, REAR = 15 FEET
MAXIMUM BUILDING HEIGHT = 2-1/2 STORIES
MAXIMUM LOT COVERAGE = 20%

5. A TITLE SEARCH HAS NOT BEEN PERFORMED FOR THIS SITE. THERE MAY BE RIGHTS BY OTHERS, EASEMENT, TAKINGS, MORTGAGES, RIGHT OF WAYS ETC. NOT DEPICTED. IF DETERMINED TO BE NECESSARY, A TITLE SEARCH SHALL BE PERFORMED BY OTHERS AND SUPPLIED TO BAXTER NYE ENGINEERING & SURVEYING.
6. THE PROPERTY LINE INFORMATION SHOWN IS PER THE PROPERTY LINES SET BY THE REGISTERED PROFESSIONAL LAND SURVEYOR (PLS) AS SHOWN ON THE CERTIFIED PLOT PLAN AS SEALED BY THE PLS WITHIN THIS PLAN SET. THE EXISTING FEATURES SHOWN HEREON WERE OBTAINED FROM AN ON THE GROUND FIELD SURVEY PERFORMED BY BAXTER NYE ENGINEERING & SURVEYING ON MARCH 17, 2022, ON AUGUST 12 AND 16 AND DECEMBER 12 2022. THE PROPERTY LINE AND SURVEY INFORMATION WAS COMMISSIONED AS PART OF THE PROJECT AND IS SHOWN AS BACKGROUND INFORMATION ON THE DESIGN PLANS.
7. COMMUNITY PANEL NUMBER: 250009 0752 J. THE FLOOD INSURANCE RATE MAP DEFINES THIS AREA AS ZONE X (UNSHADED) AND ZONE X (SHADED).
8. ENVIRONMENTAL INFORMATION:
PER MASS GIS OLIVER AS OF 08/23/2022:
   - SITE DOES NOT APPEAR TO BE WITHIN AN A.C.E.C. (AREA OF CRITICAL ENVIRONMENTAL CONCERN).
   - SITE DOES NOT APPEAR TO BE WITHIN AN AREA OF ESTIMATED HABITAT OF RARE WILDLIFE AS MAPPED ON MASS GIS OLIVER PER NHESP "ESTIMATED HABITATS OF RARE WILDLIFE" FOR USE WITH THE MA WETLANDS PROTECTION ACT REGULATIONS (310 CMR 10)."
   - SITE DOES NOT APPEAR TO BE WITHIN A PRIORITY HABITAT AS MAPPED ON MASS GIS OLIVER PER NHESP "PRIORITY HABITATS OF RARE SPECIES" FOR SPECIES UNDER THE MASSACHUSETTS ENDANGERED SPECIES ACT, REGULATIONS (321 CMR 10).
   - SITE DOES NOT APPEAR TO CONTAIN A CERTIFIED VERNAL POOL AS MAPPED ON MASS GIS OLIVER PER NHESP "CERTIFIED VERNAL POOLS."
   - SITE APPEARS TO BE WITHIN A WETLAND RESOURCE AREA AS MAPPED ON MASS GIS SYSTEM.
   - SITE DOES NOT APPEAR TO BE WITHIN A STATE APPROVED ZONE II GROUNDWATER RECHARGE PROTECTION AREA.
9. UTILITY INFORMATION SHOWN HEREIN:
   - THE CONTRACTOR SHALL CONTACT DIG SAFE (AT 1-888-DIG-SAFE) AND UTILITY COMPANIES TO LOCATE THE LOCATION OF ALL EXISTING UTILITIES, AT LEAST 72 HOURS PRIOR TO THE START OF CONSTRUCTION. EXISTING UNDERGROUND INFRASTRUCTURE, UTILITIES, CONDUITS AND LINES ARE SHOWN IN AN APPROXIMATE WAY ONLY, MAY NOT BE LIMITED TO THOSE SHOWN HEREIN AND HAVE BEEN RESEARCHED BASED ON THE AVAILABLE UTILITY RECORDS NOTED HEREON. THE CONTRACTOR AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO LOCATE SAID INFRASTRUCTURE AND UTILITIES EXACTLY. IF FIELD CONDITIONS DIFFER FROM PLAN INFORMATION, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY FOR POSSIBLE REDESIGN.
   - SOURCE INFORMATION FROM PLANS HAS BEEN COMBINED WITH OBSERVED EVIDENCE OF UTILITIES TO DEVELOP A VIEW OF THOSE UNDERGROUND UTILITIES. HOWEVER, LACKING EXCAVATION, THE EXACT LOCATION OF UNDERGROUND FEATURES CANNOT BE ACCURATELY, COMPLETELY AND RELIABLY DEPICTED. WHERE ADDITIONAL OR MORE DETAILED INFORMATION IS REQUIRED, THE CLIENT IS ADVISED THAT EXCAVATION MAY BE NECESSARY.
   - UTILITIES NOTED HEREON AS "COMPILED" ARE SHOWN BASED ON SOURCE INFORMATION (RECORD PLANS) OBTAINED FROM UTILITY COMPANIES AND/OR MUNICIPALITIES. LOCATIONS OF "COMPILED" UTILITIES SHOWN ARE TO BE CONSIDERED APPROXIMATE ONLY.
   - EXISTING SEPTIC SYSTEM INFORMATION OBTAINED FROM TITLE 5 SEPTIC SYSTEM INSPECTION REPORT BY PAUL C. MARTIN, DATED 3/27/2019, ON FILE AT BOARD OF HEALTH.
   - TOWN WATER SERVICE SHOWN ON PLAN FROM WATER DEPARTMENT TIE CARD "275 QUINAQUISETT AVENUE ACCT#5043" DATED 10/17/1996.
   - GAS SERVICE SHOWN ON PLAN FROM NATIONAL GRID "MA-S02570" DATED 4/26/2019.
   - ELECTRIC LINE SHOWN ON THIS PLAN COMPILED FROM EVERSOURCE T-PLAN DATED 6/10/2022 AND PHYSICAL SITE FEATURES.

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STAMP

CONSULTANT

CONSULTANT

PREPARED FOR:
Southworth Mashpee Properties, LLC
130 Willowbend Drive
Mashpee, MA 02649

PROJECT TITLE
Cranberry Point
275 Quinaquisset Avenue
Mashpee, MA 02649

		DATE	DESCRIPTION

SHEET TITLE
Existing Conditions Plan

SHEET NO
C2.0

DATE: JANUARY 16, 2023

30 0 30 60
SCALE IN FEET
SCALE: 1"=30'

DRAWN BY: ZDP CHECKED BY: MWE
JOB NO: 2014-009 FILE: 2014-009 QUIN EC.dwg

NOTES:

1. ALL CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH MHDSS, TOWN ORDINANCES, REQUIREMENTS, AND SPECIFICATIONS.

2. THE CONTRACTOR SHALL CONTACT THE ENGINEER TO SCHEDULE A PRE-CONSTRUCTION MEETING AT LEAST TWO (2) WEEKS PRIOR TO COMMENCING CONSTRUCTION.

3. THE CONTRACTOR SHALL MAKE SUBMITTALS TO THE ENGINEER FOR APPROVAL BEFORE ANY FABRICATION OR DELIVERY OF PRODUCTS OR MATERIALS.

4. ALL PROPOSED WALKWAYS WILL BE HANDICAPPED ACCESSIBLE WHERE REQUIRED. ALL PROPOSED RUNNING SLOPES ON WALKWAYS SHALL BE LESS THAN 5%, ALL CROSS SLOPES AND ALL LANDING SLOPES SHALL BE LESS THAN 2%. RAMPS WHERE NEEDED SHALL HAVE SLOPES LESS THAN 8%. RAILINGS SHALL BE PER ARCHITECT. THESE ARE MAXIMUM SLOPES WITH NO TOLERANCE. ALL WORK WILL BE IN ACCORDANCE WITH THE MOST CURRENT REQUIREMENTS OF THE U.S. ACCESS BOARD, AMERICANS WITH DISABILITIES ACT & COMMONWEALTH OF MASSACHUSETTS, ARCHITECTURAL ACCESS BOARD.

5. CONTRACTOR SHALL CONFIRM AND PROVIDE ALL LANDINGS OUTSIDE OF DOORWAYS, AT THE TOP AND BOTTOM OF STEPS, AND AT TOP AND BOTTOM OF RAMPS, TO BE CONSTRUCTED SO THE LANDING IS 5 FT X 5 FT MIN. (UON) AND IS LESS THAN A 2% SLOPE IN ALL DIRECTIONS ON THE LANDING. THE CONTRACTOR SHALL VERIFY THE LANDING CONDITIONS IN THE FIELD AND CONTACT THE SITE ENGINEER WITH ANY QUESTIONS PRIOR TO INSTALLING LANDING.

STAIRS REPRESENTED ON THE SITE PLANS DO NOT INDICATE THE EXACT NUMBER OF TREADS AND RISERS NEEDED. THESE WILL VARY BASED ON SPECIFIC FIELD CONDITIONS. THE CONTRACTOR SHALL VERIFY THE CONDITION IN THE FIELD AND DETERMINE TREADS AND RISERS REQUIRED PER THE BUILDING CODE. REFERENCE SHALL BE MADE TO THE ARCHITECTURAL PLANS.

THE CONTRACTOR SHALL CONTACT THE SITE ENGINEER AS NEEDED WITH QUESTIONS REGARDING SPECIFIC TREADS AND RISERS PRIOR TO INSTALLING THE STAIRS.

6. DEMOLISH/REMOVE ALL EXISTING STRUCTURES, FOUNDATIONS, CONCRETE PADS, FENCES AND APPURTENANT ITEMS UNLESS OTHERWISE NOTED TO SAVE, SALVAGE OR RESET.

7. EXISTING PAVING EDGES SHALL BE SAWCUT TO CREATE A CLEAN EDGE WHERE IT IS TO BE TIED INTO NEW PAVING, OR WHERE ASPHALT IS REMOVED ADJACENT TO ASPHALT WHICH IS TO REMAIN. BROKEN OR UNSTABLE PAVEMENT SHALL BE REMOVED AND SUBBASE REPLACED WITH SUITABLE COMPACTED MATERIAL PER PAVEMENT SECTION DETAIL HEREIN. ANY SAWCUT LINES SHOWN ON THE PLANS ARE APPROXIMATE ONLY. THE EXACT EDGE OF SAWCUT SHALL BE DETERMINED BY THE CONTRACTOR IN THE FIELD TO PROPERLY BLEND TO THE SURROUNDING GRADES. PROPOSED ASPHALT SHALL BE PROPERLY BUTTED AND BLENDED TO SURROUNDING ASPHALT WHICH IS TO REMAIN. THE BLENDED TRANSITION BETWEEN PROPOSED AND EXISTING ASPHALT SHALL BE WITH AN APPROXIMATE 1.5% GRADE UNLESS OTHERWISE IDENTIFIED. THE JOINT SHALL NOT BE ABRUPT.

8. THE PROPERTY LINE INFORMATION SHOWN HEREIN/HEREON IS PER THE PROPERTY LINES SET BY THE REGISTERED PROFESSIONAL LAND SURVEYOR (PLS) AS SHOWN ON THE CERTIFIED PLOT PLAN AS SEALED BY THE PLS WITHIN THIS PLAN SET. THE PROPERTY LINE AND SURVEY INFORMATION WAS COMMISSIONED AS PART OF THE PROJECT AND IS SHOWN AS BACKGROUND INFORMATION ON THE DESIGN PLANS. SETBACKS SHOWN ARE TO THE PROPERTY LINE SET BY THE PLS. DIMENSIONS SHOWN ARE TO OUTSIDE FACE OF FOUNDATION OR TO THE FACE OF CURB/BERM WHERE APPLICABLE.

9. ALL CURBING SHALL BE INSTALLED SO THAT WHEN A TERMINAL END OF A CURB EXISTS IT SHALL HAVE A TAPERED END PER MDOT SPECIFICATIONS SO THAT THERE IS NOT A BLUNT SQUARE END PROJECTING.

10. THE CONTRACTOR SHALL NOTIFY AND COORDINATE A SITE MEETING WITH THE ENGINEER PRIOR TO PLACING FINAL PAVING COURSE. LAYOUT AND FINAL REQUIRED DIMENSIONS ARE TO BE REVIEWED AT THIS MEETING PRIOR TO PAVING OPERATION. REQUIREMENTS SHALL BE PER MASSDOT STANDARD SPECIFICATIONS.

11. SITE LIGHTING – SEE ELECTRICAL DRAWINGS IN ARCHITECTURAL PLAN PACKAGE FOR DETAILED INFORMATION.

12. ALL WORK WITHIN THESE PLANS SHALL BE PERFORMED AND PROVIDED BY THE CONTRACTOR IN ACCORDANCE WITH THE CONSTRUCTION DETAILS PROVIDED IN THIS PLAN SET WHETHER OR NOT THE DETAIL NUMBER IS SPECIFICALLY REFERENCED.

ZONING TABLE

ZONING DISTRICT(S): R3*
OVERLAY DISTRICTS: NONE
ALLOWED USE: SINGLE FAMILY RES.
EXIST USE: SINGLE-FAMILY RES.

PROPOSED USE:
14 DETACHED SINGLE FAM. RESIDENTIAL UNITS
TYPICAL UNIT FOOTPRINT:
BUILDING = 1,802 SF
REAR DECK = 309 SF
FREE STANDING GARAGE = 296 SF
TOTAL FOOTPRINT/UNIT = 2,407 SF

EXIST BLDGS FOOTPRINT=3,873 SF
EXIST BUILDING TO BE DEMOLISHED

PROP TOTAL SITE BLDG FOOTPRINT = 33,698 SF

TOTAL PARCEL AREA: 220,650 SF TOTAL (UPLAND-152,288± SF; WETLAND-68,362 SF)

	REQUIRED/ALLOWED	PROPOSED
LOT AREA:	40,000 SF (UPLAND)	152,288 SF
FRONTAGE:	150 FT	658 FT
BUILDING SETBACKS*		
FRONT SETBACK	40 FT	40.0 FT
SIDE SETBACK	15 FT*	N/A INTERIOR LOT LINE
REAR SETBACK	15 FT*	N/A INTERIOR LOT LINE
PARKING SETBACK TO ABUTTER LOTS	10 FT	N/A
MAX. BLDG. HEIGHT (STORIES)	2.5 STORIES / 35 FT	2 STORIES/30.7 FT
MAX. LOT COVERAGE (STRUCTURES):	20%*	PER WILLOWBEND S.P.
PARKING TABLE		
SINGLE FAMILY = 2 PER UNIT x 14 UNITS (1 GARAGE AND 1 DRIVEWAY SPACE)	28 SPACES	28 SPACES
PARKING STALL SIZE – 90°	19.33' x 9'	19' x 9'
DESIGN VEHICLE		AERIAL LADDER

*PROP. BUILDING REQUIREMENTS TO BE PER WILLOWBEND SPECIAL PERMIT MODIFICATION

SIGN SUMMARY

M.U.T.C.D. NUMBER	SPECIFICATION WIDTH	SPECIFICATION HEIGHT	TEXT/ GRAPHIC	QUAN.
R1-1	24"	24"	STOP	1

ALL SIGNAGE MUST BE IN CONFORMANCE WITH THE FEDERAL HIGHWAY ADMINISTRATION "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD), LATEST EDITION, ALL APPLICABLE CODES, AND LOCAL REQUIREMENTS, ORDINANCES, AND BYLAWS. SEE SIGN INSTALLATION DETAIL HEREIN.

SIGN INSTALLER SHALL COORDINATE SPECIFIC SIGN WORDING AND COLOR REQUIREMENTS WITH LOCAL AGENCIES AS NECESSARY (NOTE TO CONTRACTOR TO VERIFY HANDICAP PARKING SIGN FORMAT – SEE DETAIL HEREIN)

* ADD "VAN ACCESSIBLE" SIGN WHERE ASTERISKED

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COMMONWEALTH OF MASSACHUSETTS
MATTHEW W. EDDY
CIVIL
No. 43183
REGISTERED PROFESSIONAL ENGINEER

CONSULTANT

CONSULTANT

PREPARED FOR:
Southworth Mashpee Properties, LLC
130 Willowbend Drive
Mashpee, MA 02649

PROJECT TITLE
Cranberry Point
275 Quinaquisset Avenue
Mashpee, MA 02649

		DATE	DESCRIPTION

SHEET TITLE
Master Layout Plan

SHEET NO
C3.0

DATE: JANUARY 16, 2023

30 0 30 60
SCALE IN FEET
SCALE: 1"=30'

DRAWN BY: JKL CHECKED BY: MWE
JOB NO: 2014-009 FILE: 2014-009 QUIN DM.dwg

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		DATE	DESCRIPTION

SHEET TITLE
Site Layout Plan Sheet 1 of 2

SHEET NO
C3.1

DATE: JANUARY 16, 2023

SCALE IN FEET
SCALE: 1"=20'

DRAWN BY: JKL CHECKED BY: MWE
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Cranberry Point
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Mashpee, MA 02649

		DATE	DESCRIPTION

SHEET TITLE

Site Layout Plan
Sheet 2 of 2

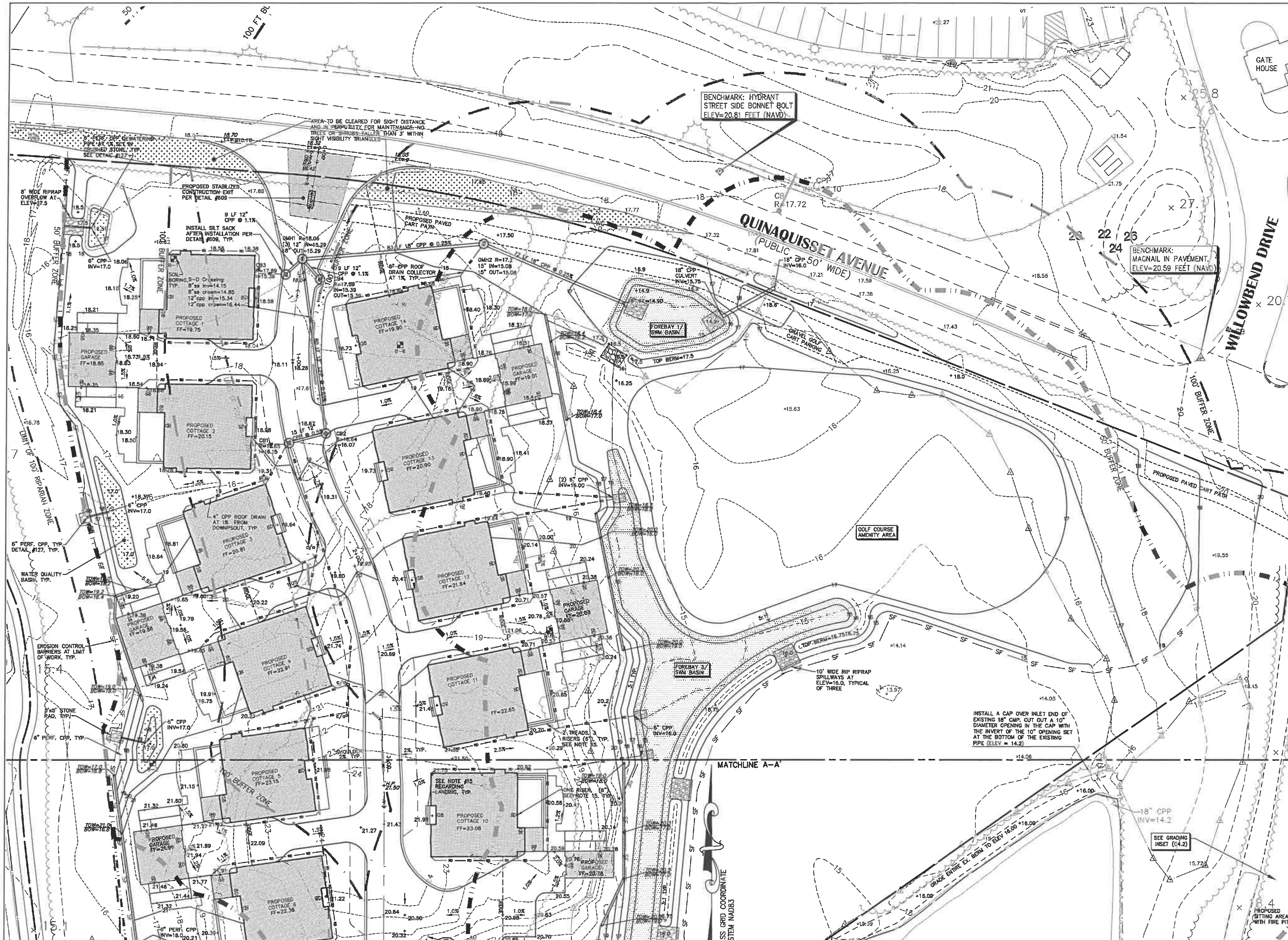
SHEET NO

C3.2

DATE: JANUARY 16, 2023

20 0 20 40
SCALE IN FEET
SCALE: 1"=20'

DRAWN BY: JKL CHECKED BY: MWE
JOB NO: 2014-009 FILE: 2014-009 QUIN DM.dwg



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PROJECT TITLE
Cranberry Point
275 Quinaquisset Avenue
Mashpee, MA 02649

DATE	DESCRIPTION

SHEET TITLE
Grading & Drainage Plan - Sheet 1 Of 2

SHEET NO
C4.0

DATE: JANUARY 16, 2023

20 0 20 40
SCALE IN FEET
SCALE: 1"=20'

DRAWN BY: JKL CHECKED BY: MME
JOB NO: 2014-009 FILE: 2014-009 QUIN GD.dwg

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GRADING AND DRAINAGE NOTES:

1. THE PROJECT ELEVATIONS ARE BASED ON THE NAVD VERTICAL DATUM.

2. DEBRIS, STUMPS, EXCESS, AND UNSUITABLE MATERIALS FROM THE CLEARING & DEMOLITION OPERATIONS SHALL BE REMOVED FROM THE SITE AND DISPOSED OF IN A LEGAL MANNER BY THE CONTRACTOR

3. DISTURBED AREAS SHALL BE PROTECTED AT ALL TIMES TO CONTROL SEDIMENT TRANSPORT BEYOND THE LIMIT OF WORK.

4. DISTURBED AREAS SHALL BE TREATED WITH WATER DURING EXCAVATION, OR APPROVED ALTERNATIVE, TO CONTROL THE DUST.

5. THE SITE SUBCONTRACTOR SHALL PROVIDE ALL EXCAVATION, BACKFILL AND COMPACTION NECESSARY TO ACHIEVE THE FINISH GRADES SHOWN ON THE PLANS AND FOR INSTALLATION OF BUILDING STRUCTURES, PAVING, STORMWATER MANAGEMENT AND ALL UTILITIES (INTERIOR AND EXTERIOR). SITE CONTRACTOR TO REFER TO SITE ELECTRICAL, MEP AND LANDSCAPE PLANS FOR ADDITIONAL INFORMATION AND DETAIL.
EXISTING PAVING EDGES SHALL BE SAWCUT TO CREATE A CLEAN EDGE WHERE IT IS TO BE TIED INTO NEW PAVING, OR WHERE ASPHALT IS REMOVED ADJACENT TO ASPHALT WHICH IS TO REMAIN. BROKEN OR UNSTABLE PAVEMENT SHALL BE REMOVED AND SUBBASE REPLACED WITH SUITABLE COMPACTED MATERIAL PER PAVEMENT SECTION DETAIL HEREIN. ANY SAWCUT LINES SHOWN ON THE PLANS ARE APPROXIMATE ONLY. THE EXACT EDGE OF SAWCUT SHALL BE DETERMINED BY THE CONTRACTOR IN THE FIELD TO PROPERLY BLEND TO THE SURROUNDING GRADES. PROPOSED ASPHALT SHALL BE PROPERLY BUTTED AND BLENDED TO SURROUNDING ASPHALT WHICH IS TO REMAIN. THE BLENDED TRANSITION BETWEEN PROPOSED AND EXISTING ASPHALT SHALL BE ACCOMPLISHED WITH AN APPROXIMATE 1.5% GRADE UNLESS OTHERWISE IDENTIFIED. THE JOINT SHALL NOT BE ABRUPT.

6. ALL PIPE OUTFALLS, CURB OPENINGS, STONE WEIRS, AND OTHER DRAINAGE OVERFLOW AND OUTLET AREAS SHALL HAVE RIPRAP EXTENDED FROM THE OUTLET TO THE BOTTOM OF SLOPE WITH A MINIMUM 10 FT x 10 FT RIPRAP LEVEL SPREADER, UNLESS OTHERWISE SPECIFICALLY DETAILED. ALL STONE OUTFALLS SHALL BE PROPERLY SHAPED SO THE RUNOFF IS CONTAINED WITH THE STONE LINING. SEE TYPICAL DETAILS FOR ADDITIONAL INFORMATION.

7. ALL DISTURBED AREAS NOT OTHERWISE TREATED SHALL BE STABILIZED WITH 4" LOAM, SEED, & MULCH. THE CONTRACTOR SHALL BE RESPONSIBLE FOR AREAS UNTIL VEGETATION HAS BEEN PERMANENTLY ESTABLISHED. SLOPES IN EXCESS OF 3:1 AND AREAS THAT SHOW SIGNS OF EROSION FROM CONCENTRATED FLOWS SHALL BE FURTHER STABILIZED WITH EROSION CONTROL BLANKETS (ECB) OF CURLEX DOUBLE NET – CURLEX II .98 BY AMERICAN EXCELSIOR COMPANY OR EQUAL. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE REQUIRED ECB'S AND PROPERLY STABILIZE ALL AREAS OF THE SITE.

8. ALL DRAINAGE STRUCTURES AND PIPING SHALL BE DESIGNED AND INSTALLED FOR H–20 LOADING. SETTING OF CATCH BASINS AND MANHOLE STRUCTURES SHALL BE ADJUSTED WITH CONCENTRIC OR OFFSET TOPS AS NEEDED FOR MINOR ADJUSTMENTS TO AVOID CONFLICTS WITH UNDERGROUND UTILITIES OR OTHER STRUCTURES. THE GRATE OR MANHOLE COVER SHALL ALSO BE ADJUSTED OVER THE STRUCTURE TO NOT CONFLICT WITH STEPS INSIDE THE STRUCTURE.

9. A 10 FOOT MINIMUM SEPARATION SHALL BE MAINTAINED BETWEEN ALL SWM INFILTRATION FACILITIES AND SANITARY SEWER LINES AND MANHOLES.

10. CPP – HIGH DENSITY POLYETHYLENE CORRUGATED PIPE WITH SMOOTH INTERIOR WALL TO MEET ADS N–12 PIPE SPECIFICATION OR EQUAL. CPP PIPE USE SHALL BE ALLOWED AS NOTED, WITH A DIAMETER UP TO AND INCLUDING 24". BACKFILLING CPP MUST FOLLOW MANUFACTURER'S RECOMMENDATIONS AND SPECIAL CARE MUST BE EXERCISED (SEE ADS PRODUCT NOTE 3.115).

11. ALL COTTAGES ROOF DOWNSPOUTS SHALL BE TIED INTO ROOF DRAINS. REFER TO ARCHITECTURAL PLANS FOR ALL LOCATIONS OF DOWNSPOUTS. CONTRACTOR SHALL PROVIDE TIE–INS TO ALL DOWNSPOUT LOCATIONS. ROOF DRAINS TO BE AT LEAST 4" CPP AT 1% SLOPE MINIMUM WITH 1 FOOT MINIMUM COVER, TYPICAL, UNLESS OTHERWISE NOTED ON THE PLAN. GARAGES SHALL BE PROVIDED WITH STONE DRIP STRIPS ALONG FOUNDATION OUT PAST ROOF LINES TO CONTROL ALL GARAGE ROOF RUNOFF.

12. ALL GRADING WORK SHALL BE DONE IN A WORKMANLIKE MANNER ACCOMPLISHED TO CREATE POSITIVE DRAINAGE AND ELIMINATE ANY PUDDLING OR PONDING. WHERE NOT OTHERWISE NOTED OR DEFINED ON THE PLAN, ALL CUT AND FILL SHALL BE BLENDED TO DAYLIGHT AT EXISTING GRADE WITH A 3:1 SLOPE.

13. THE CONTRACTOR SHALL NOTIFY THE ENGINEER WITH ANY GRADE ISSUES OR QUESTIONS PRIOR TO PERFORMING THE FINISH GRADING WORK.

14. ALL PROPOSED WALKWAYS WILL HAVE RUNNING SLOPES OF LESS THAN 5% AND ALL CROSS SLOPES < 2%, U.O.N. THESE ARE MAXIMUM SLOPES WITH NO TOLERANCE. ALL WORK WILL BE IN ACCORDANCE WITH THE MOST CURRENT REQUIREMENTS OF THE U.S. ACCESS BOARD, AMERICANS WITH DISABILITIES ACT & COMMONWEALTH OF MASSACHUSETTS, ARCHITECTURAL ACCESS BOARD, WHERE REQUIRED.

15. CONTRACTOR SHALL CONFIRM AND PROVIDE ALL LANDINGS OUTSIDE OF DOORWAYS, AT THE TOP AND BOTTOM OF STEPS, AND AT TOP AND BOTTOM OF RAMPS, TO BE CONSTRUCTED SO THE LANDING IS 5 FT X 5 FT MIN. (UON) AND IS LESS THAN A 2% SLOPE IN ALL DIRECTIONS ON THE LANDING. THE CONTRACTOR SHALL VERIFY THE LANDING CONDITIONS IN THE FIELD AND CONTACT THE SITE ENGINEER WITH ANY QUESTIONS PRIOR TO INSTALLING LANDING.

STAIRS REPRESENTED ON THE SITE PLANS DO NOT INDICATE THE EXACT NUMBER OF TREADS AND RISERS NEEDED. THESE WILL VARY BASED ON SPECIFIC FIELD CONDITIONS. THE CONTRACTOR SHALL VERIFY THE CONDITION IN THE FIELD AND DETERMINE TREADS AND RISERS REQUIRED PER THE BUILDING CODE. REFERENCE SHALL BE MADE TO THE ARCHITECTURAL PLANS. THE CONTRACTOR SHALL CONTACT THE SITE ENGINEER AS NEEDED WITH QUESTIONS REGARDING SPECIFIC TREADS AND RISERS PRIOR TO INSTALLING THE STAIRS.

16. BOTTOM OF WALL (BOW) OR TOP OF WALL (TOW) ELEVATIONS FOR RETAINING WALLS NOTED ON THE PLAN ARE APPROXIMATE ELEVATIONS WHERE THE WALL IS EXPECTED TO DAYLIGHT WITH EXISTING GRADE. STRUCTURAL RETAINING WALL DESIGN IS DONE BY OTHERS AND THE BOW OR TOW EXISTING GROUND ELEVATIONS FOR WHERE THE WALL WOULD DAYLIGHT TO EXISTING GRADES SHALL BE VERIFIED AS NEEDED FOR THE STRUCTURAL DESIGN. THE ACTUAL BOW OR TOW ELEVATION AT THE PROPOSED WALL(S) MAY DIFFER FROM CONTOURS SHOWN ON THE PLANS ESPECIALLY AT STEEP SLOPES AREAS.

17. STORMWATER MANAGEMENT FACILITIES SHALL BE PROTECTED FROM SEDIMENT AND SILTATION AT ALL TIMES. JUST PRIOR TO COMPLETION, THE SITE SUBCONTRACTOR SHALL PERFORM A FINAL INSPECTION AND CLEANING OF THE STORMWATER MANAGEMENT SYSTEM. ALL SEDIMENT AND SILTATION SHALL BE REMOVED FROM THE BASINS, FOREBAYS, ETC. AND THESE AREAS SHALL BE SHAPED TO FINAL CONTOURS AND ELEVATION PER THE PLANS. ALL REPAIRS SHALL BE MADE AS NECESSARY TO THE SATISFACTION OF THE ENGINEER PRIOR TO PLACING FINAL TOPSOIL, MULCH, VEGETATION, SEEDING, ETC.

18. ANY DEWATERING OPERATION, WHEN REQUIRED AS PART OF THE CONSTRUCTION PROCESS, SHALL ENSURE ALL DEWATERING OCCURS THROUGH A PROPER DEWATERING BASIN (STONE, FILTER FABRIC AND HAYBALES OR OTHER ACCEPTABLE MEANS) PRIOR TO DISCHARGE FROM THE SITE.

19. ALL WORK WITHIN THESE PLANS SHALL BE PERFORMED AND PROVIDED BY THE CONTRACTOR IN ACCORDANCE WITH THE CONSTRUCTION DETAILS PROVIDED IN THIS PLAN SET WHETHER OR NOT THE DETAIL NUMBER IS SPECIFICALLY REFERENCED.

20. FOUNDATION DRAINS ARE REQUIRED. REFER TO STRUCTURAL AND ARCHITECTURAL PLANS (SEE DETAIL #120).

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CONSULTANT

CONSULTANT

PREPARED FOR:
Southworth Mashpee Properties, LLC
130 Willowbend Drive
Mashpee, MA 02649

PROJECT TITLE
Cranberry Point
275 Quinaquisset Avenue
Mashpee, MA 02649

DATE DESCRIPTION

SHEET TITLE
Grading & Drainage Plan - Sheet 2 of 2

SHEET NO
C4.1

DATE: JANUARY 16, 2023

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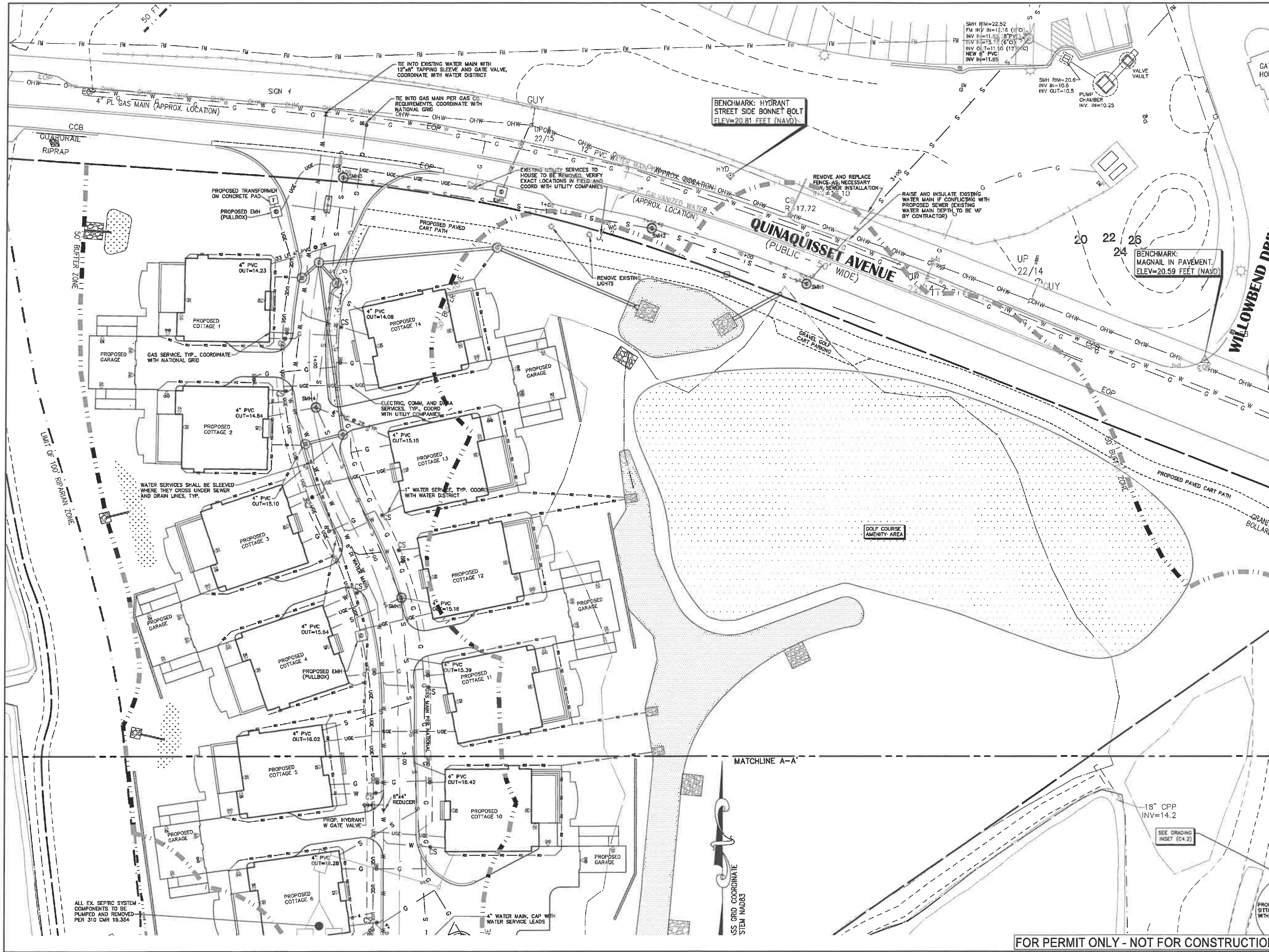
SCALE: 1"=20'

DRAWN BY: JKL CHECKED BY: MWE
JOB NO: 2014-009 FILE 2014-009 QUIN GD.dwg



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PROJECT TITLE

Cranberry Point
275 Quinaquisset Avenue
Mashpee, MA 02649

DATE	DESCRIPTION

SHEET TITLE

Utilities Plan
Sheet 1 of 2

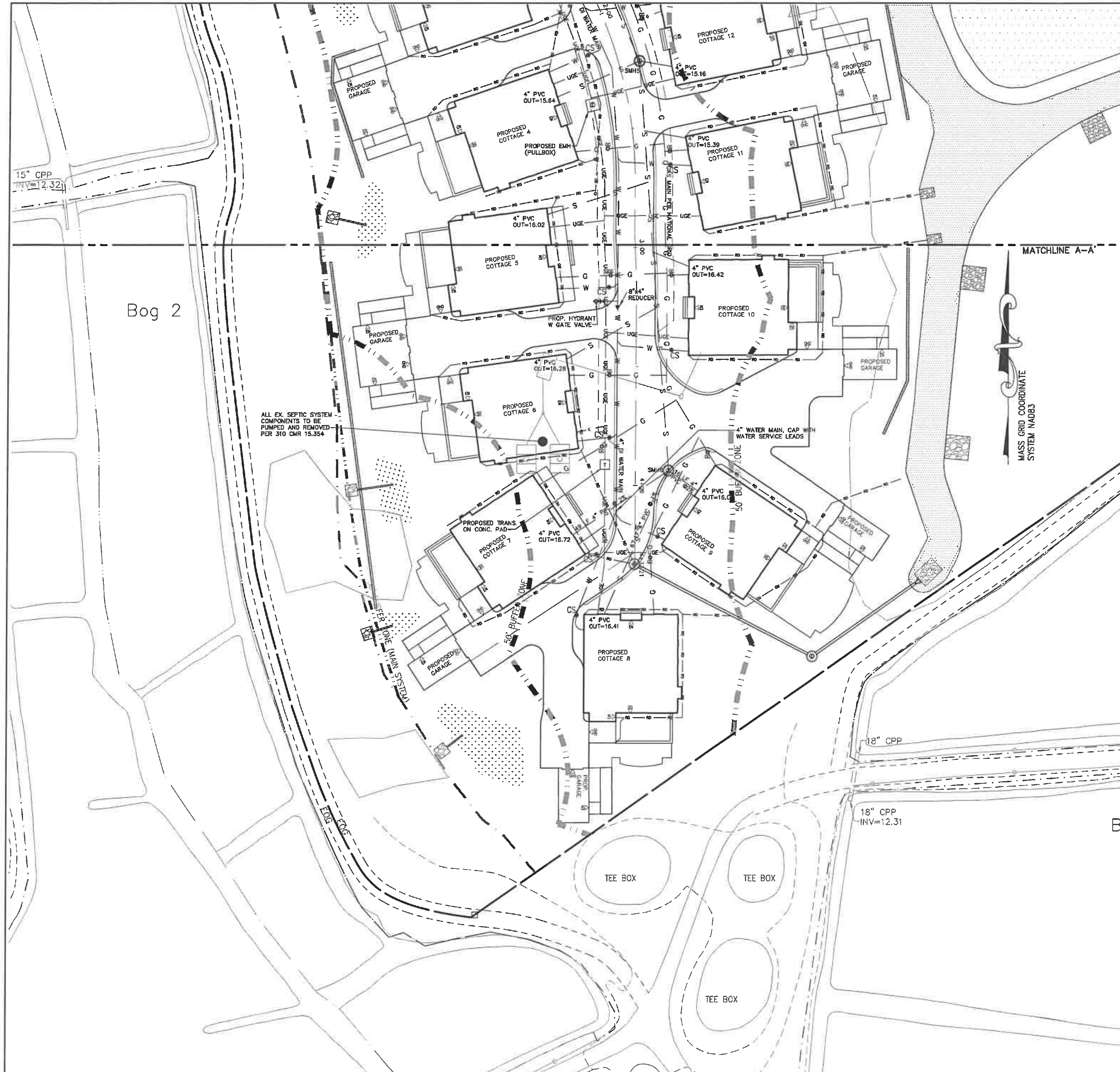
SHEET NO

C5.0

DATE: JANUARY 16, 2023

SCALE IN FEET
SCALE: 1"=20'

DRAWN BY: JKL
CHECKED BY: MWE
JOB NO: 2014-009
FILE: 2014-009 QUIN UT.dwg



UTILITY NOTES:

1. CAUTION: THE CONTRACTOR SHALL CONTACT DIG SAFE (AT 1-888-DIG-SAFE) AND UTILITY COMPANIES TO LOCATE ALL EXISTING UTILITIES, AT LEAST 72 HOURS PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION, BOTH HORIZONTALLY AND VERTICALLY, OF ALL EXISTING UTILITIES BEFORE THE START OF ANY WORK. THE LOCATION OF EXISTING UNDERGROUND SYSTEMS, INFRASTRUCTURE, UTILITIES, CONDUITS AND LINES ARE SHOWN IN AN APPROXIMATE WAY ONLY, MAY NOT BE LIMITED TO THOSE SHOWN HEREIN AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER, THE ENGINEER, OR ITS REPRESENTATIVE. THE CONTRACTOR AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO LOCATE SAID SYSTEMS, INFRASTRUCTURE AND UTILITIES EXACTLY. IF ELEVATION INFORMATION DIFFERS FROM PLAN INFORMATION, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY FOR POSSIBLE REDESIGN. AT UTILITY CROSSINGS, VERIFY IN FIELD THE LOCATION AND INVERTS OF WATER, ELECTRIC, GAS, TELEPHONE & DATA/COMM AND RELOCATE IF CONFLICTING WITH PROPOSED INVERTS PER THE ENGINEERS DIRECTION. THE CONTRACTOR SHALL PRESERVE ALL UNDERGROUND SYSTEMS, INFRASTRUCTURE AND UTILITIES AS REQUIRED.

2. 12" MINIMUM VERTICAL CLEARANCE SHALL BE MAINTAINED BETWEEN ALL UTILITY CROSSINGS.

3. A MINIMUM 10' HORIZONTAL SEPARATION SHALL BE MAINTAINED BETWEEN WATER AND SEWER LINES. WHERE WATER LINES CROSS SEWER LINES, THE SEWER LINE SHALL BE LOCATED WITH A MINIMUM VERTICAL CLEARANCE OF 18" BELOW THE WATER LINE. THE SEWER LINE JOINTS SHALL BE LOCATED EQUIDISTANT AND AS FAR AWAY FROM THE WATER LINE AS POSSIBLE. WHEN IT IS IMPOSSIBLE TO ACHIEVE HORIZONTAL AND/OR VERTICAL SEPARATION AS STIPULATED ABOVE, BOTH THE WATER LINE AND SEWER LINE AT THE CROSSING LOCATION SHALL BE CONSTRUCTED OF MECHANICAL JOINT CEMENT-LINED DUCTILE IRON PIPE FOR ONE FULL 20' PIPE LENGTH OR ANOTHER EQUIVALENT THAT IS WATERTIGHT AND STRUCTURALLY SOUND. THE JOINTS FOR BOTH PIPES SHALL BE LOCATED AS FAR AWAY FROM THE CROSSING AS POSSIBLE. BOTH PIPES SHOULD BE PRESSURE TESTED TO 150 PSI TO ENSURE THAT THEY ARE WATERTIGHT.

4. SEWER MAINS TO BE 8" MIN. SDR-35 PVC WITH A MIN. SLOPE OF 0.50% UNLESS OTHERWISE NOTED. SEWER MAINS AND SEWER FORCE MAINS TYPICAL COVER OVER SEWER LINE SHALL BE 6'. IF LESS THAN 4' OF COVER IS PROVIDED, INSULATE SEWER LINE AGAINST FREEZING IN ACCORDANCE WITH DETAIL #205 OR EQUAL.

5. RESIDENTIAL SEWER BUILDING CONNECTIONS SHALL BE 4" MIN. SCHEDULE 40 PVC, U.O.N., AT A MIN. SLOPE OF 1% U.O.N. INSTALL A CLEANOUT ON EACH SERVICE LINE AT DISTANCE OF 10'± (U.O.N.) OFF THE FOUNDATION, AT A CHANGE OF HORIZONTAL DIRECTION GREATER THAN 45° OR WHERE MORE THAN ONE CHANGE OF HORIZONTAL DIRECTION GREATER THAN 45° OCCURS WITHIN 40 FEET. CLEANOUTS SHOULD BE LOCATED AT INTERVALS OF NOT MORE THAN 100 FEET.

6. ALL WATERLINE MATERIALS AND WORKMANSHIP TO CONFORM TO THE RULES, REGULATIONS AND SPECIFICATIONS OF THE MASHPEE WATER DISTRICT AS AMENDED TO PRESENT. WATER DISTRICT HAS AUTHORITY TO AMEND PLANS. IF ANY CONFLICTS WITH THE CONTRACT DOCUMENT OCCUR THE HIGHER STANDARD SHALL APPLY. THE WRITTEN SPECIFICATIONS OF THE MASHPEE WATER DISTRICT ARE HEREBY INCLUDED BY REFERENCE AND CONSIDERED A PART OF THE CONTRACT DOCUMENTS. ALL WATER LINE ABANDONMENT SHALL BE DONE AT THE WATER MAIN, NOT LEAVING A STUB LINE, UNLESS OTHERWISE APPROVED BY THE WATER DISTRICT.

7. WATER MAINS TO BE CEMENT LINED DUCTILE IRON PIPE CLASS 52, U.O.N. ALL CONSTRUCTION METHODS AND MATERIALS SHALL BE AS REQUIRED BY, AND IN ACCORDANCE WITH THE LOCAL WATER DEPARTMENT AND APPLICABLE AWWA SPECIFICATIONS. DOMESTIC SERVICE TO BE 200 PSI CTS PLASTIC LINE U.O.N., TO DIVISION SPECIFICATIONS SLEEVED WHERE REQUIRED.

8. GATE VALVES SHALL BE MUELLER ONLY. IRON BODY, BRONZE MOUNTED, DOUBLE DISC, WITH TWO INCH OPERATING NUT WITH MECHANICAL JOINT HUBS. GATE VALVES SHALL CONFORM IN EVERY RESPECT TO ALL APPLICABLE AWWA STANDARDS. VALVES SHALL BE DESIGNED FOR 200 PSI WORKING AND 300 PSI TEST PRESSURE AND SHALL OPEN LEFT.

9. VALVES SHALL ALSO CONFORM TO THE SPECIFICATIONS OF THE AWWA AS TO SIZE STEM, PITCH OF THREAD, GASKET SEATING AREA SHALL BE FULLY MACHINED TO THE FIXED DIMENSIONS AND TOLERANCES AS PER AWWA SPECIFICATIONS. ALL VALVES SHALL BE PROVIDED WITH "O" RINGS. THE DESIGN OF THE VALVE SHALL BE SUCH THAT THE SEAL PLATE CAN BE FITTED WITH NEW "O" RINGS WHILE THE VALVE IS UNDER PRESSURE IN THE FULLY OPEN POSITION.

10. VALVE BOXES AND CURB BOXES SHALL BE BUFFALO OR PIONEER AND SHALL BE FURNISHED AND INSTALLED FOR ALL VALVES. THEY SHALL BE CAST IRON, TAR COATED, SLIDING TYPE ADJUSTABLE VALVE BOXES TOGETHER WITH CAST IRON COVERS. SEE WATER DIVISION REGULATIONS.

11. TYPICAL COVER OVER WATER LINE SHALL BE 5'. IF LESS THAN 4' OF COVER IS PROVIDED, INSULATE WATER LINE AGAINST FREEZING IN ACCORDANCE WITH DETAIL #205 OR EQUAL.

12. WATERLINE INSTALLATION REQUIRES TIE ROD RESTRAINED JOINTS TO BE USED AT ALL BENDS, ENDS OF LINE, VALVES AND FIRE HYDRANTS, PER WATER DISTRICT REQUIREMENTS. RESTRAINED JOINTS TO BE INSTALLED PER WATER DISTRICT REQUIREMENTS.

13. IF RESTRAINED JOINTS CAN'T BE USED DUE TO PHYSICAL CONSTRAINTS, ONLY AS SPECIFICALLY APPROVED BY THE WATER DISTRICT, THRUST BLOCKS TO BE INSTALLED AT ALL BENDS, ENDS OF LINE, VALVES AND FIRE HYDRANTS IN ACCORDANCE DETAIL #301. CONCRETE THRUST BLOCKS AS REQUIRED, CONCRETE SHALL BE 1 PART CEMENT TO 2 PARTS SAND AND 4 PARTS COARSE AGGREGATE. CONCRETE CLASS "C" WITH A 28 DAY COMPRESSION STRENGTH OF 2000 PSI MINIMUM AGGREGATE SIZE OF 1-1/2". THRUST BLOCKS SIZED PER SPECIFICATIONS. ALTERNATELY PRECAST THRUST BLOCKS TO DISTRICT SPECIFICATIONS MAY BE UTILIZED. CARE SHALL BE TAKEN TO ENSURE THAT ALL CONCRETE THRUST BLOCKS BEAR AGAINST UNDISTURBED TRENCH WALLS AND NOT TO ENCASE FLANGES AND BOLTS ON MECHANICAL JOINT FITTINGS. WHERE UNSUITABLE BEARING MATERIAL IS ENCOUNTERED, EXCAVATE AND PLACE SUFFICIENT CONCRETE BALLAST TO OFFSET THE ANTICIPATED THRUSTS.

14. MASHPEE WATER DISTRICT APPROVED WATER SUBCONTRACTOR AND THIRD PARTY INSPECTOR REQUIRED. COST OF THE INSPECTOR SHALL BE BORN BY THE CONTRACTOR/WATER SUBCONTRACTOR.

15. GAS, ELECTRIC, DATA/COM IS SHOWN SCHEMATICALLY HEREON. ALL LABOR, WORK, EQUIPMENT AND MATERIALS FOR INSTALLATION OF THESE UTILITIES SHALL BE OWNED AND PERFORMED BY THE CONTRACTOR. UTILITIES SHALL BE INSTALLED WITH A MINIMUM COVER OF 3 FEET U.O.N. OR OTHERWISE DIRECTED BY THE CONTROLLING UTILITY COMPANY. CONTRACTOR SHALL COORDINATE ALL FINAL LAYOUTS AND DETAILS WITH APPLICABLE UTILITY COMPANY.

16. POWER AND COMMUNICATION DUCT BANKS SHALL BE INSTALLED IN ACCORDANCE WITH DETAIL #C-832. WHERE A DESIGN BY THE UTILITY COMPANY OR MEP ENGINEERS ARE PROVIDED, THOSE SHALL SUPERCEDE #C-832.

17. EXTERIOR RESIDENTIAL LIGHTING SHALL BE LOW WATTAGE TYPE AND DIRECTED SO AS TO KEEP ALL LIGHTING WITHIN SUBJECT LOT. SITE LIGHTING USED SHALL BE LOW WATTAGE LED STREET LANTERNS ON 15' MAXIMUM POLE LOCATED ADJACENT TO ROAD SHOULDERS OR WALKWAYS. LIGHTING FIXTURES TO BE FULL 90° CUTOFF ("DARK SKY" COMPLIANT). A FINAL PHOTOMETRIC AND LIGHTING SCHEDULE PLAN SHALL BE PREPARED BY THE ELECTRICAL ENGINEER OR LIGHTING VENDOR.

18. ALL UTILITY CUTS THROUGH EXISTING CONCRETE OR BITUMINOUS CONCRETE PAVED SURFACES SHALL BE SAWCUT. BACK FILLING OF TRENCH SHALL INCLUDE 12" IN DEPTH FLOWABLE FILL TO THE BASE COURSE OF THE SURFACE TREATMENT. THE SURFACE TREATMENT SHALL THEN BE REPLACED IN KIND.

19. SITE CONTRACTOR TO OWN ALL EXCAVATION, TRENCHING, & BACKFILLING FOR ALL UTILITIES AND MISCELLANEOUS WORK INCIDENTAL TO THE SCOPE OF THE PROJECT AND CONTRACT DOCUMENTS. CONTRACTOR SHALL REFER TO MEP AND LANDSCAPE PLANS BY OTHERS FOR ADDITIONAL INFORMATION AS APPLICABLE.

20. ALL WORK WITHIN THESE PLANS SHALL BE PERFORMED AND PROVIDED BY THE CONTRACTOR IN ACCORDANCE WITH THE SPECIFICATIONS REFERENCED AND CONSTRUCTION DETAILS PROVIDED IN THIS PLAN SET WHETHER OR NOT THE DETAIL NUMBER IS SPECIFICALLY REFERENCED.

21. ALL COVERS, CURB BOXES, GRATES, AND OTHER FINISH SURFACES SHALL BE RESET TO THE NEW FINISH GRADE.

22. THE FIRST 10 FEET FROM THE BUILDING FACE FOR STORM DRAIN, SEWER AND WATER PIPING SHALL FOLLOW THE PLUMBING CODE. REFER TO PLUMBING PLANS BY OTHERS AS APPLICABLE.

23. WHERE UTILITIES CALLED OUT TO BE ABANDONED OR REMOVED AS NEEDED, CONTRACTOR SHALL OWN REMOVING ALL TANKS, PIPE AND APPURTENANCES AS NEEDED WHERE WITHIN THE PROPOSED AREA OF WORK.

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130 Willowbend Drive
Mashpee, MA 02649

PROJECT TITLE

Cranberry Point
275 Quinaquisset Avenue
Mashpee, MA 02649

DATE	DESCRIPTION

SHEET TITLE

Utilities Plan
Sheet 2 of 2

SHEET NO

C5.1

DATE: JANUARY 16, 2023

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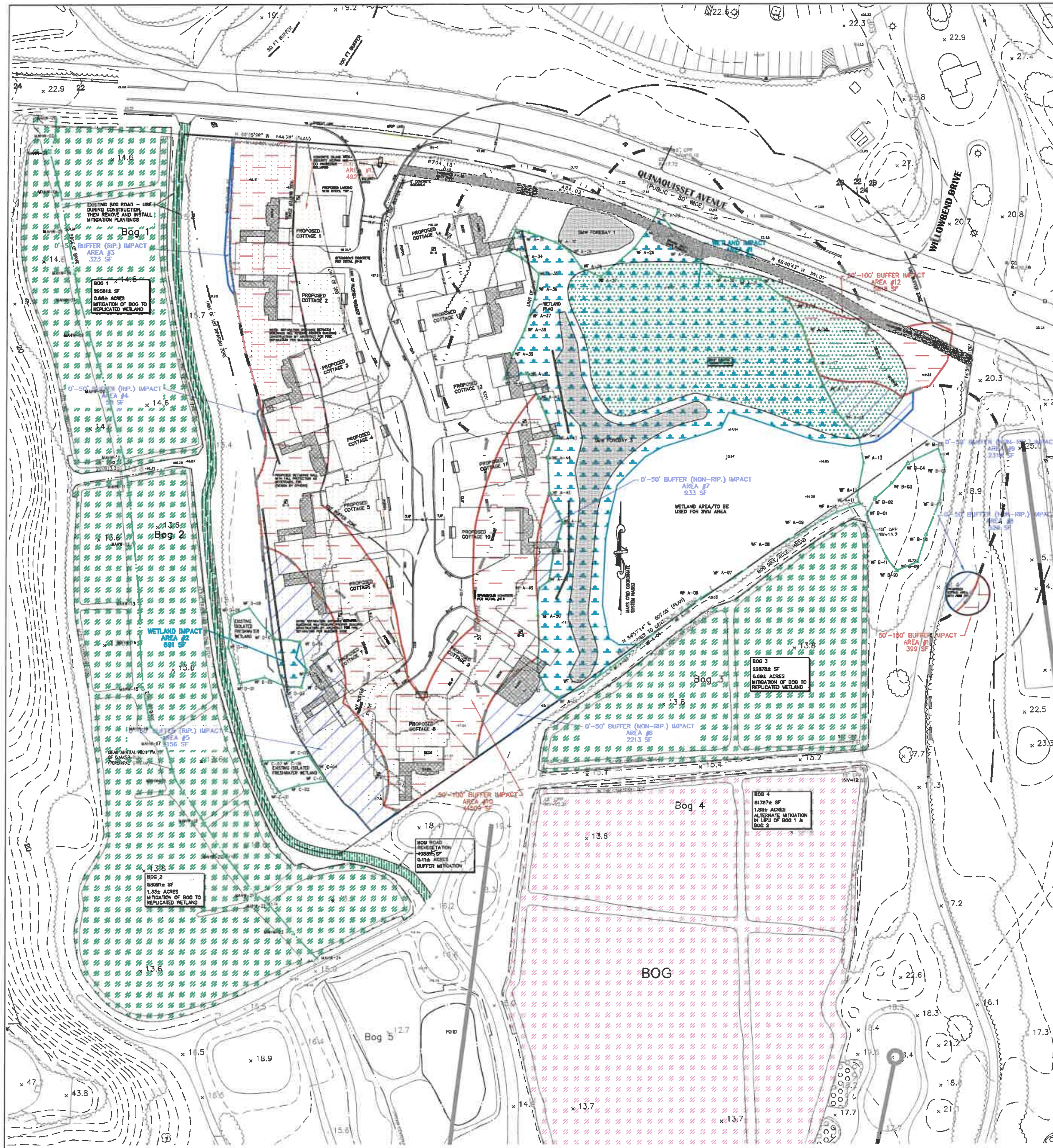
SCALE IN FEET
SCALE: 1"=20'

DRAWN BY: JKL CHECKED BY: MWE
JOB NO: 2014-009 FILE: 2014-009 QUIN UT.dwg



WETLAND MITIGATION CALCULATIONS

Buffer Impact Areas (SF)		Mitigation Multiple	Required Buffer Mitigation Area sf	Ac.	Wetland Restoration Required (Ac)	
					Mitigation is being provided in the form of Wetland Restoration of existing active Bog Areas. As this is a higher form of mitigation we propose the total Buffer Mitigation requirement to be at a ratio of 0.25: 1 Wetland	
(0-50) NR	6,989	2.9	17,468	0.40		
(0-50) R	9,537	3.3	31,260	0.72		
(50-100)	47,726	1.0	47,726	1.10		
(100-200) R	49,271					
Total Mitigation for Buffer Impact				2.21		
Upland Buffer Mitigation Provided on Existing Bog Road				0.11		
Net Mitigation required for Buffer Impact				2.10	0.25 *	0.53
					*.25/1 Ratio taken as comparison to Bylaw Mitigation Table. Between a 5 to 6:1 ratio is required at 0 ft to 10 ft buffer impact. Reasoning a 4:1 credit ratio for actual wetland restoration vs. buffer restoration is a conservative assumption.	

Wetland Impact Area (SF) Wetland Number	Wetland Area (SF)		Required Wetland Replication Area sf	Ac.	
1	42,417				
2	691				
Total Mitigation for Wetland Impact	43,108	2.0	86,216	1.98	1.98
TOTAL MITIGATION REQUIRED					2.51

Mitigation Provided — Bog Areas Bog Number	Bog Area (SF)	Wetland Restoration Provided sf	Ac.
1	29,561	29,561	0.68
2	58,091	58,091	1.33
3	29,878	29,878	0.69
4 (Alternate in-lieu-of Bogs 1&2	81,787	81,787	1.88
TOTAL WETLAND RESTORATION MITIGATION PROVIDED USING 1,2,& 3			2.70
OR			
TOTAL ALTERNATE WETLAND RESTORATION MITIGATION PROVIDED USING BOG 3 & Alternate 4			2.58

USING EITHER BOGS 1, 2, & 3 FOR MITIGATION OR BOGS 3 & 4 FOR MITIGATION MEET THE MITIGATION AREA REQUIREMENTS.

SHADING KEY

- WETLAND IMPACT
- 0' TO 50' BUFFER IMPACT
- 50' TO 100' BUFFER IMPACT
- OUTER RIPARIAN' BUFFER IMPACT
- BOG TO WETLAND RESTORATION
- ALTERNATE BOG TO WETLAND RESTORATION
- BOG ROAD REVEGETATION

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PROJECT TITLE
Cranberry Point
275 Quinaquisset Avenue
Mashpee, MA 02649

DATE	DESCRIPTION

SHEET TITLE
Master Mitigation Plan

SHEET NO
C6.0

DATE: JANUARY 16, 2023

40 0 40 80
SCALE IN FEET
SCALE: 1"=40'

DRAWN BY: ZDP CHECKED BY: MWE
JOB NO: 2014-009 FILE: 2014-009 QUIN DM.dwg

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Stormwater Management Report

for

CRANBERRY POINT at WILLOWBEND GOLF & COUNTRY CLUB

275 Quinaquisset Avenue

Mashpee, Massachusetts

Prepared for:

Southworth Mashpee Properties, LLC

130 Willowbend Drive

Mashpee, MA 02649

1/16/2023

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Registered Professional Engineers, Land Surveyors & Scientists

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PROJECT STATEMENT

PROJECT: **Cranberry Point**
LOCATION: **275 Quinaquisset Ave, Mashpee, MA**

BN JOB NUMBER: **2014-009 QUIN**

CLIENT: Southworth Mashpee Properties, LLC .

SUBJECT: Stormwater Management Calculations

OBJECTIVES:

1) Meet the objectives of the Mashpee Zoning Ordinance & MA DEP SWM Policy
   (a) Evaluate the pre-development conditions and calculate the peak rate of runoff.
   (b) Evaluate the post-development conditions and provide stormwater management and treatment to prevent any increase in the 2, 10, and 25 year storms, from the pre-development conditions peak discharge at the site study point.
   (c) Safely pass the 100 year storm event without causing any downstream detrimental impact.
   (d) Provide for Water Quality Treatment for the first flush 1” of rainfall (in Critical Areas) in accordance with MDEP SWM Policy and Mashpee Zoning Ordinance SWM Regulations.
   (e) Provide for Groundwater Recharge in accordance with MDEP SWM Policy.

CALCULATION METHODS & DESIGN STORMS:

1) Soil information was taken from the SCS Soil Survey of Barnstable County. Field analysis of the soils was performed via Soil Borings by Briggs Engineering.
2) Subcatchment areas, flow paths, and design points were delineated using standard engineering practice.
3) The existing and proposed conditions were modeled using HydroCAD, which incorporates the methodologies of SCS TR-55 and TR-20.
4) The proposed stormwater management system was designed to control the 2, 10, and 25-year storm event using the SCS TR-20 Method. The 100-year storm event will pass safely through the system with no detrimental impact to downstream areas.

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INTRODUCTION

Baxter Nye Engineering & Surveying (BN) performed a Stormwater Management (SWM) analysis of the subject site at Cranberry Point at Willowbend Golf & Country Club, at 275 Quinaquisset Avenue in Mashpee, MA to evaluate the post-development impacts associated with the proposed development. The hydrology for both the pre and post development drainage areas was analyzed to determine the impact of development.

SCS TR-55 and HydroCAD Stormwater Modeling System were used to model the site for existing and proposed conditions and the associated runoffs. HydroCAD utilizes the SCS TR20 Method to determine peak rates of runoff, which were computed and compared to the existing conditions.

BN designed a system for storm runoff collection and management using BMP's (Best Management Practices) as defined by MDEP. The collection and conveyance system is comprised of hooded deep sump catch basins, water quality swales, sediment forebays and a wet basin. The stormwater collection system discharge to sediment forebays, and an open air extended detention facility.

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Hydrology and Hydraulics

Drainage calculations are performed to demonstrate that there is no increase in the rate of runoff (and therefore, no increase in downstream flooding) from the subject site due to the proposed improvements. The rate of runoff is compared at a common point referred to as the design point of interest, for both the pre and post development condition. The hydrologic and hydraulic model created to analyze the pre and post development condition was developed using the Soil Conservation Service (SCS) Technical Release No. 20 (TR 20, SCS unit hydrograph procedures), SCS Technical Release No. 55 (TR 55, Time of Concentration (T_c) and Curve Number (CN)), National Weather Service Technical Paper No. 40 (TP 40, rainfall intensity) or the “Northeast Regional Climate Center – Atlas of Precipitation Extremes for the Northeastern United States and Southeastern Canada” (as identified herein), and the stormwater detention facilities were modeled using the SCS Storage Indication Method.

Time of Concentration (T_c) is the time required for stormwater runoff to travel from the most hydraulically distant point in a drainage area or subcatchment to the design point. The T_c is calculated based upon slope, distance, surface cover and type of flow. A longer time of concentration will generally result in a smaller rate of runoff.

The Curve Number (CN) represents the amount of runoff expected from a particular segment of the drainage area. A higher curve number represents a more impervious surface and hence will have a larger rate of runoff. The CN is based upon three characteristics: (1) The Hydrologic Soil Group (HSG) A, B, C, or D; A is the most infiltratable and has the lowest runoff potential, D is the least infiltratable and has the highest runoff potential; (2) The soil cover (vegetated, developed, farmland or impervious); impervious cover obviously having the highest runoff potential. The final factor is the condition of the surface cover, being classified as good, fair or poor; surface cover in good condition has the lowest runoff potential.

The soil types for the drainage areas were determined from the Soil Conservation Service Soil Survey for the appropriate County and State where the project is located. The soil survey contains maps, which delineate the extent of the various soil types and their characteristics.

To assist in the analysis, software entitled HydroCAD, (developed by Applied Microcomputer Systems) was utilized. The HydroCAD program calculates the runoff based on rainfall and watershed characteristics, and produces a runoff hydrograph (a runoff rate versus time curve). Then the stage-storage-discharge curves for a specific SWM facility are calculated. The stage-storage-discharge curves are a set of curves for a specific SWM facility that depict the outflow from the outlet control structure versus the volume of runoff stored in the facility. The stage-storage-discharge curves are used to compute an outflow hydrograph by hydraulically routing an inflow hydrograph through the detention facility. The rate of infiltration used in the analysis of these proposed facilities is per the Rawls Rate table attached with this report. The rates are entered into HydroCad in the format of velocity (ft/min) or flow rate (cfs – which is obtained by applying the velocity – or infiltration rate - over the infiltratable area of the SWM facility).

The peak rates of runoff, at the design points, were calculated for the pre and post development conditions for the design storm events with Type III – 24 hour rainfall distribution. The peak rate of runoff was compared for each required design storm event to confirm that there was no increase from the pre to post development conditions for the required storm events.

Volumes were analyzed as well for comparison of pre to post-development levels. The “Discarded” number represented in the HyrdoCad/TR-20 Outputs represents the rate and volume of runoff, which is infiltrated into the ground through the bottom of the basin.

Assumptions

1) Shallow concentrated flow occurs at a maximum of 300 feet. If the slope is greater than two percent (2%), shallow concentrated flow occurs at a maximum of 200 feet. This is based on an assumed drainage area of several hundred acres. Smaller drainage areas should have their shallow concentrated flow occurrence adjusted to a lesser distance accordingly.

2) The minimum time of concentration (tc) value used shall be five (5) minutes.

3) Rainfall distribution is even over the drainage areas to be analyzed for a given storm event.

4) Base flow contribution has a negligible effect on the peak discharge.

5) Flows are steady, turbulent, and uniform.

6) Fluids are incompressible.

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DRAINAGE DESIGN CONDITIONS

Summary of Proposed Drainage Facilities

Baxter Nye has designed a system for storm runoff collection and management using BMP's (Best Management Practices) as defined by MDEP. The collection and conveyance systems are comprised of hooded sump catch basins, corrugated plastic pipe, sediment forebays, and vegetated swales. The deep sump catch basins and forebays will separate gas, oil and heavy particulates from the runoff. The forebays and vegetated swales will attenuate runoff, assist in removing suspended solids, and allow for nitrogen uptake through the vegetation.

The stormwater collection system discharges to an open-air detention basin. The facilities are sized to detain the runoff for the 2, 10, 25 and 100-year storm events down to or below the existing conditions runoff conditions. There is no flooding impact to downstream areas.

The proposed stormwater management system (SMS) will be installed to control stormwater runoff for water quality and quantity in accordance with MDEP SWM Policy. The SMS as designed will have a net benefit to the wetland resource over the existing conditions. Since, under the existing conditions, no SMS exists, and therefore, there has been no control of water quality and quantity being discharged from the site. Additionally, we have sized the forebays for additional water quality treatment for the existing road runoff from Quinaquisset Ave.

Under the proposed conditions, both stormwater quantity and quality are controlled. The post-development peak storm discharges and volumes are reduced for the 2, 10, 25, and 100 year events. The Water Quality Volume (see Appendix E) is treated through multiple sediment forebays and swm basins. Hooded Deep Sump Catch Basins, with a sump of 4 ft. and vegetated swales are also provided for pretreatment. The runoff is then conveyed through sediment forebays prior to entering the wet detention basin facility. The swm facilities have been designed with sediment trap forebays to enhance pollutant removal. All the runoff from the impervious areas passes through these facilities. The combined BMP treatments are designed in accordance with the MDEP sizing requirements. This combination of BMP's results in the removal of 89% of the initial T.S.S. loading. This exceeds the MDEP requirement of 80%.

The Groundwater Recharge Volume required are also met for the noted Hydrologic Soil Groups. The water to the wetland resources will be affected positively, as it will receive the same volume of runoff, but at attenuated peaks, thereby, reducing velocities and erosion.

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Refer to Table 1, Peak Discharge and Volume Release below for pre and post-development flows at the Study Point, for each of the 2, 10, 25, and 100 year storm events.

TABLE 1: PEAK DISCHARGE AND VOLUME RELEASE

STORM (YEAR)	DRAINAGE AREA	PRE-DEVELOPMENT		POST DEVELOPMENT	
		PEAK DISCHARGE (cfs)	VOLUME (ac-ft)	PEAK DISCHARGE (cfs)	VOLUME (ac-ft)
2	SP1	0.10	0.0.093	0.05	0.014
10	SP1	0.48	0.361	0.48	0.248
25	SP1	1.07	0.604	0.99	0.514
100	SP1	2.52	1.066	2.09	1.010

LIST OF FIGURES

FIGURES 1A and 1B

Figure 1A: Site Location Map - U.S.G.S. Topographical Quad Map

Figure 1B: Site Location Map - Aerial Photograph

FIGURE 1A – USGS TOPOGRAPHIC MAP

CRANBERRY POINT at WILLOWBEND COUNTRY CLUB, MASHPEE

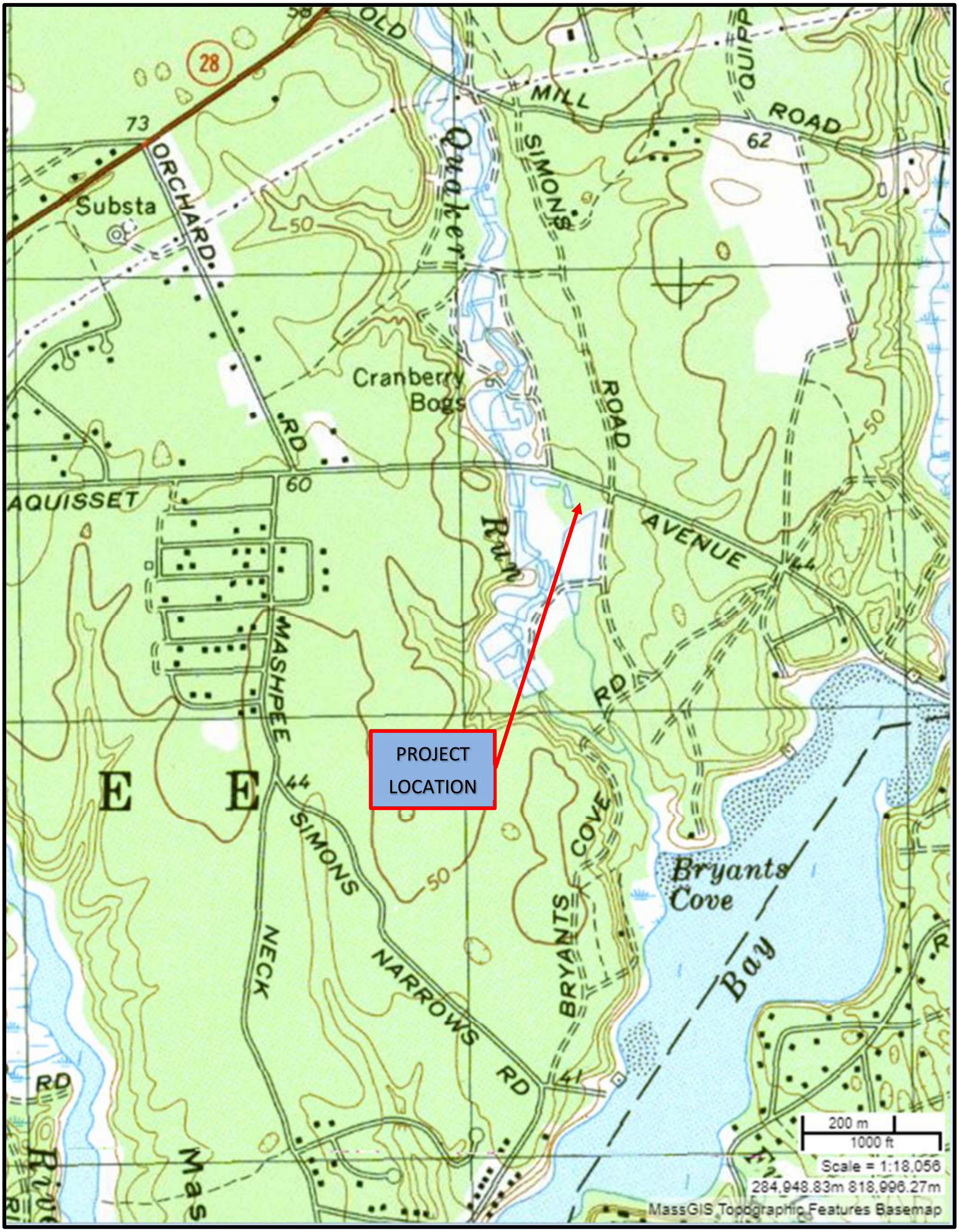


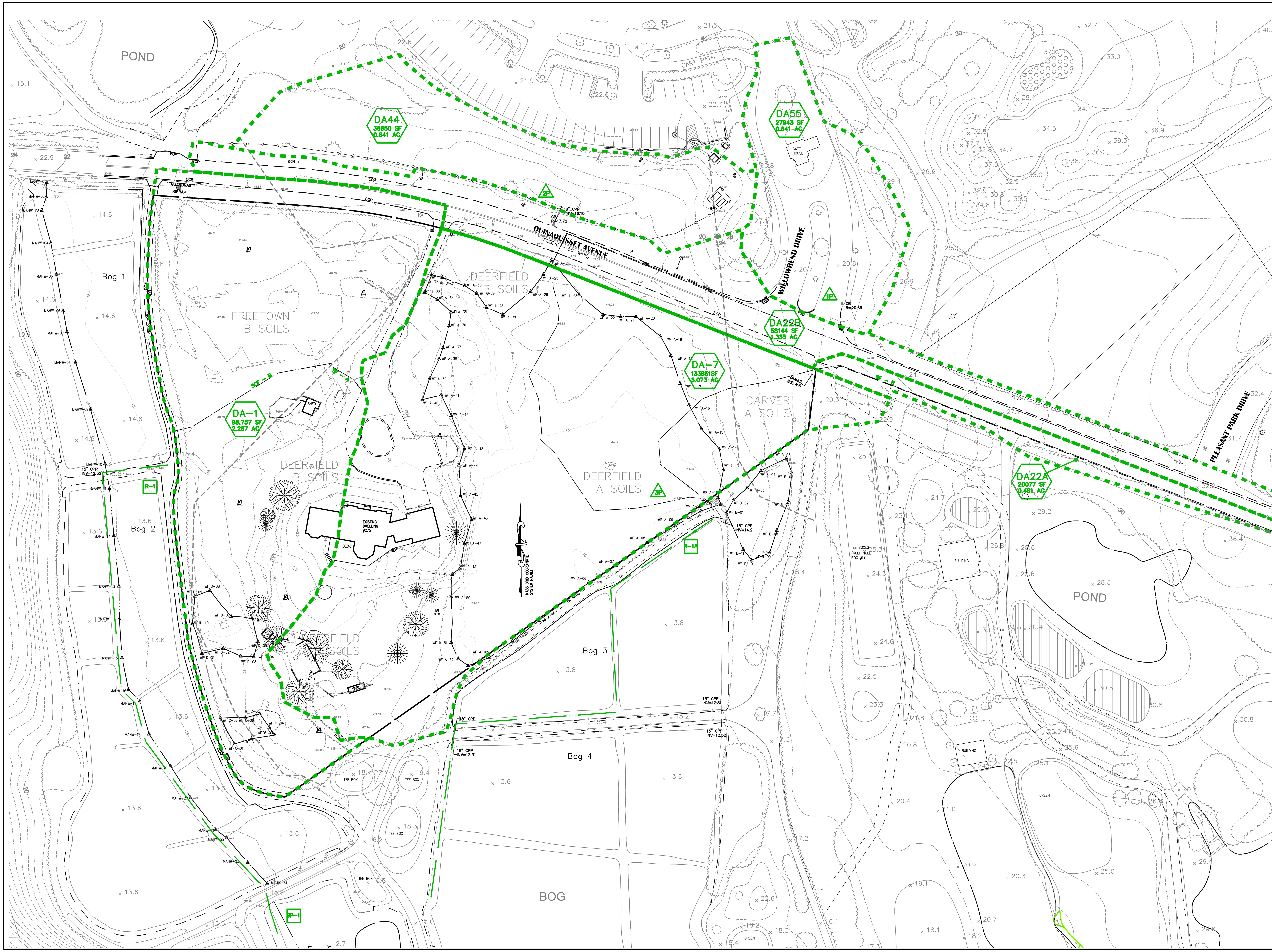
FIGURE 1B – AERIAL PHOTO LOCUS

CRANBERRY POINT at WILLOWBEND COUNTRY CLUB, MASHPEE

SOURCE: Google Earth

FIGURE 2

Pre-Development Drainage Area Plan



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STAMP | STAMP

CONSULTANT

CONSULTANT

PREPARED FOR:

Southworth Mashpee Properties, LLC
130 Willowbend Drive
Mashpee, MA 02649

PROJECT TITLE

Cranberry Point
275 Quinaquisset Avenue
Mashpee, MA 02649

DATE	DESCRIPTION

SHEET TITLE

Pre-Devt Drainage Areas Plan

SHEET NO

DA1.0

DATE: JANUARY 16, 2023

40 0 40 80
SCALE IN FEET

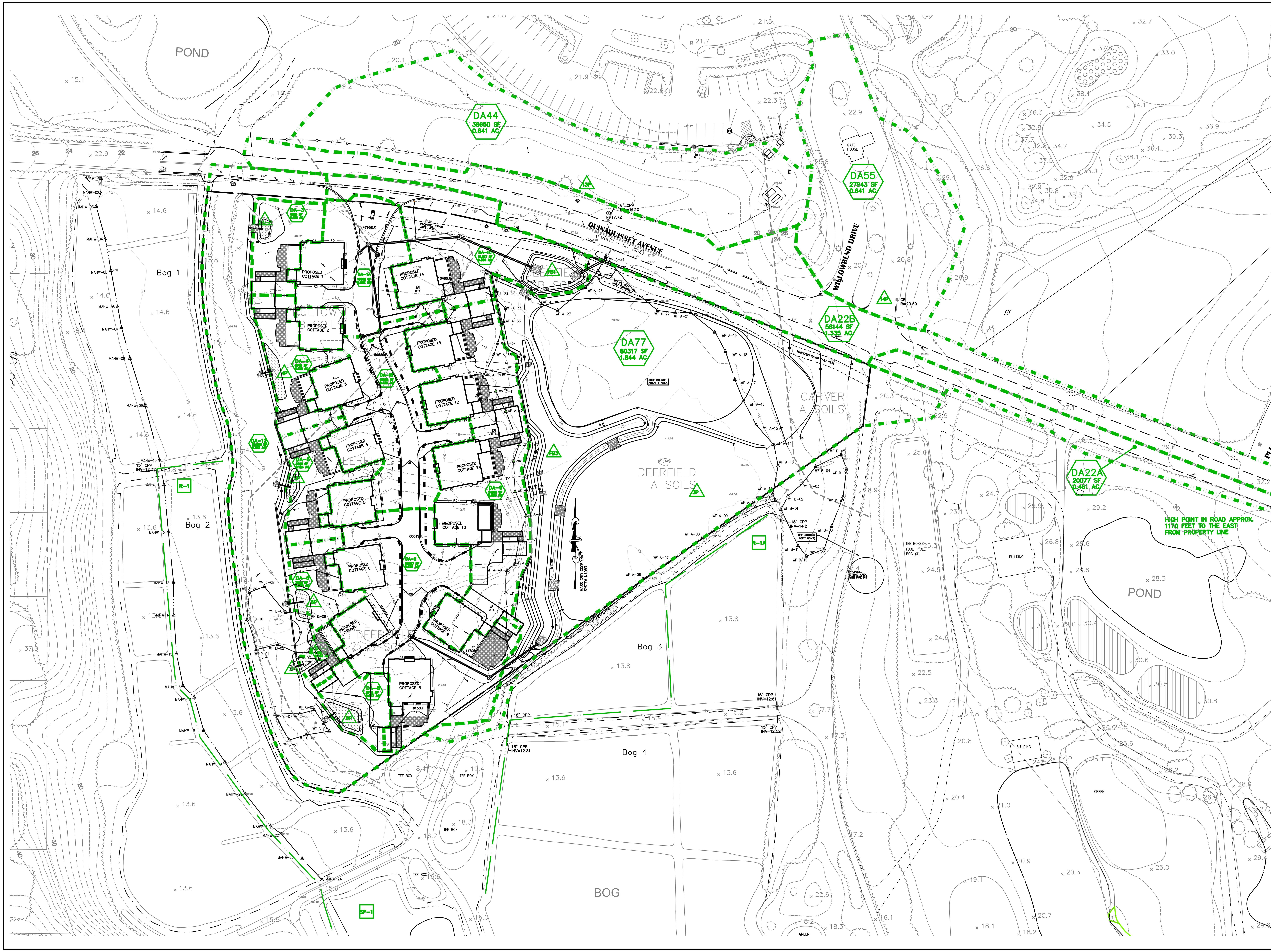
SCALE: 1"=40'

DRAWN BY: JKL CHECKED BY: MWE

JOB NO: 2014-009 FILE: 2014-009QUIN DA-PRE.dwg

FIGURE 3

Post-Development Drainage Area Plan



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CONSULTANT

PREPARED FOR:

Southworth Mashpee Properties, LLC
130 Willowbend Drive
Mashpee, MA 02649

PROJECT TITLE

Cranberry Point
275 Quinaquisset Avenue
Mashpee, MA 02649

DATE	DESCRIPTION

SHEET TITLE

Post-Devt Drainage Areas Plan

SHEET NO

DA2.0

DATE: JANUARY 16, 2023

40 0 40 80
SCALE IN FEET
SCALE: 1"=40'

DRAWN BY: JKL
CHECKED BY: MWE
JOB NO: 2014-009
FILE: 2014-009QUINDA-POST.dwg

APPENDIX A

SITE SOIL INFORMATION

- SOIL SURVEY MAPS AND MAP UNITS
- CLASSIFICATION AND DESCRIPTION OF SOILS ON SITE
- TEST PIT SOIL LOGS

Map Scale: 1:1,520 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 20, 40, 80, 120

Feet: 0, 50, 100, 200, 300

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

Barnstable County, Massachusetts

259B—Carver loamy coarse sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2y07t
Elevation: 0 to 240 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Carver, loamy coarse sand, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Carver, Loamy Coarse Sand

Setting

Landform: Moraines, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, tread
Down-slope shape: Convex, linear
Across-slope shape: Linear
Parent material: Sandy glaciofluvial deposits

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
Oe - 2 to 3 inches: moderately decomposed plant material
A - 3 to 7 inches: loamy coarse sand
E - 7 to 10 inches: coarse sand
Bw1 - 10 to 15 inches: coarse sand
Bw2 - 15 to 28 inches: coarse sand
BC - 28 to 32 inches: coarse sand
C - 32 to 67 inches: coarse sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F149BY005MA - Dry Outwash
Hydric soil rating: No

Minor Components

Deerfield

Percent of map unit: 10 percent
Landform: Outwash terraces, outwash plains, kame terraces, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Kame terraces, moraines, eskers, kames, outwash deltas, outwash terraces, outwash plains
Landform position (two-dimensional): Summit, toeslope, shoulder, backslope, footslope
Landform position (three-dimensional): Side slope, crest, head slope, nose slope, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Merrimac

Percent of map unit: 3 percent
Landform: Kame terraces, outwash deltas, outwash terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Mashpee

Percent of map unit: 2 percent
Landform: Depressions, drainageways, terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Barnstable County, Massachusetts
Survey Area Data: Version 18, Sep 1, 2021

Barnstable County, Massachusetts

55A—Freetown coarse sand, 0 to 3 percent slopes, sanded surface

Map Unit Setting

National map unit symbol: 2t2qj
Elevation: 0 to 180 feet
Mean annual precipitation: 40 to 52 inches
Mean annual air temperature: 48 to 55 degrees F
Frost-free period: 190 to 250 days
Farmland classification: Farmland of unique importance

Map Unit Composition

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

Description of Freetown, Sanded Surface

Setting

Landform: Kettles, bogs, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy human-transported material over highly decomposed organic material

Typical profile

^Ap - 0 to 15 inches: coarse sand
2Oa - 15 to 79 inches: muck

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 20.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Ecological site: F144AY043MA - Acidic Organic Wetlands

Hydric soil rating: Yes

Minor Components

Swansea, sanded surface, inactive

Percent of map unit: 5 percent
Landform: Kettles, bogs, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Rainberry, sanded surface

Percent of map unit: 4 percent
Landform: Kettles, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

Udipsamments, wet substratum

Percent of map unit: 3 percent
Landform: Dikes on bogs
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex
Across-slope shape: Concave, linear
Hydric soil rating: No

Tihonet

Percent of map unit: 3 percent
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Barnstable County, Massachusetts
Survey Area Data: Version 18, Sep 1, 2021

Barnstable County, Massachusetts

256A—Deerfield loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2xfg8
Elevation: 0 to 1,100 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Deerfield

Setting

Landform: Outwash terraces, outwash deltas, outwash plains, kame terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Parent material: Sandy outwash derived from granite, gneiss, and/or quartzite

Typical profile

Ap - 0 to 9 inches: loamy fine sand
Bw - 9 to 25 inches: loamy fine sand
BC - 25 to 33 inches: fine sand
Cg - 33 to 60 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: About 15 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Sodium adsorption ratio, maximum: 11.0
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A
Ecological site: F144AY027MA - Moist Sandy Outwash
Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 7 percent
Landform: Outwash terraces, kame terraces, outwash deltas, outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Wareham

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Sudbury

Percent of map unit: 2 percent
Landform: Outwash plains, kame terraces, outwash deltas, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave, convex, linear
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Ninigret

Percent of map unit: 1 percent
Landform: Kame terraces, outwash plains, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex, linear
Across-slope shape: Convex, concave
Hydric soil rating: No

Data Source Information

Soil Survey Area: Barnstable County, Massachusetts
Survey Area Data: Version 18, Sep 1, 2021

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

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

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

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

Soil Survey Area: Barnstable County, Massachusetts
Survey Area Data: Version 18, Sep 1, 2021

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

Date(s) aerial images were photographed: Jul 10, 2018—Nov 17, 2018

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
55A	Freetown coarse sand, 0 to 3 percent slopes, sanded surface	2.0	32.0%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	4.0	63.1%
259B	Carver loamy coarse sand, 3 to 8 percent slopes	0.3	4.9%
Totals for Area of Interest		**6.4**	**100.0%**

Table 2.3.3. 1982 Rawls Rates[1]

Texture Class	NRCS Hydrologic Soil Group (HSG)	Infiltration Rate Inches/Hour
Sand	A	8.27
Loamy Sand	A	2.41
Sandy Loam	B	1.02
Loam	B	0.52
Silt Loam	C	0.27
Sandy Clay Loam	C	0.17
Clay Loam	D	0.09
Silty Clay Loam	D	0.06
Sandy Clay	D	0.05
Silty Clay	D	0.04
Clay	D	0.02

1 Rawls, Brakensiek and Saxton, 1982

Client: Briggs		Date: 12-21-22	Page # 1 of 1
Location: Crane Point Mashpee MA			
Boring No. B1	Ground Elev 16.6	Date Start 12/21	Date Complete 12/21
Drilling Foreman: T Perry		Eng/Hydrol. Geologist: D. Geisser	

DEPTH	Sample Data: Sample NO.	Sample Depth(ft.)	Blows 6" Penetration	Rec. Inches	Casing Blows Per Ft.	Strata Change Depth	Visual Identification of Soil and/or Rock Strata
	1	0-2	1-2-4-2	12		0.3	Topsoil - f/m S. Hy organic Sand
						1.7	subsoil - f/m Sand, little Silt trace(-) organic, brown
	2	2-4'	1-2-1-4	14			Sand - f/c, trace Gravel, trace silt, light brown.
	3	5-7	3-5-4-5	12			Sand - f/c, trace Silt, light brown, wet
	4	10-12	3-5-5-5	12			Similar to above
	5	15-17	1-4-3-4	9			similar to above
	6	20-22	3-4-5-7	10			Similar to above
	7	25-27	4-5-6-7	12			Similar to above
							Bottom of Boring at 27ft

Type Of Boring: Casing Size Hollow Stem Auger Size

Standard Penetration Test (ST) = 140lb hammer falling 30"

Proportion Percentages	Granular Soils (blows per ft.)		Cohesive Soils (blows per ft.)	
Trace 0 to 10%	0 to 4 Very Loose	30 to 50 Dense	0 to 2 Very Soft	8 to 15 Stiff
Some 10 to 40%	4 to 10 Loose	Over 50 Very Dense	2 to 4 Soft	15 to 30 Very Stiff
And 40 to 50%	10 to 30 Medium Dense		4 to 8 Medium Stiff	Over 30 Hard

Blows are per 6" taken with an 24" long X 2" OD X 1 3/8" I.D.

Client: Briggs | Date: 12-21-22 | Page # 1 of 1

Location: Cran Point, Mashpee, MA

Boring No: B2 | Ground Elev: 17.0 | Date Start: 12/21 | Date Complete: 12/21 | Drilling Foreman: T Perry | Eng/Hydrol. Geologist: D Geisser

DEPTH	Sample Data: Sample NO.	Sample Depth(ft.)	Blows 6" Penetration	Rec. Inches	Casing Blows Per Ft.	Strata Change Depth	Visual Identification of Soil and/or Rock Strata
	1	0-2	0-1-0-1	16		0.4	Topsoil-organic silty Sand
						2'	Subsoil - fine Sand, little (+) silt, orange brown
	2	2-4	1-2-1-2	16			Sand - fine, trace silt, light brown
	3	5-7	2-3-3-4	14			Similar to above, wet
	4	10-12	3-4-3-3	16			Similar to above.
	5	15-17	3-3-3-4	10			Similar to above
	6	20-22	2-4-4-4	12			Similar to above
							Bottom of Boring at 22 ft

Type Of Boring: Casing Size | Hollow Stem Auger Size | Standard Penetration Test (ST) = 140lb hammer falling 30"

Proportion Percentages	Granular Soils (blows per ft.)		Cohesive Soils (blows per ft.)	
Trace 0 to 10%	0 to 4 Very Loose	30 to 50 Dense	0 to 2 Very Soft	8 to 15 Stiff
Some 10 to 40%	4 to 10 Loose	Over 50 Very Dense	2 to 4 Soft	15 to 30 Very Stiff
And 40 to 50%	10 to 30 Medium Dense		4 to 8 Medium Stiff	Over 30 Hard

Blows are per 6" taken with an 24" long X 2" OD X 1 3/8" I.D.

Geosearch Inc.

Client: Briggs Date: 12-21-22 Page # 1 of 1

Location: Cran Point - Mashpee, MA

Boring No. B3 | Ground Elev 21' | Date Start 12/21 | Date Complete 12/21 | Drilling Foreman: T. Perry | Eng/Hydrol. Geologist: D. Geisser

DEPTH	Sample NO.	Sample Depth(ft.)	Blows 6" Penetration	Rec. Inches	Casing Blows Per Ft.	Strata Change Depth	Visual Identification of Soil and/or Rock Strata
	1	0-2	2-1-1-2	20			Sandy Topsoil - f/m, trace(+) Silt
						1.0	trace(-) organic, dk grey.
							subsoil - f/m Silty Sand - little
						1.6'	silt, orange brown
							Sand - f/m, trace silt, light
		2-4	1-2-2-5	20			brown
							similar to above,
		5-7	5-3-4-4	16			Similar to above, trace Gravel
		10-12	2-2-3-4	10			Similar to above
		15-17	3-4-3-5	14			Similar to above
		20-22	3-5-4-5	16			similar to above
							Bottom of Boring at 22ft

Type Of Boring: Casing Size Hollow Stem Auger Size

Standard Penetration Test (ST) = 140lb hammer falling 30"

Proportion Percentages	Granular Soils (blows per ft.)		Cohesive Soils (blows per ft.)	
Trace 0 to 10%	0 to 4 Very Loose	30 to 50 Dense	0 to 2 Very Soft	8 to 15 Stiff
Some 10 to 40%	4 to 10 Loose	Over 50 Very Dense	2 to 4 Soft	15 to 30 Very Stiff
And 40 to 50%	10 to 30 Medium Dense		4 to 8 Medium Stiff	Over 30 Hard

Blows are per 6" taken with an 24" long X 2" OD X 1 3/8" I.D.

Client: Briggs					Date: 12-21-22	Page # 1 of 1
Location: Cran Point - Mashpee, MA						
Boring No. B4	Ground Elev 17.7'	Date Start 12/21/22	Date Complete 12/21	Drilling Foreman: T. Perry	Eng/Hydrol. Geologist: D. Geisser	

DEPTH	Sample Data NO.	Sample Depth(ft.)	Blows 6" Penetration	Rec. Inches	Casing Blows Per Ft.	Strata Change Depth	Visual Identification of Soil and/or Rock Strata
	1	0-2	2-1-3-4	10		0.5	Topsoil - f/m Sand, trace silt, trace(-) organic, dark brown
						2.2	Subsoil - f/m Sand, little silt orange brown.
	2	2-4'	2-2-2-1	14			Sand - f/m, trace silt, light brown
	3	5-7	3-3-4-5	16			Similar to above, wet
	4	10-12	2-4-4-4	14			Similar to above
	5	15-17	2-3-4-4	14			Similar to above
	6	20-22	1-3-3-4	12			Similar to above
	7	25-27	5-4-4-6	14		28	Similar to above.
	8	30-32	3-5-10-13	14			Silt and Sand - nonplastic, brown, wet
	9	35-37	4-6-9-14	12			Silty Sand - f/m, some silt brown, wet
							Bottom of Boring at 37 ft.
							GW at 4'8" at 10 minutes 5'0 @ 30 min

Type Of Boring: Casing Size Hollow Stem Auger Size

Standard Penetration Test (ST) = 140lb hammer falling 30"

Proportion Percentages	Granular Soils (blows per ft.)		Cohesive Soils (blows per ft.)	
Trace 0 to 10%	0 to 4 Very Loose	30 to 50 Dense	0 to 2 Very Soft	8 to 15 Stiff
Some 10 to 40%	4 to 10 Loose	Over 50 Very Dense	2 to 4 Soft	15 to 30 Very Stiff
And 40 to 50%	10 to 30 Medium Dense		4 to 8 Medium Stiff	Over 30 Hard

Blows are per 6" taken with an 24" long X 2" OD X 1 3/8" I.D.

Geosearch Inc.

Client: Briggs | Date: 12-21-22 | Page #

Location: Cran Point - Mashpee, MA

Boring No. B5 | Ground Elev 16.5 | Date Start 12/21 | Date Complete 12/21 | Drilling Foreman: T Perry | Eng/Hydrol. Geologist: D. Geisser

DEPTH	Sample NO.	Sample Depth(ft.)	Blows 6" Penetration	Rec. Inches	Casing Blows Per Ft.	Strata Change Depth	Visual Identification of Soil and/or Rock Strata
	1	0-2	1-1-2-2	10		0.5	Topsoil - f/m sand, little silt trace organic, black
						2'	Subsoil - f/m Sand, little Silt orange brown
	2	2-4	4-3-2 2	18			Sand - f/c, trace Gravel, trace Silt, light brown
	3	5-7	3-4-4-6	12			Sand - f/m, trace Silt, light brown, wet.
	4	10-12	2-4-5-4	12		14	
	5	15-17	4-6-6-8	14			Silty Sand - f/m, little Silt, grey brown, wet
							Bottom of Boring at 17 ft

Type Of Boring: Casing Size | Hollow Stem Auger Size | Standard Penetration Test (ST) = 140lb hammer falling 30"

Proportion Percentages	Granular Soils (blows per ft.)		Cohesive Soils (blows per ft.)	
Trace 0 to 10%	0 to 4 Very Loose	30 to 50 Dense	0 to 2 Very Soft	8 to 15 Stiff
Some 10 to 40%	4 to 10 Loose	Over 50 Very Dense	2 to 4 Soft	15 to 30 Very Stiff
And 40 to 50%	10 to 30 Medium Dense		4 to 8 Medium Stiff	Over 30 Hard

Blows are per 6" taken with an 24" long X 2" OD X 1 3/8" I.D.

Client: Briggs			Date: 12-21-22	Page # 1 of 1
Location: Cran Point - Mashpee MA				
Boring No. B6	Ground Elev 19.0	Date Start 12/21	Date Complete 12/21	Drilling Foreman: T Perry	Eng/Hydrol. Geologist: D Geisser

DEPTH	Sample Data: Sample NO.	Sample Depth(ft.)	Blows 6" Penetration	Rec. Inches	Casing Blows Per Ft.	Strata Change Depth	Visual Identification of Soil and/or Rock Strata
	1	0-2	4-4-5-6	10		2'	Sandy Fill - f/c, sand, trace(+) silt, trace(+) Gravel, brown
	2	2-4	8-7-5-4	14		4'	Gravelly Sand - f/c, little Gravel, trace(+) silt, brown - orange brown
	3	5-7	2-2-2-3	10			Sand - f/m, trace silt, light brown
	4	10-12	3-5-4-5	14			Similar to above
	5	15-17	3-5-5-6	14			Similar to above
							Bottom of Boring at 17 ft
							Groundwater at 5'2" at 20 mins. 5'9" at 1 hr.

Type Of Boring: Casing Size Hollow Stem Auger Size

Standard Penetration Test (ST) = 140lb hammer falling 30"

Proportion Percentages	Granular Soils (blows per ft.)		Cohesive Soils (blows per ft.)	
Trace 0 to 10%	0 to 4 Very Loose	30 to 50 Dense	0 to 2 Very Soft	8 to 15 Stiff
Some 10 to 40%	4 to 10 Loose	Over 50 Very Dense	2 to 4 Soft	15 to 30 Very Stiff
And 40 to 50%	10 to 30 Medium Dense		4 to 8 Medium Stiff	Over 30 Hard

Blows are per 6" taken with an 24" long X 2" OD X 1 3/8" I.D.

Client: Briggs　　Date: 12-21-22　　Page # 1 of 1

Location. Cran Point - Mashpee MA

Boring No. B7　Ground Elev 16.8　Date Start 12/21　Date Complete 12/21　Drilling Foreman: T Perry　Eng/Hydrol. Geologist: D. Geisser

DEPTH	Sample Data NO.	Sample Depth(ft.)	Blows 6" Penetration	Rec. Inches	Casing Blows Per Ft.	Strata Change Depth	Visual Identification of Soil and/or Rock Strata
	1	0-2	1-0-1-0	19		0.3	Topsoil - f/m Silty Sand, organic
							subsoil - f/m Sand, little silt, light brown
						1.5	
	2	2-4	1-1-1-1	18			Sand - f/m, trace silt, light brown
	3	5-7	3-3-6-3	18			Similar to above, wet
	4	10-12	2-4-5 8	16			similar to above
						14	
	5	15-17	10-5-4 4	18			silty Sand - f/m, little (-) Silt, light grey
	6	20-22	2-8-12 12	14		21	
							clayey Silty Sand - f/m, trace clay, some silt, grey
	7	25-27	8-6-12 19	16			Similar to above
							Bottom of Boring at 27 ft

Type Of Boring:　Casing Size　Hollow Stem Auger Size　Standard Penetration Test (ST) = 140lb hammer falling 30"

Proportion Percentages	Granular Soils (blows per ft.)		Cohesive Soils (blows per ft.)	
Trace 0 to 10%	0 to 4 Very Loose	30 to 50 Dense	0 to 2 Very Soft	8 to 15 Stiff
Some 10 to 40%	4 to 10 Loose	Over 50 Very Dense	2 to 4 Soft	15 to 30 Very Stiff
And 40 to 50%	10 to 30 Medium Dense		4 to 8 Medium Stiff	Over 30 Hard
	Blows are per 6" taken with an 24" long X 2" OD X 1 3/8" I.D.			

APPENDIX B

HYDROLOGIC INFORMATION

- ATLAS 14 RAINFALL DATA INFORMATION

NOAA Atlas 14, Volume 10, Version 3
Location name: Mashpee, Massachusetts, USA*
Latitude: 41.6205°, Longitude: -70.4615°
Elevation: 24.79 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.281 (0.230-0.344)	0.352 (0.287-0.432)	0.468 (0.380-0.575)	0.564 (0.455-0.697)	0.696 (0.541-0.894)	0.794 (0.603-1.04)	0.900 (0.661-1.22)	1.03 (0.701-1.39)	1.22 (0.794-1.70)	1.38 (0.875-1.95)
10-min	0.398 (0.325-0.488)	0.498 (0.407-0.612)	0.662 (0.539-0.815)	0.798 (0.644-0.986)	0.986 (0.767-1.27)	1.13 (0.855-1.47)	1.27 (0.937-1.72)	1.45 (0.993-1.97)	1.72 (1.13-2.40)	1.95 (1.24-2.76)
15-min	0.468 (0.383-0.574)	0.586 (0.479-0.720)	0.779 (0.634-0.959)	0.939 (0.759-1.16)	1.16 (0.902-1.49)	1.32 (1.00-1.73)	1.50 (1.10-2.03)	1.71 (1.17-2.32)	2.03 (1.32-2.82)	2.30 (1.46-3.25)
30-min	0.680 (0.556-0.834)	0.851 (0.695-1.05)	1.13 (0.919-1.39)	1.36 (1.10-1.68)	1.68 (1.31-2.16)	1.92 (1.46-2.51)	2.17 (1.60-2.94)	2.48 (1.69-3.36)	2.94 (1.92-4.10)	3.34 (2.12-4.72)
60-min	0.892 (0.730-1.09)	1.12 (0.911-1.37)	1.48 (1.21-1.82)	1.79 (1.44-2.21)	2.20 (1.71-2.83)	2.51 (1.91-3.29)	2.85 (2.09-3.85)	3.25 (2.22-4.41)	3.86 (2.52-5.38)	4.39 (2.78-6.20)
2-hr	1.24 (1.02-1.51)	1.54 (1.26-1.87)	2.03 (1.66-2.48)	2.43 (1.98-2.98)	2.99 (2.34-3.81)	3.40 (2.61-4.42)	3.85 (2.86-5.17)	4.39 (3.03-5.90)	5.22 (3.45-7.21)	5.93 (3.82-8.31)
3-hr	1.47 (1.22-1.79)	1.82 (1.50-2.21)	2.38 (1.96-2.89)	2.84 (2.32-3.47)	3.48 (2.75-4.42)	3.96 (3.05-5.12)	4.47 (3.34-5.98)	5.09 (3.54-6.82)	6.04 (4.02-8.29)	6.85 (4.44-9.55)
6-hr	1.93 (1.60-2.32)	2.34 (1.94-2.82)	3.02 (2.50-3.64)	3.58 (2.94-4.34)	4.35 (3.45-5.47)	4.92 (3.82-6.29)	5.53 (4.17-7.30)	6.26 (4.41-8.31)	7.35 (4.95-10.00)	8.27 (5.43-11.4)
12-hr	2.42 (2.03-2.90)	2.89 (2.42-3.46)	3.66 (3.05-4.39)	4.30 (3.56-5.18)	5.17 (4.13-6.44)	5.83 (4.56-7.37)	6.53 (4.93-8.48)	7.31 (5.21-9.61)	8.45 (5.77-11.4)	9.38 (6.24-12.8)
24-hr	2.91 (2.45-3.45)	3.43 (2.89-4.08)	4.29 (3.60-5.11)	5.00 (4.17-5.98)	5.97 (4.81-7.36)	6.72 (5.28-8.39)	7.48 (5.69-9.58)	8.32 (6.00-10.8)	9.49 (6.56-12.7)	10.4 (7.03-14.1)
2-day	3.37 (2.86-3.97)	3.95 (3.35-4.66)	4.89 (4.13-5.78)	5.67 (4.76-6.73)	6.74 (5.47-8.23)	7.56 (6.00-9.36)	8.40 (6.45-10.7)	9.31 (6.79-12.0)	10.6 (7.40-14.0)	11.6 (7.90-15.5)
3-day	3.69 (3.14-4.33)	4.28 (3.64-5.03)	5.25 (4.45-6.18)	6.05 (5.10-7.15)	7.15 (5.83-8.69)	7.99 (6.37-9.84)	8.85 (6.84-11.2)	9.78 (7.19-12.5)	11.1 (7.82-14.5)	12.1 (8.33-16.1)
4-day	3.95 (3.38-4.63)	4.55 (3.89-5.33)	5.53 (4.71-6.49)	6.34 (5.37-7.47)	7.46 (6.10-9.03)	8.30 (6.65-10.2)	9.18 (7.12-11.5)	10.1 (7.47-12.9)	11.4 (8.11-14.9)	12.5 (8.63-16.5)
7-day	4.63 (3.99-5.40)	5.25 (4.51-6.12)	6.26 (5.36-7.30)	7.09 (6.04-8.31)	8.24 (6.79-9.90)	9.12 (7.35-11.1)	10.0 (7.81-12.5)	11.0 (8.17-13.9)	12.2 (8.78-15.9)	13.2 (9.27-17.4)
10-day	5.27 (4.55-6.11)	5.91 (5.09-6.86)	6.95 (5.98-8.09)	7.82 (6.68-9.13)	9.01 (7.45-10.8)	9.93 (8.04-12.0)	10.9 (8.50-13.4)	11.8 (8.86-14.9)	13.1 (9.45-16.9)	14.0 (9.89-18.4)
20-day	7.19 (6.25-8.28)	7.93 (6.88-9.13)	9.13 (7.90-10.5)	10.1 (8.71-11.7)	11.5 (9.57-13.6)	12.6 (10.2-15.0)	13.6 (10.7-16.5)	14.6 (11.1-18.2)	15.9 (11.6-20.3)	16.8 (12.0-21.7)
30-day	8.84 (7.72-10.1)	9.66 (8.42-11.1)	11.0 (9.56-12.6)	12.1 (10.5-14.0)	13.6 (11.4-16.0)	14.8 (12.2-17.6)	16.0 (12.6-19.3)	17.0 (13.1-21.2)	18.3 (13.6-23.3)	19.2 (13.9-24.8)
45-day	11.0 (9.60-12.5)	11.9 (10.4-13.6)	13.4 (11.7-15.3)	14.6 (12.7-16.8)	16.4 (13.8-19.1)	17.7 (14.6-20.9)	19.0 (15.1-22.8)	20.2 (15.6-24.9)	21.5 (16.0-27.1)	22.4 (16.3-28.6)
60-day	12.8 (11.2-14.5)	13.8 (12.1-15.7)	15.4 (13.5-17.6)	16.8 (14.6-19.2)	18.7 (15.8-21.8)	20.2 (16.7-23.8)	21.6 (17.2-25.7)	22.8 (17.7-28.0)	24.2 (18.2-30.4)	25.1 (18.3-32.0)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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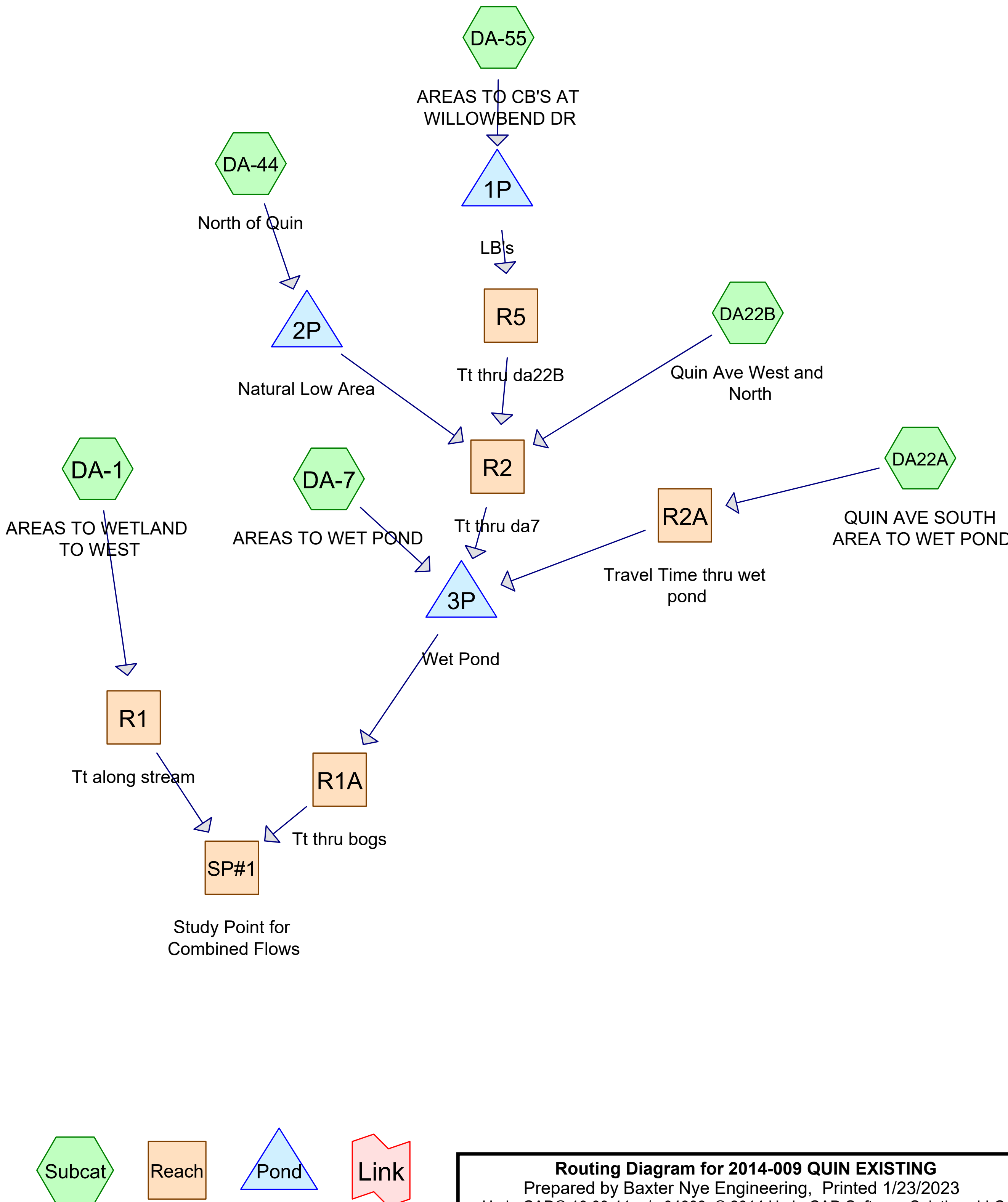
PF graphical

APPENDIX C

PRE-DEVELOPMENT

WATERSHED RUNOFF & ROUTING



Routing Diagram for 2014-009 QUIN EXISTING
Prepared by Baxter Nye Engineering, Printed 1/23/2023
HydroCAD® 10.00-11 s/n 04803 © 2014 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.464	39	>75% Grass cover, Good, HSG A (DA-1, DA-7, DA22A, DA22B)
0.183	76	Gravel roads, HSG A (DA-1, DA-7)
0.315	39	Pasture/grassland/range, Good, HSG A (DA-55)
0.326	98	Paved parking, HSG A (DA-55)
0.172	98	Roofs, HSG A (DA-1, DA-7)
0.872	98	Unconnected pavement, HSG A (DA22A, DA22B)
3.381	30	Woods, Good, HSG A (DA-1, DA-7)
1.064	55	Woods, Good, HSG B (DA-1)
0.841	32	Woods/grass comb., Good, HSG A (DA-44)
8.618	**47**	**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA-1: AREAS TO WETLAND Runoff Area=2.267 ac 3.62% Impervious Runoff Depth=0.08"
Flow Length=200' Tc=16.2 min CN=45 Runoff=0.03 cfs 0.016 af

Subcatchment DA-44: North of Quin Runoff Area=0.841 ac 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=32 Runoff=0.00 cfs 0.000 af

Subcatchment DA-55: AREAS TO CB'S AT Runoff Area=0.641 ac 50.86% Impervious Runoff Depth=0.95"
Tc=5.0 min CN=69 Runoff=0.68 cfs 0.051 af

Subcatchment DA-7: AREAS TO WET POND Runoff Area=3.073 ac 2.93% Impervious Runoff Depth=0.00"
Flow Length=431' Tc=26.3 min CN=35 Runoff=0.00 cfs 0.000 af

Subcatchment DA22A: QUIN AVE SOUTH Runoff Area=0.461 ac 63.56% Impervious Runoff Depth=1.37"
Flow Length=1,172' Tc=6.9 min CN=76 Runoff=0.70 cfs 0.052 af

Subcatchment DA22B: Quin Ave West and Runoff Area=1.335 ac 43.37% Impervious Runoff Depth=0.75"
Flow Length=1,473' Tc=8.8 min CN=65 Runoff=0.89 cfs 0.084 af

Reach R1: Tt along stream Avg. Flow Depth=0.05' Max Vel=0.23 fps Inflow=0.03 cfs 0.016 af
n=0.040 L=550.0' S=0.0035 '/' Capacity=69.34 cfs Outflow=0.02 cfs 0.016 af

Reach R1A: Tt thru bogs Avg. Flow Depth=0.05' Max Vel=0.28 fps Inflow=0.08 cfs 0.079 af
n=0.040 L=520.0' S=0.0029 '/' Capacity=50.84 cfs Outflow=0.08 cfs 0.077 af

Reach R2: Tt thru da7 Avg. Flow Depth=0.10' Max Vel=0.73 fps Inflow=0.99 cfs 0.101 af
n=0.025 L=380.0' S=0.0074 '/' Capacity=330.00 cfs Outflow=0.85 cfs 0.101 af

Reach R2A: Travel Time thru wet pond Avg. Flow Depth=0.14' Max Vel=2.41 fps Inflow=0.70 cfs 0.052 af
n=0.025 L=255.0' S=0.0267 '/' Capacity=13.24 cfs Outflow=0.68 cfs 0.052 af

Reach R5: Tt thru da22B Avg. Flow Depth=0.05' Max Vel=1.39 fps Inflow=0.39 cfs 0.017 af
n=0.013 L=246.0' S=0.0146 '/' Capacity=75.75 cfs Outflow=0.31 cfs 0.017 af

Reach SP#1: Study Point for Combined Flows Inflow=0.10 cfs 0.093 af
Outflow=0.10 cfs 0.093 af

Pond 1P: LB's Peak Elev=20.64' Storage=448 cf Inflow=0.68 cfs 0.051 af
Discarded=0.03 cfs 0.033 af Primary=0.39 cfs 0.017 af Outflow=0.42 cfs 0.051 af

Pond 2P: Natural Low Area Peak Elev=16.01' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond 3P: Wet Pond Peak Elev=14.39' Storage=4,532 cf Inflow=1.20 cfs 0.154 af
Outflow=0.08 cfs 0.079 af

Total Runoff Area = 8.618 ac Runoff Volume = 0.203 af Average Runoff Depth = 0.28"
84.10% Pervious = 7.248 ac 15.90% Impervious = 1.370 ac

Summary for Subcatchment DA-1: AREAS TO WETLAND TO WEST

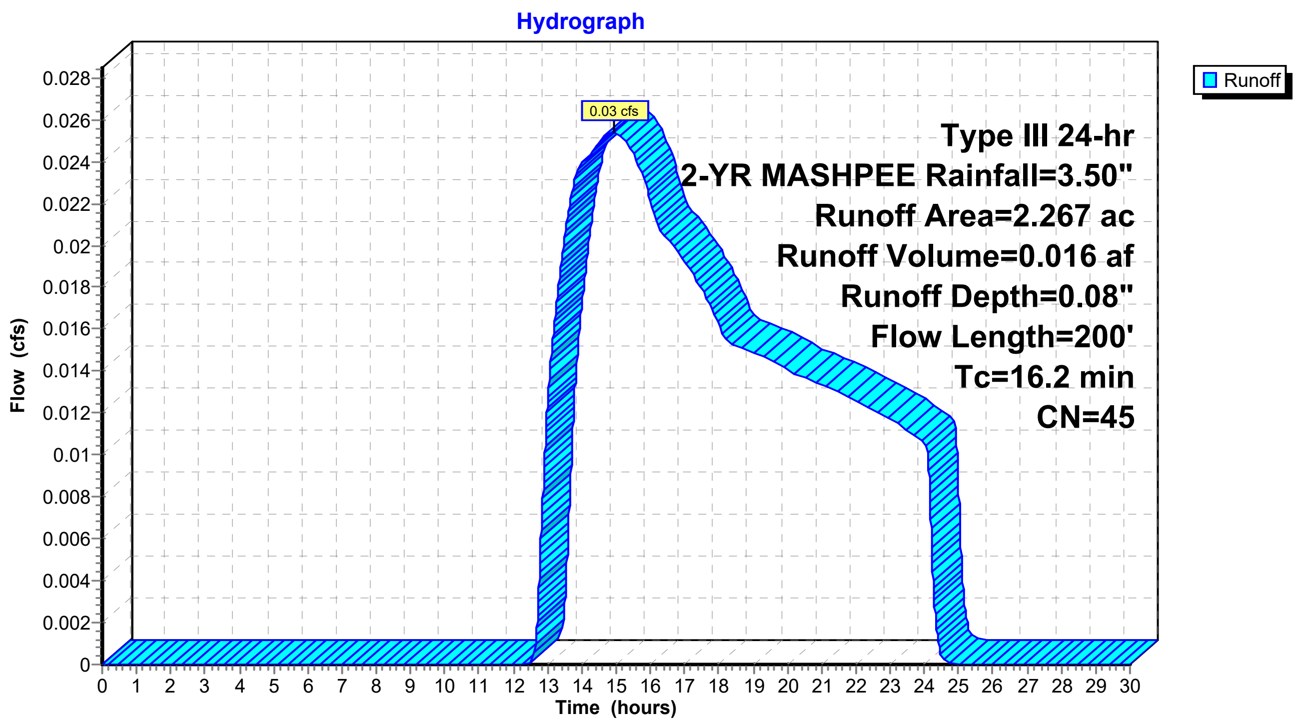
Runoff = 0.03 cfs @ 14.92 hrs, Volume= 0.016 af, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.090	39	>75% Grass cover, Good, HSG A
0.986	30	Woods, Good, HSG A
0.045	76	Gravel roads, HSG A
0.082	98	Roofs, HSG A
1.064	55	Woods, Good, HSG B
2.267	45	Weighted Average
2.185		96.38% Pervious Area
0.082		3.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0480	0.10		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.55"
7.9	150	0.0040	0.32		**Shallow Concentrated Flow, B** Woodland Kv= 5.0 fps
16.2	200	Total			

Subcatchment DA-1: AREAS TO WETLAND TO WEST



Summary for Subcatchment DA-44: North of Quin

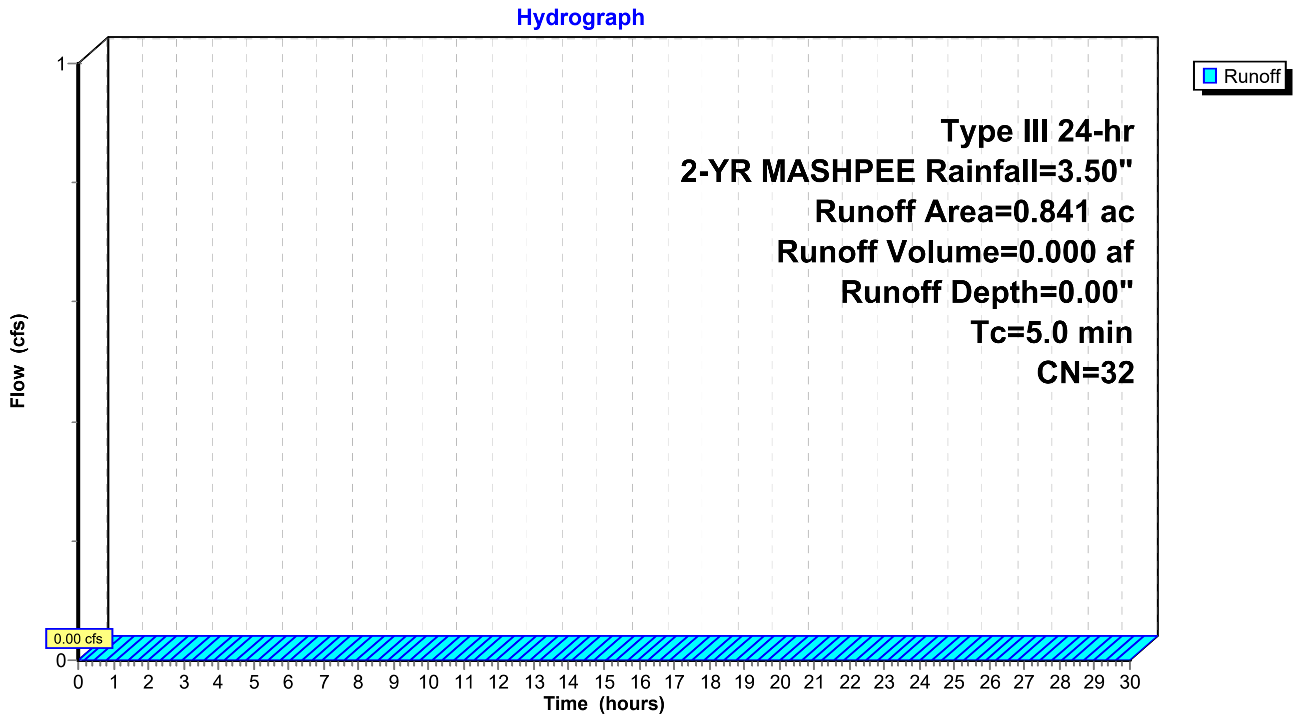
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.841	32	Woods/grass comb., Good, HSG A
0.841		100.00% Pervious Area

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

Subcatchment DA-44: North of Quin



Summary for Subcatchment DA-55: AREAS TO CB'S AT WILLOWBEND DR

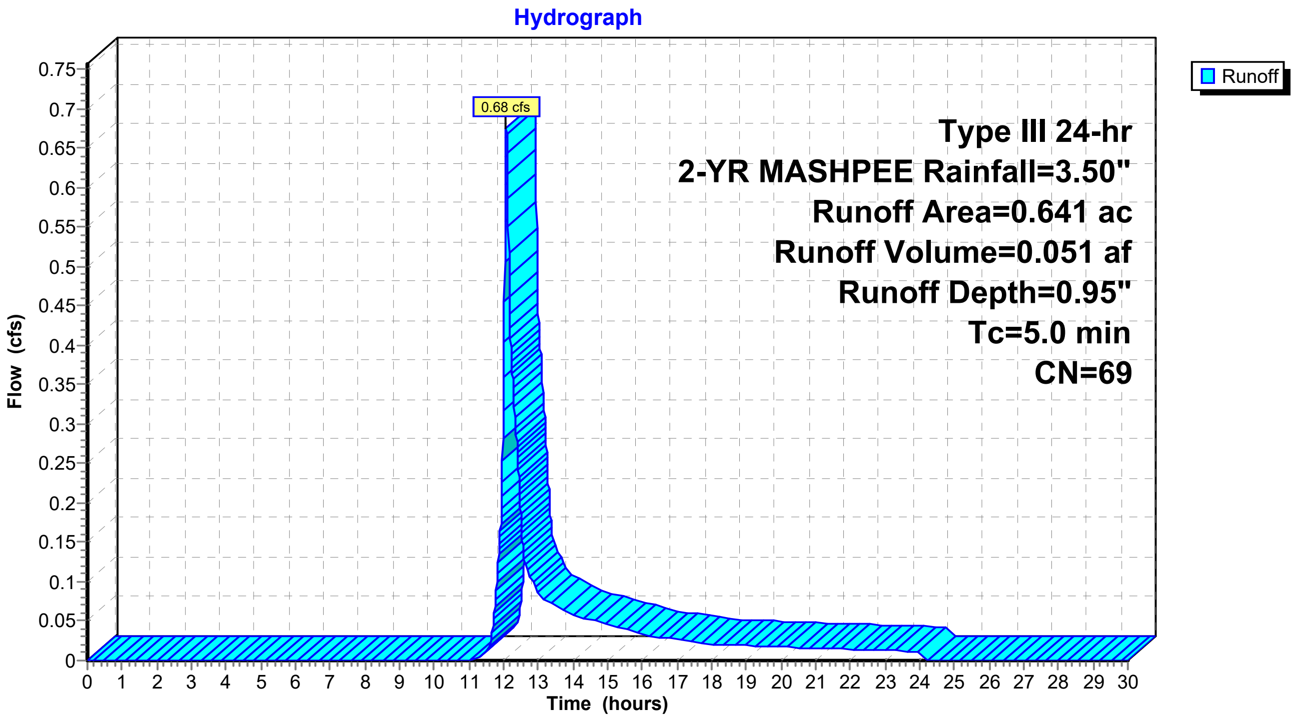
Runoff = 0.68 cfs @ 12.08 hrs, Volume= 0.051 af, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.326	98	Paved parking, HSG A
0.315	39	Pasture/grassland/range, Good, HSG A
0.641	69	Weighted Average
0.315		49.14% Pervious Area
0.326		50.86% Impervious Area

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

Subcatchment DA-55: AREAS TO CB'S AT WILLOWBEND DR



Summary for Subcatchment DA-7: AREAS TO WET POND

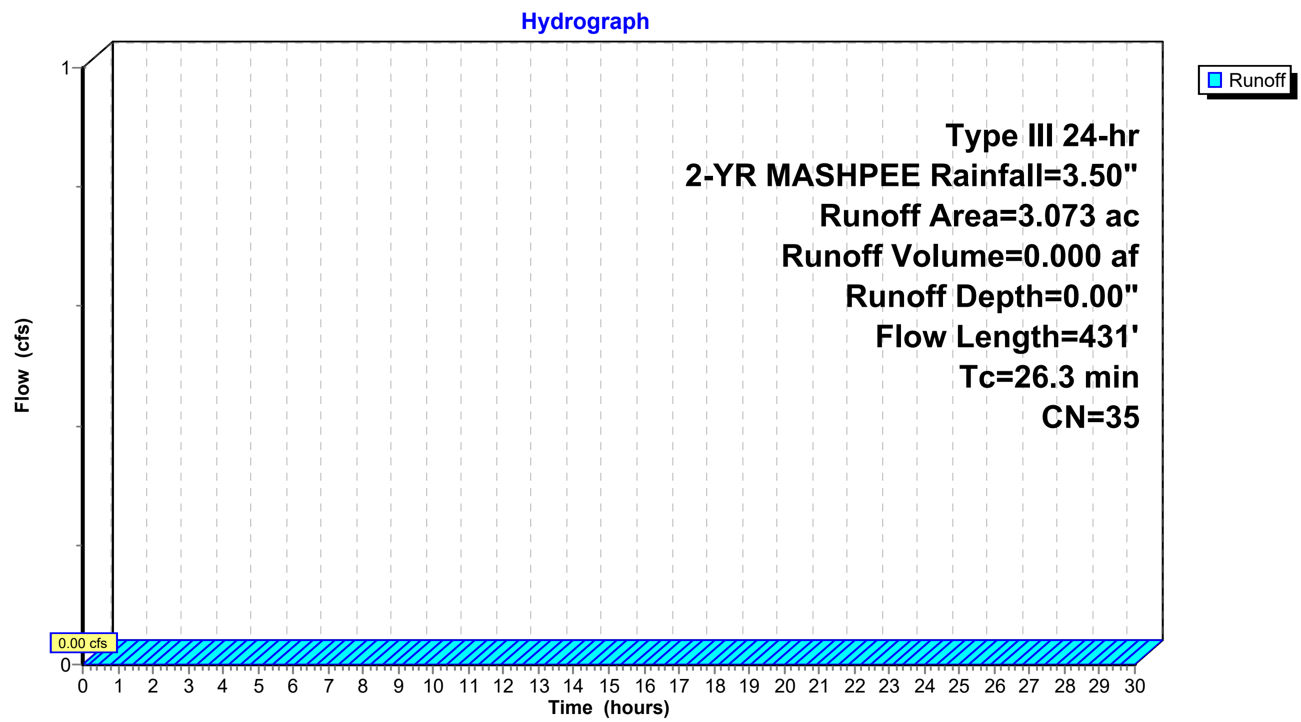
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.450	39	>75% Grass cover, Good, HSG A
2.230	30	Woods, Good, HSG A
0.138	76	Gravel roads, HSG A
0.090	98	Roofs, HSG A
0.165	30	Woods, Good, HSG A
3.073	35	Weighted Average
2.983		97.07% Pervious Area
0.090		2.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0480	0.10		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.55"
18.0	381	0.0050	0.35		**Shallow Concentrated Flow, A** Woodland Kv= 5.0 fps
26.3	431	Total			

Subcatchment DA-7: AREAS TO WET POND



Summary for Subcatchment DA22A: QUIN AVE SOUTH AREA TO WET POND

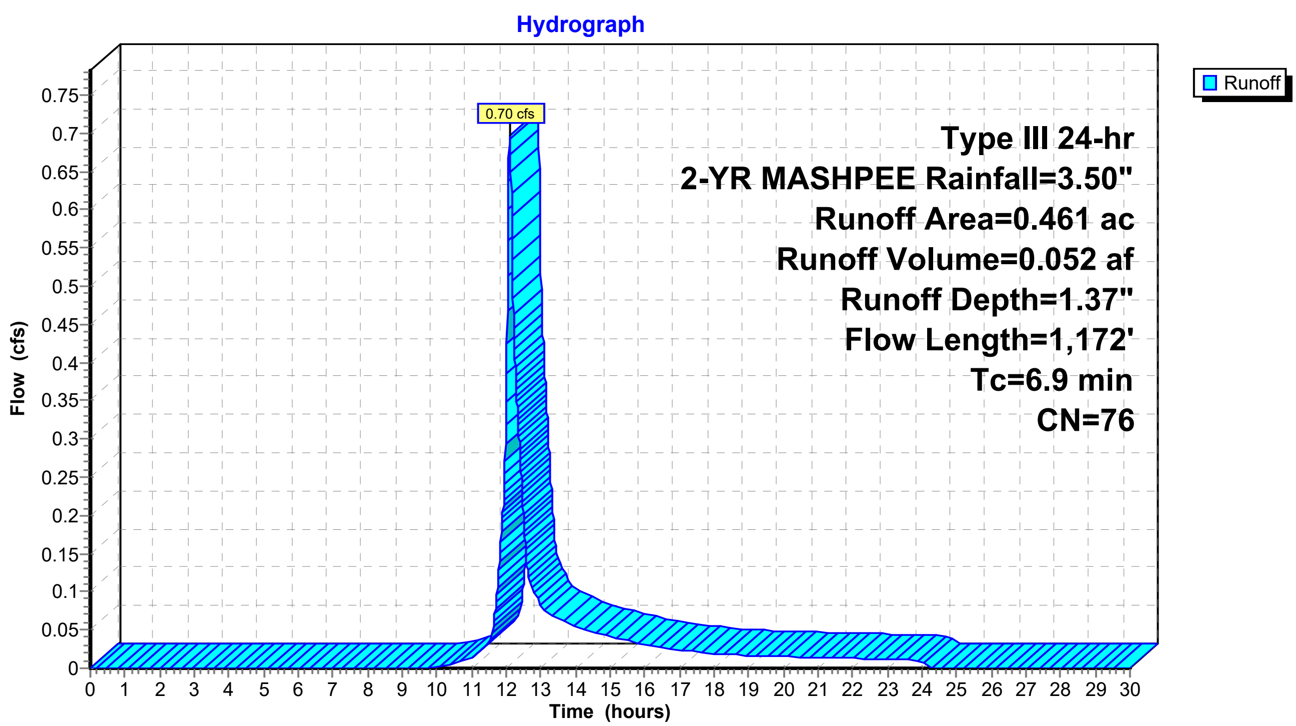
Runoff = 0.70 cfs @ 12.11 hrs, Volume= 0.052 af, Depth= 1.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.293	98	Unconnected pavement, HSG A
0.168	39	>75% Grass cover, Good, HSG A
0.461	76	Weighted Average
0.168		36.44% Pervious Area
0.293		63.56% Impervious Area
0.293		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.96		**Sheet Flow, A** Smooth surfaces n= 0.011 P2= 3.55"
6.0	1,122	0.0236	3.12		**Shallow Concentrated Flow, B** Paved Kv= 20.3 fps
6.9	1,172	Total			

Subcatchment DA22A: QUIN AVE SOUTH AREA TO WET POND



Summary for Subcatchment DA22B: Quin Ave West and North

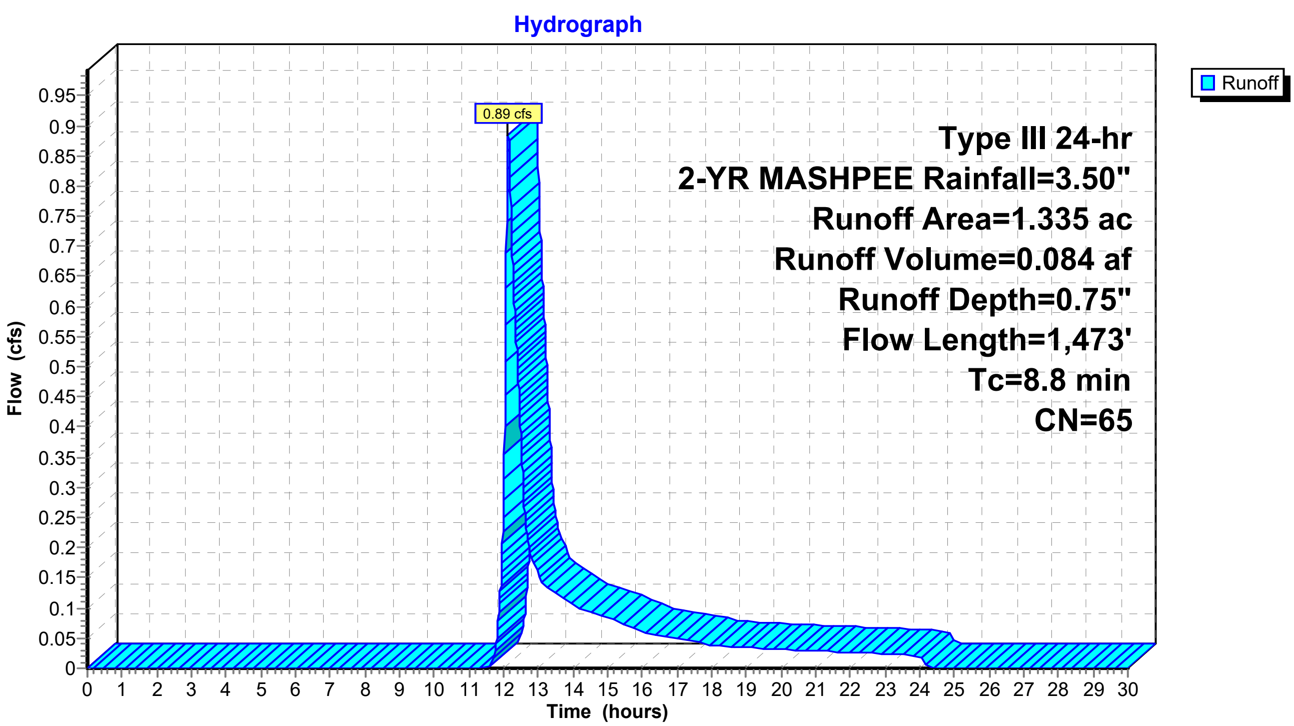
Runoff = 0.89 cfs @ 12.14 hrs, Volume= 0.084 af, Depth= 0.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.579	98	Unconnected pavement, HSG A
0.756	39	>75% Grass cover, Good, HSG A
1.335	65	Weighted Average
0.756		56.63% Pervious Area
0.579		43.37% Impervious Area
0.579		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.96		**Sheet Flow, A** Smooth surfaces n= 0.011 P2= 3.55"
7.9	1,423	0.0220	3.01		**Shallow Concentrated Flow, B** Paved Kv= 20.3 fps
8.8	1,473	Total			

Subcatchment DA22B: Quin Ave West and North



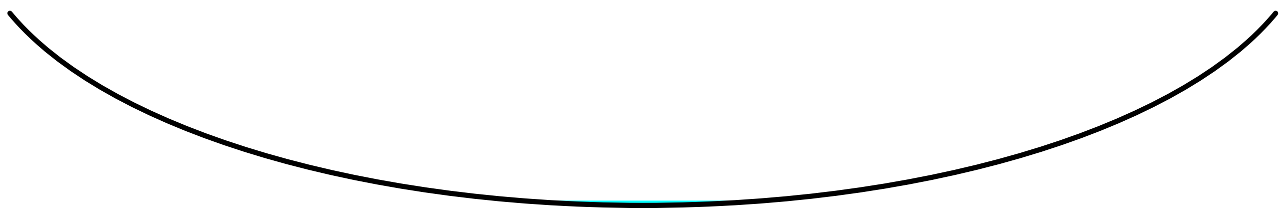
Summary for Reach R1: Tt along stream

Inflow Area = 2.267 ac, 3.62% Impervious, Inflow Depth = 0.08" for 2-YR MASHPEE event
Inflow = 0.03 cfs @ 14.92 hrs, Volume= 0.016 af
Outflow = 0.02 cfs @ 15.40 hrs, Volume= 0.016 af, Atten= 3%, Lag= 28.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.23 fps, Min. Travel Time= 39.3 min
Avg. Velocity = 0.18 fps, Avg. Travel Time= 52.2 min

Peak Storage= 58 cf @ 15.40 hrs
Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 2.00' Flow Area= 26.7 sf, Capacity= 69.34 cfs

20.00' x 2.00' deep Parabolic Channel, n= 0.040 Winding stream, pools & shoals
Length= 550.0' Slope= 0.0035 '/'
Inlet Invert= 14.60', Outlet Invert= 12.70'



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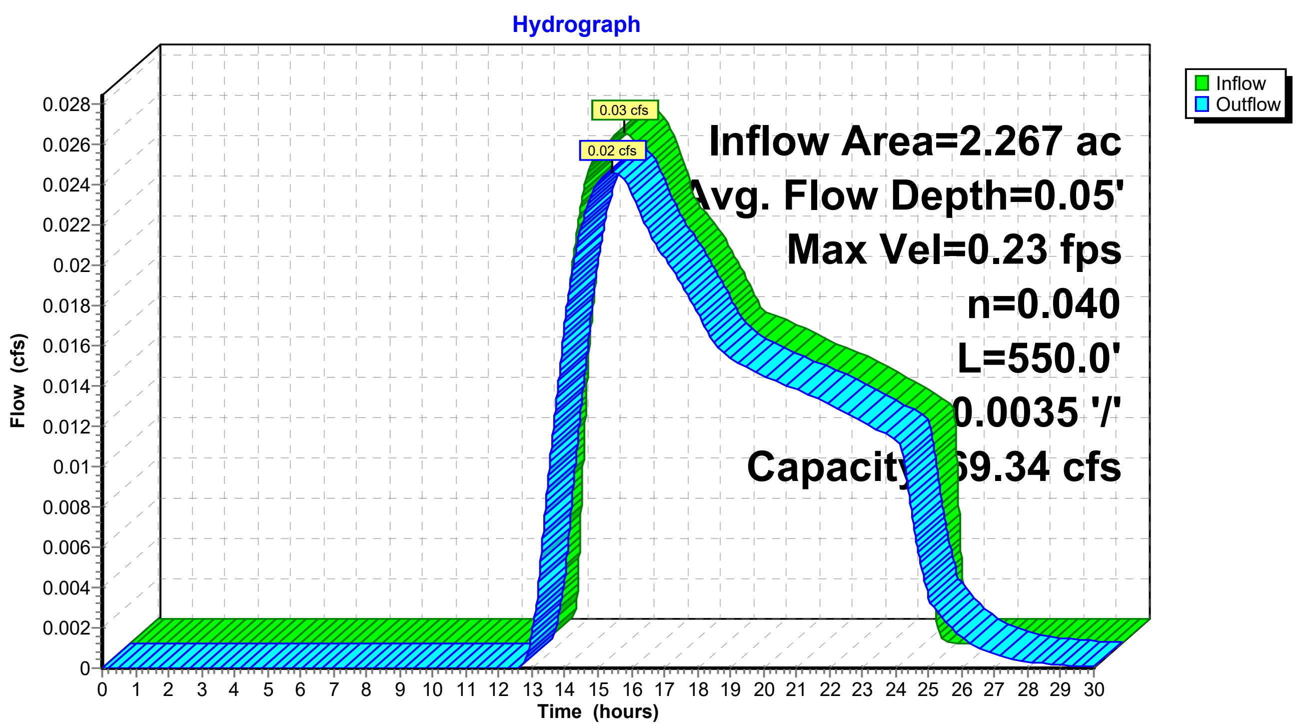
Reach R1: Tt along stream



Summary for Reach R1A: Tt thru bogs

Inflow Area = 6.351 ac, 20.28% Impervious, Inflow Depth > 0.15" for 2-YR MASHPEE event
Inflow = 0.08 cfs @ 16.88 hrs, Volume= 0.079 af
Outflow = 0.08 cfs @ 17.28 hrs, Volume= 0.077 af, Atten= 0%, Lag= 23.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.28 fps, Min. Travel Time= 30.7 min
Avg. Velocity = 0.24 fps, Avg. Travel Time= 36.0 min

Peak Storage= 145 cf @ 17.28 hrs
Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 2.00' Flow Area= 22.0 sf, Capacity= 50.84 cfs

5.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/' Top Width= 17.00'
Length= 520.0' Slope= 0.0029 '/'
Inlet Invert= 14.20', Outlet Invert= 12.70'

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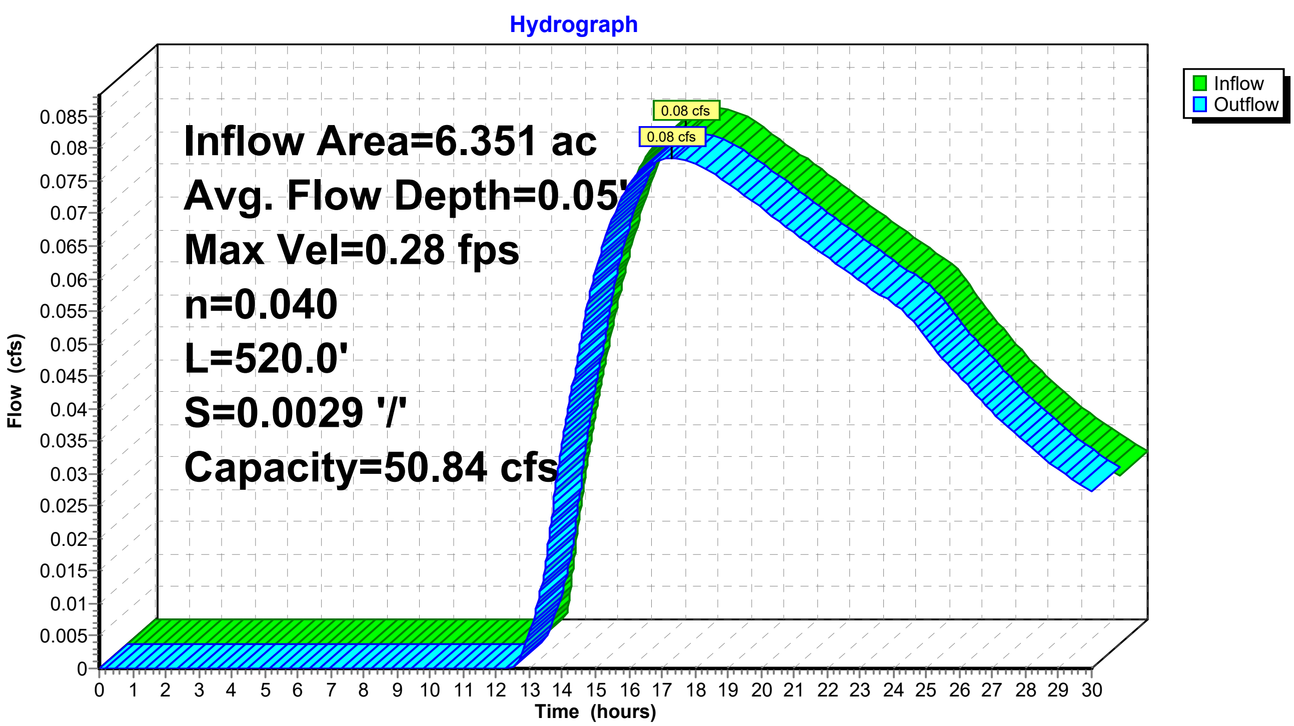
Reach R1A: Tt thru bogs



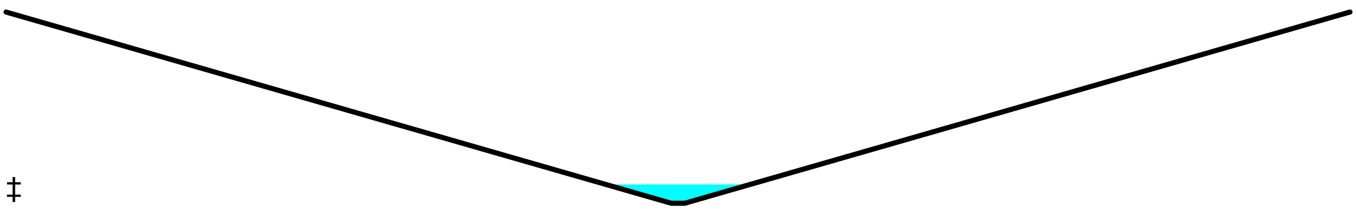
Summary for Reach R2: Tt thru da7

Inflow Area = 2.817 ac, 32.13% Impervious, Inflow Depth = 0.43" for 2-YR MASHPEE event
Inflow = 0.99 cfs @ 12.23 hrs, Volume= 0.101 af
Outflow = 0.85 cfs @ 12.35 hrs, Volume= 0.101 af, Atten= 14%, Lag= 7.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.73 fps, Min. Travel Time= 8.7 min
Avg. Velocity = 0.34 fps, Avg. Travel Time= 18.7 min

Peak Storage= 443 cf @ 12.35 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 1.00' Flow Area= 102.0 sf, Capacity= 330.00 cfs

2.00' x 1.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 100.0 '/' Top Width= 202.00'
Length= 380.0' Slope= 0.0074 '/'
Inlet Invert= 17.00', Outlet Invert= 14.20'



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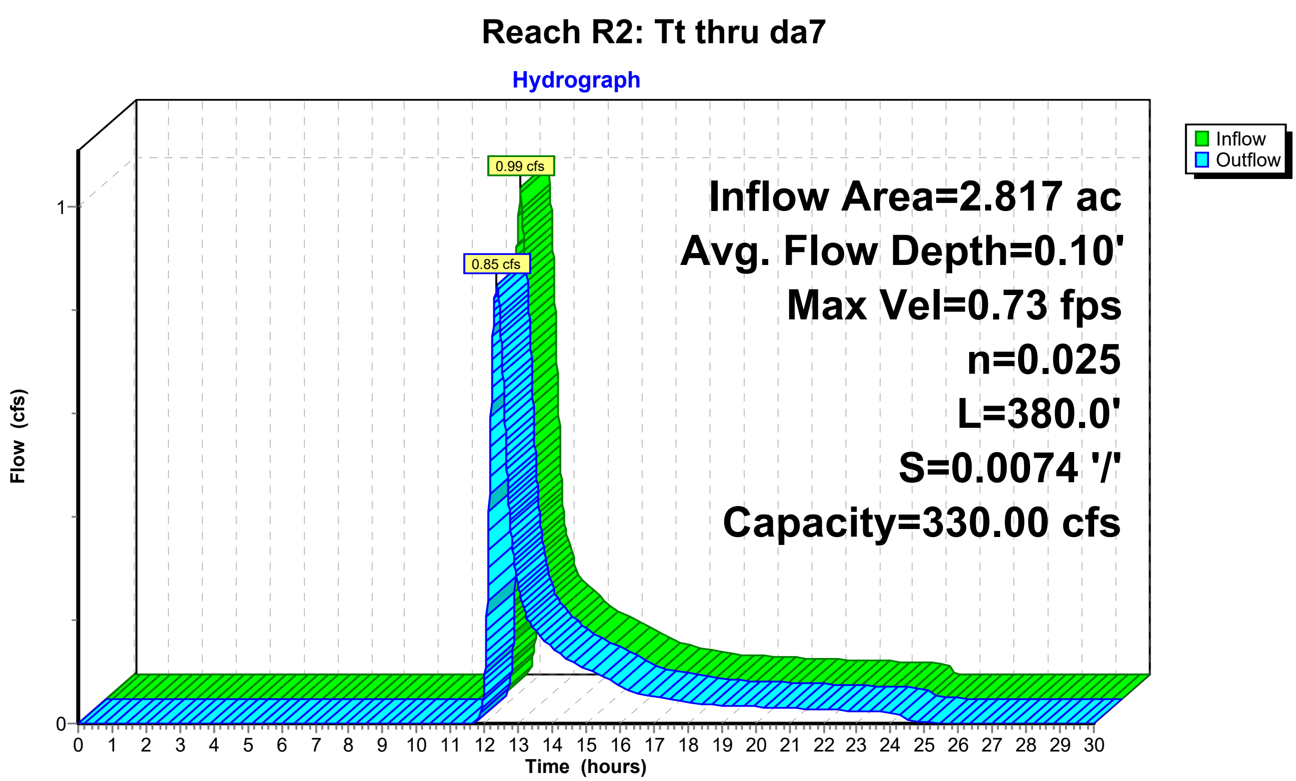


Summary for Reach R2A: Travel Time thru wet pond

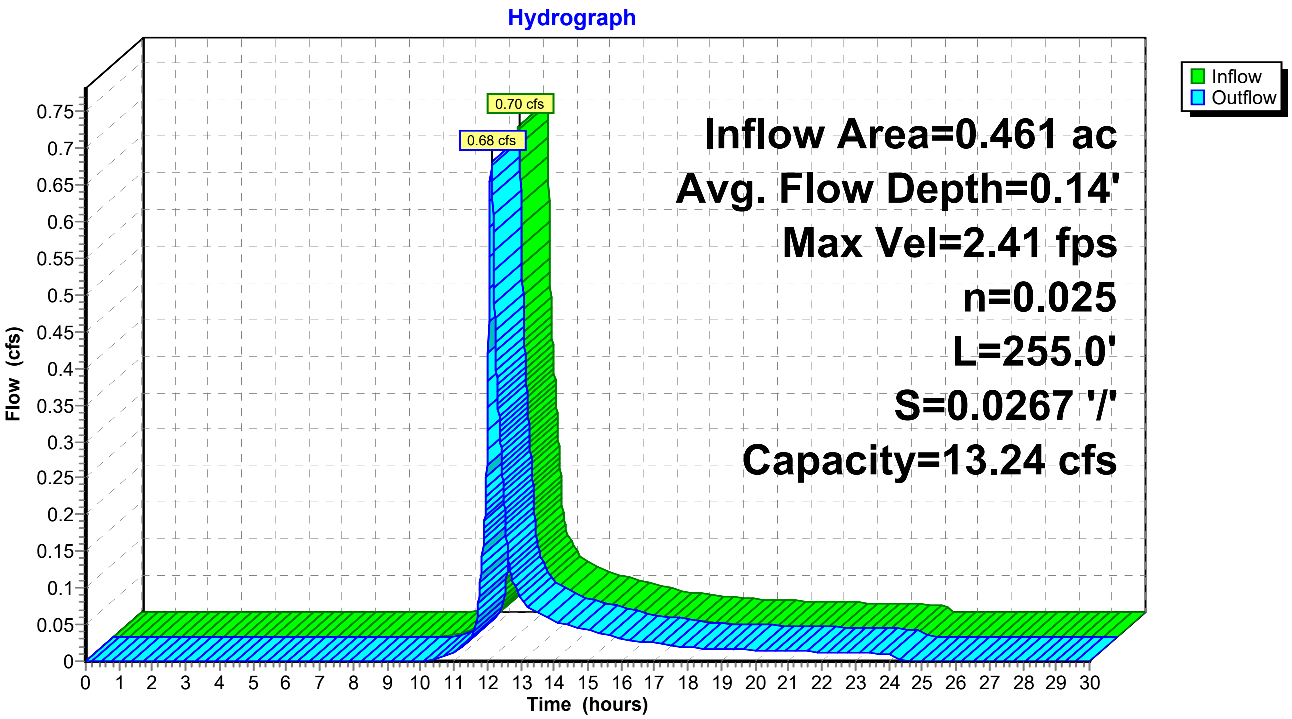
Inflow Area = 0.461 ac, 63.56% Impervious, Inflow Depth = 1.37" for 2-YR MASHPEE event
Inflow = 0.70 cfs @ 12.11 hrs, Volume= 0.052 af
Outflow = 0.68 cfs @ 12.12 hrs, Volume= 0.052 af, Atten= 2%, Lag= 1.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.41 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 0.72 fps, Avg. Travel Time= 5.9 min

Peak Storage= 72 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.14'
Bank-Full Depth= 1.00' Flow Area= 2.1 sf, Capacity= 13.24 cfs

2.00' x 1.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 0.1 '/' Top Width= 2.20'
Length= 255.0' Slope= 0.0267 '/'
Inlet Invert= 21.00', Outlet Invert= 14.20'

Reach R2A: Travel Time thru wet pond



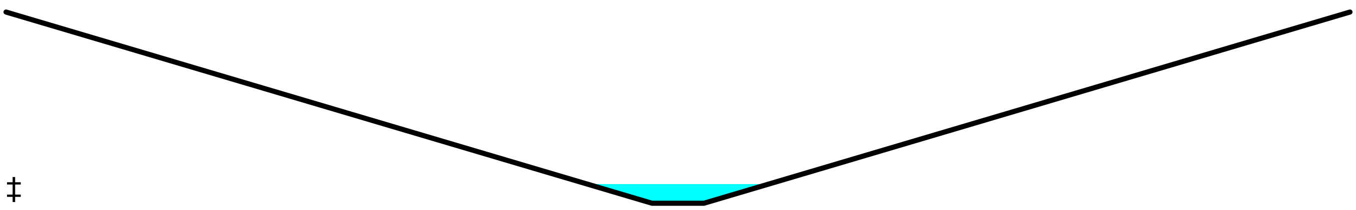
Summary for Reach R5: Tt thru da22B

Inflow Area = 0.641 ac, 50.86% Impervious, Inflow Depth = 0.33" for 2-YR MASHPEE event
Inflow = 0.39 cfs @ 12.19 hrs, Volume= 0.017 af
Outflow = 0.31 cfs @ 12.29 hrs, Volume= 0.017 af, Atten= 21%, Lag= 6.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.39 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 0.67 fps, Avg. Travel Time= 6.1 min

Peak Storage= 55 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 0.50' Flow Area= 13.5 sf, Capacity= 75.75 cfs

2.00' x 0.50' deep channel, n= 0.013 Asphalt, smooth
Side Slope Z-value= 50.0 '/' Top Width= 52.00'
Length= 246.0' Slope= 0.0146 '/'
Inlet Invert= 20.58', Outlet Invert= 17.00'



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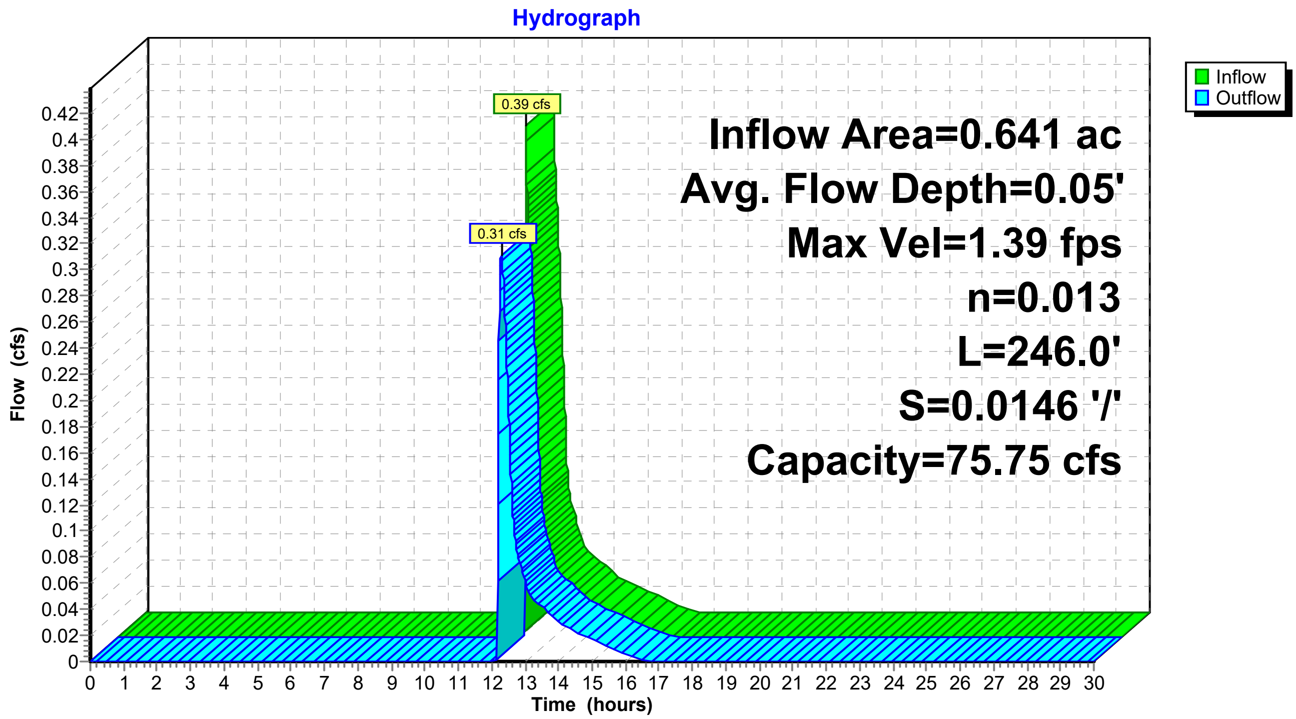
Reach R5: Tt thru da22B

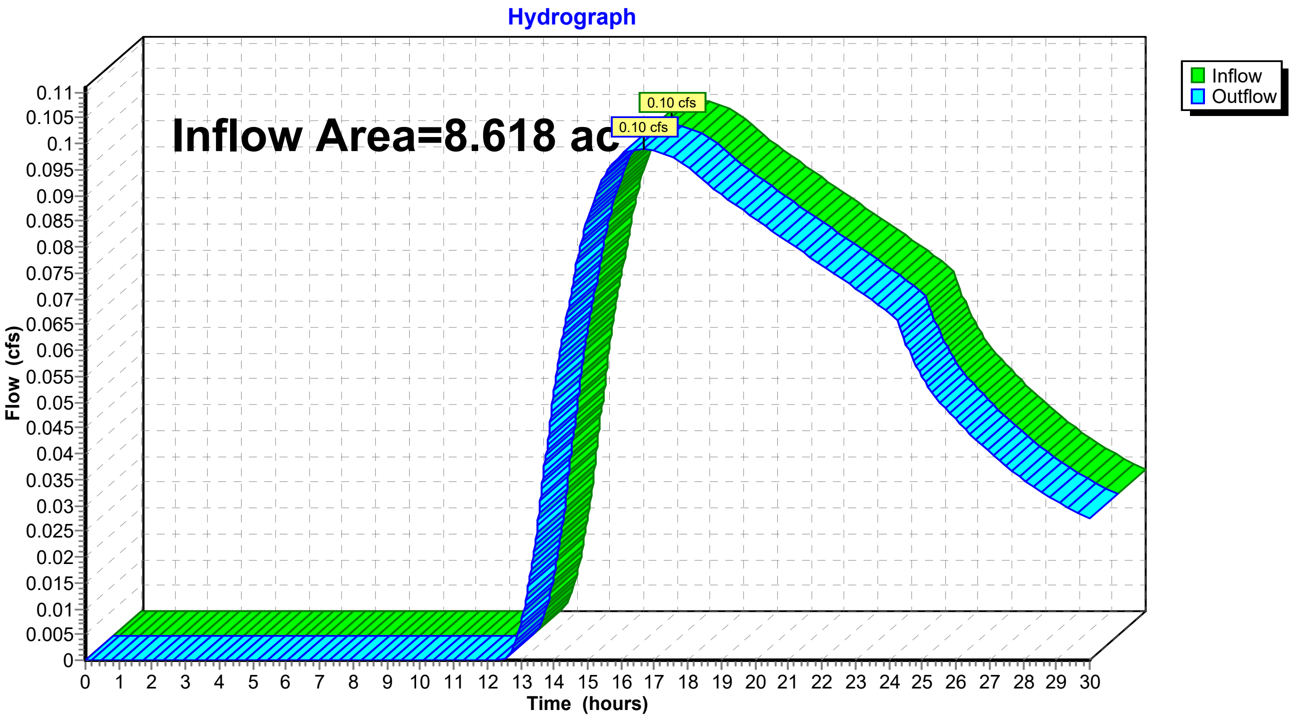


Summary for Reach SP#1: Study Point for Combined Flows

Inflow Area = 8.618 ac, 15.90% Impervious, Inflow Depth > 0.13" for 2-YR MASHPEE event
Inflow = 0.10 cfs @ 16.64 hrs, Volume= 0.093 af
Outflow = 0.10 cfs @ 16.64 hrs, Volume= 0.093 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach SP#1: Study Point for Combined Flows



Summary for Pond 1P: LB's

Inflow Area = 0.641 ac, 50.86% Impervious, Inflow Depth = 0.95" for 2-YR MASHPEE event
Inflow = 0.68 cfs @ 12.08 hrs, Volume= 0.051 af
Outflow = 0.42 cfs @ 12.19 hrs, Volume= 0.051 af, Atten= 38%, Lag= 6.1 min
Discarded = 0.03 cfs @ 11.74 hrs, Volume= 0.033 af
Primary = 0.39 cfs @ 12.19 hrs, Volume= 0.017 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 20.64' @ 12.27 hrs Surf.Area= 574 sf Storage= 448 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 114.3 min (986.0 - 871.7)

Volume	Invert	Avail.Storage	Storage Description
#1	13.50'	192 cf	**10.00'D x 4.50'H Vertical Cone/Cylinder** x 2 707 cf Overall - 226 cf Embedded = 481 cf x 40.0% Voids
#2	14.00'	226 cf	**6.00'D x 4.00'H Vertical Cone/Cylinder** x 2 Inside #1
#3	20.50'	376 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		794 cf	Total Available Storage

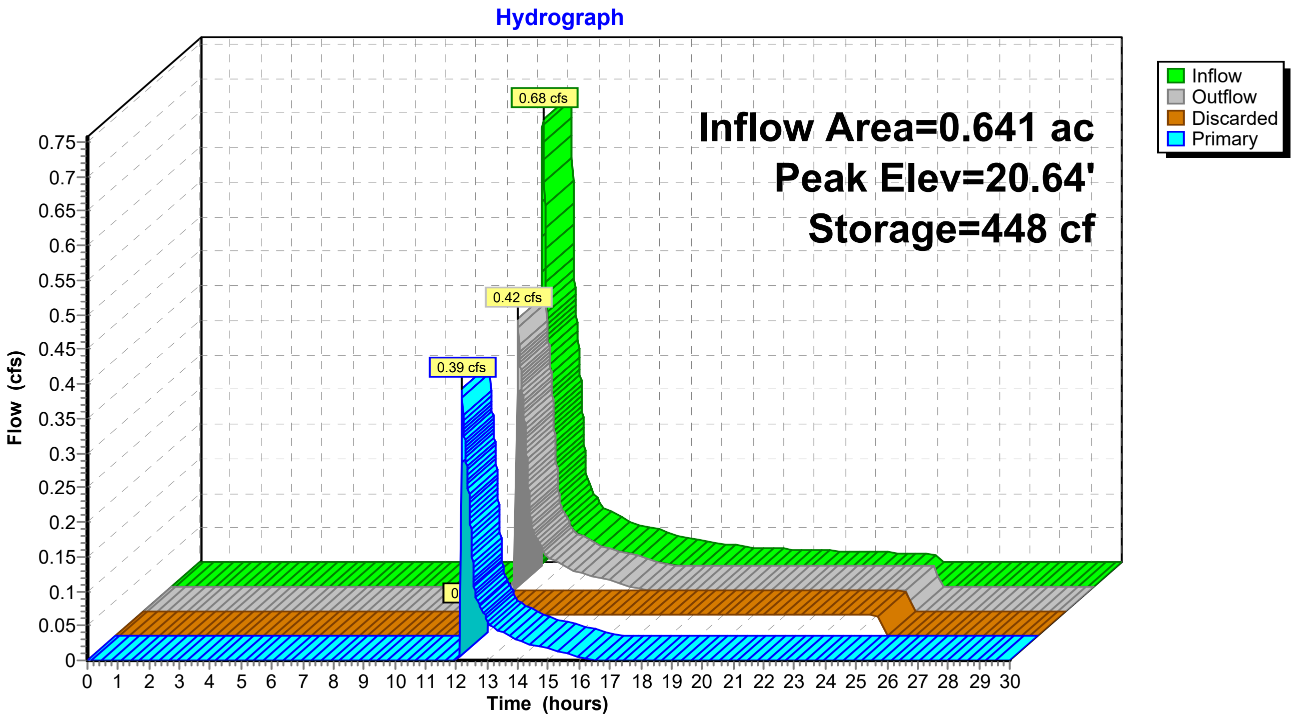
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.50	4	0	0
21.00	1,500	376	376

Device	Routing	Invert	Outlet Devices
#1	Discarded	13.50'	**8.270 in/hr Exfiltration over Surface area from 13.49' - 18.00'** Excluded Surface area = 0 sf
#2	Primary	20.58'	**179.0 deg x 6.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.46 (C= 3.08)

Discarded OutFlow Max=0.03 cfs @ 11.74 hrs HW=13.59' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.37 cfs @ 12.19 hrs HW=20.63' TW=20.61' (Dynamic Tailwater)
└─**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 0.37 cfs @ 0.58 fps)

Pond 1P: LB's


Hydrograph
0.68 cfs
0.42 cfs
0.39 cfs
Inflow
Outflow
Discarded
Primary
Inflow Area=0.641 ac
Peak Elev=20.64'
Storage=448 cf
Flow (cfs)
0.75
0.7
0.65
0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Time (hours)

Summary for Pond 2P: Natural Low Area

Inflow Area = 0.841 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-YR MASHPEE event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 16.01' @ 0.00 hrs Surf.Area= 1 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	16.01'	4,754 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

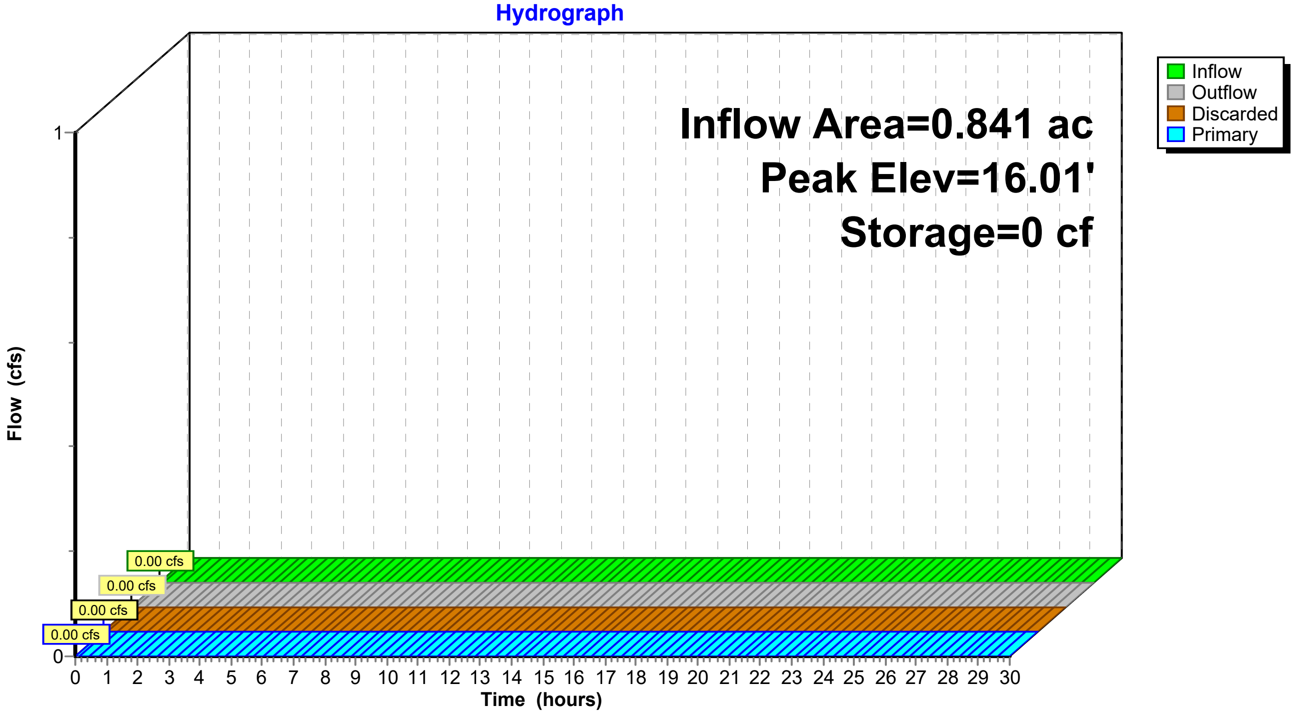
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
16.01	1	0	0
17.00	739	366	366
18.00	6,669	3,704	4,070
18.10	7,000	683	4,754

Device	Routing	Invert	Outlet Devices
#1	Discarded	16.01'	**2.410 in/hr Exfiltration over Surface area from 15.90' - 17.70'** Excluded Surface area = 0 sf
#2	Primary	17.72'	**2.0" x 2.0" Horiz. Orifice/Grate X 36.00** C= 0.600 in 24.0" x 24.0" Grate Limited to weir flow at low heads
#3	Primary	18.00'	**25.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=16.01' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 0.00 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=16.01' TW=17.00' (Dynamic Tailwater)
├─**2=Orifice/Grate** (Controls 0.00 cfs)
└─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Natural Low Area



Summary for Pond 3P: Wet Pond

Inflow Area = 6.351 ac, 20.28% Impervious, Inflow Depth = 0.29" for 2-YR MASHPEE event
Inflow = 1.20 cfs @ 12.30 hrs, Volume= 0.154 af
Outflow = 0.08 cfs @ 16.88 hrs, Volume= 0.079 af, Atten= 93%, Lag= 275.0 min
Primary = 0.08 cfs @ 16.88 hrs, Volume= 0.079 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 14.39' @ 16.88 hrs Surf.Area= 18,444 sf Storage= 4,532 cf

Plug-Flow detention time= 482.3 min calculated for 0.079 af (51% of inflow)
Center-of-Mass det. time= 353.5 min (1,228.4 - 874.9)

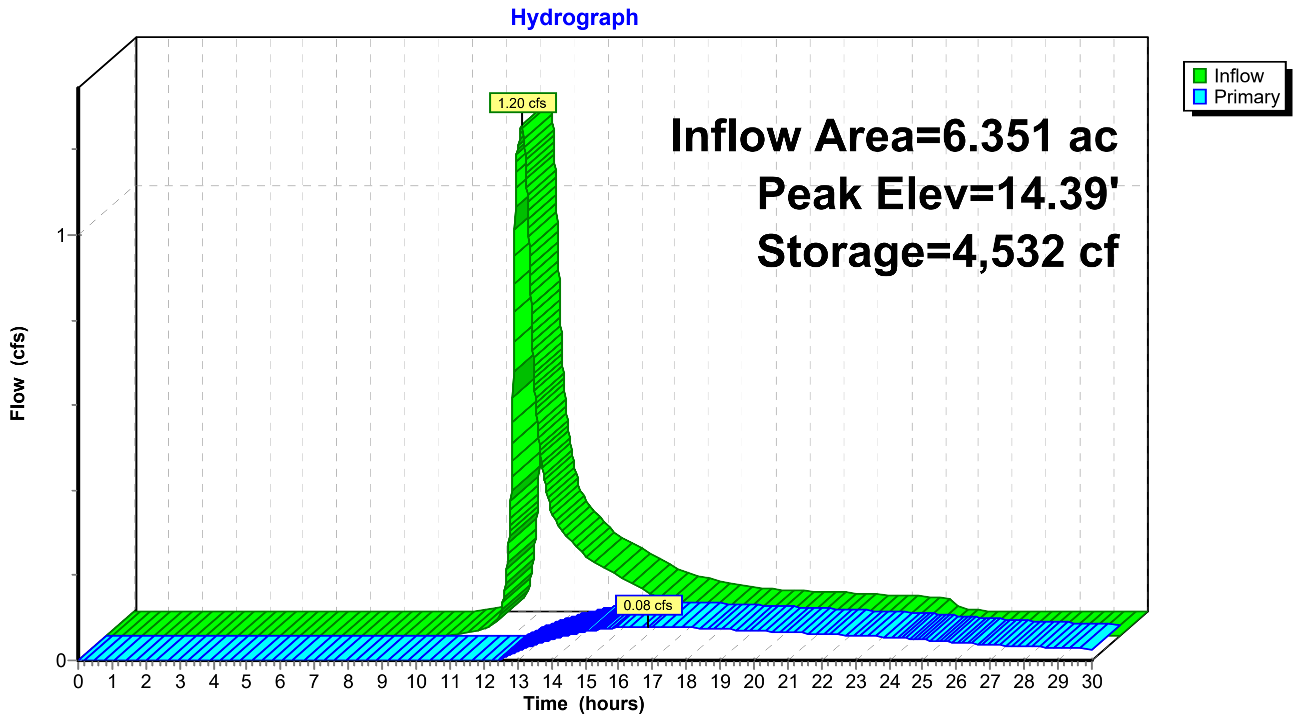
Volume	Invert	Avail.Storage	Storage Description
#1	13.97'	63,264 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
13.97	1	0	0
14.00	56	1	1
14.20	13,877	1,393	1,394
15.00	32,693	18,628	20,022
16.00	53,790	43,242	63,264

Device	Routing	Invert	Outlet Devices
#1	Primary	14.20'	**18.0" Round Culvert** L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 14.20' / 14.20' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Primary	15.00'	**30.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.08 cfs @ 16.88 hrs HW=14.39' TW=14.25' (Dynamic Tailwater)
├─**1=Culvert** (Barrel Controls 0.08 cfs @ 0.89 fps)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Wet Pond



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentDA-1: AREAS TO WETLAND Runoff Area=2.267 ac 3.62% Impervious Runoff Depth=0.45"
Flow Length=200' Tc=16.2 min CN=45 Runoff=0.41 cfs 0.084 af

SubcatchmentDA-44: North of Quin Runoff Area=0.841 ac 0.00% Impervious Runoff Depth=0.03"
Tc=5.0 min CN=32 Runoff=0.00 cfs 0.002 af

SubcatchmentDA-55: AREAS TO CB'S AT Runoff Area=0.641 ac 50.86% Impervious Runoff Depth=1.96"
Tc=5.0 min CN=69 Runoff=1.50 cfs 0.105 af

SubcatchmentDA-7: AREAS TO WET POND Runoff Area=3.073 ac 2.93% Impervious Runoff Depth=0.08"
Flow Length=431' Tc=26.3 min CN=35 Runoff=0.03 cfs 0.022 af

SubcatchmentDA22A: QUIN AVE SOUTH Runoff Area=0.461 ac 63.56% Impervious Runoff Depth=2.54"
Flow Length=1,172' Tc=6.9 min CN=76 Runoff=1.33 cfs 0.098 af

SubcatchmentDA22B: Quin Ave West and Runoff Area=1.335 ac 43.37% Impervious Runoff Depth=1.66"
Flow Length=1,473' Tc=8.8 min CN=65 Runoff=2.24 cfs 0.185 af

Reach R1: Tt along stream Avg. Flow Depth=0.16' Max Vel=0.49 fps Inflow=0.41 cfs 0.084 af
n=0.040 L=550.0' S=0.0035 '/' Capacity=69.34 cfs Outflow=0.30 cfs 0.084 af

Reach R1A: Tt thru bogs Avg. Flow Depth=0.13' Max Vel=0.49 fps Inflow=0.35 cfs 0.279 af
n=0.040 L=520.0' S=0.0029 '/' Capacity=50.84 cfs Outflow=0.35 cfs 0.277 af

Reach R2: Tt thru da7 Avg. Flow Depth=0.16' Max Vel=0.98 fps Inflow=3.57 cfs 0.248 af
n=0.025 L=380.0' S=0.0074 '/' Capacity=330.00 cfs Outflow=2.83 cfs 0.248 af

Reach R2A: Travel Time thru wet pond Avg. Flow Depth=0.21' Max Vel=3.06 fps Inflow=1.33 cfs 0.098 af
n=0.025 L=255.0' S=0.0267 '/' Capacity=13.24 cfs Outflow=1.31 cfs 0.098 af

Reach R5: Tt thru da22B Avg. Flow Depth=0.10' Max Vel=2.04 fps Inflow=1.44 cfs 0.063 af
n=0.013 L=246.0' S=0.0146 '/' Capacity=75.75 cfs Outflow=1.36 cfs 0.063 af

Reach SP#1: Study Point for Combined Flows Inflow=0.48 cfs 0.361 af
Outflow=0.48 cfs 0.361 af

Pond 1P: LB's Peak Elev=20.70' Storage=477 cf Inflow=1.50 cfs 0.105 af
Discarded=0.03 cfs 0.042 af Primary=1.44 cfs 0.063 af Outflow=1.47 cfs 0.105 af

Pond 2P: Natural Low Area Peak Elev=16.08' Storage=2 cf Inflow=0.00 cfs 0.002 af
Discarded=0.00 cfs 0.002 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.002 af

Pond 3P: Wet Pond Peak Elev=14.58' Storage=8,391 cf Inflow=3.87 cfs 0.367 af
Outflow=0.35 cfs 0.279 af

Total Runoff Area = 8.618 ac Runoff Volume = 0.495 af Average Runoff Depth = 0.69"
84.10% Pervious = 7.248 ac 15.90% Impervious = 1.370 ac

Summary for Subcatchment DA-1: AREAS TO WETLAND TO WEST

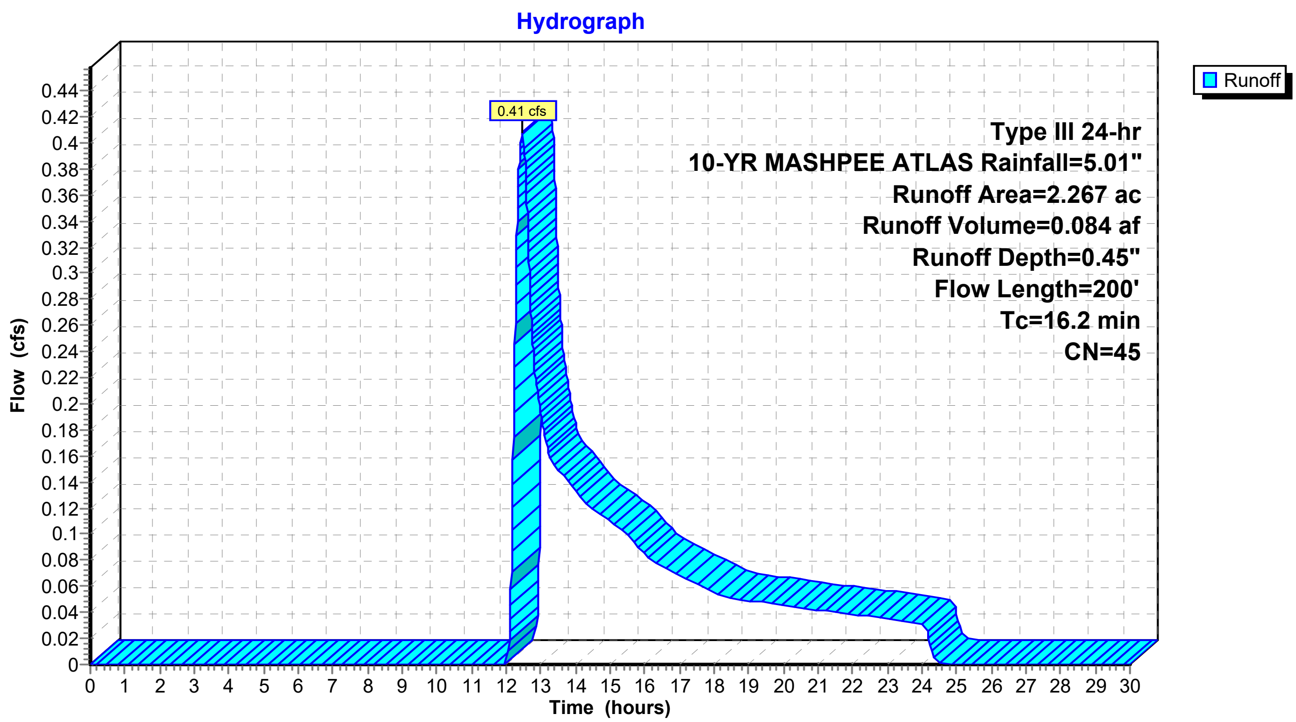
Runoff = 0.41 cfs @ 12.47 hrs, Volume= 0.084 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.090	39	>75% Grass cover, Good, HSG A
0.986	30	Woods, Good, HSG A
0.045	76	Gravel roads, HSG A
0.082	98	Roofs, HSG A
1.064	55	Woods, Good, HSG B
2.267	45	Weighted Average
2.185		96.38% Pervious Area
0.082		3.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0480	0.10		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.55"
7.9	150	0.0040	0.32		**Shallow Concentrated Flow, B** Woodland Kv= 5.0 fps
16.2	200	Total			

Subcatchment DA-1: AREAS TO WETLAND TO WEST



Summary for Subcatchment DA-44: North of Quin

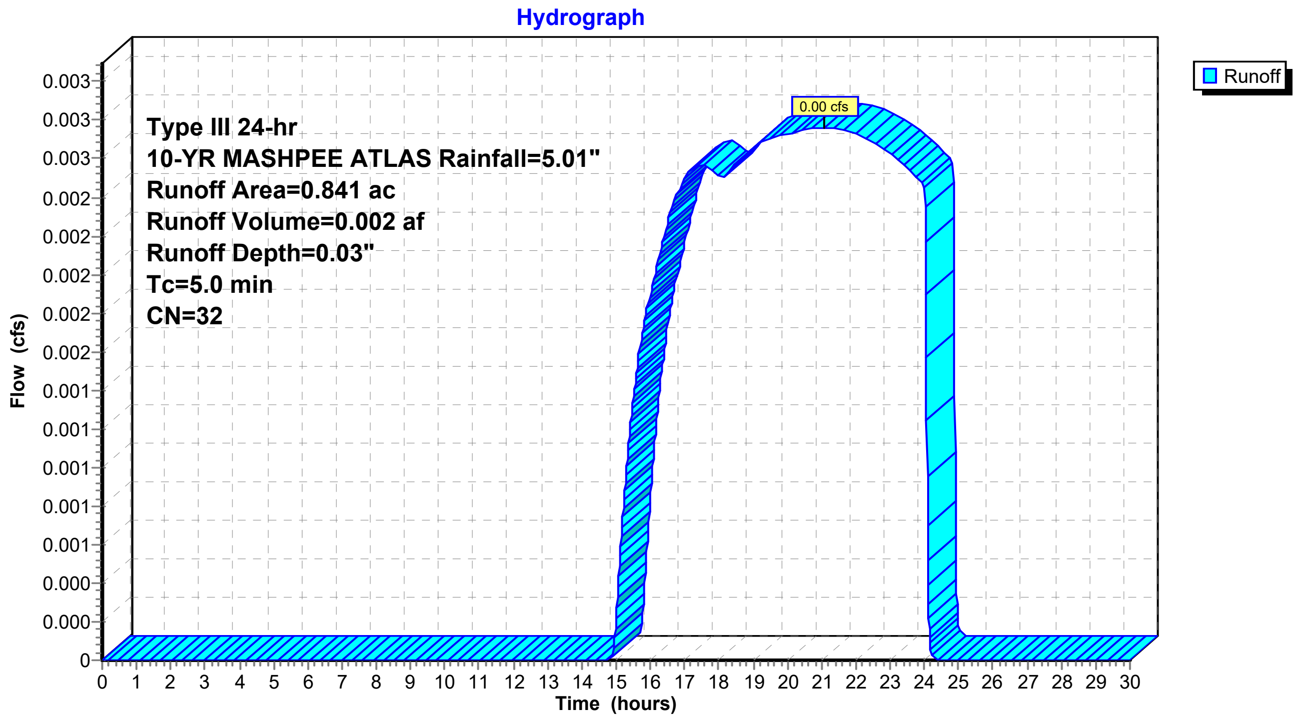
Runoff = 0.00 cfs @ 21.05 hrs, Volume= 0.002 af, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.841	32	Woods/grass comb., Good, HSG A
0.841		100.00% Pervious Area

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

Subcatchment DA-44: North of Quin



Summary for Subcatchment DA-55: AREAS TO CB'S AT WILLOWBEND DR

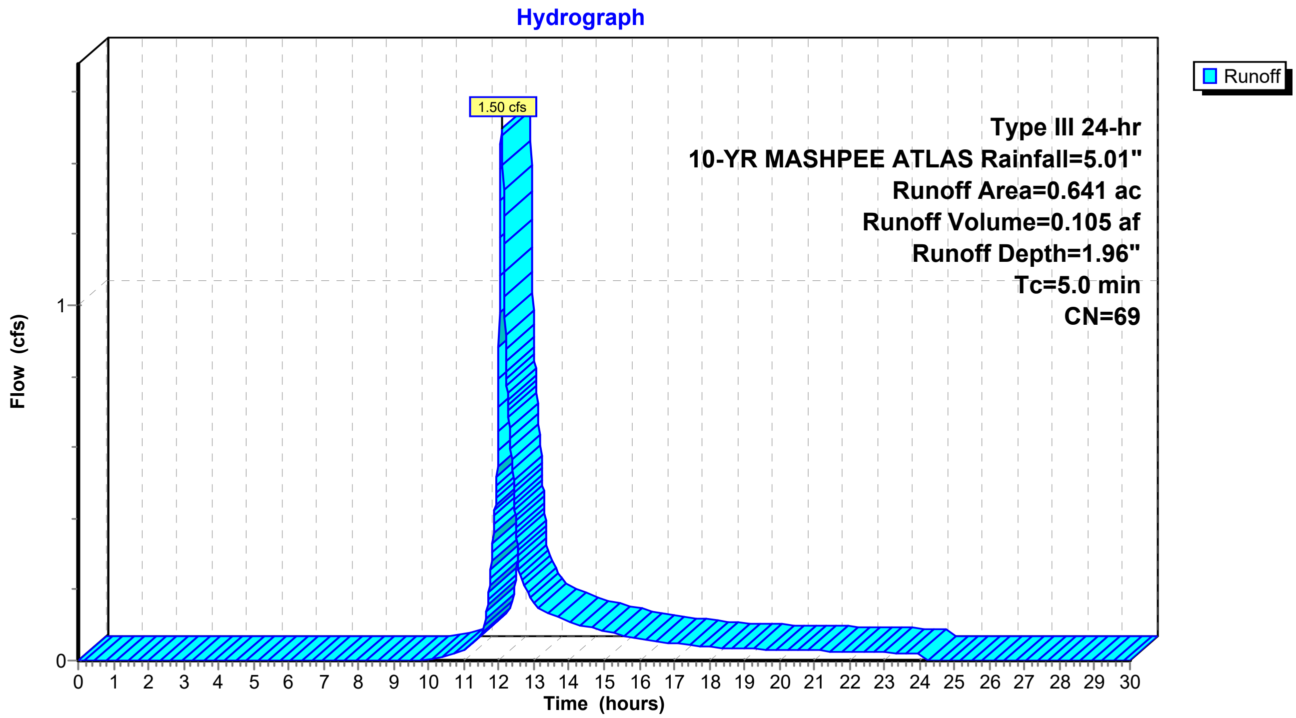
Runoff = 1.50 cfs @ 12.08 hrs, Volume= 0.105 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.326	98	Paved parking, HSG A
0.315	39	Pasture/grassland/range, Good, HSG A
0.641	69	Weighted Average
0.315		49.14% Pervious Area
0.326		50.86% Impervious Area

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

Subcatchment DA-55: AREAS TO CB'S AT WILLOWBEND DR



Summary for Subcatchment DA-7: AREAS TO WET POND

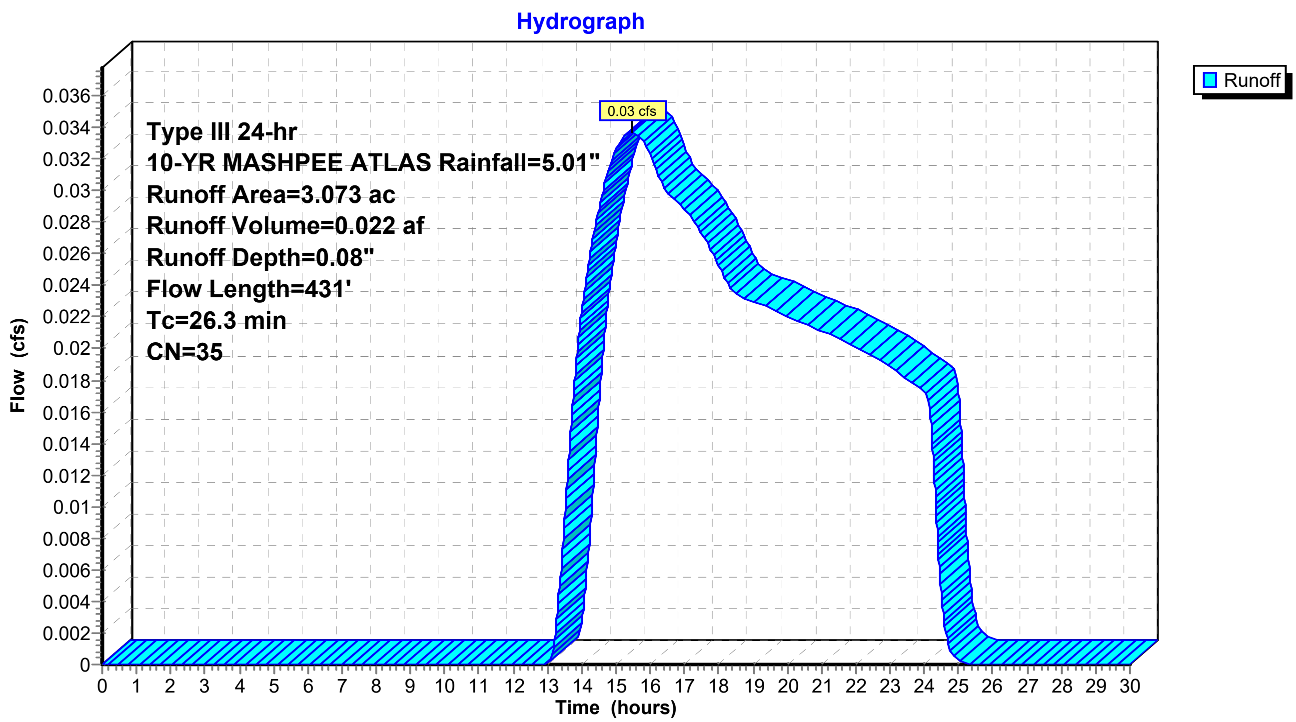
Runoff = 0.03 cfs @ 15.46 hrs, Volume= 0.022 af, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.450	39	>75% Grass cover, Good, HSG A
2.230	30	Woods, Good, HSG A
0.138	76	Gravel roads, HSG A
0.090	98	Roofs, HSG A
0.165	30	Woods, Good, HSG A
3.073	35	Weighted Average
2.983		97.07% Pervious Area
0.090		2.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0480	0.10		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.55"
18.0	381	0.0050	0.35		**Shallow Concentrated Flow, A** Woodland Kv= 5.0 fps
26.3	431	Total			

Subcatchment DA-7: AREAS TO WET POND



Summary for Subcatchment DA22A: QUIN AVE SOUTH AREA TO WET POND

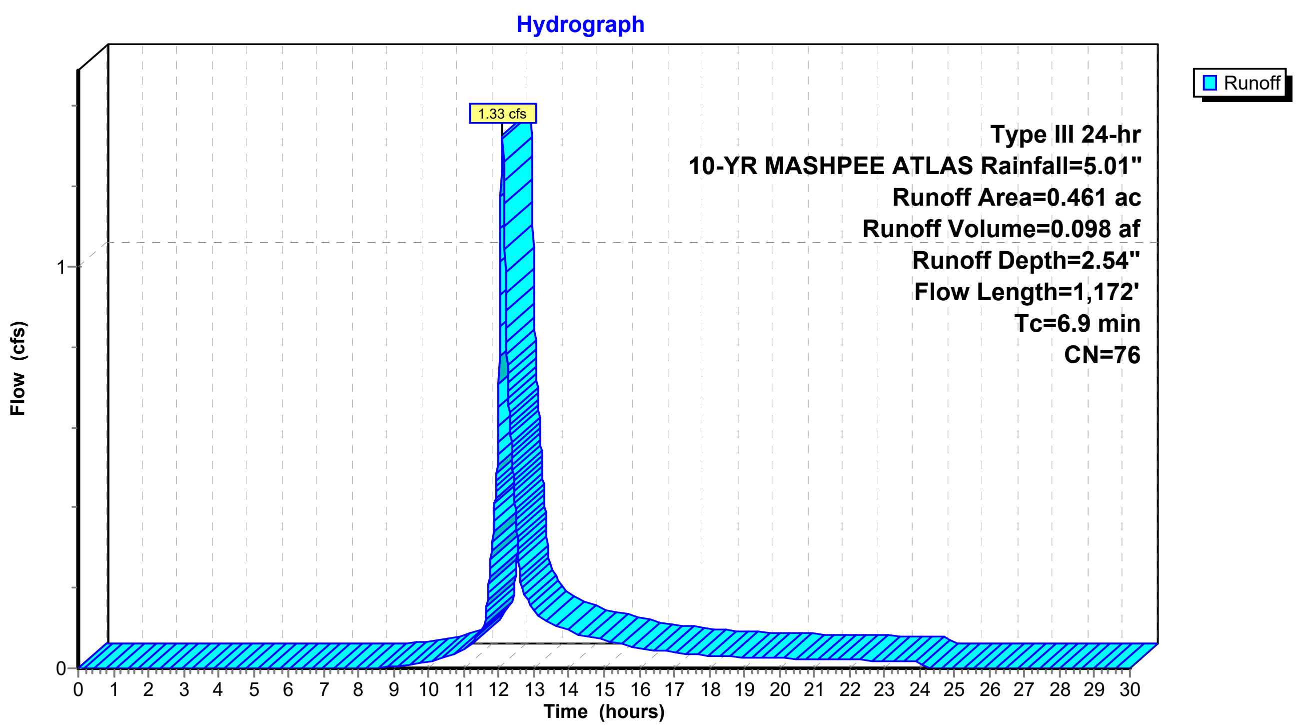
Runoff = 1.33 cfs @ 12.10 hrs, Volume= 0.098 af, Depth= 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.293	98	Unconnected pavement, HSG A
0.168	39	>75% Grass cover, Good, HSG A
0.461	76	Weighted Average
0.168		36.44% Pervious Area
0.293		63.56% Impervious Area
0.293		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.96		**Sheet Flow, A** Smooth surfaces n= 0.011 P2= 3.55"
6.0	1,122	0.0236	3.12		**Shallow Concentrated Flow, B** Paved Kv= 20.3 fps
6.9	1,172	Total			

Subcatchment DA22A: QUIN AVE SOUTH AREA TO WET POND



Summary for Subcatchment DA22B: Quin Ave West and North

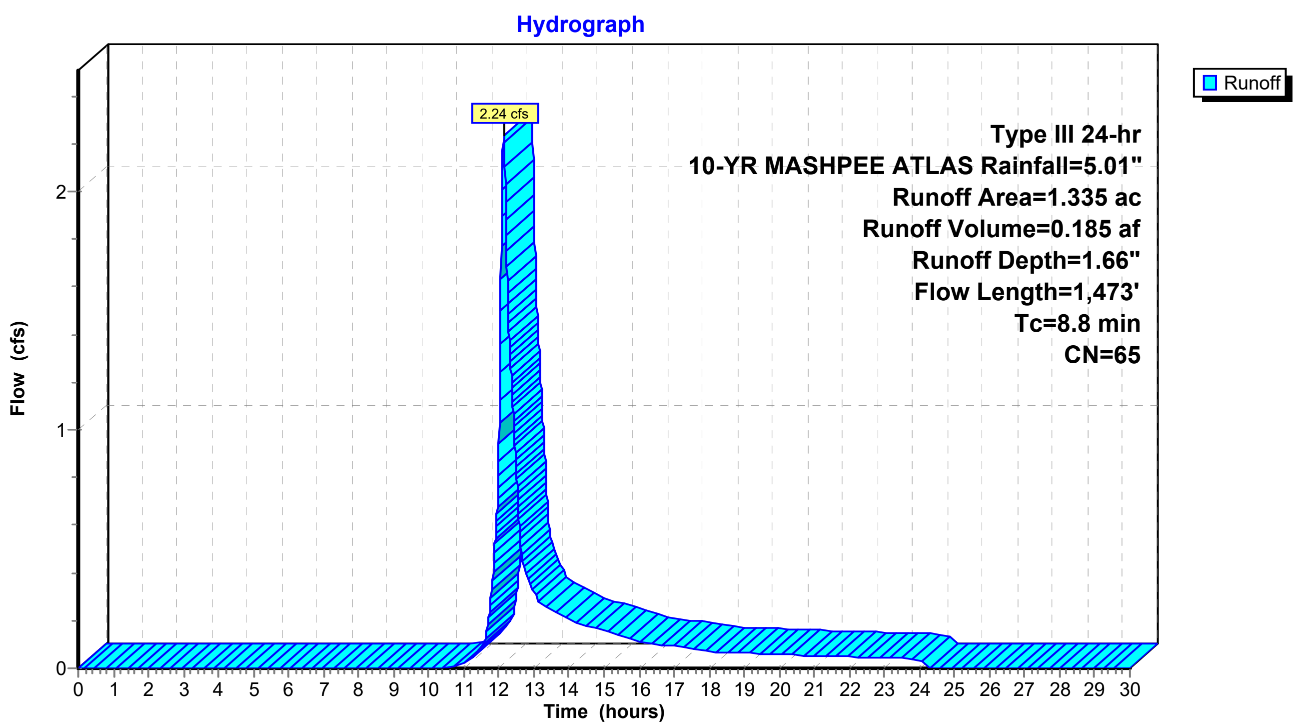
Runoff = 2.24 cfs @ 12.13 hrs, Volume= 0.185 af, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.579	98	Unconnected pavement, HSG A
0.756	39	>75% Grass cover, Good, HSG A
1.335	65	Weighted Average
0.756		56.63% Pervious Area
0.579		43.37% Impervious Area
0.579		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.96		**Sheet Flow, A** Smooth surfaces n= 0.011 P2= 3.55"
7.9	1,423	0.0220	3.01		**Shallow Concentrated Flow, B** Paved Kv= 20.3 fps
8.8	1,473	Total			

Subcatchment DA22B: Quin Ave West and North



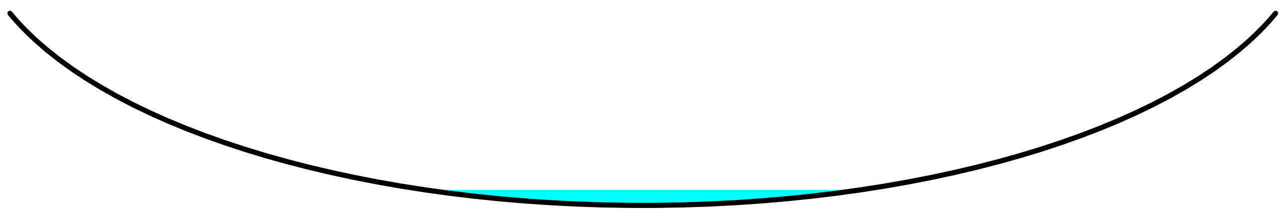
Summary for Reach R1: Tt along stream

Inflow Area = 2.267 ac, 3.62% Impervious, Inflow Depth = 0.45" for 10-YR MASHPEE ATLAS event
Inflow = 0.41 cfs @ 12.47 hrs, Volume= 0.084 af
Outflow = 0.30 cfs @ 12.68 hrs, Volume= 0.084 af, Atten= 28%, Lag= 12.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.49 fps, Min. Travel Time= 18.7 min
Avg. Velocity = 0.26 fps, Avg. Travel Time= 35.4 min

Peak Storage= 332 cf @ 12.68 hrs
Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 2.00' Flow Area= 26.7 sf, Capacity= 69.34 cfs

20.00' x 2.00' deep Parabolic Channel, n= 0.040 Winding stream, pools & shoals
Length= 550.0' Slope= 0.0035 '/'
Inlet Invert= 14.60', Outlet Invert= 12.70'



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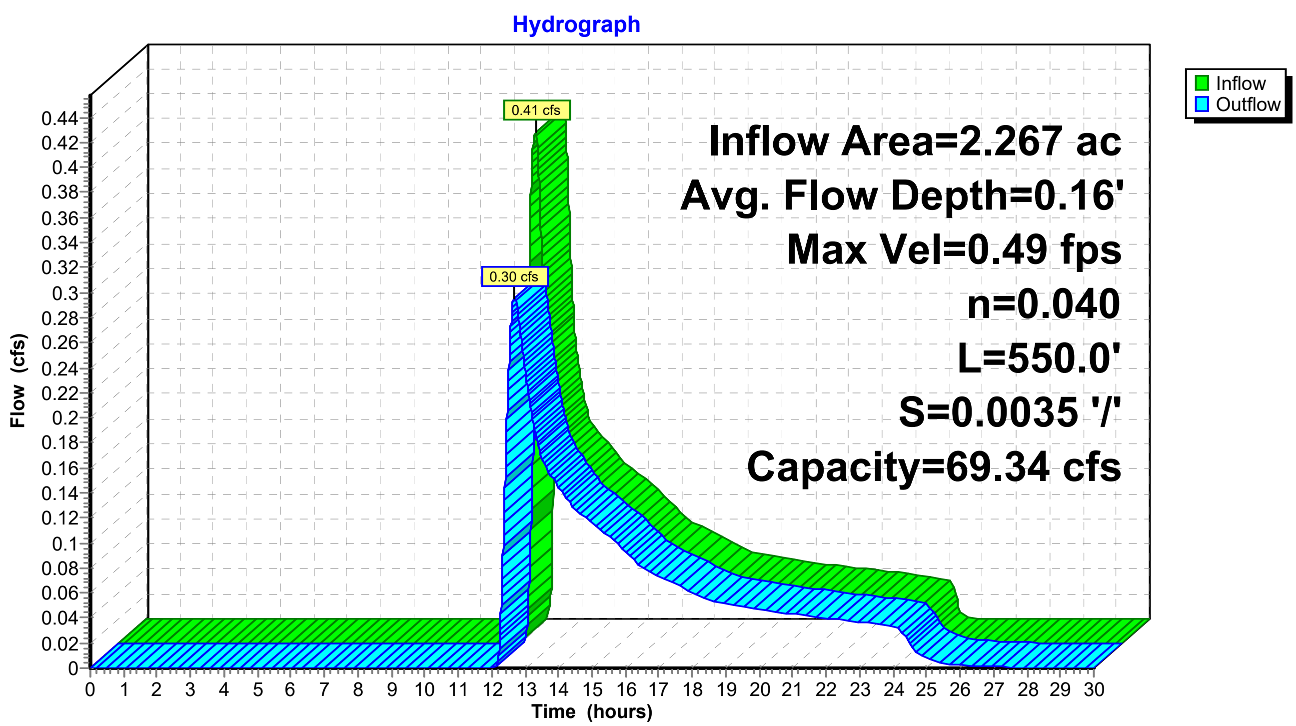
Reach R1: Tt along stream



Summary for Reach R1A: Tt thru bogs

Inflow Area = 6.351 ac, 20.28% Impervious, Inflow Depth > 0.53" for 10-YR MASHPEE ATLAS event
Inflow = 0.35 cfs @ 14.73 hrs, Volume= 0.279 af
Outflow = 0.35 cfs @ 14.93 hrs, Volume= 0.277 af, Atten= 0%, Lag= 11.9 min

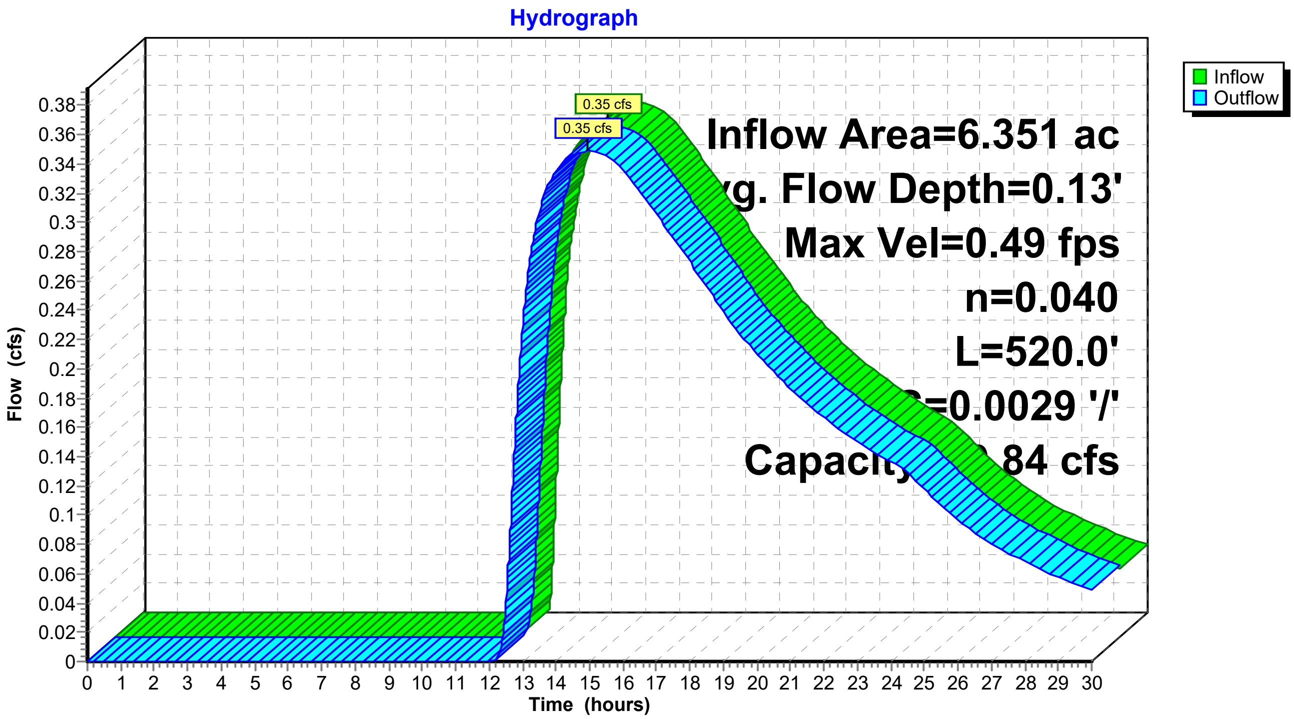
Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.49 fps, Min. Travel Time= 17.6 min
Avg. Velocity = 0.37 fps, Avg. Travel Time= 23.2 min

Peak Storage= 369 cf @ 14.93 hrs
Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 2.00' Flow Area= 22.0 sf, Capacity= 50.84 cfs

5.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/' Top Width= 17.00'
Length= 520.0' Slope= 0.0029 '/'
Inlet Invert= 14.20', Outlet Invert= 12.70'

‡

Reach R1A: Tt thru bogs



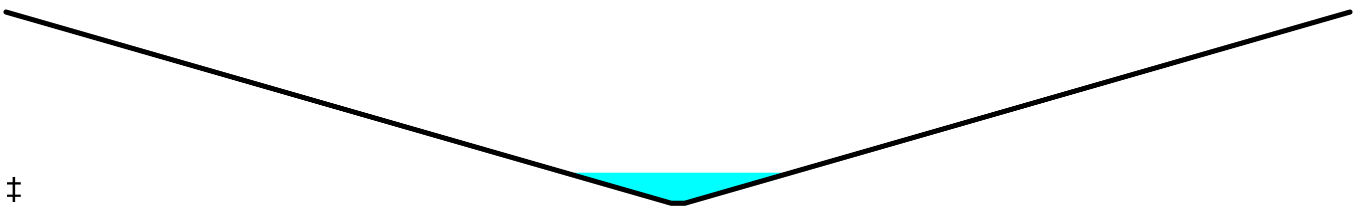
Summary for Reach R2: Tt thru da7

Inflow Area = 2.817 ac, 32.13% Impervious, Inflow Depth = 1.06" for 10-YR MASHPEE ATLAS event
Inflow = 3.57 cfs @ 12.12 hrs, Volume= 0.248 af
Outflow = 2.83 cfs @ 12.20 hrs, Volume= 0.248 af, Atten= 21%, Lag= 4.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.98 fps, Min. Travel Time= 6.4 min
Avg. Velocity = 0.39 fps, Avg. Travel Time= 16.1 min

Peak Storage= 1,093 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 1.00' Flow Area= 102.0 sf, Capacity= 330.00 cfs

2.00' x 1.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 100.0 '/' Top Width= 202.00'
Length= 380.0' Slope= 0.0074 '/'
Inlet Invert= 17.00', Outlet Invert= 14.20'



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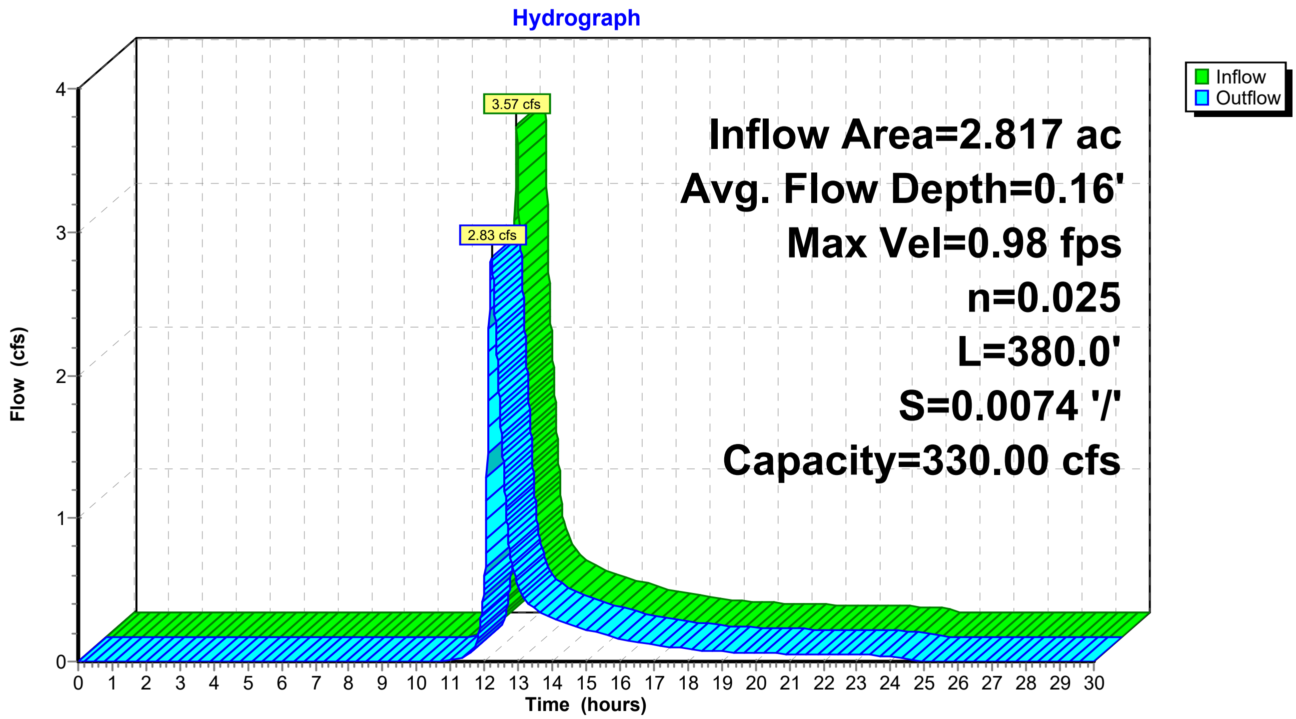
Reach R2: Tt thru da7



Summary for Reach R2A: Travel Time thru wet pond

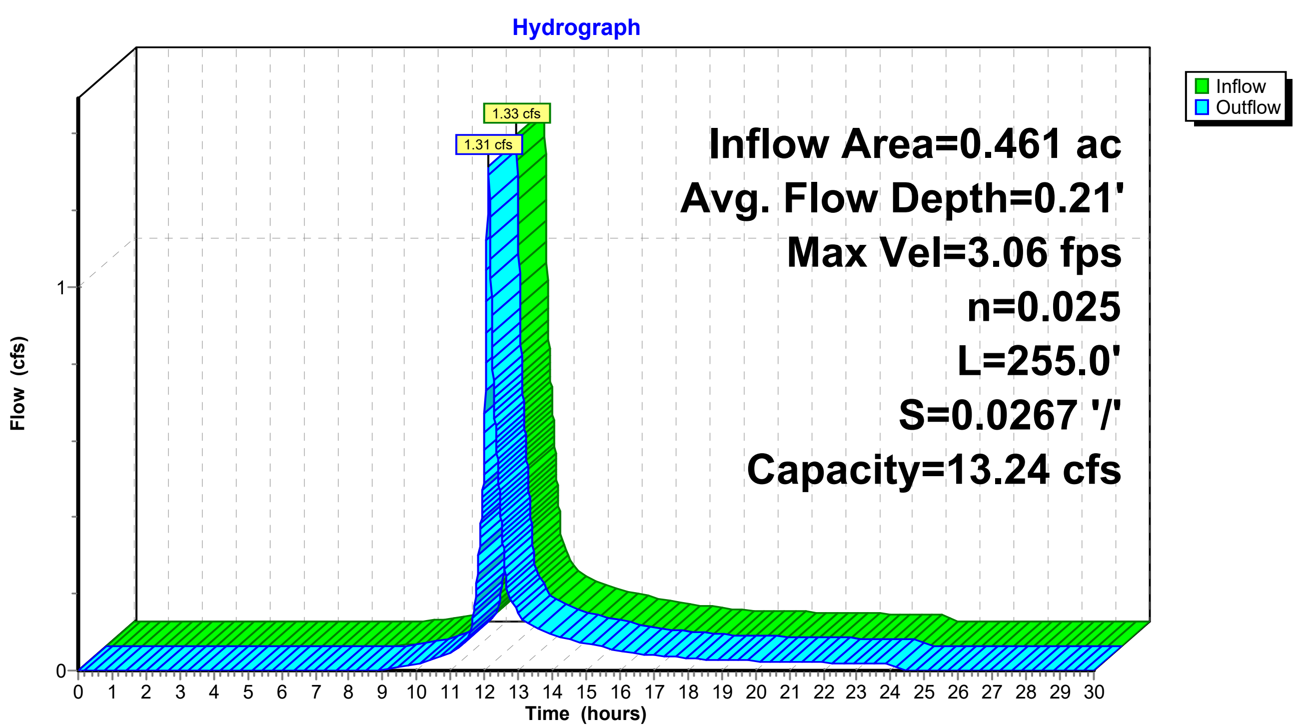
Inflow Area = 0.461 ac, 63.56% Impervious, Inflow Depth = 2.54" for 10-YR MASHPEE ATLAS event
Inflow = 1.33 cfs @ 12.10 hrs, Volume= 0.098 af
Outflow = 1.31 cfs @ 12.12 hrs, Volume= 0.098 af, Atten= 2%, Lag= 0.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.06 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 0.85 fps, Avg. Travel Time= 5.0 min

Peak Storage= 109 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 1.00' Flow Area= 2.1 sf, Capacity= 13.24 cfs

2.00' x 1.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 0.1 '/' Top Width= 2.20'
Length= 255.0' Slope= 0.0267 '/'
Inlet Invert= 21.00', Outlet Invert= 14.20'

Reach R2A: Travel Time thru wet pond



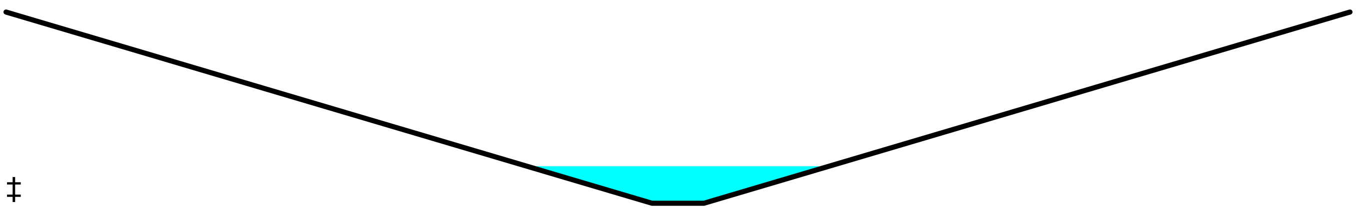
Summary for Reach R5: Tt thru da22B

Inflow Area = 0.641 ac, 50.86% Impervious, Inflow Depth = 1.18" for 10-YR MASHPEE ATLAS event
Inflow = 1.44 cfs @ 12.09 hrs, Volume= 0.063 af
Outflow = 1.36 cfs @ 12.11 hrs, Volume= 0.063 af, Atten= 6%, Lag= 1.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.04 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 0.76 fps, Avg. Travel Time= 5.4 min

Peak Storage= 164 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 0.50' Flow Area= 13.5 sf, Capacity= 75.75 cfs

2.00' x 0.50' deep channel, n= 0.013 Asphalt, smooth
Side Slope Z-value= 50.0 '/' Top Width= 52.00'
Length= 246.0' Slope= 0.0146 '/'
Inlet Invert= 20.58', Outlet Invert= 17.00'



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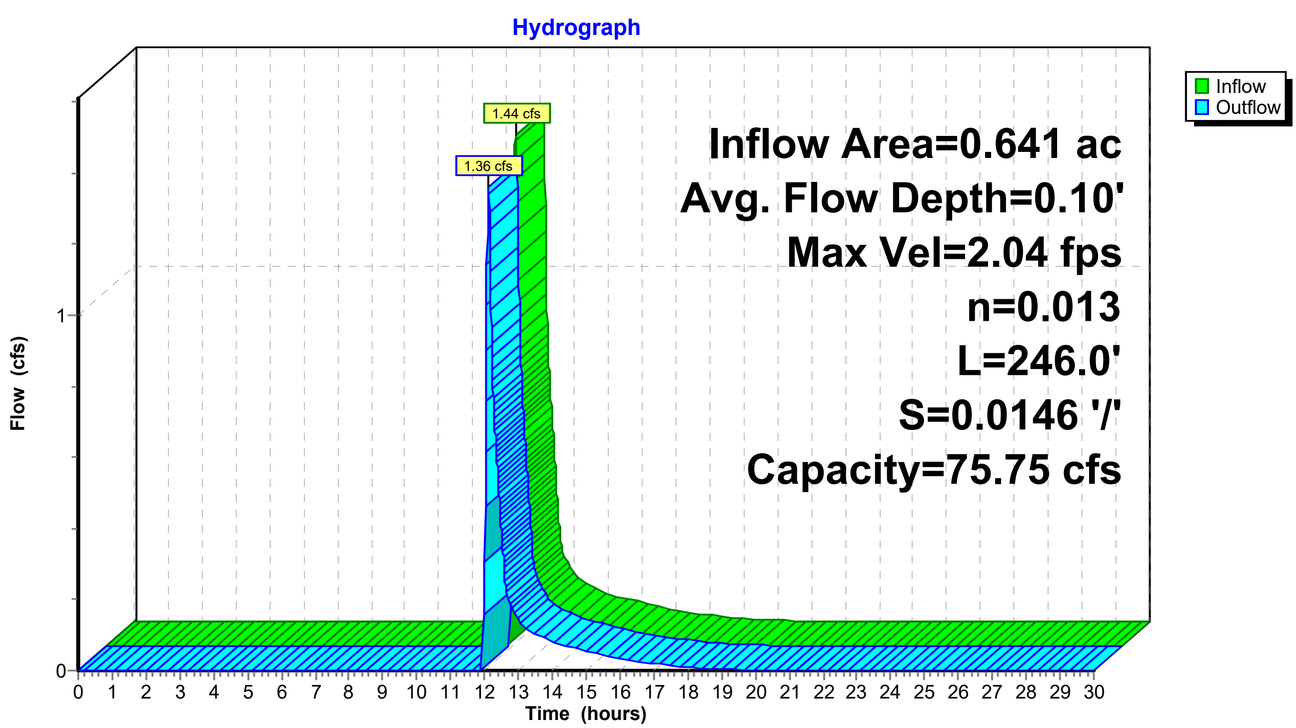
Reach R5: Tt thru da22B

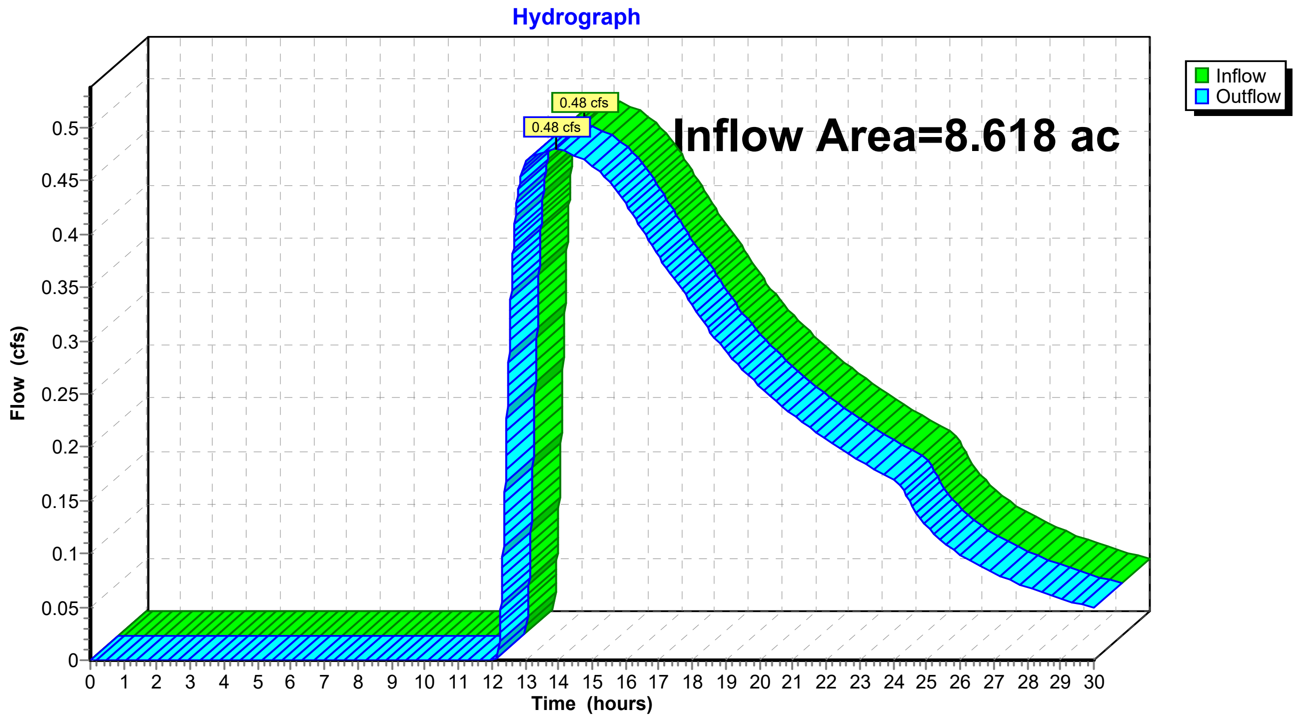


Summary for Reach SP#1: Study Point for Combined Flows

Inflow Area =	8.618 ac,	15.90% Impervious,	Inflow Depth > 0.50"	for 10-YR MASHPEE ATLAS event
Inflow =	0.48 cfs @	13.95 hrs, Volume=	0.361 af	
Outflow =	0.48 cfs @	13.95 hrs, Volume=	0.361 af, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach SP#1: Study Point for Combined Flows



Summary for Pond 1P: LB's

Inflow Area = 0.641 ac, 50.86% Impervious, Inflow Depth = 1.96" for 10-YR MASHPEE ATLAS event
Inflow = 1.50 cfs @ 12.08 hrs, Volume= 0.105 af
Outflow = 1.47 cfs @ 12.09 hrs, Volume= 0.105 af, Atten= 2%, Lag= 0.4 min
Discarded = 0.03 cfs @ 11.22 hrs, Volume= 0.042 af
Primary = 1.44 cfs @ 12.09 hrs, Volume= 0.063 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 20.70' @ 12.10 hrs Surf.Area= 748 sf Storage= 477 cf

Plug-Flow detention time= 76.3 min calculated for 0.105 af (100% of inflow)
Center-of-Mass det. time= 76.3 min (925.5 - 849.2)

Volume	Invert	Avail.Storage	Storage Description
#1	13.50'	192 cf	**10.00'D x 4.50'H Vertical Cone/Cylinder** x 2 707 cf Overall - 226 cf Embedded = 481 cf x 40.0% Voids
#2	14.00'	226 cf	**6.00'D x 4.00'H Vertical Cone/Cylinder** x 2 Inside #1
#3	20.50'	376 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		794 cf	Total Available Storage

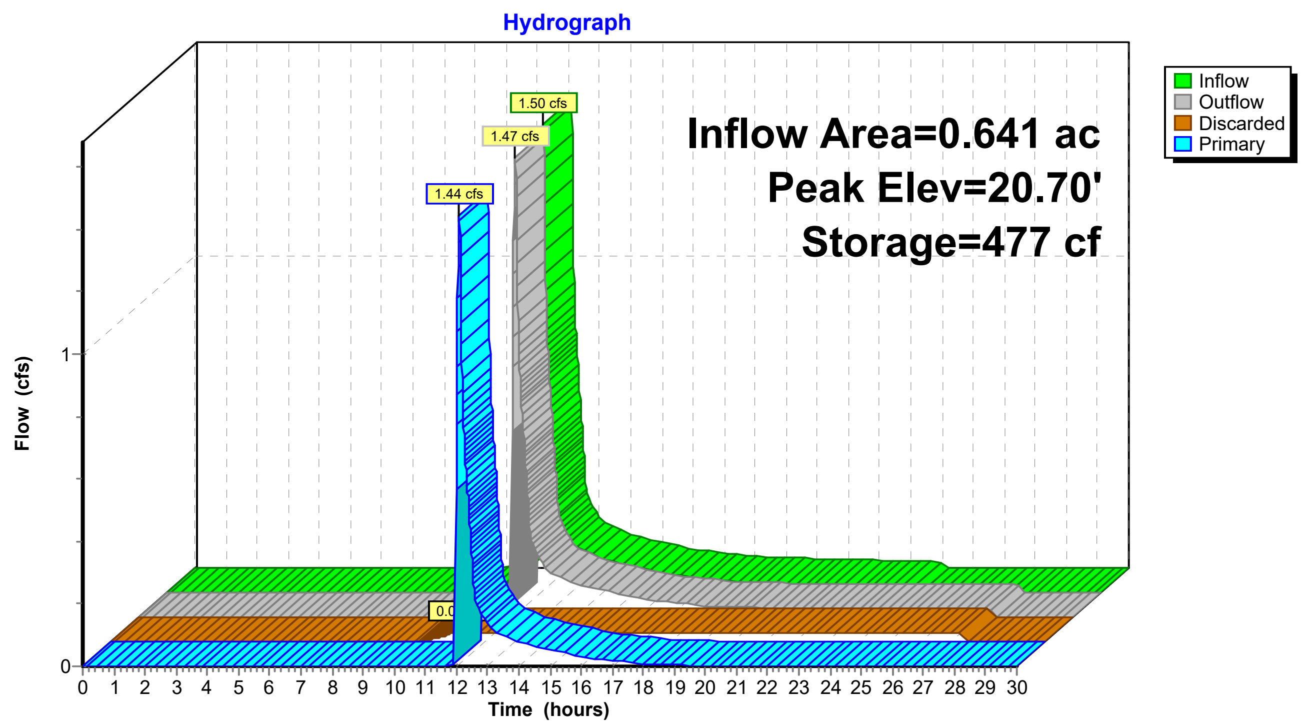
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.50	4	0	0
21.00	1,500	376	376

Device	Routing	Invert	Outlet Devices
#1	Discarded	13.50'	**8.270 in/hr Exfiltration over Surface area from 13.49' - 18.00'** Excluded Surface area = 0 sf
#2	Primary	20.58'	**179.0 deg x 6.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.46 (C= 3.08)

Discarded OutFlow Max=0.03 cfs @ 11.22 hrs HW=13.58' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.38 cfs @ 12.09 hrs HW=20.69' TW=20.67' (Dynamic Tailwater)
└─**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 1.38 cfs @ 0.63 fps)

Pond 1P: LB's


Hydrograph
1.50 cfs
1.47 cfs
1.44 cfs
Inflow Area=0.641 ac
Peak Elev=20.70'
Storage=477 cf
Inflow
Outflow
Discarded
Primary
Flow (cfs)
0
1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Time (hours)

Summary for Pond 2P: Natural Low Area

Inflow Area = 0.841 ac, 0.00% Impervious, Inflow Depth = 0.03" for 10-YR MASHPEE ATLAS event
Inflow = 0.00 cfs @ 21.05 hrs, Volume= 0.002 af
Outflow = 0.00 cfs @ 21.37 hrs, Volume= 0.002 af, Atten= 0%, Lag= 19.1 min
Discarded = 0.00 cfs @ 21.37 hrs, Volume= 0.002 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 16.08' @ 21.37 hrs Surf.Area= 49 sf Storage= 2 cf

Plug-Flow detention time= 9.0 min calculated for 0.002 af (100% of inflow)
Center-of-Mass det. time= 9.0 min (1,200.9 - 1,191.9)

Volume	Invert	Avail.Storage	Storage Description
#1	16.01'	4,754 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

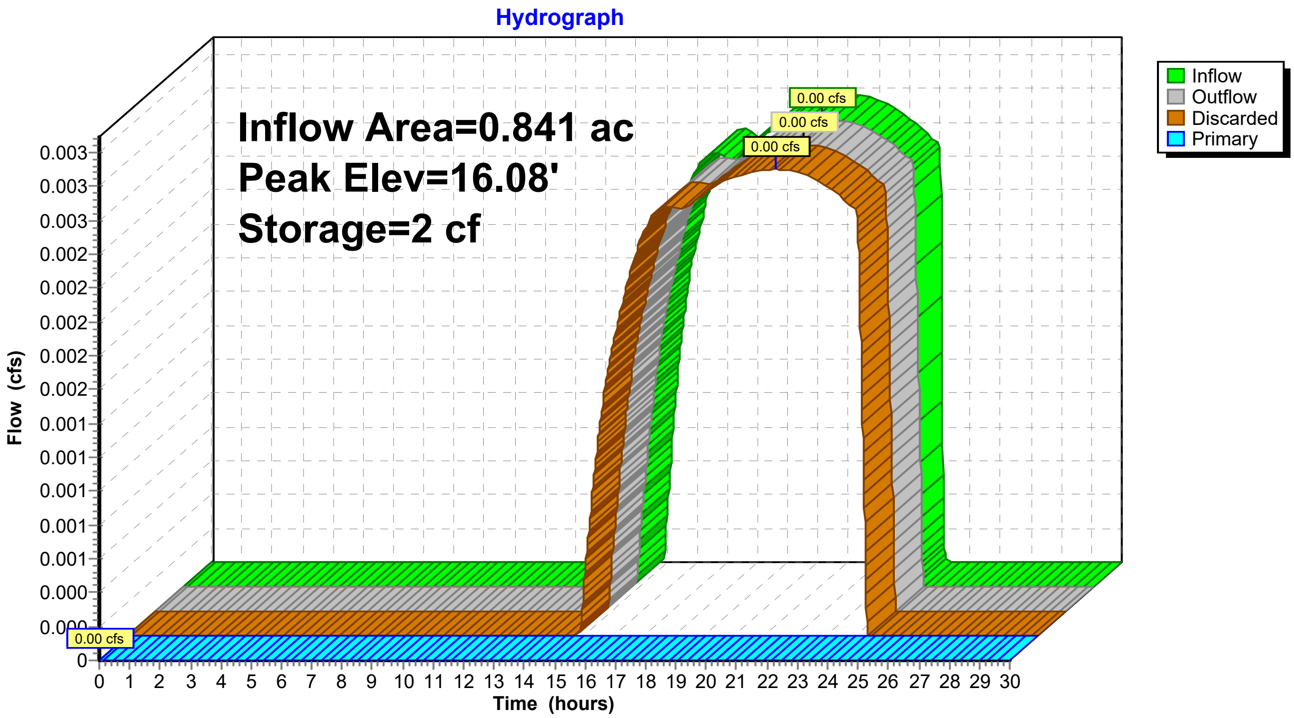
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
16.01	1	0	0
17.00	739	366	366
18.00	6,669	3,704	4,070
18.10	7,000	683	4,754

Device	Routing	Invert	Outlet Devices
#1	Discarded	16.01'	**2.410 in/hr Exfiltration over Surface area from 15.90' - 17.70'** Excluded Surface area = 0 sf
#2	Primary	17.72'	**2.0" x 2.0" Horiz. Orifice/Grate X 36.00** C= 0.600 in 24.0" x 24.0" Grate Limited to weir flow at low heads
#3	Primary	18.00'	**25.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.00 cfs @ 21.37 hrs HW=16.08' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=16.01' TW=17.00' (Dynamic Tailwater)
├─**2=Orifice/Grate** (Controls 0.00 cfs)
└─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Natural Low Area



Summary for Pond 3P: Wet Pond

Inflow Area = 6.351 ac, 20.28% Impervious, Inflow Depth = 0.69" for 10-YR MASHPEE ATLAS event
Inflow = 3.87 cfs @ 12.17 hrs, Volume= 0.367 af
Outflow = 0.35 cfs @ 14.73 hrs, Volume= 0.279 af, Atten= 91%, Lag= 153.3 min
Primary = 0.35 cfs @ 14.73 hrs, Volume= 0.279 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 14.58' @ 14.73 hrs Surf.Area= 22,841 sf Storage= 8,391 cf

Plug-Flow detention time= 344.9 min calculated for 0.279 af (76% of inflow)
Center-of-Mass det. time= 254.3 min (1,119.0 - 864.7)

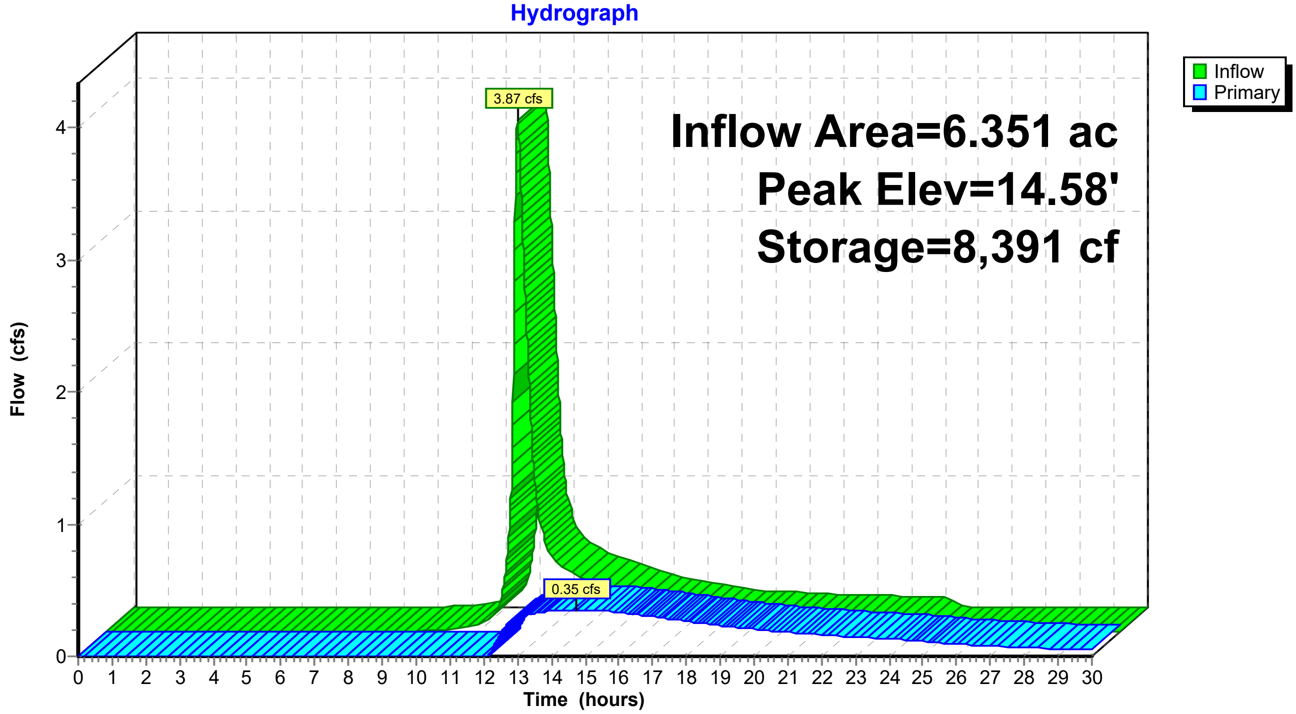
Volume	Invert	Avail.Storage	Storage Description
#1	13.97'	63,264 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
13.97	1	0	0
14.00	56	1	1
14.20	13,877	1,393	1,394
15.00	32,693	18,628	20,022
16.00	53,790	43,242	63,264

Device	Routing	Invert	Outlet Devices
#1	Primary	14.20'	**18.0" Round Culvert** L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 14.20' / 14.20' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Primary	15.00'	**30.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.35 cfs @ 14.73 hrs HW=14.58' TW=14.33' (Dynamic Tailwater)
├─**1=Culvert** (Barrel Controls 0.35 cfs @ 1.49 fps)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Wet Pond



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentDA-1: AREAS TO WETLAND Runoff Area=2.267 ac 3.62% Impervious Runoff Depth=0.79"
Flow Length=200' Tc=16.2 min CN=45 Runoff=0.96 cfs 0.150 af

SubcatchmentDA-44: North of Quin Runoff Area=0.841 ac 0.00% Impervious Runoff Depth=0.13"
Tc=5.0 min CN=32 Runoff=0.01 cfs 0.009 af

SubcatchmentDA-55: AREAS TO CB'S AT Runoff Area=0.641 ac 50.86% Impervious Runoff Depth=2.70"
Tc=5.0 min CN=69 Runoff=2.09 cfs 0.144 af

SubcatchmentDA-7: AREAS TO WET POND Runoff Area=3.073 ac 2.93% Impervious Runoff Depth=0.25"
Flow Length=431' Tc=26.3 min CN=35 Runoff=0.11 cfs 0.063 af

SubcatchmentDA22A: QUIN AVE SOUTH Runoff Area=0.461 ac 63.56% Impervious Runoff Depth=3.36"
Flow Length=1,172' Tc=6.9 min CN=76 Runoff=1.76 cfs 0.129 af

SubcatchmentDA22B: Quin Ave West and Runoff Area=1.335 ac 43.37% Impervious Runoff Depth=2.34"
Flow Length=1,473' Tc=8.8 min CN=65 Runoff=3.24 cfs 0.260 af

Reach R1: Tt along stream Avg. Flow Depth=0.25' Max Vel=0.66 fps Inflow=0.96 cfs 0.150 af
n=0.040 L=550.0' S=0.0035 '/' Capacity=69.34 cfs Outflow=0.77 cfs 0.150 af

Reach R1A: Tt thru bogs Avg. Flow Depth=0.19' Max Vel=0.61 fps Inflow=0.64 cfs 0.457 af
n=0.040 L=520.0' S=0.0029 '/' Capacity=50.84 cfs Outflow=0.64 cfs 0.454 af

Reach R2: Tt thru da7 Avg. Flow Depth=0.19' Max Vel=1.09 fps Inflow=5.14 cfs 0.359 af
n=0.025 L=380.0' S=0.0074 '/' Capacity=330.00 cfs Outflow=4.28 cfs 0.359 af

Reach R2A: Travel Time thru wet pond Avg. Flow Depth=0.25' Max Vel=3.37 fps Inflow=1.76 cfs 0.129 af
n=0.025 L=255.0' S=0.0267 '/' Capacity=13.24 cfs Outflow=1.74 cfs 0.129 af

Reach R5: Tt thru da22B Avg. Flow Depth=0.11' Max Vel=2.23 fps Inflow=2.03 cfs 0.099 af
n=0.013 L=246.0' S=0.0146 '/' Capacity=75.75 cfs Outflow=1.95 cfs 0.099 af

Reach SP#1: Study Point for Combined Flows Inflow=1.07 cfs 0.604 af
Outflow=1.07 cfs 0.604 af

Pond 1P: LB's Peak Elev=20.72' Storage=489 cf Inflow=2.09 cfs 0.144 af
Discarded=0.03 cfs 0.045 af Primary=2.03 cfs 0.099 af Outflow=2.06 cfs 0.144 af

Pond 2P: Natural Low Area Peak Elev=16.32' Storage=35 cf Inflow=0.01 cfs 0.009 af
Discarded=0.01 cfs 0.009 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.009 af

Pond 3P: Wet Pond Peak Elev=14.71' Storage=11,519 cf Inflow=5.74 cfs 0.551 af
Outflow=0.64 cfs 0.457 af

Total Runoff Area = 8.618 ac Runoff Volume = 0.755 af Average Runoff Depth = 1.05"
84.10% Pervious = 7.248 ac 15.90% Impervious = 1.370 ac

Summary for Subcatchment DA-1: AREAS TO WETLAND TO WEST

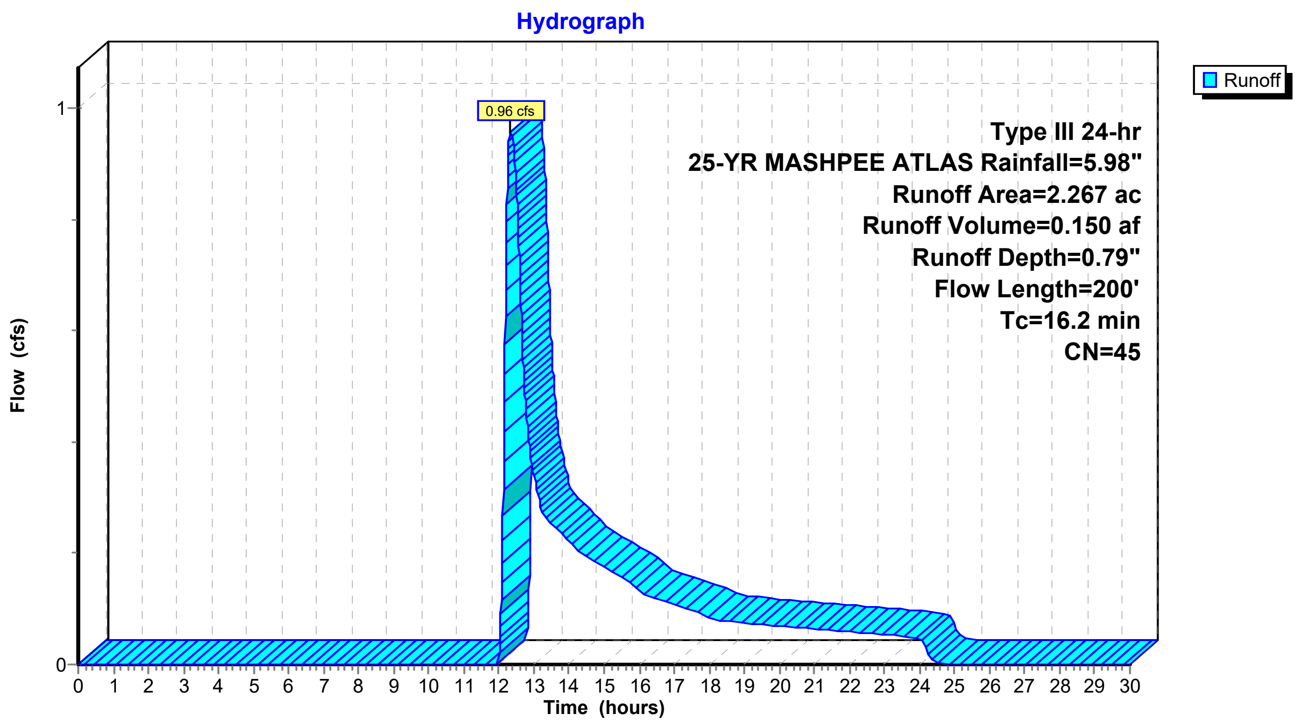
Runoff = 0.96 cfs @ 12.33 hrs, Volume= 0.150 af, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.090	39	>75% Grass cover, Good, HSG A
0.986	30	Woods, Good, HSG A
0.045	76	Gravel roads, HSG A
0.082	98	Roofs, HSG A
1.064	55	Woods, Good, HSG B
2.267	45	Weighted Average
2.185		96.38% Pervious Area
0.082		3.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0480	0.10		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.55"
7.9	150	0.0040	0.32		**Shallow Concentrated Flow, B** Woodland Kv= 5.0 fps
16.2	200	Total			

Subcatchment DA-1: AREAS TO WETLAND TO WEST



Summary for Subcatchment DA-44: North of Quin

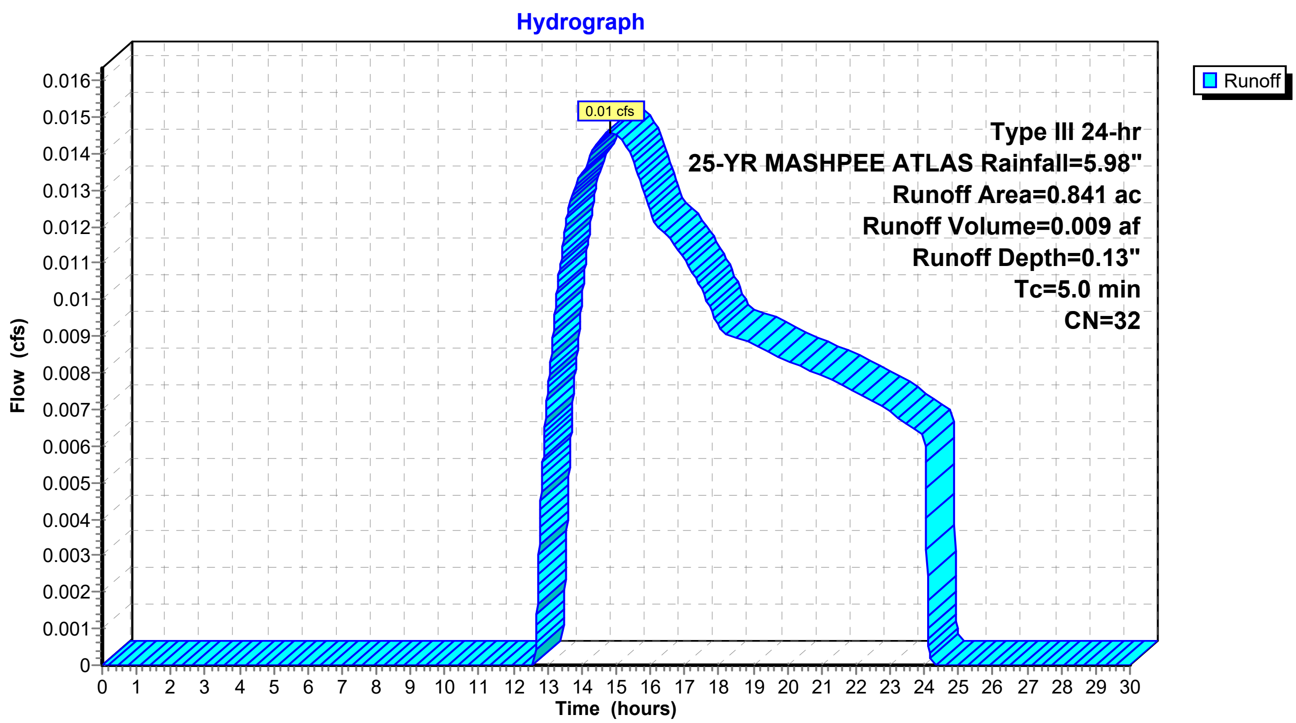
Runoff = 0.01 cfs @ 14.84 hrs, Volume= 0.009 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.841	32	Woods/grass comb., Good, HSG A
0.841		100.00% Pervious Area

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

Subcatchment DA-44: North of Quin



Summary for Subcatchment DA-55: AREAS TO CB'S AT WILLOWBEND DR

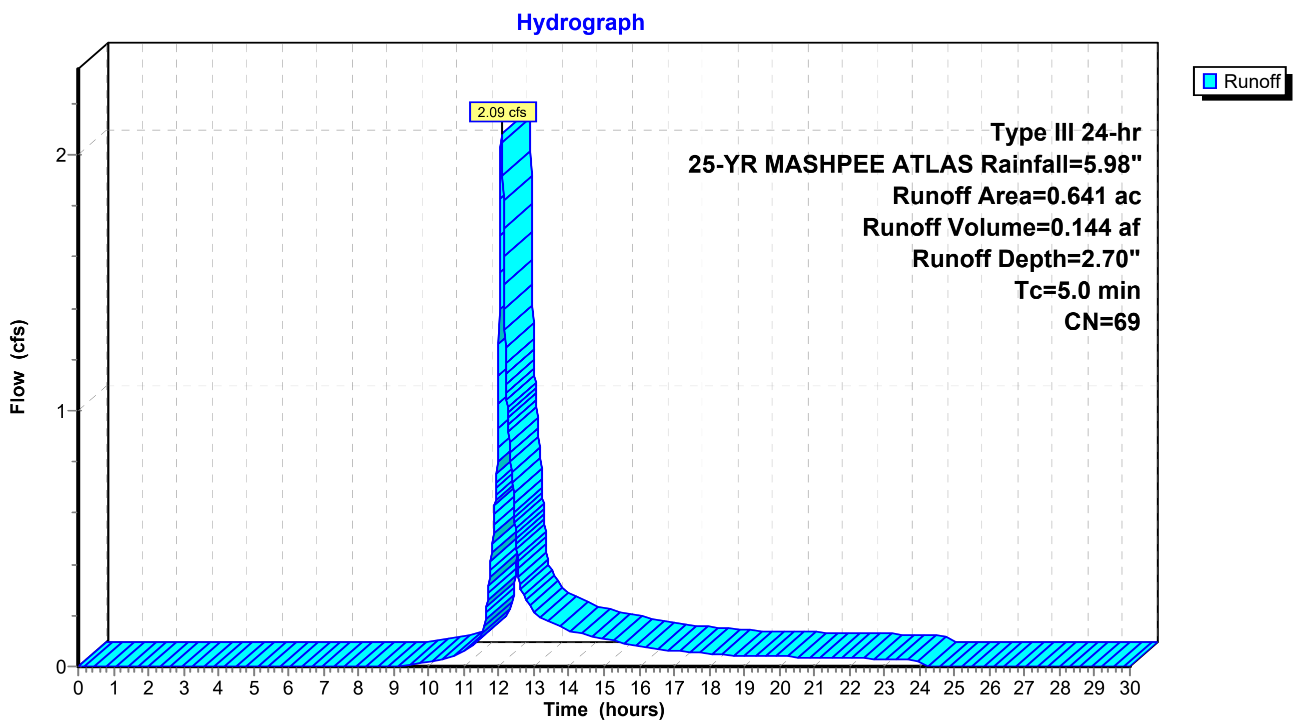
Runoff = 2.09 cfs @ 12.08 hrs, Volume= 0.144 af, Depth= 2.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.326	98	Paved parking, HSG A
0.315	39	Pasture/grassland/range, Good, HSG A
0.641	69	Weighted Average
0.315		49.14% Pervious Area
0.326		50.86% Impervious Area

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

Subcatchment DA-55: AREAS TO CB'S AT WILLOWBEND DR



Summary for Subcatchment DA-7: AREAS TO WET POND

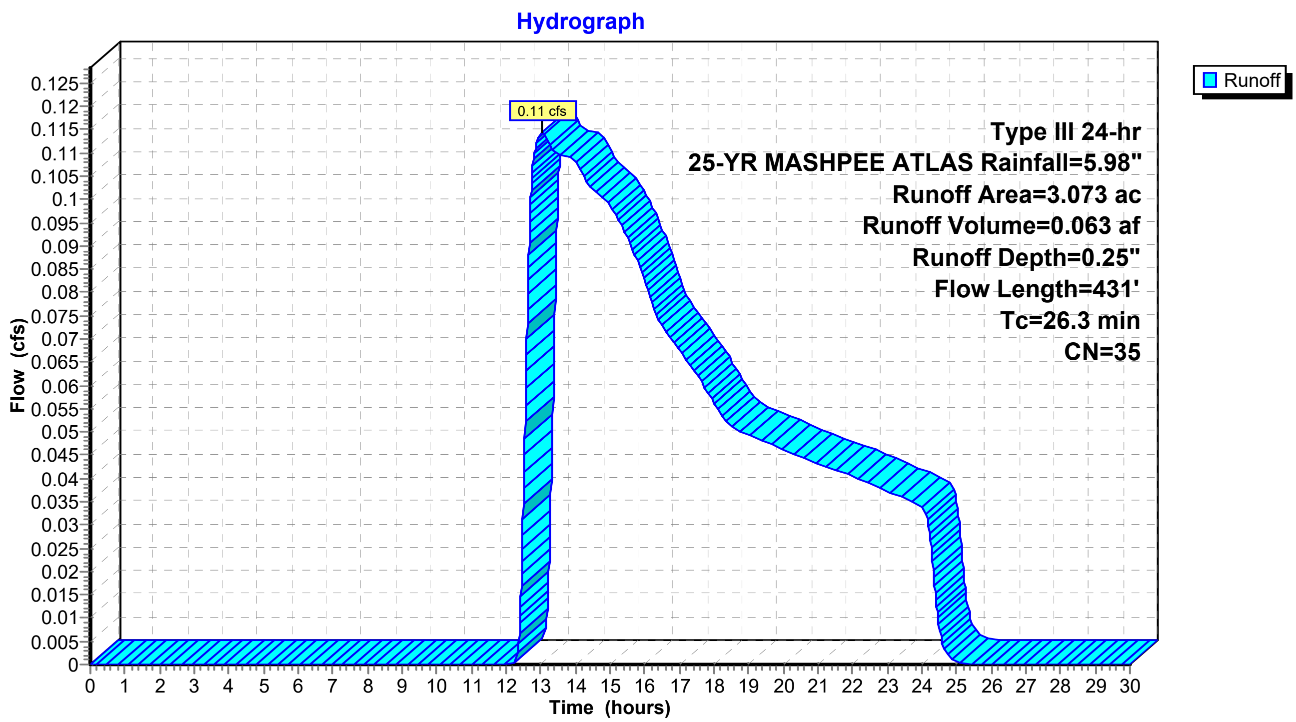
Runoff = 0.11 cfs @ 13.06 hrs, Volume= 0.063 af, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.450	39	>75% Grass cover, Good, HSG A
2.230	30	Woods, Good, HSG A
0.138	76	Gravel roads, HSG A
0.090	98	Roofs, HSG A
0.165	30	Woods, Good, HSG A
3.073	35	Weighted Average
2.983		97.07% Pervious Area
0.090		2.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0480	0.10		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.55"
18.0	381	0.0050	0.35		**Shallow Concentrated Flow, A** Woodland Kv= 5.0 fps
26.3	431	Total			

Subcatchment DA-7: AREAS TO WET POND



Summary for Subcatchment DA22A: QUIN AVE SOUTH AREA TO WET POND

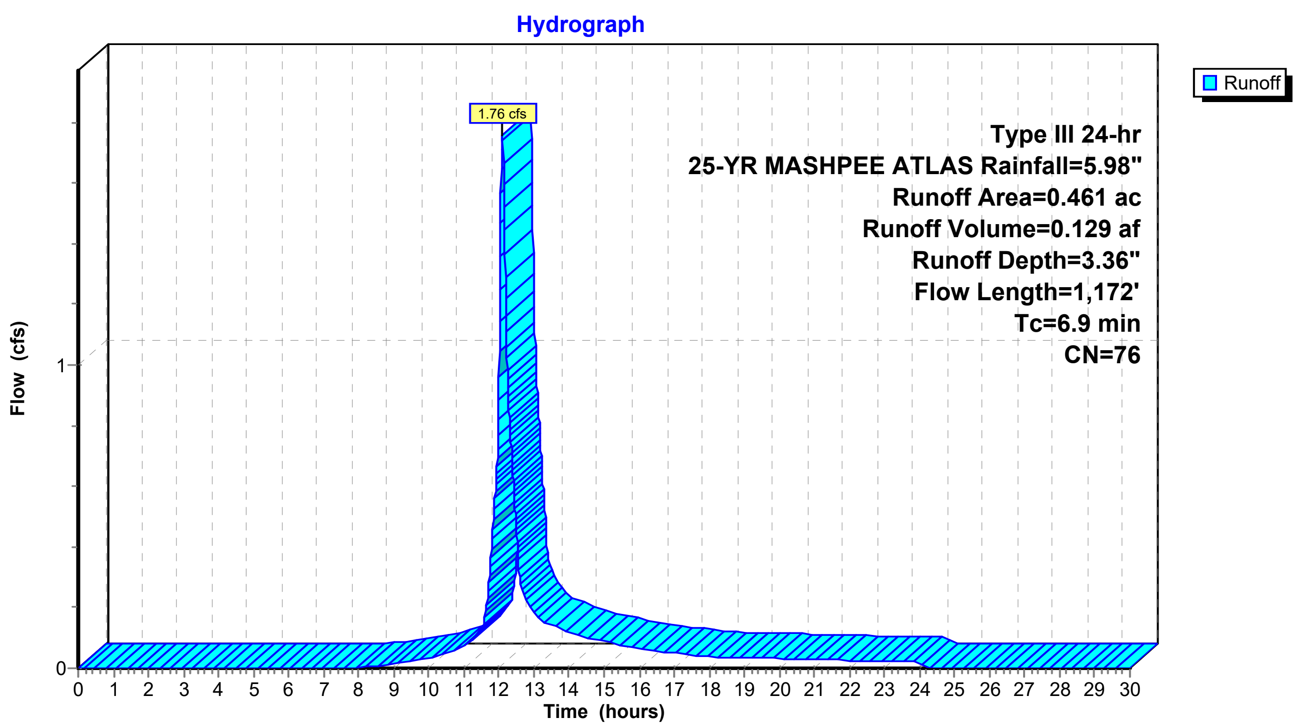
Runoff = 1.76 cfs @ 12.10 hrs, Volume= 0.129 af, Depth= 3.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.293	98	Unconnected pavement, HSG A
0.168	39	>75% Grass cover, Good, HSG A
0.461	76	Weighted Average
0.168		36.44% Pervious Area
0.293		63.56% Impervious Area
0.293		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.96		**Sheet Flow, A** Smooth surfaces n= 0.011 P2= 3.55"
6.0	1,122	0.0236	3.12		**Shallow Concentrated Flow, B** Paved Kv= 20.3 fps
6.9	1,172	Total			

Subcatchment DA22A: QUIN AVE SOUTH AREA TO WET POND



Summary for Subcatchment DA22B: Quin Ave West and North

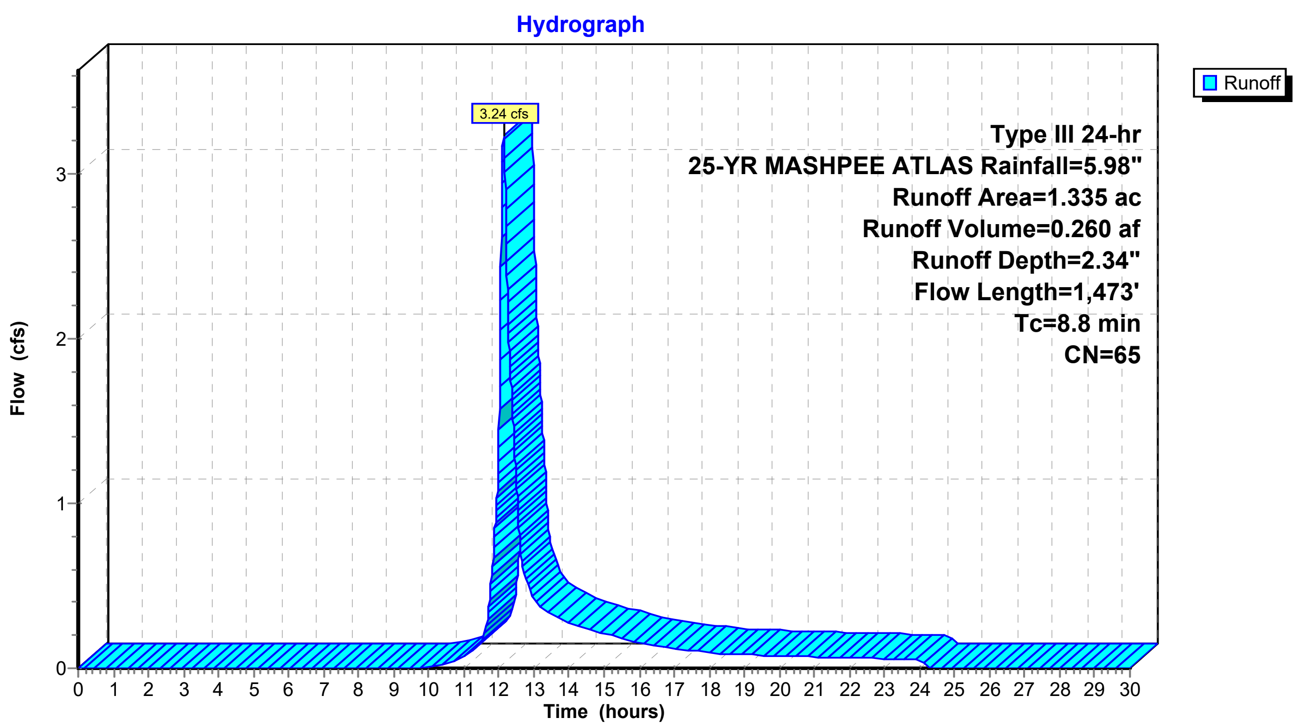
Runoff = 3.24 cfs @ 12.13 hrs, Volume= 0.260 af, Depth= 2.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.579	98	Unconnected pavement, HSG A
0.756	39	>75% Grass cover, Good, HSG A
1.335	65	Weighted Average
0.756		56.63% Pervious Area
0.579		43.37% Impervious Area
0.579		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.96		**Sheet Flow, A** Smooth surfaces n= 0.011 P2= 3.55"
7.9	1,423	0.0220	3.01		**Shallow Concentrated Flow, B** Paved Kv= 20.3 fps
8.8	1,473	Total			

Subcatchment DA22B: Quin Ave West and North



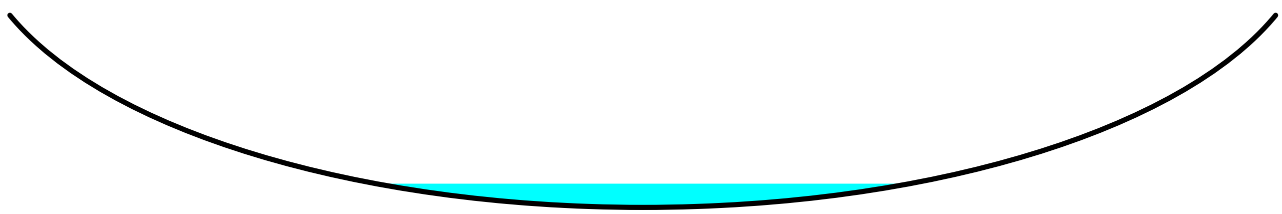
Summary for Reach R1: Tt along stream

Inflow Area = 2.267 ac, 3.62% Impervious, Inflow Depth = 0.79" for 25-YR MASHPEE ATLAS event
Inflow = 0.96 cfs @ 12.33 hrs, Volume= 0.150 af
Outflow = 0.77 cfs @ 12.56 hrs, Volume= 0.150 af, Atten= 20%, Lag= 13.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.66 fps, Min. Travel Time= 13.9 min
Avg. Velocity = 0.30 fps, Avg. Travel Time= 31.0 min

Peak Storage= 642 cf @ 12.56 hrs
Average Depth at Peak Storage= 0.25'
Bank-Full Depth= 2.00' Flow Area= 26.7 sf, Capacity= 69.34 cfs

20.00' x 2.00' deep Parabolic Channel, n= 0.040 Winding stream, pools & shoals
Length= 550.0' Slope= 0.0035 '/'
Inlet Invert= 14.60', Outlet Invert= 12.70'



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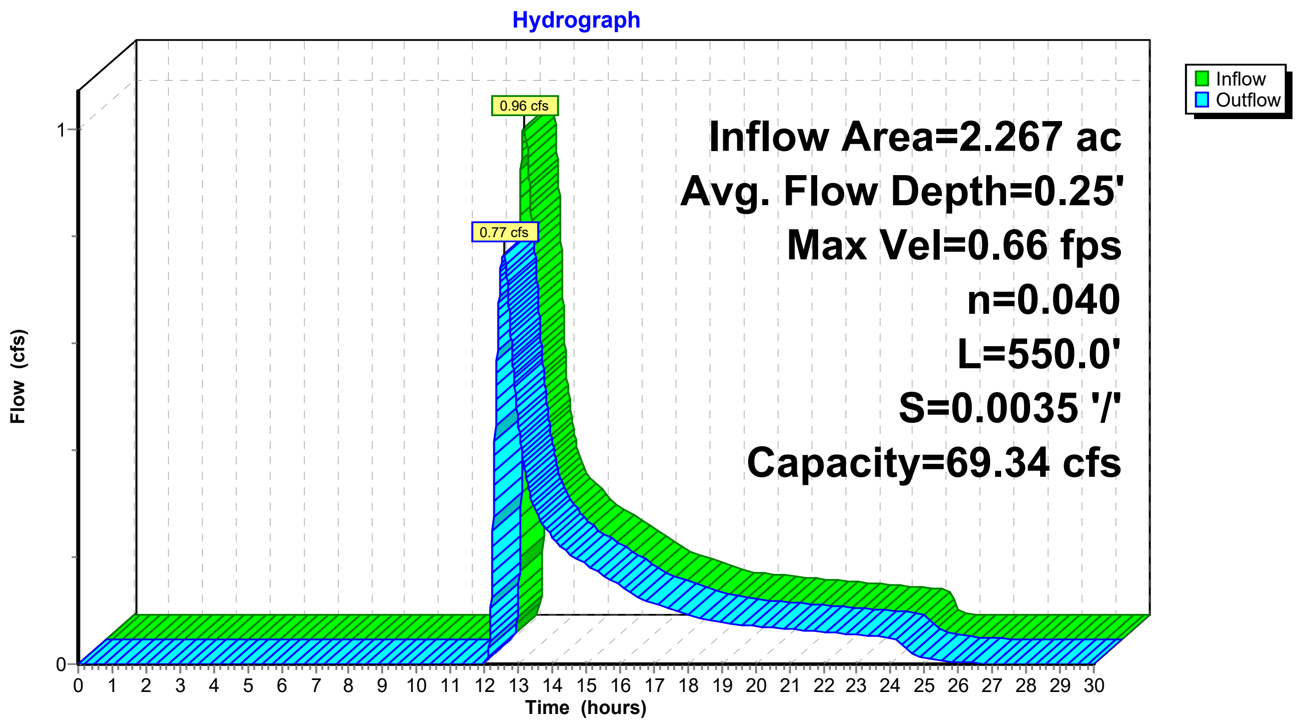
Reach R1: Tt along stream



Summary for Reach R1A: Tt thru bogs

Inflow Area = 6.351 ac, 20.28% Impervious, Inflow Depth > 0.86" for 25-YR MASHPEE ATLAS event
Inflow = 0.64 cfs @ 13.99 hrs, Volume= 0.457 af
Outflow = 0.64 cfs @ 14.15 hrs, Volume= 0.454 af, Atten= 0%, Lag= 9.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.61 fps, Min. Travel Time= 14.2 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 19.6 min

Peak Storage= 544 cf @ 14.15 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 2.00' Flow Area= 22.0 sf, Capacity= 50.84 cfs

5.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/' Top Width= 17.00'
Length= 520.0' Slope= 0.0029 '/'
Inlet Invert= 14.20', Outlet Invert= 12.70'

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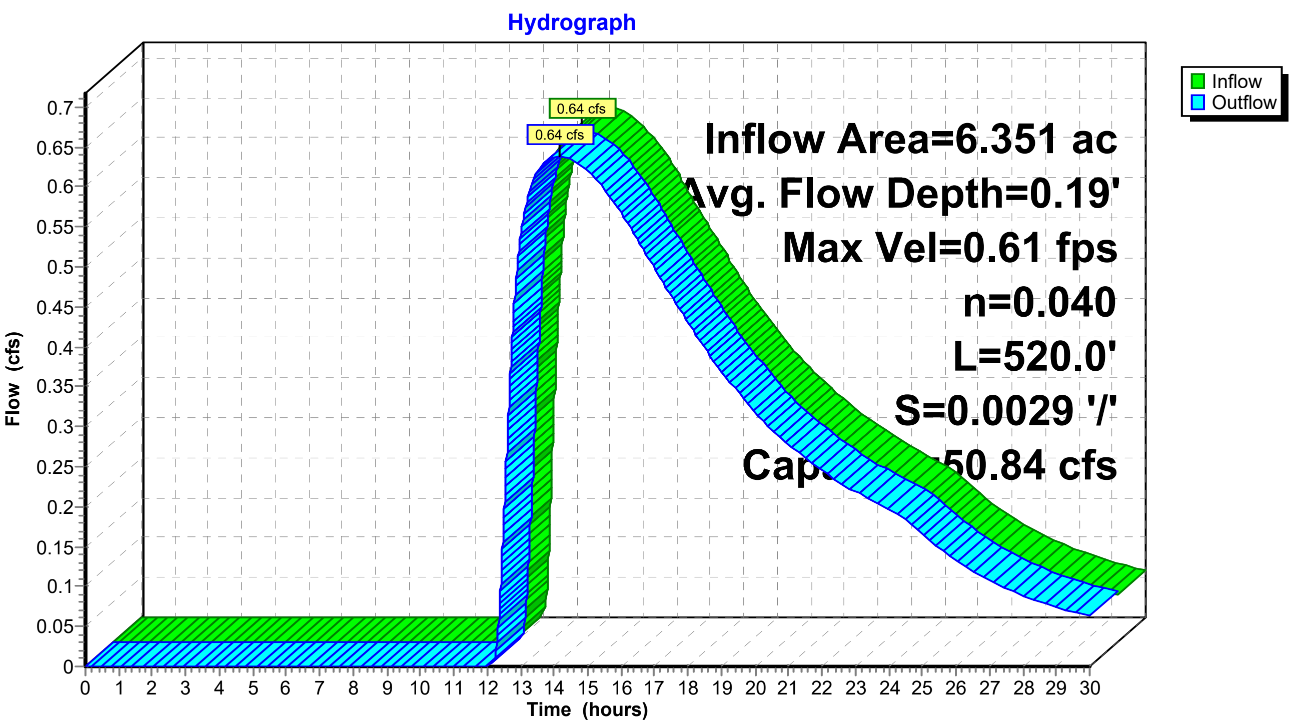
Reach R1A: Tt thru bogs



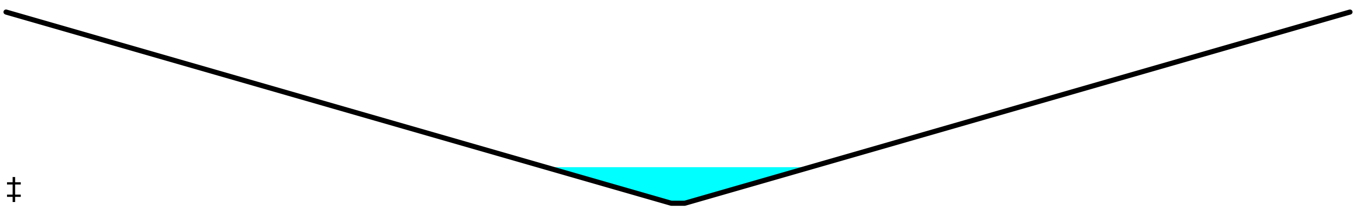
Summary for Reach R2: Tt thru da7

Inflow Area = 2.817 ac, 32.13% Impervious, Inflow Depth = 1.53" for 25-YR MASHPEE ATLAS event
Inflow = 5.14 cfs @ 12.12 hrs, Volume= 0.359 af
Outflow = 4.28 cfs @ 12.18 hrs, Volume= 0.359 af, Atten= 17%, Lag= 3.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.09 fps, Min. Travel Time= 5.8 min
Avg. Velocity = 0.42 fps, Avg. Travel Time= 15.0 min

Peak Storage= 1,490 cf @ 12.18 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 1.00' Flow Area= 102.0 sf, Capacity= 330.00 cfs

2.00' x 1.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 100.0 '/' Top Width= 202.00'
Length= 380.0' Slope= 0.0074 '/'
Inlet Invert= 17.00', Outlet Invert= 14.20'



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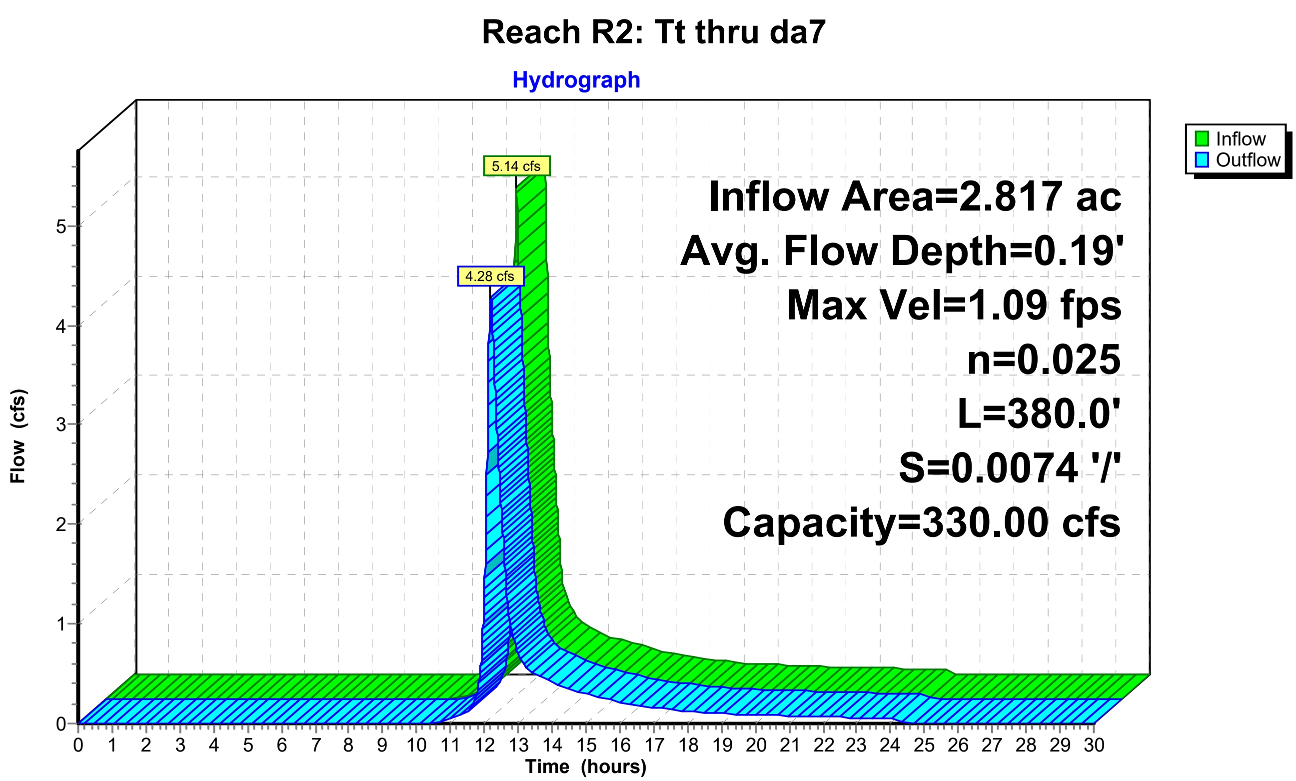


Summary for Reach R2A: Travel Time thru wet pond

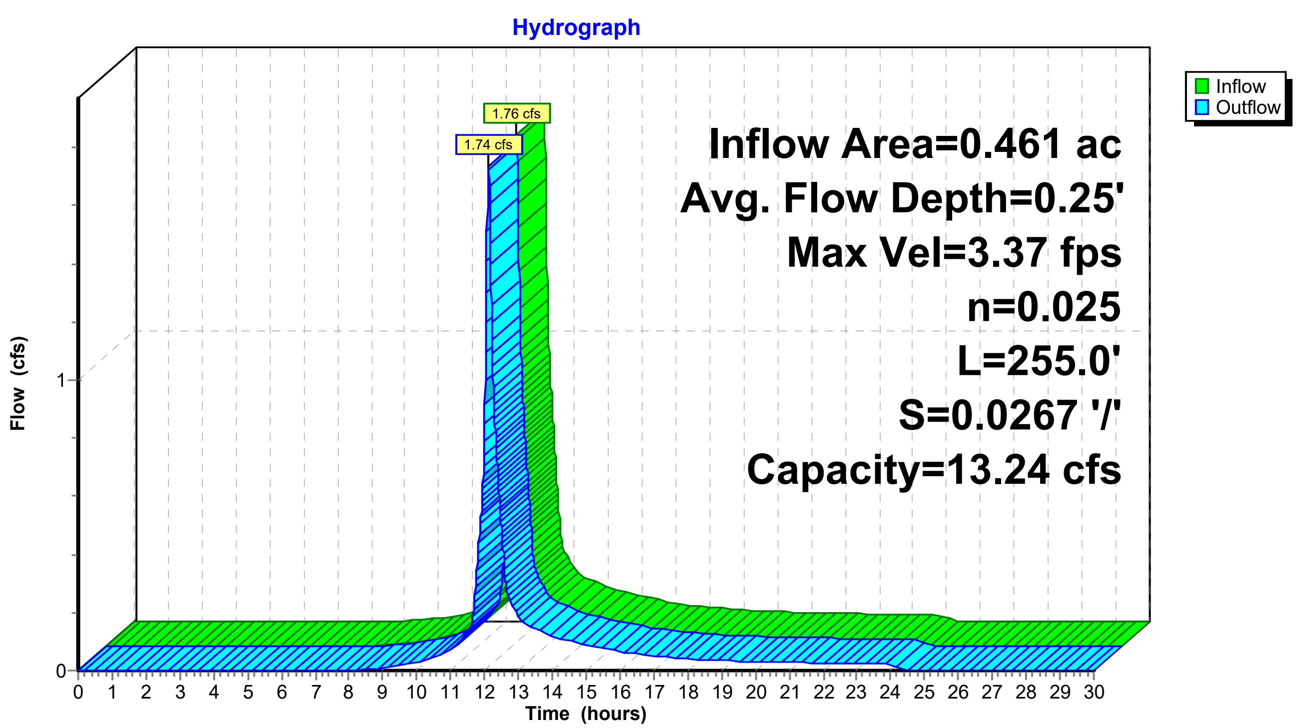
Inflow Area = 0.461 ac, 63.56% Impervious, Inflow Depth = 3.36" for 25-YR MASHPEE ATLAS event
Inflow = 1.76 cfs @ 12.10 hrs, Volume= 0.129 af
Outflow = 1.74 cfs @ 12.11 hrs, Volume= 0.129 af, Atten= 1%, Lag= 0.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.37 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.92 fps, Avg. Travel Time= 4.6 min

Peak Storage= 131 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.25'
Bank-Full Depth= 1.00' Flow Area= 2.1 sf, Capacity= 13.24 cfs

2.00' x 1.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 0.1 '/' Top Width= 2.20'
Length= 255.0' Slope= 0.0267 '/'
Inlet Invert= 21.00', Outlet Invert= 14.20'

Reach R2A: Travel Time thru wet pond



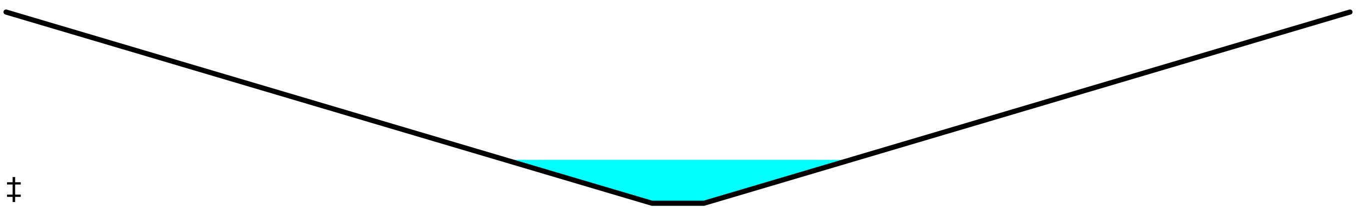
Summary for Reach R5: Tt thru da22B

Inflow Area = 0.641 ac, 50.86% Impervious, Inflow Depth = 1.86" for 25-YR MASHPEE ATLAS event
Inflow = 2.03 cfs @ 12.08 hrs, Volume= 0.099 af
Outflow = 1.95 cfs @ 12.11 hrs, Volume= 0.099 af, Atten= 4%, Lag= 1.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.23 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 0.77 fps, Avg. Travel Time= 5.3 min

Peak Storage= 214 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 0.50' Flow Area= 13.5 sf, Capacity= 75.75 cfs

2.00' x 0.50' deep channel, n= 0.013 Asphalt, smooth
Side Slope Z-value= 50.0 '/' Top Width= 52.00'
Length= 246.0' Slope= 0.0146 '/'
Inlet Invert= 20.58', Outlet Invert= 17.00'



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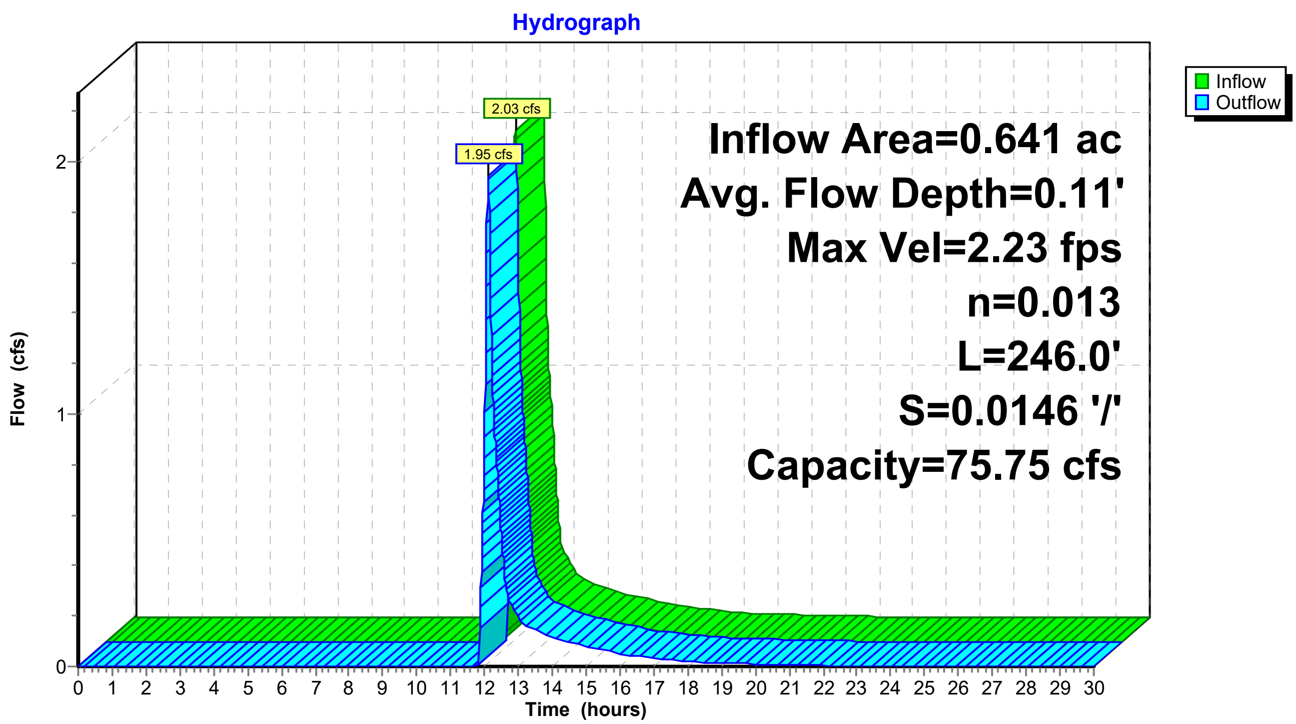
Reach R5: Tt thru da22B

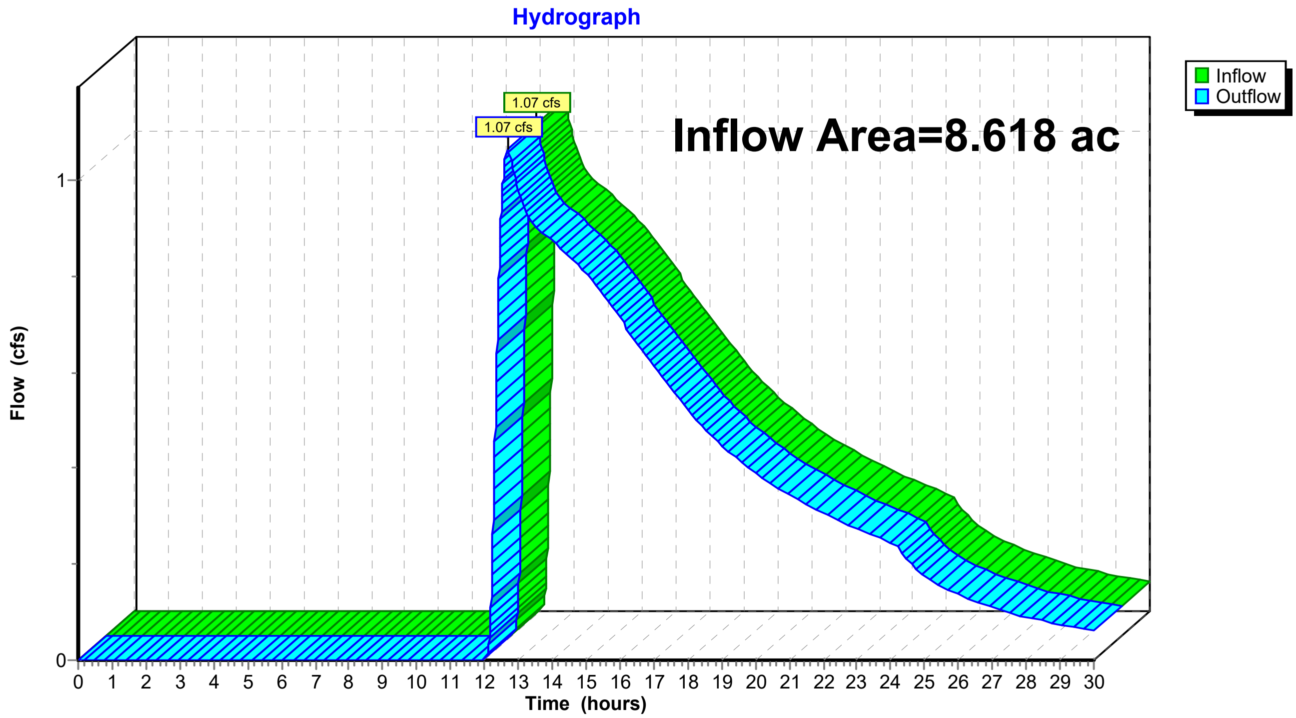


Summary for Reach SP#1: Study Point for Combined Flows

Inflow Area = 8.618 ac, 15.90% Impervious, Inflow Depth > 0.84" for 25-YR MASHPEE ATLAS event
Inflow = 1.07 cfs @ 12.67 hrs, Volume= 0.604 af
Outflow = 1.07 cfs @ 12.67 hrs, Volume= 0.604 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach SP#1: Study Point for Combined Flows



Summary for Pond 1P: LB's

Inflow Area = 0.641 ac, 50.86% Impervious, Inflow Depth = 2.70" for 25-YR MASHPEE ATLAS event
Inflow = 2.09 cfs @ 12.08 hrs, Volume= 0.144 af
Outflow = 2.06 cfs @ 12.08 hrs, Volume= 0.144 af, Atten= 1%, Lag= 0.3 min
Discarded = 0.03 cfs @ 10.67 hrs, Volume= 0.045 af
Primary = 2.03 cfs @ 12.08 hrs, Volume= 0.099 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 20.72' @ 12.10 hrs Surf.Area= 809 sf Storage= 489 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 59.7 min (899.6 - 839.8)

Volume	Invert	Avail.Storage	Storage Description
#1	13.50'	192 cf	**10.00'D x 4.50'H Vertical Cone/Cylinder** x 2
			707 cf Overall - 226 cf Embedded = 481 cf x 40.0% Voids
#2	14.00'	226 cf	**6.00'D x 4.00'H Vertical Cone/Cylinder** x 2 Inside #1
#3	20.50'	376 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		794 cf	Total Available Storage

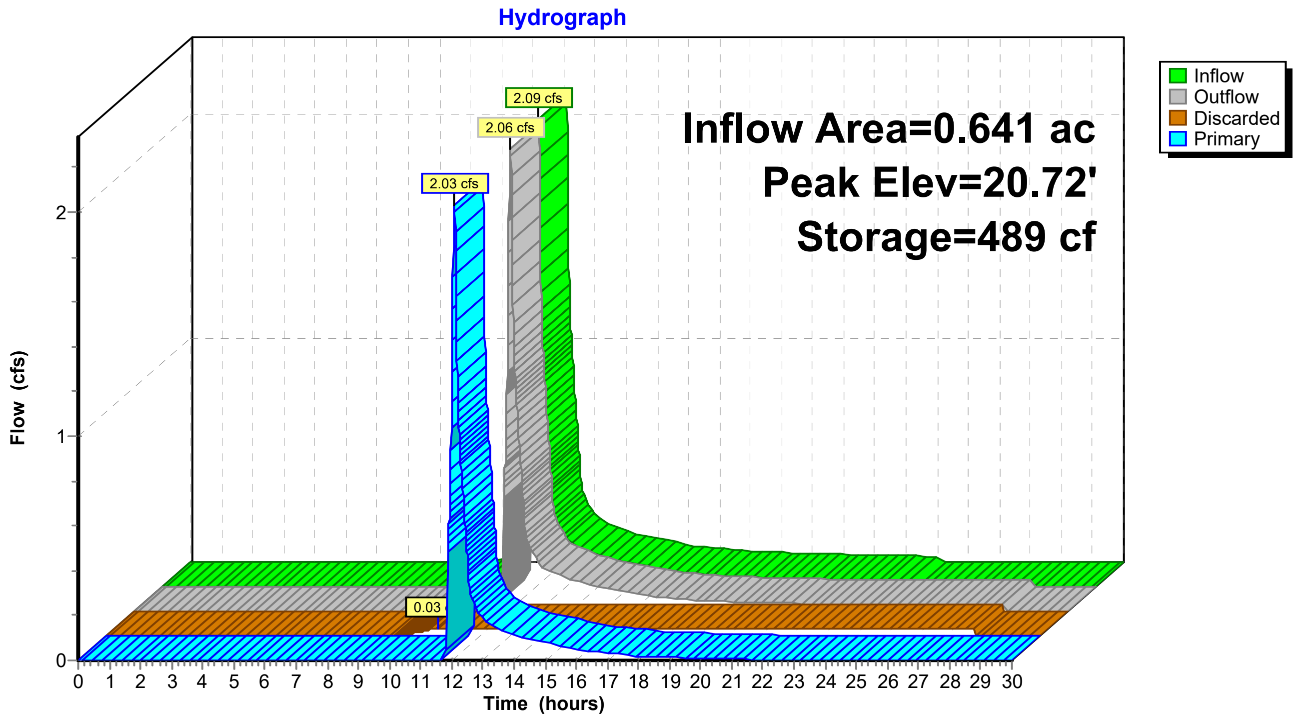
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.50	4	0	0
21.00	1,500	376	376

Device	Routing	Invert	Outlet Devices
#1	Discarded	13.50'	**8.270 in/hr Exfiltration over Surface area from 13.49' - 18.00'**
			Excluded Surface area = 0 sf
#2	Primary	20.58'	**179.0 deg x 6.0' long Sharp-Crested Vee/Trap Weir**
			Cv= 2.46 (C= 3.08)

Discarded OutFlow Max=0.03 cfs @ 10.67 hrs HW=13.58' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.97 cfs @ 12.08 hrs HW=20.72' TW=20.69' (Dynamic Tailwater)
└─**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 1.97 cfs @ 0.67 fps)

Pond 1P: LB's


Hydrograph
Inflow
Outflow
Discarded
Primary
Inflow Area=0.641 ac
Peak Elev=20.72'
Storage=489 cf
2.09 cfs
2.06 cfs
2.03 cfs
0.03
Flow (cfs)
Time (hours)
0
1
2
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Summary for Pond 2P: Natural Low Area

Inflow Area = 0.841 ac, 0.00% Impervious, Inflow Depth = 0.13" for 25-YR MASHPEE ATLAS event
Inflow = 0.01 cfs @ 14.84 hrs, Volume= 0.009 af
Outflow = 0.01 cfs @ 15.88 hrs, Volume= 0.009 af, Atten= 12%, Lag= 62.0 min
Discarded = 0.01 cfs @ 15.88 hrs, Volume= 0.009 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 16.32' @ 15.88 hrs Surf.Area= 229 sf Storage= 35 cf

Plug-Flow detention time= 35.6 min calculated for 0.009 af (100% of inflow)
Center-of-Mass det. time= 35.6 min (1,099.6 - 1,063.9)

Volume	Invert	Avail.Storage	Storage Description
#1	16.01'	4,754 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

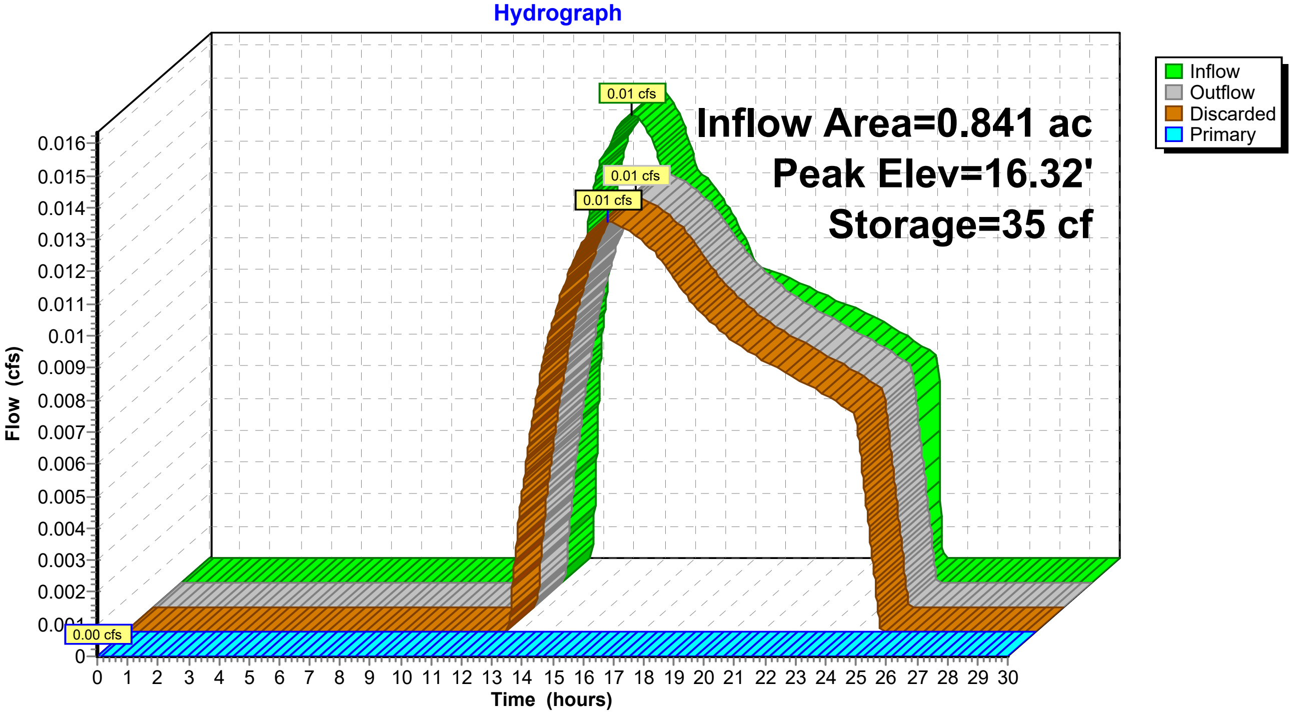
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
16.01	1	0	0
17.00	739	366	366
18.00	6,669	3,704	4,070
18.10	7,000	683	4,754

Device	Routing	Invert	Outlet Devices
#1	Discarded	16.01'	**2.410 in/hr Exfiltration over Surface area from 15.90' - 17.70'** Excluded Surface area = 0 sf
#2	Primary	17.72'	**2.0" x 2.0" Horiz. Orifice/Grate X 36.00** C= 0.600 in 24.0" x 24.0" Grate Limited to weir flow at low heads
#3	Primary	18.00'	**25.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.01 cfs @ 15.88 hrs HW=16.32' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=16.01' TW=17.00' (Dynamic Tailwater)
├─**2=Orifice/Grate** (Controls 0.00 cfs)
└─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Natural Low Area



Summary for Pond 3P: Wet Pond

Inflow Area = 6.351 ac, 20.28% Impervious, Inflow Depth = 1.04" for 25-YR MASHPEE ATLAS event
Inflow = 5.74 cfs @ 12.16 hrs, Volume= 0.551 af
Outflow = 0.64 cfs @ 13.99 hrs, Volume= 0.457 af, Atten= 89%, Lag= 109.7 min
Primary = 0.64 cfs @ 13.99 hrs, Volume= 0.457 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 14.71' @ 13.99 hrs Surf.Area= 25,862 sf Storage= 11,519 cf

Plug-Flow detention time= 296.4 min calculated for 0.457 af (83% of inflow)
Center-of-Mass det. time= 223.4 min (1,086.4 - 863.0)

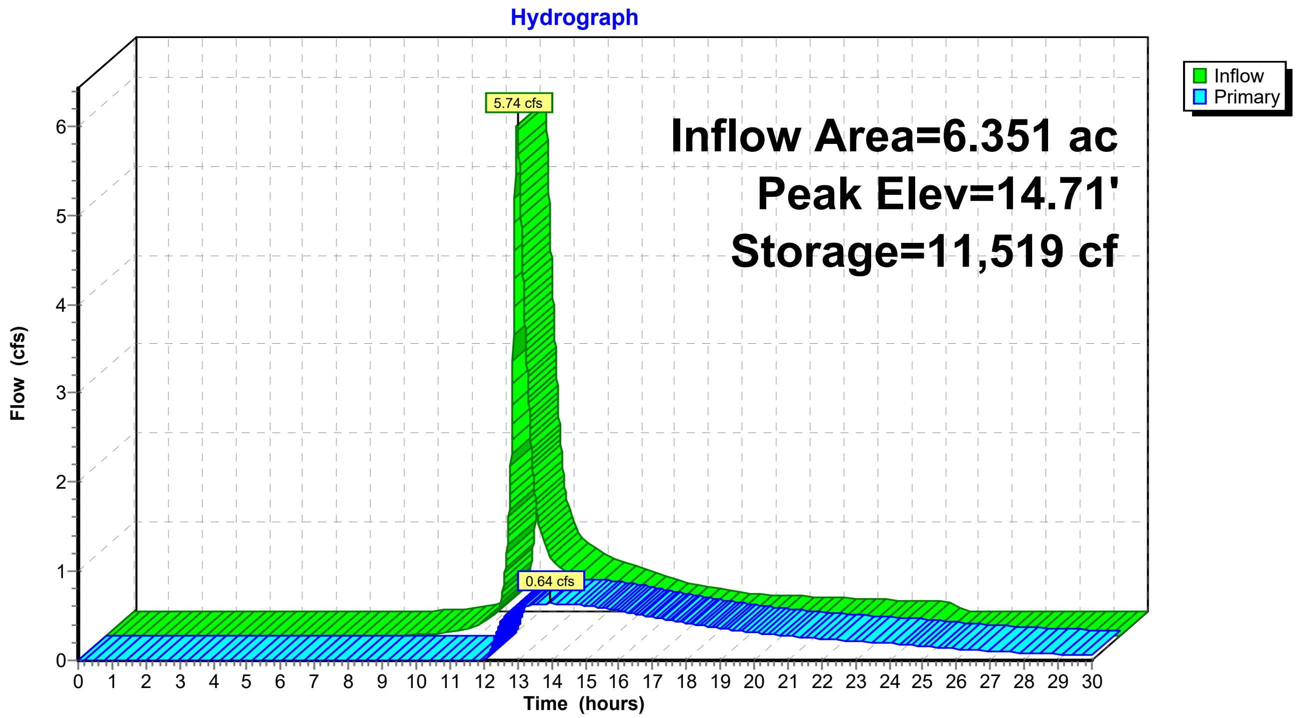
Volume	Invert	Avail.Storage	Storage Description
#1	13.97'	63,264 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
13.97	1	0	0
14.00	56	1	1
14.20	13,877	1,393	1,394
15.00	32,693	18,628	20,022
16.00	53,790	43,242	63,264

Device	Routing	Invert	Outlet Devices
#1	Primary	14.20'	**18.0" Round Culvert** L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 14.20' / 14.20' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Primary	15.00'	**30.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.64 cfs @ 13.99 hrs HW=14.71' TW=14.39' (Dynamic Tailwater)
├─**1=Culvert** (Barrel Controls 0.64 cfs @ 1.80 fps)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Wet Pond



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA-1: AREAS TO WETLAND Runoff Area=2.267 ac 3.62% Impervious Runoff Depth=1.47"
Flow Length=200' Tc=16.2 min CN=45 Runoff=2.28 cfs 0.279 af

Subcatchment DA-44: North of Quin Runoff Area=0.841 ac 0.00% Impervious Runoff Depth=0.43"
Tc=5.0 min CN=32 Runoff=0.11 cfs 0.030 af

Subcatchment DA-55: AREAS TO CB'S AT Runoff Area=0.641 ac 50.86% Impervious Runoff Depth=3.92"
Tc=5.0 min CN=69 Runoff=3.05 cfs 0.209 af

Subcatchment DA-7: AREAS TO WET POND Runoff Area=3.073 ac 2.93% Impervious Runoff Depth=0.64"
Flow Length=431' Tc=26.3 min CN=35 Runoff=0.66 cfs 0.163 af

Subcatchment DA22A: QUIN AVE SOUTH Runoff Area=0.461 ac 63.56% Impervious Runoff Depth=4.70"
Flow Length=1,172' Tc=6.9 min CN=76 Runoff=2.45 cfs 0.180 af

Subcatchment DA22B: Quin Ave West and Runoff Area=1.335 ac 43.37% Impervious Runoff Depth=3.49"
Flow Length=1,473' Tc=8.8 min CN=65 Runoff=4.92 cfs 0.388 af

Reach R1: Tt along stream Avg. Flow Depth=0.38' Max Vel=0.86 fps Inflow=2.28 cfs 0.279 af
n=0.040 L=550.0' S=0.0035 '/' Capacity=69.34 cfs Outflow=1.88 cfs 0.279 af

Reach R1A: Tt thru bogs Avg. Flow Depth=0.28' Max Vel=0.78 fps Inflow=1.28 cfs 0.791 af
n=0.040 L=520.0' S=0.0029 '/' Capacity=50.84 cfs Outflow=1.28 cfs 0.787 af

Reach R2: Tt thru da7 Avg. Flow Depth=0.22' Max Vel=1.22 fps Inflow=7.73 cfs 0.550 af
n=0.025 L=380.0' S=0.0074 '/' Capacity=330.00 cfs Outflow=6.65 cfs 0.550 af

Reach R2A: Travel Time thru wet pond Avg. Flow Depth=0.32' Max Vel=3.78 fps Inflow=2.45 cfs 0.180 af
n=0.025 L=255.0' S=0.0267 '/' Capacity=13.24 cfs Outflow=2.43 cfs 0.180 af

Reach R5: Tt thru da22B Avg. Flow Depth=0.13' Max Vel=2.47 fps Inflow=2.99 cfs 0.162 af
n=0.013 L=246.0' S=0.0146 '/' Capacity=75.75 cfs Outflow=2.89 cfs 0.162 af

Reach SP#1: Study Point for Combined Flows Inflow=2.52 cfs 1.066 af
Outflow=2.52 cfs 1.066 af

Pond 1P: LB's Peak Elev=20.74' Storage=507 cf Inflow=3.05 cfs 0.209 af
Discarded=0.03 cfs 0.047 af Primary=2.99 cfs 0.162 af Outflow=3.02 cfs 0.209 af

Pond 2P: Natural Low Area Peak Elev=16.90' Storage=293 cf Inflow=0.11 cfs 0.030 af
Discarded=0.04 cfs 0.030 af Primary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.030 af

Pond 3P: Wet Pond Peak Elev=14.92' Storage=17,498 cf Inflow=8.77 cfs 0.894 af
Outflow=1.28 cfs 0.791 af

Total Runoff Area = 8.618 ac Runoff Volume = 1.250 af Average Runoff Depth = 1.74"
84.10% Pervious = 7.248 ac 15.90% Impervious = 1.370 ac

Summary for Subcatchment DA-1: AREAS TO WETLAND TO WEST

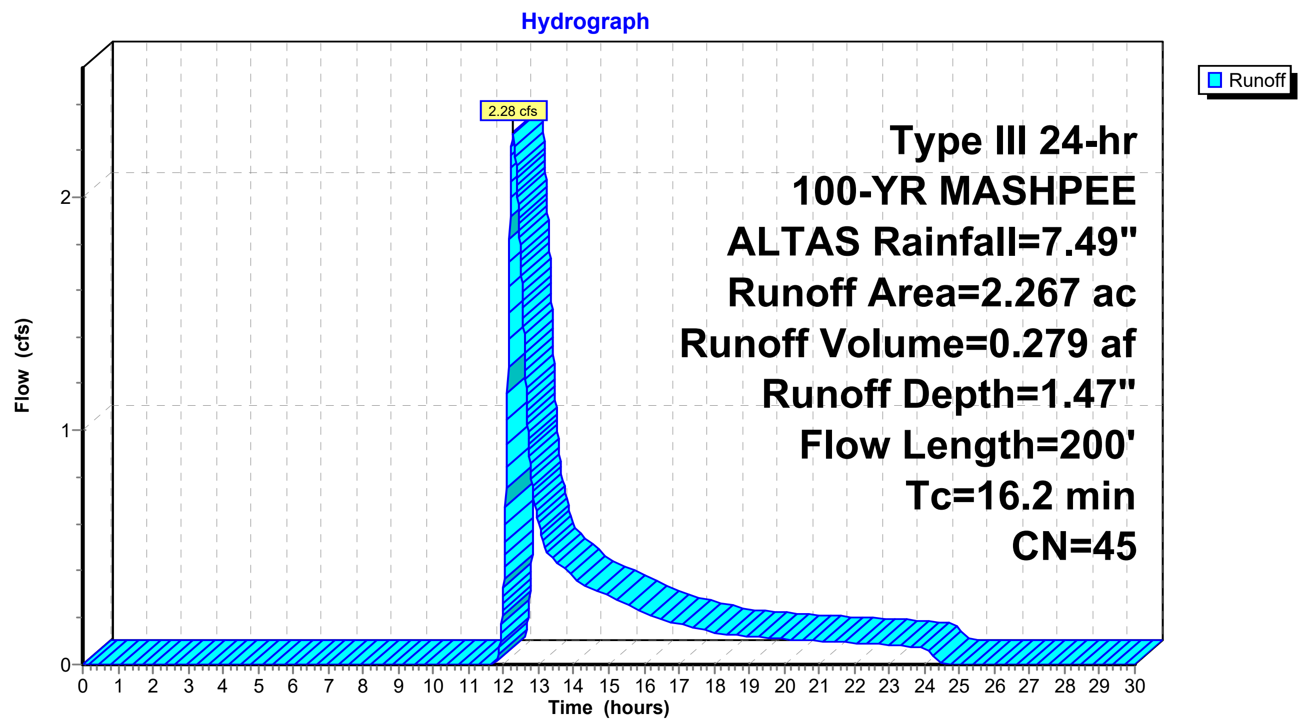
Runoff = 2.28 cfs @ 12.26 hrs, Volume= 0.279 af, Depth= 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.090	39	>75% Grass cover, Good, HSG A
0.986	30	Woods, Good, HSG A
0.045	76	Gravel roads, HSG A
0.082	98	Roofs, HSG A
1.064	55	Woods, Good, HSG B
2.267	45	Weighted Average
2.185		96.38% Pervious Area
0.082		3.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0480	0.10		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.55"
7.9	150	0.0040	0.32		**Shallow Concentrated Flow, B** Woodland Kv= 5.0 fps
16.2	200	Total			

Subcatchment DA-1: AREAS TO WETLAND TO WEST



Summary for Subcatchment DA-44: North of Quin

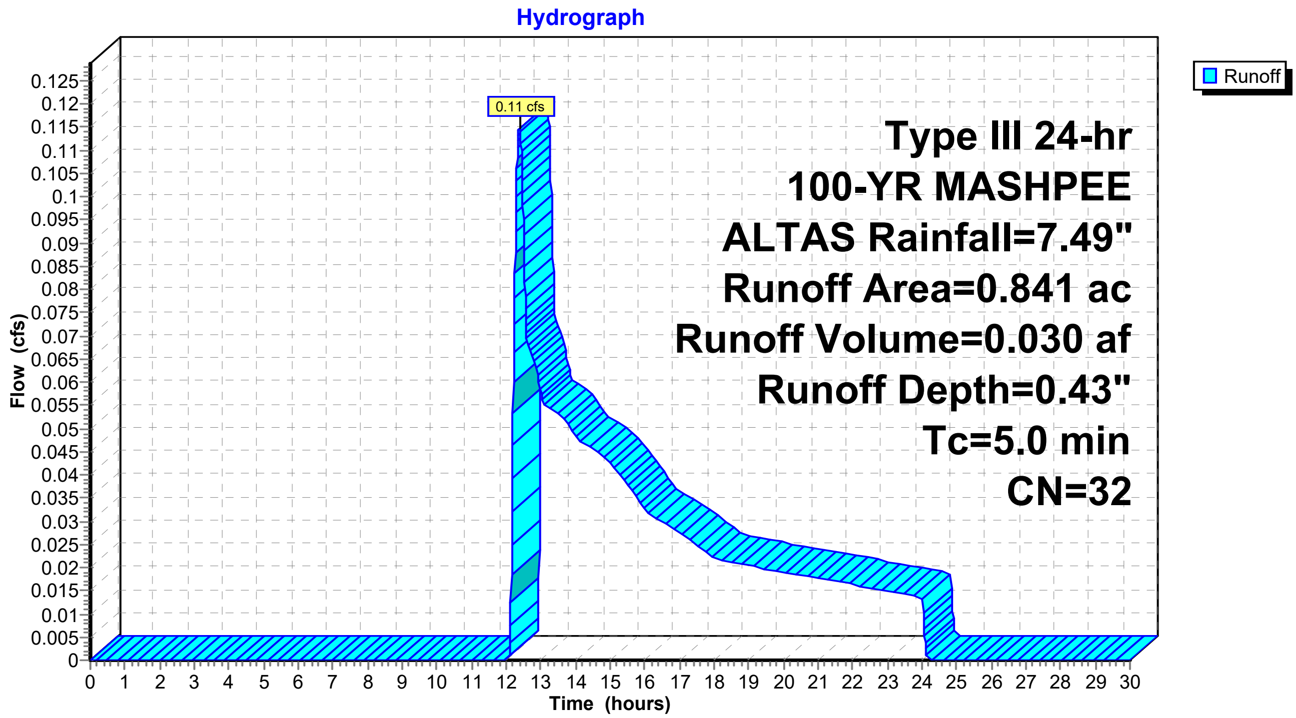
Runoff = 0.11 cfs @ 12.38 hrs, Volume= 0.030 af, Depth= 0.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.841	32	Woods/grass comb., Good, HSG A
0.841		100.00% Pervious Area

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

Subcatchment DA-44: North of Quin



Summary for Subcatchment DA-55: AREAS TO CB'S AT WILLOWBEND DR

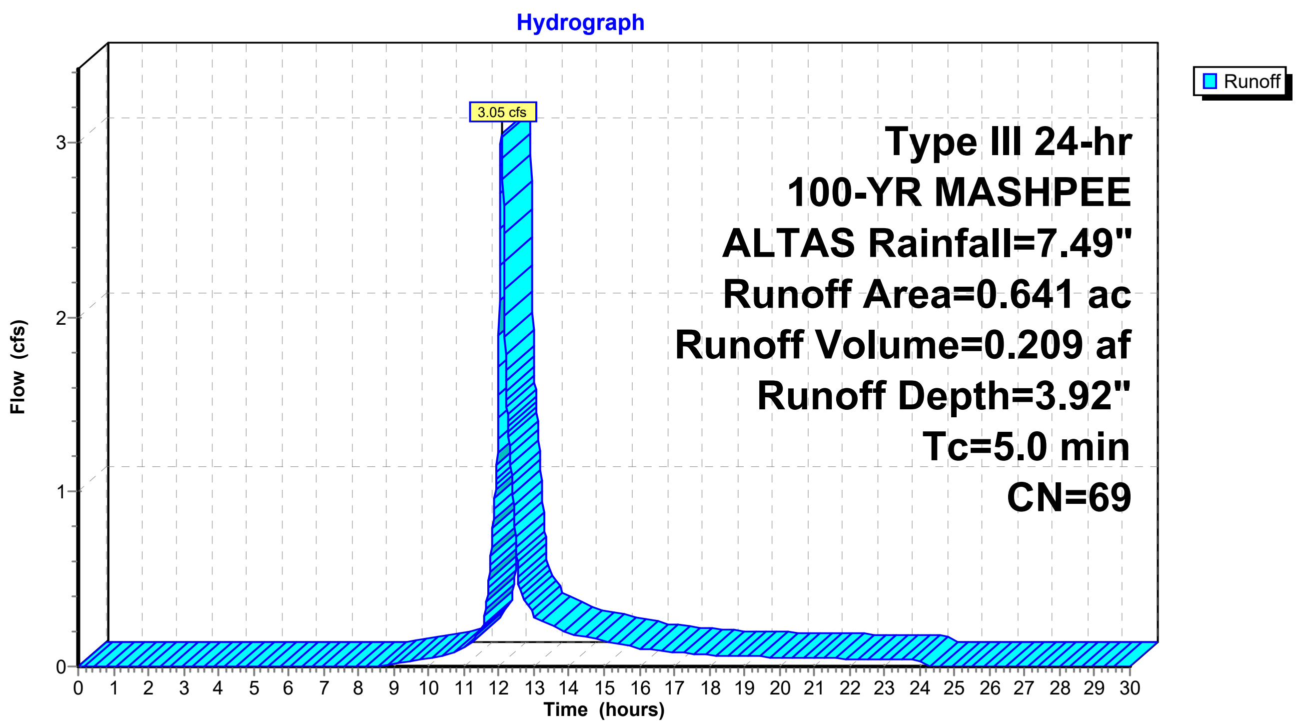
Runoff = 3.05 cfs @ 12.08 hrs, Volume= 0.209 af, Depth= 3.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.326	98	Paved parking, HSG A
0.315	39	Pasture/grassland/range, Good, HSG A
0.641	69	Weighted Average
0.315		49.14% Pervious Area
0.326		50.86% Impervious Area

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

Subcatchment DA-55: AREAS TO CB'S AT WILLOWBEND DR



Summary for Subcatchment DA-7: AREAS TO WET POND

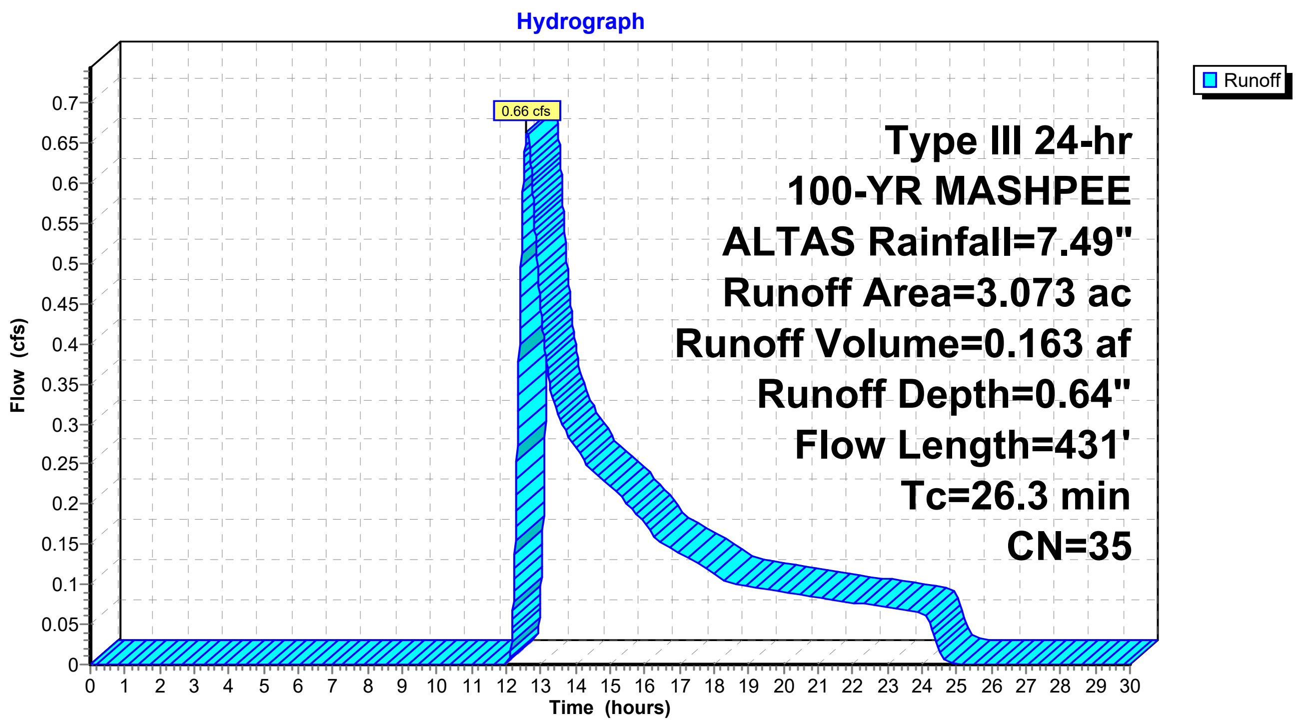
Runoff = 0.66 cfs @ 12.60 hrs, Volume= 0.163 af, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.450	39	>75% Grass cover, Good, HSG A
2.230	30	Woods, Good, HSG A
0.138	76	Gravel roads, HSG A
0.090	98	Roofs, HSG A
0.165	30	Woods, Good, HSG A
3.073	35	Weighted Average
2.983		97.07% Pervious Area
0.090		2.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0480	0.10		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.55"
18.0	381	0.0050	0.35		**Shallow Concentrated Flow, A** Woodland Kv= 5.0 fps
26.3	431	Total			

Subcatchment DA-7: AREAS TO WET POND



Summary for Subcatchment DA22A: QUIN AVE SOUTH AREA TO WET POND

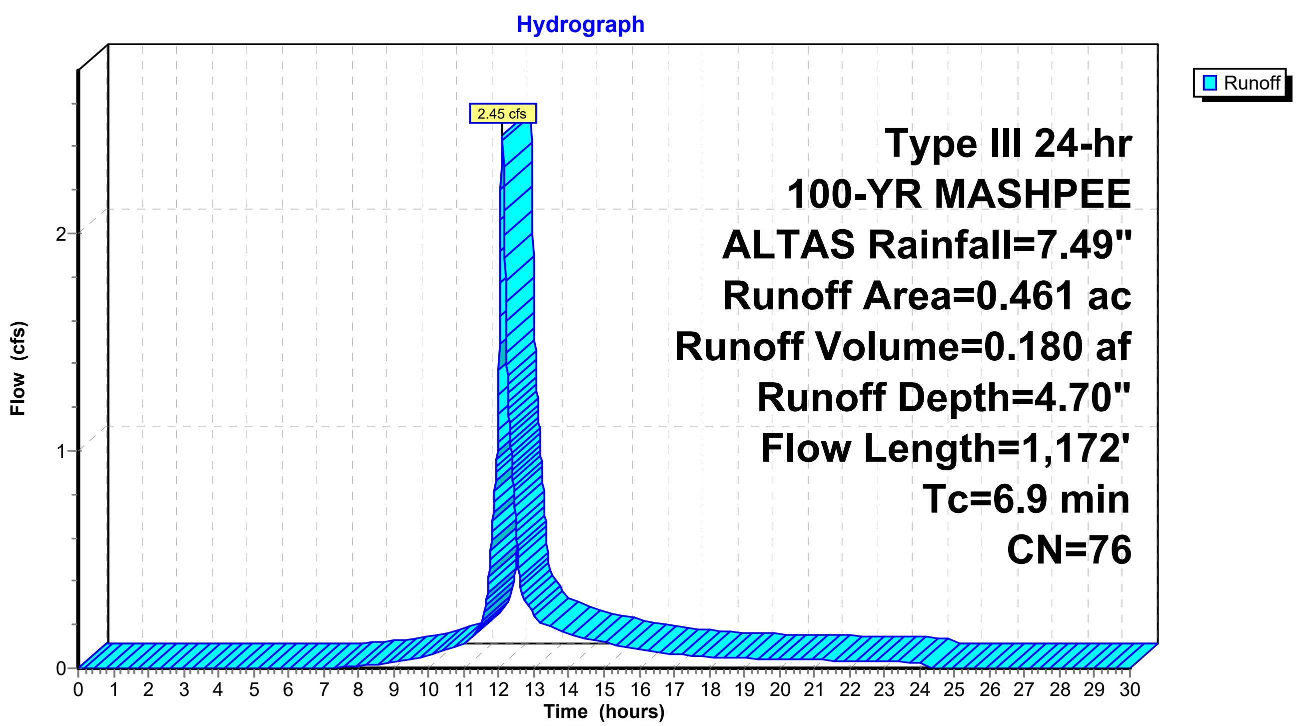
Runoff = 2.45 cfs @ 12.10 hrs, Volume= 0.180 af, Depth= 4.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.293	98	Unconnected pavement, HSG A
0.168	39	>75% Grass cover, Good, HSG A
0.461	76	Weighted Average
0.168		36.44% Pervious Area
0.293		63.56% Impervious Area
0.293		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.96		**Sheet Flow, A** Smooth surfaces n= 0.011 P2= 3.55"
6.0	1,122	0.0236	3.12		**Shallow Concentrated Flow, B** Paved Kv= 20.3 fps
6.9	1,172	Total			

Subcatchment DA22A: QUIN AVE SOUTH AREA TO WET POND



Summary for Subcatchment DA22B: Quin Ave West and North

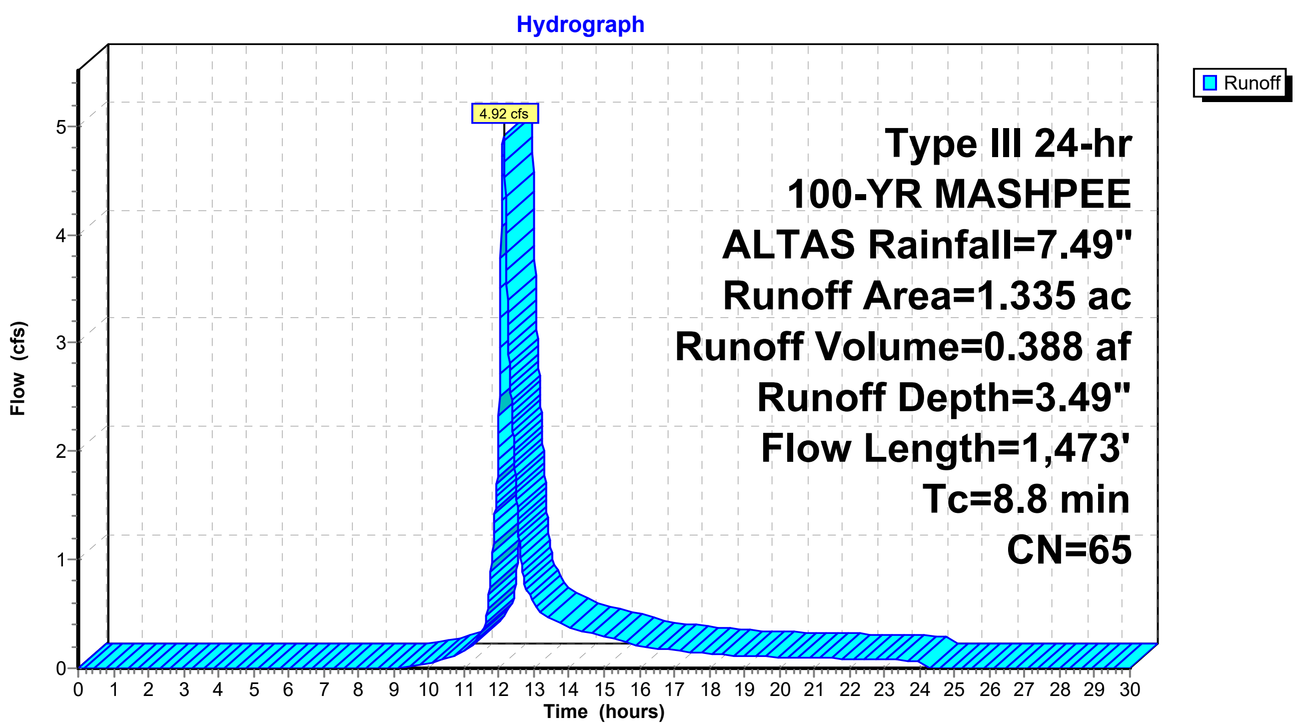
Runoff = 4.92 cfs @ 12.13 hrs, Volume= 0.388 af, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.579	98	Unconnected pavement, HSG A
0.756	39	>75% Grass cover, Good, HSG A
1.335	65	Weighted Average
0.756		56.63% Pervious Area
0.579		43.37% Impervious Area
0.579		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.96		**Sheet Flow, A** Smooth surfaces n= 0.011 P2= 3.55"
7.9	1,423	0.0220	3.01		**Shallow Concentrated Flow, B** Paved Kv= 20.3 fps
8.8	1,473	Total			

Subcatchment DA22B: Quin Ave West and North



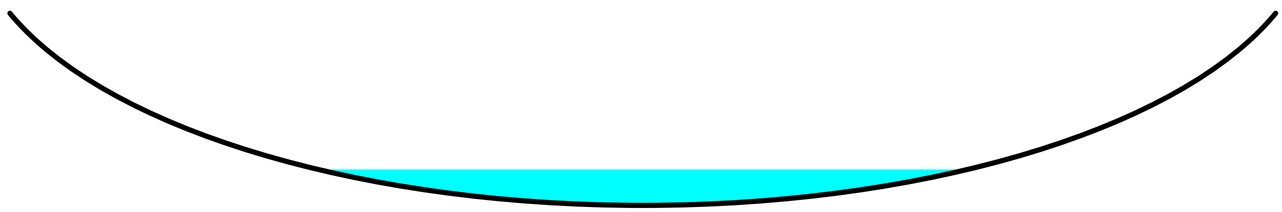
Summary for Reach R1: Tt along stream

Inflow Area = 2.267 ac, 3.62% Impervious, Inflow Depth = 1.47" for 100-YR MASHPEE ALTAS event
Inflow = 2.28 cfs @ 12.26 hrs, Volume= 0.279 af
Outflow = 1.88 cfs @ 12.44 hrs, Volume= 0.279 af, Atten= 18%, Lag= 10.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.86 fps, Min. Travel Time= 10.6 min
Avg. Velocity = 0.34 fps, Avg. Travel Time= 26.8 min

Peak Storage= 1,193 cf @ 12.44 hrs
Average Depth at Peak Storage= 0.38'
Bank-Full Depth= 2.00' Flow Area= 26.7 sf, Capacity= 69.34 cfs

20.00' x 2.00' deep Parabolic Channel, n= 0.040 Winding stream, pools & shoals
Length= 550.0' Slope= 0.0035 '/'
Inlet Invert= 14.60', Outlet Invert= 12.70'



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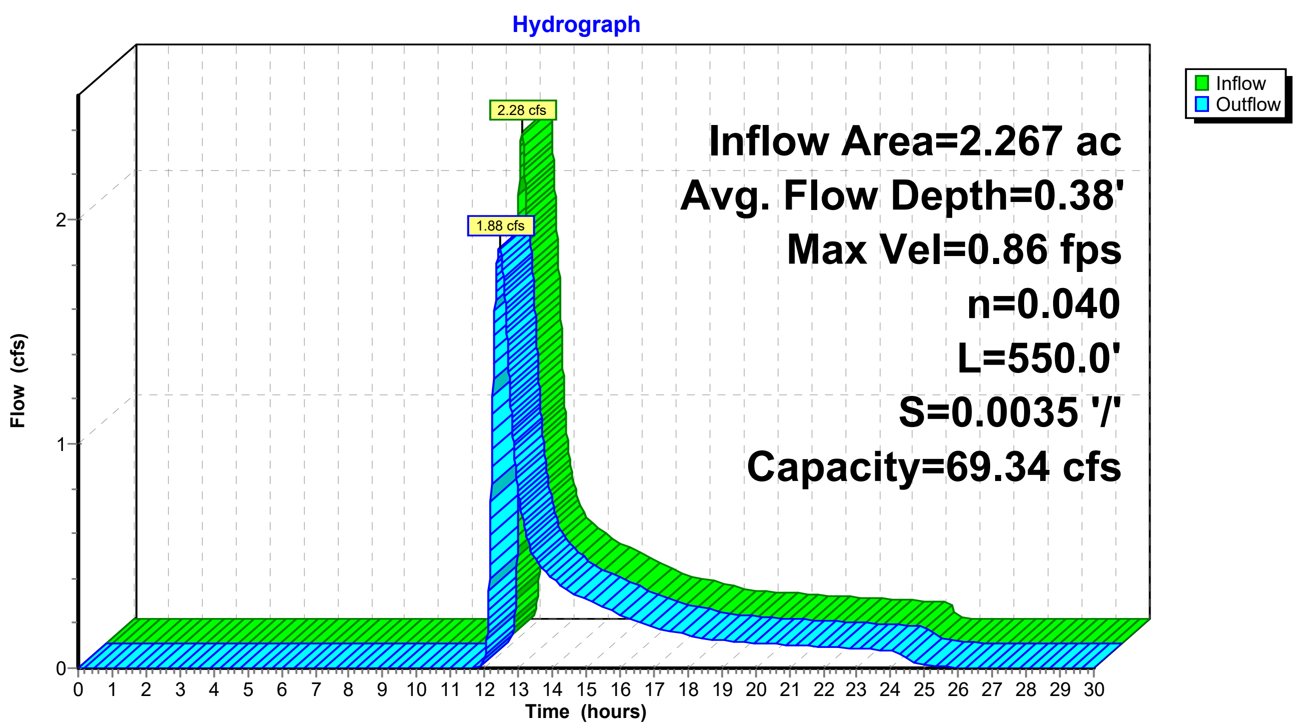
Reach R1: Tt along stream



Summary for Reach R1A: Tt thru bogs

Inflow Area = 6.351 ac, 20.28% Impervious, Inflow Depth > 1.49" for 100-YR MASHPEE ALTAS event
Inflow = 1.28 cfs @ 13.35 hrs, Volume= 0.791 af
Outflow = 1.28 cfs @ 13.51 hrs, Volume= 0.787 af, Atten= 0%, Lag= 9.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.78 fps, Min. Travel Time= 11.2 min
Avg. Velocity = 0.52 fps, Avg. Travel Time= 16.6 min

Peak Storage= 856 cf @ 13.51 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 2.00' Flow Area= 22.0 sf, Capacity= 50.84 cfs

5.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/' Top Width= 17.00'
Length= 520.0' Slope= 0.0029 '/'
Inlet Invert= 14.20', Outlet Invert= 12.70'

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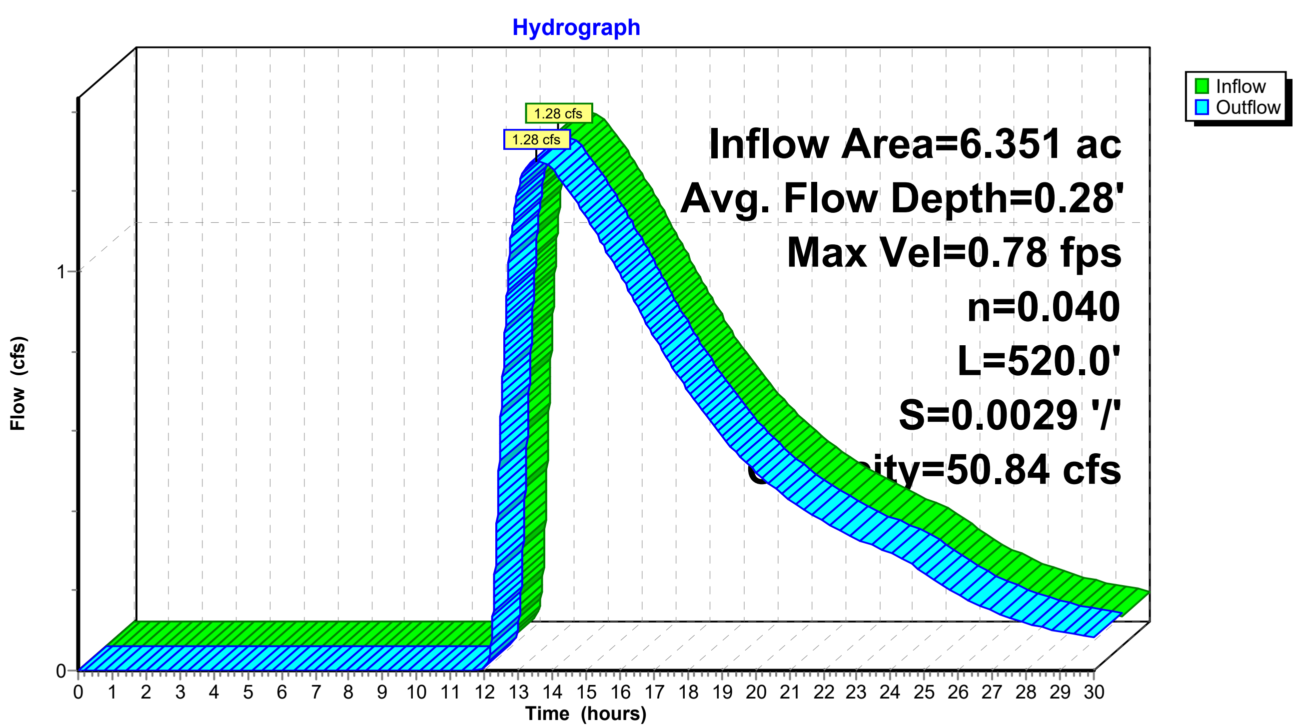
Reach R1A: Tt thru bogs



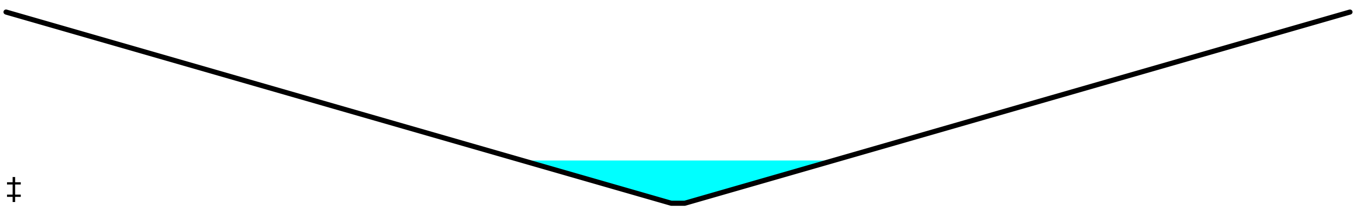
Summary for Reach R2: Tt thru da7

Inflow Area = 2.817 ac, 32.13% Impervious, Inflow Depth = 2.34" for 100-YR MASHPEE ALTAS event
Inflow = 7.73 cfs @ 12.12 hrs, Volume= 0.550 af
Outflow = 6.65 cfs @ 12.17 hrs, Volume= 0.550 af, Atten= 14%, Lag= 3.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.22 fps, Min. Travel Time= 5.2 min
Avg. Velocity = 0.46 fps, Avg. Travel Time= 13.8 min

Peak Storage= 2,072 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 1.00' Flow Area= 102.0 sf, Capacity= 330.00 cfs

2.00' x 1.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 100.0 '/' Top Width= 202.00'
Length= 380.0' Slope= 0.0074 '/'
Inlet Invert= 17.00', Outlet Invert= 14.20'



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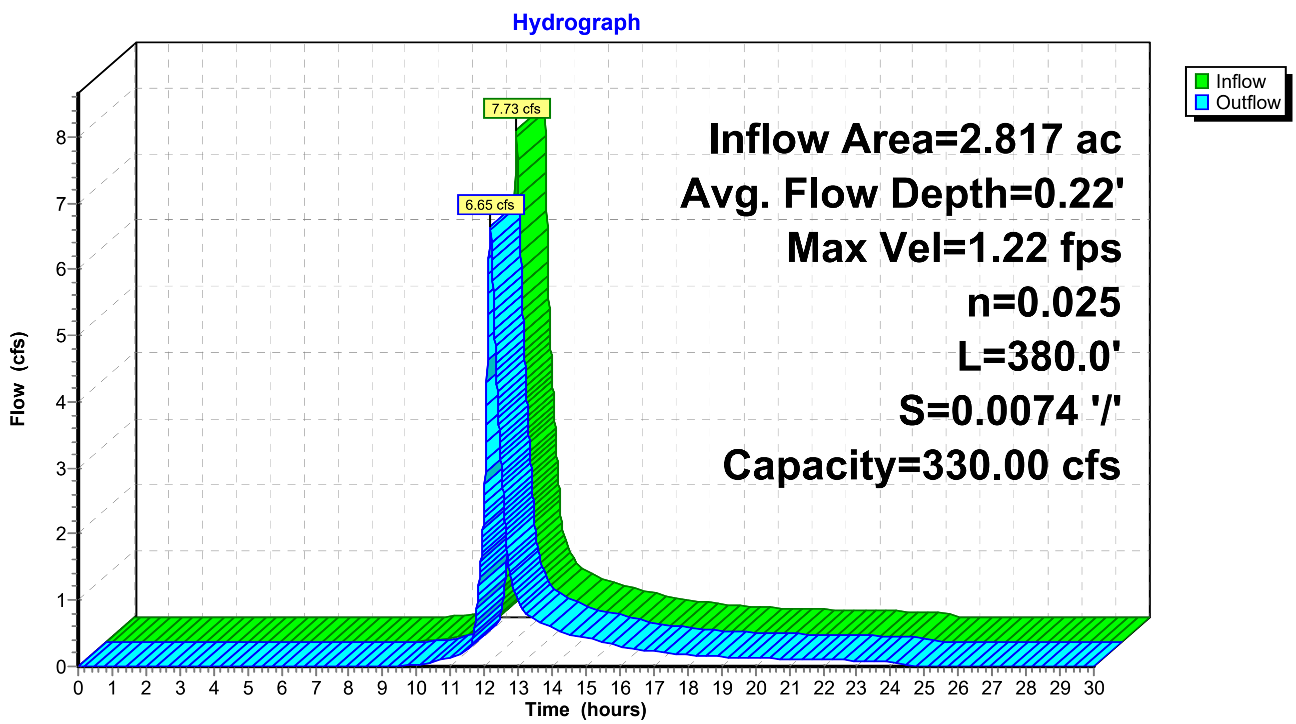
Reach R2: Tt thru da7



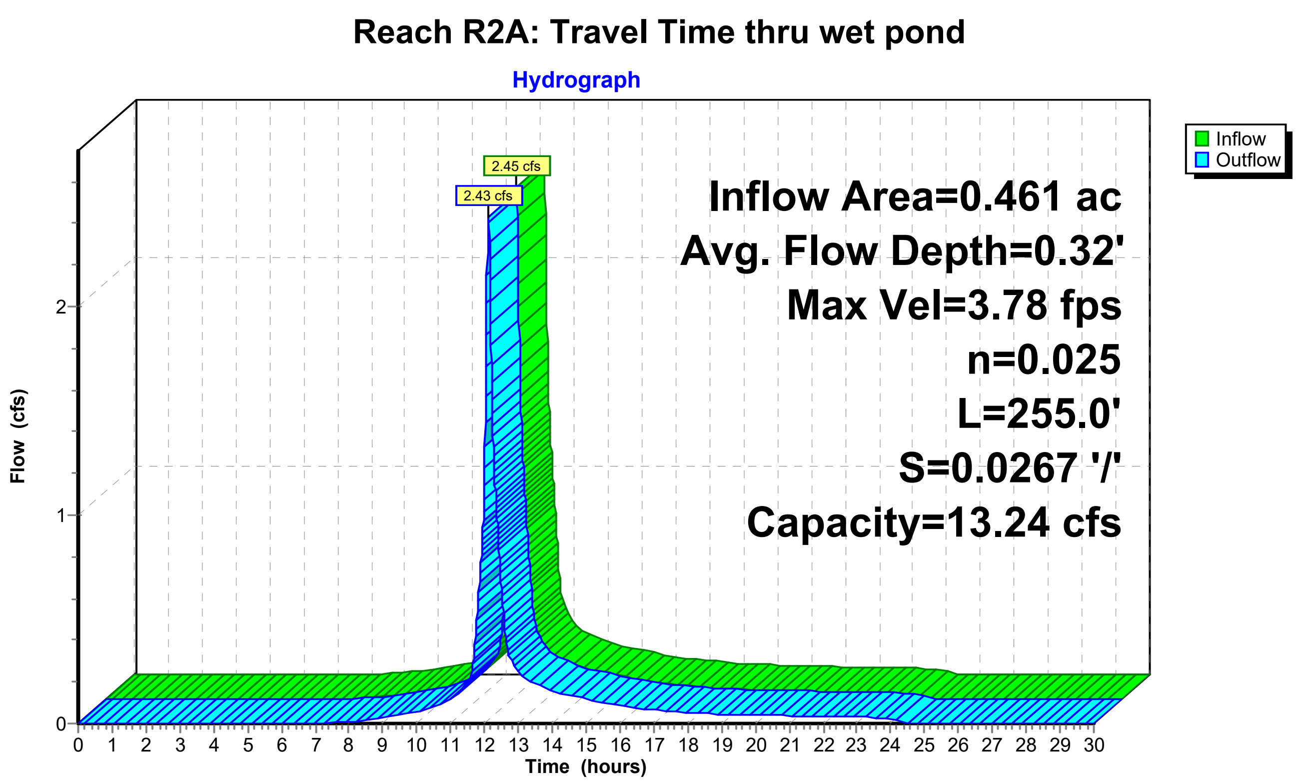
Summary for Reach R2A: Travel Time thru wet pond

Inflow Area = 0.461 ac, 63.56% Impervious, Inflow Depth = 4.70" for 100-YR MASHPEE ALTAS event
Inflow = 2.45 cfs @ 12.10 hrs, Volume= 0.180 af
Outflow = 2.43 cfs @ 12.11 hrs, Volume= 0.180 af, Atten= 1%, Lag= 0.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.78 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.02 fps, Avg. Travel Time= 4.2 min

Peak Storage= 163 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.32'
Bank-Full Depth= 1.00' Flow Area= 2.1 sf, Capacity= 13.24 cfs

2.00' x 1.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 0.1 '/' Top Width= 2.20'
Length= 255.0' Slope= 0.0267 '/'
Inlet Invert= 21.00', Outlet Invert= 14.20'



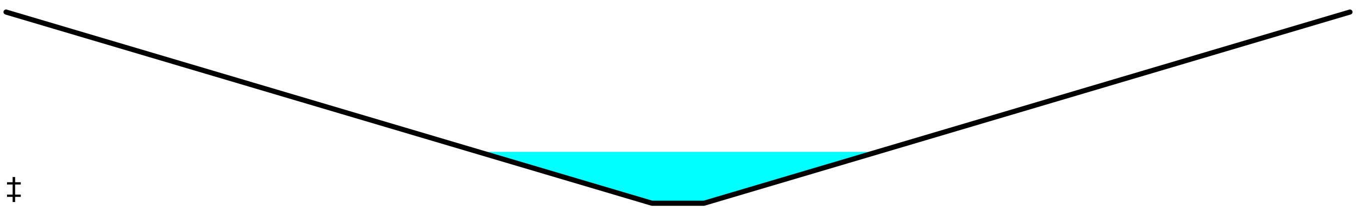
Summary for Reach R5: Tt thru da22B

Inflow Area = 0.641 ac, 50.86% Impervious, Inflow Depth = 3.04" for 100-YR MASHPEE ALTAS event
Inflow = 2.99 cfs @ 12.08 hrs, Volume= 0.162 af
Outflow = 2.89 cfs @ 12.10 hrs, Volume= 0.162 af, Atten= 3%, Lag= 1.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.47 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 0.87 fps, Avg. Travel Time= 4.7 min

Peak Storage= 288 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 0.50' Flow Area= 13.5 sf, Capacity= 75.75 cfs

2.00' x 0.50' deep channel, n= 0.013 Asphalt, smooth
Side Slope Z-value= 50.0 '/' Top Width= 52.00'
Length= 246.0' Slope= 0.0146 '/'
Inlet Invert= 20.58', Outlet Invert= 17.00'



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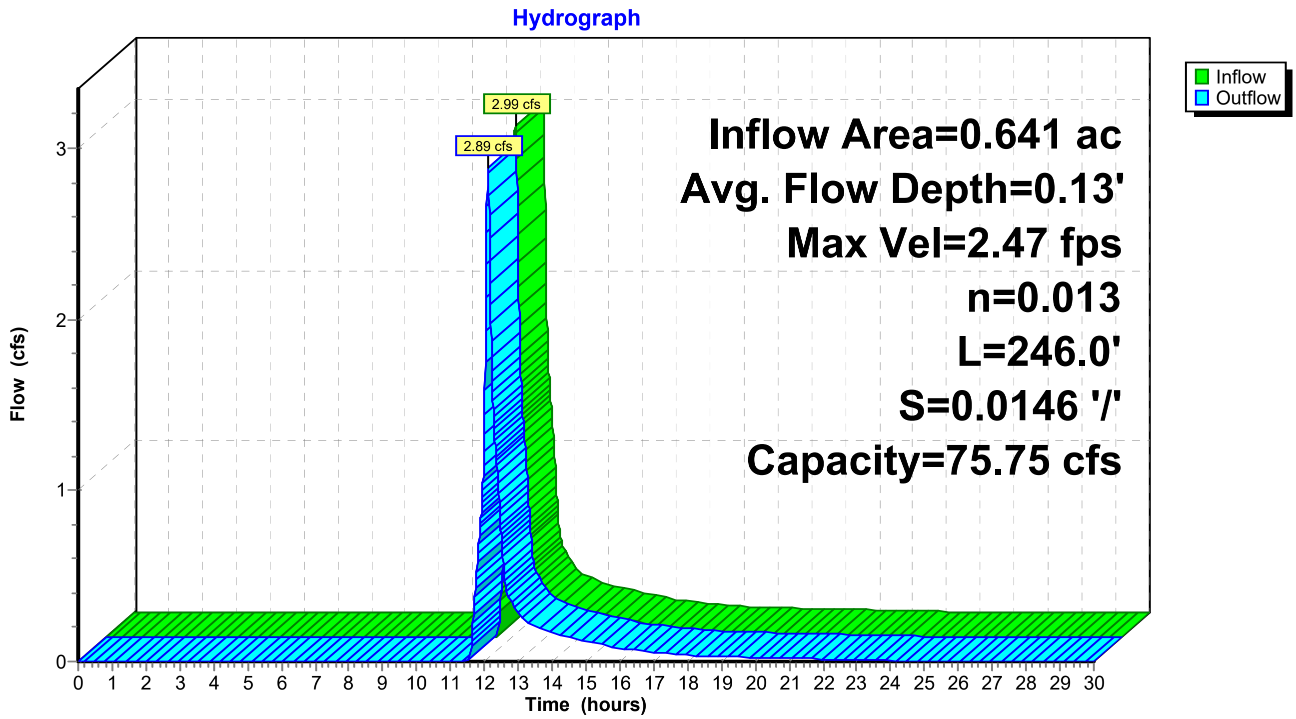
Reach R5: Tt thru da22B

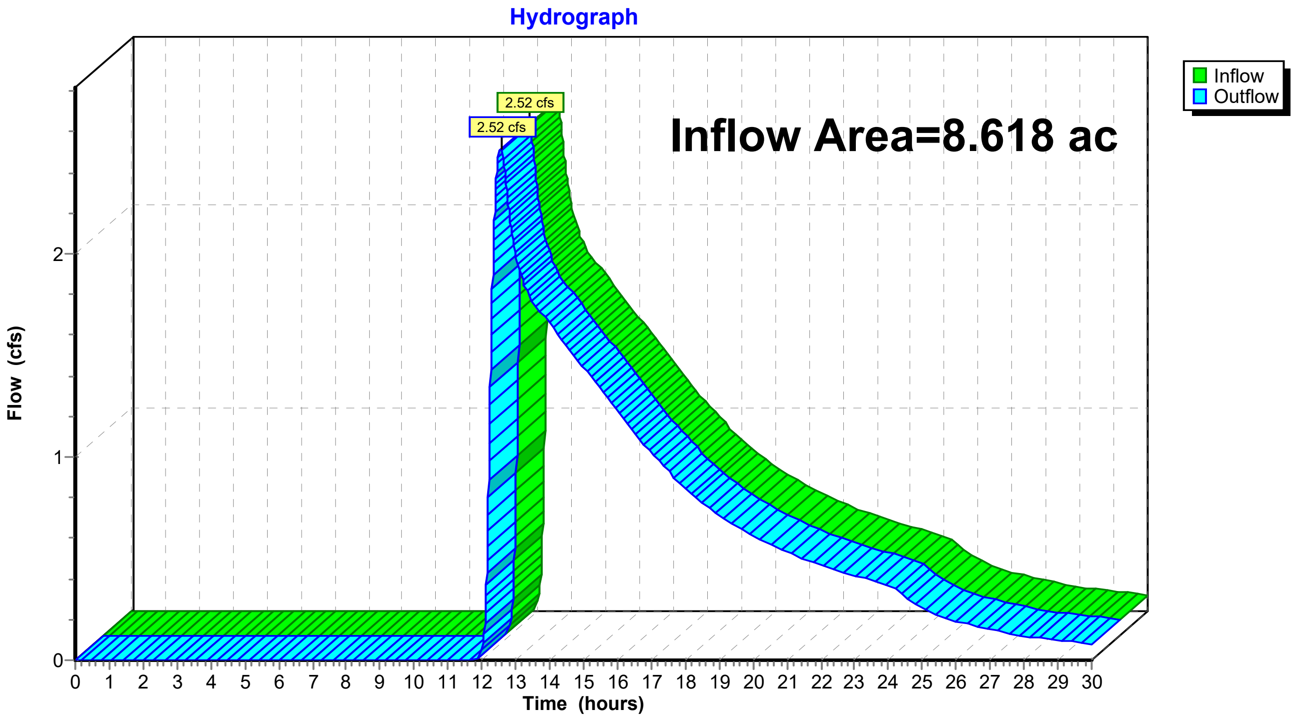


Summary for Reach SP#1: Study Point for Combined Flows

Inflow Area = 8.618 ac, 15.90% Impervious, Inflow Depth > 1.48" for 100-YR MASHPEE ALTAS event
Inflow = 2.52 cfs @ 12.55 hrs, Volume= 1.066 af
Outflow = 2.52 cfs @ 12.55 hrs, Volume= 1.066 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Reach SP#1: Study Point for Combined Flows



Summary for Pond 1P: LB's

Inflow Area =	0.641 ac, 50.86% Impervious,	Inflow Depth = 3.92"	for 100-YR MASHPEE ALTAS event
Inflow =	3.05 cfs @ 12.08 hrs,	Volume=	0.209 af
Outflow =	3.02 cfs @ 12.08 hrs,	Volume=	0.209 af, Atten= 1%, Lag= 0.3 min
Discarded =	0.03 cfs @ 9.90 hrs,	Volume=	0.047 af
Primary =	2.99 cfs @ 12.08 hrs,	Volume=	0.162 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 20.74' @ 12.09 hrs Surf.Area= 887 sf Storage= 507 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 43.1 min (872.1 - 829.0)

Volume	Invert	Avail.Storage	Storage Description
#1	13.50'	192 cf	**10.00'D x 4.50'H Vertical Cone/Cylinder** x 2 707 cf Overall - 226 cf Embedded = 481 cf x 40.0% Voids
#2	14.00'	226 cf	**6.00'D x 4.00'H Vertical Cone/Cylinder** x 2 Inside #1
#3	20.50'	376 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		794 cf	Total Available Storage

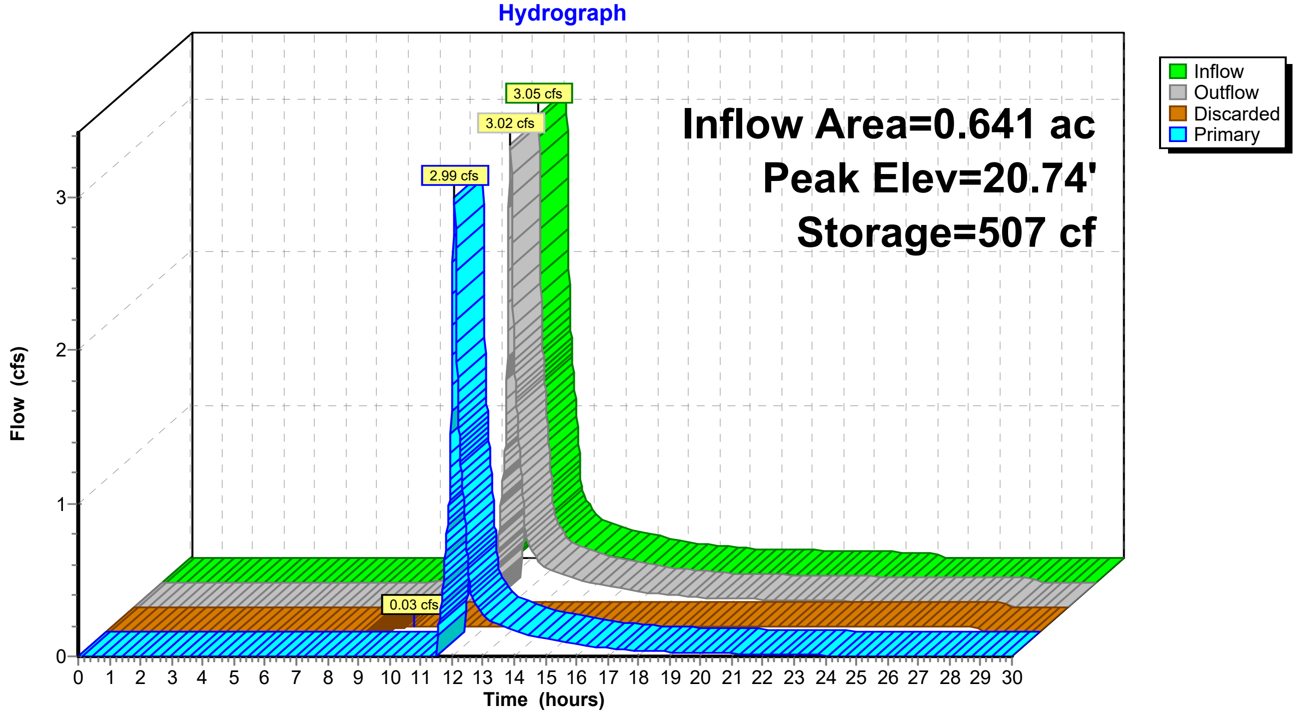
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.50	4	0	0
21.00	1,500	376	376

Device	Routing	Invert	Outlet Devices
#1	Discarded	13.50'	**8.270 in/hr Exfiltration over Surface area from 13.49' - 18.00'** Excluded Surface area = 0 sf
#2	Primary	20.58'	**179.0 deg x 6.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.46 (C= 3.08)

Discarded OutFlow Max=0.03 cfs @ 9.90 hrs HW=13.58' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=2.92 cfs @ 12.08 hrs HW=20.74' TW=20.71' (Dynamic Tailwater)
└─**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 2.92 cfs @ 0.73 fps)

Pond 1P: LB's


Hydrograph
Inflow
Outflow
Discarded
Primary
3.05 cfs
3.02 cfs
2.99 cfs
0.03 cfs
Inflow Area=0.641 ac
Peak Elev=20.74'
Storage=507 cf
Flow (cfs)
0
1
2
3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Time (hours)

Summary for Pond 2P: Natural Low Area

Inflow Area = 0.841 ac, 0.00% Impervious, Inflow Depth = 0.43" for 100-YR MASHPEE ALTAS event
Inflow = 0.11 cfs @ 12.38 hrs, Volume= 0.030 af
Outflow = 0.04 cfs @ 15.61 hrs, Volume= 0.030 af, Atten= 68%, Lag= 193.5 min
Discarded = 0.04 cfs @ 15.61 hrs, Volume= 0.030 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 16.90' @ 15.61 hrs Surf.Area= 661 sf Storage= 293 cf

Plug-Flow detention time= 105.3 min calculated for 0.030 af (100% of inflow)
Center-of-Mass det. time= 105.3 min (1,084.6 - 979.3)

Volume	Invert	Avail.Storage	Storage Description
#1	16.01'	4,754 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

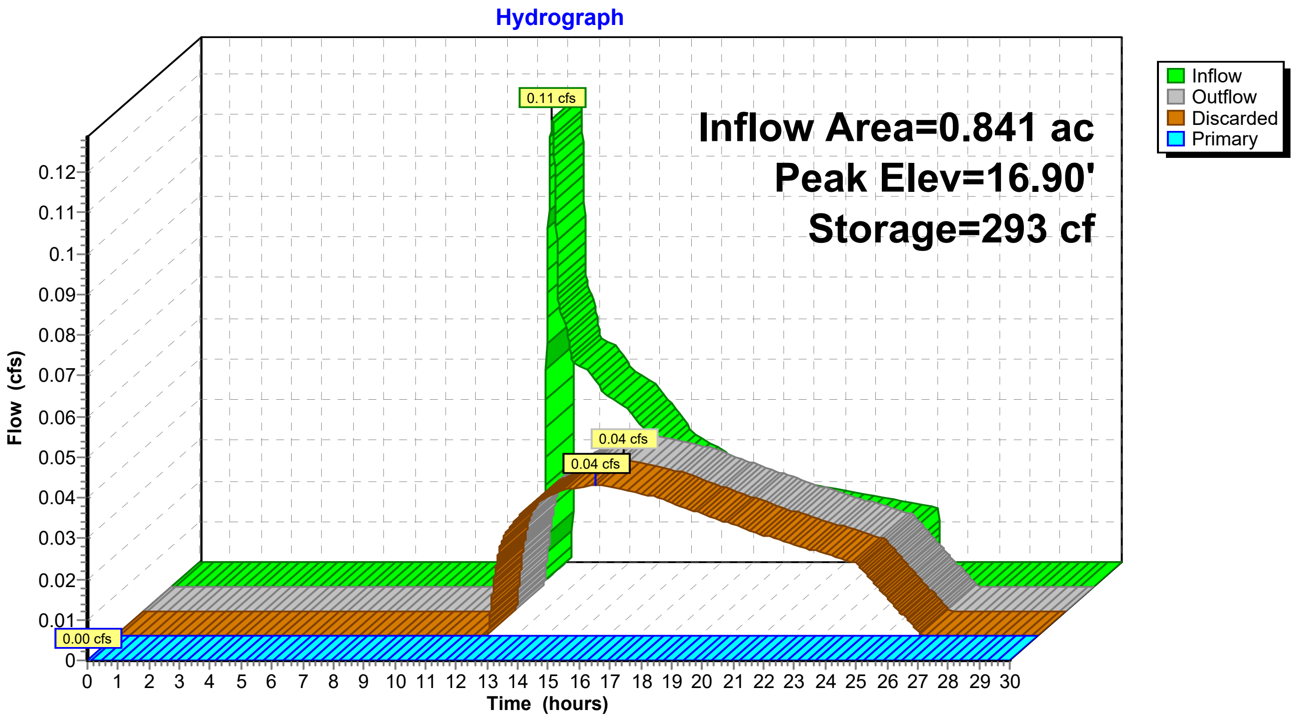
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
16.01	1	0	0
17.00	739	366	366
18.00	6,669	3,704	4,070
18.10	7,000	683	4,754

Device	Routing	Invert	Outlet Devices
#1	Discarded	16.01'	**2.410 in/hr Exfiltration over Surface area from 15.90' - 17.70'** Excluded Surface area = 0 sf
#2	Primary	17.72'	**2.0" x 2.0" Horiz. Orifice/Grate X 36.00** C= 0.600 in 24.0" x 24.0" Grate Limited to weir flow at low heads
#3	Primary	18.00'	**25.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.04 cfs @ 15.61 hrs HW=16.90' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=16.01' TW=17.00' (Dynamic Tailwater)
├─**2=Orifice/Grate** (Controls 0.00 cfs)
└─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Natural Low Area



Summary for Pond 3P: Wet Pond

Inflow Area = 6.351 ac, 20.28% Impervious, Inflow Depth = 1.69" for 100-YR MASHPEE ALTAS event
Inflow = 8.77 cfs @ 12.15 hrs, Volume= 0.894 af
Outflow = 1.28 cfs @ 13.35 hrs, Volume= 0.791 af, Atten= 85%, Lag= 71.8 min
Primary = 1.28 cfs @ 13.35 hrs, Volume= 0.791 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 14.92' @ 13.35 hrs Surf.Area= 30,823 sf Storage= 17,498 cf

Plug-Flow detention time= 250.3 min calculated for 0.791 af (88% of inflow)
Center-of-Mass det. time= 195.4 min (1,053.8 - 858.4)

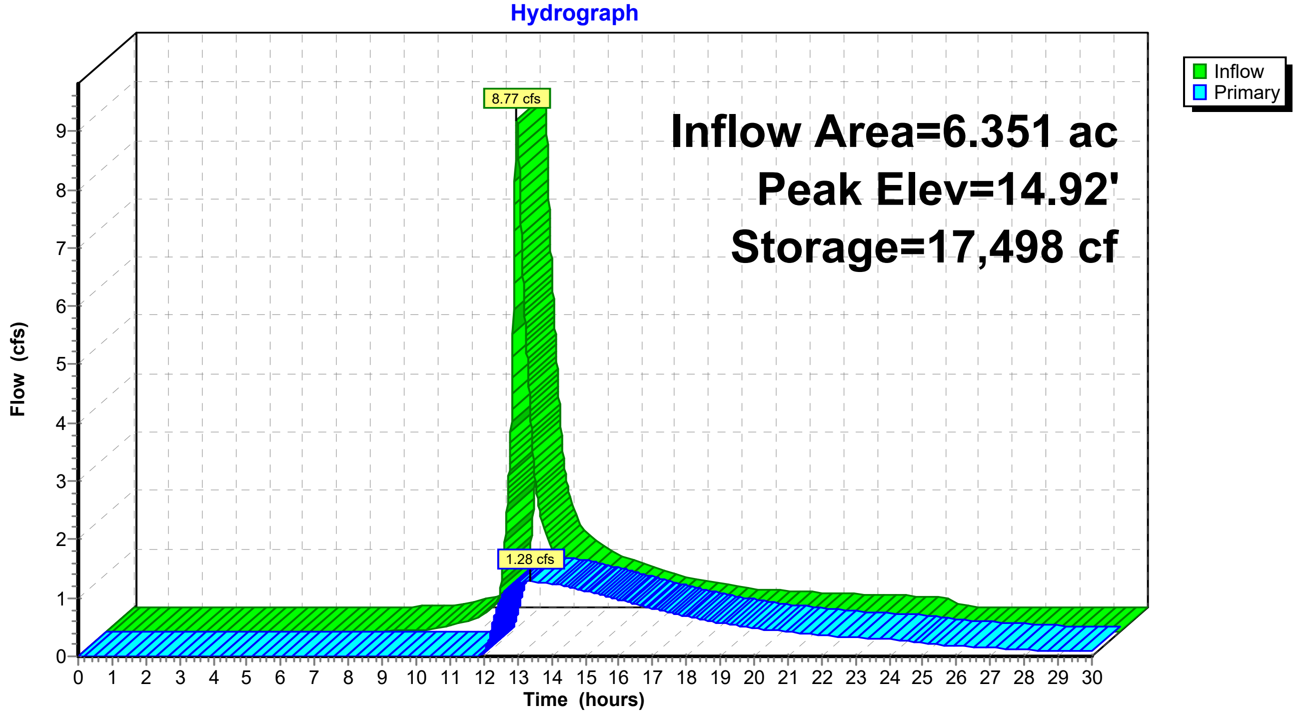
Volume	Invert	Avail.Storage	Storage Description
#1	13.97'	63,264 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
13.97	1	0	0
14.00	56	1	1
14.20	13,877	1,393	1,394
15.00	32,693	18,628	20,022
16.00	53,790	43,242	63,264

Device	Routing	Invert	Outlet Devices
#1	Primary	14.20'	**18.0" Round Culvert** L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 14.20' / 14.20' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Primary	15.00'	**30.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.28 cfs @ 13.35 hrs HW=14.92' TW=14.48' (Dynamic Tailwater)
├─**1=Culvert** (Barrel Controls 1.28 cfs @ 2.23 fps)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

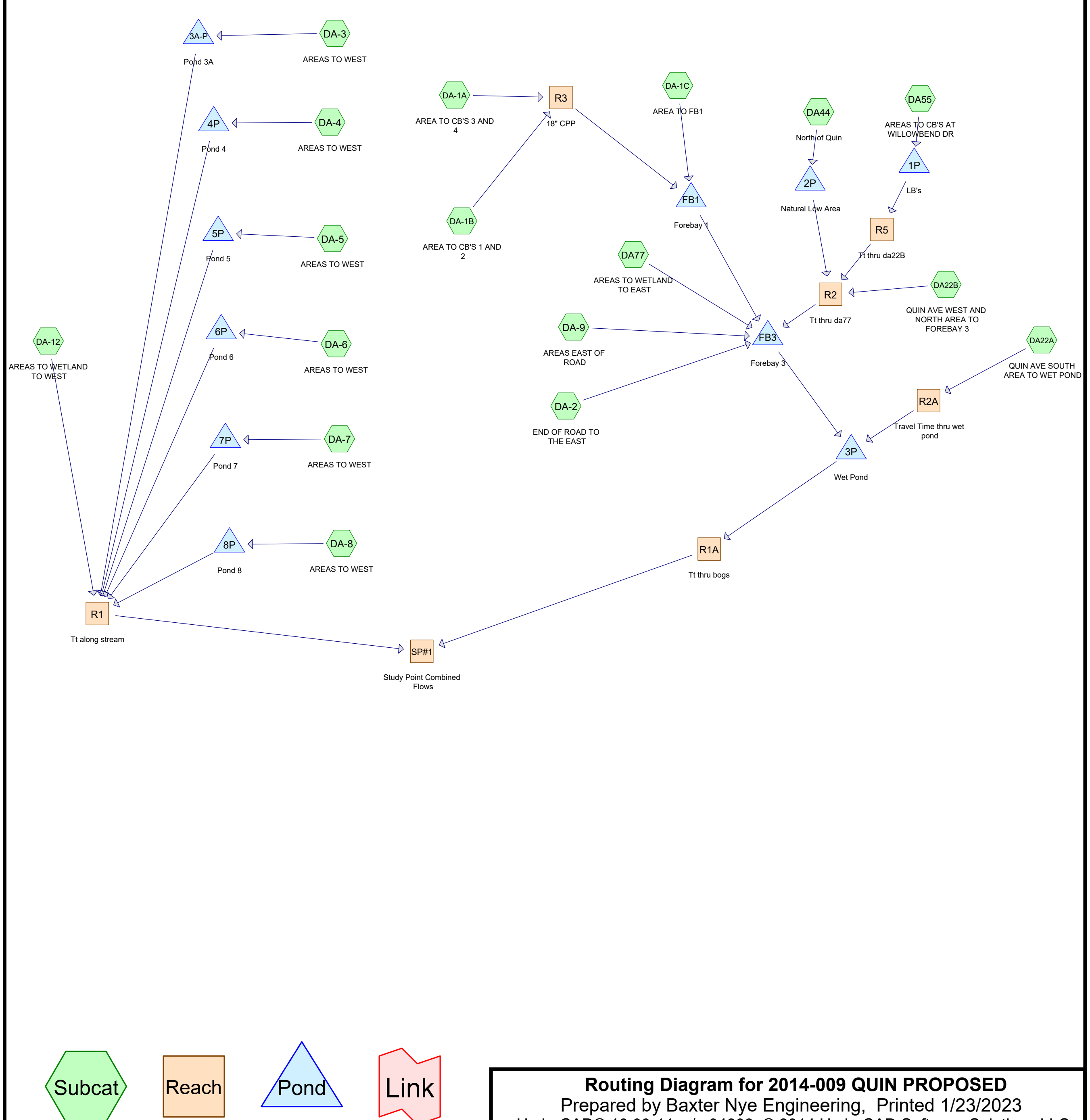
Pond 3P: Wet Pond



APPENDIX D

POST- DEVELOPMENT WATERSHED

RUNOFF & ROUTING



Routing Diagram for 2014-009 QUIN PROPOSED
Prepared by Baxter Nye Engineering, Printed 1/23/2023
HydroCAD® 10.00-11 s/n 04803 © 2014 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.442	39	>75% Grass cover, Good, HSG A (DA-12, DA-1A, DA-1C, DA-2, DA-5, DA-6, DA-7, DA-8, DA-9, DA22A, DA22B, DA77)
0.151	61	>75% Grass cover, Good, HSG B (DA-3, DA-4)
0.023	76	Gravel roads, HSG A (DA-12)
0.022	85	Gravel roads, HSG B (DA-12)
0.442	39	Pasture/grassland/range, Good, HSG A (DA-1B, DA55)
0.326	98	Paved parking, HSG A (DA55)
0.515	98	Roofs, HSG A (DA-1B, DA-2, DA-6, DA-9)
0.084	98	Roofs, HSG B (DA-1A, DA-1C)
1.660	98	Unconnected pavement, HSG A (DA-1A, DA-1B, DA-1C, DA-2, DA-5, DA-6, DA-7, DA-8, DA-9, DA22A, DA22B)
0.113	98	Unconnected pavement, HSG B (DA-12, DA-3, DA-4)
1.686	30	Woods, Good, HSG A (DA-12, DA77)
0.317	55	Woods, Good, HSG B (DA-12)
0.841	32	Woods/grass comb., Good, HSG A (DA44)
8.622	**56**	**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentDA-12: AREAS TO WETLAND Runoff Area=0.793 ac 2.90% Impervious Runoff Depth=0.08"
Tc=5.0 min UI Adjusted CN=45 Runoff=0.01 cfs 0.006 af

SubcatchmentDA-1A: AREA TO CB'S 3 Runoff Area=0.252 ac 59.92% Impervious Runoff Depth=1.24"
Tc=5.0 min CN=74 Runoff=0.36 cfs 0.026 af

SubcatchmentDA-1B: AREA TO CB'S 1 Runoff Area=0.432 ac 70.60% Impervious Runoff Depth=1.71"
Tc=5.0 min CN=81 Runoff=0.89 cfs 0.062 af

SubcatchmentDA-1C: AREA TO FB1 Runoff Area=0.356 ac 32.58% Impervious Runoff Depth=0.45"
Tc=5.0 min CN=58 Runoff=0.11 cfs 0.013 af

SubcatchmentDA-2: END OF ROAD TO Runoff Area=0.536 ac 58.02% Impervious Runoff Depth=1.18"
Flow Length=250' Tc=6.2 min CN=73 Runoff=0.70 cfs 0.053 af

SubcatchmentDA-3: AREAS TO WEST Runoff Area=0.109 ac 21.10% Impervious Runoff Depth=0.75"
Tc=5.0 min UI Adjusted CN=65 Runoff=0.08 cfs 0.007 af

SubcatchmentDA-4: AREAS TO WEST Runoff Area=0.132 ac 50.76% Impervious Runoff Depth=1.64"
Tc=5.0 min CN=80 Runoff=0.26 cfs 0.018 af

SubcatchmentDA-5: AREAS TO WEST Runoff Area=0.124 ac 58.87% Impervious Runoff Depth=1.24"
Tc=5.0 min CN=74 Runoff=0.18 cfs 0.013 af

SubcatchmentDA-6: AREAS TO WEST Runoff Area=0.088 ac 17.05% Impervious Runoff Depth=0.10"
Tc=5.0 min UI Adjusted CN=46 Runoff=0.00 cfs 0.001 af

SubcatchmentDA-7: AREAS TO WEST Runoff Area=0.033 ac 63.64% Impervious Runoff Depth=1.43"
Tc=5.0 min CN=77 Runoff=0.06 cfs 0.004 af

SubcatchmentDA-8: AREAS TO WEST Runoff Area=0.087 ac 35.63% Impervious Runoff Depth=0.53"
Tc=5.0 min CN=60 Runoff=0.04 cfs 0.004 af

SubcatchmentDA-9: AREAS EAST OF Runoff Area=0.558 ac 65.23% Impervious Runoff Depth=1.43"
Tc=5.0 min CN=77 Runoff=0.95 cfs 0.067 af

SubcatchmentDA22A: QUIN AVE SOUTH Runoff Area=0.461 ac 63.56% Impervious Runoff Depth=1.37"
Flow Length=1,172' Tc=6.9 min CN=76 Runoff=0.69 cfs 0.052 af

SubcatchmentDA22B: QUIN AVE WEST Runoff Area=1.335 ac 43.37% Impervious Runoff Depth=0.75"
Flow Length=1,473' Tc=8.8 min CN=65 Runoff=0.88 cfs 0.084 af

SubcatchmentDA44: North of Quin Runoff Area=0.841 ac 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=32 Runoff=0.00 cfs 0.000 af

SubcatchmentDA55: AREAS TO CB'S AT Runoff Area=0.641 ac 50.86% Impervious Runoff Depth=0.95"
Tc=5.0 min CN=69 Runoff=0.67 cfs 0.051 af

Subcatchment DA77: AREAS TO WETLAND Runoff Area=1.844 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=431' Tc=26.3 min CN=32 Runoff=0.00 cfs 0.000 af

Reach R1: Tt along stream Avg. Flow Depth=0.07' Max Vel=0.28 fps Inflow=0.21 cfs 0.011 af
n=0.040 L=550.0' S=0.0035 '/' Capacity=69.34 cfs Outflow=0.05 cfs 0.011 af

Reach R1A: Tt thru bogs Avg. Flow Depth=0.00' Max Vel=0.15 fps Inflow=0.00 cfs 0.003 af
n=0.040 L=520.0' S=0.0029 '/' Capacity=50.84 cfs Outflow=0.00 cfs 0.003 af

Reach R2: Tt thru da77 Avg. Flow Depth=0.10' Max Vel=0.71 fps Inflow=0.99 cfs 0.101 af
n=0.030 L=210.0' S=0.0095 '/' Capacity=50.53 cfs Outflow=0.93 cfs 0.101 af

Reach R2A: Travel Time thru wet pond Avg. Flow Depth=0.14' Max Vel=2.41 fps Inflow=0.69 cfs 0.052 af
n=0.025 L=255.0' S=0.0267 '/' Capacity=13.24 cfs Outflow=0.68 cfs 0.052 af

Reach R3: 18" CPP Avg. Flow Depth=0.51' Max Vel=2.37 fps Inflow=1.25 cfs 0.088 af
18.0" Round Pipe n=0.012 L=81.0' S=0.0020 '/' Capacity=5.06 cfs Outflow=1.25 cfs 0.088 af

Reach R5: Tt thru da22B Avg. Flow Depth=0.05' Max Vel=1.39 fps Inflow=0.38 cfs 0.017 af
n=0.013 L=246.0' S=0.0146 '/' Capacity=75.75 cfs Outflow=0.31 cfs 0.017 af

Reach SP#1: Study Point Combined Flows Inflow=0.05 cfs 0.014 af
Outflow=0.05 cfs 0.014 af

Pond 1P: LB's Peak Elev=20.64' Storage=448 cf Inflow=0.67 cfs 0.051 af
Discarded=0.03 cfs 0.033 af Primary=0.38 cfs 0.017 af Outflow=0.41 cfs 0.051 af

Pond 2P: Natural Low Area Peak Elev=16.01' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond 3A-P: Pond 3A Peak Elev=17.33' Storage=97 cf Inflow=0.08 cfs 0.007 af
Discarded=0.01 cfs 0.007 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.007 af

Pond 3P: Wet Pond Peak Elev=14.26' Storage=2,214 cf Inflow=0.68 cfs 0.052 af
Outflow=0.00 cfs 0.003 af

Pond 4P: Pond 4 Peak Elev=18.01' Storage=236 cf Inflow=0.26 cfs 0.018 af
Discarded=0.01 cfs 0.013 af Primary=0.21 cfs 0.005 af Outflow=0.22 cfs 0.018 af

Pond 5P: Pond 5 Peak Elev=19.00' Storage=228 cf Inflow=0.18 cfs 0.013 af
Discarded=0.02 cfs 0.012 af Primary=0.01 cfs 0.000 af Outflow=0.03 cfs 0.013 af

Pond 6P: Pond 6 Peak Elev=18.06' Storage=1 cf Inflow=0.00 cfs 0.001 af
Discarded=0.00 cfs 0.001 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.001 af

Pond 7P: Pond 7 Peak Elev=17.88' Storage=65 cf Inflow=0.06 cfs 0.004 af
Discarded=0.01 cfs 0.004 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.004 af

Pond 8P: Pond 8 Peak Elev=17.01' Storage=6 cf Inflow=0.04 cfs 0.004 af
Discarded=0.02 cfs 0.004 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.004 af

Pond FB1: Forebay 1 Peak Elev=16.48' Storage=2,008 cf Inflow=1.36 cfs 0.101 af
Discarded=0.09 cfs 0.101 af Primary=0.00 cfs 0.000 af Outflow=0.09 cfs 0.101 af

Pond FB3: Forebay 3 Peak Elev=15.65' Storage=3,311 cf Inflow=2.06 cfs 0.220 af
Discarded=0.33 cfs 0.220 af Primary=0.00 cfs 0.000 af Outflow=0.33 cfs 0.220 af

Total Runoff Area = 8.622 ac Runoff Volume = 0.459 af Average Runoff Depth = 0.64"
68.71% Pervious = 5.924 ac 31.29% Impervious = 2.698 ac

Summary for Subcatchment DA-12: AREAS TO WETLAND TO WEST

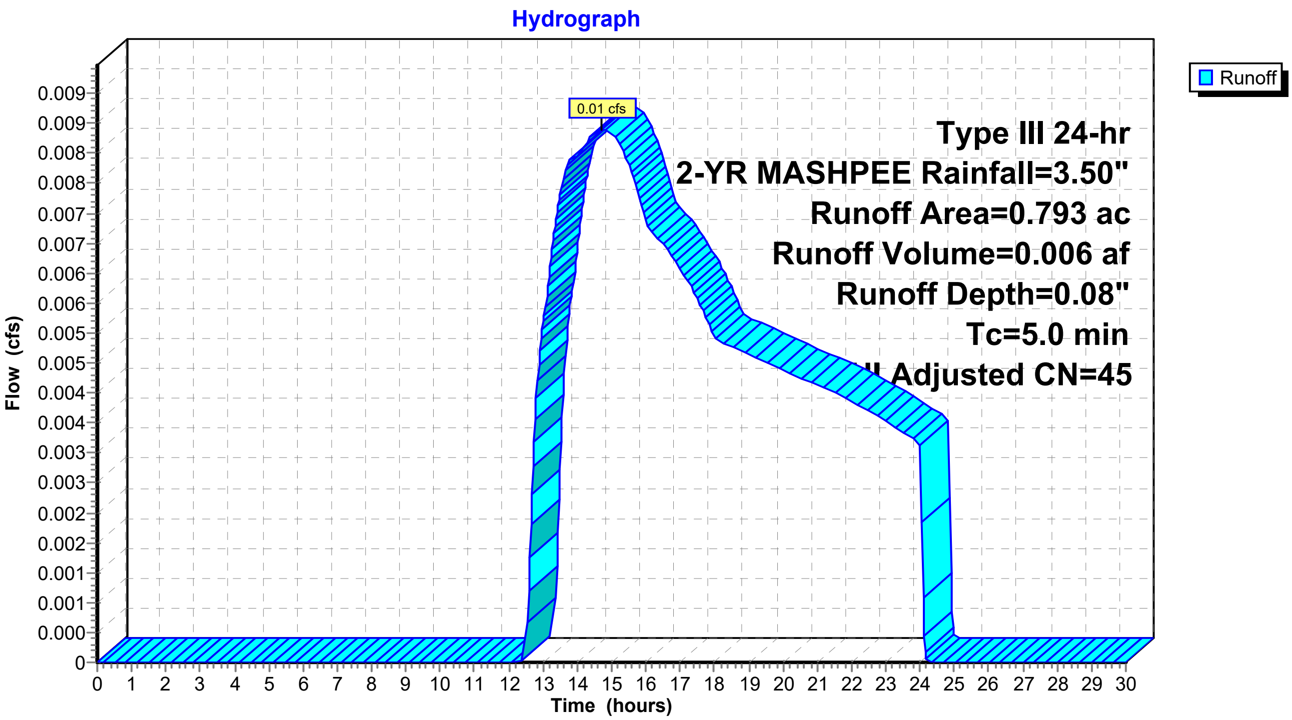
Runoff = 0.01 cfs @ 14.73 hrs, Volume= 0.006 af, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Adj	Description
0.090	39		>75% Grass cover, Good, HSG A
0.318	30		Woods, Good, HSG A
0.023	76		Gravel roads, HSG A
0.023	98		Unconnected pavement, HSG B
0.317	55		Woods, Good, HSG B
0.022	85		Gravel roads, HSG B
0.793	46	45	Weighted Average, UI Adjusted
0.770			97.10% Pervious Area
0.023			2.90% Impervious Area
0.023			100.00% Unconnected

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

Subcatchment DA-12: AREAS TO WETLAND TO WEST



Summary for Subcatchment DA-1A: AREA TO CB'S 3 AND 4

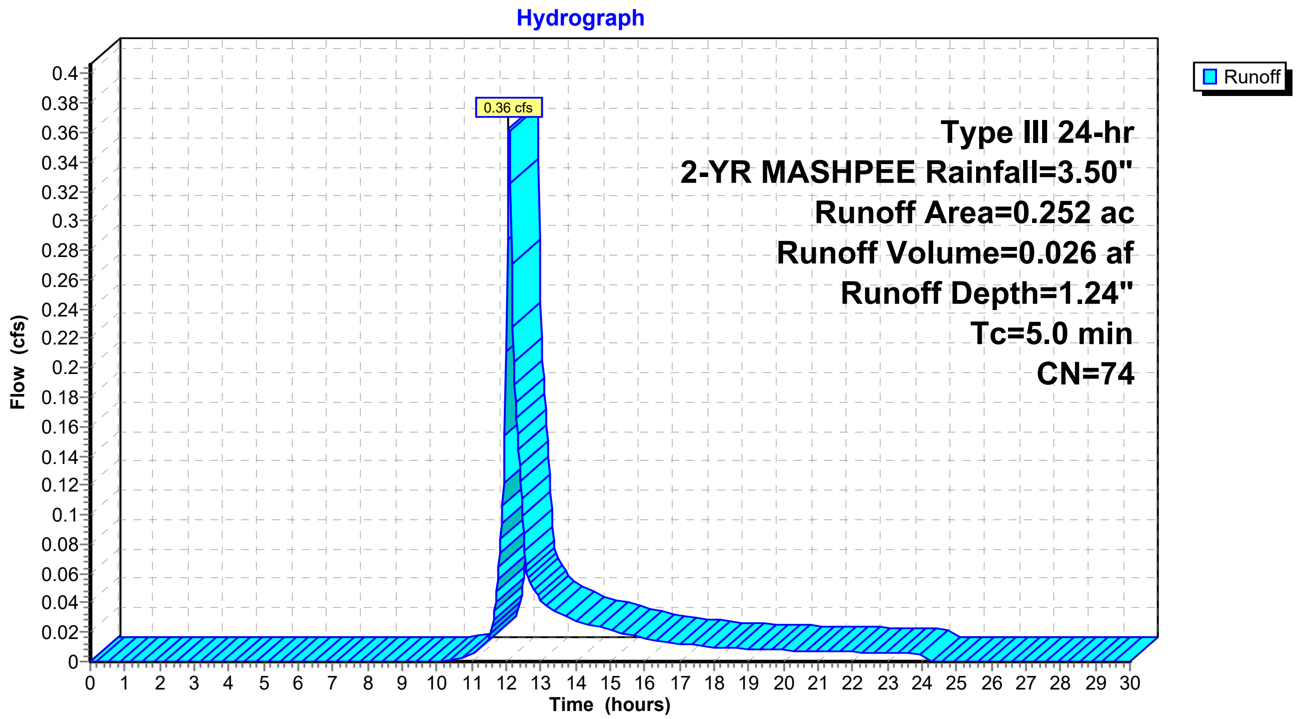
Runoff = 0.36 cfs @ 12.08 hrs, Volume= 0.026 af, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.101	39	>75% Grass cover, Good, HSG A
0.109	98	Unconnected pavement, HSG A
0.042	98	Roofs, HSG B
0.252	74	Weighted Average
0.101		40.08% Pervious Area
0.151		59.92% Impervious Area
0.109		72.19% Unconnected

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

Subcatchment DA-1A: AREA TO CB'S 3 AND 4



Summary for Subcatchment DA-1B: AREA TO CB'S 1 AND 2

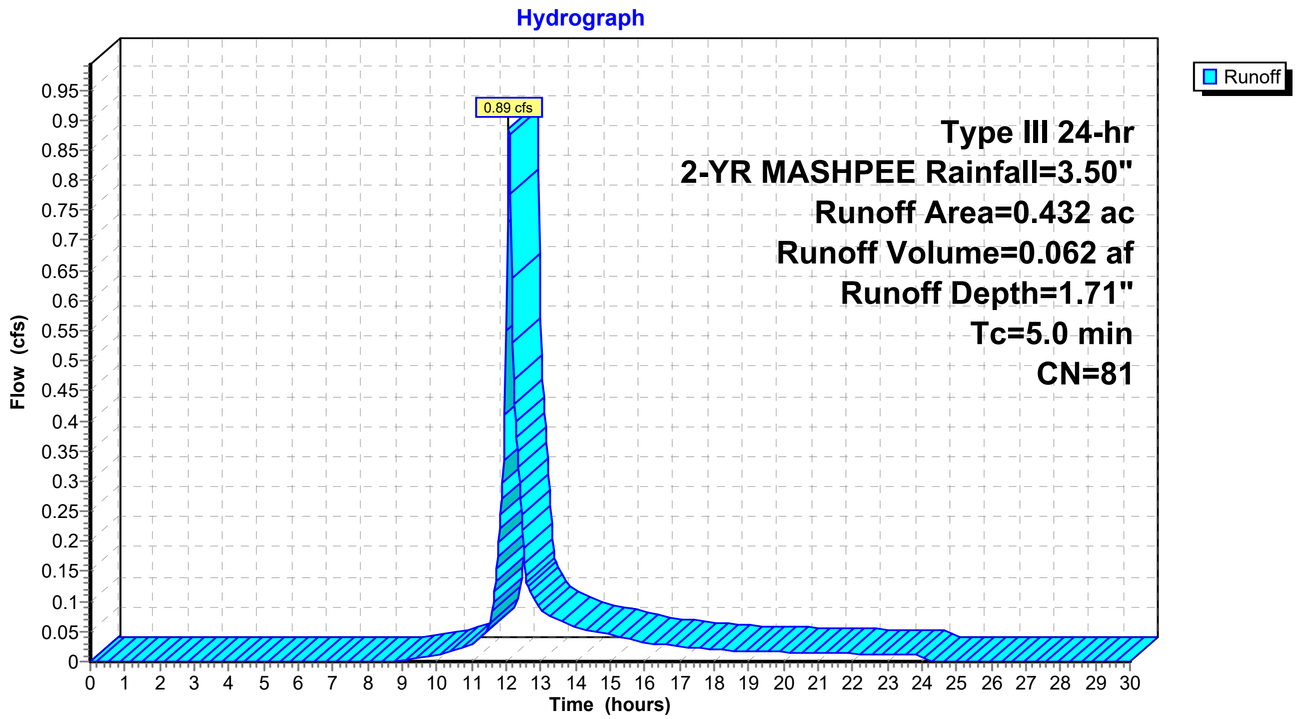
Runoff = 0.89 cfs @ 12.08 hrs, Volume= 0.062 af, Depth= 1.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.137	98	Unconnected pavement, HSG A
0.127	39	Pasture/grassland/range, Good, HSG A
0.168	98	Roofs, HSG A
0.432	81	Weighted Average
0.127		29.40% Pervious Area
0.305		70.60% Impervious Area
0.137		44.92% Unconnected

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

Subcatchment DA-1B: AREA TO CB'S 1 AND 2



Summary for Subcatchment DA-1C: AREA TO FB1

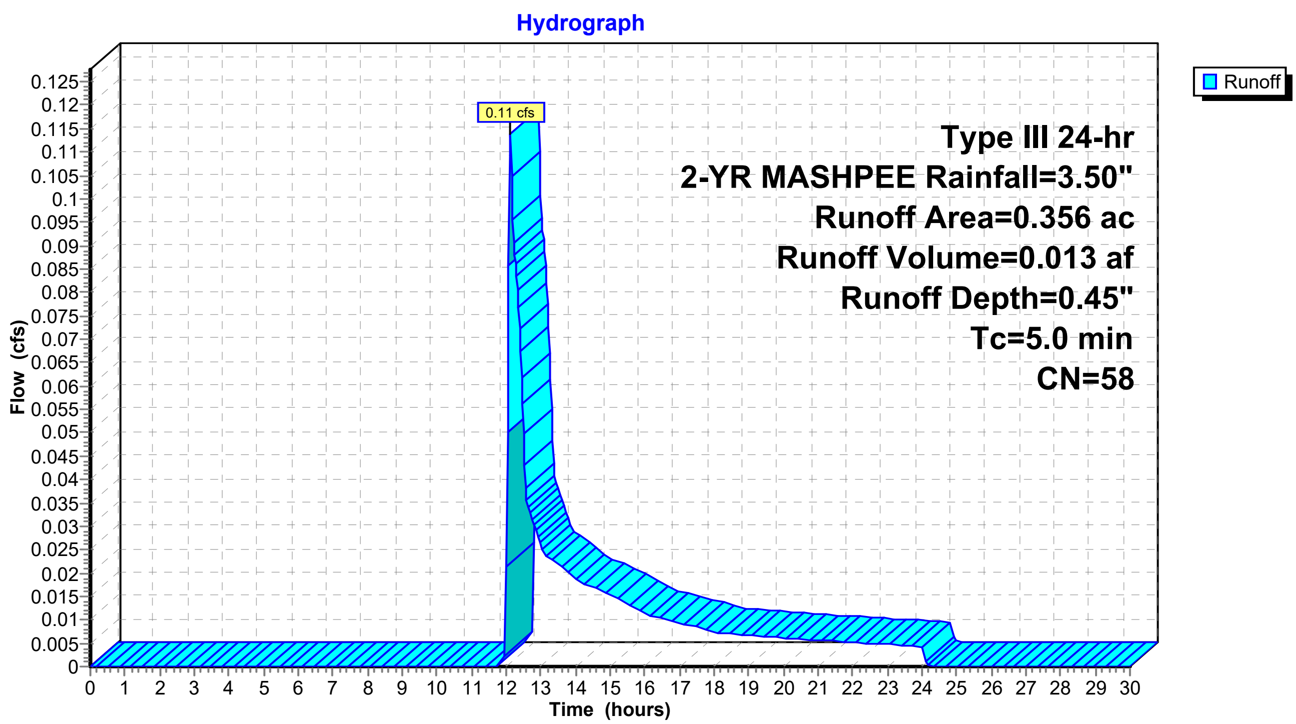
Runoff = 0.11 cfs @ 12.11 hrs, Volume= 0.013 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.240	39	>75% Grass cover, Good, HSG A
0.074	98	Unconnected pavement, HSG A
0.042	98	Roofs, HSG B
0.356	58	Weighted Average
0.240		67.42% Pervious Area
0.116		32.58% Impervious Area
0.074		63.79% Unconnected

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

Subcatchment DA-1C: AREA TO FB1



Summary for Subcatchment DA-2: END OF ROAD TO THE EAST

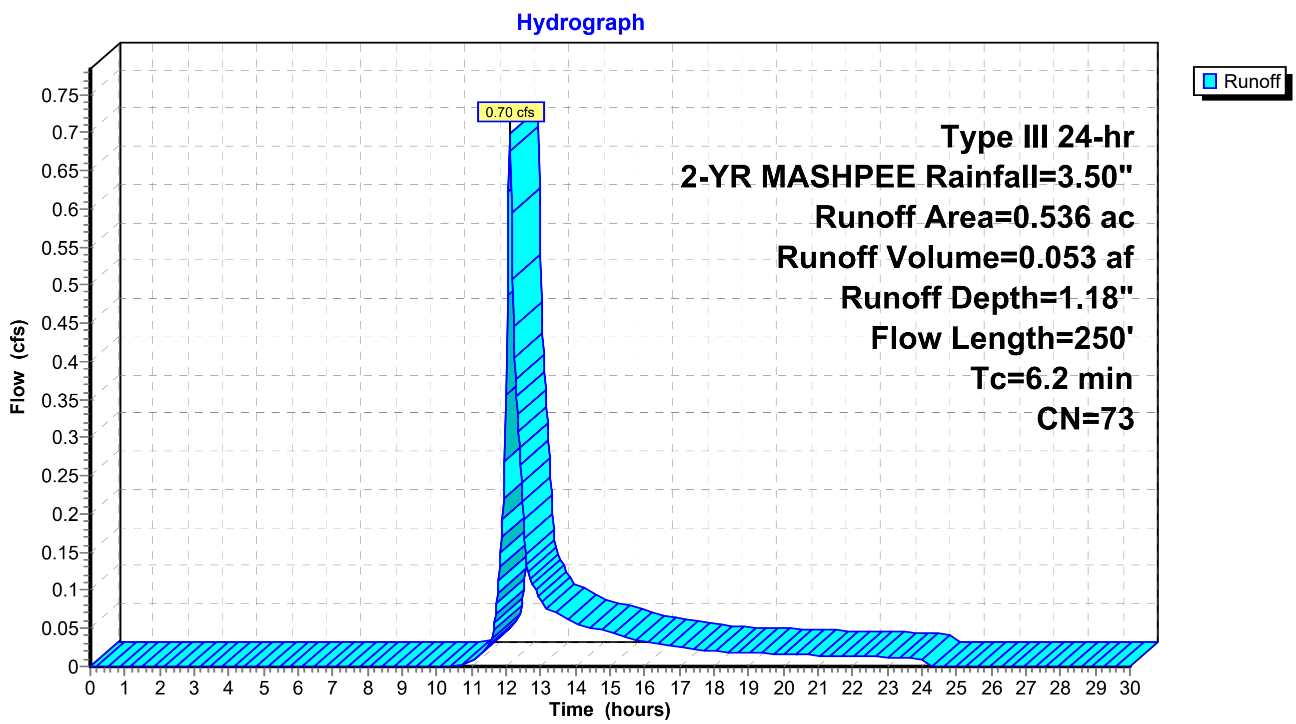
Runoff = 0.70 cfs @ 12.10 hrs, Volume= 0.053 af, Depth= 1.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.225	39	>75% Grass cover, Good, HSG A
0.181	98	Unconnected pavement, HSG A
0.130	98	Roofs, HSG A
0.536	73	Weighted Average
0.225		41.98% Pervious Area
0.311		58.02% Impervious Area
0.181		58.20% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	30	0.0200	0.10		**Sheet Flow, LAWN** Grass: Dense n= 0.240 P2= 3.55"
0.5	80	0.0200	2.87		**Shallow Concentrated Flow, ROAD** Paved Kv= 20.3 fps
0.5	140	0.0100	4.91	3.86	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
6.2	250	Total			

Subcatchment DA-2: END OF ROAD TO THE EAST



Summary for Subcatchment DA-3: AREAS TO WEST

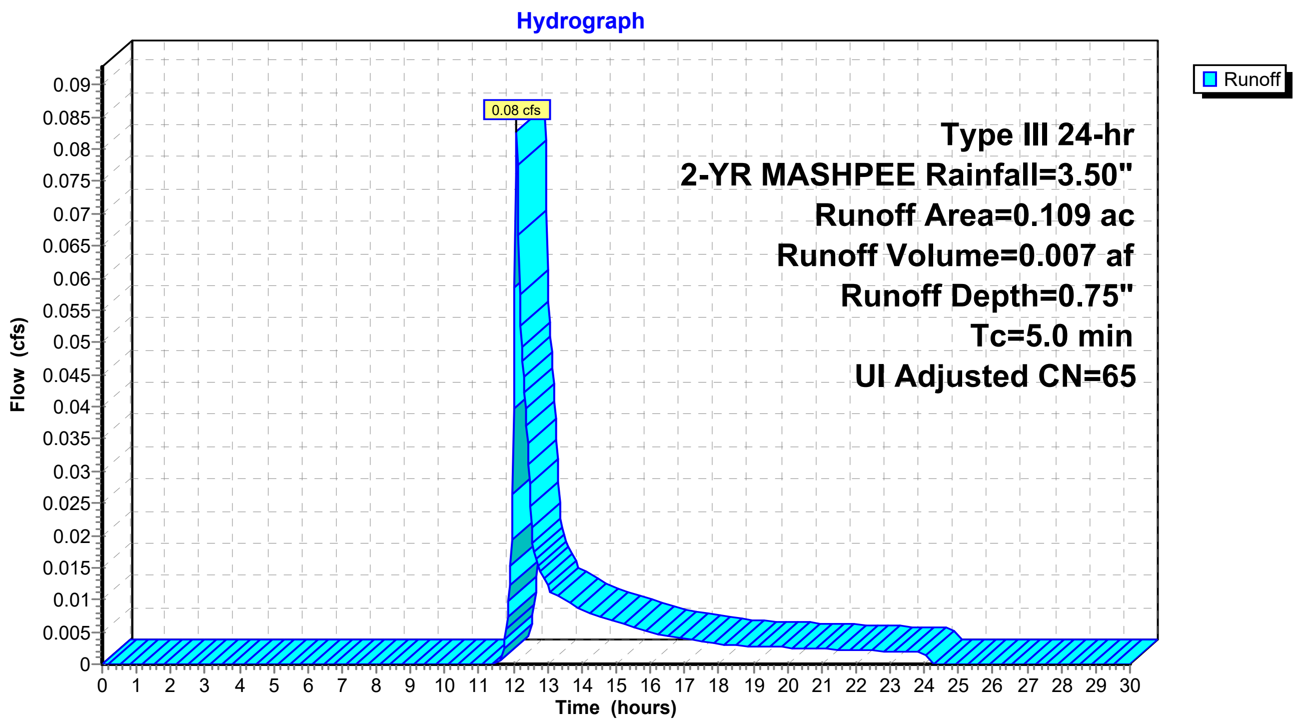
Runoff = 0.08 cfs @ 12.09 hrs, Volume= 0.007 af, Depth= 0.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Adj	Description
0.086	61		>75% Grass cover, Good, HSG B
0.023	98		Unconnected pavement, HSG B
0.109	69	65	Weighted Average, UI Adjusted
0.086			78.90% Pervious Area
0.023			21.10% Impervious Area
0.023			100.00% Unconnected

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

Subcatchment DA-3: AREAS TO WEST



Summary for Subcatchment DA-4: AREAS TO WEST

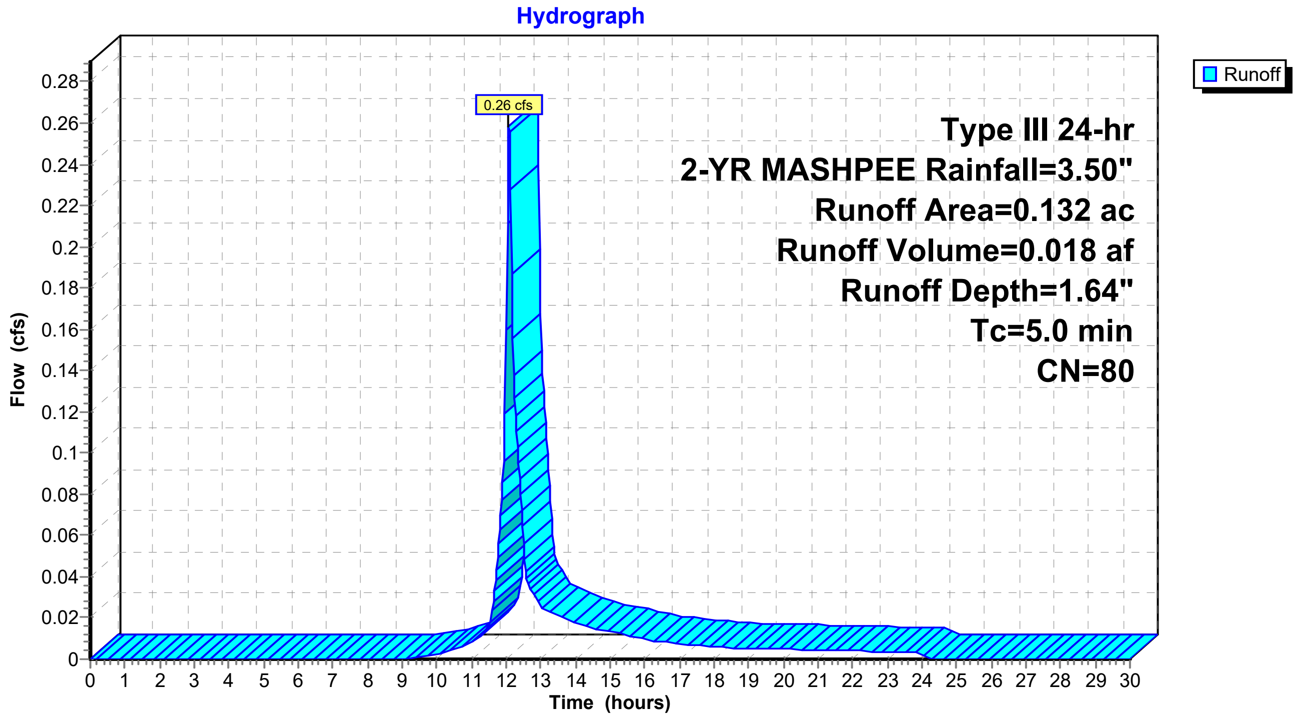
Runoff = 0.26 cfs @ 12.08 hrs, Volume= 0.018 af, Depth= 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.065	61	>75% Grass cover, Good, HSG B
0.067	98	Unconnected pavement, HSG B
0.132	80	Weighted Average
0.065		49.24% Pervious Area
0.067		50.76% Impervious Area
0.067		100.00% Unconnected

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

Subcatchment DA-4: AREAS TO WEST



Summary for Subcatchment DA-5: AREAS TO WEST

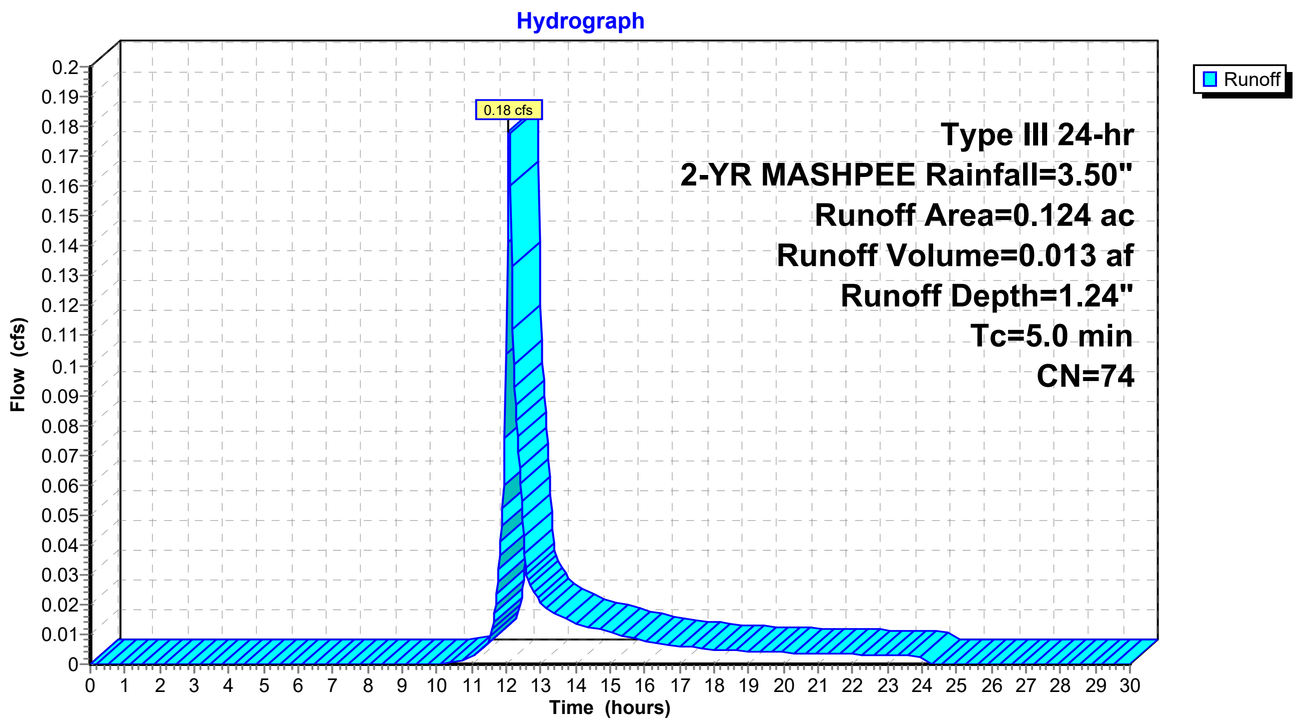
Runoff = 0.18 cfs @ 12.08 hrs, Volume= 0.013 af, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.051	39	>75% Grass cover, Good, HSG A
0.073	98	Unconnected pavement, HSG A
0.124	74	Weighted Average
0.051		41.13% Pervious Area
0.073		58.87% Impervious Area
0.073		100.00% Unconnected

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

Subcatchment DA-5: AREAS TO WEST



Summary for Subcatchment DA-6: AREAS TO WEST

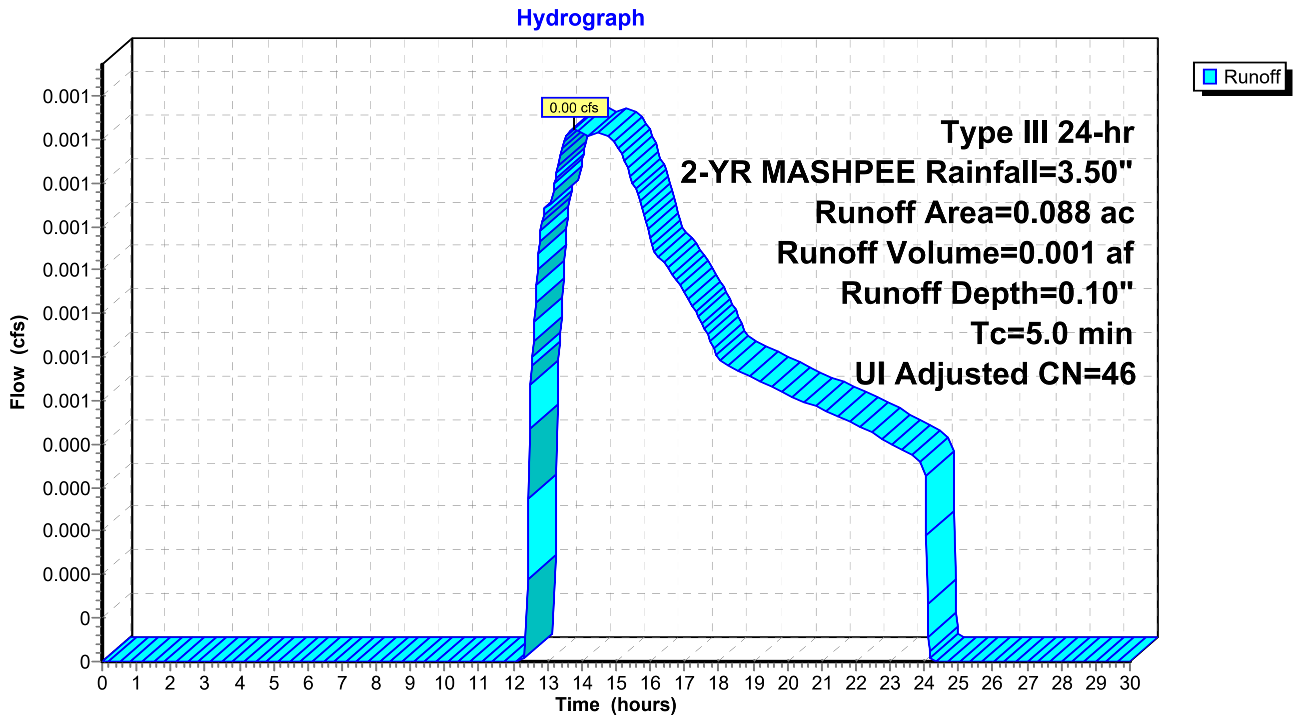
Runoff = 0.00 cfs @ 13.77 hrs, Volume= 0.001 af, Depth= 0.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Adj	Description
0.073	39		>75% Grass cover, Good, HSG A
0.008	98		Unconnected pavement, HSG A
0.007	98		Roofs, HSG A
0.088	49	46	Weighted Average, UI Adjusted
0.073			82.95% Pervious Area
0.015			17.05% Impervious Area
0.008			53.33% Unconnected

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

Subcatchment DA-6: AREAS TO WEST



Summary for Subcatchment DA-7: AREAS TO WEST

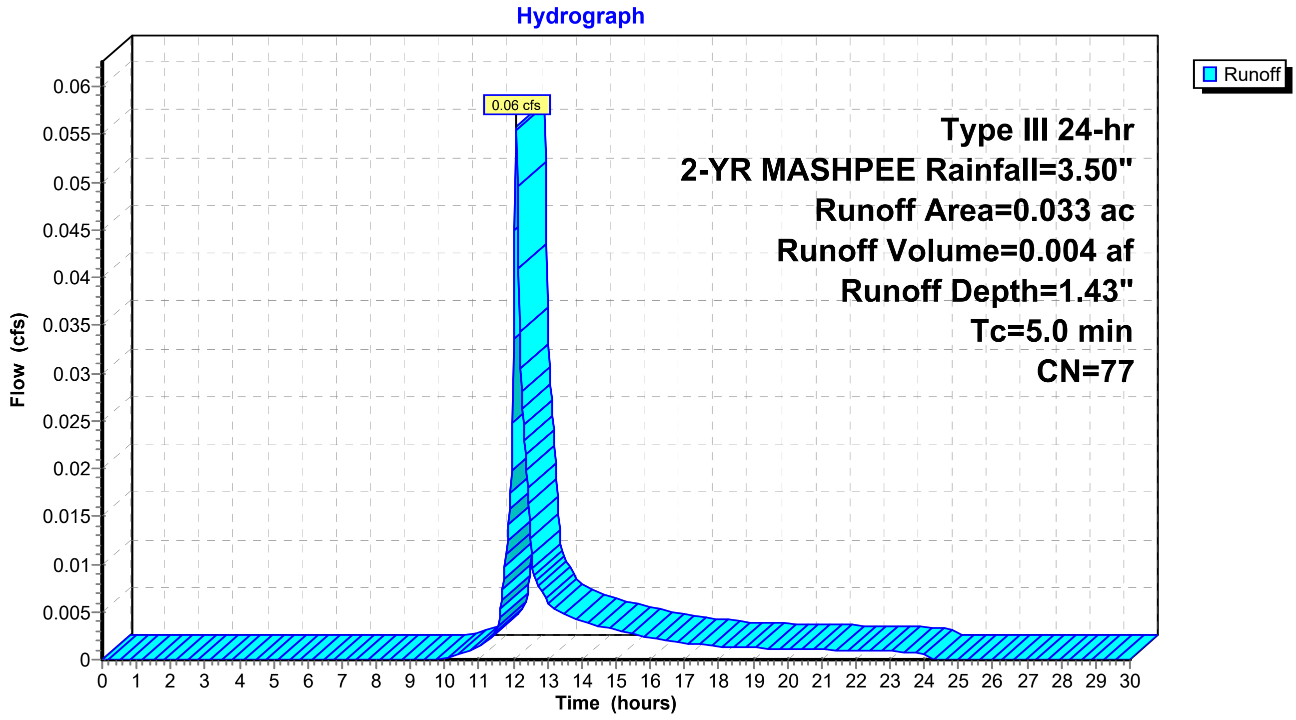
Runoff = 0.06 cfs @ 12.08 hrs, Volume= 0.004 af, Depth= 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.012	39	>75% Grass cover, Good, HSG A
0.021	98	Unconnected pavement, HSG A
0.033	77	Weighted Average
0.012		36.36% Pervious Area
0.021		63.64% Impervious Area
0.021		100.00% Unconnected

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

Subcatchment DA-7: AREAS TO WEST



Summary for Subcatchment DA-8: AREAS TO WEST

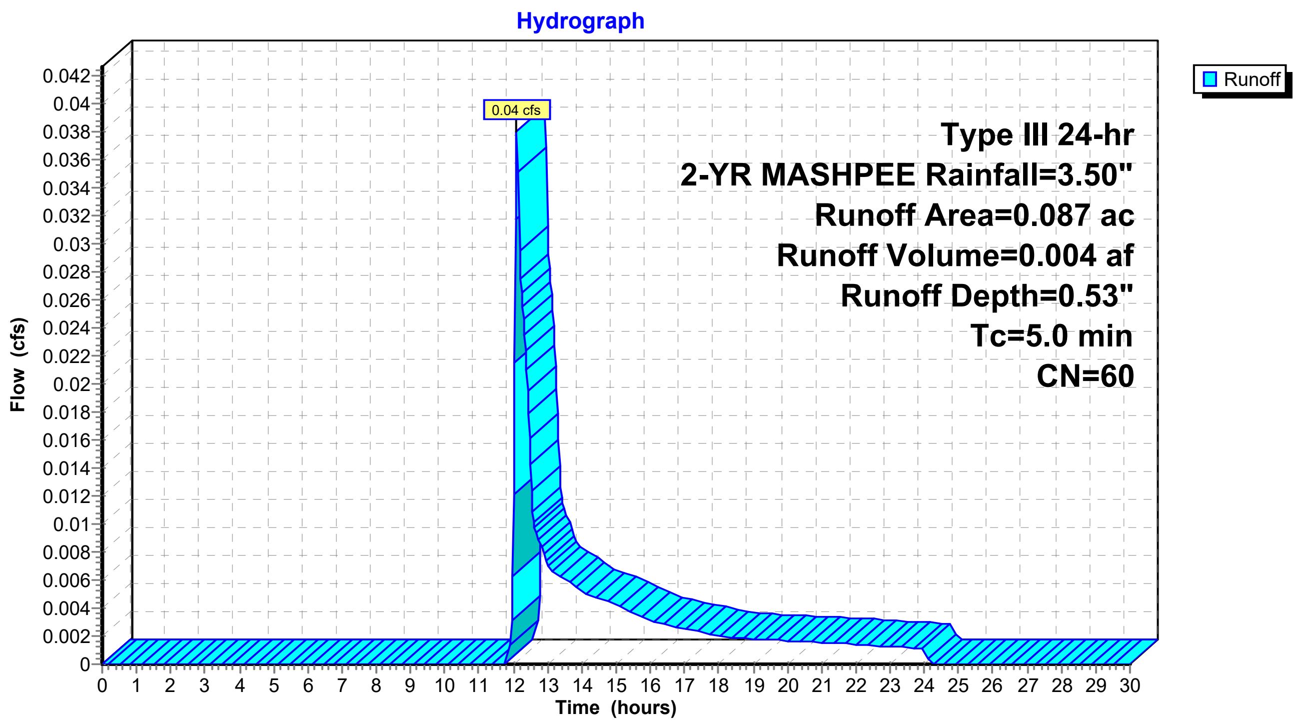
Runoff = 0.04 cfs @ 12.10 hrs, Volume= 0.004 af, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.056	39	>75% Grass cover, Good, HSG A
0.031	98	Unconnected pavement, HSG A
0.087	60	Weighted Average
0.056		64.37% Pervious Area
0.031		35.63% Impervious Area
0.031		100.00% Unconnected

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

Subcatchment DA-8: AREAS TO WEST



Summary for Subcatchment DA-9: AREAS EAST OF ROAD

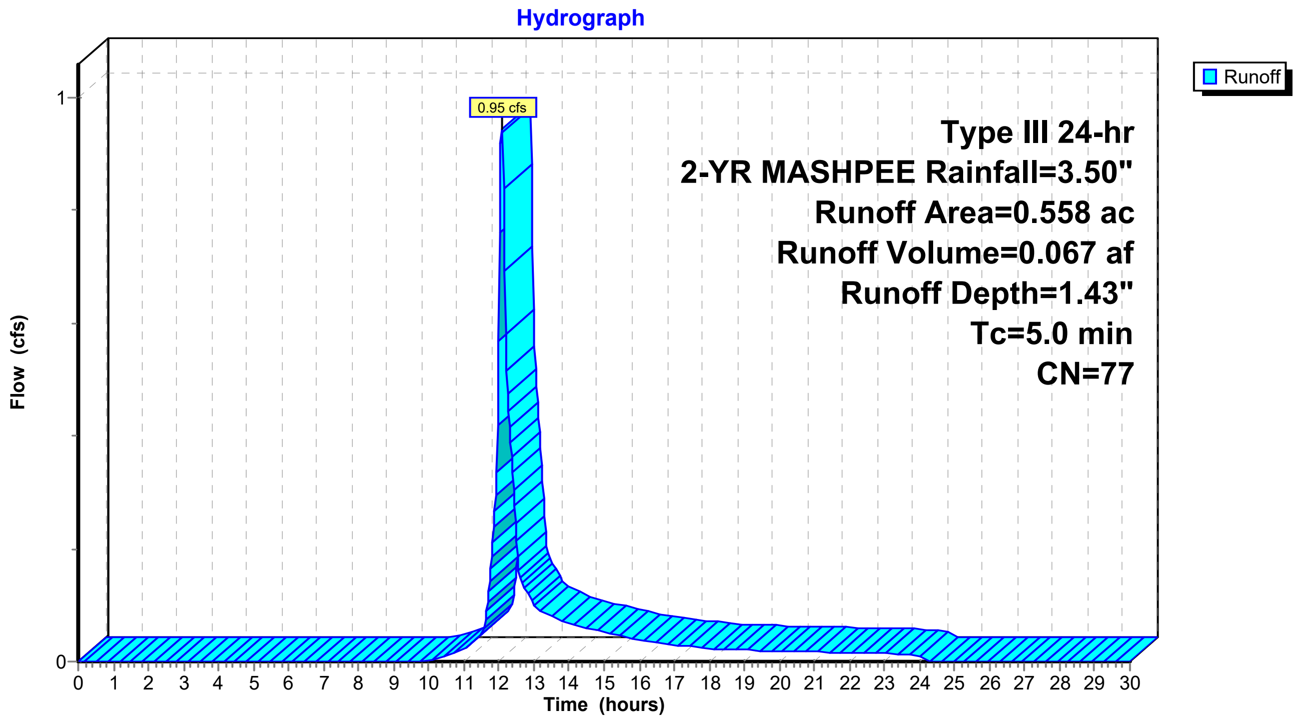
Runoff = 0.95 cfs @ 12.08 hrs, Volume= 0.067 af, Depth= 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.194	39	>75% Grass cover, Good, HSG A
0.154	98	Unconnected pavement, HSG A
0.210	98	Roofs, HSG A
0.558	77	Weighted Average
0.194		34.77% Pervious Area
0.364		65.23% Impervious Area
0.154		42.31% Unconnected

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

Subcatchment DA-9: AREAS EAST OF ROAD



Summary for Subcatchment DA22A: QUIN AVE SOUTH AREA TO WET POND

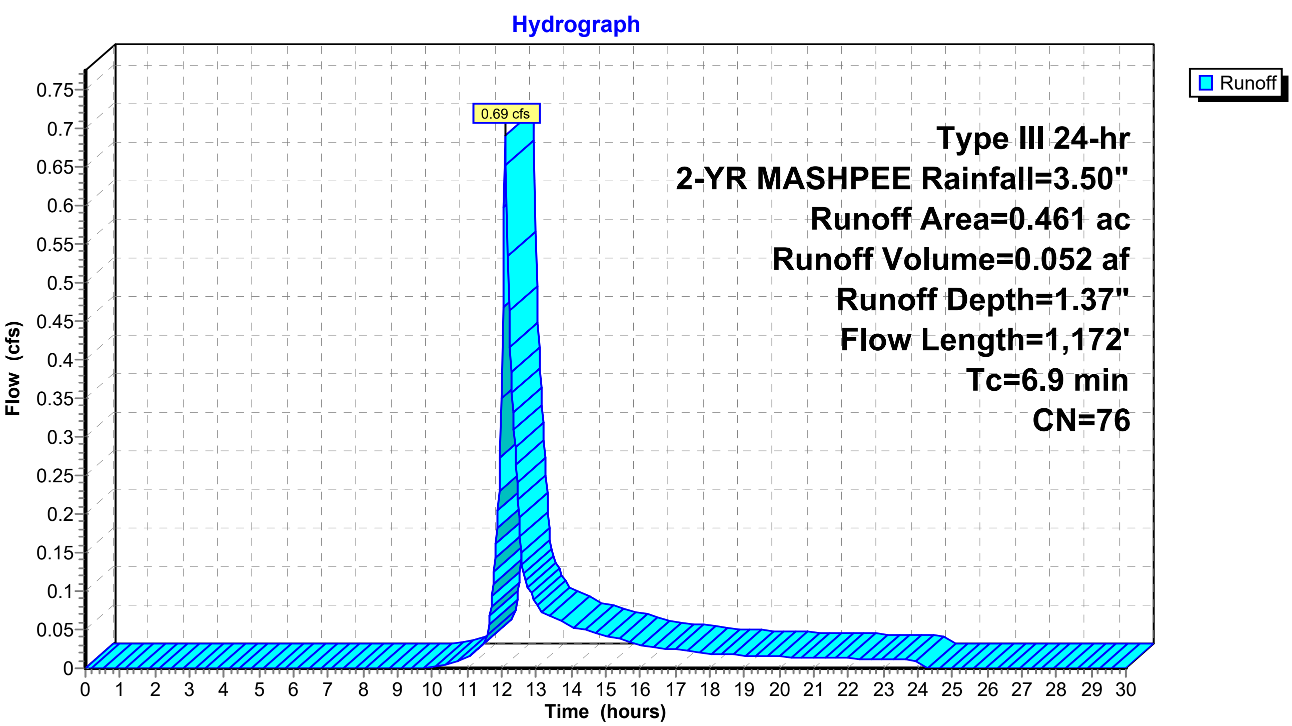
Runoff = 0.69 cfs @ 12.11 hrs, Volume= 0.052 af, Depth= 1.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.293	98	Unconnected pavement, HSG A
0.168	39	>75% Grass cover, Good, HSG A
0.461	76	Weighted Average
0.168		36.44% Pervious Area
0.293		63.56% Impervious Area
0.293		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.96		**Sheet Flow, A** Smooth surfaces n= 0.011 P2= 3.55"
6.0	1,122	0.0236	3.12		**Shallow Concentrated Flow, B** Paved Kv= 20.3 fps
6.9	1,172	Total			

Subcatchment DA22A: QUIN AVE SOUTH AREA TO WET POND



Summary for Subcatchment DA22B: QUIN AVE WEST AND NORTH AREA TO FOREBAY 3

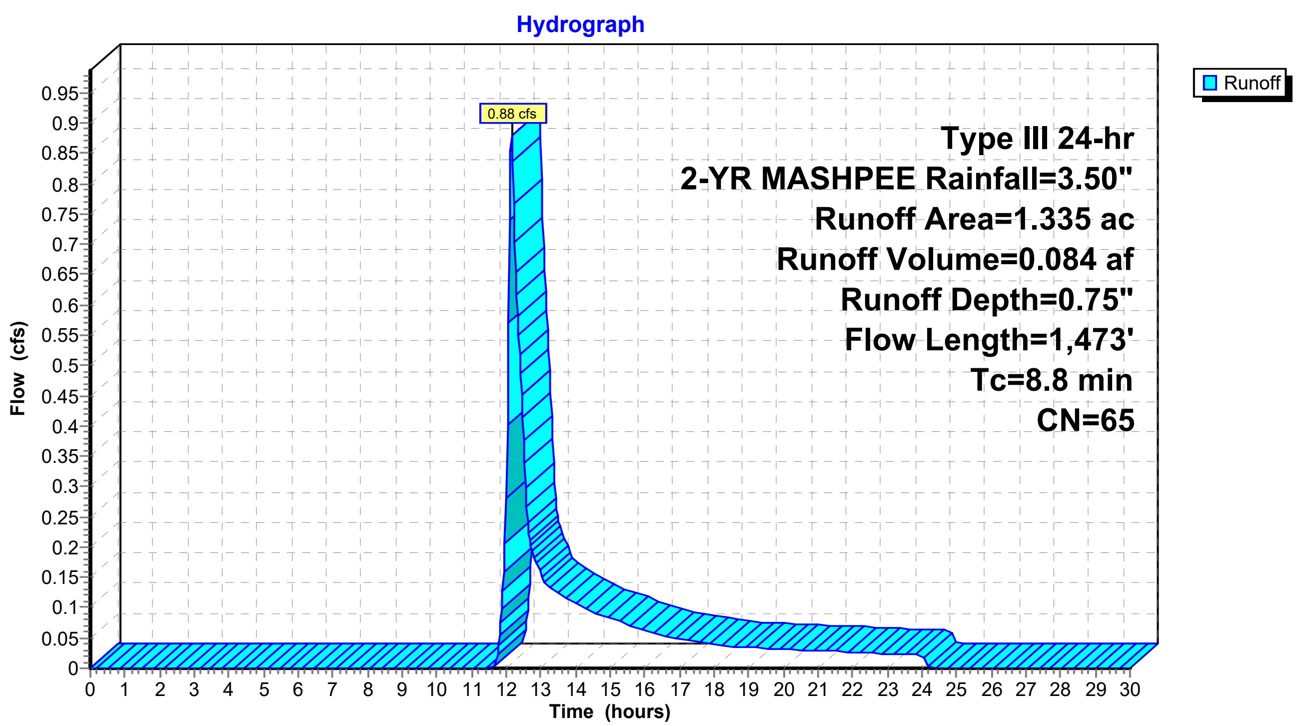
Runoff = 0.88 cfs @ 12.15 hrs, Volume= 0.084 af, Depth= 0.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.579	98	Unconnected pavement, HSG A
0.756	39	>75% Grass cover, Good, HSG A
1.335	65	Weighted Average
0.756		56.63% Pervious Area
0.579		43.37% Impervious Area
0.579		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.96		**Sheet Flow, A** Smooth surfaces n= 0.011 P2= 3.55"
7.9	1,423	0.0220	3.01		**Shallow Concentrated Flow, B** Paved Kv= 20.3 fps
8.8	1,473	Total			

Subcatchment DA22B: QUIN AVE WEST AND NORTH AREA TO FOREBAY 3



Summary for Subcatchment DA44: North of Quin

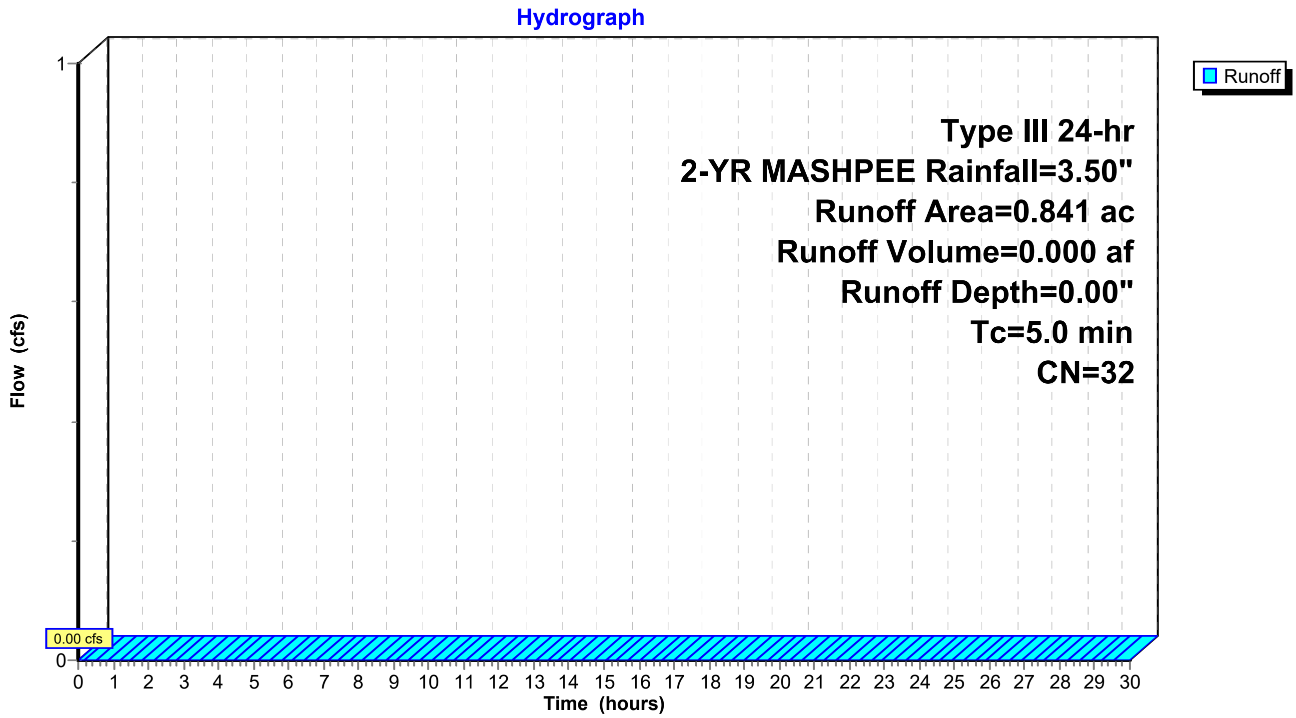
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.841	32	Woods/grass comb., Good, HSG A
0.841		100.00% Pervious Area

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

Subcatchment DA44: North of Quin



Summary for Subcatchment DA55: AREAS TO CB'S AT WILLOWBEND DR

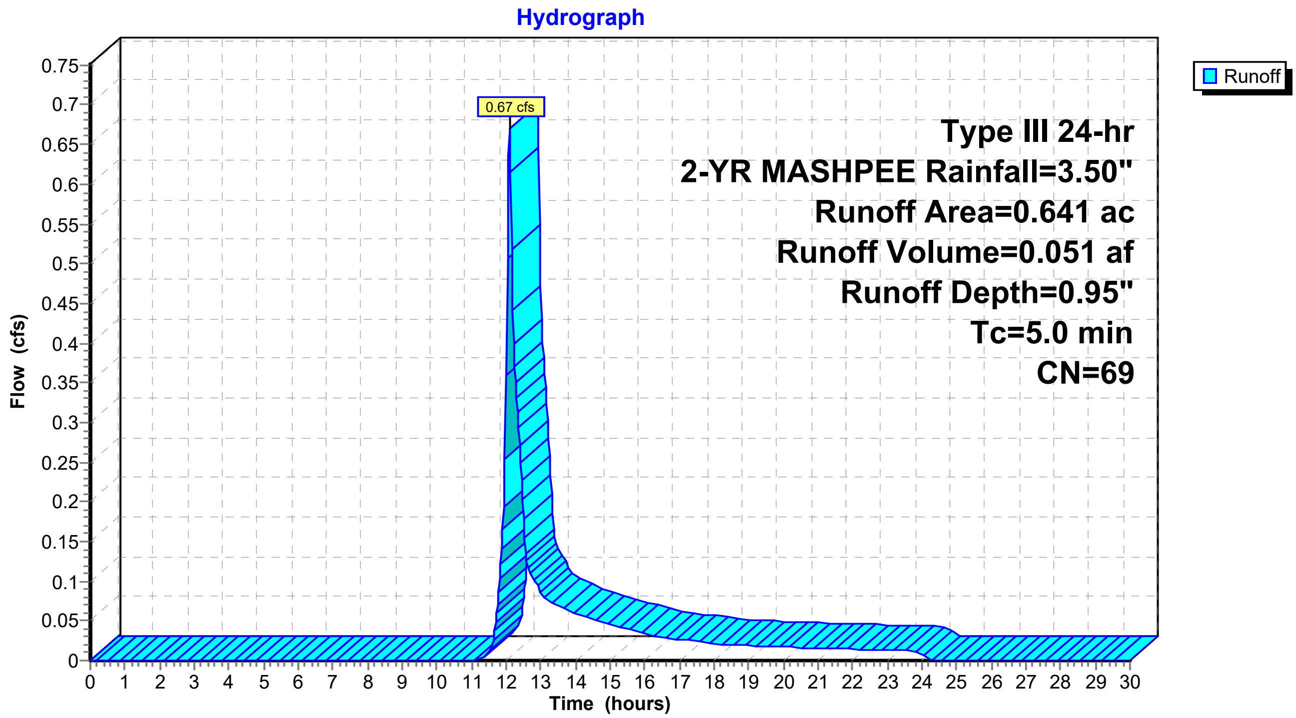
Runoff = 0.67 cfs @ 12.09 hrs, Volume= 0.051 af, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.326	98	Paved parking, HSG A
0.315	39	Pasture/grassland/range, Good, HSG A
0.641	69	Weighted Average
0.315		49.14% Pervious Area
0.326		50.86% Impervious Area

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

Subcatchment DA55: AREAS TO CB'S AT WILLOWBEND DR



Summary for Subcatchment DA77: AREAS TO WETLAND TO EAST

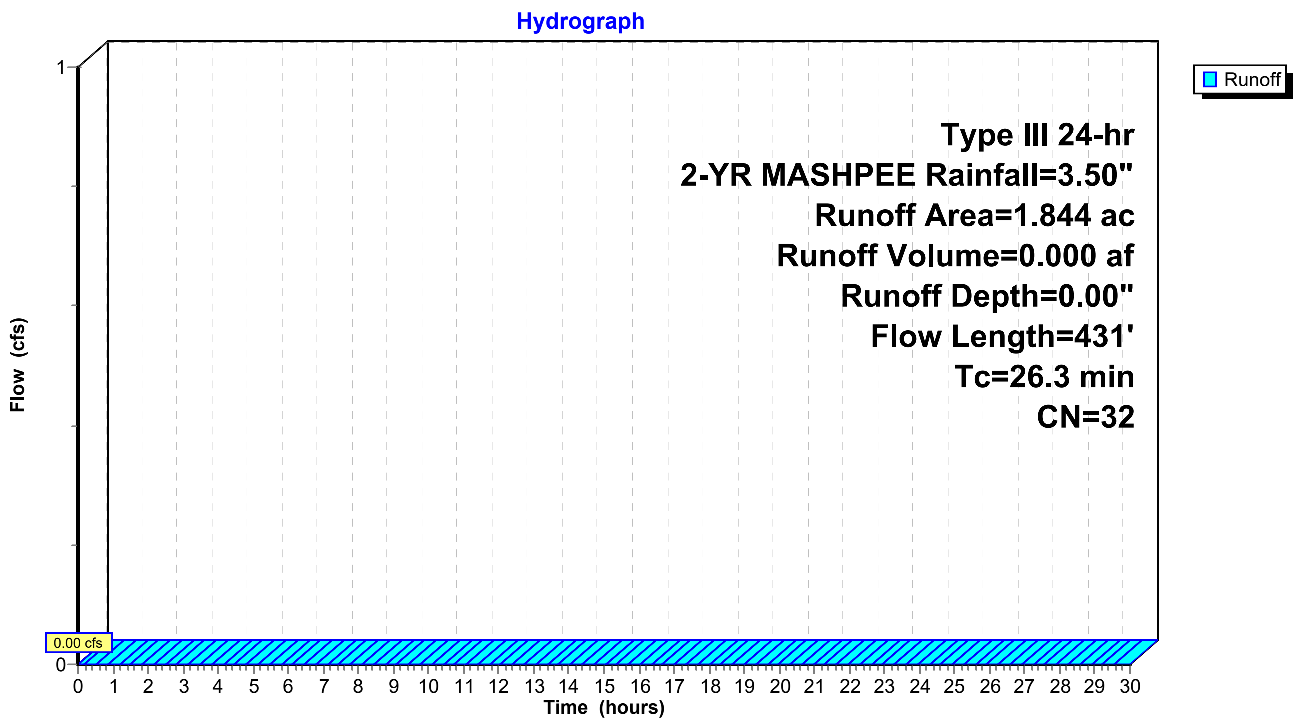
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-YR MASHPEE Rainfall=3.50"

Area (ac)	CN	Description
0.476	39	>75% Grass cover, Good, HSG A
1.201	30	Woods, Good, HSG A
0.167	30	Woods, Good, HSG A
1.844	32	Weighted Average
1.844		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0480	0.10		**Sheet Flow, A**
					Woods: Light underbrush n= 0.400 P2= 3.55"
18.0	381	0.0050	0.35		**Shallow Concentrated Flow, B**
					Woodland Kv= 5.0 fps
26.3	431	Total			

Subcatchment DA77: AREAS TO WETLAND TO EAST



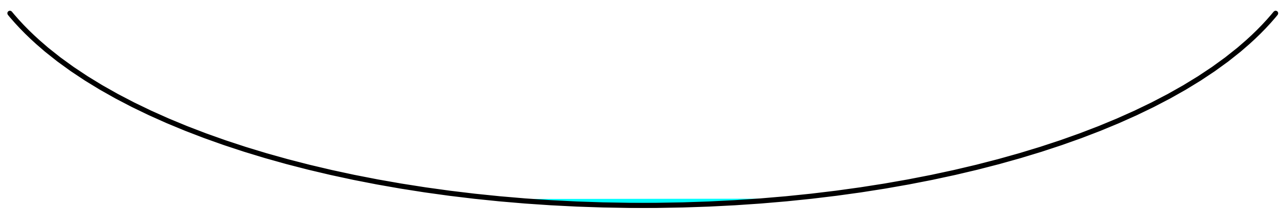
Summary for Reach R1: Tt along stream

Inflow Area = 1.366 ac, 18.52% Impervious, Inflow Depth = 0.10" for 2-YR MASHPEE event
Inflow = 0.21 cfs @ 12.18 hrs, Volume= 0.011 af
Outflow = 0.05 cfs @ 12.52 hrs, Volume= 0.011 af, Atten= 78%, Lag= 20.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 0.28 fps, Min. Travel Time= 33.0 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 58.8 min

Peak Storage= 89 cf @ 12.52 hrs
Average Depth at Peak Storage= 0.07'
Bank-Full Depth= 2.00' Flow Area= 26.7 sf, Capacity= 69.34 cfs

20.00' x 2.00' deep Parabolic Channel, n= 0.040 Winding stream, pools & shoals
Length= 550.0' Slope= 0.0035 '/'
Inlet Invert= 14.60', Outlet Invert= 12.70'



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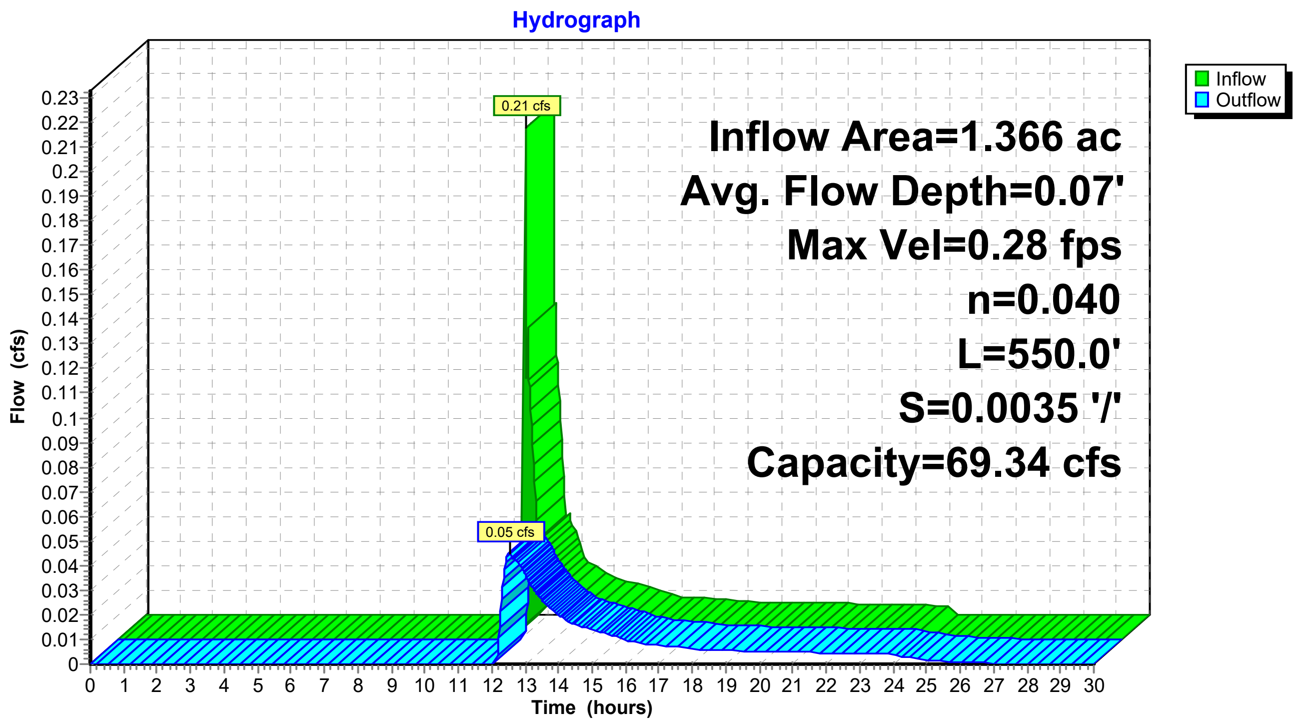
Reach R1: Tt along stream



Summary for Reach R1A: Tt thru bogs

Inflow Area = 7.256 ac, 33.70% Impervious, Inflow Depth > 0.01" for 2-YR MASHPEE event
Inflow = 0.00 cfs @ 24.28 hrs, Volume= 0.003 af
Outflow = 0.00 cfs @ 25.42 hrs, Volume= 0.003 af, Atten= 3%, Lag= 68.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 0.15 fps, Min. Travel Time= 59.5 min
Avg. Velocity = 0.15 fps, Avg. Travel Time= 59.5 min

Peak Storage= 12 cf @ 25.42 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 2.00' Flow Area= 22.0 sf, Capacity= 50.84 cfs

5.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/' Top Width= 17.00'
Length= 520.0' Slope= 0.0029 '/'
Inlet Invert= 14.20', Outlet Invert= 12.70'

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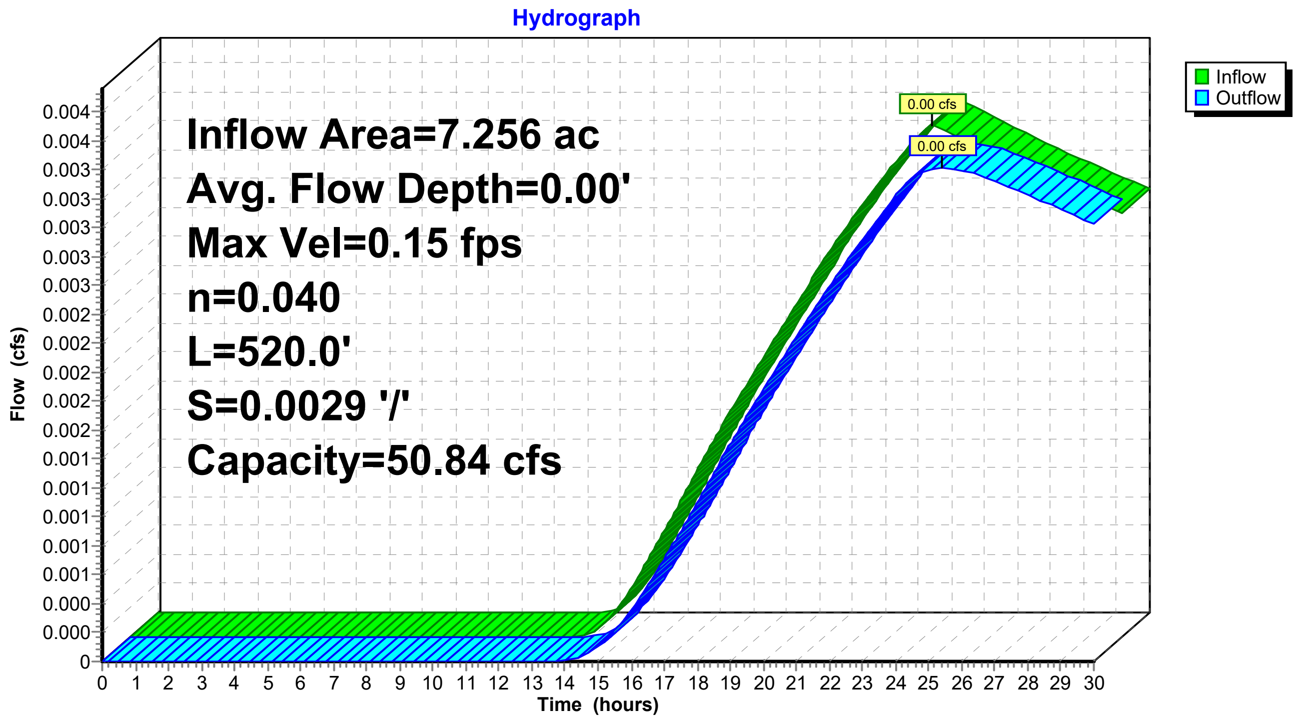
Reach R1A: Tt thru bogs



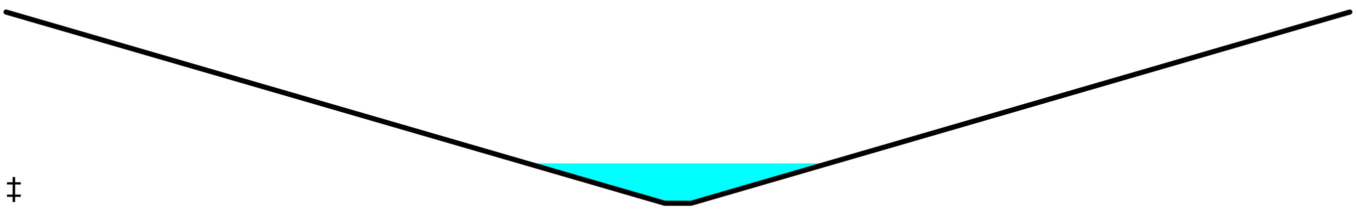
Summary for Reach R2: Tt thru da77

Inflow Area = 2.817 ac, 32.13% Impervious, Inflow Depth = 0.43" for 2-YR MASHPEE event
Inflow = 0.99 cfs @ 12.24 hrs, Volume= 0.101 af
Outflow = 0.93 cfs @ 12.30 hrs, Volume= 0.101 af, Atten= 6%, Lag= 3.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 0.71 fps, Min. Travel Time= 4.9 min
Avg. Velocity = 0.32 fps, Avg. Travel Time= 11.0 min

Peak Storage= 273 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 0.50' Flow Area= 26.0 sf, Capacity= 50.53 cfs

2.00' x 0.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 100.0 '/' Top Width= 102.00'
Length= 210.0' Slope= 0.0095 '/'
Inlet Invert= 17.00', Outlet Invert= 15.00'



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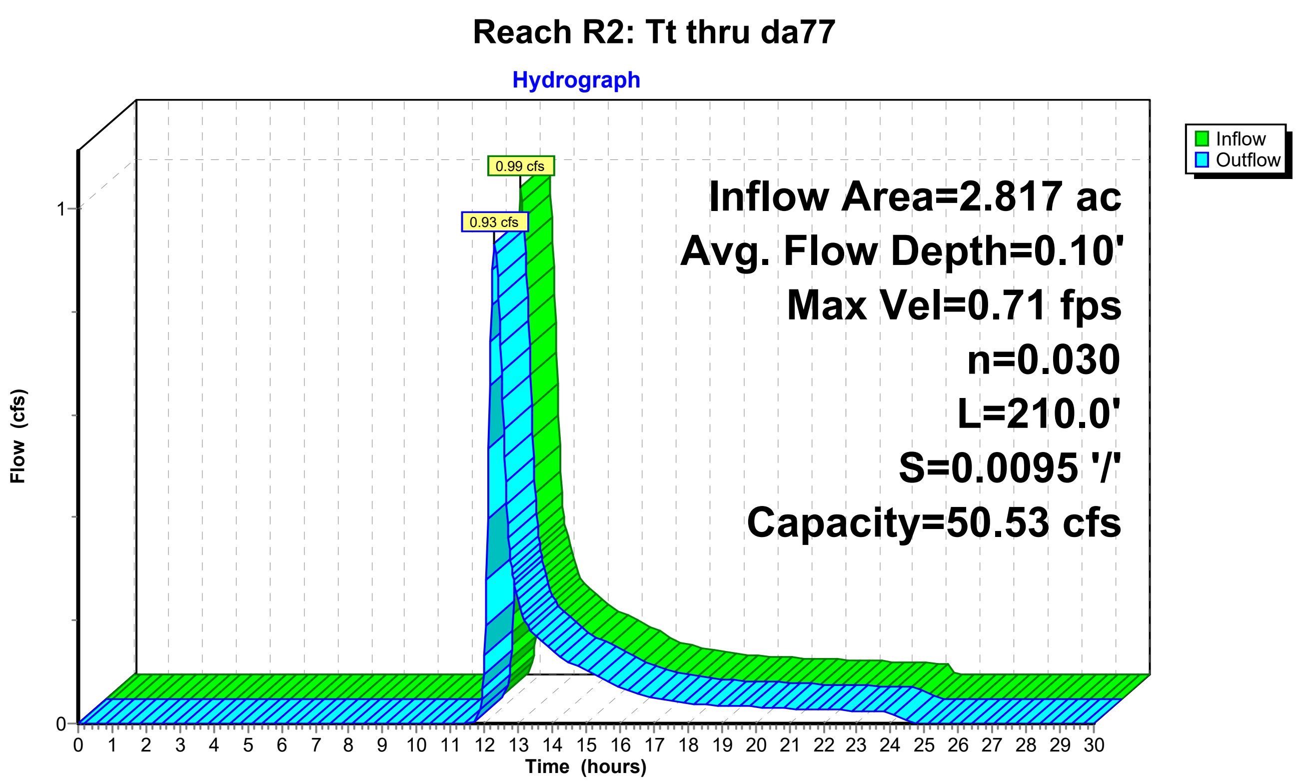


Summary for Reach R2A: Travel Time thru wet pond

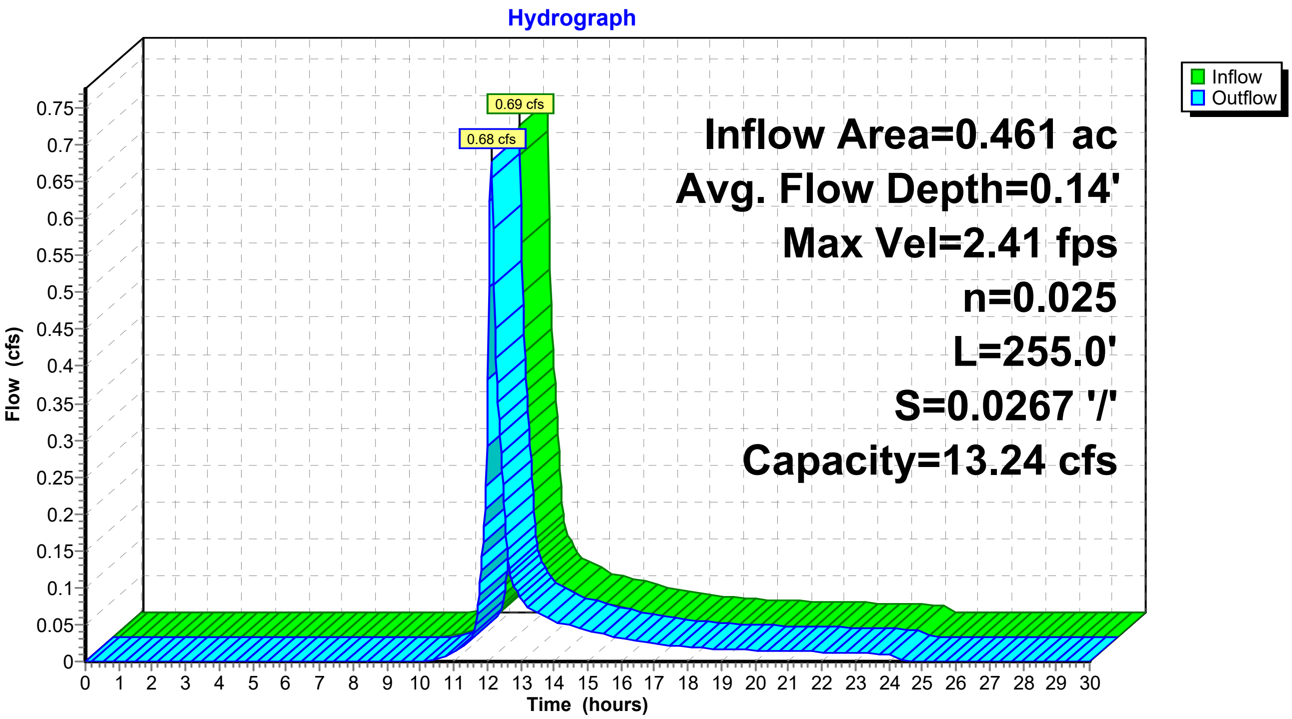
Inflow Area = 0.461 ac, 63.56% Impervious, Inflow Depth = 1.37" for 2-YR MASHPEE event
Inflow = 0.69 cfs @ 12.11 hrs, Volume= 0.052 af
Outflow = 0.68 cfs @ 12.13 hrs, Volume= 0.052 af, Atten= 2%, Lag= 1.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 2.41 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 0.72 fps, Avg. Travel Time= 5.9 min

Peak Storage= 72 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.14'
Bank-Full Depth= 1.00' Flow Area= 2.1 sf, Capacity= 13.24 cfs

2.00' x 1.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 0.1 '/' Top Width= 2.20'
Length= 255.0' Slope= 0.0267 '/'
Inlet Invert= 21.00', Outlet Invert= 14.20'

Reach R2A: Travel Time thru wet pond



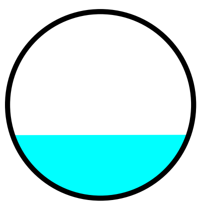
Summary for Reach R3: 18" CPP

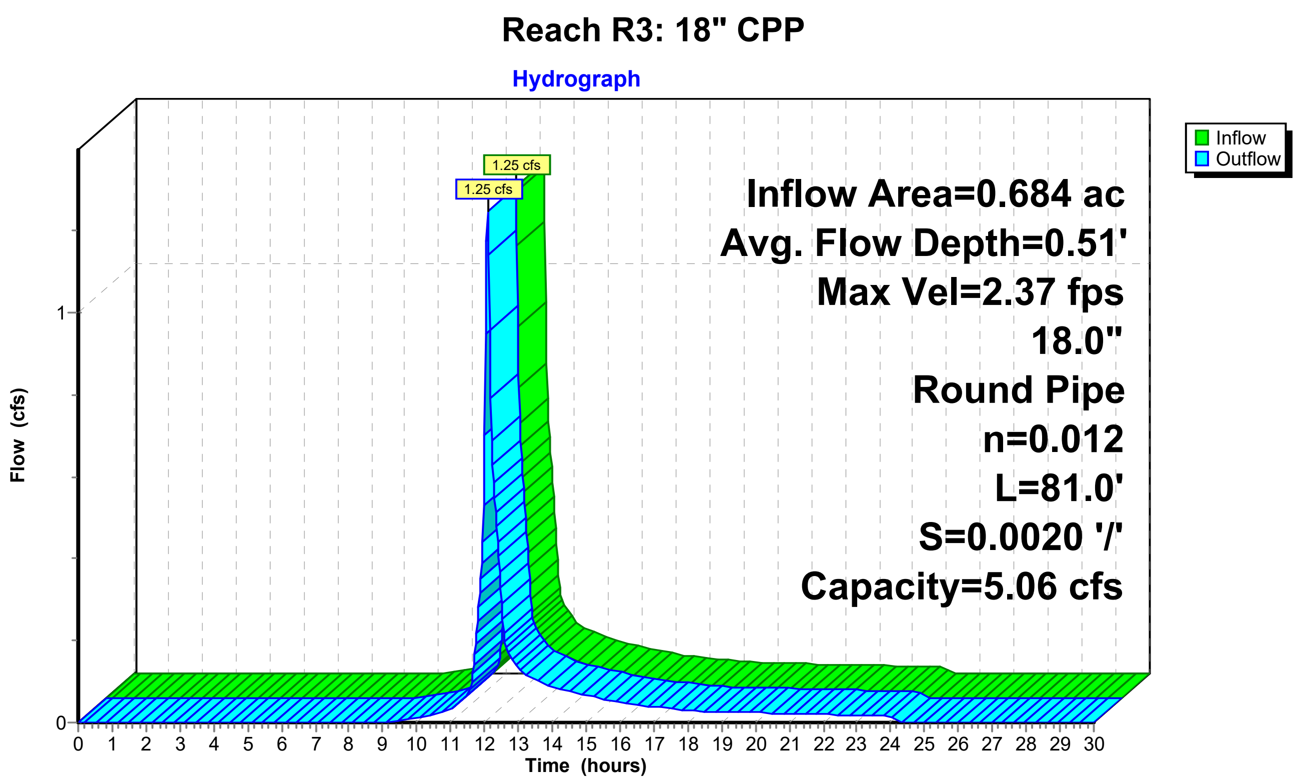
Inflow Area = 0.684 ac, 66.67% Impervious, Inflow Depth = 1.54" for 2-YR MASHPEE event
Inflow = 1.25 cfs @ 12.08 hrs, Volume= 0.088 af
Outflow = 1.25 cfs @ 12.09 hrs, Volume= 0.088 af, Atten= 0%, Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 2.37 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 0.84 fps, Avg. Travel Time= 1.6 min

Peak Storage= 43 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.51'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 5.06 cfs

18.0" Round Pipe
n= 0.012
Length= 81.0' Slope= 0.0020 '/'
Inlet Invert= 15.06', Outlet Invert= 14.90'





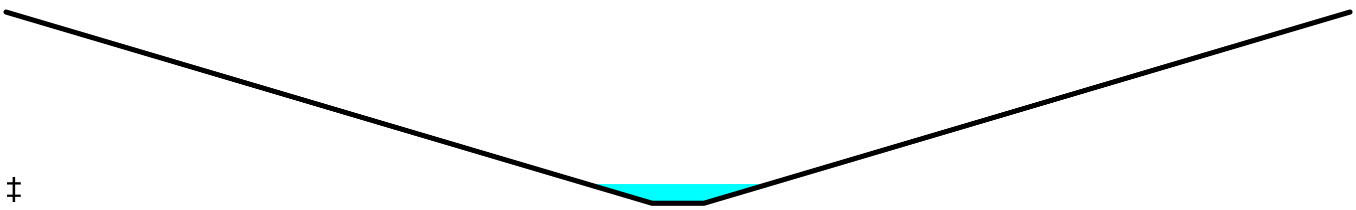
Summary for Reach R5: Tt thru da22B

Inflow Area = 0.641 ac, 50.86% Impervious, Inflow Depth = 0.33" for 2-YR MASHPEE event
Inflow = 0.38 cfs @ 12.21 hrs, Volume= 0.017 af
Outflow = 0.31 cfs @ 12.29 hrs, Volume= 0.017 af, Atten= 18%, Lag= 5.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 1.39 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 0.67 fps, Avg. Travel Time= 6.1 min

Peak Storage= 55 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 0.50' Flow Area= 13.5 sf, Capacity= 75.75 cfs

2.00' x 0.50' deep channel, n= 0.013 Asphalt, smooth
Side Slope Z-value= 50.0 '/' Top Width= 52.00'
Length= 246.0' Slope= 0.0146 '/'
Inlet Invert= 20.58', Outlet Invert= 17.00'



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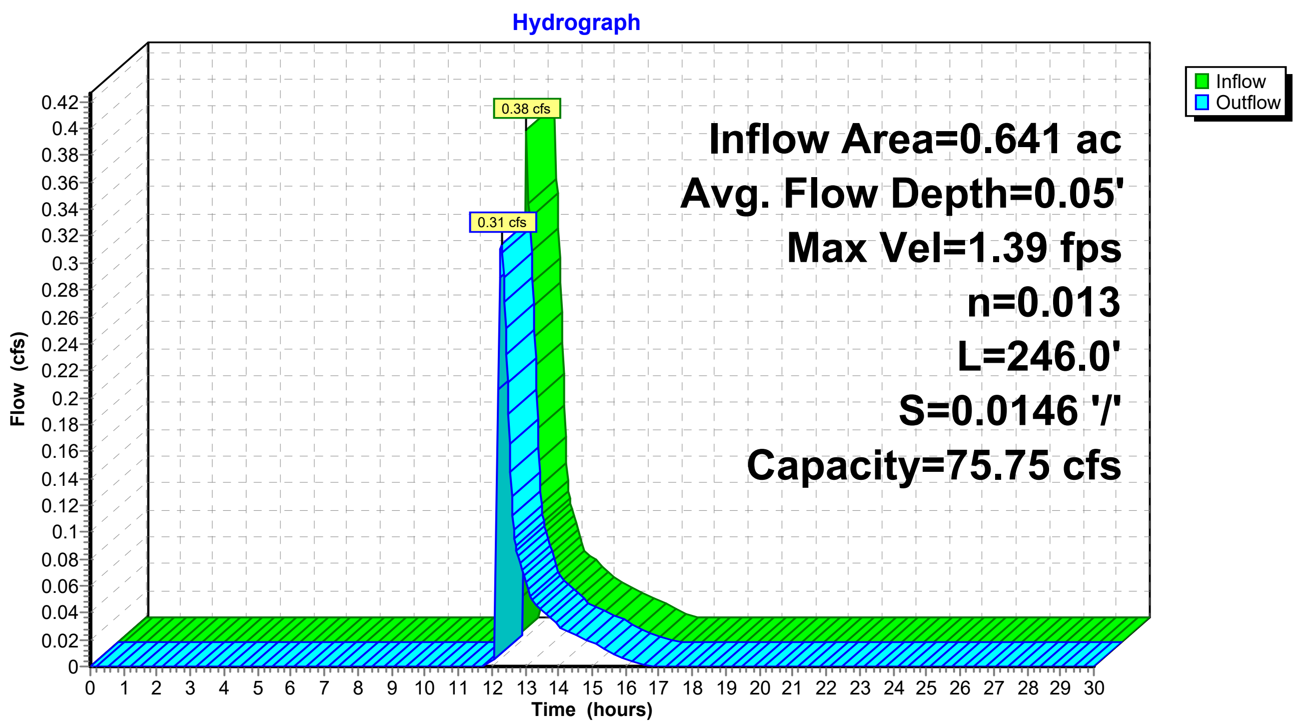
Reach R5: Tt thru da22B

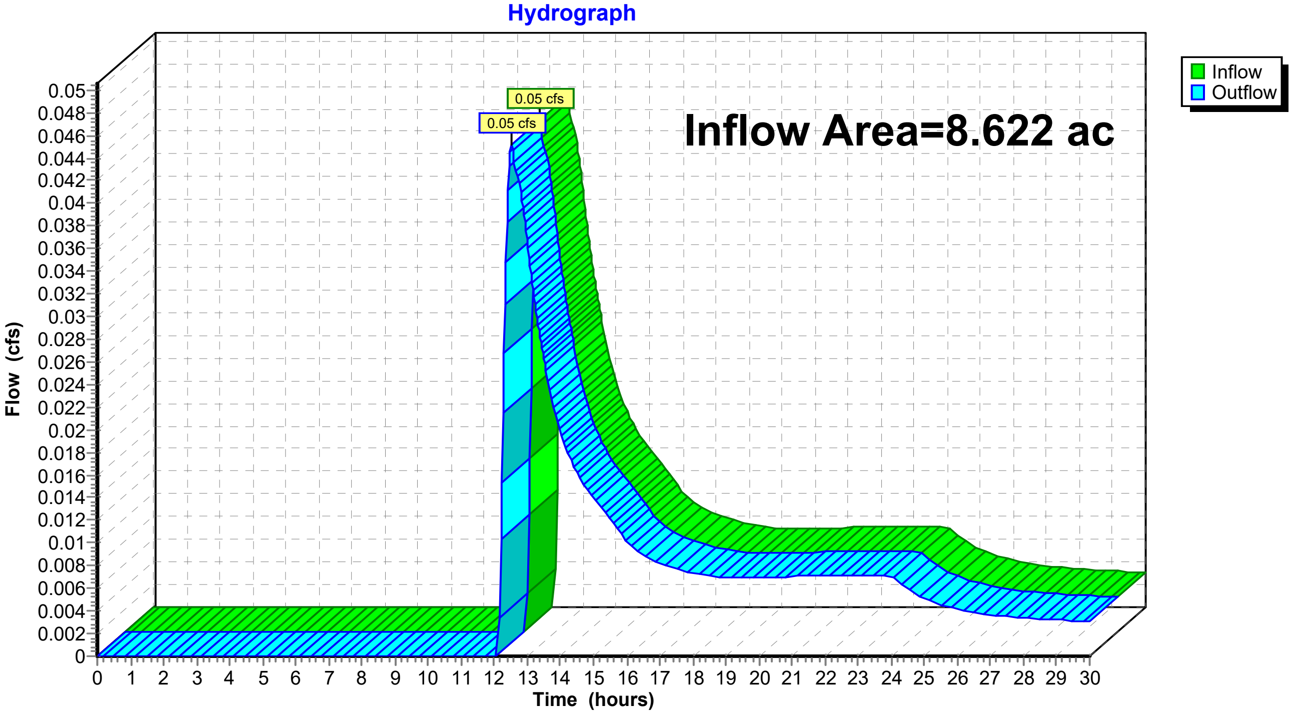


Summary for Reach SP#1: Study Point Combined Flows

Inflow Area =	8.622 ac,	31.29% Impervious,	Inflow Depth > 0.02"	for 2-YR MASHPEE event
Inflow =	0.05 cfs @	12.52 hrs, Volume=	0.014 af	
Outflow =	0.05 cfs @	12.52 hrs, Volume=	0.014 af, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3

Reach SP#1: Study Point Combined Flows



Summary for Pond 1P: LB's

Inflow Area = 0.641 ac, 50.86% Impervious, Inflow Depth = 0.95" for 2-YR MASHPEE event
Inflow = 0.67 cfs @ 12.09 hrs, Volume= 0.051 af
Outflow = 0.41 cfs @ 12.21 hrs, Volume= 0.051 af, Atten= 39%, Lag= 7.2 min
Discarded = 0.03 cfs @ 11.76 hrs, Volume= 0.033 af
Primary = 0.38 cfs @ 12.21 hrs, Volume= 0.017 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 20.64' @ 12.27 hrs Surf.Area= 576 sf Storage= 448 cf

Plug-Flow detention time= 114.3 min calculated for 0.051 af (100% of inflow)
Center-of-Mass det. time= 114.5 min (986.2 - 871.7)

Volume	Invert	Avail.Storage	Storage Description
#1	13.50'	192 cf	**10.00'D x 4.50'H Vertical Cone/Cylinder** x 2
			707 cf Overall - 226 cf Embedded = 481 cf x 40.0% Voids
#2	14.00'	226 cf	**6.00'D x 4.00'H Vertical Cone/Cylinder** x 2 Inside #1
#3	20.50'	376 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		794 cf	Total Available Storage

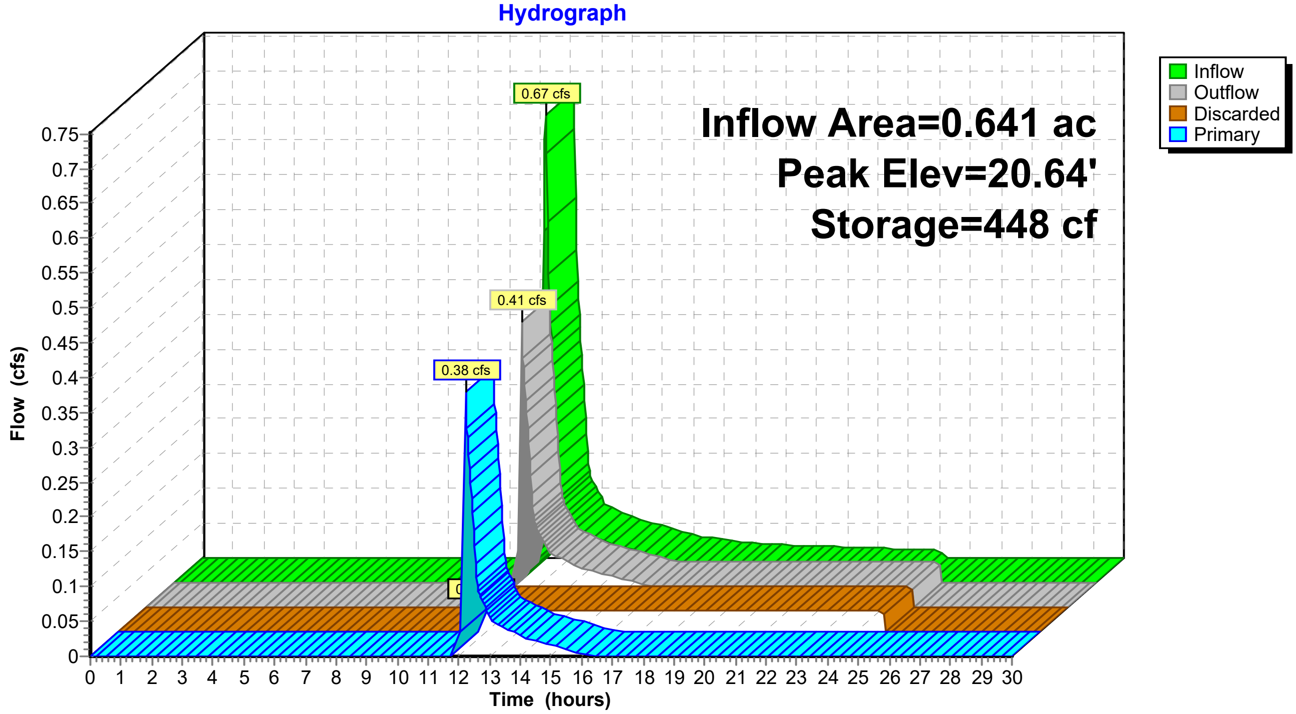
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.50	4	0	0
21.00	1,500	376	376

Device	Routing	Invert	Outlet Devices
#1	Discarded	13.50'	**8.270 in/hr Exfiltration over Surface area from 13.49' - 18.00'**
			Excluded Surface area = 0 sf
#2	Primary	20.58'	**179.0 deg x 6.0' long Sharp-Crested Vee/Trap Weir**
			Cv= 2.46 (C= 3.08)

Discarded OutFlow Max=0.03 cfs @ 11.76 hrs HW=13.63' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.38 cfs @ 12.21 hrs HW=20.64' TW=20.62' (Dynamic Tailwater)
└─**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 0.38 cfs @ 0.54 fps)

Pond 1P: LB's


Hydrograph
0.67 cfs
0.41 cfs
0.38 cfs
Inflow Area=0.641 ac
Peak Elev=20.64'
Storage=448 cf
Inflow
Outflow
Discarded
Primary
Flow (cfs)
0.75
0.7
0.65
0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Time (hours)

Summary for Pond 2P: Natural Low Area

Inflow Area = 0.841 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-YR MASHPEE event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 16.01' @ 0.00 hrs Surf.Area= 1 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	16.01'	4,469 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

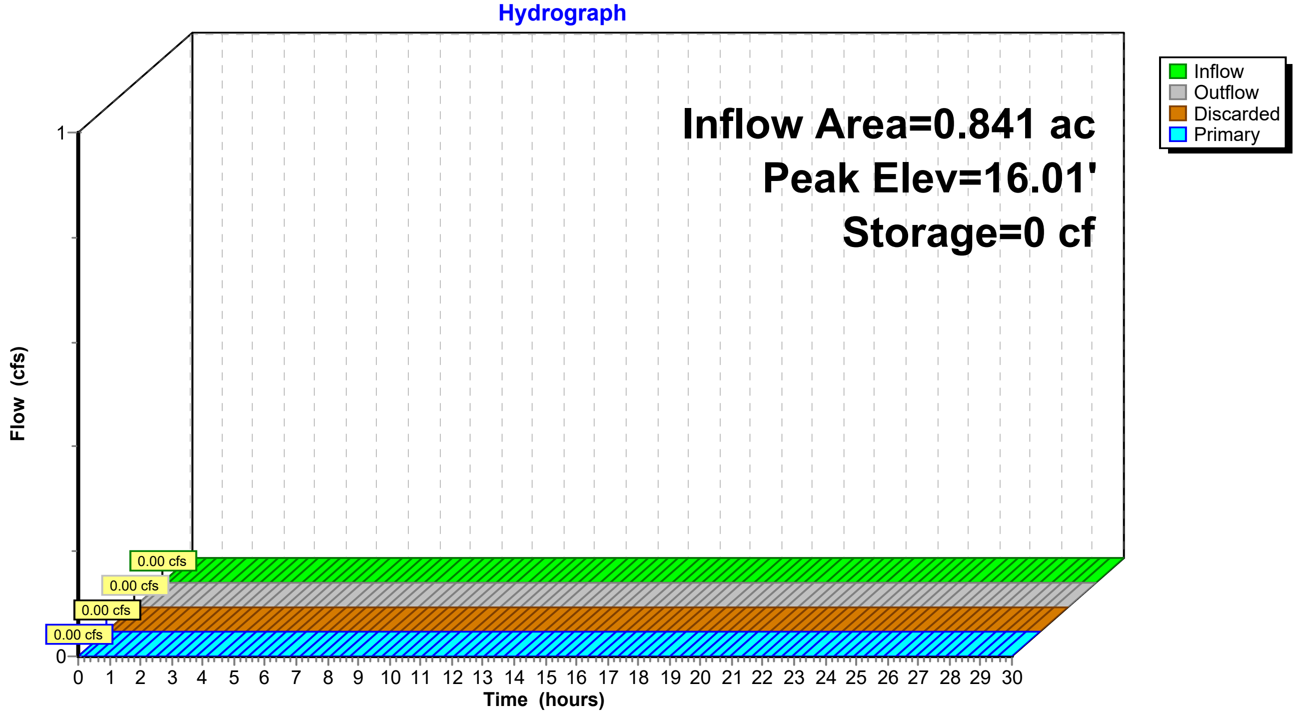
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
16.01	1	0	0
17.00	739	366	366
18.00	7,467	4,103	4,469

Device	Routing	Invert	Outlet Devices
#1	Discarded	16.01'	**2.410 in/hr Exfiltration over Surface area from 15.90' - 17.70'** Excluded Surface area = 0 sf
#2	Primary	17.58'	**50.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=16.01' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 0.00 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=16.01' TW=17.00' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Natural Low Area



Summary for Pond 3A-P: Pond 3A

Inflow Area = 0.109 ac, 21.10% Impervious, Inflow Depth = 0.75" for 2-YR MASHPEE event
Inflow = 0.08 cfs @ 12.09 hrs, Volume= 0.007 af
Outflow = 0.01 cfs @ 13.35 hrs, Volume= 0.007 af, Atten= 87%, Lag= 75.2 min
Discarded = 0.01 cfs @ 13.35 hrs, Volume= 0.007 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 17.33' @ 13.35 hrs Surf.Area= 442 sf Storage= 97 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 106.4 min (992.5 - 886.1)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	520 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

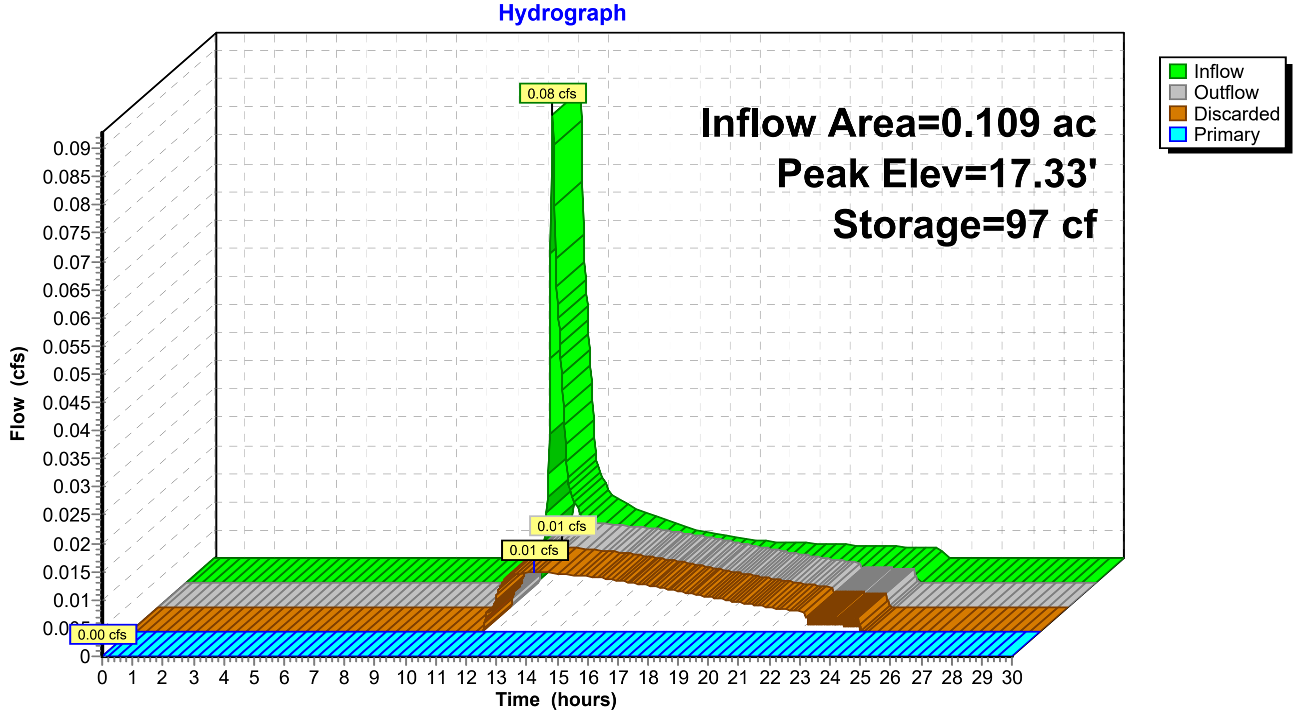
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	144	0	0
17.50	594	185	185
18.00	749	336	520

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**1.020 in/hr Exfiltration over Surface area from 16.90' - 18.00'** Excluded Surface area = 0 sf
#2	Primary	17.50'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.01 cfs @ 13.35 hrs HW=17.33' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=17.00' TW=14.60' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3A-P: Pond 3A



Summary for Pond 3P: Wet Pond

Inflow Area = 7.256 ac, 33.70% Impervious, Inflow Depth = 0.09" for 2-YR MASHPEE event
Inflow = 0.68 cfs @ 12.13 hrs, Volume= 0.052 af
Outflow = 0.00 cfs @ 24.28 hrs, Volume= 0.003 af, Atten= 99%, Lag= 729.0 min
Primary = 0.00 cfs @ 24.28 hrs, Volume= 0.003 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 14.26' @ 24.28 hrs Surf.Area= 13,904 sf Storage= 2,214 cf

Plug-Flow detention time= 745.4 min calculated for 0.003 af (6% of inflow)
Center-of-Mass det. time= 578.5 min (1,433.9 - 855.5)

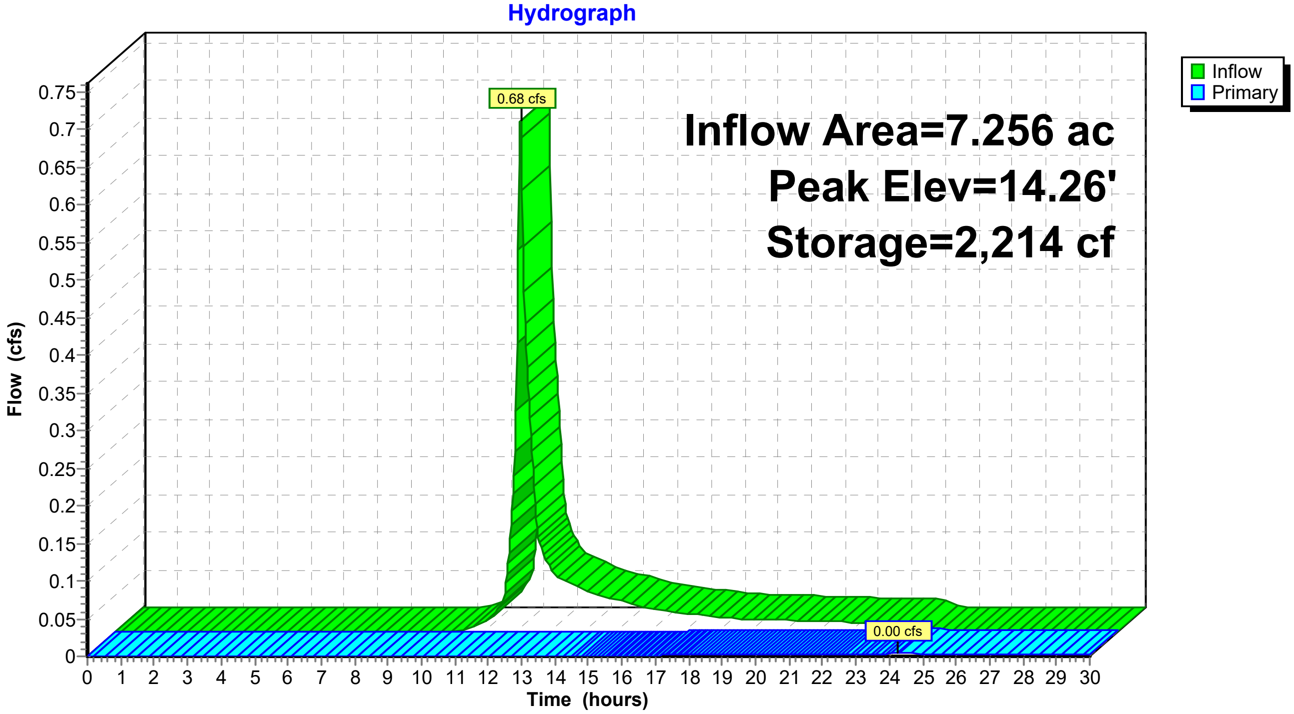
Volume	Invert	Avail.Storage	Storage Description
#1	13.97'	38,017 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
13.97	1	0	0
14.00	56	1	1
14.20	13,319	1,337	1,338
15.00	20,594	13,565	14,904
16.00	25,633	23,114	38,017

Device	Routing	Invert	Outlet Devices
#1	Primary	14.20'	**8.0" Round Culvert** L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 14.20' / 14.20' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Primary	15.75'	**30.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.00 cfs @ 24.28 hrs HW=14.26' TW=14.20' (Dynamic Tailwater)
├─**1=Culvert** (Barrel Controls 0.00 cfs @ 0.31 fps)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Wet Pond



Summary for Pond 4P: Pond 4

Inflow Area = 0.132 ac, 50.76% Impervious, Inflow Depth = 1.64" for 2-YR MASHPEE event
Inflow = 0.26 cfs @ 12.08 hrs, Volume= 0.018 af
Outflow = 0.22 cfs @ 12.18 hrs, Volume= 0.018 af, Atten= 15%, Lag= 6.3 min
Discarded = 0.01 cfs @ 12.18 hrs, Volume= 0.013 af
Primary = 0.21 cfs @ 12.18 hrs, Volume= 0.005 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 18.01' @ 12.18 hrs Surf.Area= 458 sf Storage= 236 cf

Plug-Flow detention time= 203.1 min calculated for 0.018 af (99% of inflow)
Center-of-Mass det. time= 196.1 min (1,033.4 - 837.3)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	253 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

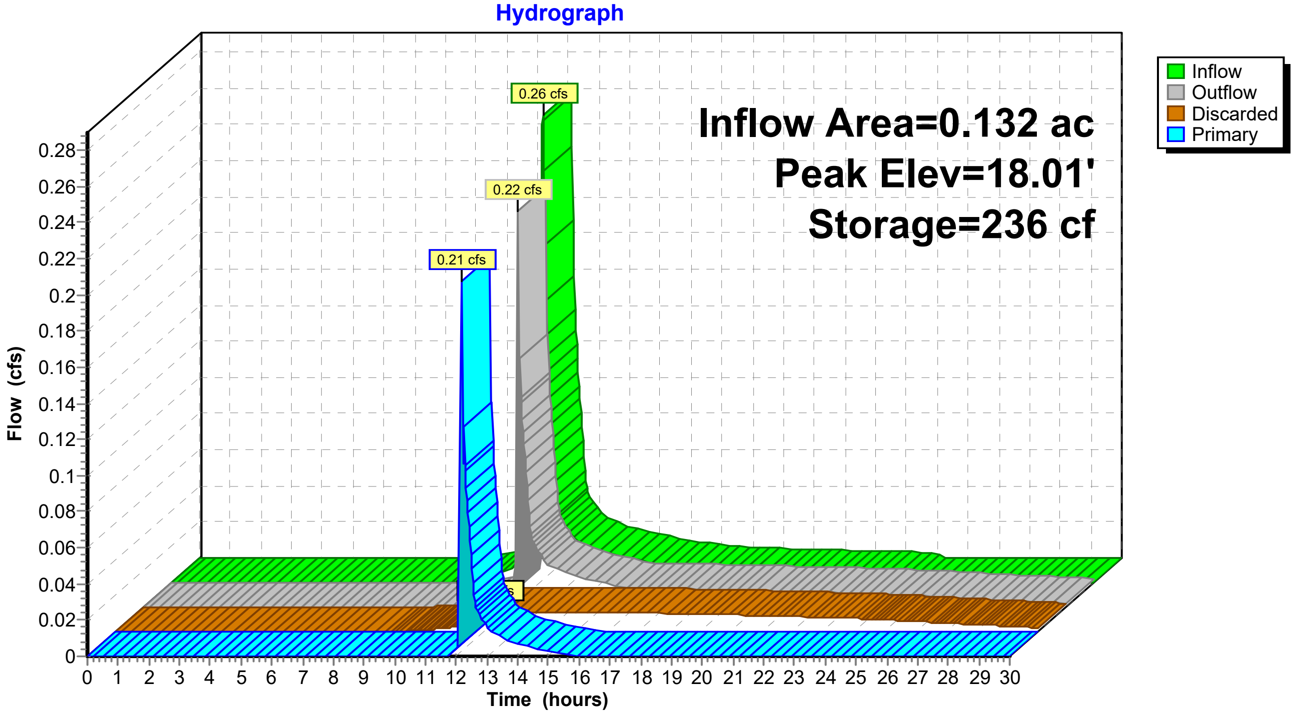
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	10	0	0
18.00	450	230	230
18.05	478	23	253

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**1.020 in/hr Exfiltration over Surface area from 16.90' - 18.05'** Excluded Surface area = 0 sf
#2	Primary	18.00'	**40.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.01 cfs @ 12.18 hrs HW=18.01' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.19 cfs @ 12.18 hrs HW=18.01' TW=14.62' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.19 cfs @ 0.37 fps)

Pond 4P: Pond 4



Summary for Pond 5P: Pond 5

Inflow Area = 0.124 ac, 58.87% Impervious, Inflow Depth = 1.24" for 2-YR MASHPEE event
Inflow = 0.18 cfs @ 12.08 hrs, Volume= 0.013 af
Outflow = 0.03 cfs @ 12.67 hrs, Volume= 0.013 af, Atten= 84%, Lag= 35.0 min
Discarded = 0.02 cfs @ 12.67 hrs, Volume= 0.012 af
Primary = 0.01 cfs @ 12.67 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 19.00' @ 12.67 hrs Surf.Area= 286 sf Storage= 228 cf

Plug-Flow detention time= 190.0 min calculated for 0.013 af (100% of inflow)
Center-of-Mass det. time= 190.1 min (1,045.8 - 855.7)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	244 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

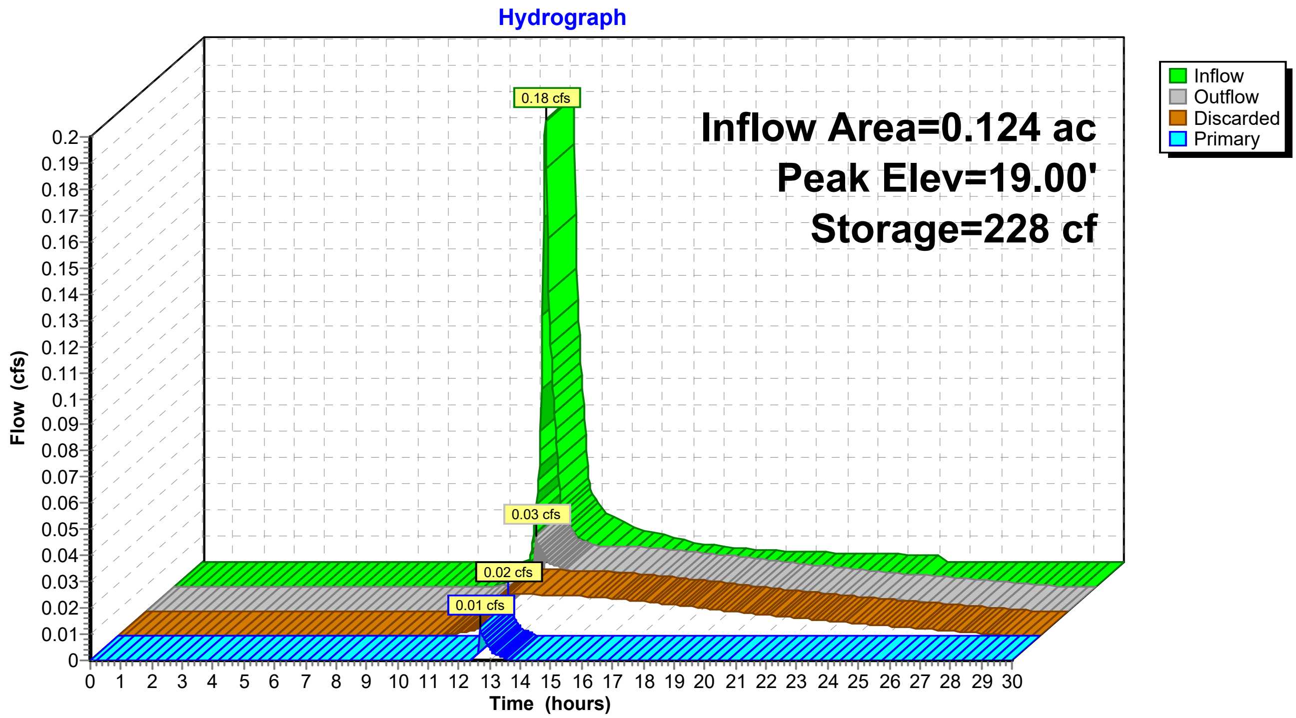
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	1	0	0
18.00	86	44	44
19.00	282	184	228
19.05	366	16	244

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**2.410 in/hr Exfiltration over Surface area from 16.90' - 19.05'** Excluded Surface area = 0 sf
#2	Primary	19.00'	**40.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.02 cfs @ 12.67 hrs HW=19.00' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.01 cfs @ 12.67 hrs HW=19.00' TW=14.66' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.01 cfs @ 0.15 fps)

Pond 5P: Pond 5



Summary for Pond 6P: Pond 6

Inflow Area =	0.088 ac,	17.05% Impervious,	Inflow Depth = 0.10"	for 2-YR MASHPEE event
Inflow =	0.00 cfs @	13.77 hrs, Volume=	0.001 af	
Outflow =	0.00 cfs @	14.71 hrs, Volume=	0.001 af,	Atten= 1%, Lag= 56.0 min
Discarded =	0.00 cfs @	14.71 hrs, Volume=	0.001 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 18.06' @ 14.71 hrs Surf.Area= 22 sf Storage= 1 cf

Plug-Flow detention time= 7.1 min calculated for 0.001 af (100% of inflow)
Center-of-Mass det. time= 7.1 min (1,043.7 - 1,036.6)

Volume	Invert	Avail.Storage	Storage Description
#1	18.00'	182 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

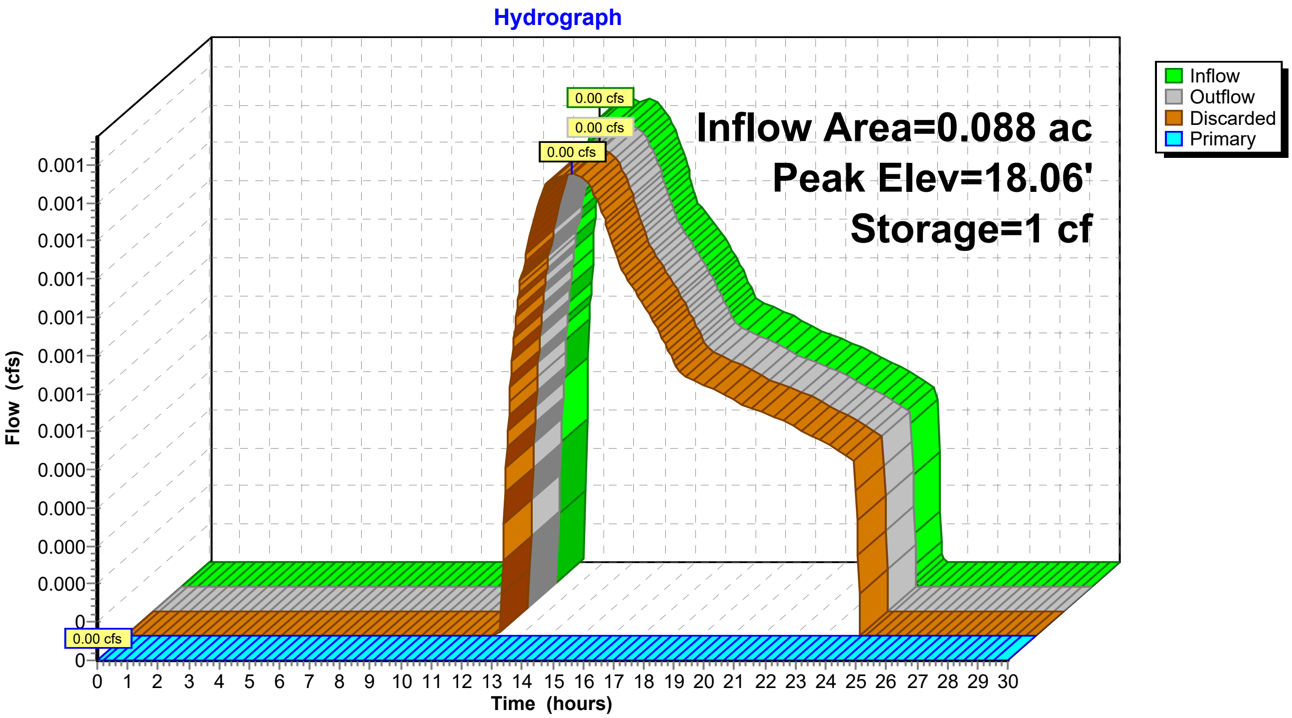
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
18.00	1	0	0
19.00	326	164	164
19.05	394	18	182

Device	Routing	Invert	Outlet Devices
#1	Discarded	18.00'	**2.410 in/hr Exfiltration over Surface area from 17.90' - 19.05'** Excluded Surface area = 0 sf
#2	Primary	19.00'	**40.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.00 cfs @ 14.71 hrs HW=18.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=18.00' TW=14.60' (Dynamic Tailwater)
↑—**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 6P: Pond 6



Summary for Pond 7P: Pond 7

Inflow Area =	0.033 ac, 63.64% Impervious,	Inflow Depth = 1.43"	for 2-YR MASHPEE event	
Inflow =	0.06 cfs @	12.08 hrs, Volume=	0.004 af	
Outflow =	0.01 cfs @	12.86 hrs, Volume=	0.004 af,	Atten= 88%, Lag= 46.6 min
Discarded =	0.01 cfs @	12.86 hrs, Volume=	0.004 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 17.88' @ 12.86 hrs Surf.Area= 124 sf Storage= 65 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 102.8 min (949.3 - 846.5)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	87 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

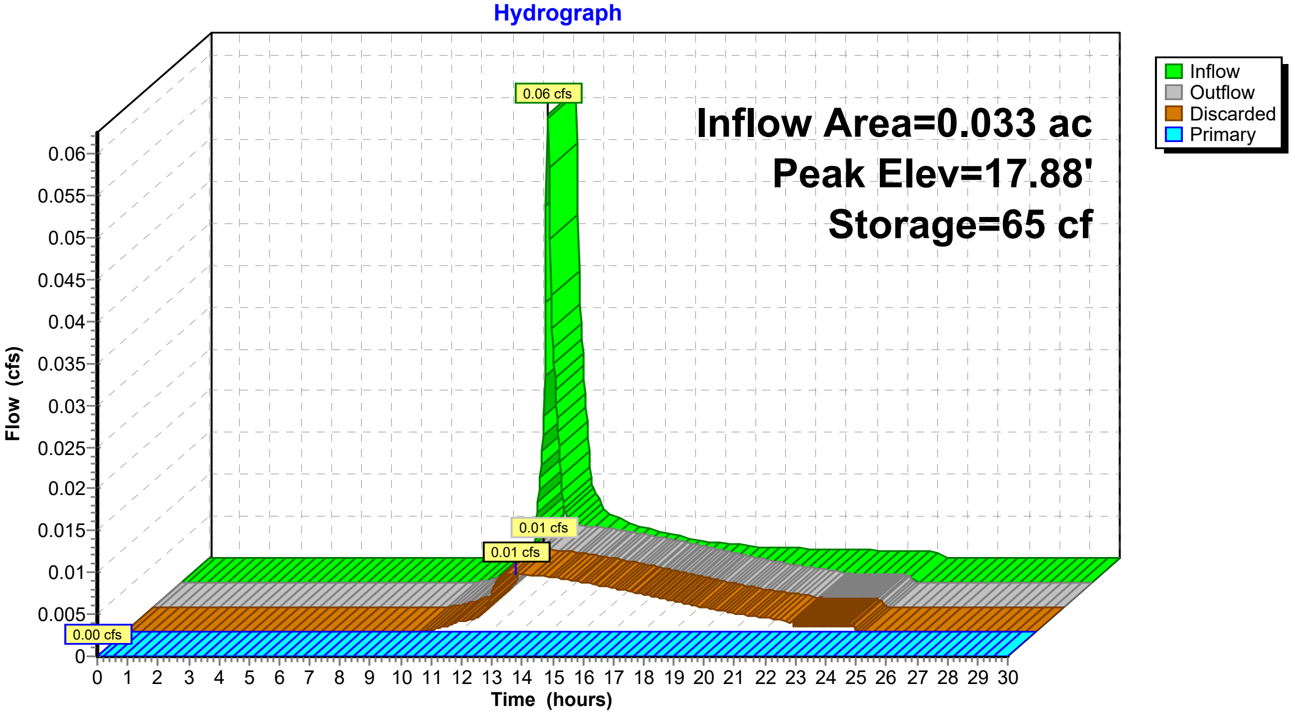
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	23	0	0
18.00	137	80	80
18.05	159	7	87

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**2.410 in/hr Exfiltration over Surface area from 16.90' - 18.05'** Excluded Surface area = 0 sf
#2	Primary	18.00'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.01 cfs @ 12.86 hrs HW=17.88' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=17.00' TW=14.60' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: Pond 7



Summary for Pond 8P: Pond 8

Inflow Area = 0.087 ac, 35.63% Impervious, Inflow Depth = 0.53" for 2-YR MASHPEE event
Inflow = 0.04 cfs @ 12.10 hrs, Volume= 0.004 af
Outflow = 0.02 cfs @ 12.32 hrs, Volume= 0.004 af, Atten= 37%, Lag= 12.8 min
Discarded = 0.02 cfs @ 12.32 hrs, Volume= 0.004 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 17.01' @ 12.32 hrs Surf.Area= 431 sf Storage= 6 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.9 min (908.8 - 907.9)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	622 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

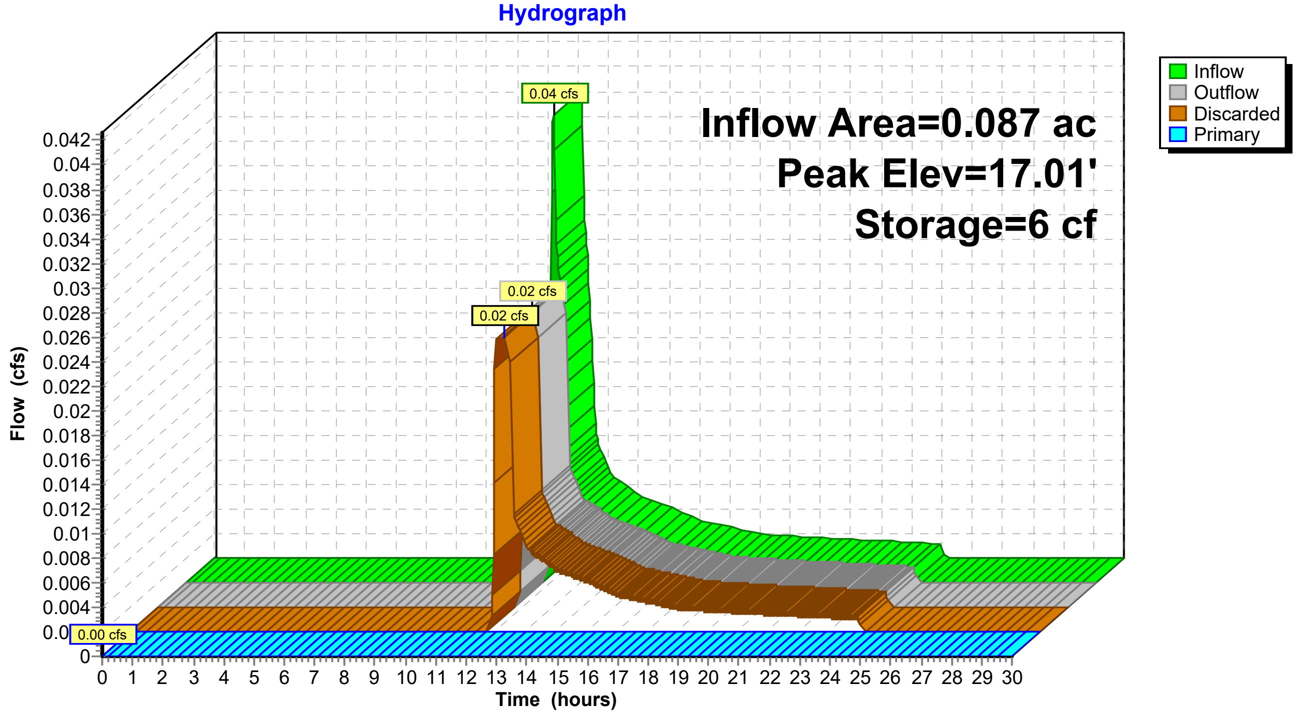
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	426	0	0
18.00	741	584	584
18.05	791	38	622

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**2.410 in/hr Exfiltration over Surface area from 16.90' - 18.00'** Excluded Surface area = 0 sf
#2	Primary	18.00'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.02 cfs @ 12.32 hrs HW=17.01' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=17.00' TW=14.60' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: Pond 8



Summary for Pond FB1: Forebay 1

Inflow Area = 1.040 ac, 55.00% Impervious, Inflow Depth = 1.17" for 2-YR MASHPEE event
Inflow = 1.36 cfs @ 12.09 hrs, Volume= 0.101 af
Outflow = 0.09 cfs @ 14.61 hrs, Volume= 0.101 af, Atten= 93%, Lag= 151.2 min
Discarded = 0.09 cfs @ 14.61 hrs, Volume= 0.101 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 16.48' @ 14.61 hrs Surf.Area= 1,623 sf Storage= 2,008 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 254.3 min (1,106.2 - 851.9)

Volume	Invert	Avail.Storage	Storage Description
#1	14.90'	3,175 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

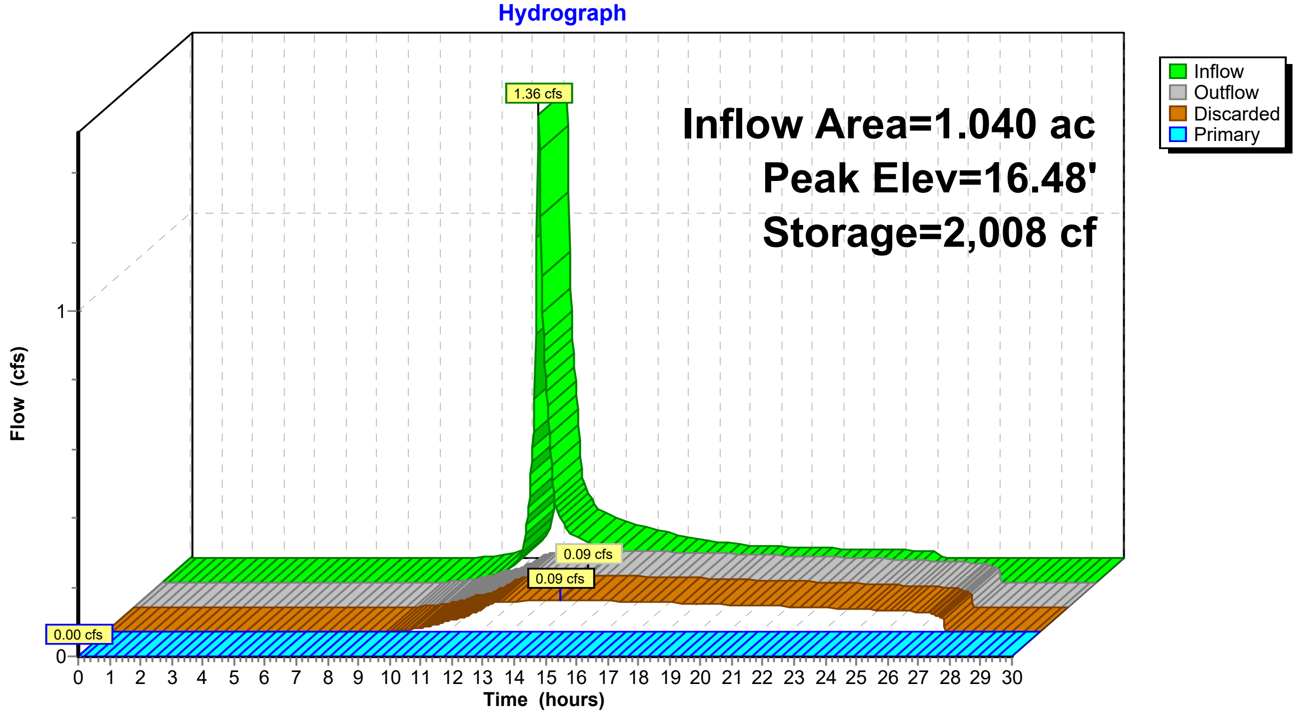
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
14.90	661	0	0
15.00	996	83	83
16.00	1,406	1,201	1,284
16.50	1,633	760	2,044
17.00	2,893	1,132	3,175

Device	Routing	Invert	Outlet Devices
#1	Discarded	14.90'	**2.410 in/hr Exfiltration over Surface area from 14.80' - 16.50'** Excluded Surface area = 0 sf
#2	Primary	16.50'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.09 cfs @ 14.61 hrs HW=16.48' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=14.90' TW=15.00' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond FB1: Forebay 1



Summary for Pond FB3: Forebay 3

Inflow Area = 6.795 ac, 31.67% Impervious, Inflow Depth = 0.39" for 2-YR MASHPEE event
Inflow = 2.06 cfs @ 12.11 hrs, Volume= 0.220 af
Outflow = 0.33 cfs @ 13.46 hrs, Volume= 0.220 af, Atten= 84%, Lag= 81.2 min
Discarded = 0.33 cfs @ 13.46 hrs, Volume= 0.220 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 15.65' @ 13.46 hrs Surf.Area= 5,861 sf Storage= 3,311 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 99.1 min (963.8 - 864.7)

Volume	Invert	Avail.Storage	Storage Description
#1	15.00'	10,961 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

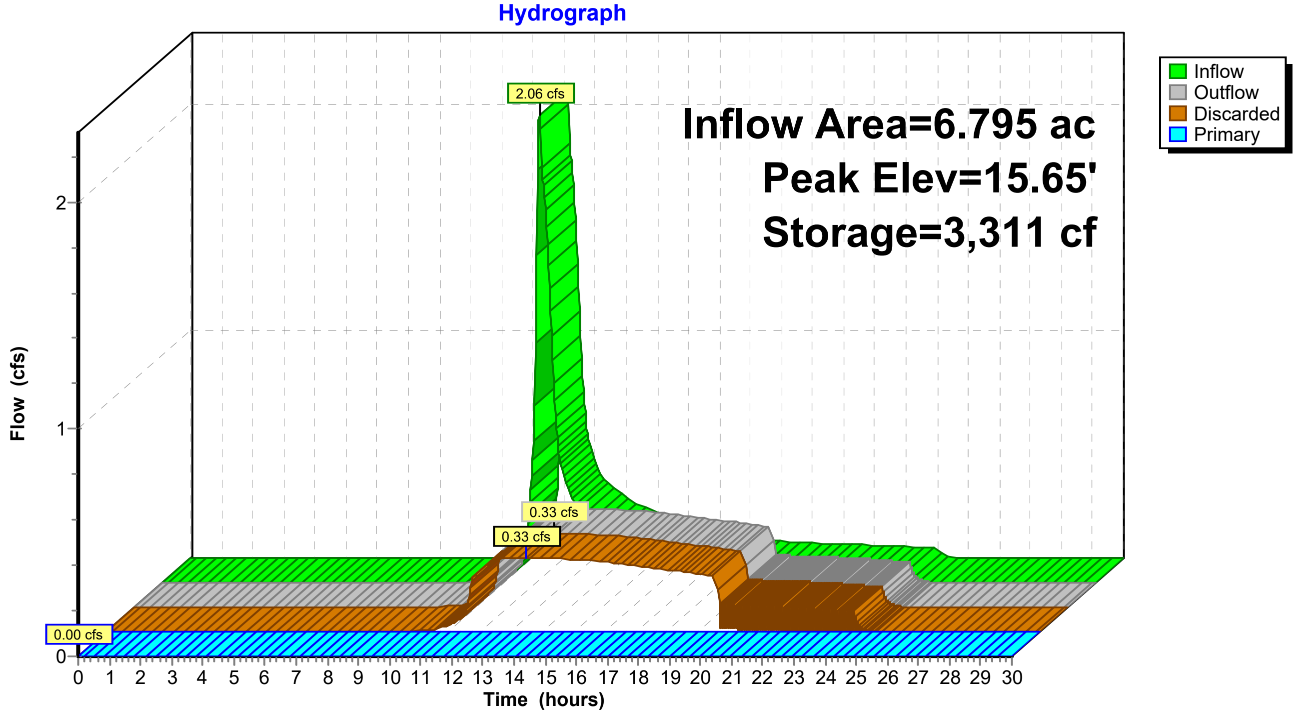
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
15.00	4,358	0	0
16.00	6,677	5,518	5,518
16.75	7,840	5,444	10,961

Device	Routing	Invert	Outlet Devices
#1	Discarded	15.00'	**2.410 in/hr Exfiltration over Surface area from 14.90' - 16.75'** Excluded Surface area = 0 sf
#2	Primary	16.00'	**10.0' long Sharp-Crested Rectangular Weir X 3.00** 2 End Contraction(s) 0.7' Crest Height

Discarded OutFlow Max=0.33 cfs @ 13.46 hrs HW=15.65' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.33 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=15.00' TW=13.97' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond FB3: Forebay 3



Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentDA-12: AREAS TO WETLAND Runoff Area=0.793 ac 2.90% Impervious Runoff Depth=0.45"
Tc=5.0 min UI Adjusted CN=45 Runoff=0.16 cfs 0.029 af

SubcatchmentDA-1A: AREA TO CB'S 3 Runoff Area=0.252 ac 59.92% Impervious Runoff Depth=2.37"
Tc=5.0 min CN=74 Runoff=0.72 cfs 0.050 af

SubcatchmentDA-1B: AREA TO CB'S 1 Runoff Area=0.432 ac 70.60% Impervious Runoff Depth=2.99"
Tc=5.0 min CN=81 Runoff=1.56 cfs 0.108 af

SubcatchmentDA-1C: AREA TO FB1 Runoff Area=0.356 ac 32.58% Impervious Runoff Depth=1.17"
Tc=5.0 min CN=58 Runoff=0.44 cfs 0.035 af

SubcatchmentDA-2: END OF ROAD TO Runoff Area=0.536 ac 58.02% Impervious Runoff Depth=2.29"
Flow Length=250' Tc=6.2 min CN=73 Runoff=1.41 cfs 0.102 af

SubcatchmentDA-3: AREAS TO WEST Runoff Area=0.109 ac 21.10% Impervious Runoff Depth=1.66"
Tc=5.0 min UI Adjusted CN=65 Runoff=0.21 cfs 0.015 af

SubcatchmentDA-4: AREAS TO WEST Runoff Area=0.132 ac 50.76% Impervious Runoff Depth=2.90"
Tc=5.0 min CN=80 Runoff=0.46 cfs 0.032 af

SubcatchmentDA-5: AREAS TO WEST Runoff Area=0.124 ac 58.87% Impervious Runoff Depth=2.37"
Tc=5.0 min CN=74 Runoff=0.35 cfs 0.025 af

SubcatchmentDA-6: AREAS TO WEST Runoff Area=0.088 ac 17.05% Impervious Runoff Depth=0.49"
Tc=5.0 min UI Adjusted CN=46 Runoff=0.02 cfs 0.004 af

SubcatchmentDA-7: AREAS TO WEST Runoff Area=0.033 ac 63.64% Impervious Runoff Depth=2.63"
Tc=5.0 min CN=77 Runoff=0.10 cfs 0.007 af

SubcatchmentDA-8: AREAS TO WEST Runoff Area=0.087 ac 35.63% Impervious Runoff Depth=1.31"
Tc=5.0 min CN=60 Runoff=0.12 cfs 0.009 af

SubcatchmentDA-9: AREAS EAST OF Runoff Area=0.558 ac 65.23% Impervious Runoff Depth=2.63"
Tc=5.0 min CN=77 Runoff=1.77 cfs 0.122 af

SubcatchmentDA22A: QUIN AVE SOUTH Runoff Area=0.461 ac 63.56% Impervious Runoff Depth=2.54"
Flow Length=1,172' Tc=6.9 min CN=76 Runoff=1.32 cfs 0.098 af

SubcatchmentDA22B: QUIN AVE WEST Runoff Area=1.335 ac 43.37% Impervious Runoff Depth=1.66"
Flow Length=1,473' Tc=8.8 min CN=65 Runoff=2.23 cfs 0.185 af

SubcatchmentDA44: North of Quin Runoff Area=0.841 ac 0.00% Impervious Runoff Depth=0.03"
Tc=5.0 min CN=32 Runoff=0.00 cfs 0.002 af

SubcatchmentDA55: AREAS TO CB'S AT Runoff Area=0.641 ac 50.86% Impervious Runoff Depth=1.96"
Tc=5.0 min CN=69 Runoff=1.48 cfs 0.105 af

Subcatchment DA77: AREAS TO WETLAND Runoff Area=1.844 ac 0.00% Impervious Runoff Depth=0.03"
Flow Length=431' Tc=26.3 min CN=32 Runoff=0.01 cfs 0.004 af

Reach R1: Tt along stream Avg. Flow Depth=0.20' Max Vel=0.57 fps Inflow=0.99 cfs 0.059 af
n=0.040 L=550.0' S=0.0035 '/' Capacity=69.34 cfs Outflow=0.48 cfs 0.059 af

Reach R1A: Tt thru bogs Avg. Flow Depth=0.12' Max Vel=0.47 fps Inflow=0.31 cfs 0.191 af
n=0.040 L=520.0' S=0.0029 '/' Capacity=50.84 cfs Outflow=0.30 cfs 0.189 af

Reach R2: Tt thru da77 Avg. Flow Depth=0.17' Max Vel=0.97 fps Inflow=3.57 cfs 0.248 af
n=0.030 L=210.0' S=0.0095 '/' Capacity=50.53 cfs Outflow=3.21 cfs 0.248 af

Reach R2A: Travel Time thru wet pond Avg. Flow Depth=0.21' Max Vel=3.05 fps Inflow=1.32 cfs 0.098 af
n=0.025 L=255.0' S=0.0267 '/' Capacity=13.24 cfs Outflow=1.30 cfs 0.098 af

Reach R3: 18" CPP Avg. Flow Depth=0.70' Max Vel=2.78 fps Inflow=2.27 cfs 0.158 af
18.0" Round Pipe n=0.012 L=81.0' S=0.0020 '/' Capacity=5.06 cfs Outflow=2.27 cfs 0.158 af

Reach R5: Tt thru da22B Avg. Flow Depth=0.10' Max Vel=2.04 fps Inflow=1.44 cfs 0.063 af
n=0.013 L=246.0' S=0.0146 '/' Capacity=75.75 cfs Outflow=1.36 cfs 0.063 af

Reach SP#1: Study Point Combined Flows Inflow=0.48 cfs 0.248 af
Outflow=0.48 cfs 0.248 af

Pond 1P: LB's Peak Elev=20.70' Storage=477 cf Inflow=1.48 cfs 0.105 af
Discarded=0.03 cfs 0.042 af Primary=1.44 cfs 0.063 af Outflow=1.47 cfs 0.105 af

Pond 2P: Natural Low Area Peak Elev=16.08' Storage=2 cf Inflow=0.00 cfs 0.002 af
Discarded=0.00 cfs 0.002 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.002 af

Pond 3A-P: Pond 3A Peak Elev=17.52' Storage=195 cf Inflow=0.21 cfs 0.015 af
Discarded=0.01 cfs 0.012 af Primary=0.08 cfs 0.003 af Outflow=0.09 cfs 0.015 af

Pond 3P: Wet Pond Peak Elev=14.67' Storage=8,564 cf Inflow=4.66 cfs 0.274 af
Outflow=0.31 cfs 0.191 af

Pond 4P: Pond 4 Peak Elev=18.02' Storage=240 cf Inflow=0.46 cfs 0.032 af
Discarded=0.01 cfs 0.015 af Primary=0.45 cfs 0.017 af Outflow=0.46 cfs 0.031 af

Pond 5P: Pond 5 Peak Elev=19.02' Storage=234 cf Inflow=0.35 cfs 0.025 af
Discarded=0.02 cfs 0.016 af Primary=0.44 cfs 0.009 af Outflow=0.46 cfs 0.025 af

Pond 6P: Pond 6 Peak Elev=18.40' Storage=26 cf Inflow=0.02 cfs 0.004 af
Discarded=0.01 cfs 0.004 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.004 af

Pond 7P: Pond 7 Peak Elev=18.01' Storage=82 cf Inflow=0.10 cfs 0.007 af
Discarded=0.01 cfs 0.006 af Primary=0.11 cfs 0.002 af Outflow=0.12 cfs 0.007 af

Pond 8P: Pond 8 Peak Elev=17.20' Storage=92 cf Inflow=0.12 cfs 0.009 af
Discarded=0.03 cfs 0.009 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.009 af

Pond FB1: Forebay 1 Peak Elev=16.63' Storage=2,277 cf Inflow=2.71 cfs 0.192 af
Discarded=0.09 cfs 0.125 af Primary=1.57 cfs 0.067 af Outflow=1.66 cfs 0.192 af

Pond FB3: Forebay 3 Peak Elev=16.12' Storage=6,313 cf Inflow=6.78 cfs 0.544 af
Discarded=0.38 cfs 0.368 af Primary=4.03 cfs 0.176 af Outflow=4.41 cfs 0.544 af

Total Runoff Area = 8.622 ac Runoff Volume = 0.931 af Average Runoff Depth = 1.30"
68.71% Pervious = 5.924 ac 31.29% Impervious = 2.698 ac

Summary for Subcatchment DA-12: AREAS TO WETLAND TO WEST

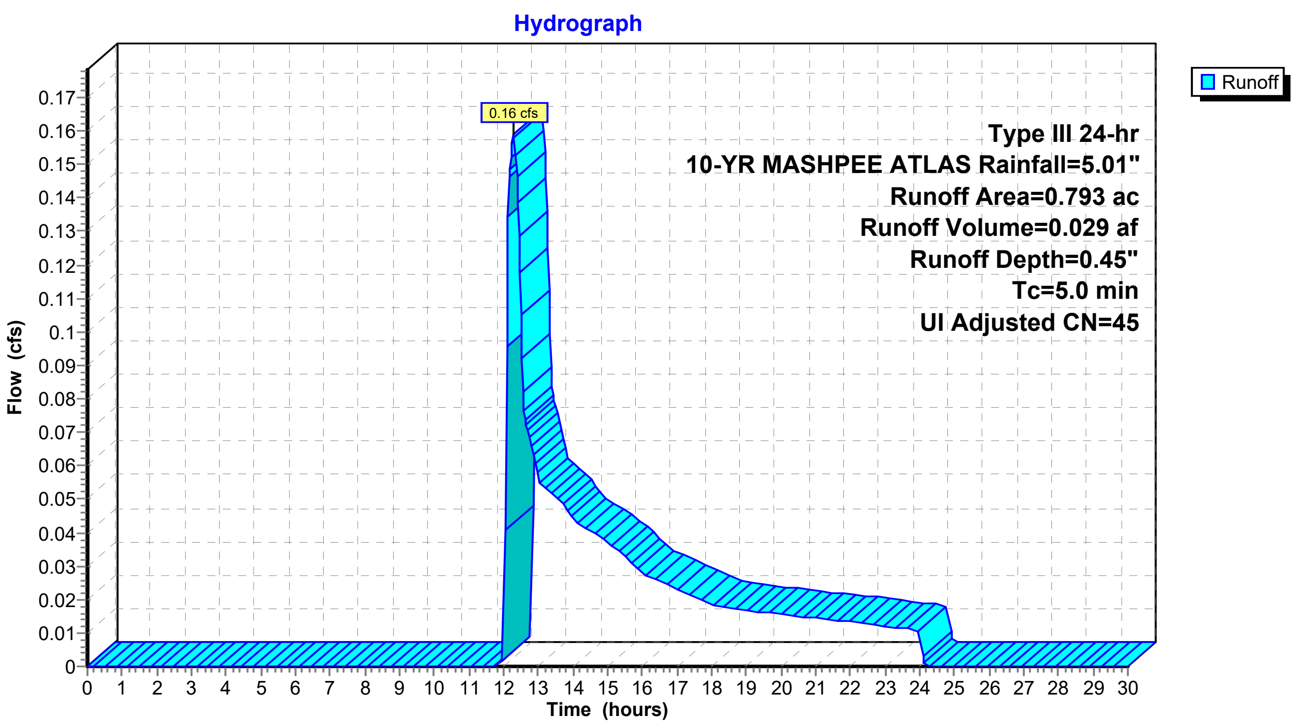
Runoff = 0.16 cfs @ 12.29 hrs, Volume= 0.029 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Adj	Description
0.090	39		>75% Grass cover, Good, HSG A
0.318	30		Woods, Good, HSG A
0.023	76		Gravel roads, HSG A
0.023	98		Unconnected pavement, HSG B
0.317	55		Woods, Good, HSG B
0.022	85		Gravel roads, HSG B
0.793	46	45	Weighted Average, UI Adjusted
0.770			97.10% Pervious Area
0.023			2.90% Impervious Area
0.023			100.00% Unconnected

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

Subcatchment DA-12: AREAS TO WETLAND TO WEST



Summary for Subcatchment DA-1A: AREA TO CB'S 3 AND 4

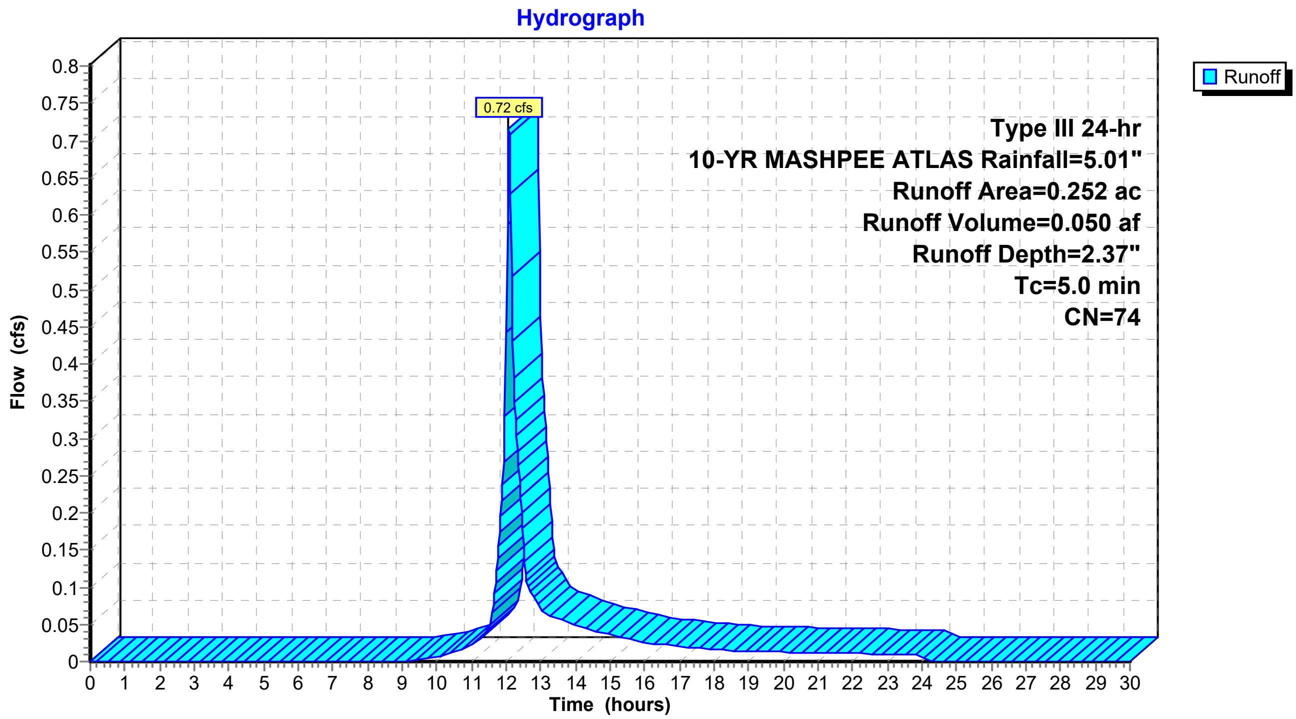
Runoff = 0.72 cfs @ 12.08 hrs, Volume= 0.050 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.101	39	>75% Grass cover, Good, HSG A
0.109	98	Unconnected pavement, HSG A
0.042	98	Roofs, HSG B
0.252	74	Weighted Average
0.101		40.08% Pervious Area
0.151		59.92% Impervious Area
0.109		72.19% Unconnected

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

Subcatchment DA-1A: AREA TO CB'S 3 AND 4



Summary for Subcatchment DA-1B: AREA TO CB'S 1 AND 2

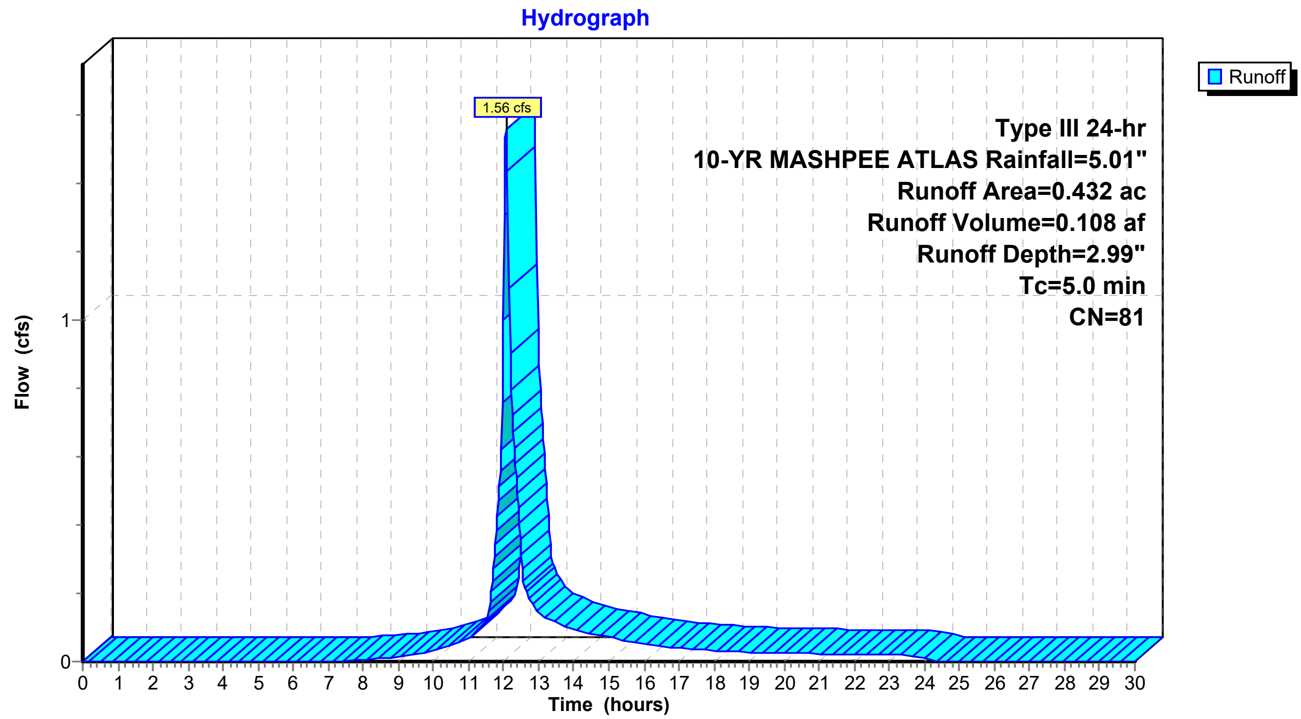
Runoff = 1.56 cfs @ 12.07 hrs, Volume= 0.108 af, Depth= 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.137	98	Unconnected pavement, HSG A
0.127	39	Pasture/grassland/range, Good, HSG A
0.168	98	Roofs, HSG A
0.432	81	Weighted Average
0.127		29.40% Pervious Area
0.305		70.60% Impervious Area
0.137		44.92% Unconnected

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

Subcatchment DA-1B: AREA TO CB'S 1 AND 2



Summary for Subcatchment DA-1C: AREA TO FB1

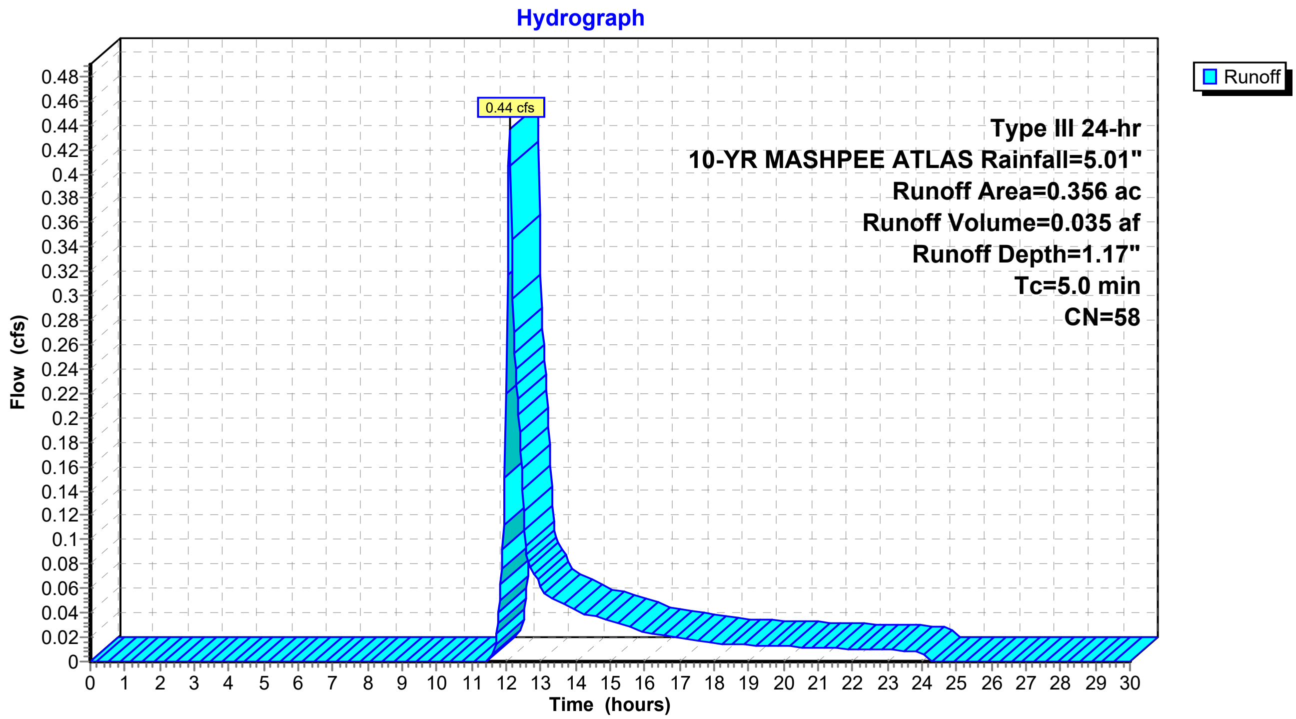
Runoff = 0.44 cfs @ 12.09 hrs, Volume= 0.035 af, Depth= 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.240	39	>75% Grass cover, Good, HSG A
0.074	98	Unconnected pavement, HSG A
0.042	98	Roofs, HSG B
0.356	58	Weighted Average
0.240		67.42% Pervious Area
0.116		32.58% Impervious Area
0.074		63.79% Unconnected

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

Subcatchment DA-1C: AREA TO FB1



Summary for Subcatchment DA-2: END OF ROAD TO THE EAST

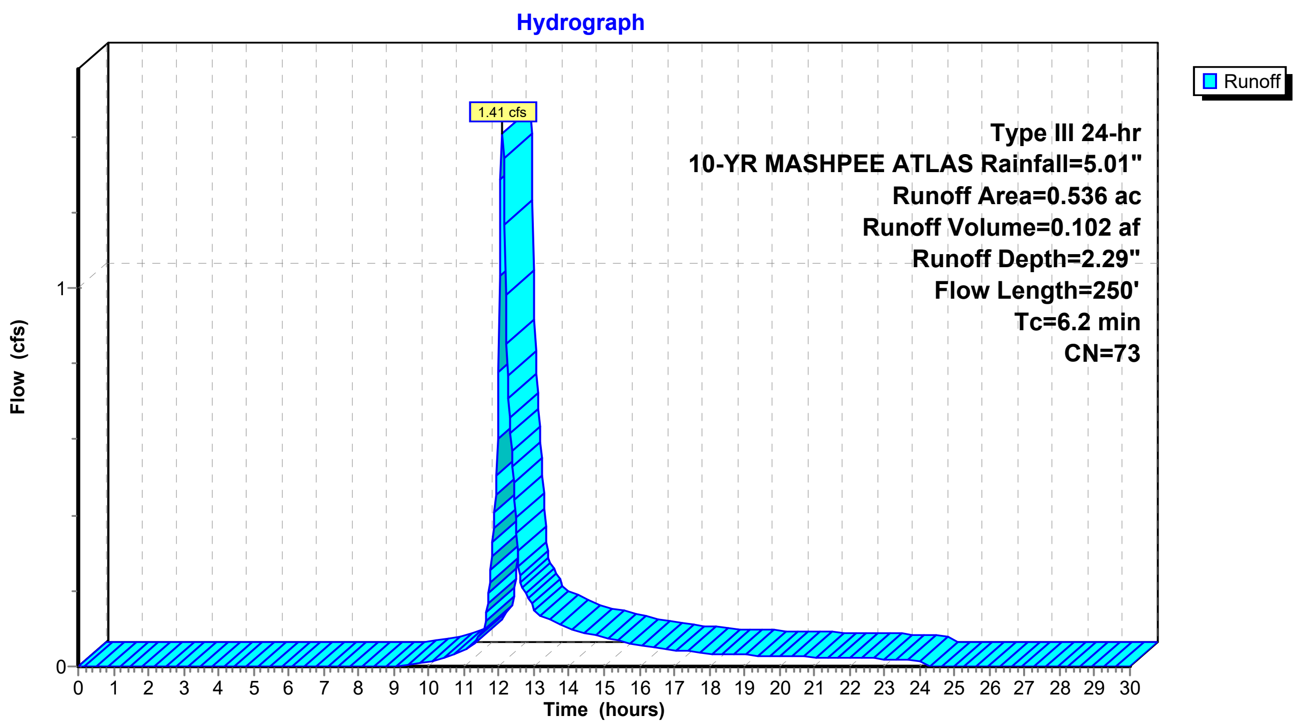
Runoff = 1.41 cfs @ 12.09 hrs, Volume= 0.102 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.225	39	>75% Grass cover, Good, HSG A
0.181	98	Unconnected pavement, HSG A
0.130	98	Roofs, HSG A
0.536	73	Weighted Average
0.225		41.98% Pervious Area
0.311		58.02% Impervious Area
0.181		58.20% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	30	0.0200	0.10		**Sheet Flow, LAWN** Grass: Dense n= 0.240 P2= 3.55"
0.5	80	0.0200	2.87		**Shallow Concentrated Flow, ROAD** Paved Kv= 20.3 fps
0.5	140	0.0100	4.91	3.86	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
6.2	250	Total			

Subcatchment DA-2: END OF ROAD TO THE EAST



Summary for Subcatchment DA-3: AREAS TO WEST

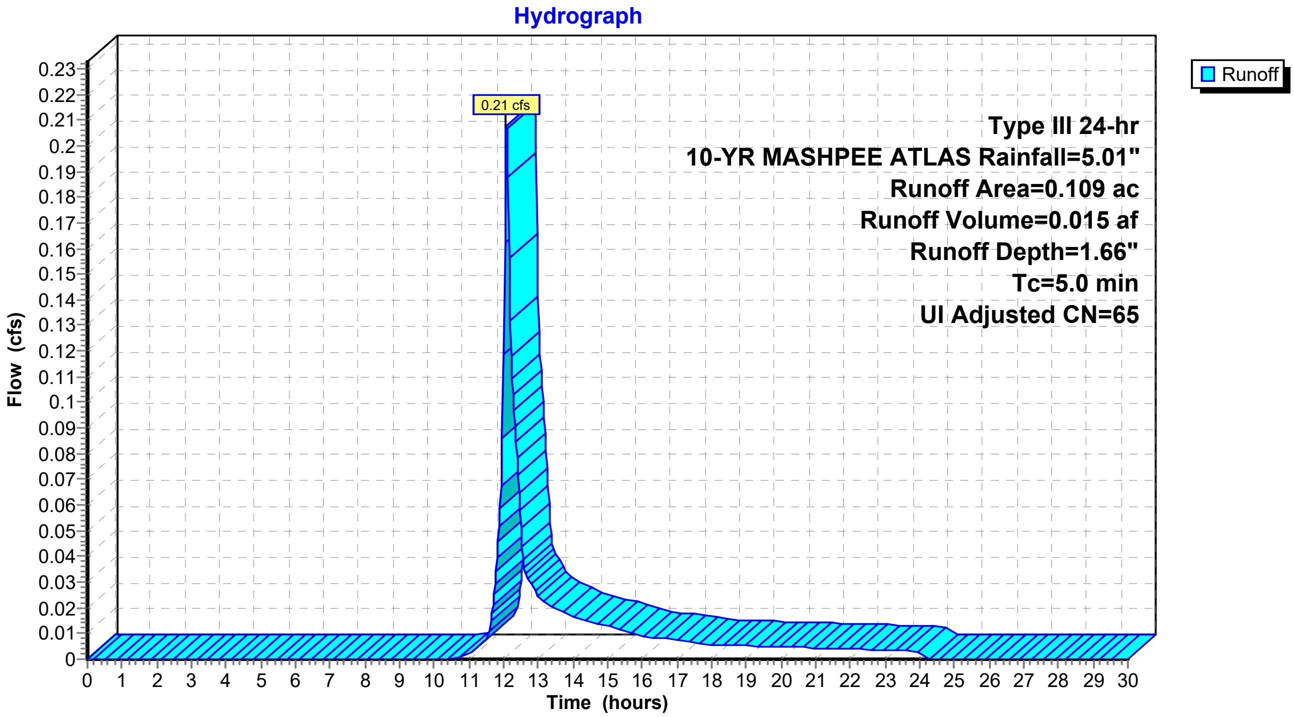
Runoff = 0.21 cfs @ 12.08 hrs, Volume= 0.015 af, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Adj	Description
0.086	61		>75% Grass cover, Good, HSG B
0.023	98		Unconnected pavement, HSG B
0.109	69	65	Weighted Average, UI Adjusted
0.086			78.90% Pervious Area
0.023			21.10% Impervious Area
0.023			100.00% Unconnected

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

Subcatchment DA-3: AREAS TO WEST



Summary for Subcatchment DA-4: AREAS TO WEST

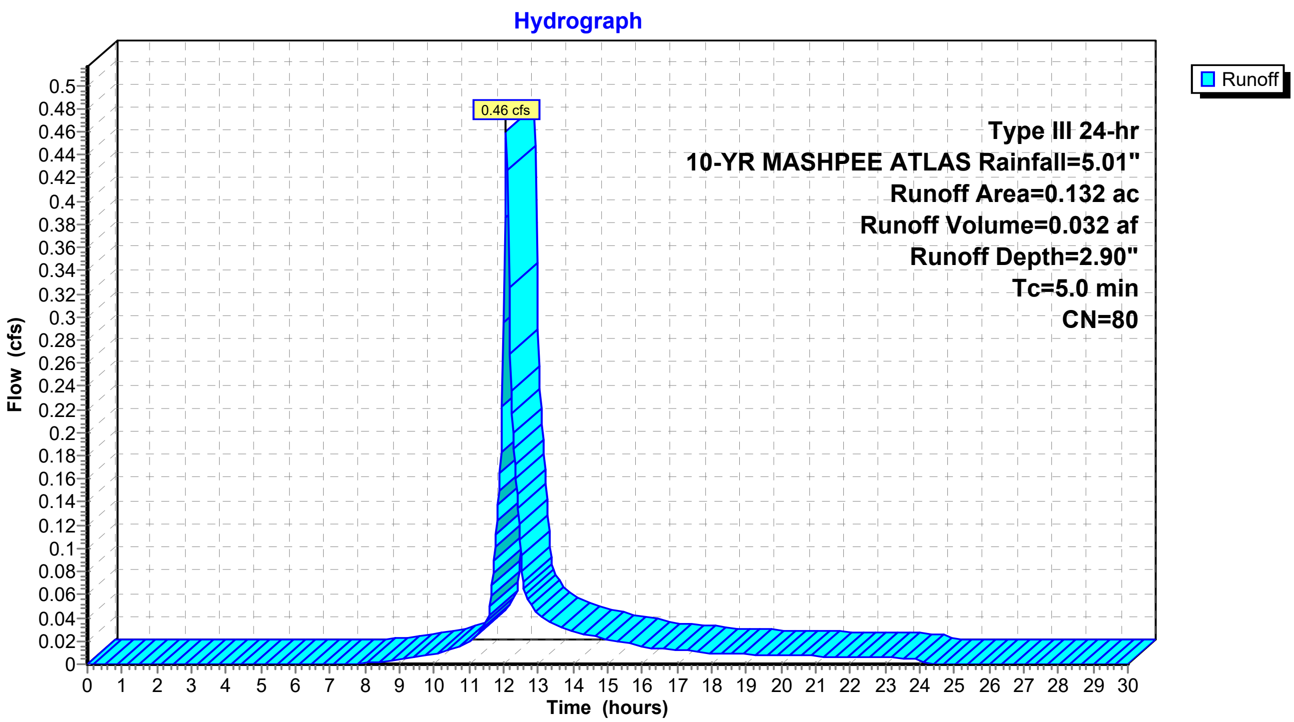
Runoff = 0.46 cfs @ 12.08 hrs, Volume= 0.032 af, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.065	61	>75% Grass cover, Good, HSG B
0.067	98	Unconnected pavement, HSG B
0.132	80	Weighted Average
0.065		49.24% Pervious Area
0.067		50.76% Impervious Area
0.067		100.00% Unconnected

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

Subcatchment DA-4: AREAS TO WEST



Summary for Subcatchment DA-5: AREAS TO WEST

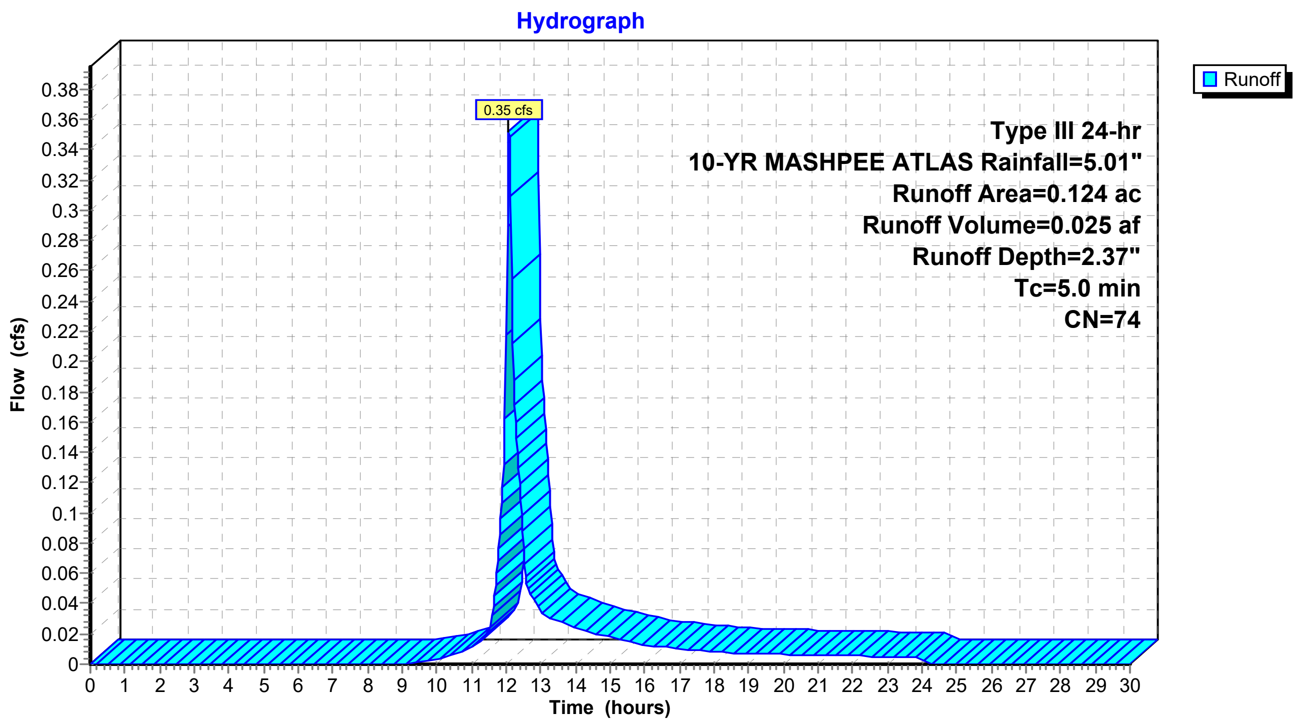
Runoff = 0.35 cfs @ 12.08 hrs, Volume= 0.025 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.051	39	>75% Grass cover, Good, HSG A
0.073	98	Unconnected pavement, HSG A
0.124	74	Weighted Average
0.051		41.13% Pervious Area
0.073		58.87% Impervious Area
0.073		100.00% Unconnected

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

Subcatchment DA-5: AREAS TO WEST



Summary for Subcatchment DA-6: AREAS TO WEST

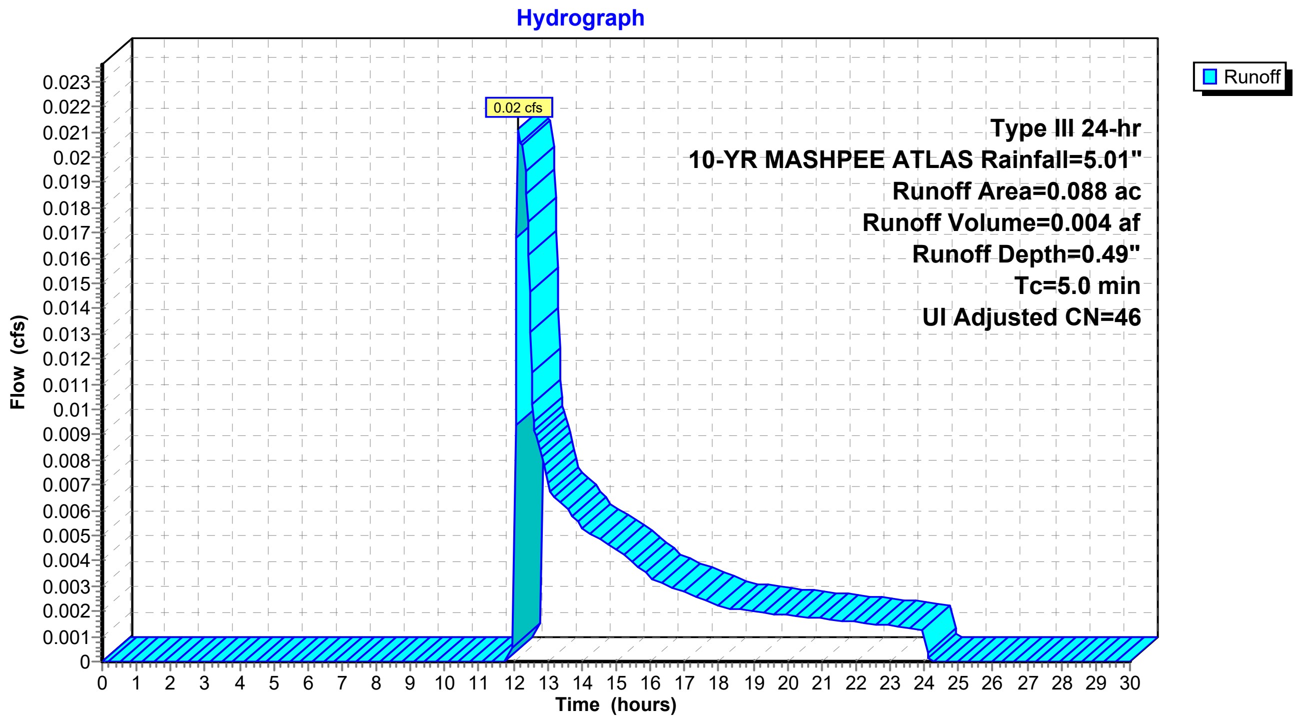
Runoff = 0.02 cfs @ 12.15 hrs, Volume= 0.004 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Adj	Description
0.073	39		>75% Grass cover, Good, HSG A
0.008	98		Unconnected pavement, HSG A
0.007	98		Roofs, HSG A
0.088	49	46	Weighted Average, UI Adjusted
0.073			82.95% Pervious Area
0.015			17.05% Impervious Area
0.008			53.33% Unconnected

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

Subcatchment DA-6: AREAS TO WEST



Summary for Subcatchment DA-7: AREAS TO WEST

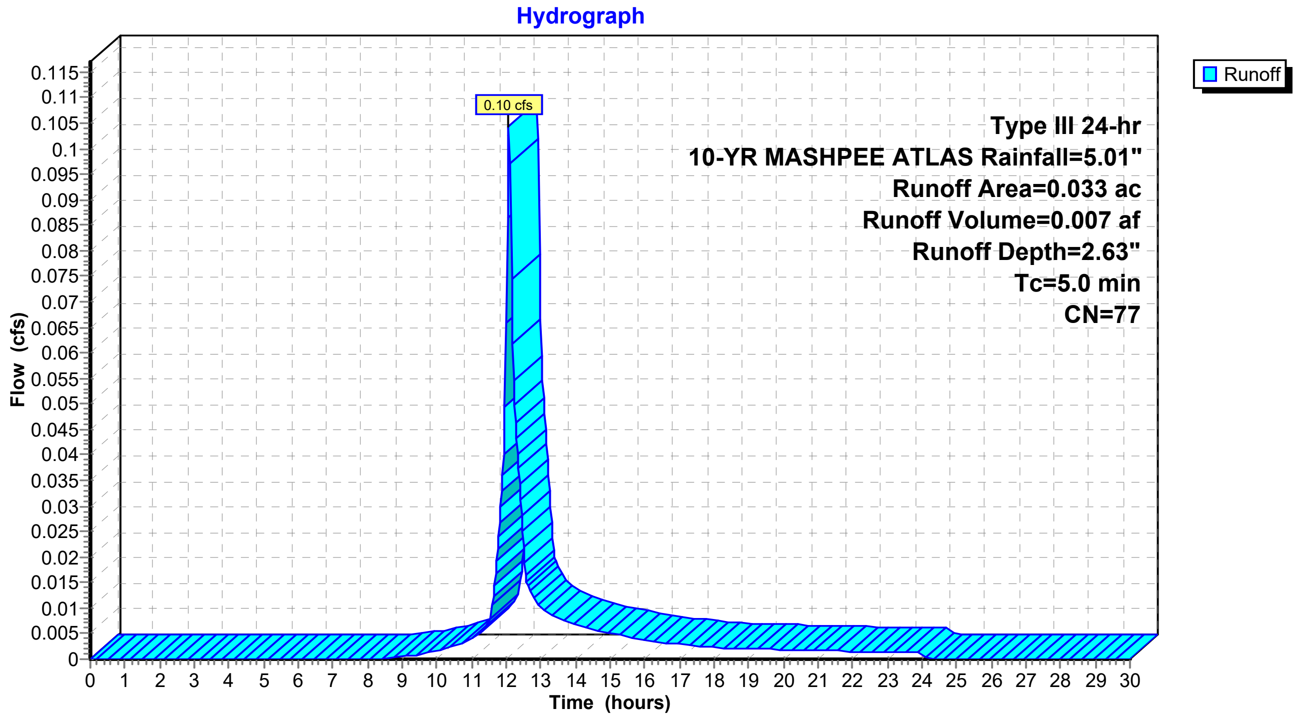
Runoff = 0.10 cfs @ 12.08 hrs, Volume= 0.007 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.012	39	>75% Grass cover, Good, HSG A
0.021	98	Unconnected pavement, HSG A
0.033	77	Weighted Average
0.012		36.36% Pervious Area
0.021		63.64% Impervious Area
0.021		100.00% Unconnected

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

Subcatchment DA-7: AREAS TO WEST



Summary for Subcatchment DA-8: AREAS TO WEST

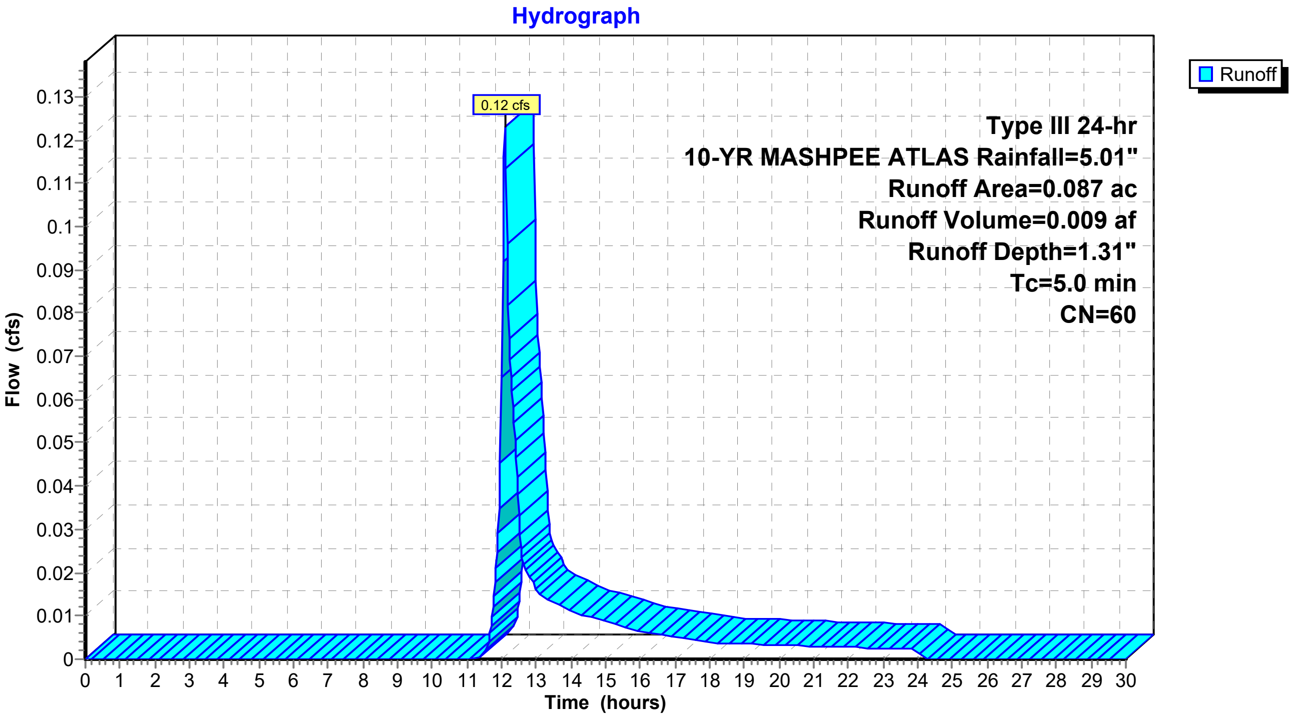
Runoff = 0.12 cfs @ 12.09 hrs, Volume= 0.009 af, Depth= 1.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.056	39	>75% Grass cover, Good, HSG A
0.031	98	Unconnected pavement, HSG A
0.087	60	Weighted Average
0.056		64.37% Pervious Area
0.031		35.63% Impervious Area
0.031		100.00% Unconnected

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

Subcatchment DA-8: AREAS TO WEST



Summary for Subcatchment DA-9: AREAS EAST OF ROAD

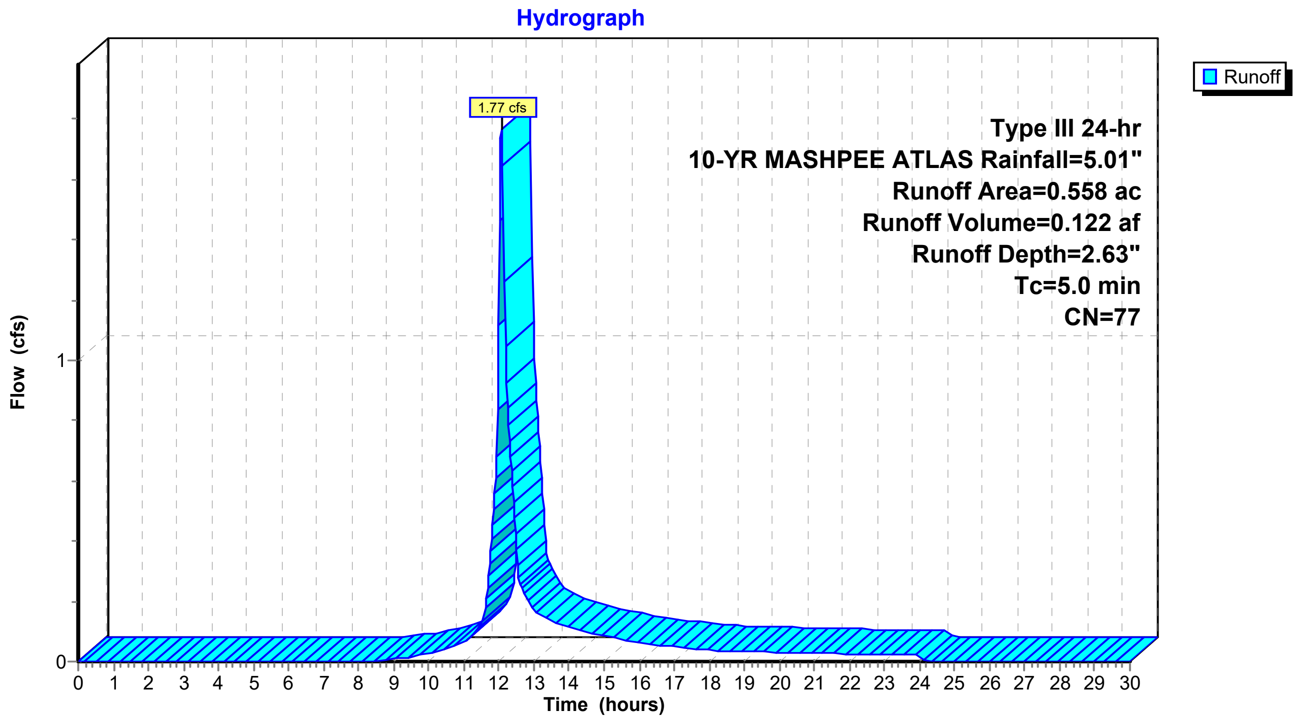
Runoff = 1.77 cfs @ 12.08 hrs, Volume= 0.122 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.194	39	>75% Grass cover, Good, HSG A
0.154	98	Unconnected pavement, HSG A
0.210	98	Roofs, HSG A
0.558	77	Weighted Average
0.194		34.77% Pervious Area
0.364		65.23% Impervious Area
0.154		42.31% Unconnected

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

Subcatchment DA-9: AREAS EAST OF ROAD



Summary for Subcatchment DA22A: QUIN AVE SOUTH AREA TO WET POND

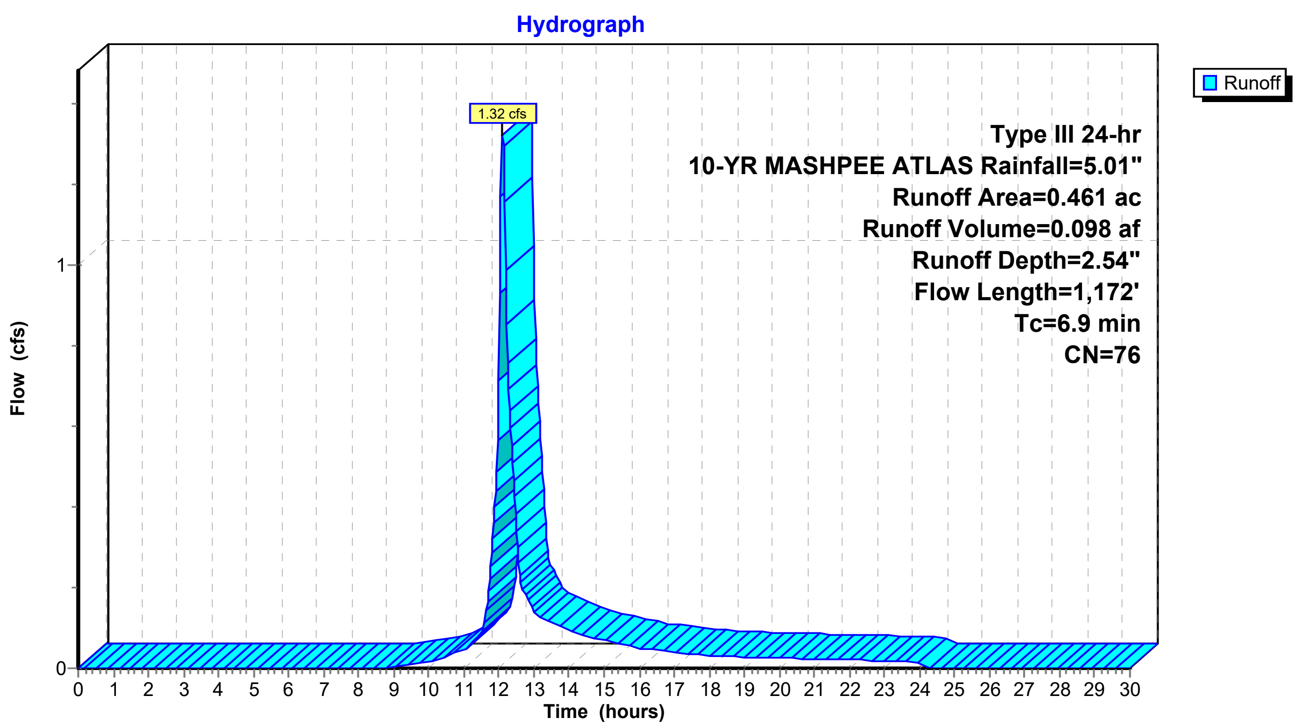
Runoff = 1.32 cfs @ 12.10 hrs, Volume= 0.098 af, Depth= 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.293	98	Unconnected pavement, HSG A
0.168	39	>75% Grass cover, Good, HSG A
0.461	76	Weighted Average
0.168		36.44% Pervious Area
0.293		63.56% Impervious Area
0.293		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.96		**Sheet Flow, A** Smooth surfaces n= 0.011 P2= 3.55"
6.0	1,122	0.0236	3.12		**Shallow Concentrated Flow, B** Paved Kv= 20.3 fps
6.9	1,172	Total			

Subcatchment DA22A: QUIN AVE SOUTH AREA TO WET POND



Summary for Subcatchment DA22B: QUIN AVE WEST AND NORTH AREA TO FOREBAY 3

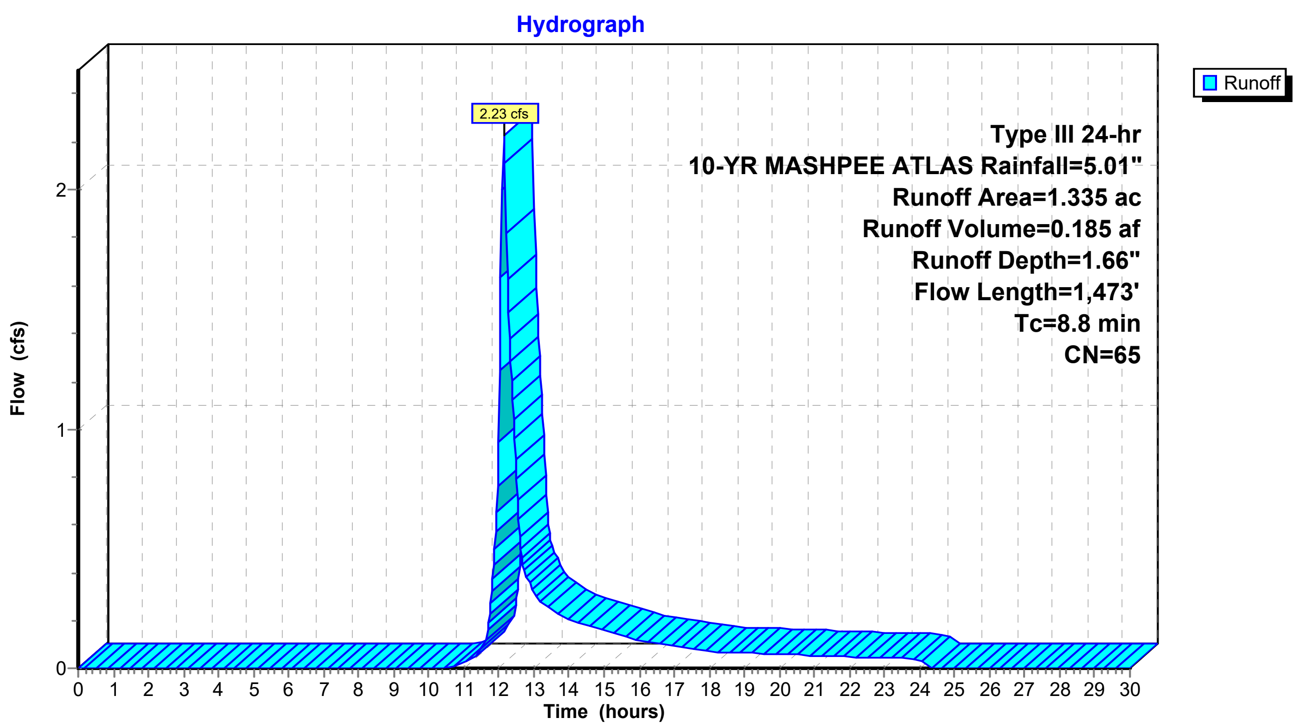
Runoff = 2.23 cfs @ 12.13 hrs, Volume= 0.185 af, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.579	98	Unconnected pavement, HSG A
0.756	39	>75% Grass cover, Good, HSG A
1.335	65	Weighted Average
0.756		56.63% Pervious Area
0.579		43.37% Impervious Area
0.579		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.96		**Sheet Flow, A** Smooth surfaces n= 0.011 P2= 3.55"
7.9	1,423	0.0220	3.01		**Shallow Concentrated Flow, B** Paved Kv= 20.3 fps
8.8	1,473	Total			

Subcatchment DA22B: QUIN AVE WEST AND NORTH AREA TO FOREBAY 3



Summary for Subcatchment DA44: North of Quin

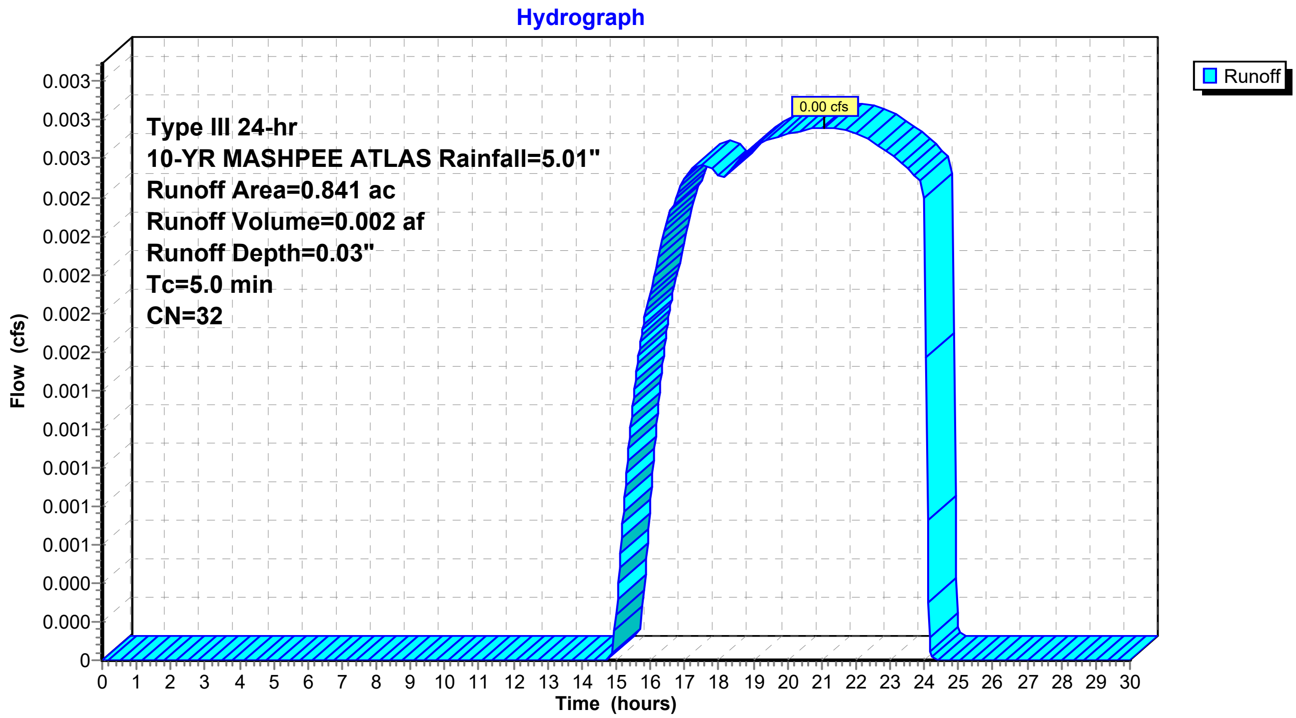
Runoff = 0.00 cfs @ 21.05 hrs, Volume= 0.002 af, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.841	32	Woods/grass comb., Good, HSG A
0.841		100.00% Pervious Area

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

Subcatchment DA44: North of Quin



Summary for Subcatchment DA55: AREAS TO CB'S AT WILLOWBEND DR

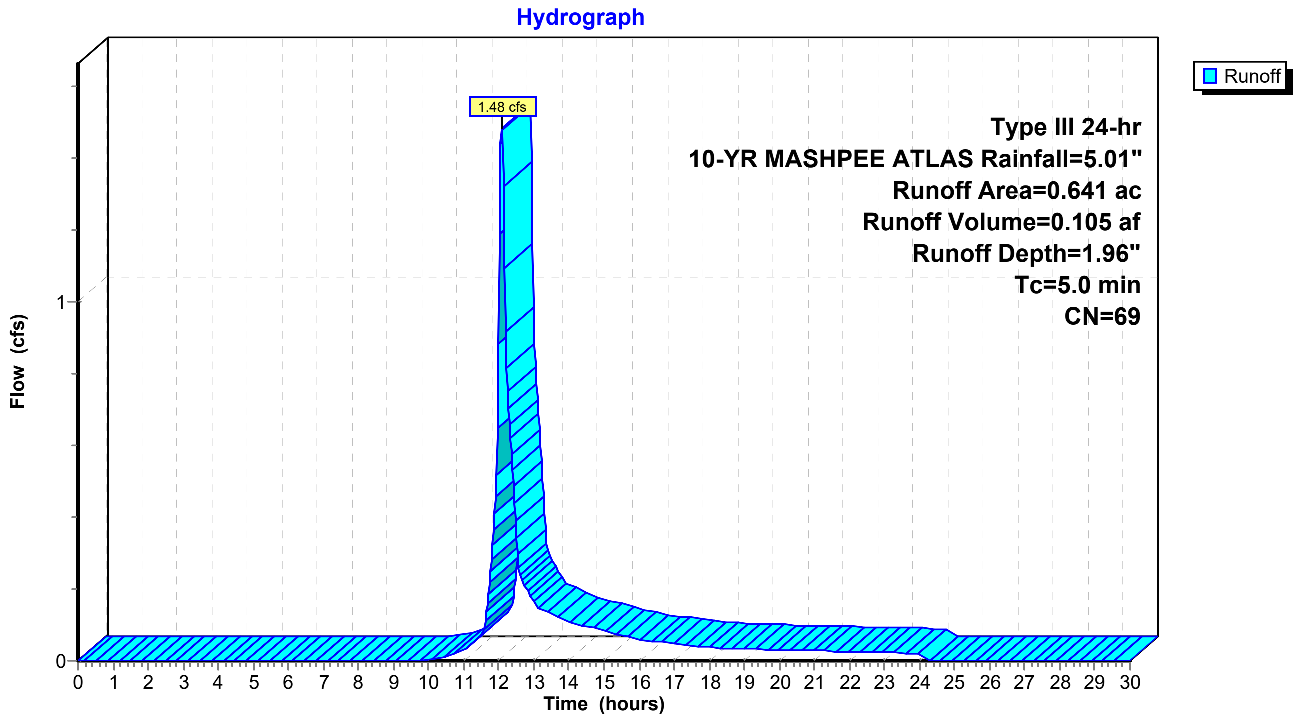
Runoff = 1.48 cfs @ 12.08 hrs, Volume= 0.105 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.326	98	Paved parking, HSG A
0.315	39	Pasture/grassland/range, Good, HSG A
0.641	69	Weighted Average
0.315		49.14% Pervious Area
0.326		50.86% Impervious Area

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

Subcatchment DA55: AREAS TO CB'S AT WILLOWBEND DR



Summary for Subcatchment DA77: AREAS TO WETLAND TO EAST

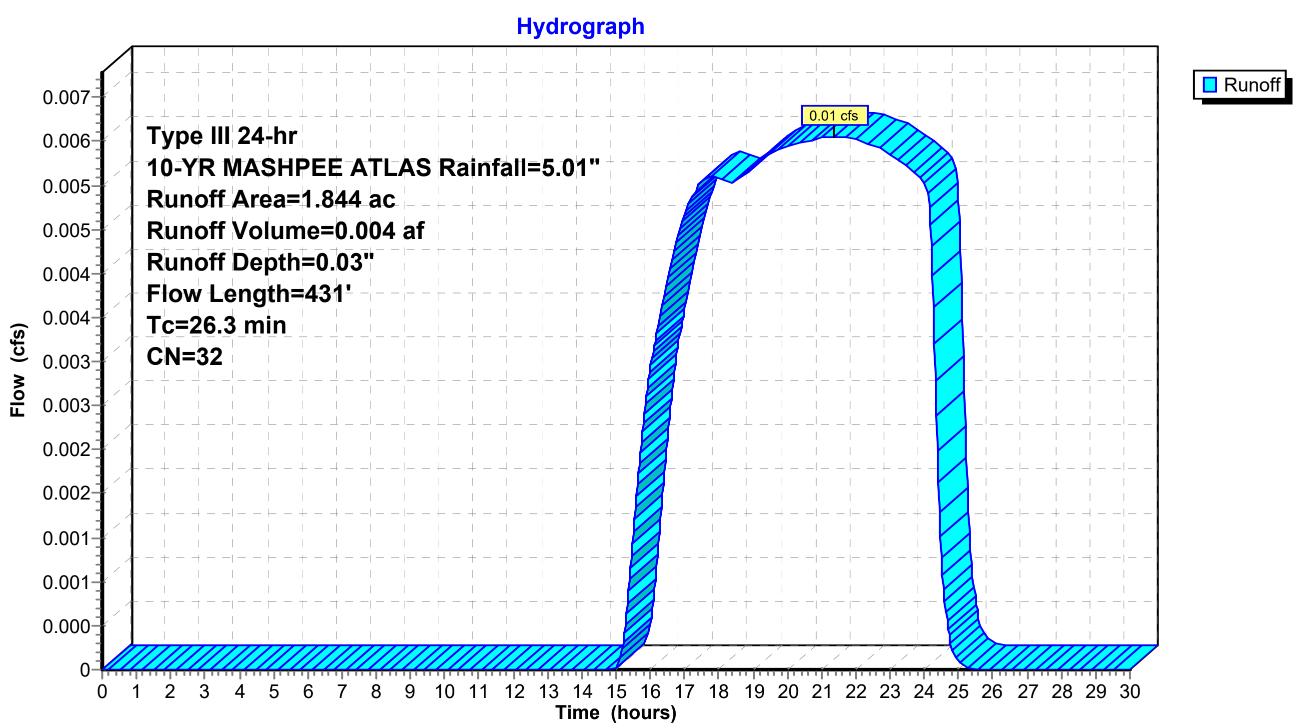
Runoff = 0.01 cfs @ 21.36 hrs, Volume= 0.004 af, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-YR MASHPEE ATLAS Rainfall=5.01"

Area (ac)	CN	Description
0.476	39	>75% Grass cover, Good, HSG A
1.201	30	Woods, Good, HSG A
0.167	30	Woods, Good, HSG A
1.844	32	Weighted Average
1.844		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0480	0.10		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.55"
18.0	381	0.0050	0.35		**Shallow Concentrated Flow, B** Woodland Kv= 5.0 fps
26.3	431	Total			

Subcatchment DA77: AREAS TO WETLAND TO EAST



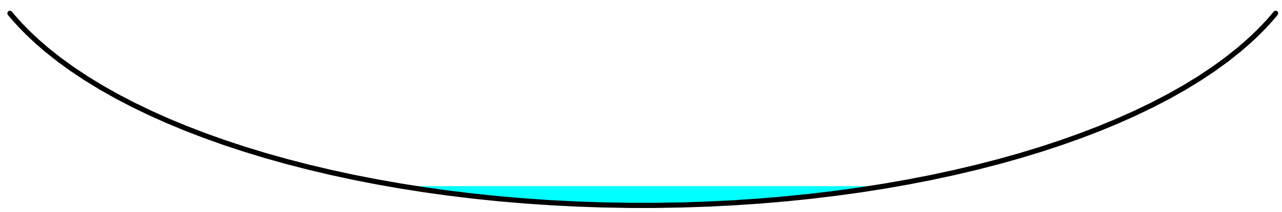
Summary for Reach R1: Tt along stream

Inflow Area = 1.366 ac, 18.52% Impervious, Inflow Depth = 0.52" for 10-YR MASHPEE ATLAS event
Inflow = 0.99 cfs @ 12.10 hrs, Volume= 0.059 af
Outflow = 0.48 cfs @ 12.39 hrs, Volume= 0.059 af, Atten= 51%, Lag= 17.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 0.57 fps, Min. Travel Time= 16.1 min
Avg. Velocity = 0.22 fps, Avg. Travel Time= 42.3 min

Peak Storage= 466 cf @ 12.39 hrs
Average Depth at Peak Storage= 0.20'
Bank-Full Depth= 2.00' Flow Area= 26.7 sf, Capacity= 69.34 cfs

20.00' x 2.00' deep Parabolic Channel, n= 0.040 Winding stream, pools & shoals
Length= 550.0' Slope= 0.0035 '/'
Inlet Invert= 14.60', Outlet Invert= 12.70'



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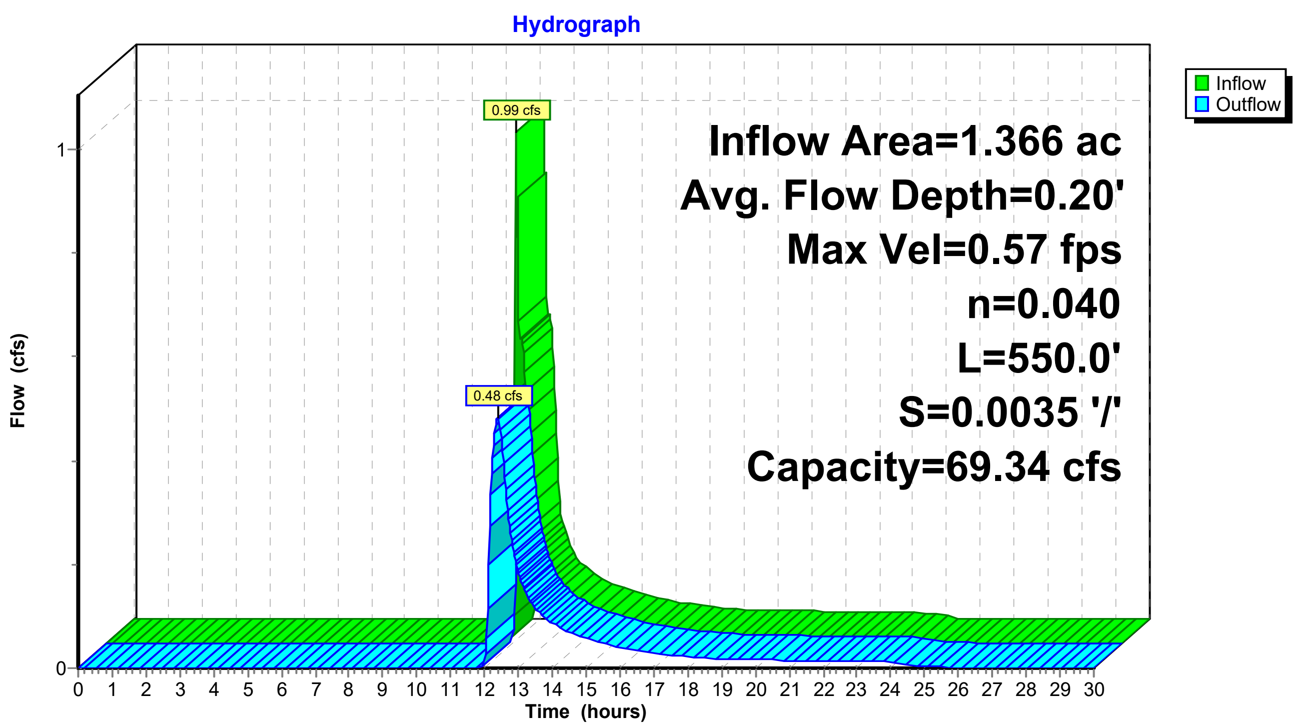
Reach R1: Tt along stream



Summary for Reach R1A: Tt thru bogs

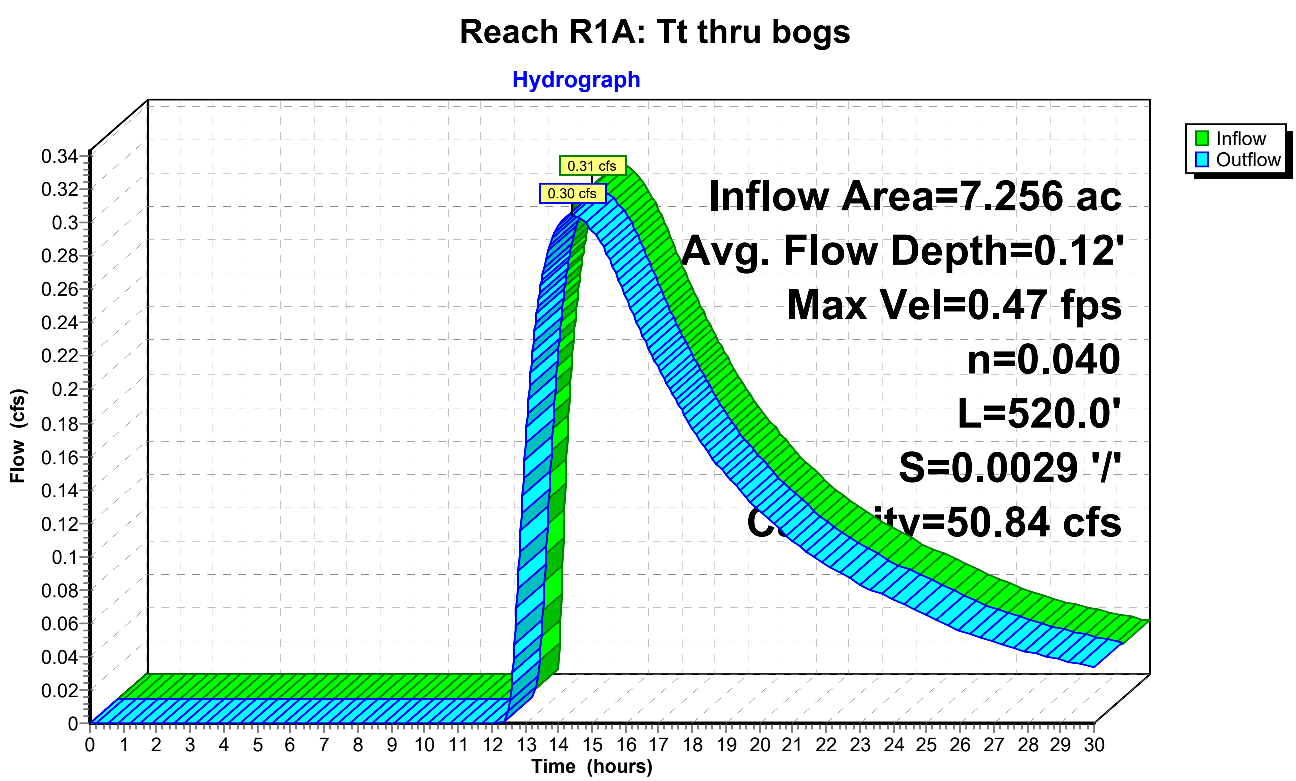
Inflow Area = 7.256 ac, 33.70% Impervious, Inflow Depth > 0.32" for 10-YR MASHPEE ATLAS event
Inflow = 0.31 cfs @ 14.15 hrs, Volume= 0.191 af
Outflow = 0.30 cfs @ 14.38 hrs, Volume= 0.189 af, Atten= 1%, Lag= 13.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 0.47 fps, Min. Travel Time= 18.6 min
Avg. Velocity = 0.32 fps, Avg. Travel Time= 27.0 min

Peak Storage= 339 cf @ 14.38 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 2.00' Flow Area= 22.0 sf, Capacity= 50.84 cfs

5.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/' Top Width= 17.00'
Length= 520.0' Slope= 0.0029 '/'
Inlet Invert= 14.20', Outlet Invert= 12.70'

‡



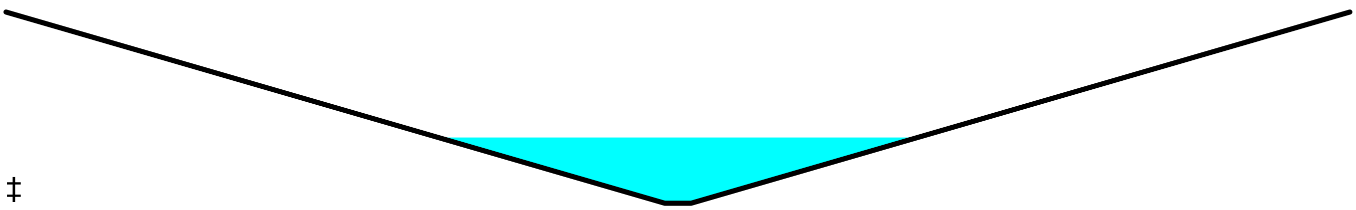
Summary for Reach R2: Tt thru da77

Inflow Area = 2.817 ac, 32.13% Impervious, Inflow Depth = 1.06" for 10-YR MASHPEE ATLAS event
Inflow = 3.57 cfs @ 12.13 hrs, Volume= 0.248 af
Outflow = 3.21 cfs @ 12.18 hrs, Volume= 0.248 af, Atten= 10%, Lag= 3.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 0.97 fps, Min. Travel Time= 3.6 min
Avg. Velocity = 0.37 fps, Avg. Travel Time= 9.3 min

Peak Storage= 691 cf @ 12.18 hrs
Average Depth at Peak Storage= 0.17'
Bank-Full Depth= 0.50' Flow Area= 26.0 sf, Capacity= 50.53 cfs

2.00' x 0.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 100.0 '/' Top Width= 102.00'
Length= 210.0' Slope= 0.0095 '/'
Inlet Invert= 17.00', Outlet Invert= 15.00'



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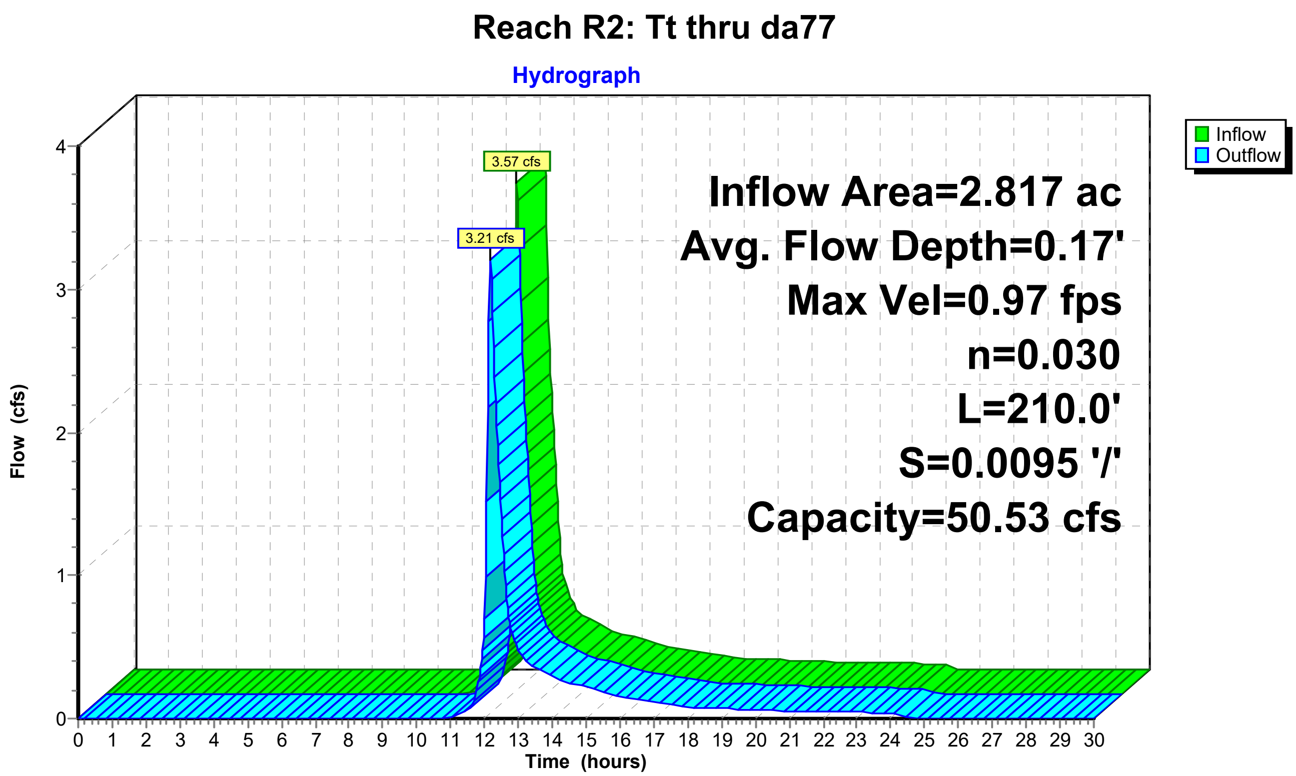


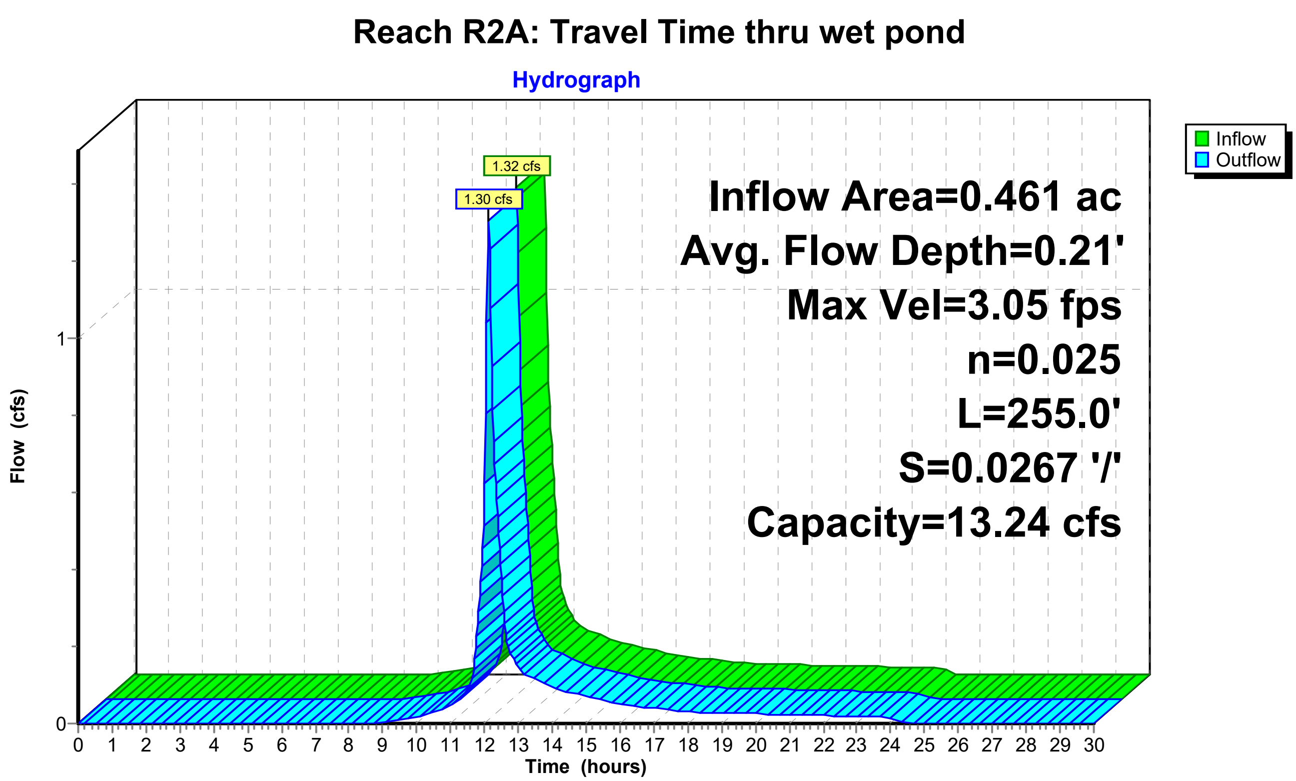
Summary for Reach R2A: Travel Time thru wet pond

Inflow Area = 0.461 ac, 63.56% Impervious, Inflow Depth = 2.54" for 10-YR MASHPEE ATLAS event
Inflow = 1.32 cfs @ 12.10 hrs, Volume= 0.098 af
Outflow = 1.30 cfs @ 12.12 hrs, Volume= 0.098 af, Atten= 2%, Lag= 1.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 3.05 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 0.86 fps, Avg. Travel Time= 5.0 min

Peak Storage= 109 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 1.00' Flow Area= 2.1 sf, Capacity= 13.24 cfs

2.00' x 1.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 0.1 '/' Top Width= 2.20'
Length= 255.0' Slope= 0.0267 '/'
Inlet Invert= 21.00', Outlet Invert= 14.20'



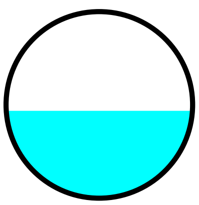
Summary for Reach R3: 18" CPP

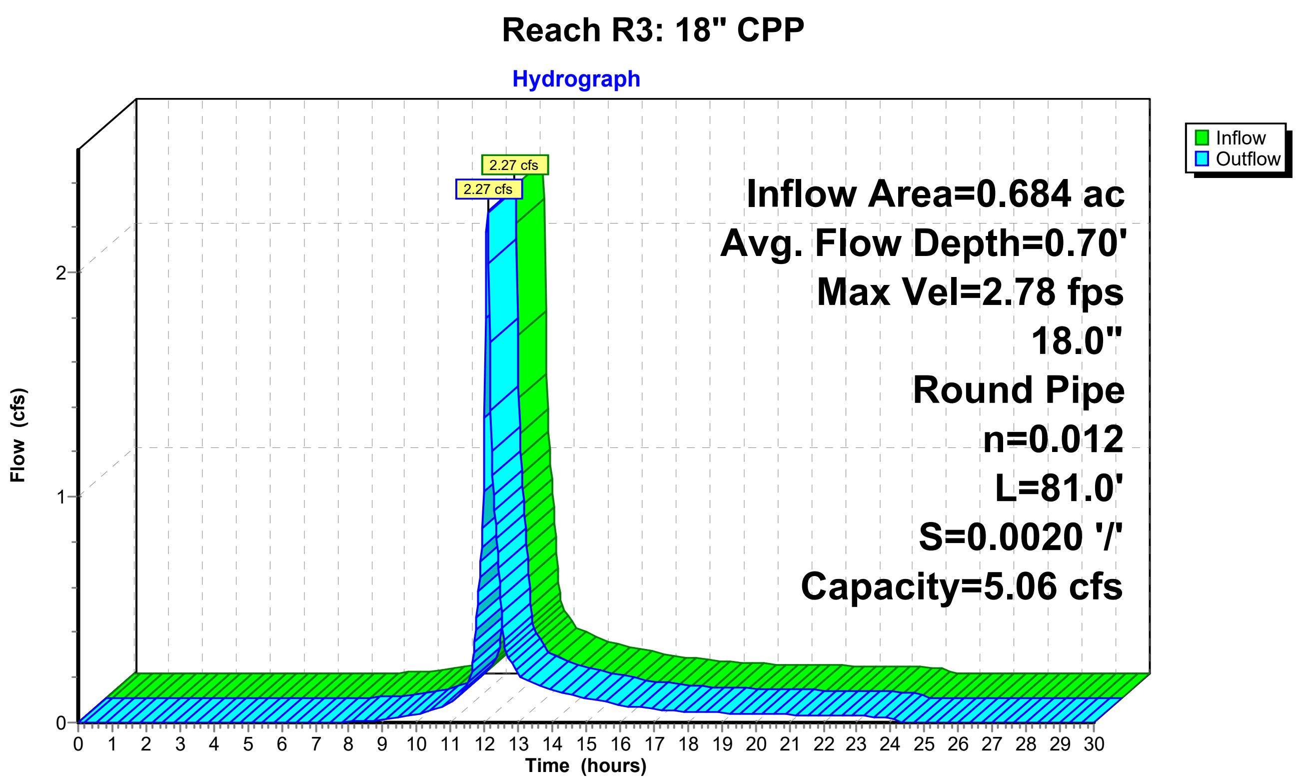
Inflow Area = 0.684 ac, 66.67% Impervious, Inflow Depth = 2.77" for 10-YR MASHPEE ATLAS event
Inflow = 2.27 cfs @ 12.08 hrs, Volume= 0.158 af
Outflow = 2.27 cfs @ 12.08 hrs, Volume= 0.158 af, Atten= 0%, Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 2.78 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 0.96 fps, Avg. Travel Time= 1.4 min

Peak Storage= 66 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.70'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 5.06 cfs

18.0" Round Pipe
n= 0.012
Length= 81.0' Slope= 0.0020 '/'
Inlet Invert= 15.06', Outlet Invert= 14.90'





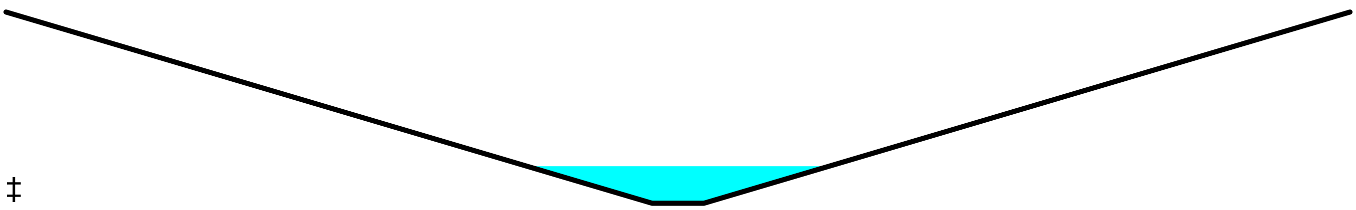
Summary for Reach R5: Tt thru da22B

Inflow Area = 0.641 ac, 50.86% Impervious, Inflow Depth = 1.18" for 10-YR MASHPEE ATLAS event
Inflow = 1.44 cfs @ 12.09 hrs, Volume= 0.063 af
Outflow = 1.36 cfs @ 12.12 hrs, Volume= 0.063 af, Atten= 6%, Lag= 1.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 2.04 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 0.76 fps, Avg. Travel Time= 5.4 min

Peak Storage= 164 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 0.50' Flow Area= 13.5 sf, Capacity= 75.75 cfs

2.00' x 0.50' deep channel, n= 0.013 Asphalt, smooth
Side Slope Z-value= 50.0 '/' Top Width= 52.00'
Length= 246.0' Slope= 0.0146 '/'
Inlet Invert= 20.58', Outlet Invert= 17.00'



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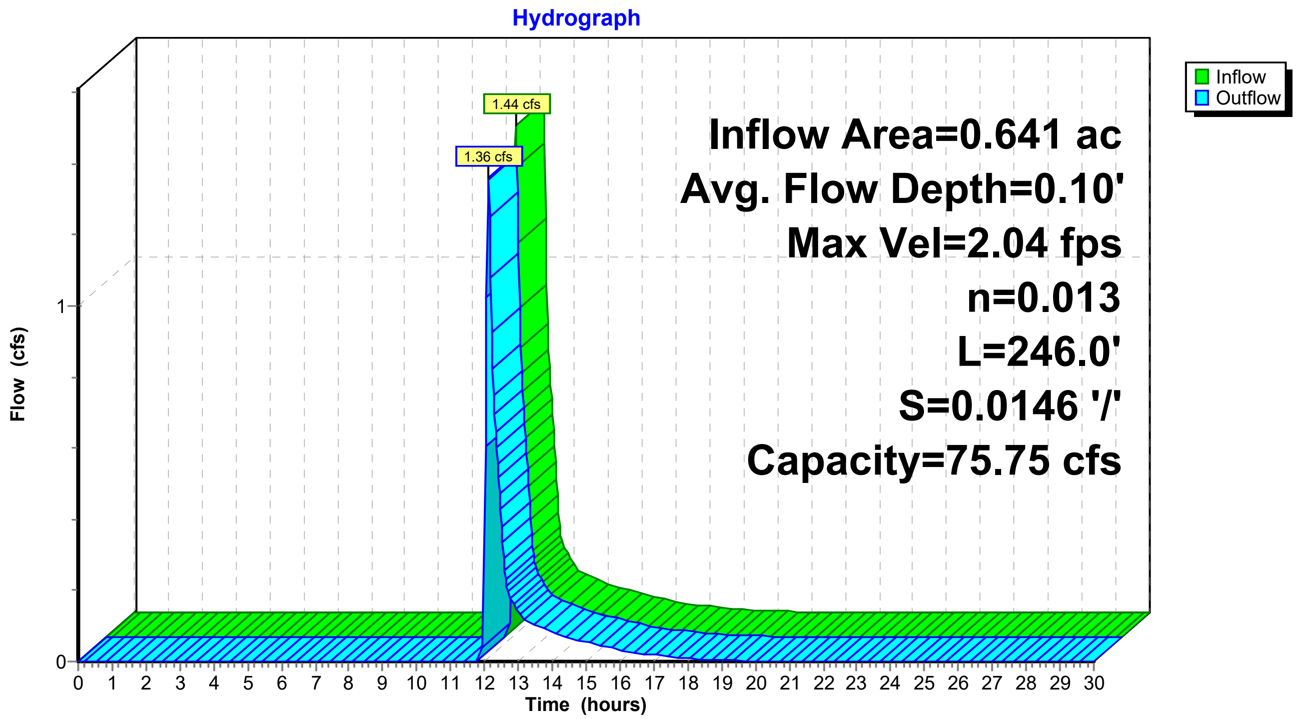
Reach R5: Tt thru da22B

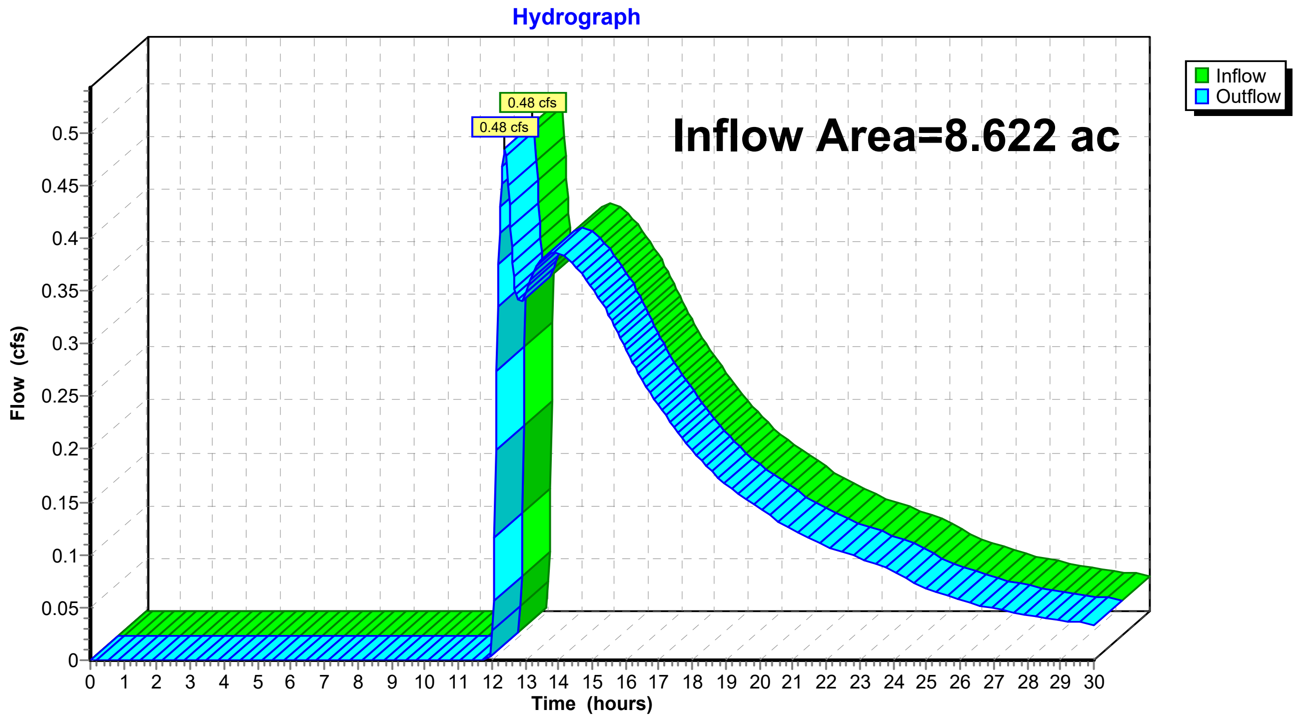


Summary for Reach SP#1: Study Point Combined Flows

Inflow Area =	8.622 ac, 31.29% Impervious, Inflow Depth > 0.35"		for 10-YR MASHPEE ATLAS event
Inflow =	0.48 cfs @ 12.40 hrs, Volume=	0.248 af	
Outflow =	0.48 cfs @ 12.40 hrs, Volume=	0.248 af, Atten= 0%, Lag= 0.0 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3

Reach SP#1: Study Point Combined Flows



Summary for Pond 1P: LB's

Inflow Area = 0.641 ac, 50.86% Impervious, Inflow Depth = 1.96" for 10-YR MASHPEE ATLAS event
Inflow = 1.48 cfs @ 12.08 hrs, Volume= 0.105 af
Outflow = 1.47 cfs @ 12.09 hrs, Volume= 0.105 af, Atten= 1%, Lag= 0.4 min
Discarded = 0.03 cfs @ 11.22 hrs, Volume= 0.042 af
Primary = 1.44 cfs @ 12.09 hrs, Volume= 0.063 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 20.70' @ 12.10 hrs Surf.Area= 750 sf Storage= 477 cf

Plug-Flow detention time= 76.2 min calculated for 0.105 af (100% of inflow)
Center-of-Mass det. time= 76.3 min (925.5 - 849.2)

Volume	Invert	Avail.Storage	Storage Description
#1	13.50'	192 cf	**10.00'D x 4.50'H Vertical Cone/Cylinder**x 2
			707 cf Overall - 226 cf Embedded = 481 cf x 40.0% Voids
#2	14.00'	226 cf	**6.00'D x 4.00'H Vertical Cone/Cylinder**x 2 Inside #1
#3	20.50'	376 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)
		794 cf	Total Available Storage

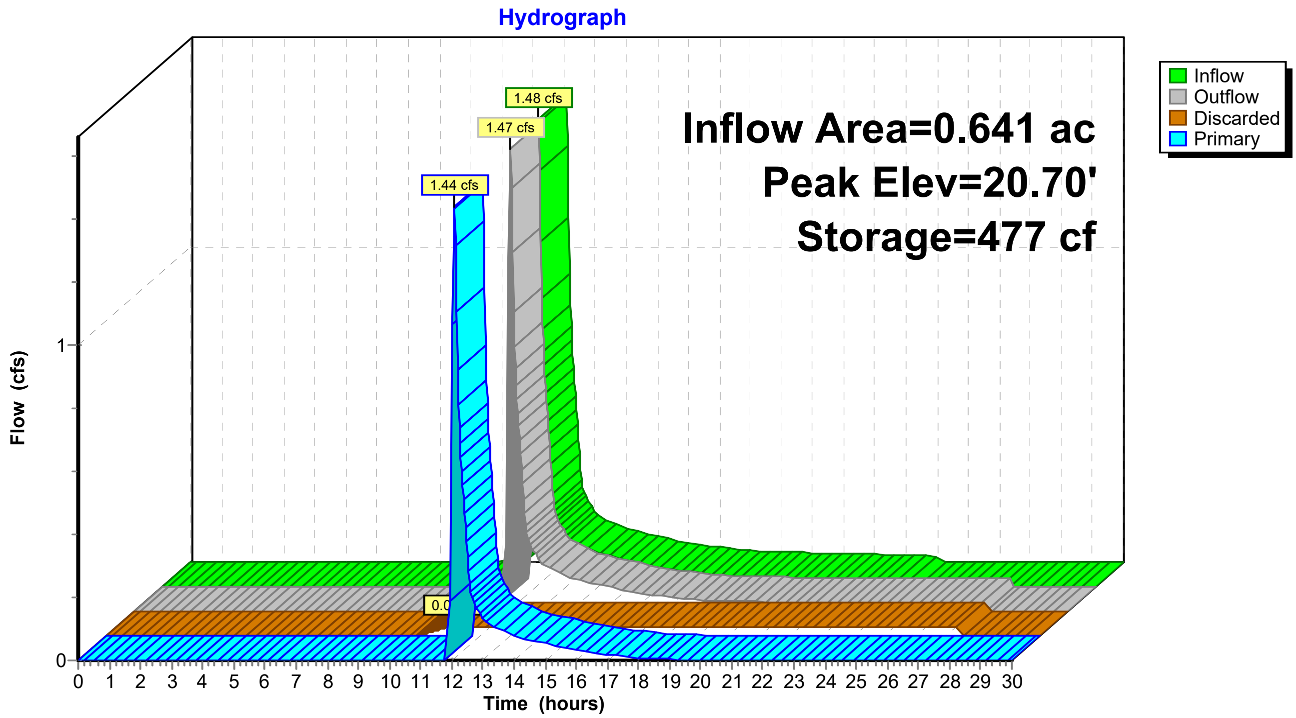
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.50	4	0	0
21.00	1,500	376	376

Device	Routing	Invert	Outlet Devices
#1	Discarded	13.50'	**8.270 in/hr Exfiltration over Surface area from 13.49' - 18.00'**
			Excluded Surface area = 0 sf
#2	Primary	20.58'	**179.0 deg x 6.0' long Sharp-Crested Vee/Trap Weir**
			Cv= 2.46 (C= 3.08)

Discarded OutFlow Max=0.03 cfs @ 11.22 hrs HW=13.58' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.43 cfs @ 12.09 hrs HW=20.70' TW=20.67' (Dynamic Tailwater)
↑—**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 1.43 cfs @ 0.64 fps)

Pond 1P: LB's


Hydrograph
Inflow
Outflow
Discarded
Primary
1.48 cfs
1.47 cfs
1.44 cfs
Inflow Area=0.641 ac
Peak Elev=20.70'
Storage=477 cf
Flow (cfs)
0
1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Time (hours)

Summary for Pond 2P: Natural Low Area

Inflow Area = 0.841 ac, 0.00% Impervious, Inflow Depth = 0.03" for 10-YR MASHPEE ATLAS event
Inflow = 0.00 cfs @ 21.05 hrs, Volume= 0.002 af
Outflow = 0.00 cfs @ 21.37 hrs, Volume= 0.002 af, Atten= 0%, Lag= 18.9 min
Discarded = 0.00 cfs @ 21.37 hrs, Volume= 0.002 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 16.08' @ 21.37 hrs Surf.Area= 49 sf Storage= 2 cf

Plug-Flow detention time= 9.0 min calculated for 0.002 af (100% of inflow)
Center-of-Mass det. time= 9.0 min (1,200.9 - 1,191.9)

Volume	Invert	Avail.Storage	Storage Description
#1	16.01'	4,469 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

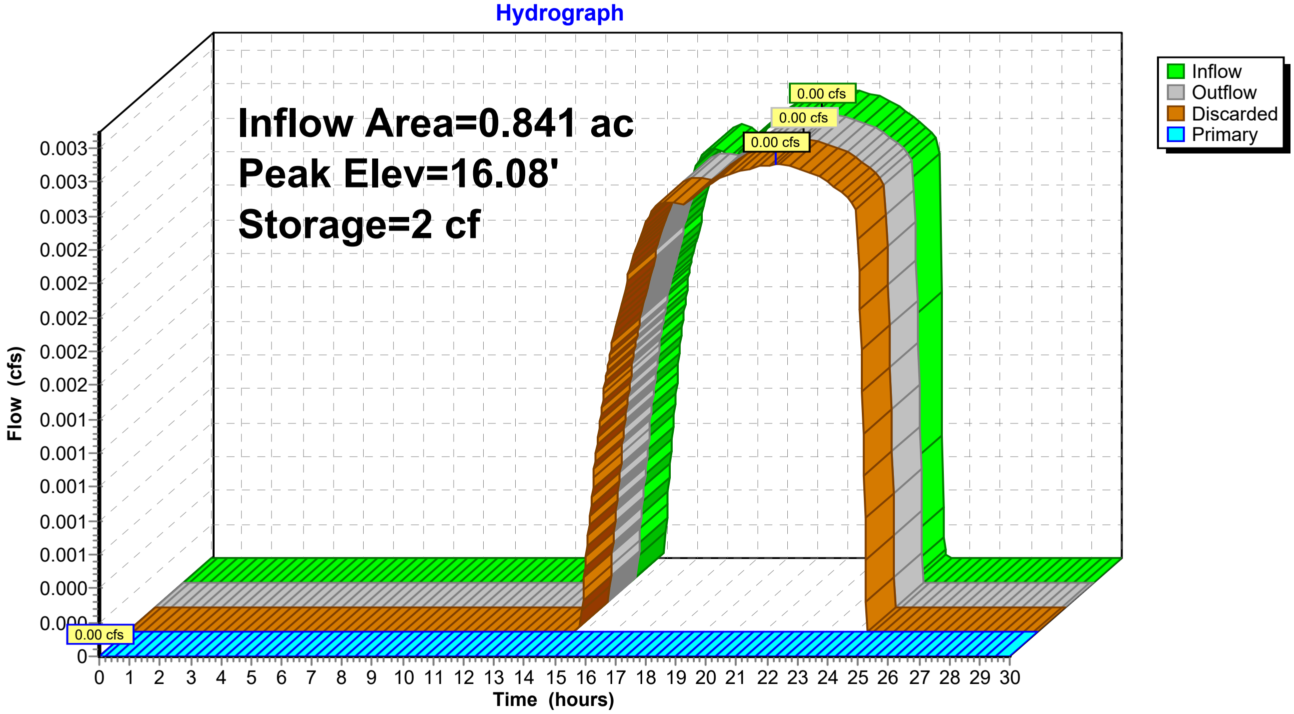
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
16.01	1	0	0
17.00	739	366	366
18.00	7,467	4,103	4,469

Device	Routing	Invert	Outlet Devices
#1	Discarded	16.01'	**2.410 in/hr Exfiltration over Surface area from 15.90' - 17.70'** Excluded Surface area = 0 sf
#2	Primary	17.58'	**50.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.00 cfs @ 21.37 hrs HW=16.08' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=16.01' TW=17.00' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Natural Low Area



Summary for Pond 3A-P: Pond 3A

Inflow Area = 0.109 ac, 21.10% Impervious, Inflow Depth = 1.66" for 10-YR MASHPEE ATLAS event
Inflow = 0.21 cfs @ 12.08 hrs, Volume= 0.015 af
Outflow = 0.09 cfs @ 12.33 hrs, Volume= 0.015 af, Atten= 56%, Lag= 14.9 min
Discarded = 0.01 cfs @ 12.33 hrs, Volume= 0.012 af
Primary = 0.08 cfs @ 12.33 hrs, Volume= 0.003 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 17.52' @ 12.33 hrs Surf.Area= 600 sf Storage= 195 cf

Plug-Flow detention time= 139.0 min calculated for 0.015 af (100% of inflow)
Center-of-Mass det. time= 139.0 min (998.9 - 859.8)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	520 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

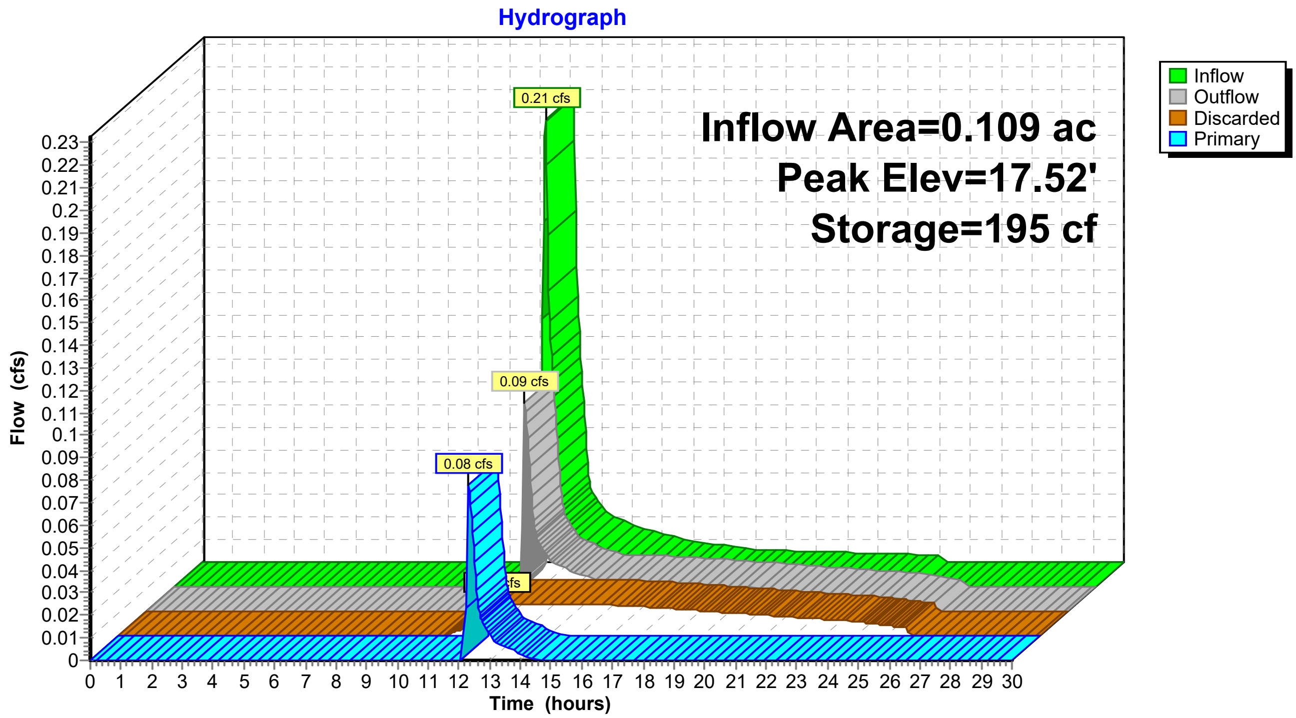
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	144	0	0
17.50	594	185	185
18.00	749	336	520

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**1.020 in/hr Exfiltration over Surface area from 16.90' - 18.00'** Excluded Surface area = 0 sf
#2	Primary	17.50'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.01 cfs @ 12.33 hrs HW=17.52' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.08 cfs @ 12.33 hrs HW=17.52' TW=14.80' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.08 cfs @ 0.44 fps)

Pond 3A-P: Pond 3A



Summary for Pond 3P: Wet Pond

Inflow Area = 7.256 ac, 33.70% Impervious, Inflow Depth = 0.45" for 10-YR MASHPEE ATLAS event
Inflow = 4.66 cfs @ 12.34 hrs, Volume= 0.274 af
Outflow = 0.31 cfs @ 14.15 hrs, Volume= 0.191 af, Atten= 93%, Lag= 108.2 min
Primary = 0.31 cfs @ 14.15 hrs, Volume= 0.191 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 14.67' @ 14.15 hrs Surf.Area= 17,573 sf Storage= 8,564 cf

Plug-Flow detention time= 340.2 min calculated for 0.191 af (70% of inflow)
Center-of-Mass det. time= 290.1 min (1,085.4 - 795.3)

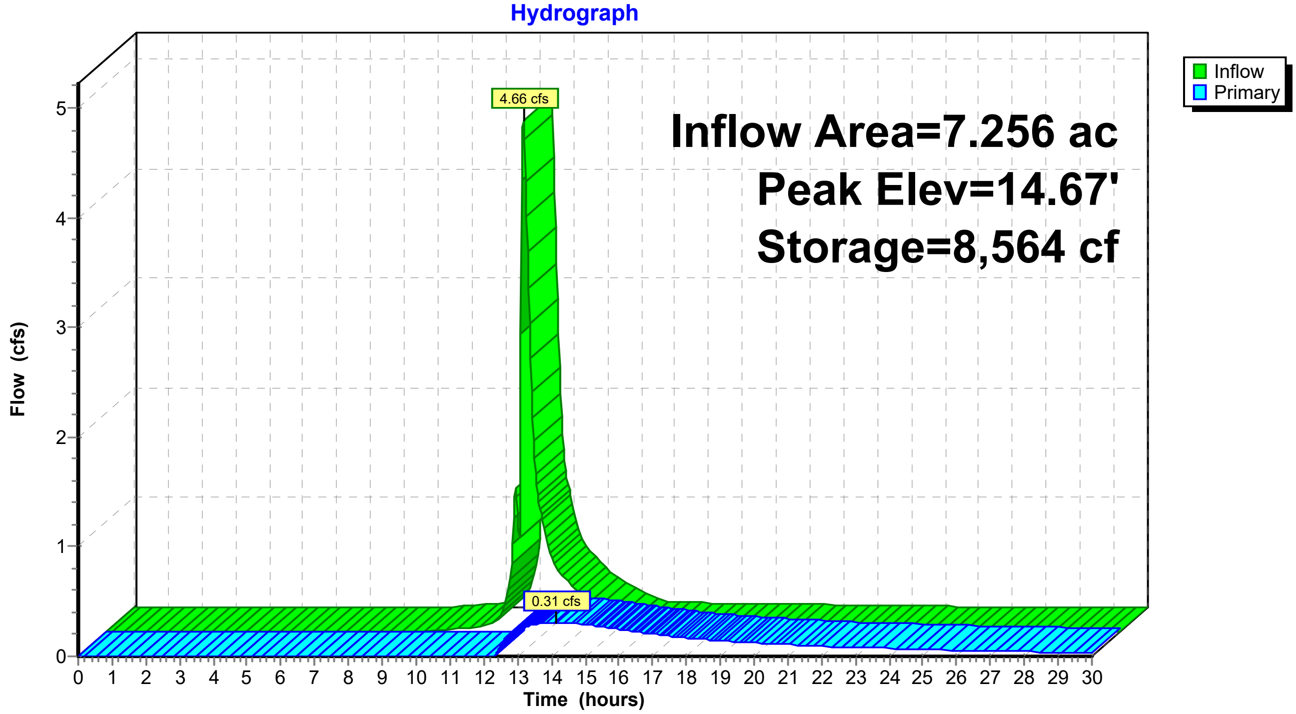
Volume	Invert	Avail.Storage	Storage Description
#1	13.97'	38,017 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
13.97	1	0	0
14.00	56	1	1
14.20	13,319	1,337	1,338
15.00	20,594	13,565	14,904
16.00	25,633	23,114	38,017

Device	Routing	Invert	Outlet Devices
#1	Primary	14.20'	**8.0" Round Culvert** L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 14.20' / 14.20' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Primary	15.75'	**30.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.31 cfs @ 14.15 hrs HW=14.67' TW=14.32' (Dynamic Tailwater)
├─**1=Culvert** (Barrel Controls 0.31 cfs @ 1.65 fps)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Wet Pond



Summary for Pond 4P: Pond 4

Inflow Area =	0.132 ac,	50.76% Impervious, Inflow Depth = 2.90"	for 10-YR MASHPEE ATLAS event	
Inflow =	0.46 cfs @	12.08 hrs, Volume=	0.032 af	
Outflow =	0.46 cfs @	12.08 hrs, Volume=	0.031 af,	Atten= 0%, Lag= 0.0 min
Discarded =	0.01 cfs @	12.08 hrs, Volume=	0.015 af	
Primary =	0.45 cfs @	12.08 hrs, Volume=	0.017 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 18.02' @ 12.08 hrs Surf.Area= 463 sf Storage= 240 cf

Plug-Flow detention time= 136.1 min calculated for 0.031 af (98% of inflow)
Center-of-Mass det. time= 124.1 min (944.9 - 820.8)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	253 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

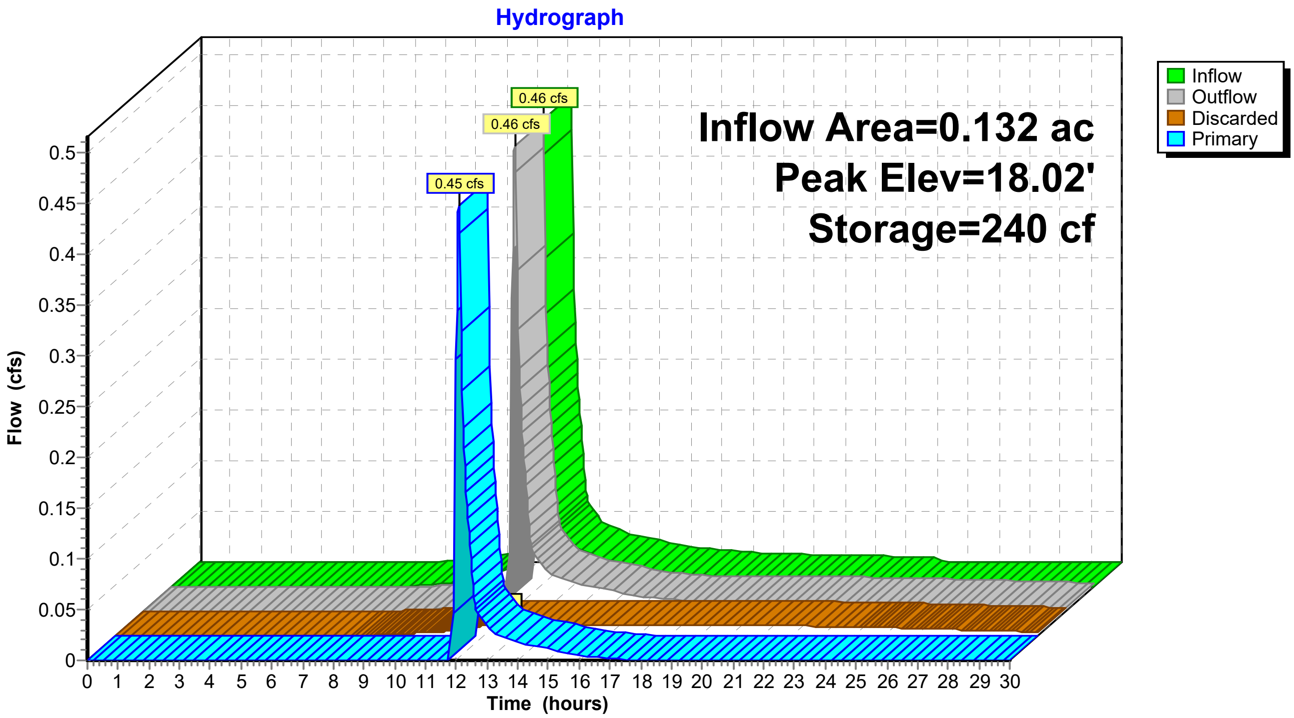
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	10	0	0
18.00	450	230	230
18.05	478	23	253

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**1.020 in/hr Exfiltration over Surface area from 16.90' - 18.05'** Excluded Surface area = 0 sf
#2	Primary	18.00'	**40.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.01 cfs @ 12.08 hrs HW=18.02' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.44 cfs @ 12.08 hrs HW=18.02' TW=14.69' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.44 cfs @ 0.49 fps)

Pond 4P: Pond 4



Summary for Pond 5P: Pond 5

Inflow Area = 0.124 ac, 58.87% Impervious, Inflow Depth = 2.37" for 10-YR MASHPEE ATLAS event
Inflow = 0.35 cfs @ 12.08 hrs, Volume= 0.025 af
Outflow = 0.46 cfs @ 12.10 hrs, Volume= 0.025 af, Atten= 0%, Lag= 1.1 min
Discarded = 0.02 cfs @ 12.10 hrs, Volume= 0.016 af
Primary = 0.44 cfs @ 12.10 hrs, Volume= 0.009 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 19.02' @ 12.09 hrs Surf.Area= 319 sf Storage= 234 cf

Plug-Flow detention time= 131.4 min calculated for 0.025 af (100% of inflow)
Center-of-Mass det. time= 131.1 min (967.5 - 836.4)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	244 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

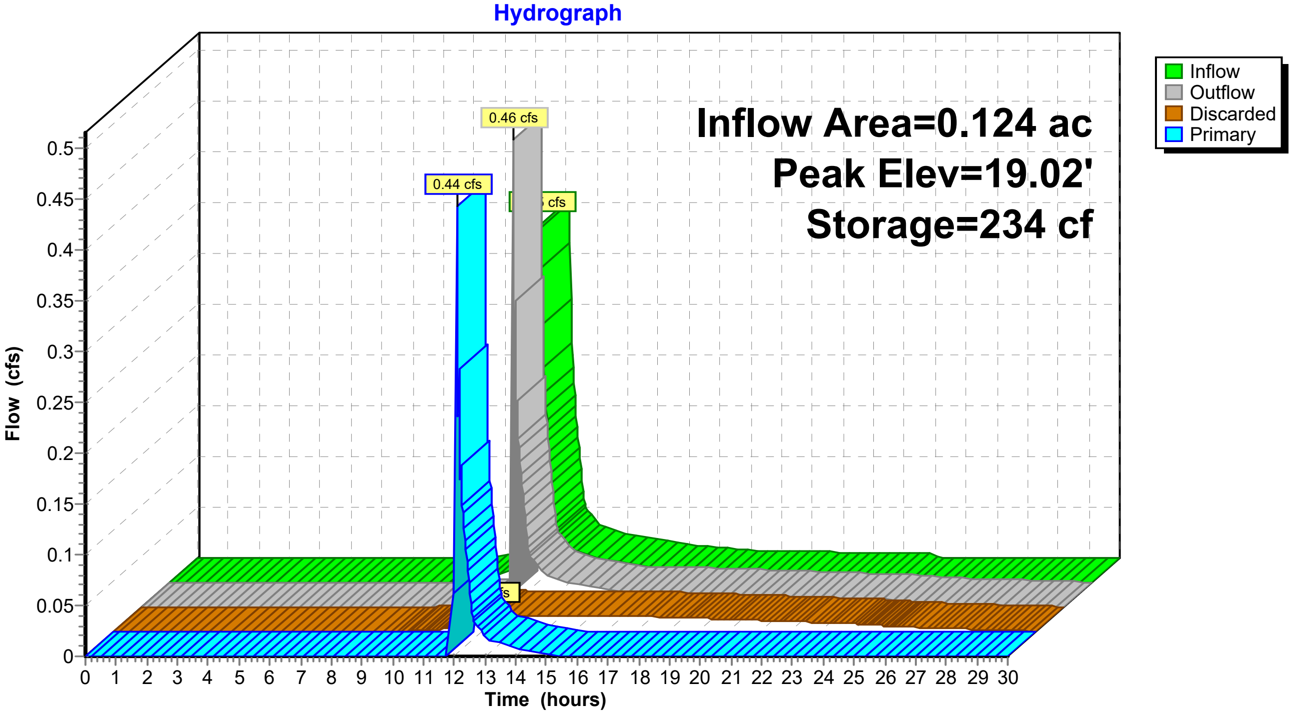
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	1	0	0
18.00	86	44	44
19.00	282	184	228
19.05	366	16	244

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**2.410 in/hr Exfiltration over Surface area from 16.90' - 19.05'** Excluded Surface area = 0 sf
#2	Primary	19.00'	**40.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.02 cfs @ 12.10 hrs HW=19.02' (Free Discharge)
└—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.39 cfs @ 12.10 hrs HW=19.02' TW=14.71' (Dynamic Tailwater)
└—**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.39 cfs @ 0.47 fps)

Pond 5P: Pond 5



Summary for Pond 6P: Pond 6

Inflow Area = 0.088 ac, 17.05% Impervious, Inflow Depth = 0.49" for 10-YR MASHPEE ATLAS event
Inflow = 0.02 cfs @ 12.15 hrs, Volume= 0.004 af
Outflow = 0.01 cfs @ 12.98 hrs, Volume= 0.004 af, Atten= 66%, Lag= 49.9 min
Discarded = 0.01 cfs @ 12.98 hrs, Volume= 0.004 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 18.40' @ 12.98 hrs Surf.Area= 130 sf Storage= 26 cf

Plug-Flow detention time= 39.2 min calculated for 0.004 af (100% of inflow)
Center-of-Mass det. time= 39.2 min (976.9 - 937.7)

Volume	Invert	Avail.Storage	Storage Description
#1	18.00'	182 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

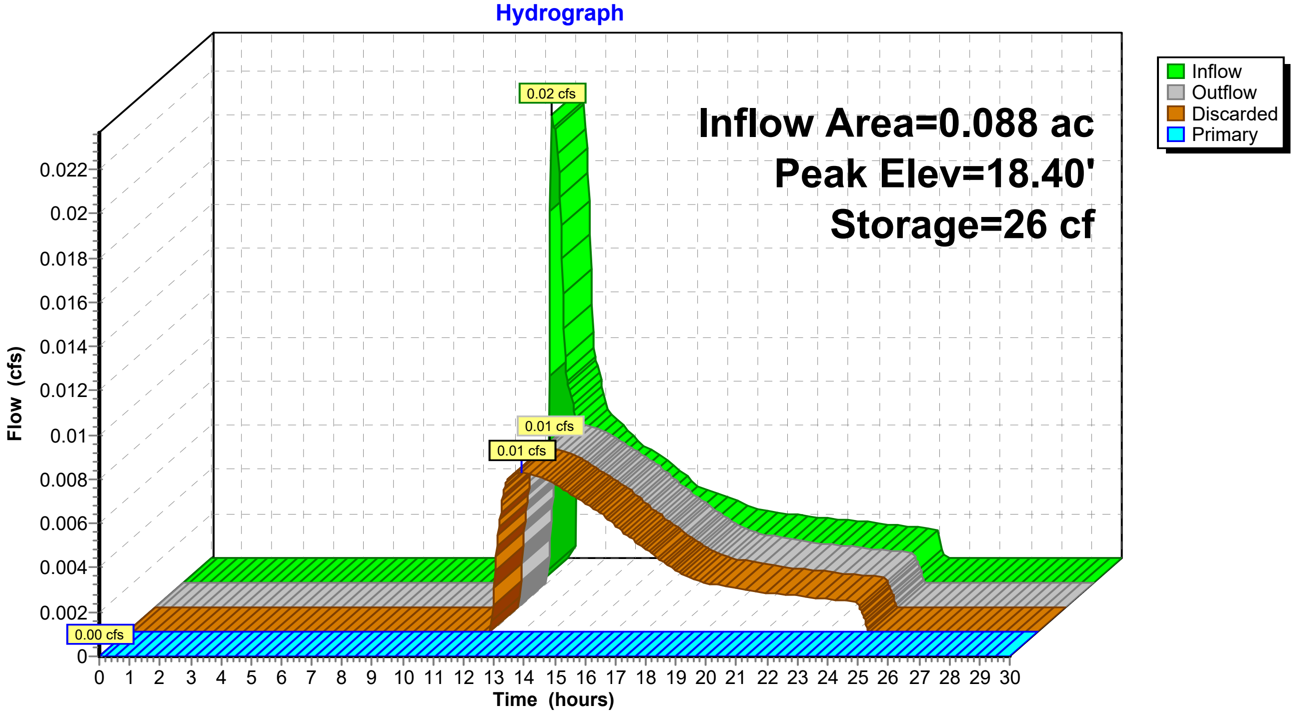
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
18.00	1	0	0
19.00	326	164	164
19.05	394	18	182

Device	Routing	Invert	Outlet Devices
#1	Discarded	18.00'	**2.410 in/hr Exfiltration over Surface area from 17.90' - 19.05'** Excluded Surface area = 0 sf
#2	Primary	19.00'	**40.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.01 cfs @ 12.98 hrs HW=18.40' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=18.00' TW=14.60' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 6P: Pond 6



Summary for Pond 7P: Pond 7

Inflow Area = 0.033 ac, 63.64% Impervious, Inflow Depth = 2.63" for 10-YR MASHPEE ATLAS event
Inflow = 0.10 cfs @ 12.08 hrs, Volume= 0.007 af
Outflow = 0.12 cfs @ 12.15 hrs, Volume= 0.007 af, Atten= 0%, Lag= 4.5 min
Discarded = 0.01 cfs @ 12.15 hrs, Volume= 0.006 af
Primary = 0.11 cfs @ 12.15 hrs, Volume= 0.002 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 18.01' @ 12.15 hrs Surf.Area= 143 sf Storage= 82 cf

Plug-Flow detention time= 98.6 min calculated for 0.007 af (100% of inflow)
Center-of-Mass det. time= 98.7 min (927.4 - 828.7)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	87 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

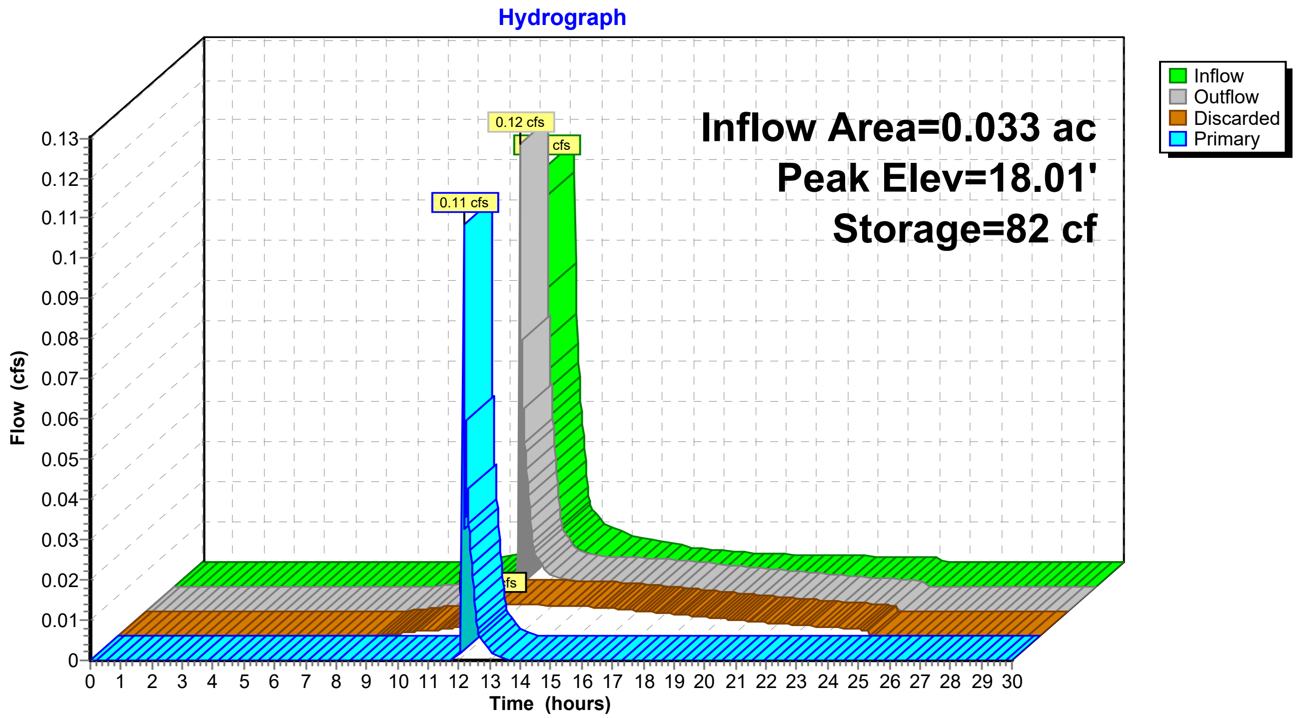
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	23	0	0
18.00	137	80	80
18.05	159	7	87

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**2.410 in/hr Exfiltration over Surface area from 16.90' - 18.05'** Excluded Surface area = 0 sf
#2	Primary	18.00'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.01 cfs @ 12.15 hrs HW=18.01' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.10 cfs @ 12.15 hrs HW=18.01' TW=14.76' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.10 cfs @ 0.38 fps)

Pond 7P: Pond 7



Summary for Pond 8P: Pond 8

Inflow Area =	0.087 ac,	35.63% Impervious,	Inflow Depth = 1.31"	for 10-YR MASHPEE ATLAS event	
Inflow =	0.12 cfs @	12.09 hrs,	Volume=	0.009 af	
Outflow =	0.03 cfs @	12.55 hrs,	Volume=	0.009 af,	Atten= 78%, Lag= 27.9 min
Discarded =	0.03 cfs @	12.55 hrs,	Volume=	0.009 af	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 17.20' @ 12.55 hrs Surf.Area= 489 sf Storage= 92 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 21.3 min (895.6 - 874.3)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	622 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

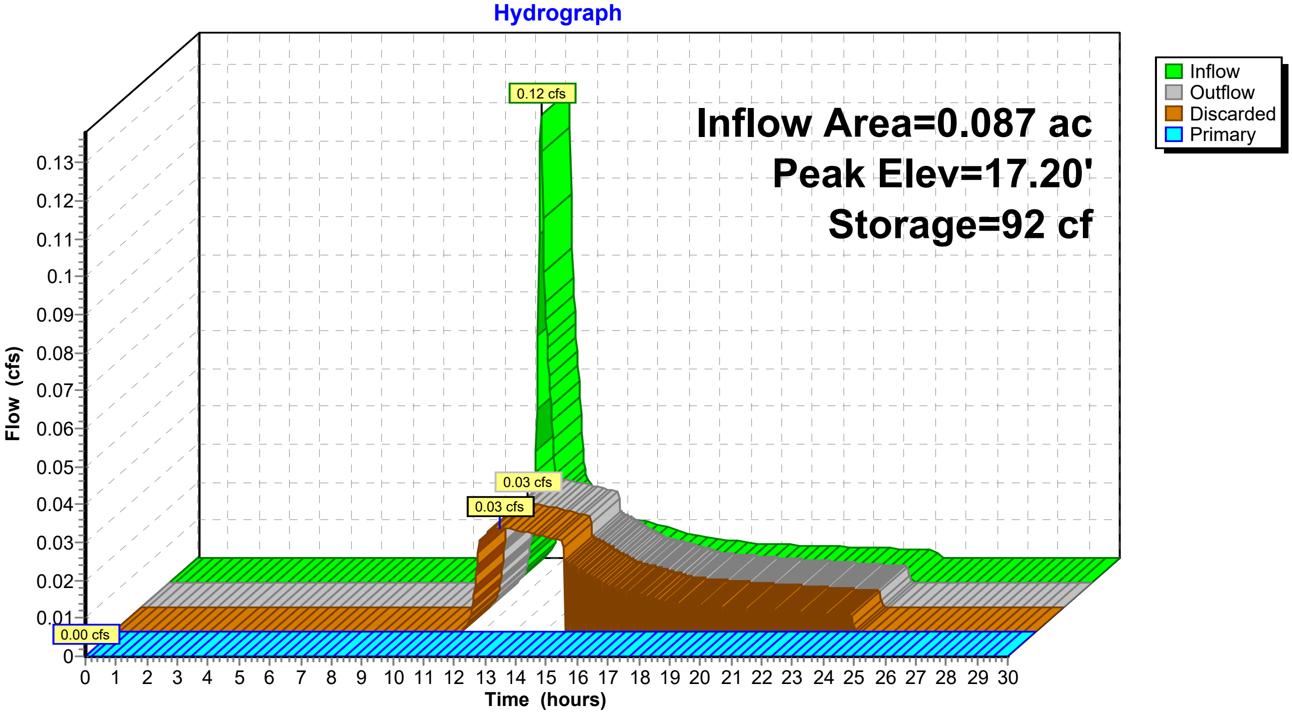
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	426	0	0
18.00	741	584	584
18.05	791	38	622

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**2.410 in/hr Exfiltration over Surface area from 16.90' - 18.00'** Excluded Surface area = 0 sf
#2	Primary	18.00'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.03 cfs @ 12.55 hrs HW=17.20' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=17.00' TW=14.60' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: Pond 8



Summary for Pond FB1: Forebay 1

Inflow Area = 1.040 ac, 55.00% Impervious, Inflow Depth = 2.22" for 10-YR MASHPEE ATLAS event
Inflow = 2.71 cfs @ 12.08 hrs, Volume= 0.192 af
Outflow = 1.66 cfs @ 12.19 hrs, Volume= 0.192 af, Atten= 39%, Lag= 6.5 min
Discarded = 0.09 cfs @ 12.12 hrs, Volume= 0.125 af
Primary = 1.57 cfs @ 12.19 hrs, Volume= 0.067 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 16.63' @ 12.19 hrs Surf.Area= 1,960 sf Storage= 2,277 cf

Plug-Flow detention time= 179.4 min calculated for 0.192 af (100% of inflow)
Center-of-Mass det. time= 179.6 min (1,014.6 - 834.9)

Volume	Invert	Avail.Storage	Storage Description
#1	14.90'	3,175 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

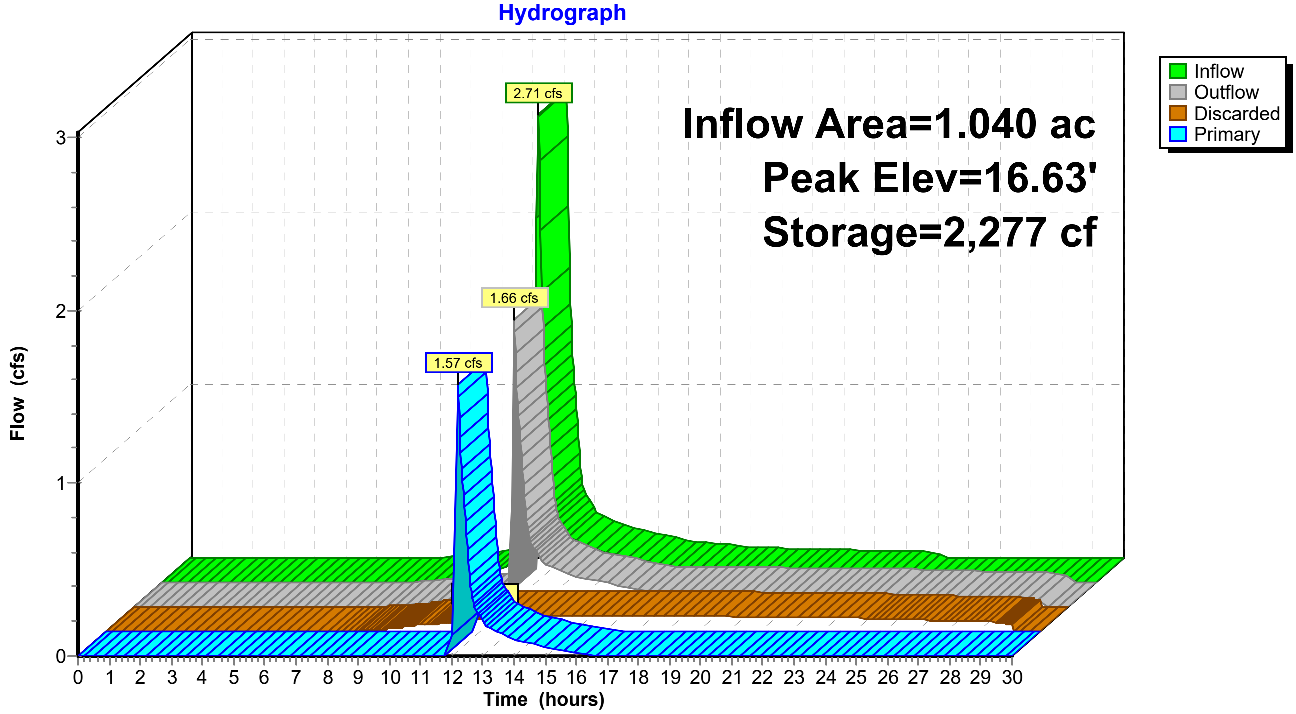
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
14.90	661	0	0
15.00	996	83	83
16.00	1,406	1,201	1,284
16.50	1,633	760	2,044
17.00	2,893	1,132	3,175

Device	Routing	Invert	Outlet Devices
#1	Discarded	14.90'	**2.410 in/hr Exfiltration over Surface area from 14.80' - 16.50'** Excluded Surface area = 0 sf
#2	Primary	16.50'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.09 cfs @ 12.12 hrs HW=16.50' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=1.51 cfs @ 12.19 hrs HW=16.63' TW=15.85' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Weir Controls 1.51 cfs @ 1.20 fps)

Pond FB1: Forebay 1



Summary for Pond FB3: Forebay 3

Inflow Area = 6.795 ac, 31.67% Impervious, Inflow Depth = 0.96" for 10-YR MASHPEE ATLAS event
Inflow = 6.78 cfs @ 12.17 hrs, Volume= 0.544 af
Outflow = 4.41 cfs @ 12.35 hrs, Volume= 0.544 af, Atten= 35%, Lag= 10.7 min
Discarded = 0.38 cfs @ 12.35 hrs, Volume= 0.368 af
Primary = 4.03 cfs @ 12.35 hrs, Volume= 0.176 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 16.12' @ 12.35 hrs Surf.Area= 6,859 sf Storage= 6,313 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 117.4 min (954.3 - 836.9)

Volume	Invert	Avail.Storage	Storage Description
#1	15.00'	10,961 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

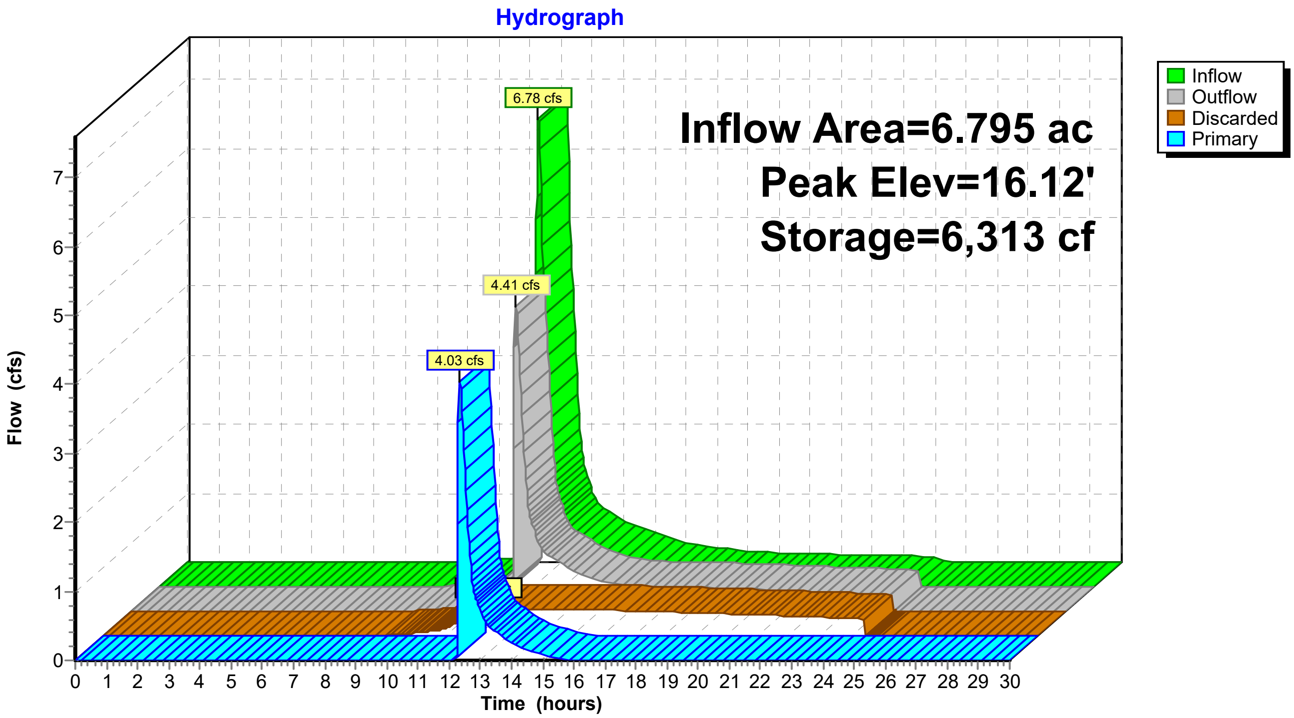
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
15.00	4,358	0	0
16.00	6,677	5,518	5,518
16.75	7,840	5,444	10,961

Device	Routing	Invert	Outlet Devices
#1	Discarded	15.00'	**2.410 in/hr Exfiltration over Surface area from 14.90' - 16.75'** Excluded Surface area = 0 sf
#2	Primary	16.00'	**10.0' long Sharp-Crested Rectangular Weir X 3.00** 2 End Contraction(s) 0.7' Crest Height

Discarded OutFlow Max=0.38 cfs @ 12.35 hrs HW=16.12' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.38 cfs)

Primary OutFlow Max=4.01 cfs @ 12.35 hrs HW=16.12' TW=14.32' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Weir Controls 4.01 cfs @ 1.14 fps)

Pond FB3: Forebay 3



Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentDA-12: AREAS TO WETLAND Runoff Area=0.793 ac 2.90% Impervious Runoff Depth=0.79"
Tc=5.0 min UI Adjusted CN=45 Runoff=0.46 cfs 0.052 af

SubcatchmentDA-1A: AREA TO CB'S 3 Runoff Area=0.252 ac 59.92% Impervious Runoff Depth=3.17"
Tc=5.0 min CN=74 Runoff=0.96 cfs 0.067 af

SubcatchmentDA-1B: AREA TO CB'S 1 Runoff Area=0.432 ac 70.60% Impervious Runoff Depth=3.87"
Tc=5.0 min CN=81 Runoff=2.00 cfs 0.139 af

SubcatchmentDA-1C: AREA TO FB1 Runoff Area=0.356 ac 32.58% Impervious Runoff Depth=1.74"
Tc=5.0 min CN=58 Runoff=0.69 cfs 0.052 af

SubcatchmentDA-2: END OF ROAD TO Runoff Area=0.536 ac 58.02% Impervious Runoff Depth=3.07"
Flow Length=250' Tc=6.2 min CN=73 Runoff=1.91 cfs 0.137 af

SubcatchmentDA-3: AREAS TO WEST Runoff Area=0.109 ac 21.10% Impervious Runoff Depth=2.34"
Tc=5.0 min UI Adjusted CN=65 Runoff=0.30 cfs 0.021 af

SubcatchmentDA-4: AREAS TO WEST Runoff Area=0.132 ac 50.76% Impervious Runoff Depth=3.76"
Tc=5.0 min CN=80 Runoff=0.60 cfs 0.041 af

SubcatchmentDA-5: AREAS TO WEST Runoff Area=0.124 ac 58.87% Impervious Runoff Depth=3.17"
Tc=5.0 min CN=74 Runoff=0.47 cfs 0.033 af

SubcatchmentDA-6: AREAS TO WEST Runoff Area=0.088 ac 17.05% Impervious Runoff Depth=0.86"
Tc=5.0 min UI Adjusted CN=46 Runoff=0.06 cfs 0.006 af

SubcatchmentDA-7: AREAS TO WEST Runoff Area=0.033 ac 63.64% Impervious Runoff Depth=3.46"
Tc=5.0 min CN=77 Runoff=0.14 cfs 0.010 af

SubcatchmentDA-8: AREAS TO WEST Runoff Area=0.087 ac 35.63% Impervious Runoff Depth=1.91"
Tc=5.0 min CN=60 Runoff=0.19 cfs 0.014 af

SubcatchmentDA-9: AREAS EAST OF Runoff Area=0.558 ac 65.23% Impervious Runoff Depth=3.46"
Tc=5.0 min CN=77 Runoff=2.32 cfs 0.161 af

SubcatchmentDA22A: QUIN AVE SOUTH Runoff Area=0.461 ac 63.56% Impervious Runoff Depth=3.36"
Flow Length=1,172' Tc=6.9 min CN=76 Runoff=1.75 cfs 0.129 af

SubcatchmentDA22B: QUIN AVE WEST Runoff Area=1.335 ac 43.37% Impervious Runoff Depth=2.34"
Flow Length=1,473' Tc=8.8 min CN=65 Runoff=3.23 cfs 0.260 af

SubcatchmentDA44: North of Quin Runoff Area=0.841 ac 0.00% Impervious Runoff Depth=0.13"
Tc=5.0 min CN=32 Runoff=0.01 cfs 0.009 af

SubcatchmentDA55: AREAS TO CB'S AT Runoff Area=0.641 ac 50.86% Impervious Runoff Depth=2.70"
Tc=5.0 min CN=69 Runoff=2.07 cfs 0.144 af

Subcatchment DA77: AREAS TO WETLAND Runoff Area=1.844 ac 0.00% Impervious Runoff Depth=0.13"
Flow Length=431' Tc=26.3 min CN=32 Runoff=0.03 cfs 0.020 af

Reach R1: Tt along stream Avg. Flow Depth=0.28' Max Vel=0.71 fps Inflow=1.66 cfs 0.103 af
n=0.040 L=550.0' S=0.0035 '/' Capacity=69.34 cfs Outflow=0.98 cfs 0.103 af

Reach R1A: Tt thru bogs Avg. Flow Depth=0.20' Max Vel=0.63 fps Inflow=0.71 cfs 0.414 af
n=0.040 L=520.0' S=0.0029 '/' Capacity=50.84 cfs Outflow=0.71 cfs 0.411 af

Reach R2: Tt thru da77 Avg. Flow Depth=0.20' Max Vel=1.07 fps Inflow=5.13 cfs 0.359 af
n=0.030 L=210.0' S=0.0095 '/' Capacity=50.53 cfs Outflow=4.73 cfs 0.359 af

Reach R2A: Travel Time thru wet pond Avg. Flow Depth=0.25' Max Vel=3.37 fps Inflow=1.75 cfs 0.129 af
n=0.025 L=255.0' S=0.0267 '/' Capacity=13.24 cfs Outflow=1.73 cfs 0.129 af

Reach R3: 18" CPP Avg. Flow Depth=0.82' Max Vel=2.97 fps Inflow=2.97 cfs 0.206 af
18.0" Round Pipe n=0.012 L=81.0' S=0.0020 '/' Capacity=5.06 cfs Outflow=2.96 cfs 0.206 af

Reach R5: Tt thru da22B Avg. Flow Depth=0.11' Max Vel=2.23 fps Inflow=2.02 cfs 0.099 af
n=0.013 L=246.0' S=0.0146 '/' Capacity=75.75 cfs Outflow=1.93 cfs 0.099 af

Reach SP#1: Study Point Combined Flows Inflow=0.99 cfs 0.514 af
Outflow=0.99 cfs 0.514 af

Pond 1P: LB's Peak Elev=20.72' Storage=490 cf Inflow=2.07 cfs 0.144 af
Discarded=0.03 cfs 0.045 af Primary=2.02 cfs 0.099 af Outflow=2.05 cfs 0.144 af

Pond 2P: Natural Low Area Peak Elev=16.32' Storage=35 cf Inflow=0.01 cfs 0.009 af
Discarded=0.01 cfs 0.009 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.009 af

Pond 3A-P: Pond 3A Peak Elev=17.54' Storage=206 cf Inflow=0.30 cfs 0.021 af
Discarded=0.01 cfs 0.014 af Primary=0.22 cfs 0.007 af Outflow=0.24 cfs 0.021 af

Pond 3P: Wet Pond Peak Elev=14.98' Storage=14,406 cf Inflow=9.98 cfs 0.505 af
Outflow=0.71 cfs 0.414 af

Pond 4P: Pond 4 Peak Elev=18.03' Storage=242 cf Inflow=0.60 cfs 0.041 af
Discarded=0.01 cfs 0.016 af Primary=0.58 cfs 0.025 af Outflow=0.60 cfs 0.040 af

Pond 5P: Pond 5 Peak Elev=19.02' Storage=234 cf Inflow=0.47 cfs 0.033 af
Discarded=0.02 cfs 0.018 af Primary=0.46 cfs 0.015 af Outflow=0.47 cfs 0.033 af

Pond 6P: Pond 6 Peak Elev=18.64' Storage=67 cf Inflow=0.06 cfs 0.006 af
Discarded=0.01 cfs 0.006 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.006 af

Pond 7P: Pond 7 Peak Elev=18.02' Storage=82 cf Inflow=0.14 cfs 0.010 af
Discarded=0.01 cfs 0.006 af Primary=0.13 cfs 0.003 af Outflow=0.14 cfs 0.010 af

Pond 8P: Pond 8 Peak Elev=17.36' Storage=173 cf Inflow=0.19 cfs 0.014 af
Discarded=0.03 cfs 0.014 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.014 af

Pond FB1: Forebay 1 Peak Elev=16.71' Storage=2,435 cf Inflow=3.65 cfs 0.257 af
Discarded=0.09 cfs 0.136 af Primary=3.22 cfs 0.121 af Outflow=3.31 cfs 0.257 af

Pond FB3: Forebay 3 Peak Elev=16.20' Storage=6,855 cf Inflow=11.38 cfs 0.798 af
Discarded=0.39 cfs 0.423 af Primary=8.76 cfs 0.376 af Outflow=9.15 cfs 0.798 af

Total Runoff Area = 8.622 ac Runoff Volume = 1.295 af Average Runoff Depth = 1.80"
68.71% Pervious = 5.924 ac 31.29% Impervious = 2.698 ac

Summary for Subcatchment DA-12: AREAS TO WETLAND TO WEST

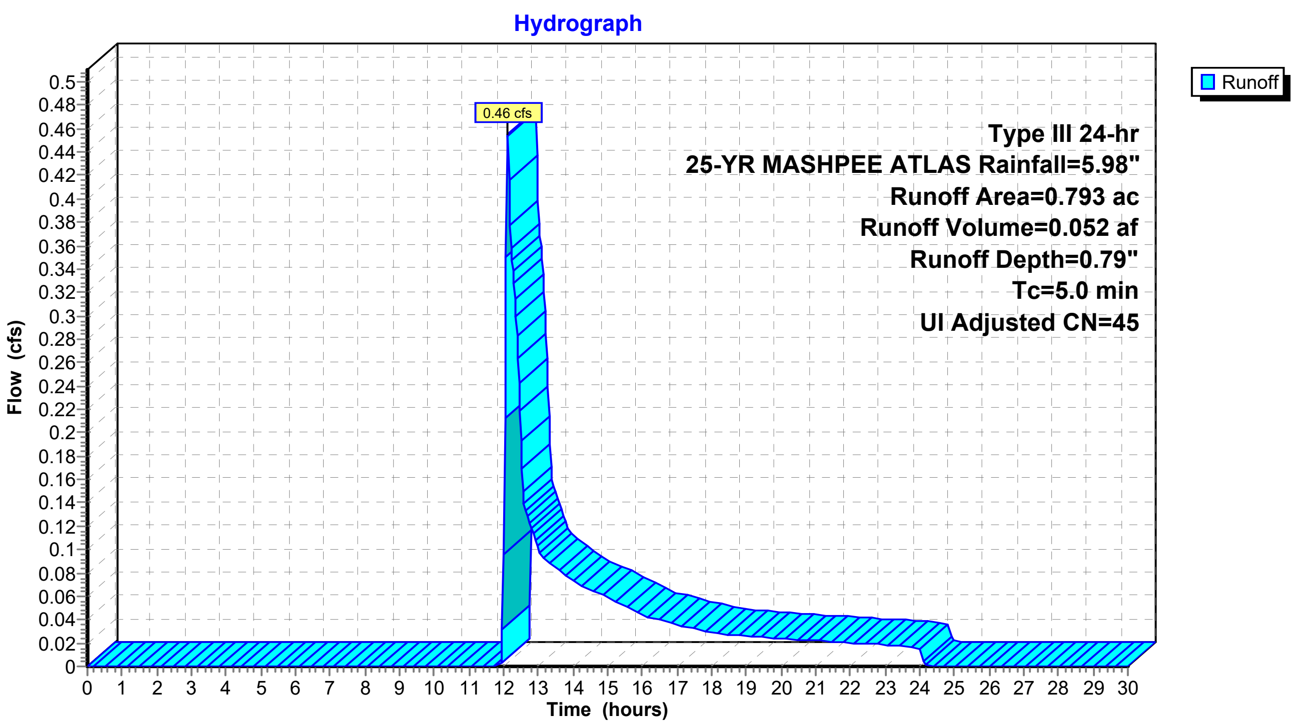
Runoff = 0.46 cfs @ 12.11 hrs, Volume= 0.052 af, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Adj	Description
0.090	39		>75% Grass cover, Good, HSG A
0.318	30		Woods, Good, HSG A
0.023	76		Gravel roads, HSG A
0.023	98		Unconnected pavement, HSG B
0.317	55		Woods, Good, HSG B
0.022	85		Gravel roads, HSG B
0.793	46	45	Weighted Average, UI Adjusted
0.770			97.10% Pervious Area
0.023			2.90% Impervious Area
0.023			100.00% Unconnected

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

Subcatchment DA-12: AREAS TO WETLAND TO WEST



Summary for Subcatchment DA-1A: AREA TO CB'S 3 AND 4

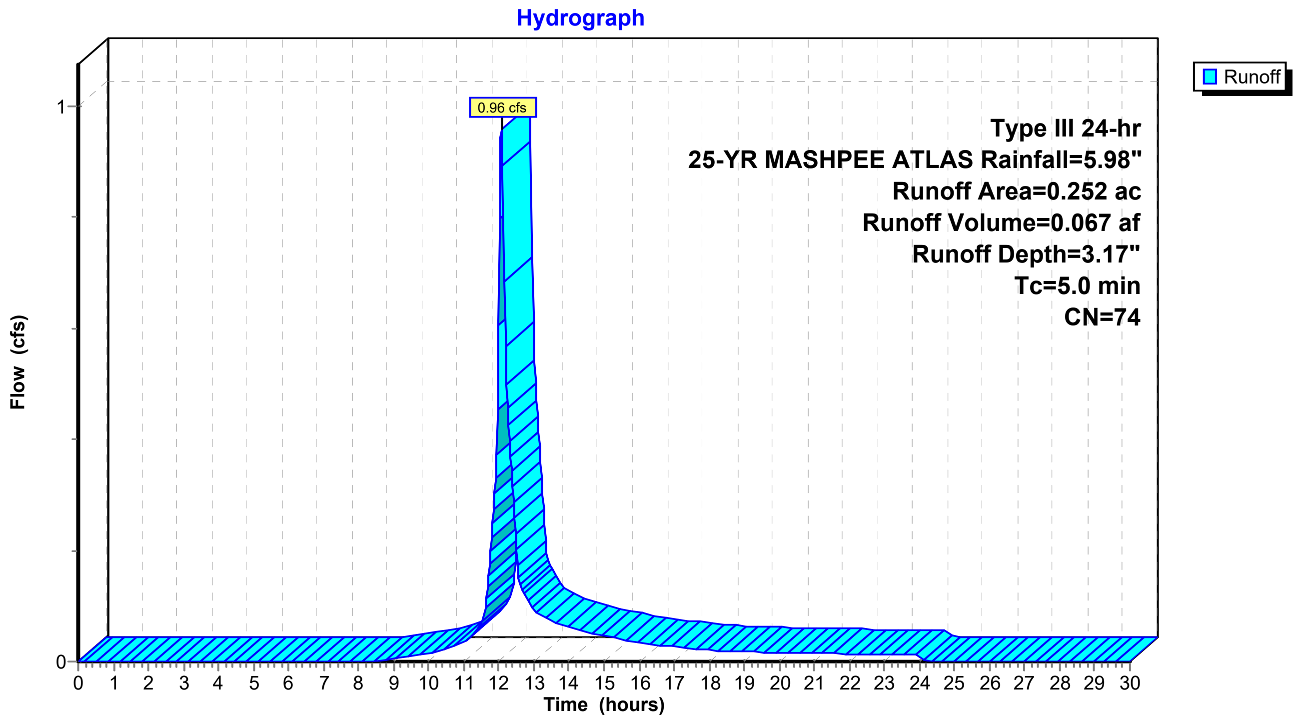
Runoff = 0.96 cfs @ 12.08 hrs, Volume= 0.067 af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.101	39	>75% Grass cover, Good, HSG A
0.109	98	Unconnected pavement, HSG A
0.042	98	Roofs, HSG B
0.252	74	Weighted Average
0.101		40.08% Pervious Area
0.151		59.92% Impervious Area
0.109		72.19% Unconnected

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

Subcatchment DA-1A: AREA TO CB'S 3 AND 4



Summary for Subcatchment DA-1B: AREA TO CB'S 1 AND 2

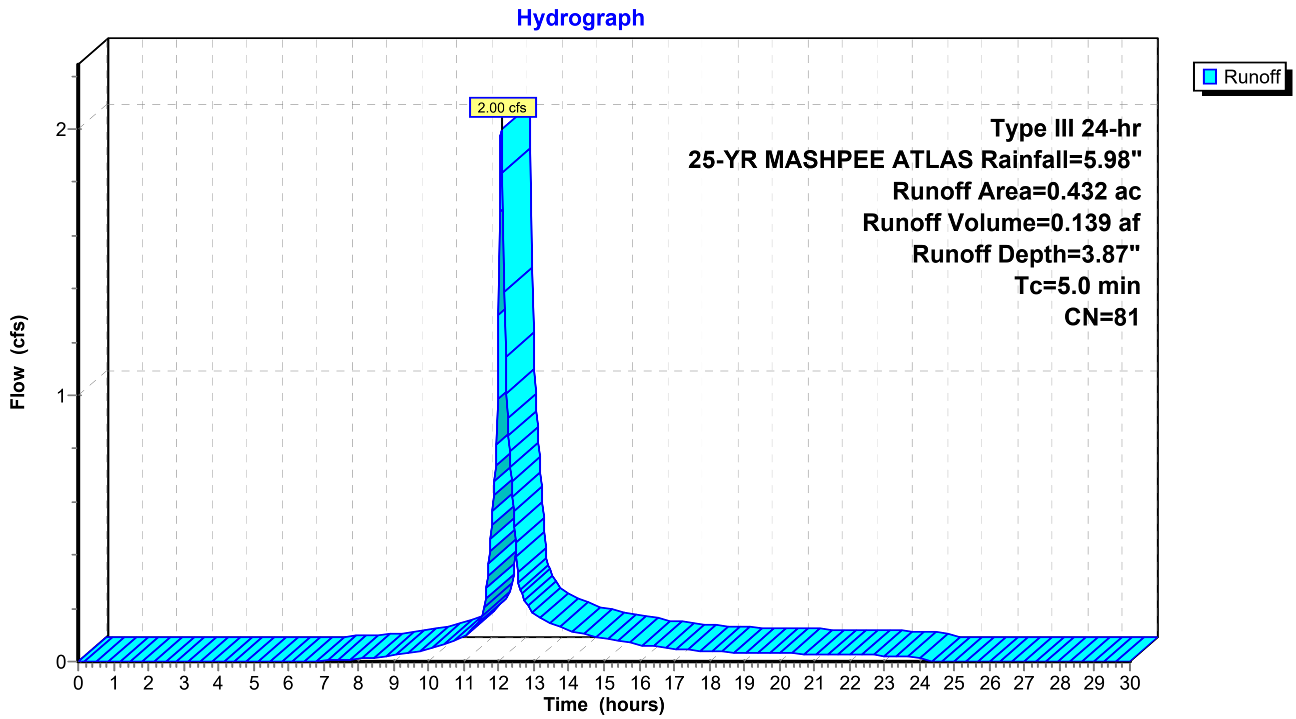
Runoff = 2.00 cfs @ 12.07 hrs, Volume= 0.139 af, Depth= 3.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.137	98	Unconnected pavement, HSG A
0.127	39	Pasture/grassland/range, Good, HSG A
0.168	98	Roofs, HSG A
0.432	81	Weighted Average
0.127		29.40% Pervious Area
0.305		70.60% Impervious Area
0.137		44.92% Unconnected

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

Subcatchment DA-1B: AREA TO CB'S 1 AND 2



Summary for Subcatchment DA-1C: AREA TO FB1

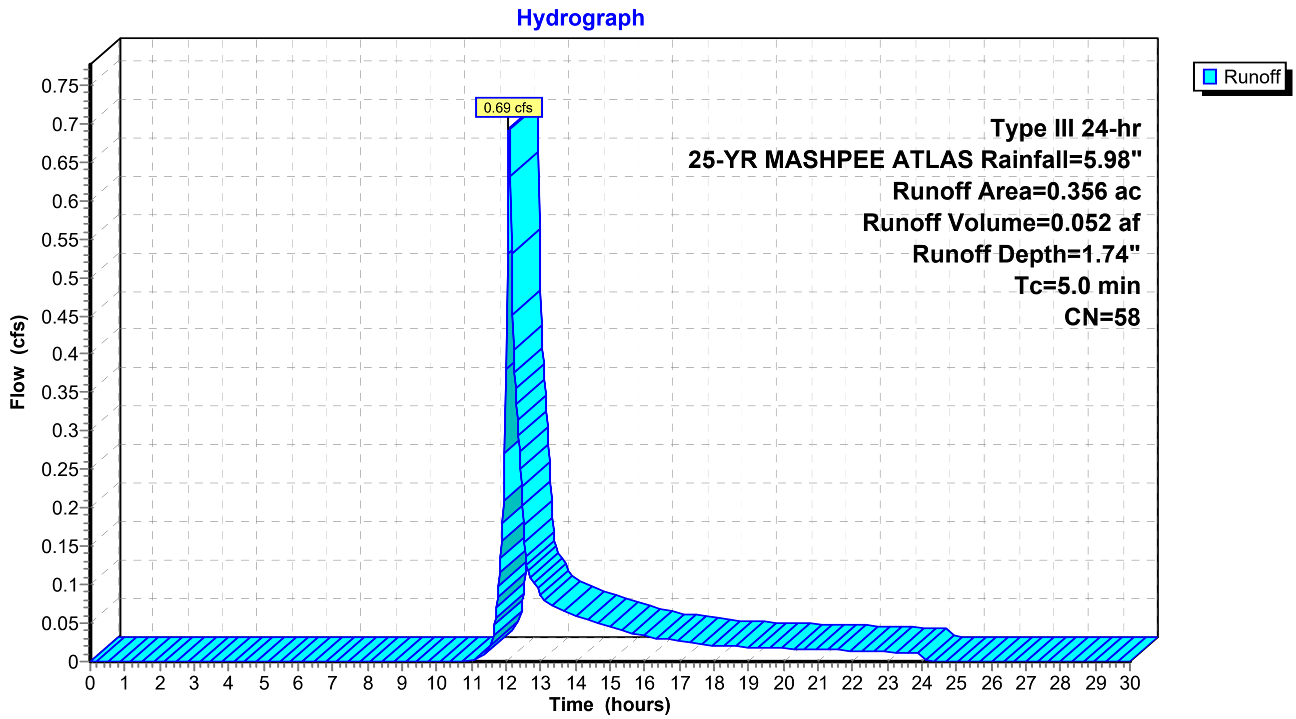
Runoff = 0.69 cfs @ 12.09 hrs, Volume= 0.052 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.240	39	>75% Grass cover, Good, HSG A
0.074	98	Unconnected pavement, HSG A
0.042	98	Roofs, HSG B
0.356	58	Weighted Average
0.240		67.42% Pervious Area
0.116		32.58% Impervious Area
0.074		63.79% Unconnected

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

Subcatchment DA-1C: AREA TO FB1



Summary for Subcatchment DA-2: END OF ROAD TO THE EAST

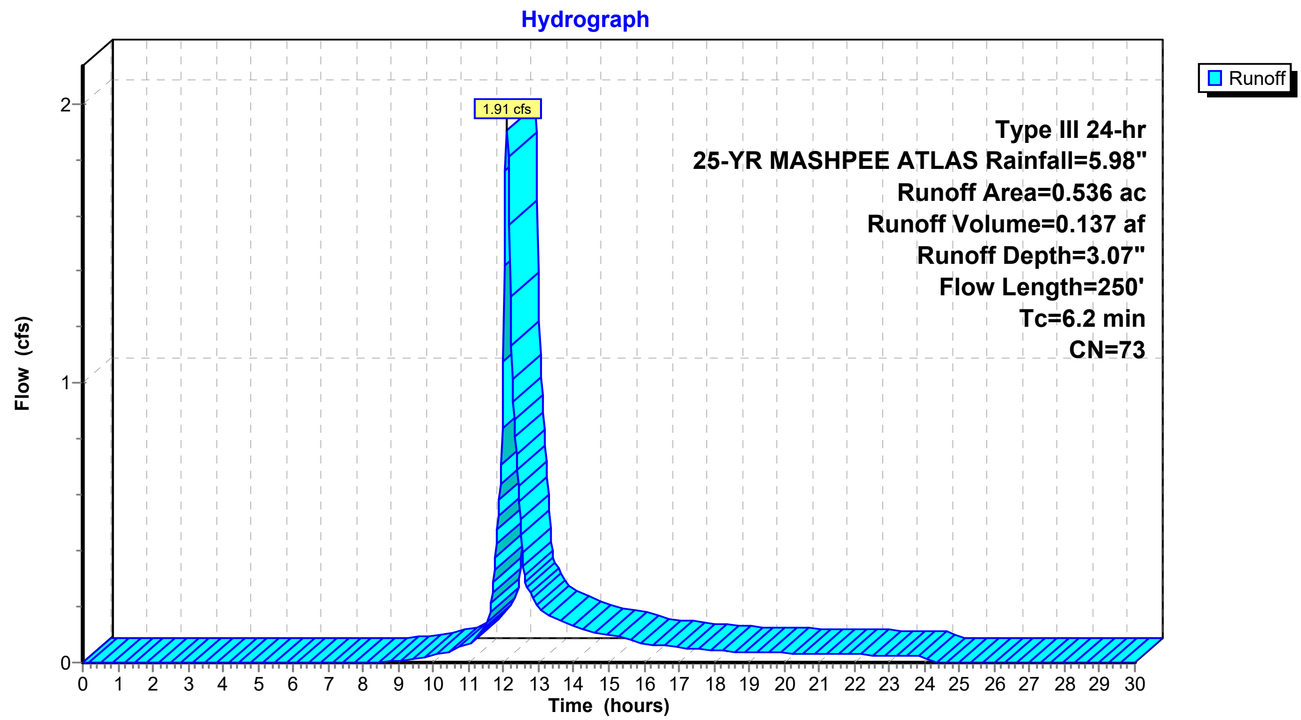
Runoff = 1.91 cfs @ 12.09 hrs, Volume= 0.137 af, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.225	39	>75% Grass cover, Good, HSG A
0.181	98	Unconnected pavement, HSG A
0.130	98	Roofs, HSG A
0.536	73	Weighted Average
0.225		41.98% Pervious Area
0.311		58.02% Impervious Area
0.181		58.20% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	30	0.0200	0.10		**Sheet Flow, LAWN** Grass: Dense n= 0.240 P2= 3.55"
0.5	80	0.0200	2.87		**Shallow Concentrated Flow, ROAD** Paved Kv= 20.3 fps
0.5	140	0.0100	4.91	3.86	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
6.2	250	Total			

Subcatchment DA-2: END OF ROAD TO THE EAST



Summary for Subcatchment DA-3: AREAS TO WEST

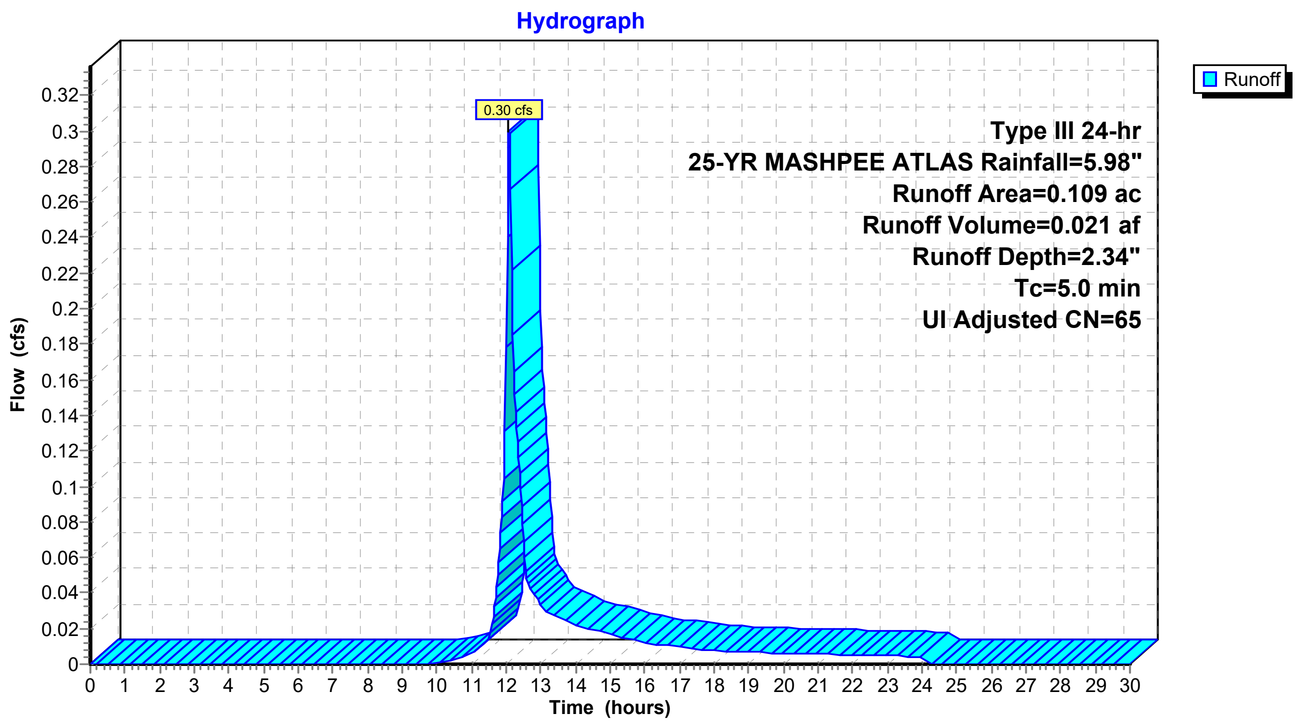
Runoff = 0.30 cfs @ 12.08 hrs, Volume= 0.021 af, Depth= 2.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Adj	Description
0.086	61		>75% Grass cover, Good, HSG B
0.023	98		Unconnected pavement, HSG B
0.109	69	65	Weighted Average, UI Adjusted
0.086			78.90% Pervious Area
0.023			21.10% Impervious Area
0.023			100.00% Unconnected

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

Subcatchment DA-3: AREAS TO WEST



Summary for Subcatchment DA-4: AREAS TO WEST

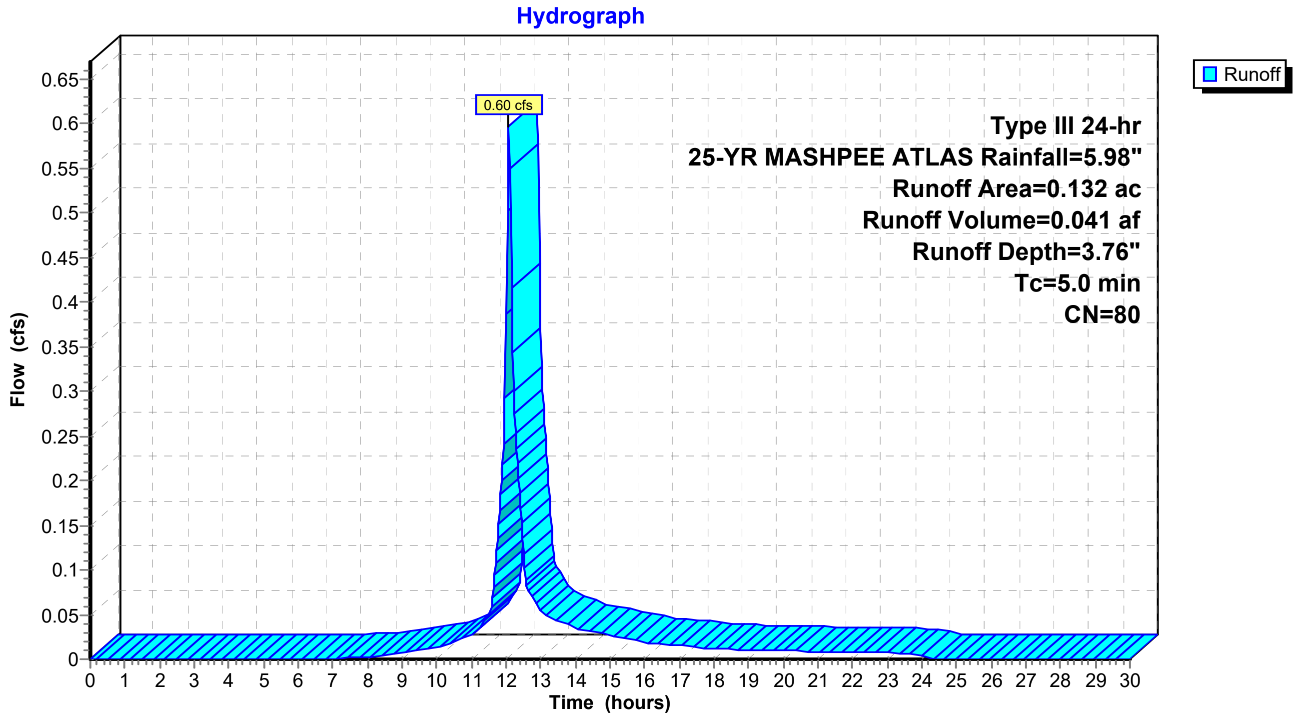
Runoff = 0.60 cfs @ 12.07 hrs, Volume= 0.041 af, Depth= 3.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.065	61	>75% Grass cover, Good, HSG B
0.067	98	Unconnected pavement, HSG B
0.132	80	Weighted Average
0.065		49.24% Pervious Area
0.067		50.76% Impervious Area
0.067		100.00% Unconnected

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

Subcatchment DA-4: AREAS TO WEST



Summary for Subcatchment DA-5: AREAS TO WEST

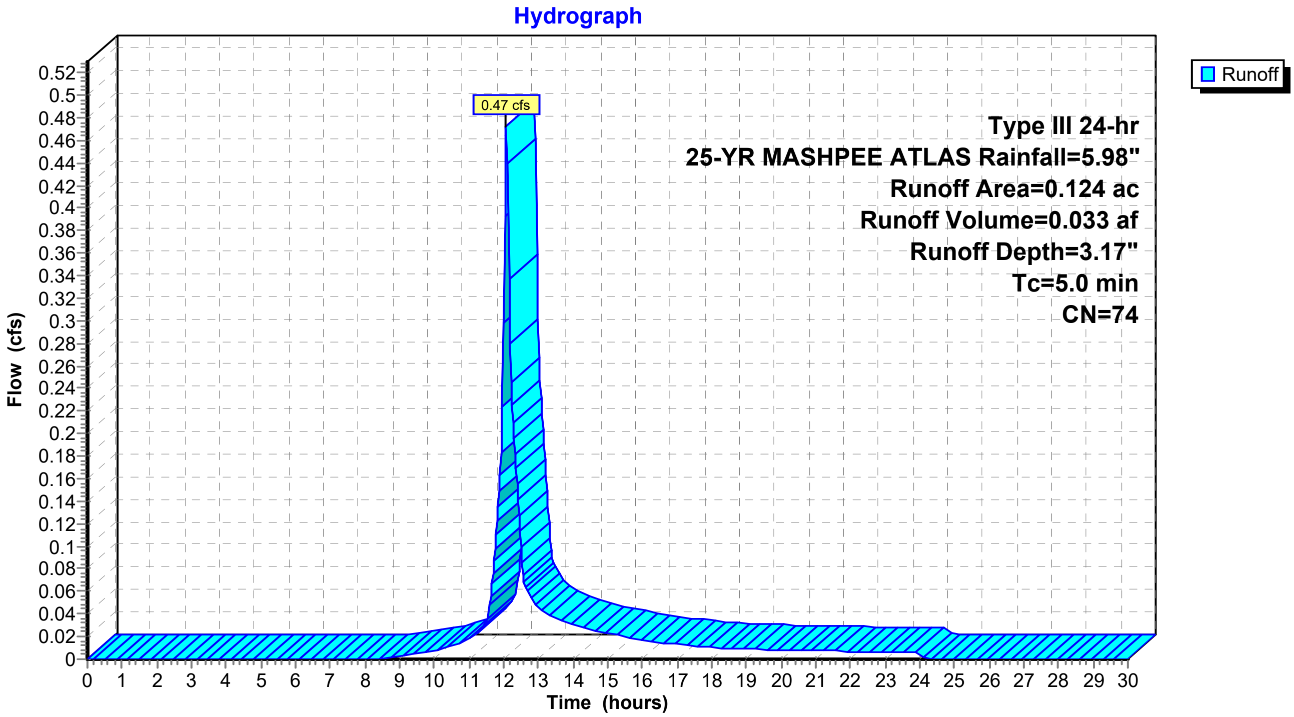
Runoff = 0.47 cfs @ 12.08 hrs, Volume= 0.033 af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.051	39	>75% Grass cover, Good, HSG A
0.073	98	Unconnected pavement, HSG A
0.124	74	Weighted Average
0.051		41.13% Pervious Area
0.073		58.87% Impervious Area
0.073		100.00% Unconnected

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

Subcatchment DA-5: AREAS TO WEST



Summary for Subcatchment DA-6: AREAS TO WEST

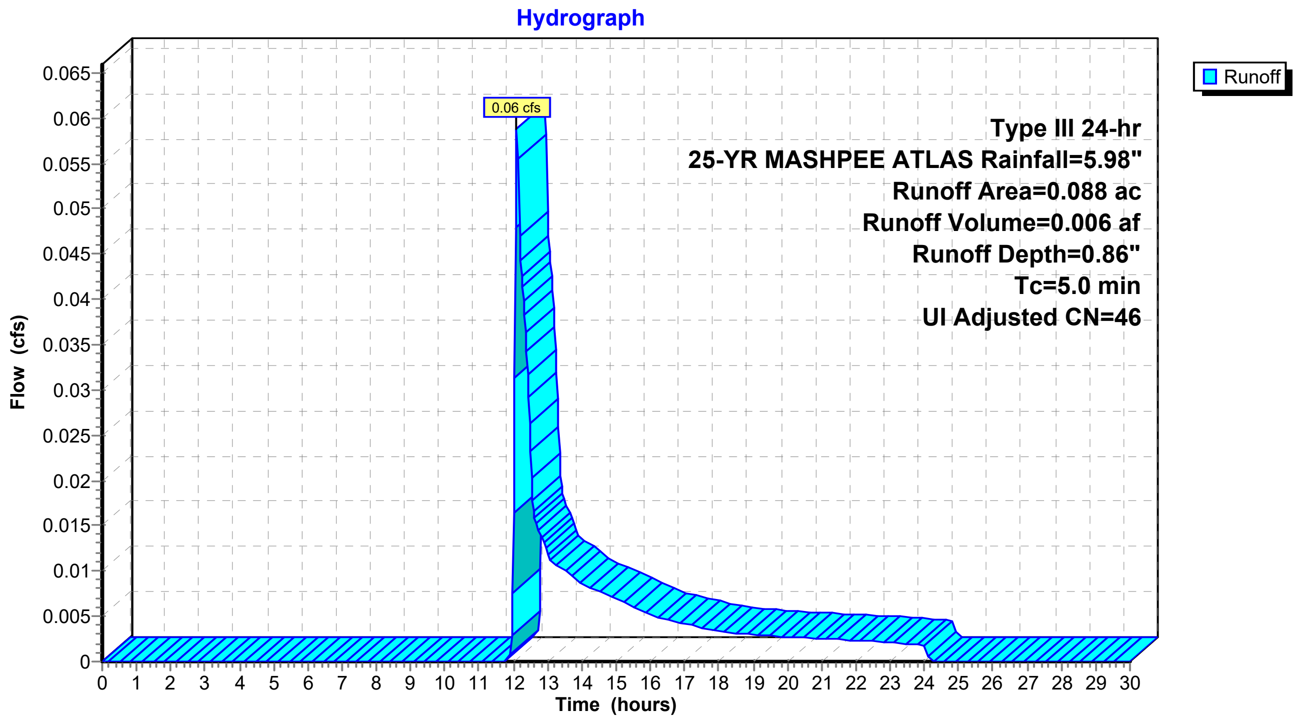
Runoff = 0.06 cfs @ 12.11 hrs, Volume= 0.006 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Adj	Description
0.073	39		>75% Grass cover, Good, HSG A
0.008	98		Unconnected pavement, HSG A
0.007	98		Roofs, HSG A
0.088	49	46	Weighted Average, UI Adjusted
0.073			82.95% Pervious Area
0.015			17.05% Impervious Area
0.008			53.33% Unconnected

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

Subcatchment DA-6: AREAS TO WEST



Summary for Subcatchment DA-7: AREAS TO WEST

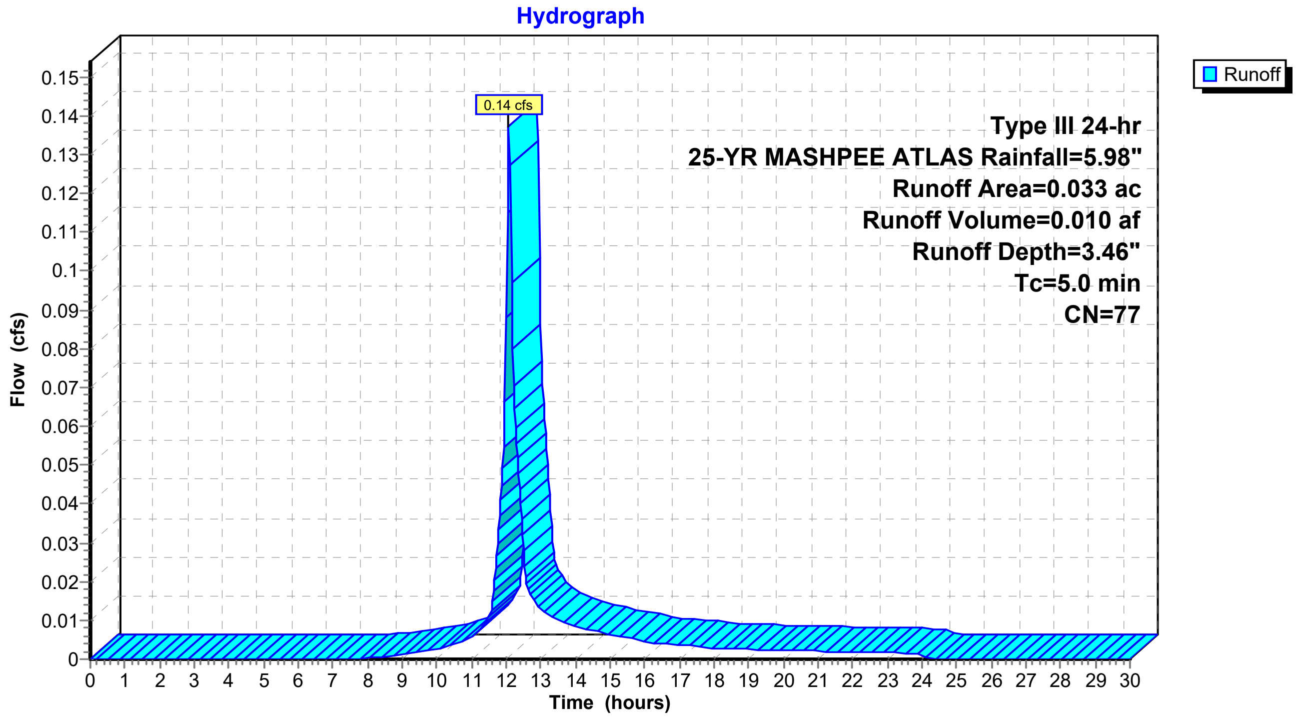
Runoff = 0.14 cfs @ 12.08 hrs, Volume= 0.010 af, Depth= 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.012	39	>75% Grass cover, Good, HSG A
0.021	98	Unconnected pavement, HSG A
0.033	77	Weighted Average
0.012		36.36% Pervious Area
0.021		63.64% Impervious Area
0.021		100.00% Unconnected

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

Subcatchment DA-7: AREAS TO WEST



Summary for Subcatchment DA-8: AREAS TO WEST

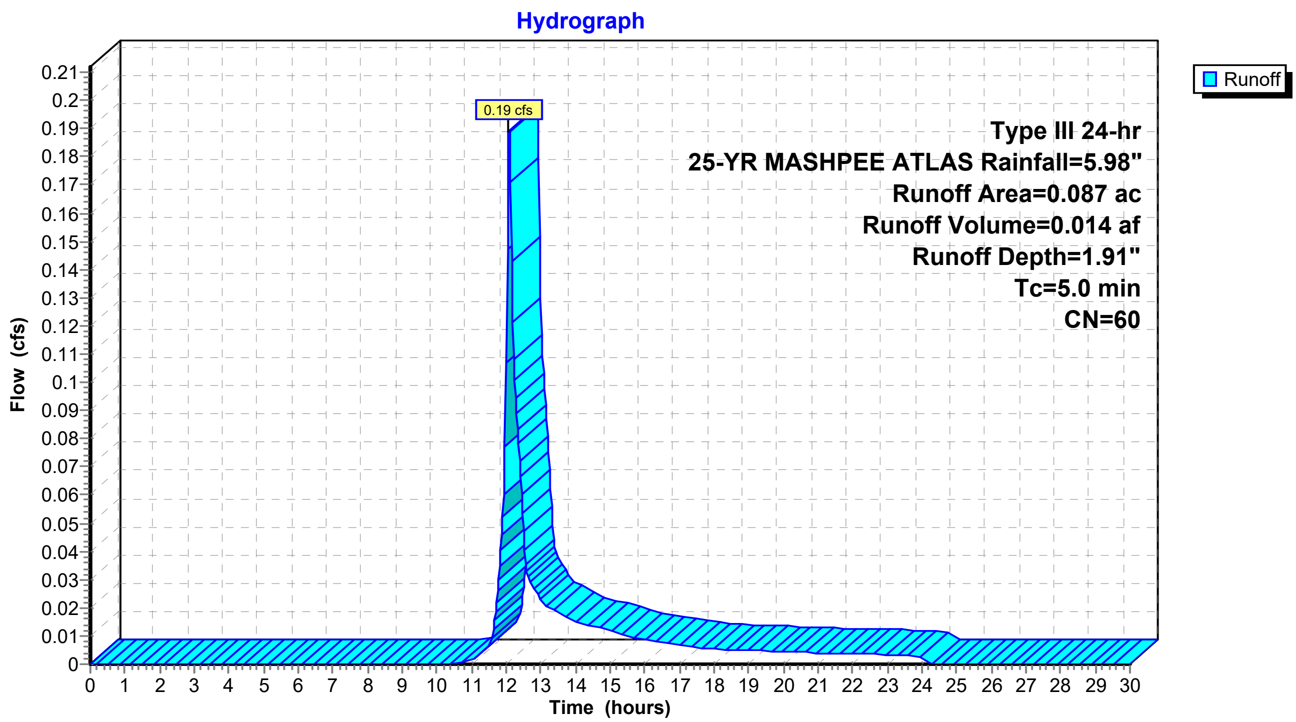
Runoff = 0.19 cfs @ 12.08 hrs, Volume= 0.014 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.056	39	>75% Grass cover, Good, HSG A
0.031	98	Unconnected pavement, HSG A
0.087	60	Weighted Average
0.056		64.37% Pervious Area
0.031		35.63% Impervious Area
0.031		100.00% Unconnected

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

Subcatchment DA-8: AREAS TO WEST



Summary for Subcatchment DA-9: AREAS EAST OF ROAD

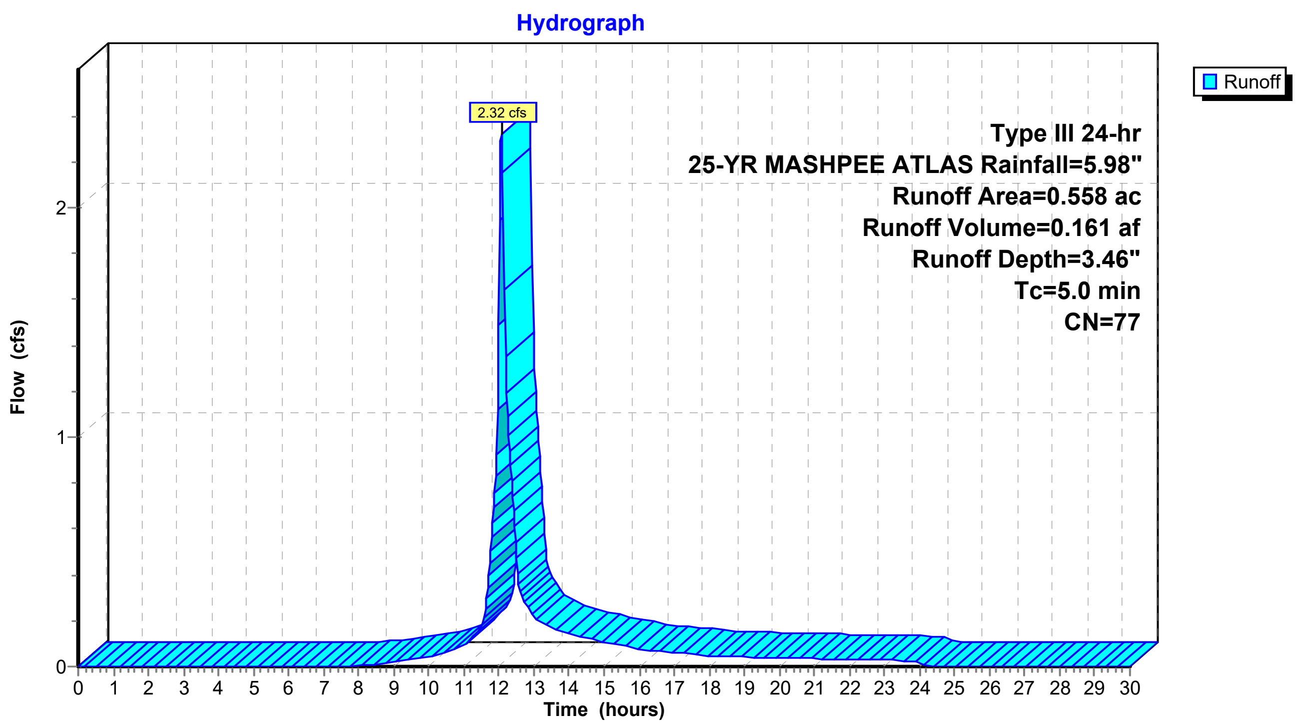
Runoff = 2.32 cfs @ 12.08 hrs, Volume= 0.161 af, Depth= 3.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.194	39	>75% Grass cover, Good, HSG A
0.154	98	Unconnected pavement, HSG A
0.210	98	Roofs, HSG A
0.558	77	Weighted Average
0.194		34.77% Pervious Area
0.364		65.23% Impervious Area
0.154		42.31% Unconnected

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

Subcatchment DA-9: AREAS EAST OF ROAD



Summary for Subcatchment DA22A: QUIN AVE SOUTH AREA TO WET POND

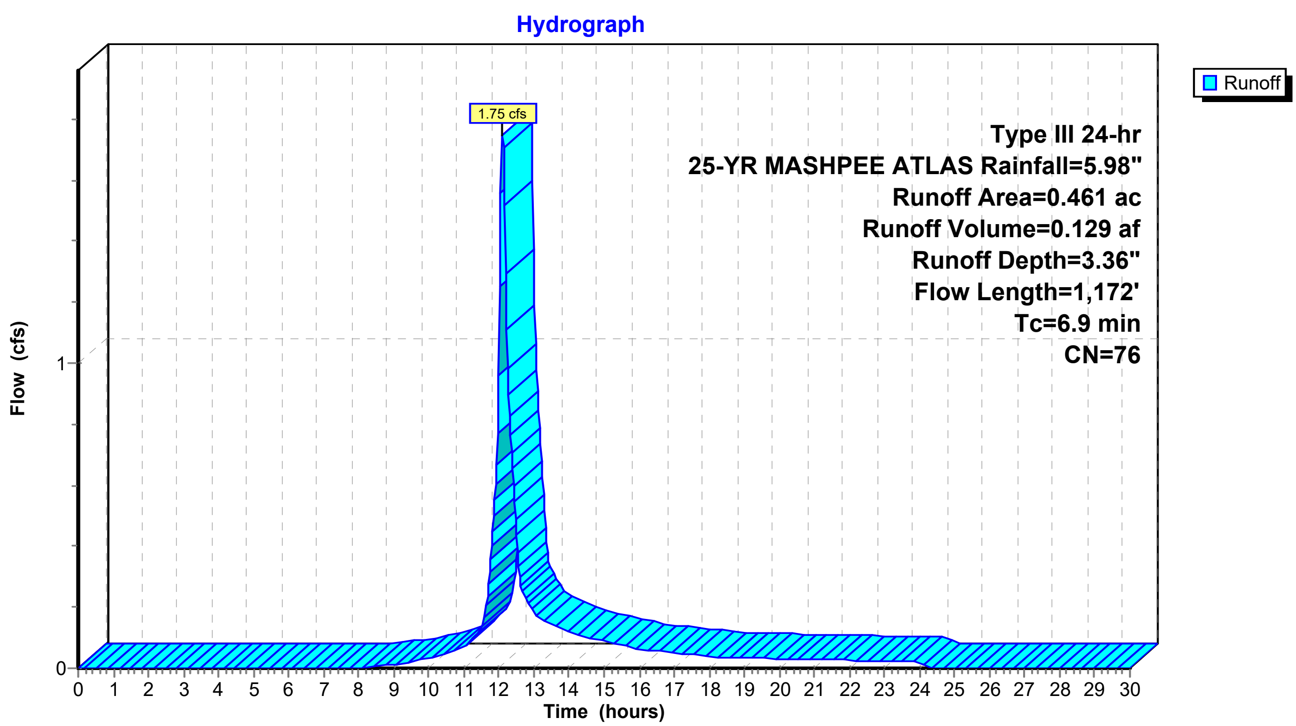
Runoff = 1.75 cfs @ 12.10 hrs, Volume= 0.129 af, Depth= 3.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.293	98	Unconnected pavement, HSG A
0.168	39	>75% Grass cover, Good, HSG A
0.461	76	Weighted Average
0.168		36.44% Pervious Area
0.293		63.56% Impervious Area
0.293		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.96		**Sheet Flow, A** Smooth surfaces n= 0.011 P2= 3.55"
6.0	1,122	0.0236	3.12		**Shallow Concentrated Flow, B** Paved Kv= 20.3 fps
6.9	1,172	Total			

Subcatchment DA22A: QUIN AVE SOUTH AREA TO WET POND



Summary for Subcatchment DA22B: QUIN AVE WEST AND NORTH AREA TO FOREBAY 3

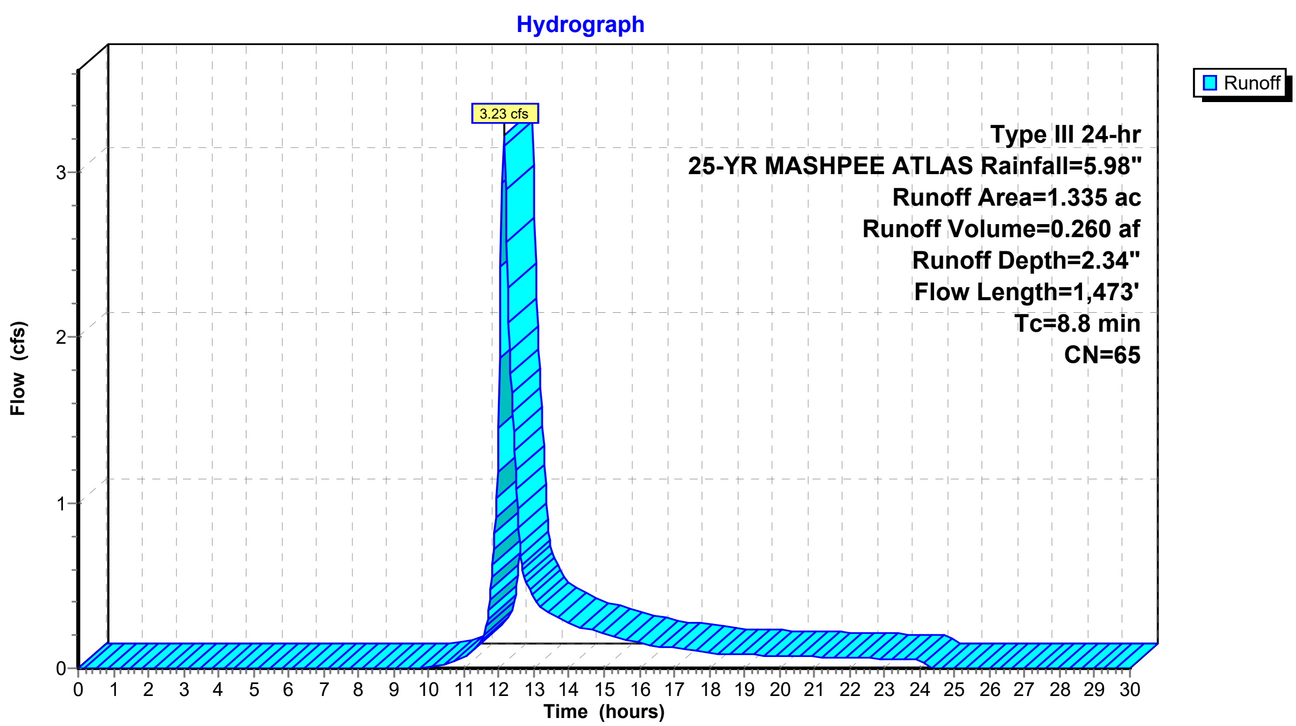
Runoff = 3.23 cfs @ 12.13 hrs, Volume= 0.260 af, Depth= 2.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.579	98	Unconnected pavement, HSG A
0.756	39	>75% Grass cover, Good, HSG A
1.335	65	Weighted Average
0.756		56.63% Pervious Area
0.579		43.37% Impervious Area
0.579		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.96		**Sheet Flow, A**
					Smooth surfaces n= 0.011 P2= 3.55"
7.9	1,423	0.0220	3.01		**Shallow Concentrated Flow, B**
					Paved Kv= 20.3 fps
8.8	1,473	Total			

Subcatchment DA22B: QUIN AVE WEST AND NORTH AREA TO FOREBAY 3



Summary for Subcatchment DA44: North of Quin

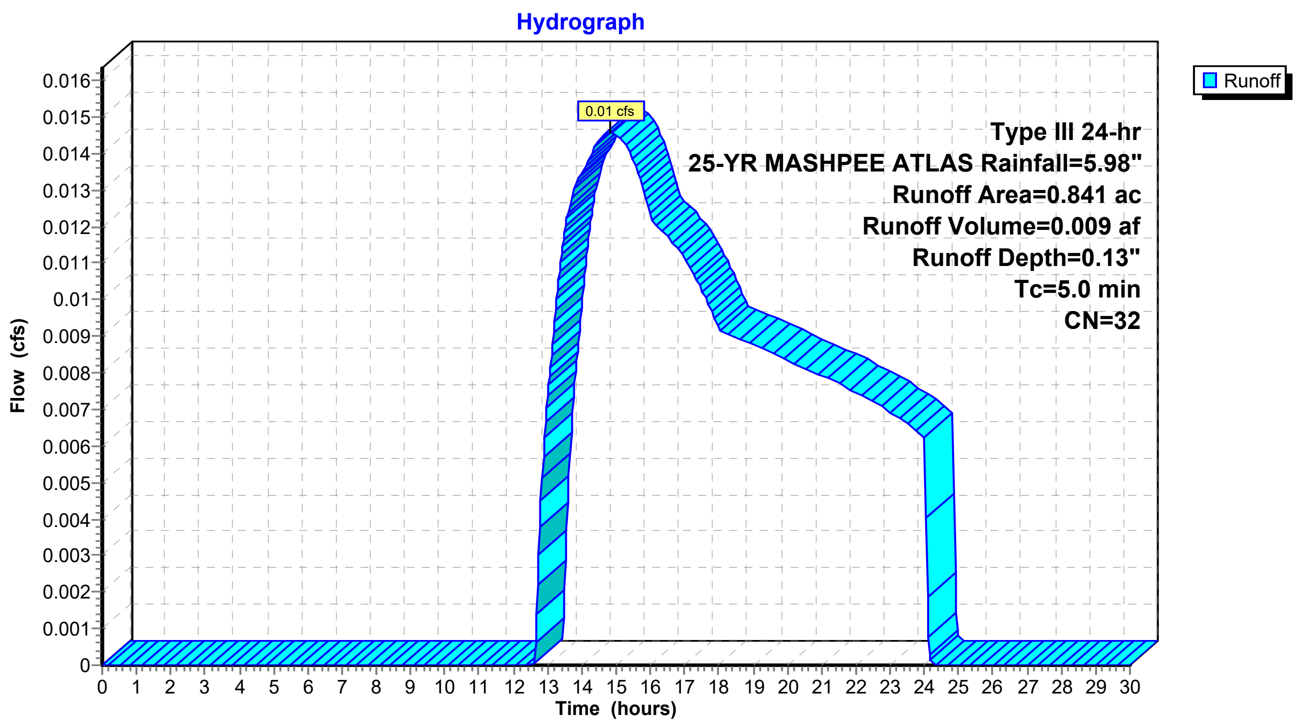
Runoff = 0.01 cfs @ 14.84 hrs, Volume= 0.009 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.841	32	Woods/grass comb., Good, HSG A
0.841		100.00% Pervious Area

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

Subcatchment DA44: North of Quin



Summary for Subcatchment DA55: AREAS TO CB'S AT WILLOWBEND DR

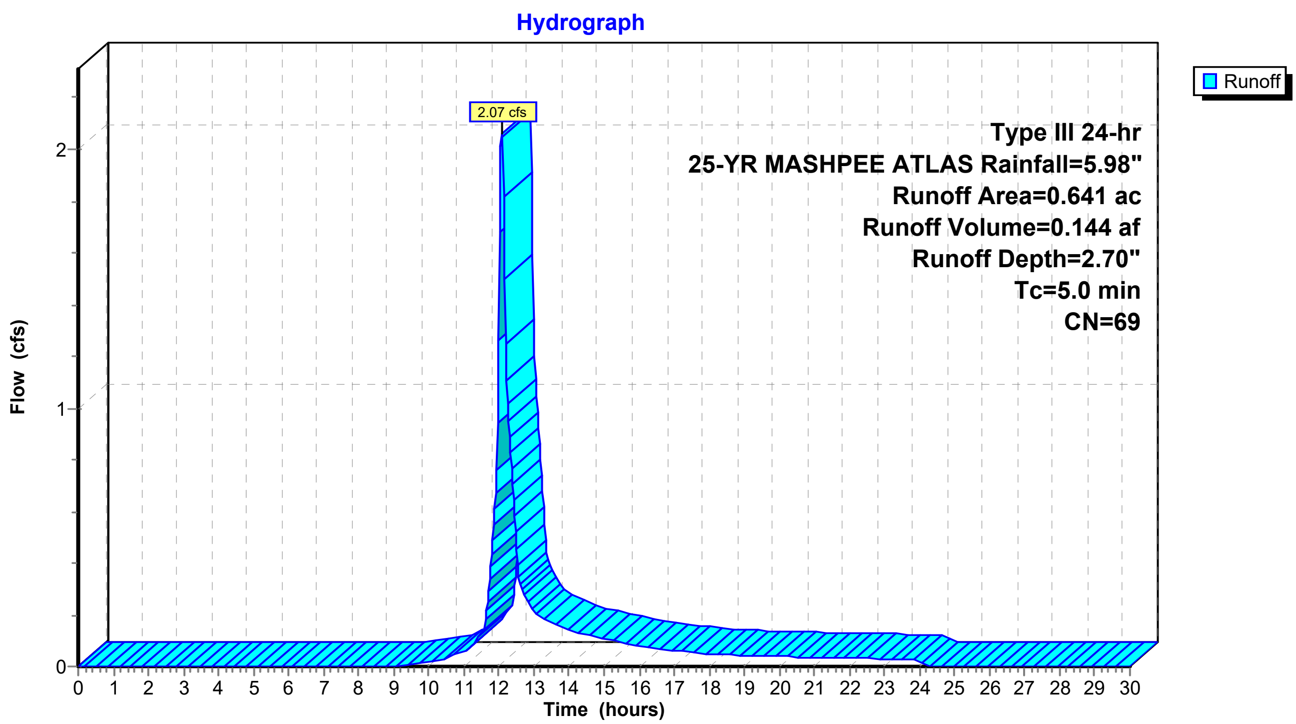
Runoff = 2.07 cfs @ 12.08 hrs, Volume= 0.144 af, Depth= 2.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.326	98	Paved parking, HSG A
0.315	39	Pasture/grassland/range, Good, HSG A
0.641	69	Weighted Average
0.315		49.14% Pervious Area
0.326		50.86% Impervious Area

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

Subcatchment DA55: AREAS TO CB'S AT WILLOWBEND DR



Summary for Subcatchment DA77: AREAS TO WETLAND TO EAST

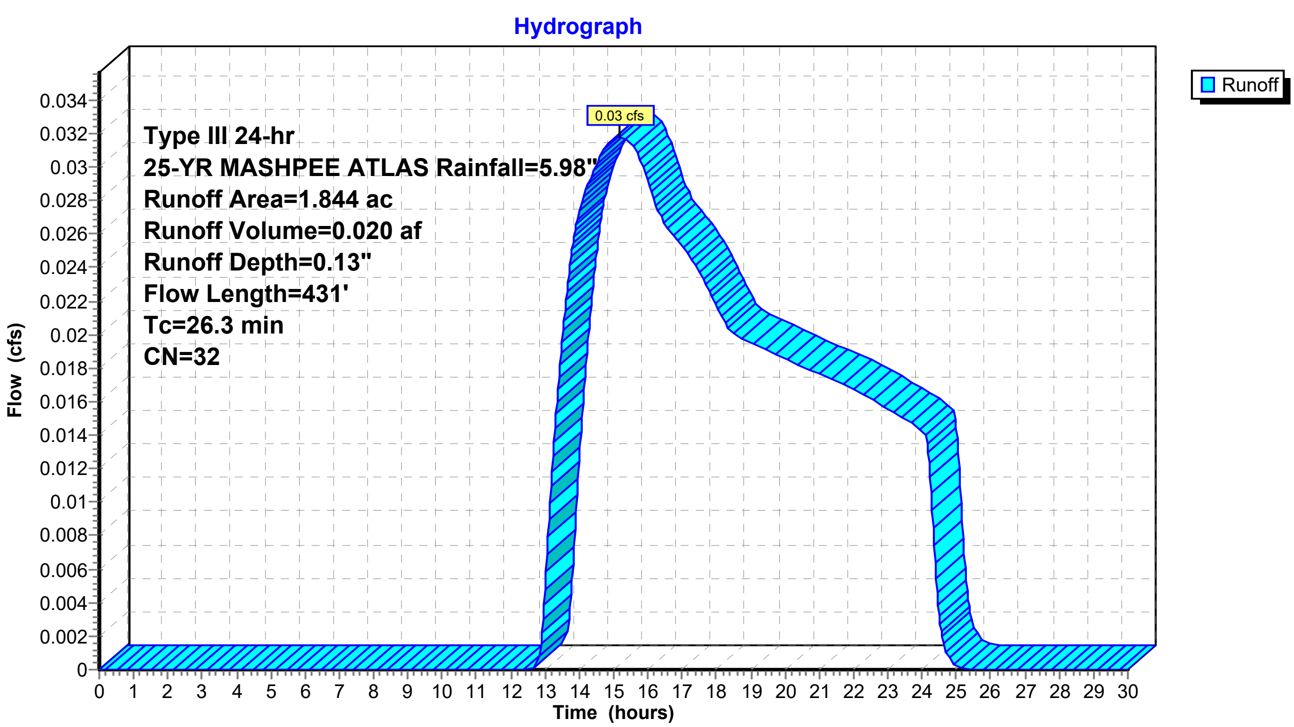
Runoff = 0.03 cfs @ 15.17 hrs, Volume= 0.020 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-YR MASHPEE ATLAS Rainfall=5.98"

Area (ac)	CN	Description
0.476	39	>75% Grass cover, Good, HSG A
1.201	30	Woods, Good, HSG A
0.167	30	Woods, Good, HSG A
1.844	32	Weighted Average
1.844		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0480	0.10		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.55"
18.0	381	0.0050	0.35		**Shallow Concentrated Flow, B** Woodland Kv= 5.0 fps
26.3	431	Total			

Subcatchment DA77: AREAS TO WETLAND TO EAST



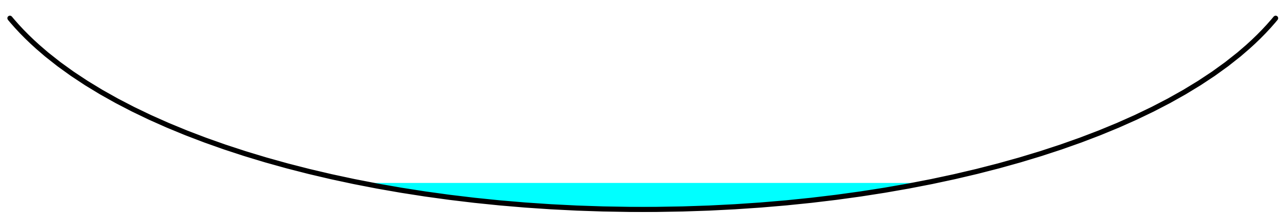
Summary for Reach R1: Tt along stream

Inflow Area = 1.366 ac, 18.52% Impervious, Inflow Depth = 0.90" for 25-YR MASHPEE ATLAS event
Inflow = 1.66 cfs @ 12.11 hrs, Volume= 0.103 af
Outflow = 0.98 cfs @ 12.26 hrs, Volume= 0.103 af, Atten= 41%, Lag= 9.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 0.71 fps, Min. Travel Time= 12.9 min
Avg. Velocity = 0.25 fps, Avg. Travel Time= 37.3 min

Peak Storage= 762 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 2.00' Flow Area= 26.7 sf, Capacity= 69.34 cfs

20.00' x 2.00' deep Parabolic Channel, n= 0.040 Winding stream, pools & shoals
Length= 550.0' Slope= 0.0035 '/'
Inlet Invert= 14.60', Outlet Invert= 12.70'



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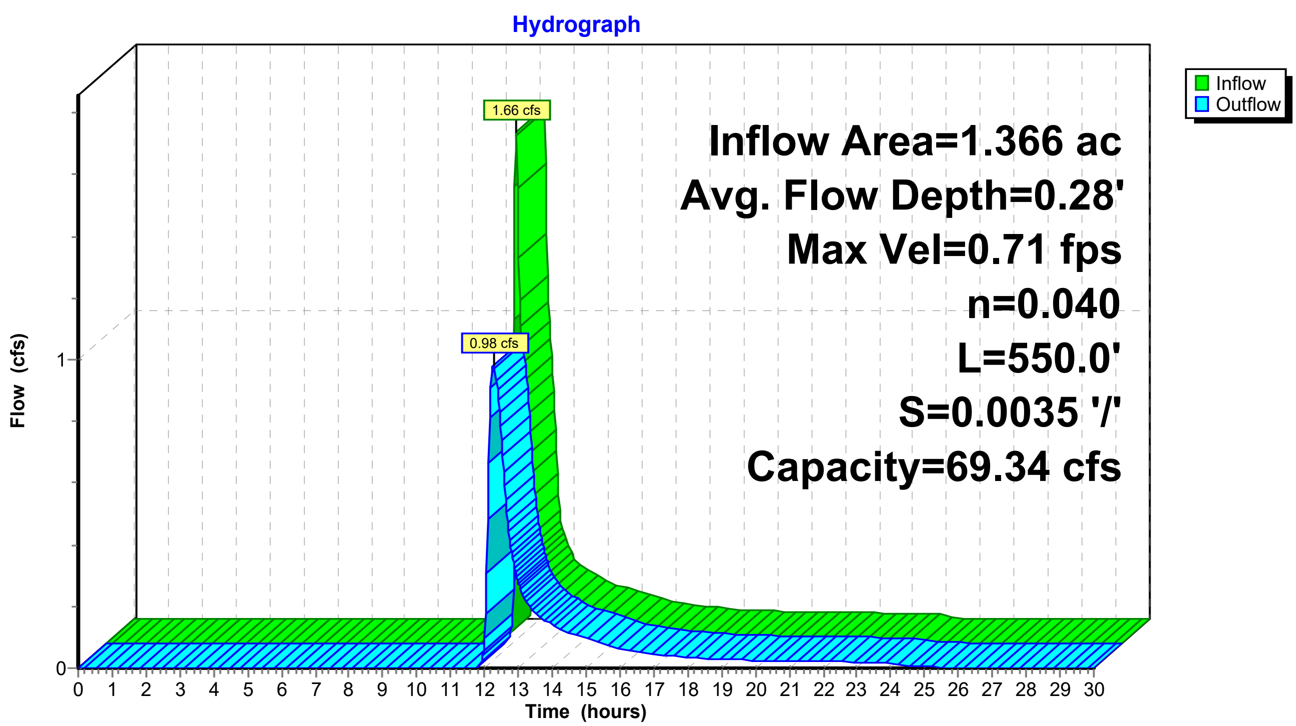
Reach R1: Tt along stream



Summary for Reach R1A: Tt thru bogs

Inflow Area = 7.256 ac, 33.70% Impervious, Inflow Depth > 0.68" for 25-YR MASHPEE ATLAS event
Inflow = 0.71 cfs @ 13.80 hrs, Volume= 0.414 af
Outflow = 0.71 cfs @ 13.96 hrs, Volume= 0.411 af, Atten= 0%, Lag= 9.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 0.63 fps, Min. Travel Time= 13.7 min
Avg. Velocity = 0.41 fps, Avg. Travel Time= 20.9 min

Peak Storage= 580 cf @ 13.96 hrs
Average Depth at Peak Storage= 0.20'
Bank-Full Depth= 2.00' Flow Area= 22.0 sf, Capacity= 50.84 cfs

5.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/' Top Width= 17.00'
Length= 520.0' Slope= 0.0029 '/'
Inlet Invert= 14.20', Outlet Invert= 12.70'

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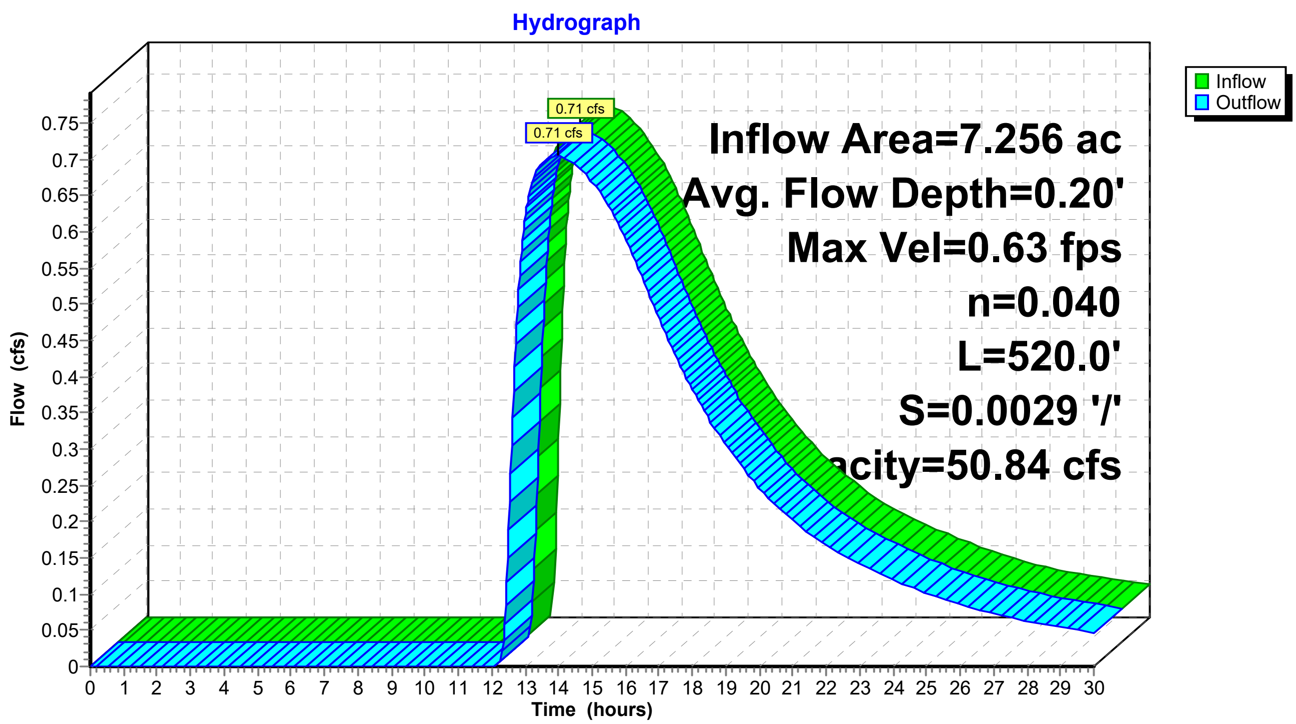
Reach R1A: Tt thru bogs



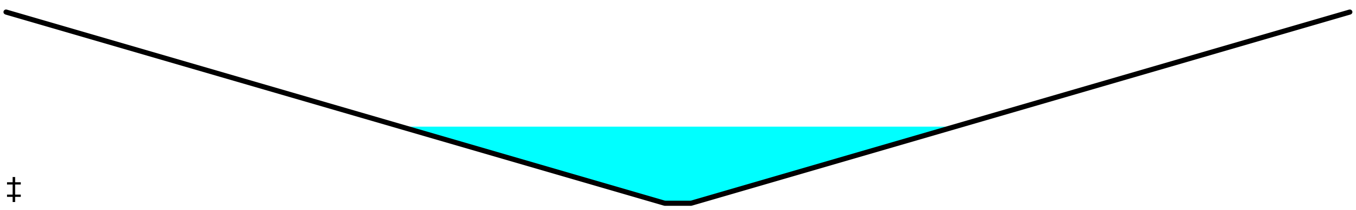
Summary for Reach R2: Tt thru da77

Inflow Area = 2.817 ac, 32.13% Impervious, Inflow Depth = 1.53" for 25-YR MASHPEE ATLAS event
Inflow = 5.13 cfs @ 12.12 hrs, Volume= 0.359 af
Outflow = 4.73 cfs @ 12.16 hrs, Volume= 0.359 af, Atten= 8%, Lag= 2.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 1.07 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 0.40 fps, Avg. Travel Time= 8.7 min

Peak Storage= 925 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.20'
Bank-Full Depth= 0.50' Flow Area= 26.0 sf, Capacity= 50.53 cfs

2.00' x 0.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 100.0 '/' Top Width= 102.00'
Length= 210.0' Slope= 0.0095 '/'
Inlet Invert= 17.00', Outlet Invert= 15.00'



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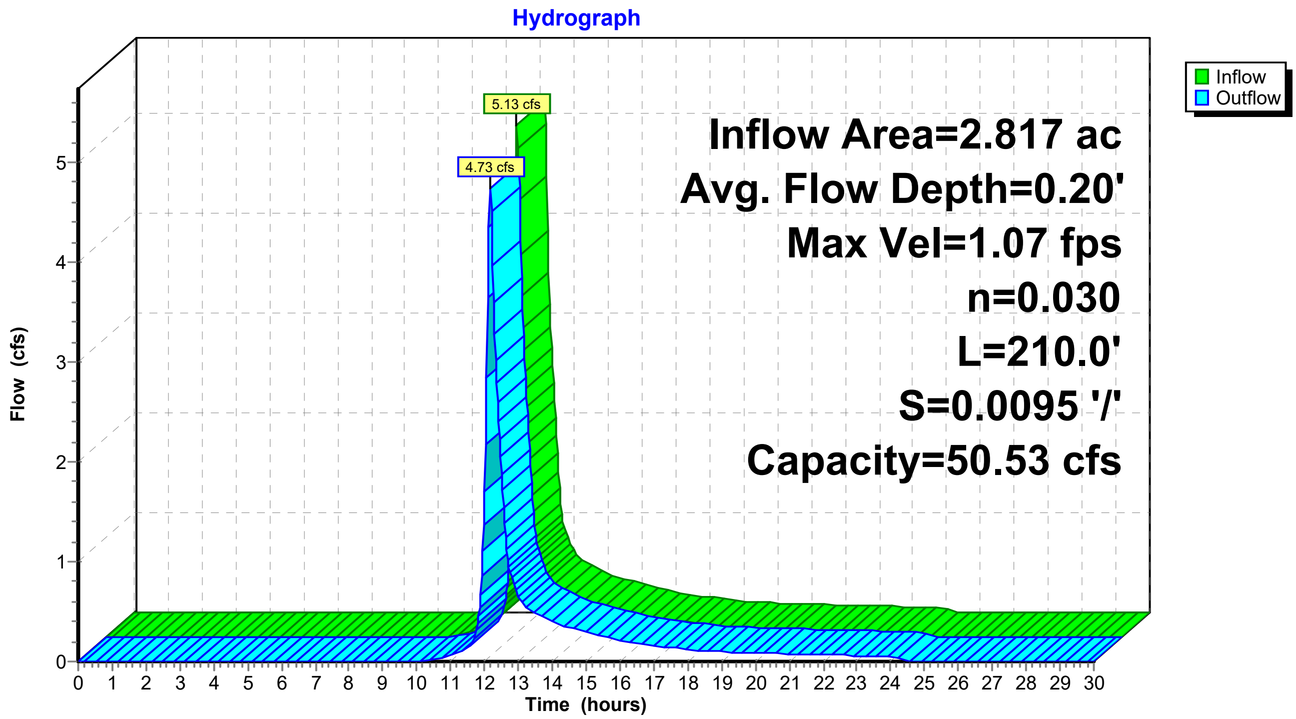
Reach R2: Tt thru da77



Summary for Reach R2A: Travel Time thru wet pond

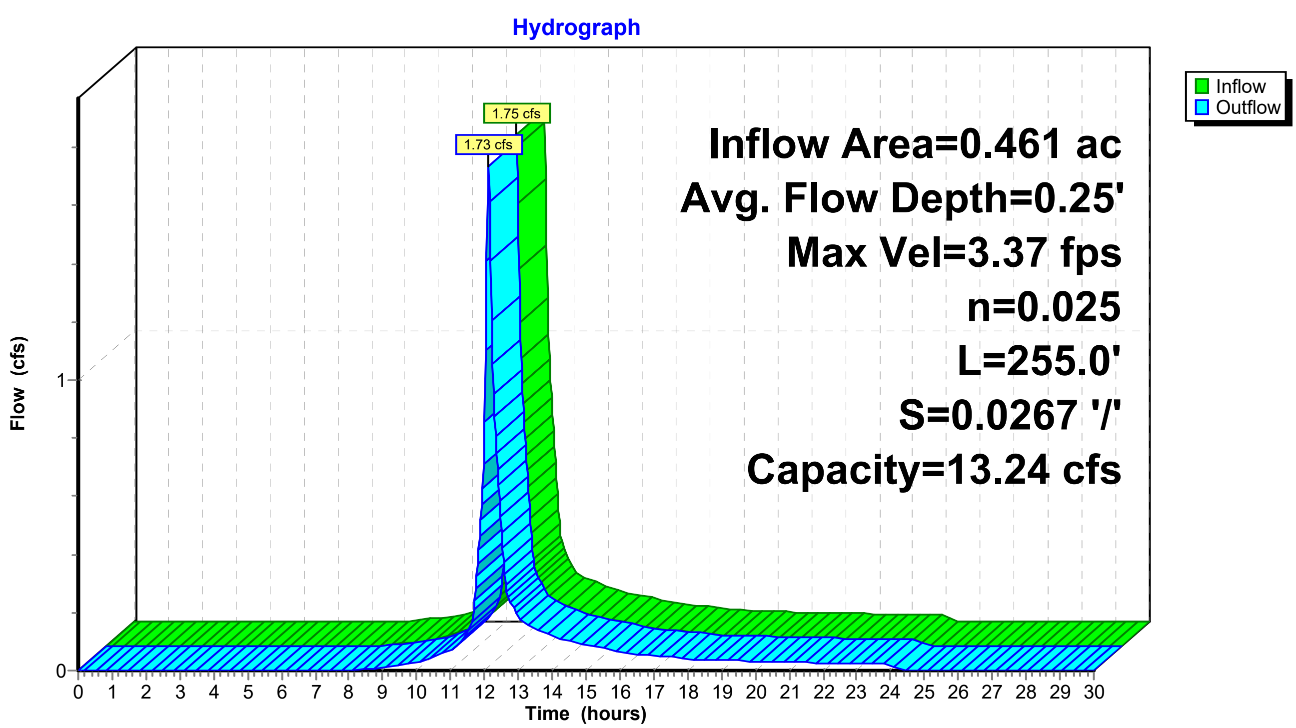
Inflow Area = 0.461 ac, 63.56% Impervious, Inflow Depth = 3.36" for 25-YR MASHPEE ATLAS event
Inflow = 1.75 cfs @ 12.10 hrs, Volume= 0.129 af
Outflow = 1.73 cfs @ 12.12 hrs, Volume= 0.129 af, Atten= 1%, Lag= 0.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 3.37 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.92 fps, Avg. Travel Time= 4.6 min

Peak Storage= 131 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.25'
Bank-Full Depth= 1.00' Flow Area= 2.1 sf, Capacity= 13.24 cfs

2.00' x 1.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 0.1 '/' Top Width= 2.20'
Length= 255.0' Slope= 0.0267 '/'
Inlet Invert= 21.00', Outlet Invert= 14.20'

Reach R2A: Travel Time thru wet pond



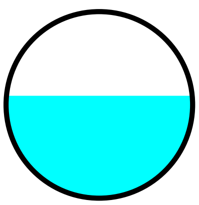
Summary for Reach R3: 18" CPP

Inflow Area = 0.684 ac, 66.67% Impervious, Inflow Depth = 3.61" for 25-YR MASHPEE ATLAS event
Inflow = 2.97 cfs @ 12.07 hrs, Volume= 0.206 af
Outflow = 2.96 cfs @ 12.08 hrs, Volume= 0.206 af, Atten= 0%, Lag= 0.4 min

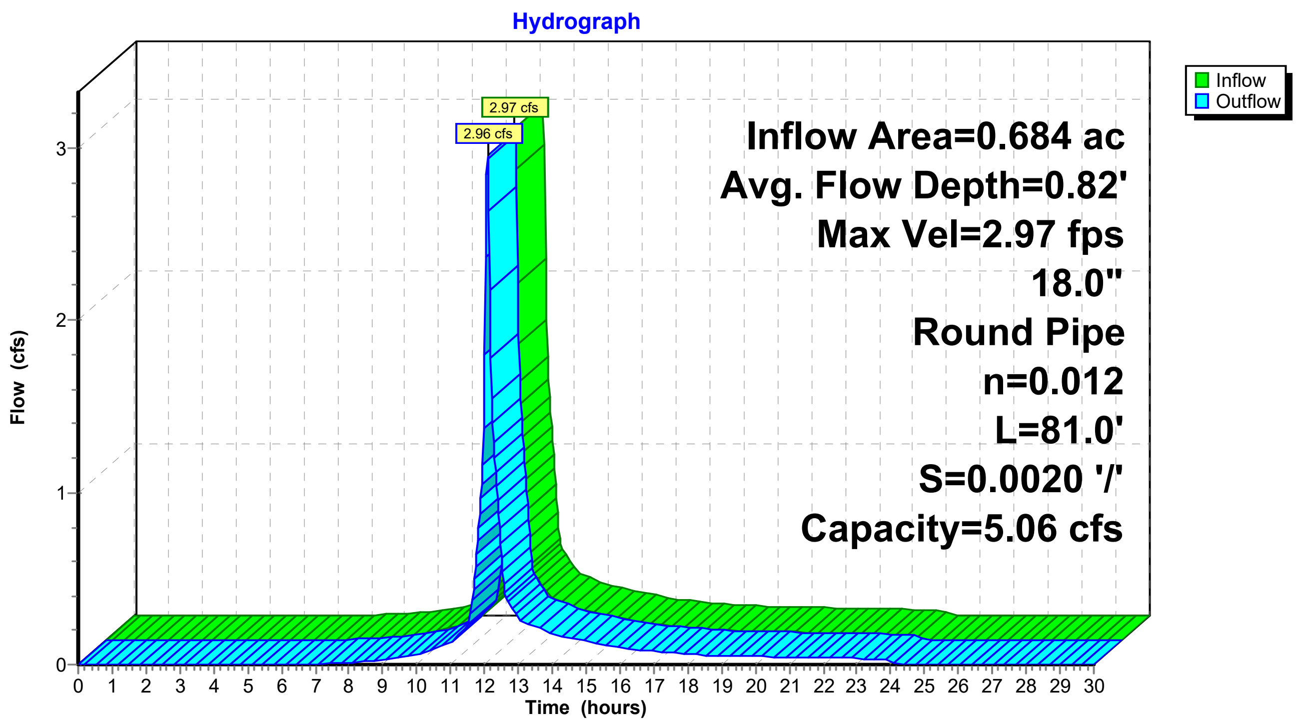
Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 2.97 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.02 fps, Avg. Travel Time= 1.3 min

Peak Storage= 81 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.82'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 5.06 cfs

18.0" Round Pipe
n= 0.012
Length= 81.0' Slope= 0.0020 '/'
Inlet Invert= 15.06', Outlet Invert= 14.90'



Reach R3: 18" CPP



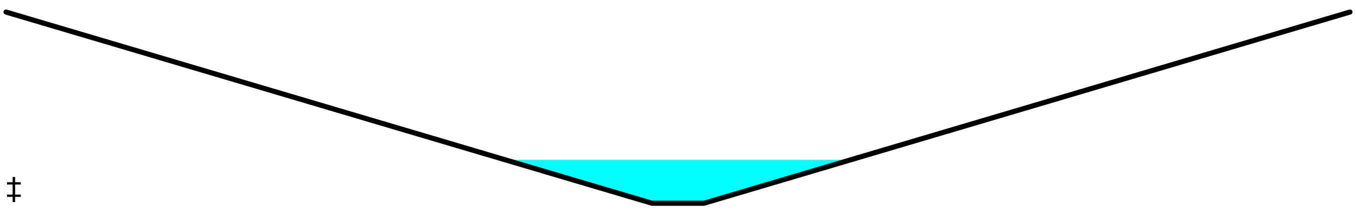
Summary for Reach R5: Tt thru da22B

Inflow Area = 0.641 ac, 50.86% Impervious, Inflow Depth = 1.86" for 25-YR MASHPEE ATLAS event
Inflow = 2.02 cfs @ 12.08 hrs, Volume= 0.099 af
Outflow = 1.93 cfs @ 12.11 hrs, Volume= 0.099 af, Atten= 4%, Lag= 1.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 2.23 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 0.77 fps, Avg. Travel Time= 5.3 min

Peak Storage= 213 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 0.50' Flow Area= 13.5 sf, Capacity= 75.75 cfs

2.00' x 0.50' deep channel, n= 0.013 Asphalt, smooth
Side Slope Z-value= 50.0 '/' Top Width= 52.00'
Length= 246.0' Slope= 0.0146 '/'
Inlet Invert= 20.58', Outlet Invert= 17.00'



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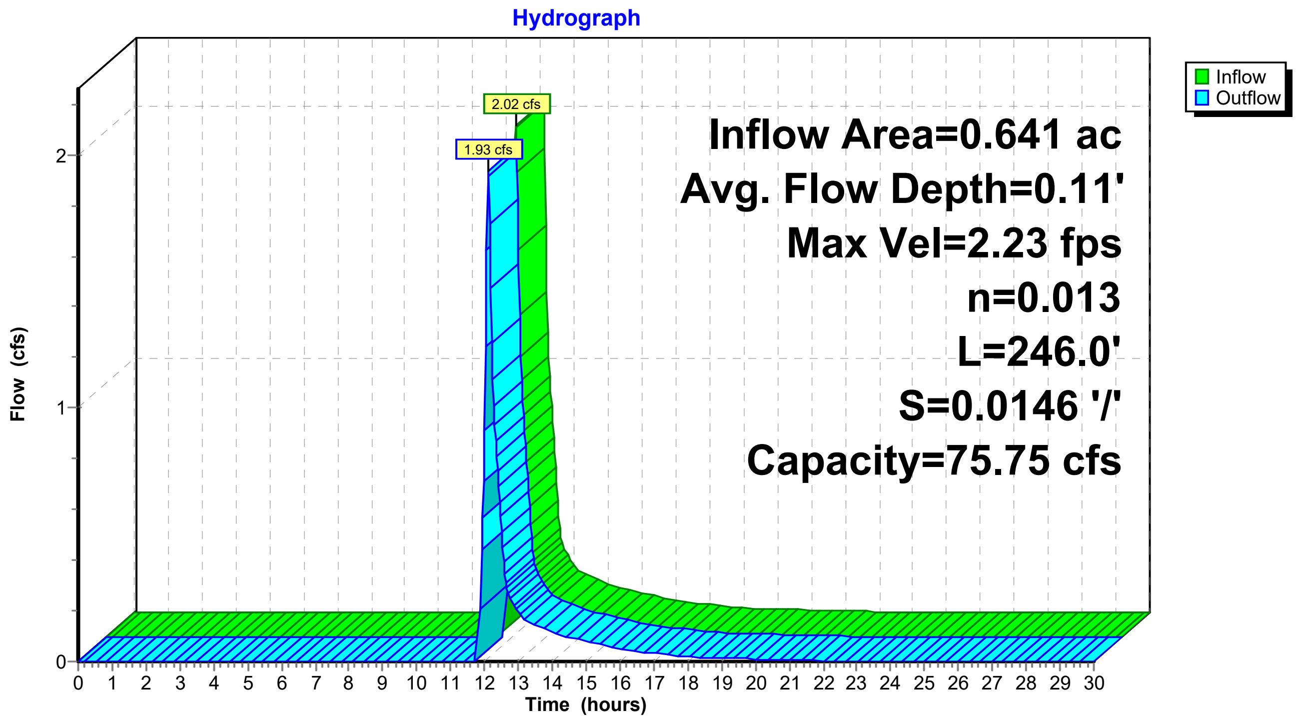
Reach R5: Tt thru da22B

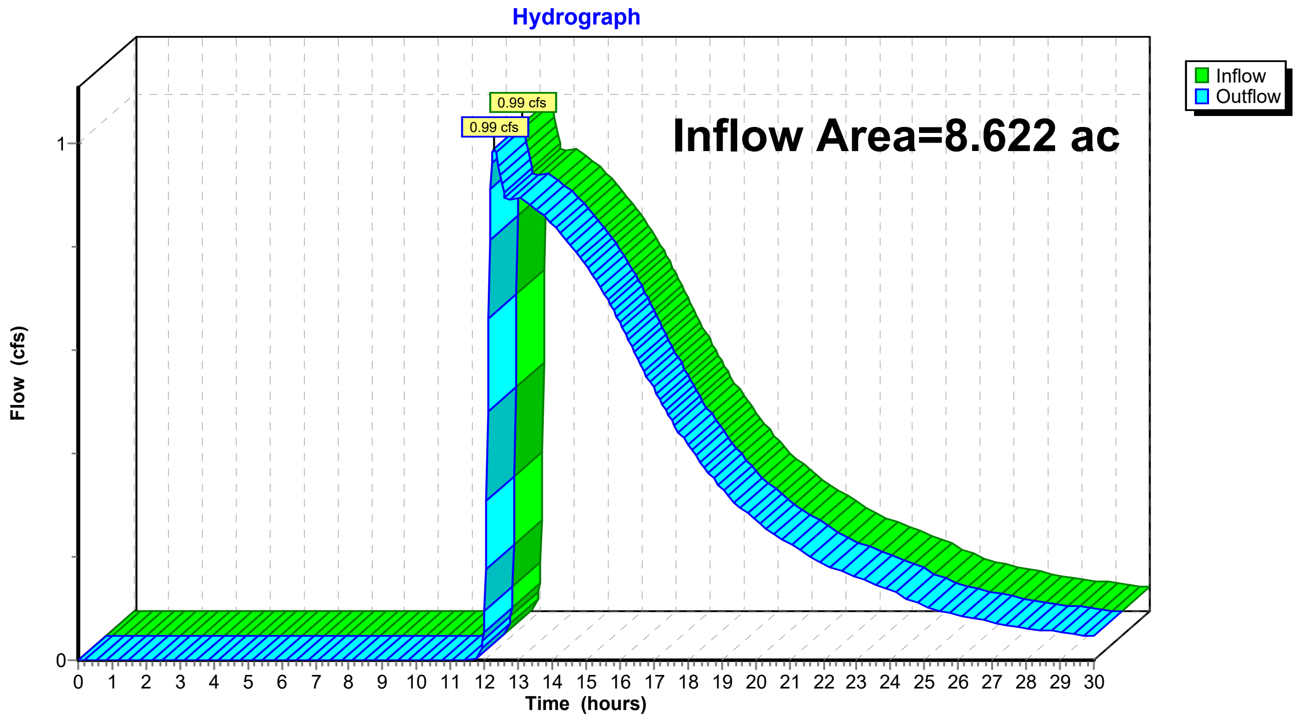


Summary for Reach SP#1: Study Point Combined Flows

Inflow Area = 8.622 ac, 31.29% Impervious, Inflow Depth > 0.72" for 25-YR MASHPEE ATLAS event
Inflow = 0.99 cfs @ 12.28 hrs, Volume= 0.514 af
Outflow = 0.99 cfs @ 12.28 hrs, Volume= 0.514 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3

Reach SP#1: Study Point Combined Flows



Summary for Pond 1P: LB's

Inflow Area = 0.641 ac, 50.86% Impervious, Inflow Depth = 2.70" for 25-YR MASHPEE ATLAS event
Inflow = 2.07 cfs @ 12.08 hrs, Volume= 0.144 af
Outflow = 2.05 cfs @ 12.08 hrs, Volume= 0.144 af, Atten= 1%, Lag= 0.4 min
Discarded = 0.03 cfs @ 10.68 hrs, Volume= 0.045 af
Primary = 2.02 cfs @ 12.08 hrs, Volume= 0.099 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 20.72' @ 12.09 hrs Surf.Area= 810 sf Storage= 490 cf

Plug-Flow detention time= 59.6 min calculated for 0.144 af (100% of inflow)
Center-of-Mass det. time= 59.8 min (899.7 - 839.8)

Volume	Invert	Avail.Storage	Storage Description
#1	13.50'	192 cf	**10.00'D x 4.50'H Vertical Cone/Cylinder** x 2 707 cf Overall - 226 cf Embedded = 481 cf x 40.0% Voids
#2	14.00'	226 cf	**6.00'D x 4.00'H Vertical Cone/Cylinder** x 2 Inside #1
#3	20.50'	376 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		794 cf	Total Available Storage

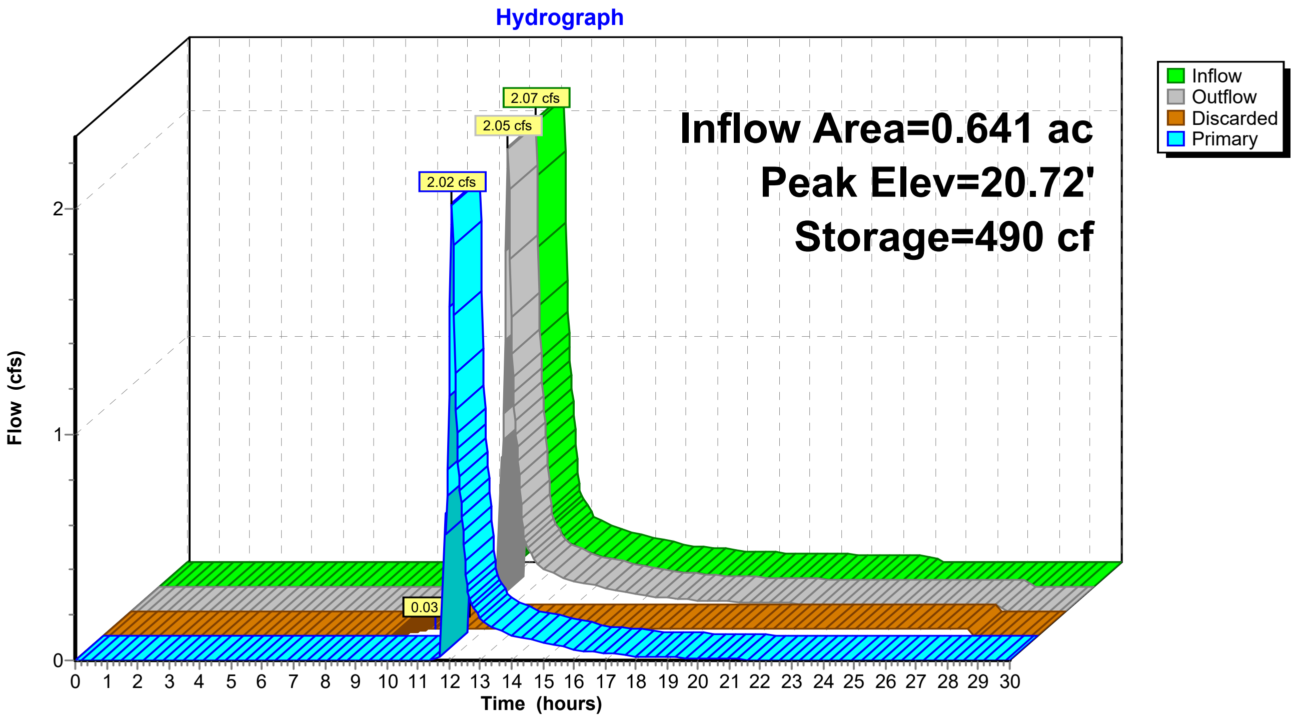
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.50	4	0	0
21.00	1,500	376	376

Device	Routing	Invert	Outlet Devices
#1	Discarded	13.50'	**8.270 in/hr Exfiltration over Surface area from 13.49' - 18.00'** Excluded Surface area = 0 sf
#2	Primary	20.58'	**179.0 deg x 6.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.46 (C= 3.08)

Discarded OutFlow Max=0.03 cfs @ 10.68 hrs HW=13.58' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=2.00 cfs @ 12.08 hrs HW=20.72' TW=20.69' (Dynamic Tailwater)
└─**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 2.00 cfs @ 0.68 fps)

Pond 1P: LB's


Hydrograph
Inflow
Outflow
Discarded
Primary
2.07 cfs
2.05 cfs
2.02 cfs
0.03
Inflow Area=0.641 ac
Peak Elev=20.72'
Storage=490 cf
Flow (cfs)
0
1
2
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Time (hours)

Summary for Pond 2P: Natural Low Area

Inflow Area = 0.841 ac, 0.00% Impervious, Inflow Depth = 0.13" for 25-YR MASHPEE ATLAS event
Inflow = 0.01 cfs @ 14.84 hrs, Volume= 0.009 af
Outflow = 0.01 cfs @ 15.88 hrs, Volume= 0.009 af, Atten= 12%, Lag= 62.3 min
Discarded = 0.01 cfs @ 15.88 hrs, Volume= 0.009 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 16.32' @ 15.88 hrs Surf.Area= 229 sf Storage= 35 cf

Plug-Flow detention time= 35.6 min calculated for 0.009 af (100% of inflow)
Center-of-Mass det. time= 35.6 min (1,099.6 - 1,063.9)

Volume	Invert	Avail.Storage	Storage Description
#1	16.01'	4,469 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

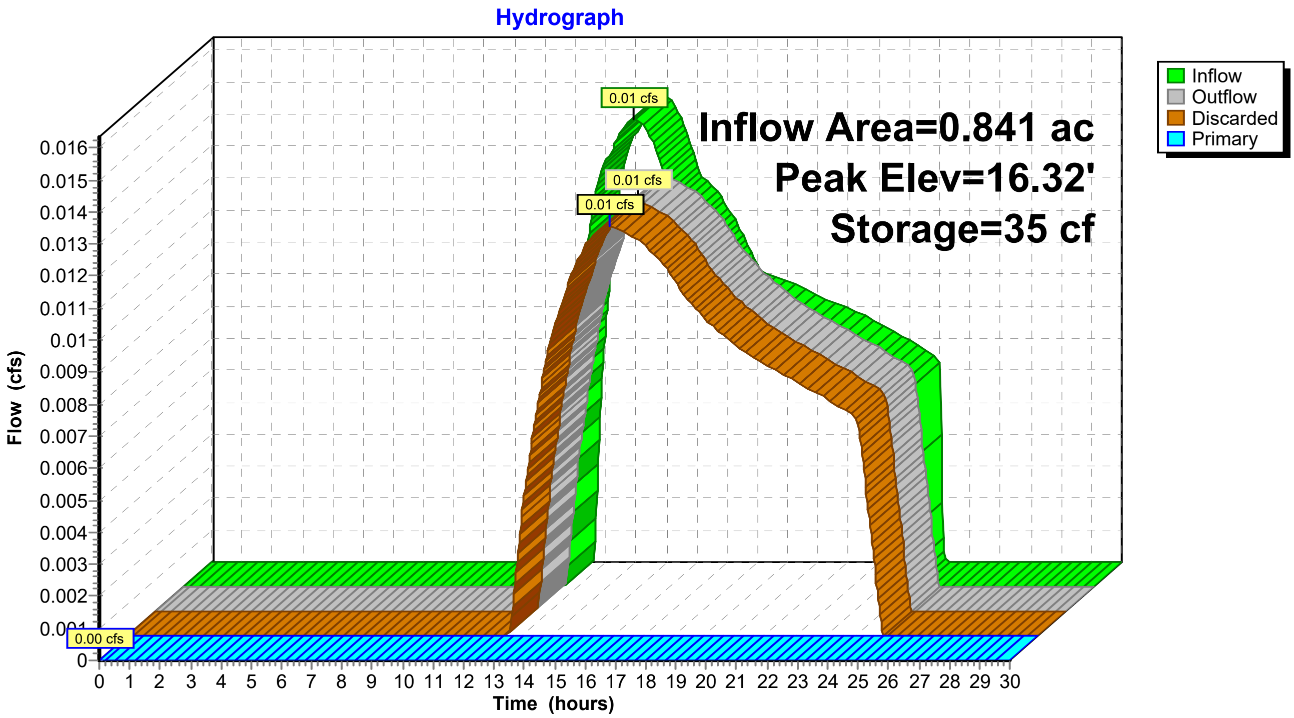
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
16.01	1	0	0
17.00	739	366	366
18.00	7,467	4,103	4,469

Device	Routing	Invert	Outlet Devices
#1	Discarded	16.01'	**2.410 in/hr Exfiltration over Surface area from 15.90' - 17.70'** Excluded Surface area = 0 sf
#2	Primary	17.58'	**50.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.01 cfs @ 15.88 hrs HW=16.32' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=16.01' TW=17.00' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Natural Low Area



Summary for Pond 3A-P: Pond 3A

Inflow Area =	0.109 ac,	21.10% Impervious, Inflow Depth = 2.34"	for 25-YR MASHPEE ATLAS event	
Inflow =	0.30 cfs @	12.08 hrs, Volume=	0.021 af	
Outflow =	0.24 cfs @	12.15 hrs, Volume=	0.021 af,	Atten= 21%, Lag= 4.4 min
Discarded =	0.01 cfs @	12.15 hrs, Volume=	0.014 af	
Primary =	0.22 cfs @	12.15 hrs, Volume=	0.007 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 17.54' @ 12.15 hrs Surf.Area= 605 sf Storage= 206 cf

Plug-Flow detention time= 115.3 min calculated for 0.021 af (100% of inflow)
Center-of-Mass det. time= 115.3 min (964.7 - 849.4)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	520 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

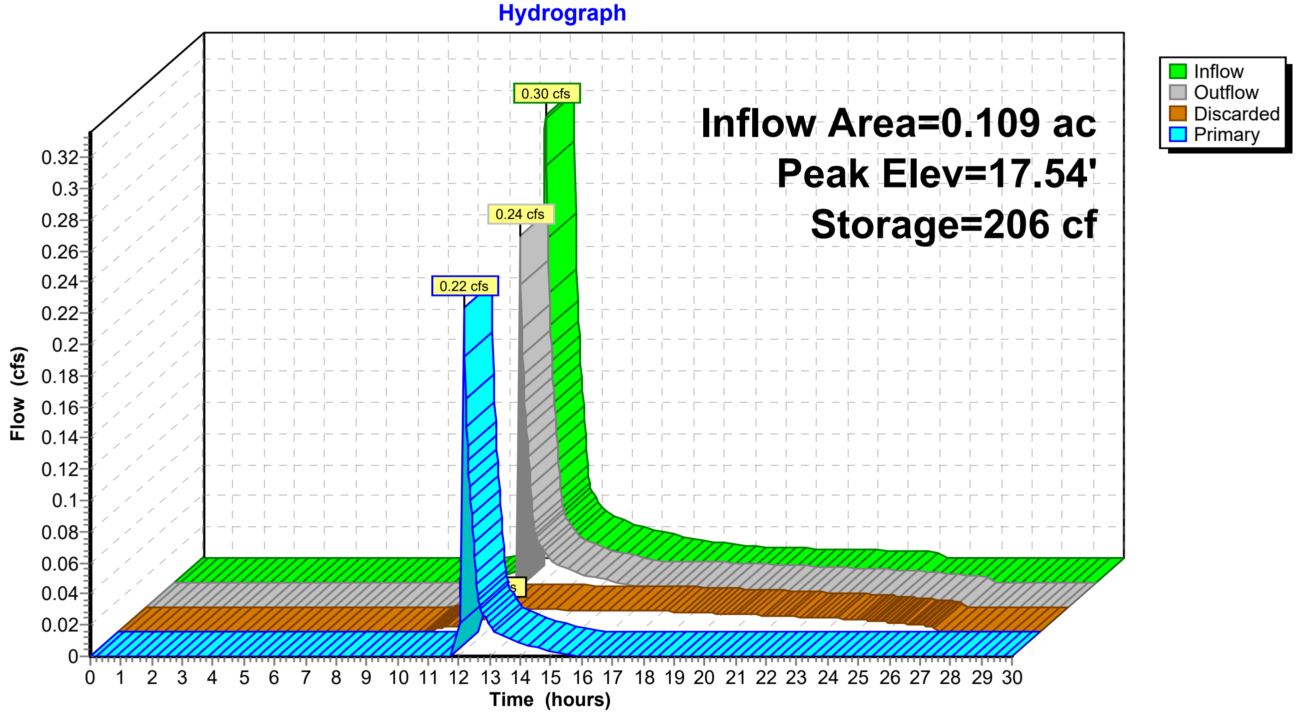
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	144	0	0
17.50	594	185	185
18.00	749	336	520

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**1.020 in/hr Exfiltration over Surface area from 16.90' - 18.00'** Excluded Surface area = 0 sf
#2	Primary	17.50'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.01 cfs @ 12.15 hrs HW=17.54' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.22 cfs @ 12.15 hrs HW=17.54' TW=14.86' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.22 cfs @ 0.62 fps)

Pond 3A-P: Pond 3A



Summary for Pond 3P: Wet Pond

Inflow Area = 7.256 ac, 33.70% Impervious, Inflow Depth = 0.84" for 25-YR MASHPEE ATLAS event
Inflow = 9.98 cfs @ 12.20 hrs, Volume= 0.505 af
Outflow = 0.71 cfs @ 13.80 hrs, Volume= 0.414 af, Atten= 93%, Lag= 95.8 min
Primary = 0.71 cfs @ 13.80 hrs, Volume= 0.414 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 14.98' @ 13.80 hrs Surf.Area= 20,373 sf Storage= 14,406 cf

Plug-Flow detention time= 289.0 min calculated for 0.413 af (82% of inflow)
Center-of-Mass det. time= 252.5 min (1,039.3 - 786.8)

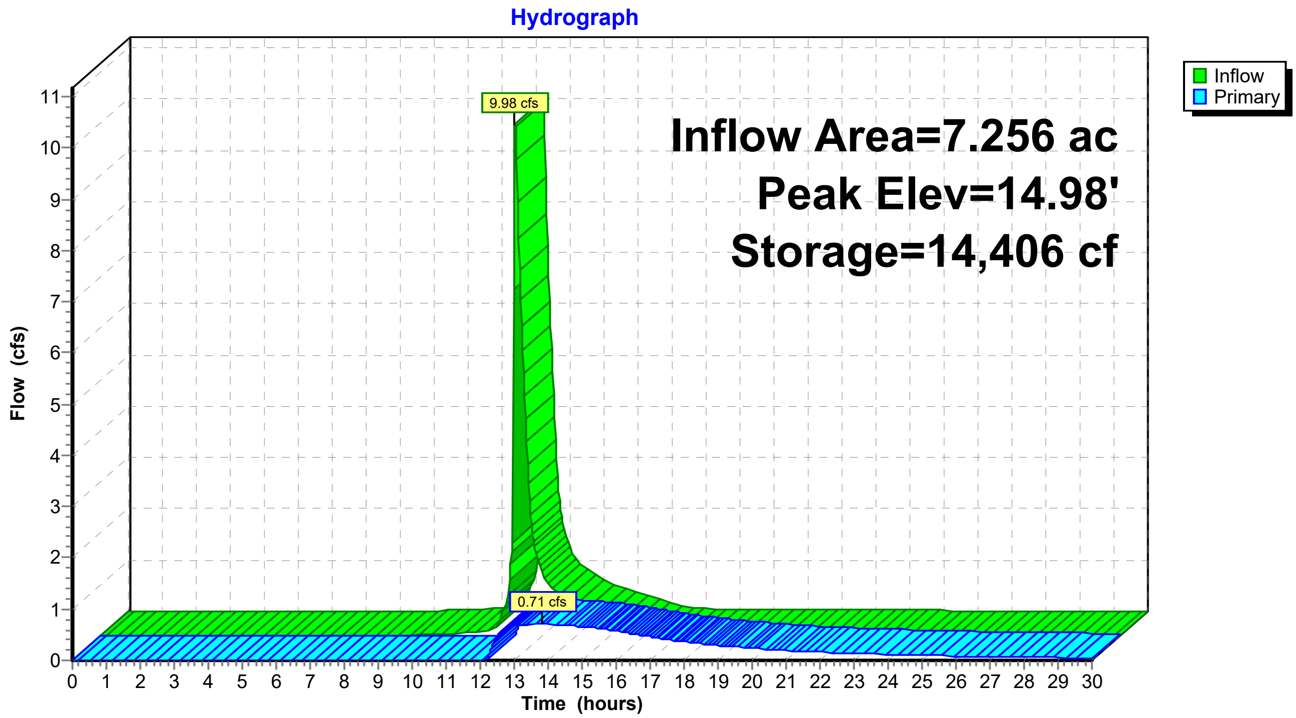
Volume	Invert	Avail.Storage	Storage Description
#1	13.97'	38,017 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
13.97	1	0	0
14.00	56	1	1
14.20	13,319	1,337	1,338
15.00	20,594	13,565	14,904
16.00	25,633	23,114	38,017

Device	Routing	Invert	Outlet Devices
#1	Primary	14.20'	**8.0" Round Culvert** L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 14.20' / 14.20' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Primary	15.75'	**30.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.71 cfs @ 13.80 hrs HW=14.98' TW=14.40' (Dynamic Tailwater)
├─**1=Culvert** (Barrel Controls 0.71 cfs @ 2.19 fps)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Wet Pond



Summary for Pond 4P: Pond 4

Inflow Area =	0.132 ac,	50.76% Impervious, Inflow Depth = 3.76"	for 25-YR MASHPEE ATLAS event	
Inflow =	0.60 cfs @	12.07 hrs, Volume=	0.041 af	
Outflow =	0.60 cfs @	12.08 hrs, Volume=	0.040 af,	Atten= 0%, Lag= 0.3 min
Discarded =	0.01 cfs @	12.08 hrs, Volume=	0.016 af	
Primary =	0.58 cfs @	12.08 hrs, Volume=	0.025 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 18.03' @ 12.08 hrs Surf.Area= 465 sf Storage= 242 cf

Plug-Flow detention time= 112.5 min calculated for 0.040 af (98% of inflow)
Center-of-Mass det. time= 99.7 min (913.0 - 813.3)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	253 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

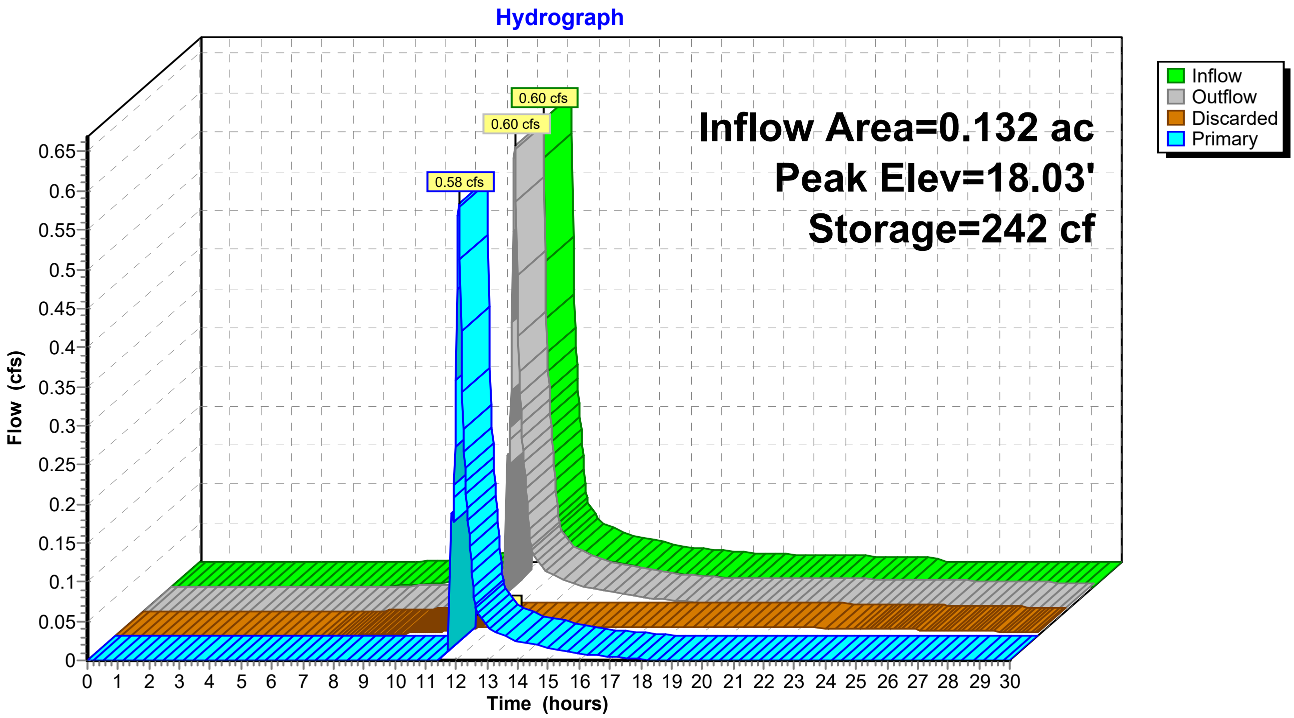
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	10	0	0
18.00	450	230	230
18.05	478	23	253

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**1.020 in/hr Exfiltration over Surface area from 16.90' - 18.05'** Excluded Surface area = 0 sf
#2	Primary	18.00'	**40.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.01 cfs @ 12.08 hrs HW=18.03' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.58 cfs @ 12.08 hrs HW=18.03' TW=14.79' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.58 cfs @ 0.54 fps)

Pond 4P: Pond 4



Summary for Pond 5P: Pond 5

Inflow Area =	0.124 ac,	58.87% Impervious,	Inflow Depth = 3.17"	for 25-YR MASHPEE ATLAS event	
Inflow =	0.47 cfs @	12.08 hrs,	Volume=	0.033 af	
Outflow =	0.47 cfs @	12.08 hrs,	Volume=	0.033 af,	Atten= 0%, Lag= 0.3 min
Discarded =	0.02 cfs @	12.08 hrs,	Volume=	0.018 af	
Primary =	0.46 cfs @	12.08 hrs,	Volume=	0.015 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 19.02' @ 12.08 hrs Surf.Area= 320 sf Storage= 234 cf

Plug-Flow detention time= 110.6 min calculated for 0.033 af (100% of inflow)
Center-of-Mass det. time= 109.3 min (937.4 - 828.0)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	244 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

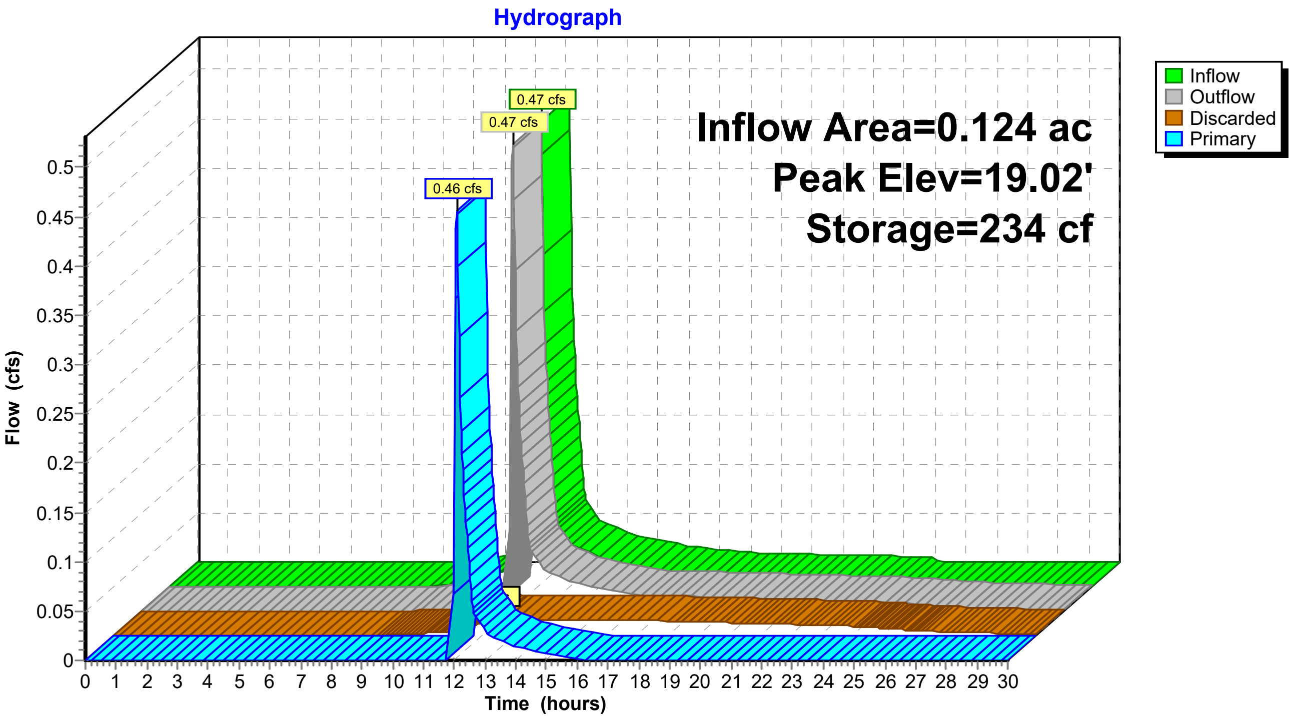
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	1	0	0
18.00	86	44	44
19.00	282	184	228
19.05	366	16	244

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**2.410 in/hr Exfiltration over Surface area from 16.90' - 19.05'** Excluded Surface area = 0 sf
#2	Primary	19.00'	**40.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.02 cfs @ 12.08 hrs HW=19.02' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.45 cfs @ 12.08 hrs HW=19.02' TW=14.79' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.45 cfs @ 0.50 fps)

Pond 5P: Pond 5



Summary for Pond 6P: Pond 6

Inflow Area = 0.088 ac, 17.05% Impervious, Inflow Depth = 0.86" for 25-YR MASHPEE ATLAS event
Inflow = 0.06 cfs @ 12.11 hrs, Volume= 0.006 af
Outflow = 0.01 cfs @ 13.03 hrs, Volume= 0.006 af, Atten= 80%, Lag= 55.3 min
Discarded = 0.01 cfs @ 13.03 hrs, Volume= 0.006 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 18.64' @ 13.03 hrs Surf.Area= 208 sf Storage= 67 cf

Plug-Flow detention time= 66.6 min calculated for 0.006 af (100% of inflow)
Center-of-Mass det. time= 66.5 min (978.1 - 911.6)

Volume	Invert	Avail.Storage	Storage Description
#1	18.00'	182 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

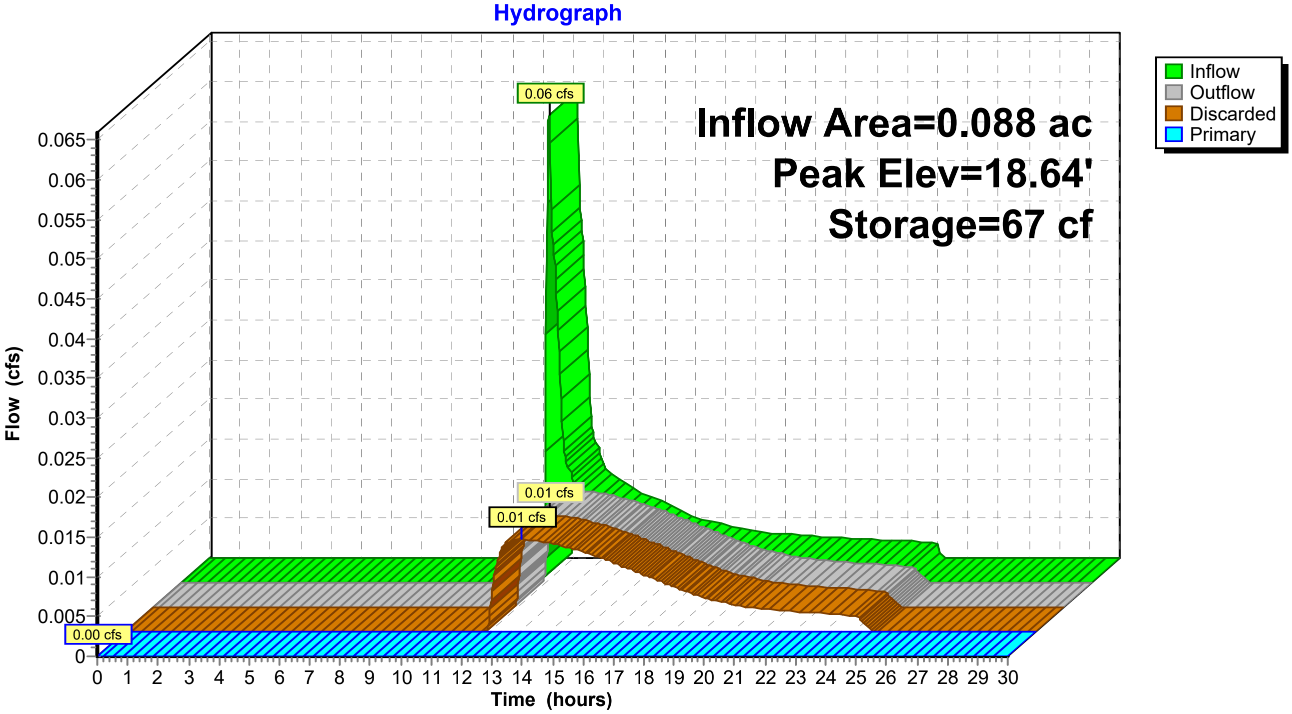
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
18.00	1	0	0
19.00	326	164	164
19.05	394	18	182

Device	Routing	Invert	Outlet Devices
#1	Discarded	18.00'	**2.410 in/hr Exfiltration over Surface area from 17.90' - 19.05'** Excluded Surface area = 0 sf
#2	Primary	19.00'	**40.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.01 cfs @ 13.03 hrs HW=18.64' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=18.00' TW=14.60' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 6P: Pond 6



Summary for Pond 7P: Pond 7

Inflow Area = 0.033 ac, 63.64% Impervious, Inflow Depth = 3.46" for 25-YR MASHPEE ATLAS event
Inflow = 0.14 cfs @ 12.08 hrs, Volume= 0.010 af
Outflow = 0.14 cfs @ 12.08 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.01 cfs @ 12.08 hrs, Volume= 0.006 af
Primary = 0.13 cfs @ 12.08 hrs, Volume= 0.003 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 18.02' @ 12.08 hrs Surf.Area= 144 sf Storage= 82 cf

Plug-Flow detention time= 87.7 min calculated for 0.010 af (100% of inflow)
Center-of-Mass det. time= 87.7 min (908.5 - 820.8)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	87 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

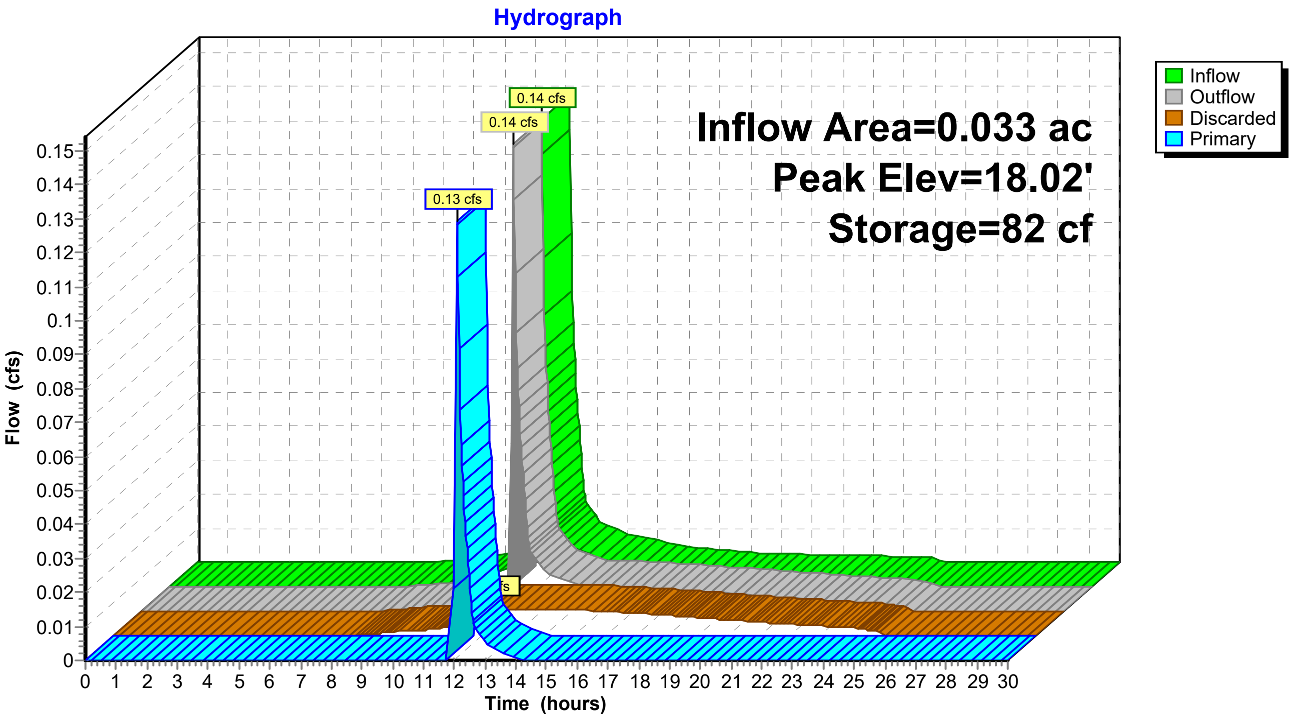
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	23	0	0
18.00	137	80	80
18.05	159	7	87

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**2.410 in/hr Exfiltration over Surface area from 16.90' - 18.05'** Excluded Surface area = 0 sf
#2	Primary	18.00'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.01 cfs @ 12.08 hrs HW=18.02' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.13 cfs @ 12.08 hrs HW=18.02' TW=14.79' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.13 cfs @ 0.41 fps)

Pond 7P: Pond 7



Summary for Pond 8P: Pond 8

Inflow Area = 0.087 ac, 35.63% Impervious, Inflow Depth = 1.91" for 25-YR MASHPEE ATLAS event
Inflow = 0.19 cfs @ 12.08 hrs, Volume= 0.014 af
Outflow = 0.03 cfs @ 12.67 hrs, Volume= 0.014 af, Atten= 84%, Lag= 35.4 min
Discarded = 0.03 cfs @ 12.67 hrs, Volume= 0.014 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 17.36' @ 12.67 hrs Surf.Area= 539 sf Storage= 173 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 45.5 min (907.6 - 862.1)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	622 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

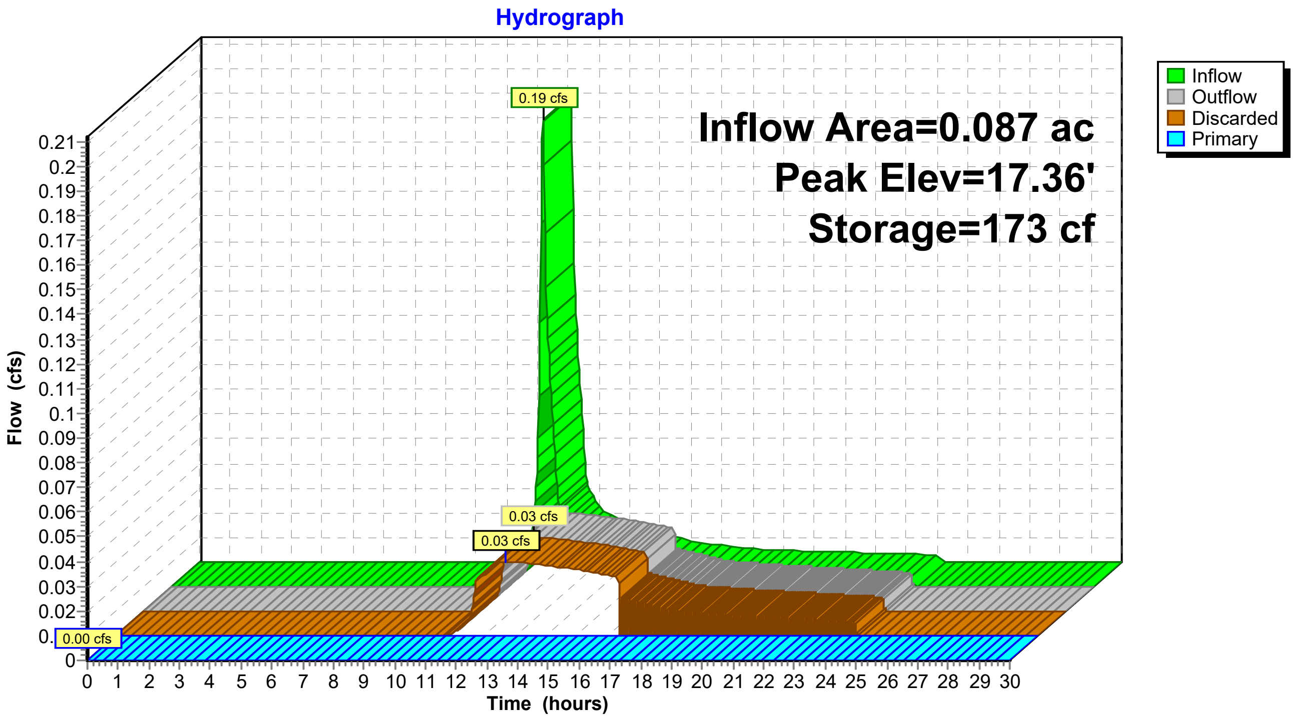
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	426	0	0
18.00	741	584	584
18.05	791	38	622

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**2.410 in/hr Exfiltration over Surface area from 16.90' - 18.00'** Excluded Surface area = 0 sf
#2	Primary	18.00'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.03 cfs @ 12.67 hrs HW=17.36' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=17.00' TW=14.60' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: Pond 8



Summary for Pond FB1: Forebay 1

Inflow Area = 1.040 ac, 55.00% Impervious, Inflow Depth = 2.97" for 25-YR MASHPEE ATLAS event
Inflow = 3.65 cfs @ 12.08 hrs, Volume= 0.257 af
Outflow = 3.31 cfs @ 12.12 hrs, Volume= 0.257 af, Atten= 9%, Lag= 2.5 min
Discarded = 0.09 cfs @ 12.06 hrs, Volume= 0.136 af
Primary = 3.22 cfs @ 12.12 hrs, Volume= 0.121 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 16.71' @ 12.12 hrs Surf.Area= 2,154 sf Storage= 2,435 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 149.0 min (976.4 - 827.4)

Volume	Invert	Avail.Storage	Storage Description
#1	14.90'	3,175 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

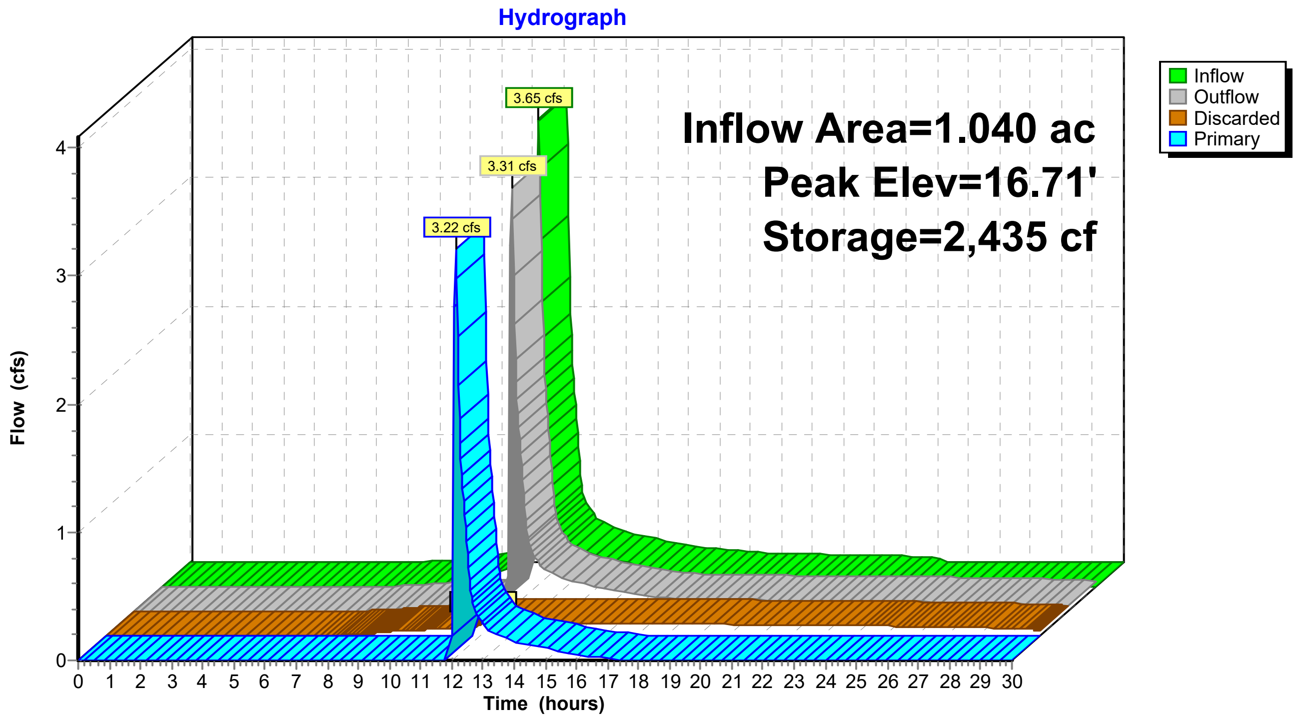
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
14.90	661	0	0
15.00	996	83	83
16.00	1,406	1,201	1,284
16.50	1,633	760	2,044
17.00	2,893	1,132	3,175

Device	Routing	Invert	Outlet Devices
#1	Discarded	14.90'	**2.410 in/hr Exfiltration over Surface area from 14.80' - 16.50'** Excluded Surface area = 0 sf
#2	Primary	16.50'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.09 cfs @ 12.06 hrs HW=16.60' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=3.17 cfs @ 12.12 hrs HW=16.70' TW=16.03' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Weir Controls 3.17 cfs @ 1.55 fps)

Pond FB1: Forebay 1



Summary for Pond FB3: Forebay 3

Inflow Area = 6.795 ac, 31.67% Impervious, Inflow Depth = 1.41" for 25-YR MASHPEE ATLAS event
Inflow = 11.38 cfs @ 12.12 hrs, Volume= 0.798 af
Outflow = 9.15 cfs @ 12.21 hrs, Volume= 0.798 af, Atten= 20%, Lag= 5.1 min
Discarded = 0.39 cfs @ 12.21 hrs, Volume= 0.423 af
Primary = 8.76 cfs @ 12.21 hrs, Volume= 0.376 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 16.20' @ 12.21 hrs Surf.Area= 6,981 sf Storage= 6,855 cf

Plug-Flow detention time= 96.5 min calculated for 0.797 af (100% of inflow)
Center-of-Mass det. time= 96.5 min (928.6 - 832.1)

Volume	Invert	Avail.Storage	Storage Description
#1	15.00'	10,961 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

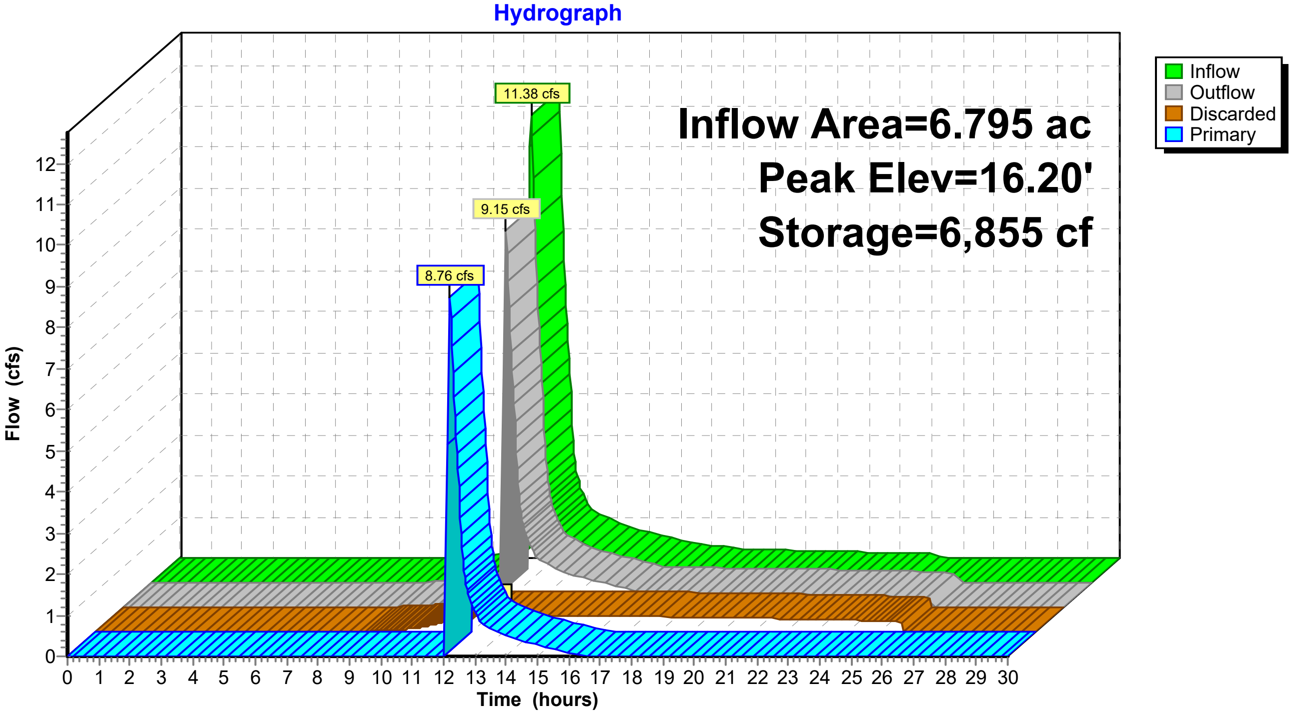
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
15.00	4,358	0	0
16.00	6,677	5,518	5,518
16.75	7,840	5,444	10,961

Device	Routing	Invert	Outlet Devices
#1	Discarded	15.00'	**2.410 in/hr Exfiltration over Surface area from 14.90' - 16.75'** Excluded Surface area = 0 sf
#2	Primary	16.00'	**10.0' long Sharp-Crested Rectangular Weir X 3.00** 2 End Contraction(s) 0.7' Crest Height

Discarded OutFlow Max=0.39 cfs @ 12.21 hrs HW=16.20' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.39 cfs)

Primary OutFlow Max=8.74 cfs @ 12.21 hrs HW=16.20' TW=14.39' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Weir Controls 8.74 cfs @ 1.50 fps)

Pond FB3: Forebay 3



Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentDA-12: AREAS TO WETLAND Runoff Area=0.793 ac 2.90% Impervious Runoff Depth=1.47"
Tc=5.0 min UI Adjusted CN=45 Runoff=1.14 cfs 0.097 af

SubcatchmentDA-1A: AREA TO CB'S 3 Runoff Area=0.252 ac 59.92% Impervious Runoff Depth=4.47"
Tc=5.0 min CN=74 Runoff=1.36 cfs 0.094 af

SubcatchmentDA-1B: AREA TO CB'S 1 Runoff Area=0.432 ac 70.60% Impervious Runoff Depth=5.26"
Tc=5.0 min CN=81 Runoff=2.70 cfs 0.189 af

SubcatchmentDA-1C: AREA TO FB1 Runoff Area=0.356 ac 32.58% Impervious Runoff Depth=2.75"
Tc=5.0 min CN=58 Runoff=1.14 cfs 0.082 af

SubcatchmentDA-2: END OF ROAD TO Runoff Area=0.536 ac 58.02% Impervious Runoff Depth=4.36"
Flow Length=250' Tc=6.2 min CN=73 Runoff=2.71 cfs 0.195 af

SubcatchmentDA-3: AREAS TO WEST Runoff Area=0.109 ac 21.10% Impervious Runoff Depth=3.49"
Tc=5.0 min UI Adjusted CN=65 Runoff=0.45 cfs 0.032 af

SubcatchmentDA-4: AREAS TO WEST Runoff Area=0.132 ac 50.76% Impervious Runoff Depth=5.15"
Tc=5.0 min CN=80 Runoff=0.81 cfs 0.057 af

SubcatchmentDA-5: AREAS TO WEST Runoff Area=0.124 ac 58.87% Impervious Runoff Depth=4.47"
Tc=5.0 min CN=74 Runoff=0.67 cfs 0.046 af

SubcatchmentDA-6: AREAS TO WEST Runoff Area=0.088 ac 17.05% Impervious Runoff Depth=1.57"
Tc=5.0 min UI Adjusted CN=46 Runoff=0.14 cfs 0.011 af

SubcatchmentDA-7: AREAS TO WEST Runoff Area=0.033 ac 63.64% Impervious Runoff Depth=4.81"
Tc=5.0 min CN=77 Runoff=0.19 cfs 0.013 af

SubcatchmentDA-8: AREAS TO WEST Runoff Area=0.087 ac 35.63% Impervious Runoff Depth=2.96"
Tc=5.0 min CN=60 Runoff=0.30 cfs 0.021 af

SubcatchmentDA-9: AREAS EAST OF Runoff Area=0.558 ac 65.23% Impervious Runoff Depth=4.81"
Tc=5.0 min CN=77 Runoff=3.22 cfs 0.224 af

SubcatchmentDA22A: QUIN AVE SOUTH Runoff Area=0.461 ac 63.56% Impervious Runoff Depth=4.70"
Flow Length=1,172' Tc=6.9 min CN=76 Runoff=2.44 cfs 0.180 af

SubcatchmentDA22B: QUIN AVE WEST Runoff Area=1.335 ac 43.37% Impervious Runoff Depth=3.49"
Flow Length=1,473' Tc=8.8 min CN=65 Runoff=4.91 cfs 0.388 af

SubcatchmentDA44: North of Quin Runoff Area=0.841 ac 0.00% Impervious Runoff Depth=0.43"
Tc=5.0 min CN=32 Runoff=0.11 cfs 0.030 af

SubcatchmentDA55: AREAS TO CB'S AT Runoff Area=0.641 ac 50.86% Impervious Runoff Depth=3.92"
Tc=5.0 min CN=69 Runoff=3.02 cfs 0.209 af

Subcatchment DA77: AREAS TO WETLAND Runoff Area=1.844 ac 0.00% Impervious Runoff Depth=0.43"
Flow Length=431' Tc=26.3 min CN=32 Runoff=0.18 cfs 0.066 af

Reach R1: Tt along stream Avg. Flow Depth=0.39' Max Vel=0.89 fps Inflow=3.18 cfs 0.184 af
n=0.040 L=550.0' S=0.0035 '/' Capacity=69.34 cfs Outflow=2.06 cfs 0.184 af

Reach R1A: Tt thru bogs Avg. Flow Depth=0.28' Max Vel=0.78 fps Inflow=1.29 cfs 0.829 af
n=0.040 L=520.0' S=0.0029 '/' Capacity=50.84 cfs Outflow=1.29 cfs 0.826 af

Reach R2: Tt thru da77 Avg. Flow Depth=0.24' Max Vel=1.19 fps Inflow=7.71 cfs 0.550 af
n=0.030 L=210.0' S=0.0095 '/' Capacity=50.53 cfs Outflow=7.21 cfs 0.550 af

Reach R2A: Travel Time thru wet pond Avg. Flow Depth=0.31' Max Vel=3.77 fps Inflow=2.44 cfs 0.180 af
n=0.025 L=255.0' S=0.0267 '/' Capacity=13.24 cfs Outflow=2.41 cfs 0.180 af

Reach R3: 18" CPP Avg. Flow Depth=1.01' Max Vel=3.18 fps Inflow=4.06 cfs 0.283 af
18.0" Round Pipe n=0.012 L=81.0' S=0.0020 '/' Capacity=5.06 cfs Outflow=4.04 cfs 0.283 af

Reach R5: Tt thru da22B Avg. Flow Depth=0.13' Max Vel=2.46 fps Inflow=2.97 cfs 0.162 af
n=0.013 L=246.0' S=0.0146 '/' Capacity=75.75 cfs Outflow=2.88 cfs 0.162 af

Reach SP#1: Study Point Combined Flows Inflow=2.09 cfs 1.010 af
Outflow=2.09 cfs 1.010 af

Pond 1P: LB's Peak Elev=20.74' Storage=508 cf Inflow=3.02 cfs 0.209 af
Discarded=0.03 cfs 0.047 af Primary=2.97 cfs 0.162 af Outflow=3.00 cfs 0.209 af

Pond 2P: Natural Low Area Peak Elev=16.90' Storage=293 cf Inflow=0.11 cfs 0.030 af
Discarded=0.04 cfs 0.030 af Primary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.030 af

Pond 3A-P: Pond 3A Peak Elev=17.56' Storage=218 cf Inflow=0.45 cfs 0.032 af
Discarded=0.01 cfs 0.016 af Primary=0.43 cfs 0.016 af Outflow=0.45 cfs 0.032 af

Pond 3P: Wet Pond Peak Elev=15.48' Storage=25,458 cf Inflow=18.30 cfs 0.934 af
Outflow=1.29 cfs 0.829 af

Pond 4P: Pond 4 Peak Elev=18.03' Storage=245 cf Inflow=0.81 cfs 0.057 af
Discarded=0.01 cfs 0.017 af Primary=0.80 cfs 0.039 af Outflow=0.81 cfs 0.055 af

Pond 5P: Pond 5 Peak Elev=19.03' Storage=236 cf Inflow=0.67 cfs 0.046 af
Discarded=0.02 cfs 0.020 af Primary=0.65 cfs 0.026 af Outflow=0.67 cfs 0.046 af

Pond 6P: Pond 6 Peak Elev=19.00' Storage=163 cf Inflow=0.14 cfs 0.011 af
Discarded=0.02 cfs 0.011 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.011 af

Pond 7P: Pond 7 Peak Elev=18.02' Storage=83 cf Inflow=0.19 cfs 0.013 af
Discarded=0.01 cfs 0.008 af Primary=0.18 cfs 0.006 af Outflow=0.19 cfs 0.013 af

Pond 8P: Pond 8 Peak Elev=17.63' Storage=331 cf Inflow=0.30 cfs 0.021 af
Discarded=0.03 cfs 0.021 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.021 af

Pond FB1: Forebay 1 Peak Elev=16.77' Storage=2,579 cf Inflow=5.18 cfs 0.365 af
Discarded=0.09 cfs 0.146 af Primary=4.89 cfs 0.214 af Outflow=4.98 cfs 0.360 af

Pond FB3: Forebay 3 Peak Elev=16.29' Storage=7,519 cf Inflow=16.96 cfs 1.248 af
Discarded=0.40 cfs 0.494 af Primary=16.00 cfs 0.754 af Outflow=16.40 cfs 1.248 af

Total Runoff Area = 8.622 ac Runoff Volume = 1.935 af Average Runoff Depth = 2.69"
68.71% Pervious = 5.924 ac 31.29% Impervious = 2.698 ac

Summary for Subcatchment DA-12: AREAS TO WETLAND TO WEST

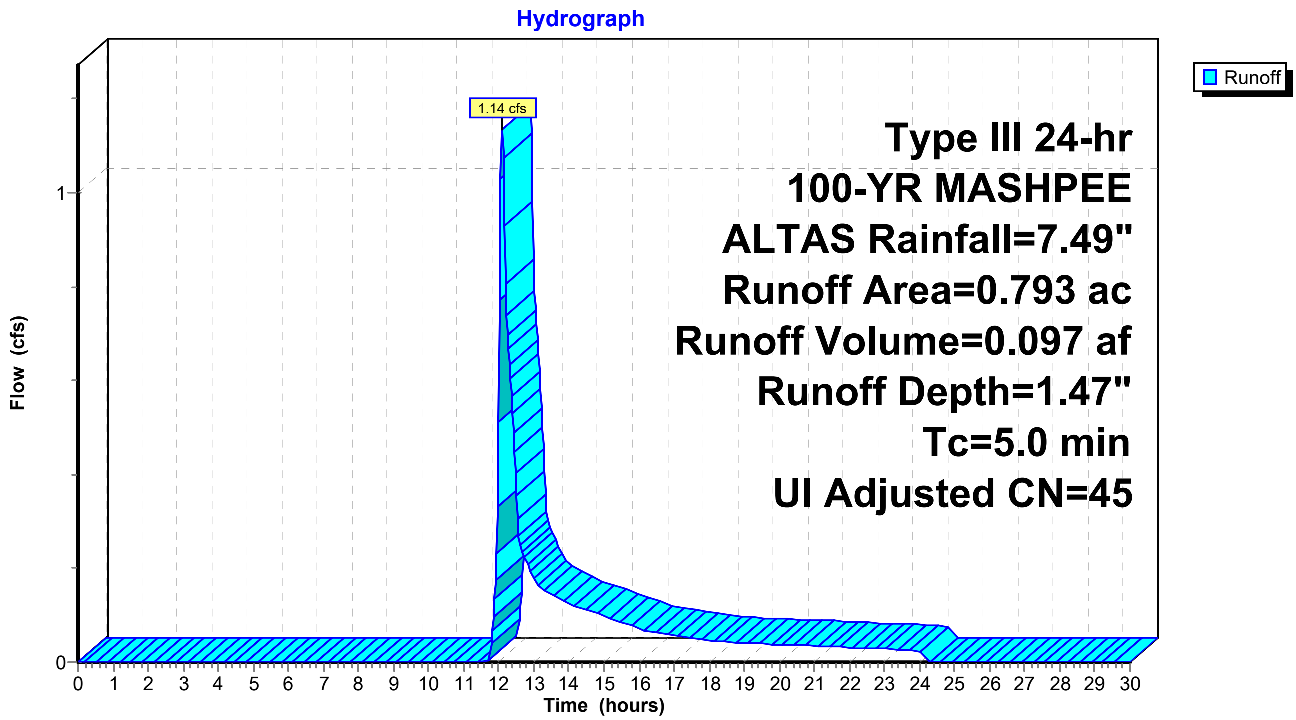
Runoff = 1.14 cfs @ 12.09 hrs, Volume= 0.097 af, Depth= 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Adj	Description
0.090	39		>75% Grass cover, Good, HSG A
0.318	30		Woods, Good, HSG A
0.023	76		Gravel roads, HSG A
0.023	98		Unconnected pavement, HSG B
0.317	55		Woods, Good, HSG B
0.022	85		Gravel roads, HSG B
0.793	46	45	Weighted Average, UI Adjusted
0.770			97.10% Pervious Area
0.023			2.90% Impervious Area
0.023			100.00% Unconnected

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

Subcatchment DA-12: AREAS TO WETLAND TO WEST



Summary for Subcatchment DA-1A: AREA TO CB'S 3 AND 4

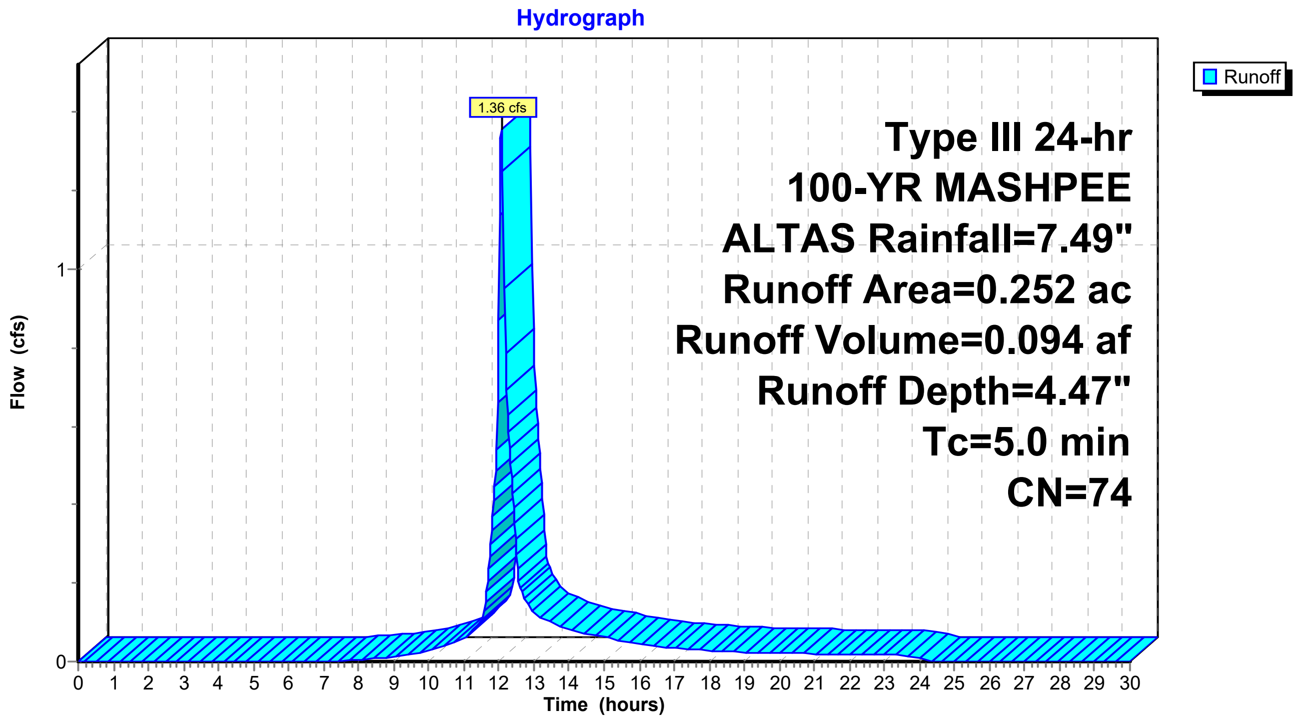
Runoff = 1.36 cfs @ 12.07 hrs, Volume= 0.094 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.101	39	>75% Grass cover, Good, HSG A
0.109	98	Unconnected pavement, HSG A
0.042	98	Roofs, HSG B
0.252	74	Weighted Average
0.101		40.08% Pervious Area
0.151		59.92% Impervious Area
0.109		72.19% Unconnected

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

Subcatchment DA-1A: AREA TO CB'S 3 AND 4



Summary for Subcatchment DA-1B: AREA TO CB'S 1 AND 2

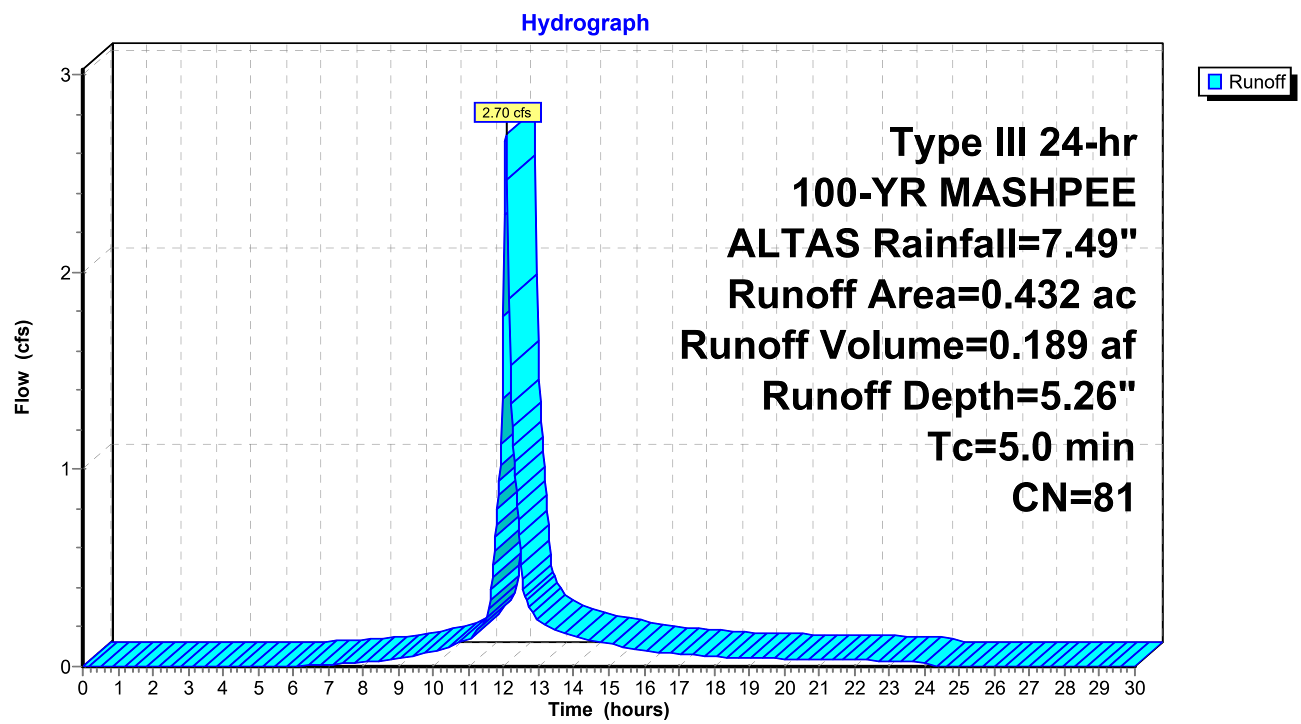
Runoff = 2.70 cfs @ 12.07 hrs, Volume= 0.189 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.137	98	Unconnected pavement, HSG A
0.127	39	Pasture/grassland/range, Good, HSG A
0.168	98	Roofs, HSG A
0.432	81	Weighted Average
0.127		29.40% Pervious Area
0.305		70.60% Impervious Area
0.137		44.92% Unconnected

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

Subcatchment DA-1B: AREA TO CB'S 1 AND 2



Summary for Subcatchment DA-1C: AREA TO FB1

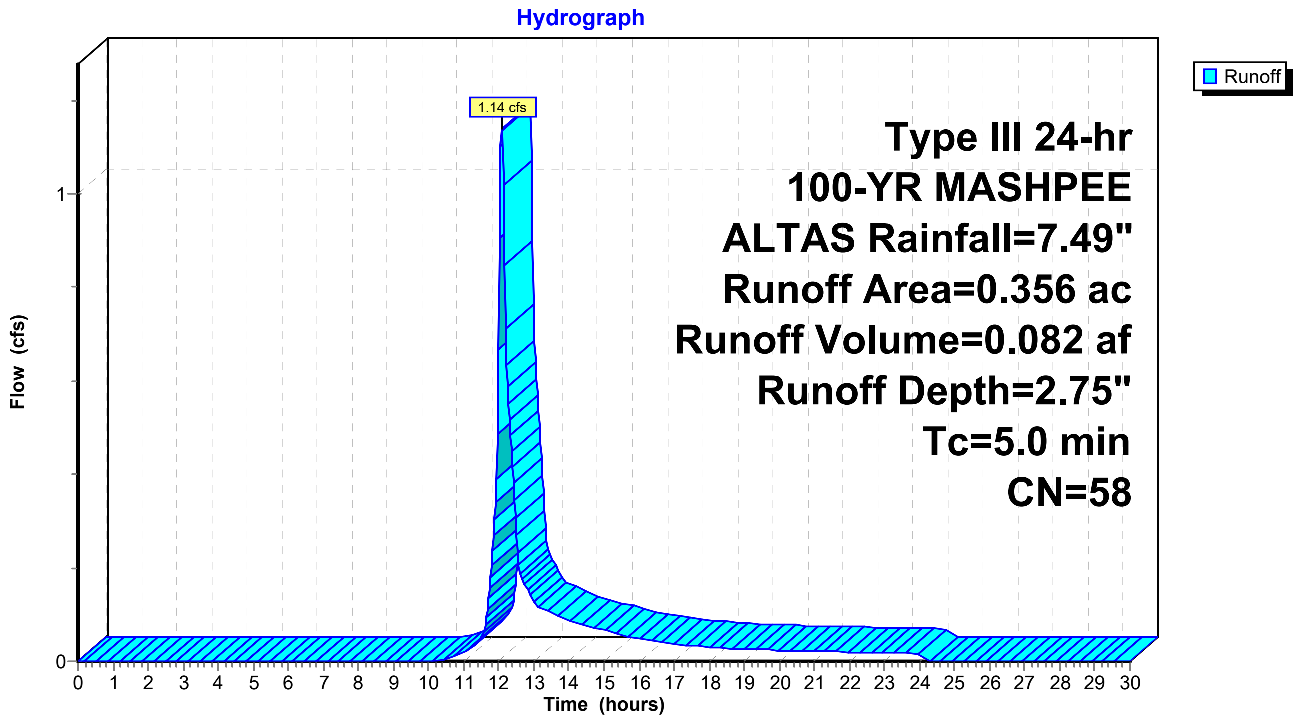
Runoff = 1.14 cfs @ 12.08 hrs, Volume= 0.082 af, Depth= 2.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.240	39	>75% Grass cover, Good, HSG A
0.074	98	Unconnected pavement, HSG A
0.042	98	Roofs, HSG B
0.356	58	Weighted Average
0.240		67.42% Pervious Area
0.116		32.58% Impervious Area
0.074		63.79% Unconnected

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

Subcatchment DA-1C: AREA TO FB1



Summary for Subcatchment DA-2: END OF ROAD TO THE EAST

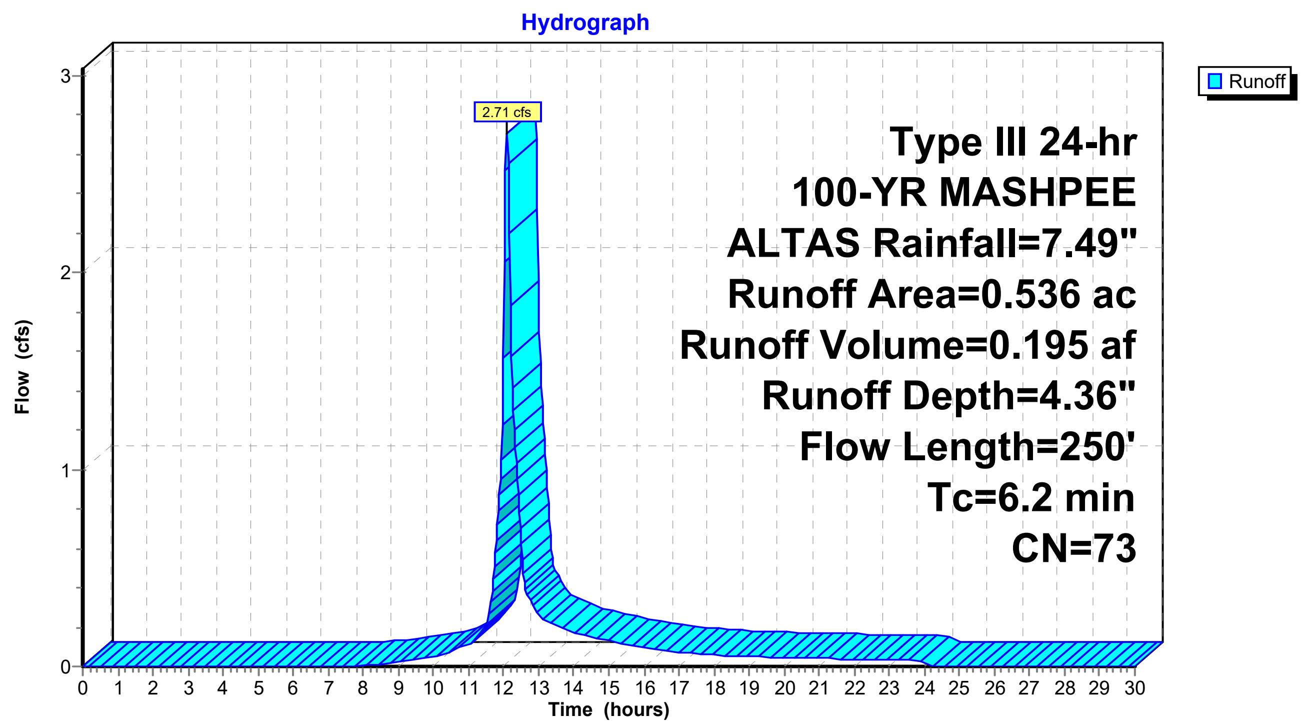
Runoff = 2.71 cfs @ 12.09 hrs, Volume= 0.195 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.225	39	>75% Grass cover, Good, HSG A
0.181	98	Unconnected pavement, HSG A
0.130	98	Roofs, HSG A
0.536	73	Weighted Average
0.225		41.98% Pervious Area
0.311		58.02% Impervious Area
0.181		58.20% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	30	0.0200	0.10		**Sheet Flow, LAWN** Grass: Dense n= 0.240 P2= 3.55"
0.5	80	0.0200	2.87		**Shallow Concentrated Flow, ROAD** Paved Kv= 20.3 fps
0.5	140	0.0100	4.91	3.86	**Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
6.2	250	Total			

Subcatchment DA-2: END OF ROAD TO THE EAST



Summary for Subcatchment DA-3: AREAS TO WEST

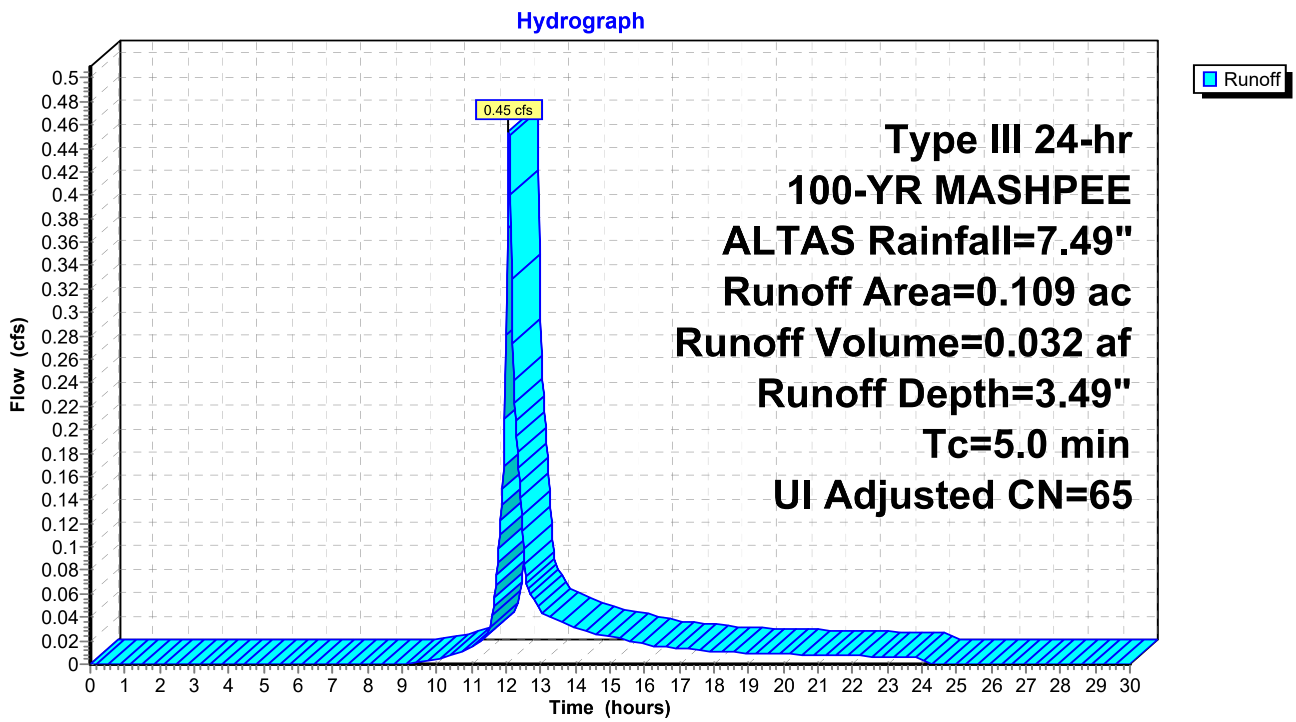
Runoff = 0.45 cfs @ 12.08 hrs, Volume= 0.032 af, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Adj	Description
0.086	61		>75% Grass cover, Good, HSG B
0.023	98		Unconnected pavement, HSG B
0.109	69	65	Weighted Average, UI Adjusted
0.086			78.90% Pervious Area
0.023			21.10% Impervious Area
0.023			100.00% Unconnected

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

Subcatchment DA-3: AREAS TO WEST



Summary for Subcatchment DA-4: AREAS TO WEST

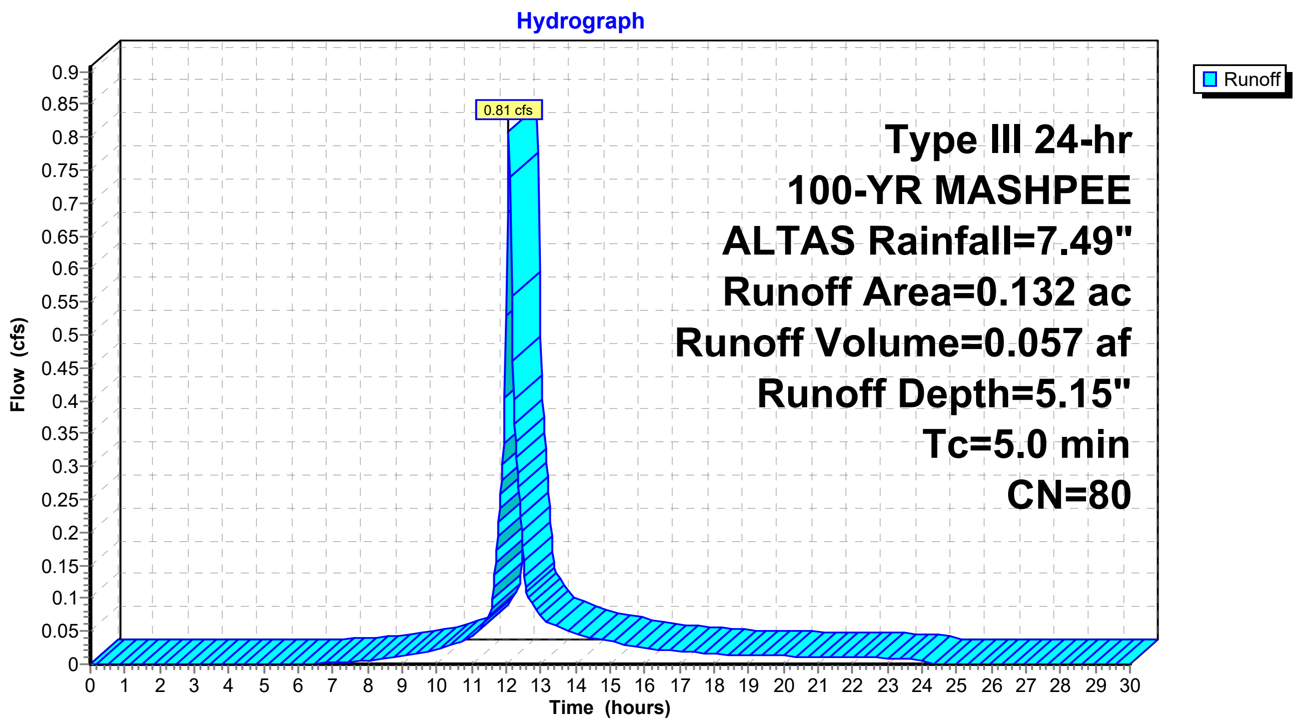
Runoff = 0.81 cfs @ 12.07 hrs, Volume= 0.057 af, Depth= 5.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.065	61	>75% Grass cover, Good, HSG B
0.067	98	Unconnected pavement, HSG B
0.132	80	Weighted Average
0.065		49.24% Pervious Area
0.067		50.76% Impervious Area
0.067		100.00% Unconnected

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

Subcatchment DA-4: AREAS TO WEST



Summary for Subcatchment DA-5: AREAS TO WEST

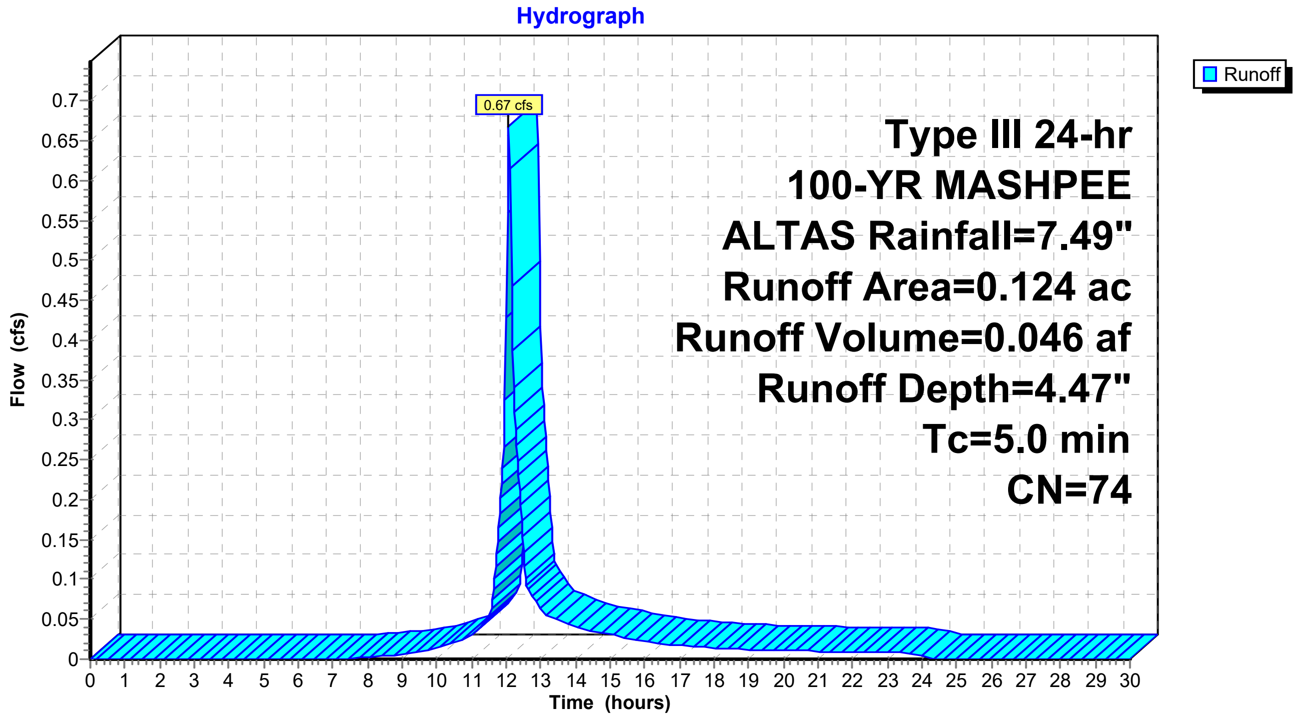
Runoff = 0.67 cfs @ 12.07 hrs, Volume= 0.046 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.051	39	>75% Grass cover, Good, HSG A
0.073	98	Unconnected pavement, HSG A
0.124	74	Weighted Average
0.051		41.13% Pervious Area
0.073		58.87% Impervious Area
0.073		100.00% Unconnected

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

Subcatchment DA-5: AREAS TO WEST



Summary for Subcatchment DA-6: AREAS TO WEST

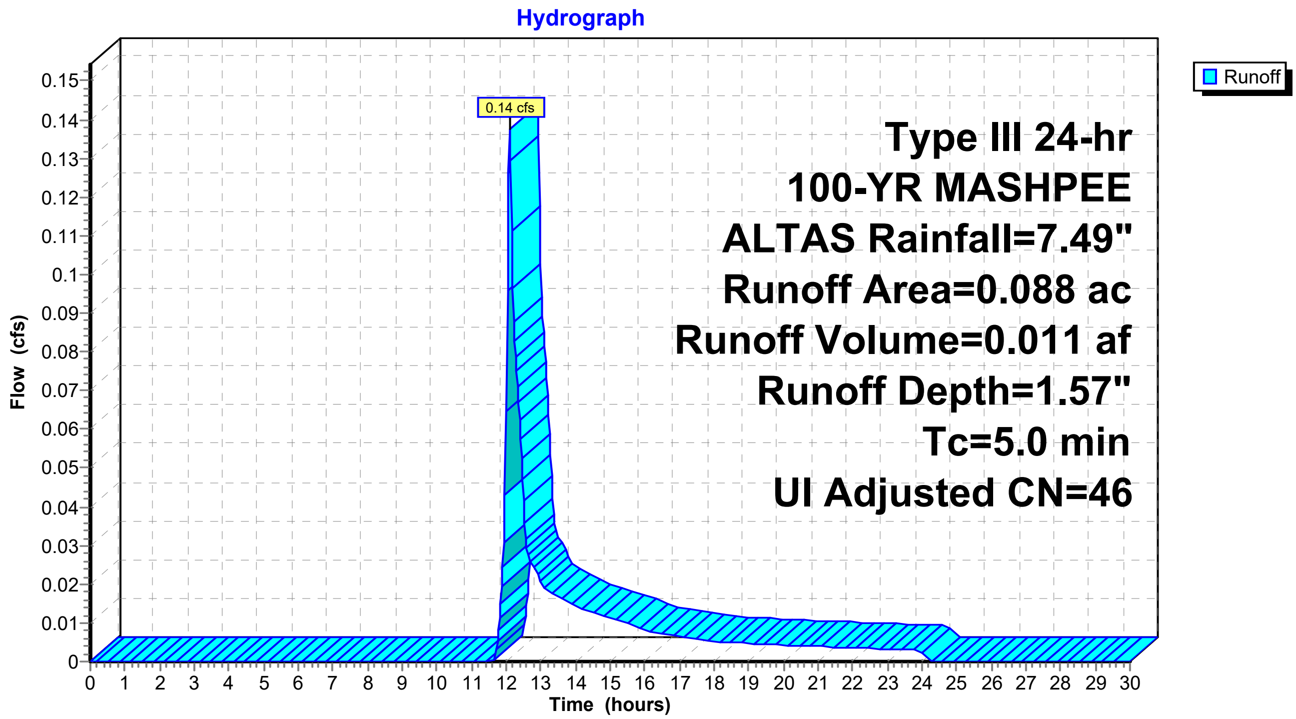
Runoff = 0.14 cfs @ 12.09 hrs, Volume= 0.011 af, Depth= 1.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Adj	Description
0.073	39		>75% Grass cover, Good, HSG A
0.008	98		Unconnected pavement, HSG A
0.007	98		Roofs, HSG A
0.088	49	46	Weighted Average, UI Adjusted
0.073			82.95% Pervious Area
0.015			17.05% Impervious Area
0.008			53.33% Unconnected

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

Subcatchment DA-6: AREAS TO WEST



Summary for Subcatchment DA-7: AREAS TO WEST

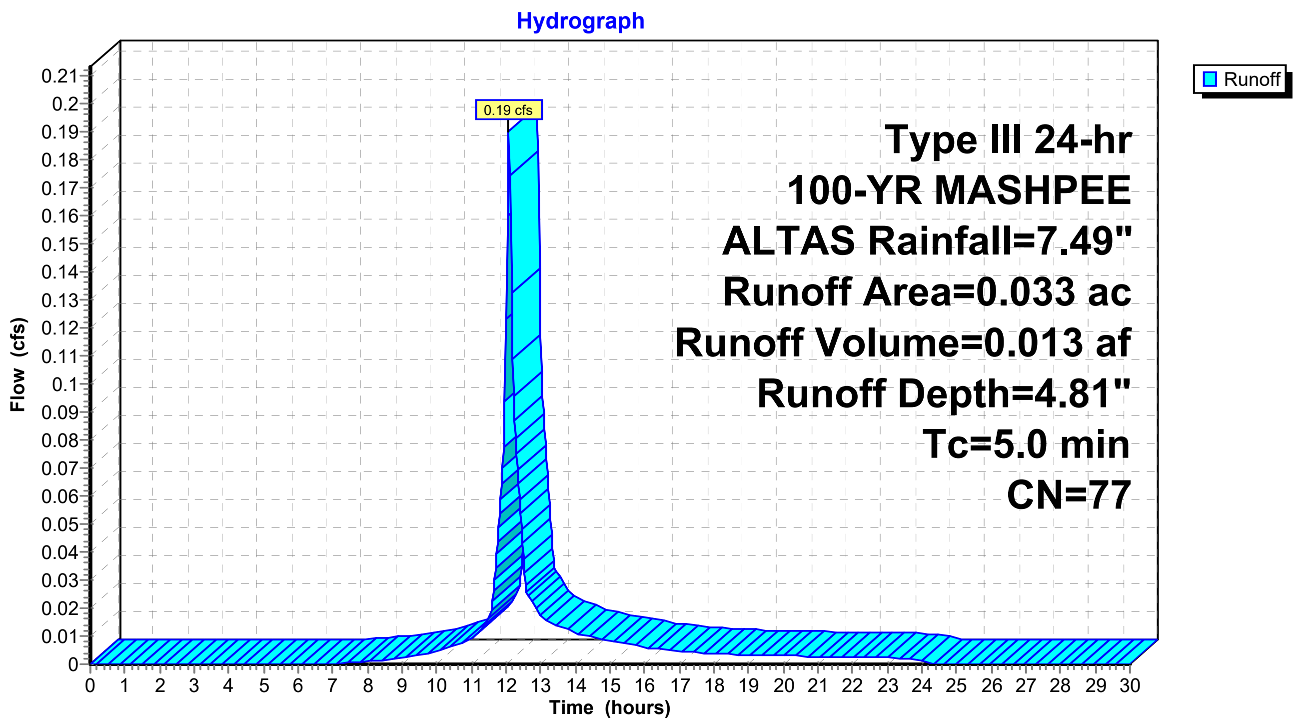
Runoff = 0.19 cfs @ 12.07 hrs, Volume= 0.013 af, Depth= 4.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.012	39	>75% Grass cover, Good, HSG A
0.021	98	Unconnected pavement, HSG A
0.033	77	Weighted Average
0.012		36.36% Pervious Area
0.021		63.64% Impervious Area
0.021		100.00% Unconnected

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

Subcatchment DA-7: AREAS TO WEST



Summary for Subcatchment DA-8: AREAS TO WEST

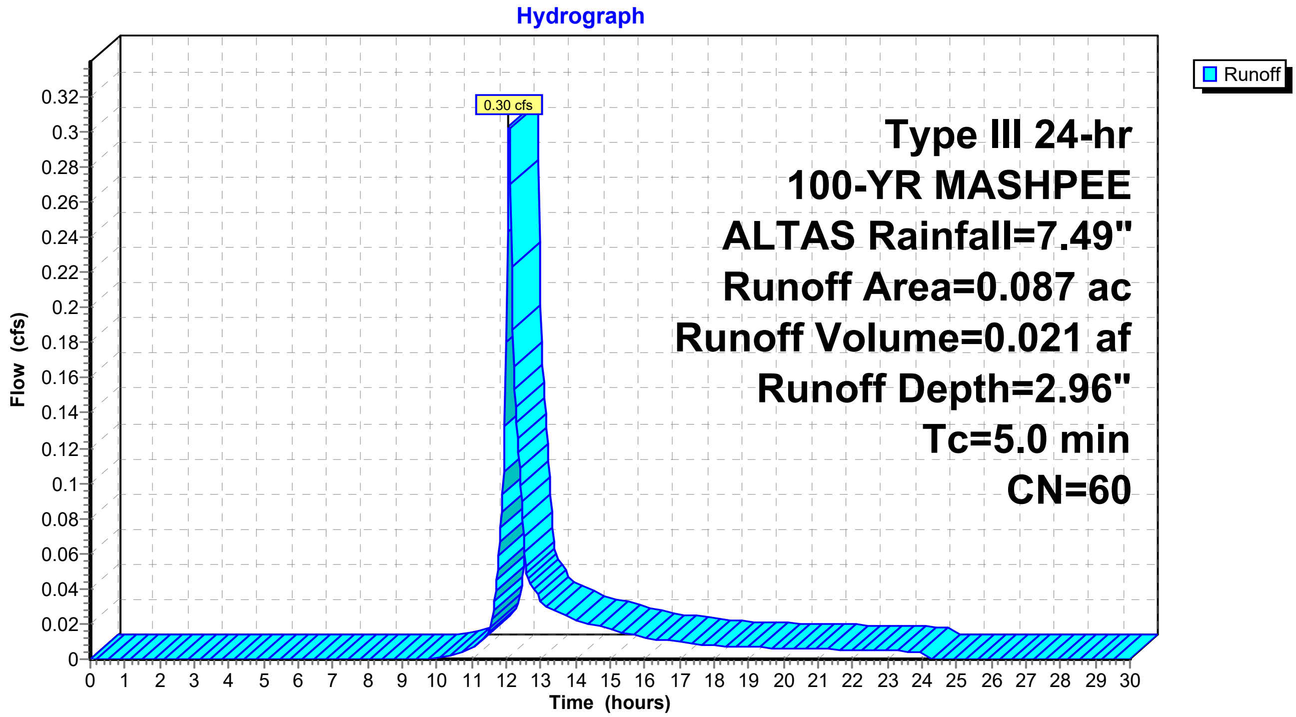
Runoff = 0.30 cfs @ 12.08 hrs, Volume= 0.021 af, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.056	39	>75% Grass cover, Good, HSG A
0.031	98	Unconnected pavement, HSG A
0.087	60	Weighted Average
0.056		64.37% Pervious Area
0.031		35.63% Impervious Area
0.031		100.00% Unconnected

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

Subcatchment DA-8: AREAS TO WEST



Summary for Subcatchment DA-9: AREAS EAST OF ROAD

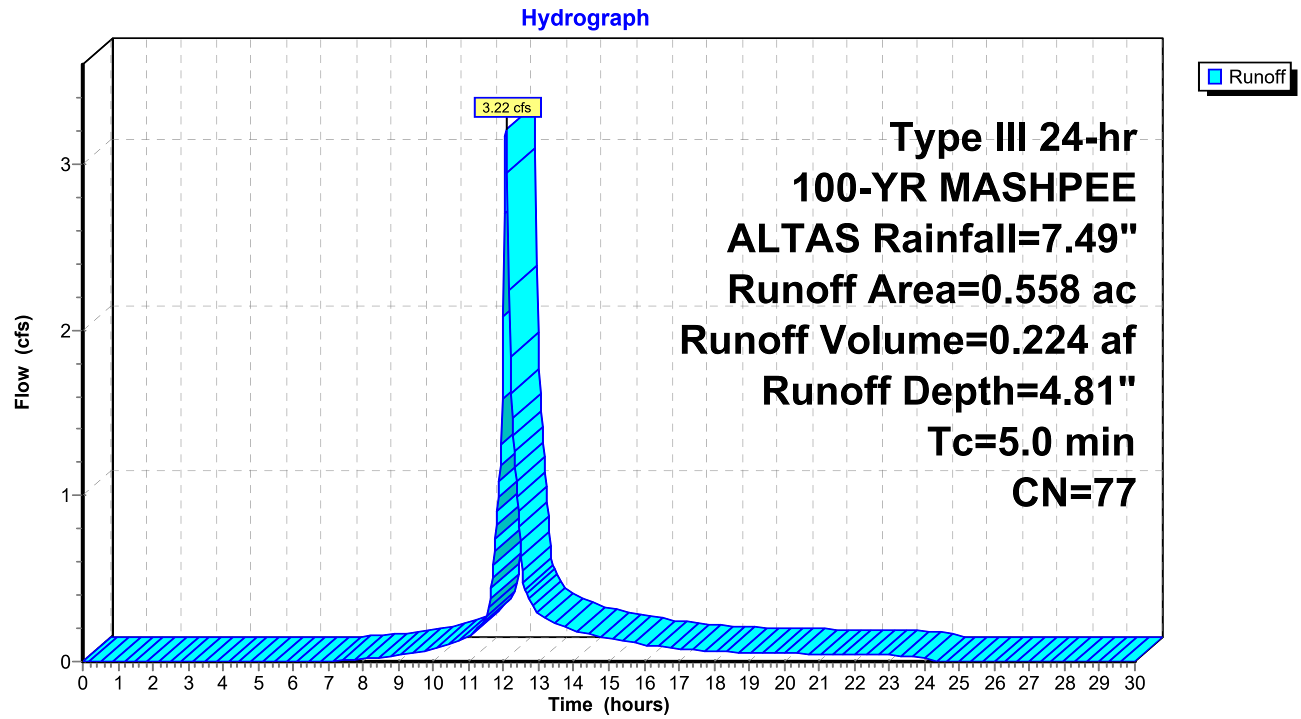
Runoff = 3.22 cfs @ 12.07 hrs, Volume= 0.224 af, Depth= 4.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.194	39	>75% Grass cover, Good, HSG A
0.154	98	Unconnected pavement, HSG A
0.210	98	Roofs, HSG A
0.558	77	Weighted Average
0.194		34.77% Pervious Area
0.364		65.23% Impervious Area
0.154		42.31% Unconnected

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

Subcatchment DA-9: AREAS EAST OF ROAD



Summary for Subcatchment DA22A: QUIN AVE SOUTH AREA TO WET POND

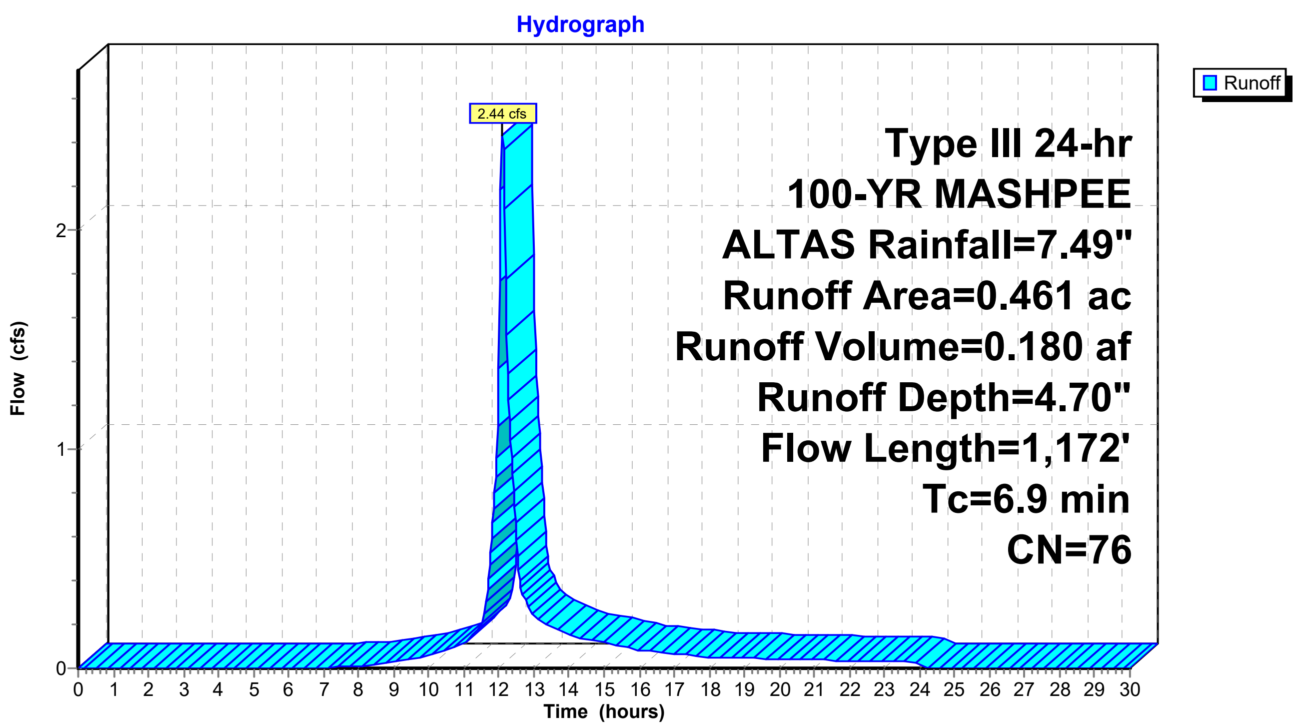
Runoff = 2.44 cfs @ 12.10 hrs, Volume= 0.180 af, Depth= 4.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.293	98	Unconnected pavement, HSG A
0.168	39	>75% Grass cover, Good, HSG A
0.461	76	Weighted Average
0.168		36.44% Pervious Area
0.293		63.56% Impervious Area
0.293		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.96		**Sheet Flow, A** Smooth surfaces n= 0.011 P2= 3.55"
6.0	1,122	0.0236	3.12		**Shallow Concentrated Flow, B** Paved Kv= 20.3 fps
6.9	1,172	Total			

Subcatchment DA22A: QUIN AVE SOUTH AREA TO WET POND



Summary for Subcatchment DA22B: QUIN AVE WEST AND NORTH AREA TO FOREBAY 3

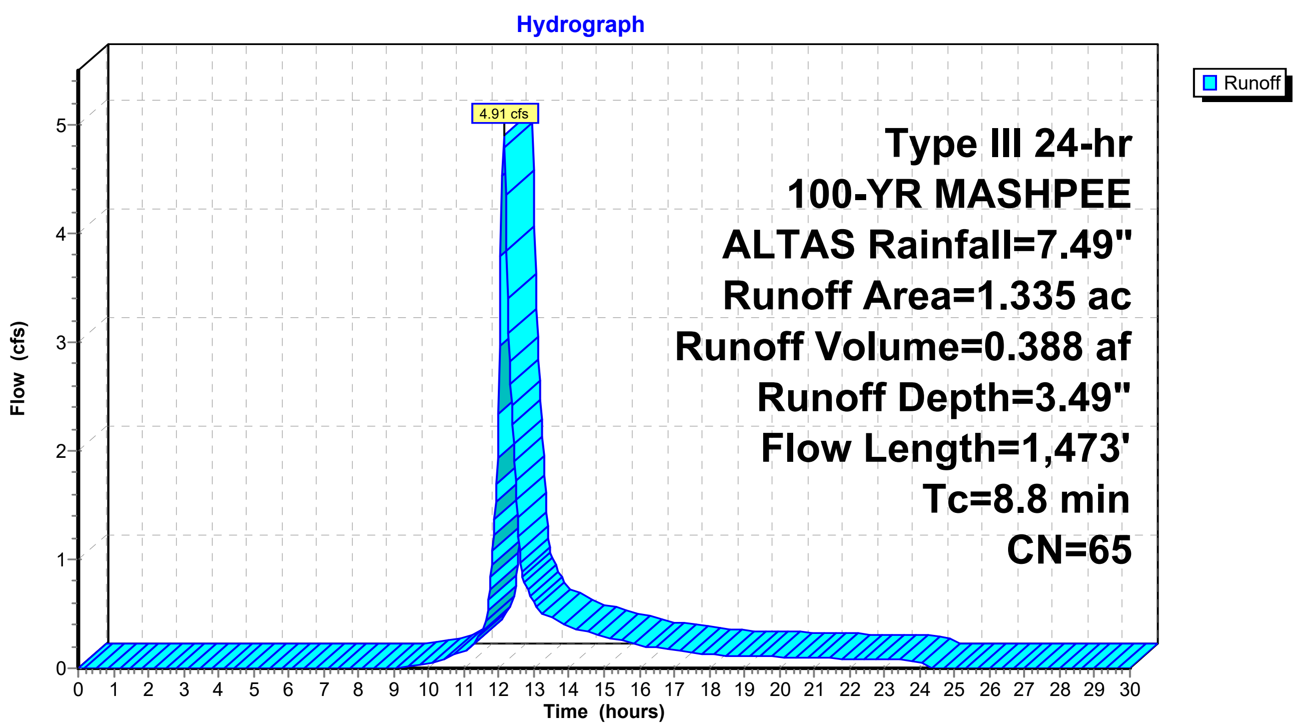
Runoff = 4.91 cfs @ 12.13 hrs, Volume= 0.388 af, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.579	98	Unconnected pavement, HSG A
0.756	39	>75% Grass cover, Good, HSG A
1.335	65	Weighted Average
0.756		56.63% Pervious Area
0.579		43.37% Impervious Area
0.579		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.96		**Sheet Flow, A**
					Smooth surfaces n= 0.011 P2= 3.55"
7.9	1,423	0.0220	3.01		**Shallow Concentrated Flow, B**
					Paved Kv= 20.3 fps
8.8	1,473	Total			

Subcatchment DA22B: QUIN AVE WEST AND NORTH AREA TO FOREBAY 3



Summary for Subcatchment DA44: North of Quin

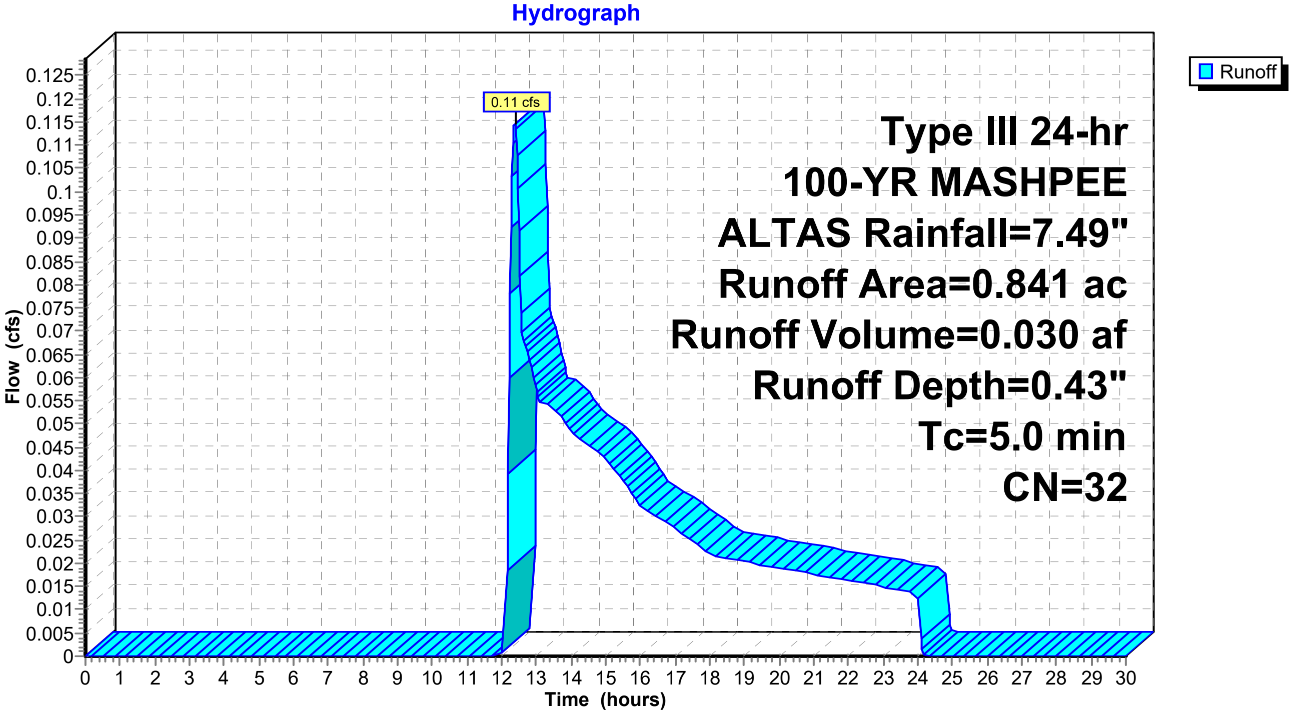
Runoff = 0.11 cfs @ 12.38 hrs, Volume= 0.030 af, Depth= 0.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.841	32	Woods/grass comb., Good, HSG A
0.841		100.00% Pervious Area

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

Subcatchment DA44: North of Quin



Summary for Subcatchment DA55: AREAS TO CB'S AT WILLOWBEND DR

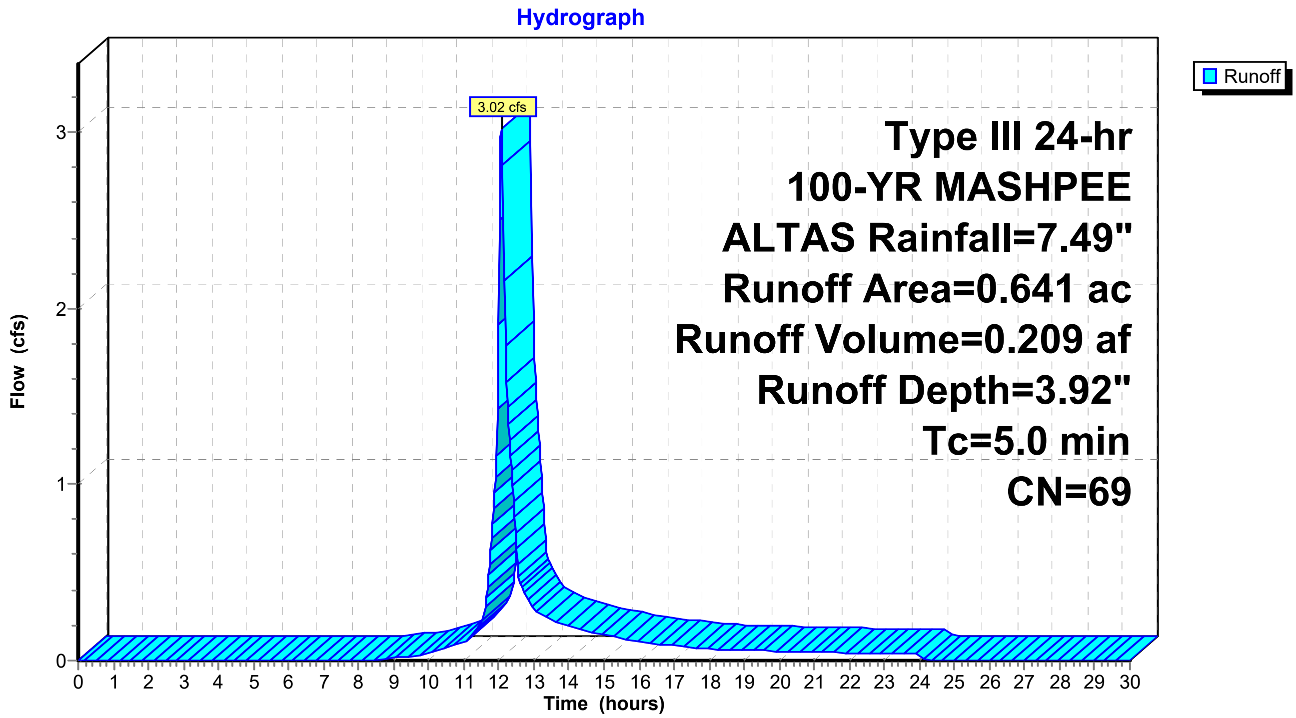
Runoff = 3.02 cfs @ 12.08 hrs, Volume= 0.209 af, Depth= 3.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.326	98	Paved parking, HSG A
0.315	39	Pasture/grassland/range, Good, HSG A
0.641	69	Weighted Average
0.315		49.14% Pervious Area
0.326		50.86% Impervious Area

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

Subcatchment DA55: AREAS TO CB'S AT WILLOWBEND DR



Summary for Subcatchment DA77: AREAS TO WETLAND TO EAST

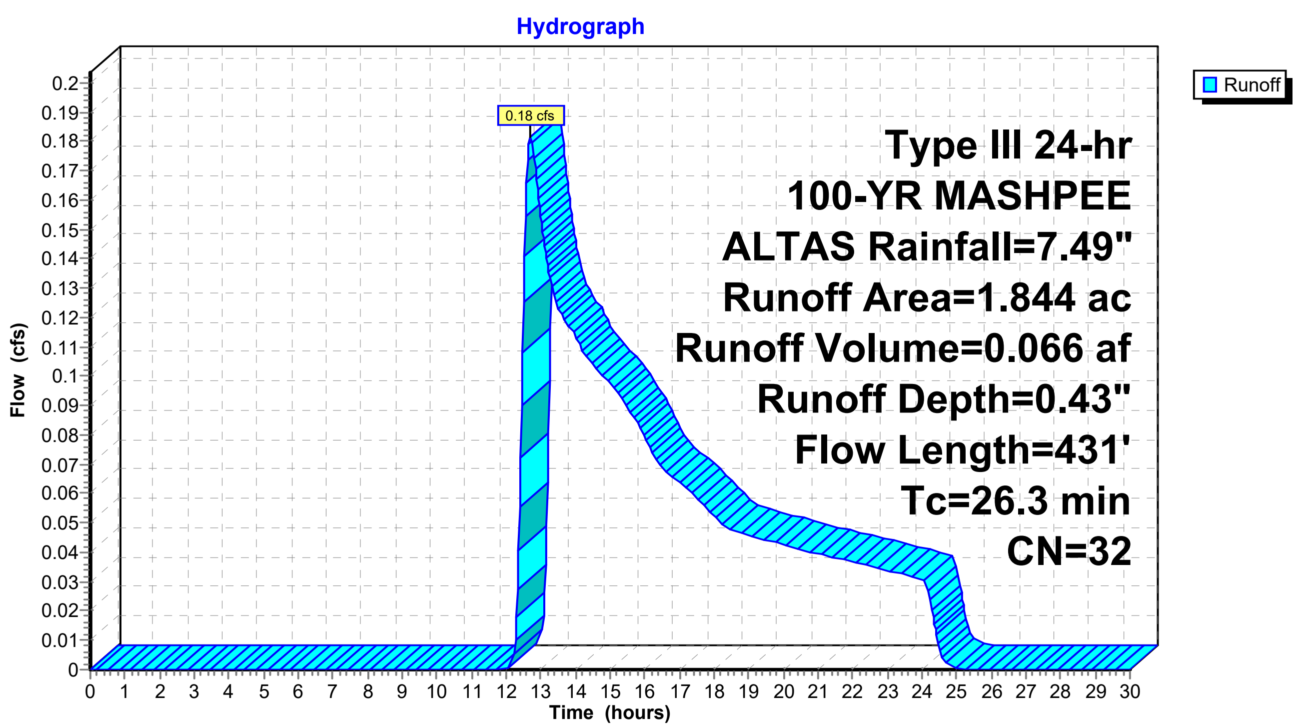
Runoff = 0.18 cfs @ 12.71 hrs, Volume= 0.066 af, Depth= 0.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-YR MASHPEE ALTAS Rainfall=7.49"

Area (ac)	CN	Description
0.476	39	>75% Grass cover, Good, HSG A
1.201	30	Woods, Good, HSG A
0.167	30	Woods, Good, HSG A
1.844	32	Weighted Average
1.844		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	50	0.0480	0.10		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.55"
18.0	381	0.0050	0.35		**Shallow Concentrated Flow, B** Woodland Kv= 5.0 fps
26.3	431	Total			

Subcatchment DA77: AREAS TO WETLAND TO EAST



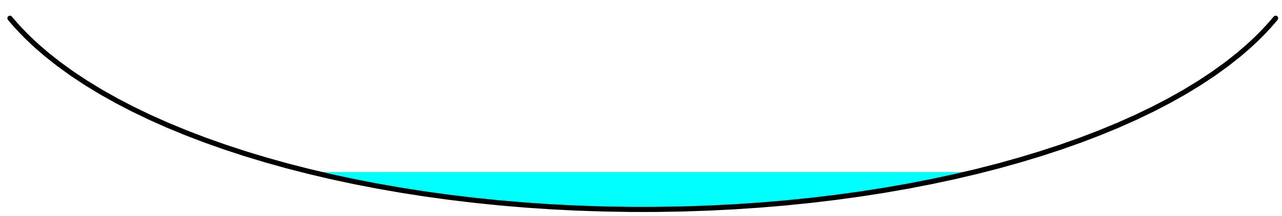
Summary for Reach R1: Tt along stream

Inflow Area = 1.366 ac, 18.52% Impervious, Inflow Depth = 1.61" for 100-YR MASHPEE ALTAS event
Inflow = 3.18 cfs @ 12.09 hrs, Volume= 0.184 af
Outflow = 2.06 cfs @ 12.18 hrs, Volume= 0.184 af, Atten= 35%, Lag= 5.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 0.89 fps, Min. Travel Time= 10.3 min
Avg. Velocity = 0.28 fps, Avg. Travel Time= 32.6 min

Peak Storage= 1,273 cf @ 12.18 hrs
Average Depth at Peak Storage= 0.39'
Bank-Full Depth= 2.00' Flow Area= 26.7 sf, Capacity= 69.34 cfs

20.00' x 2.00' deep Parabolic Channel, n= 0.040 Winding stream, pools & shoals
Length= 550.0' Slope= 0.0035 '/'
Inlet Invert= 14.60', Outlet Invert= 12.70'



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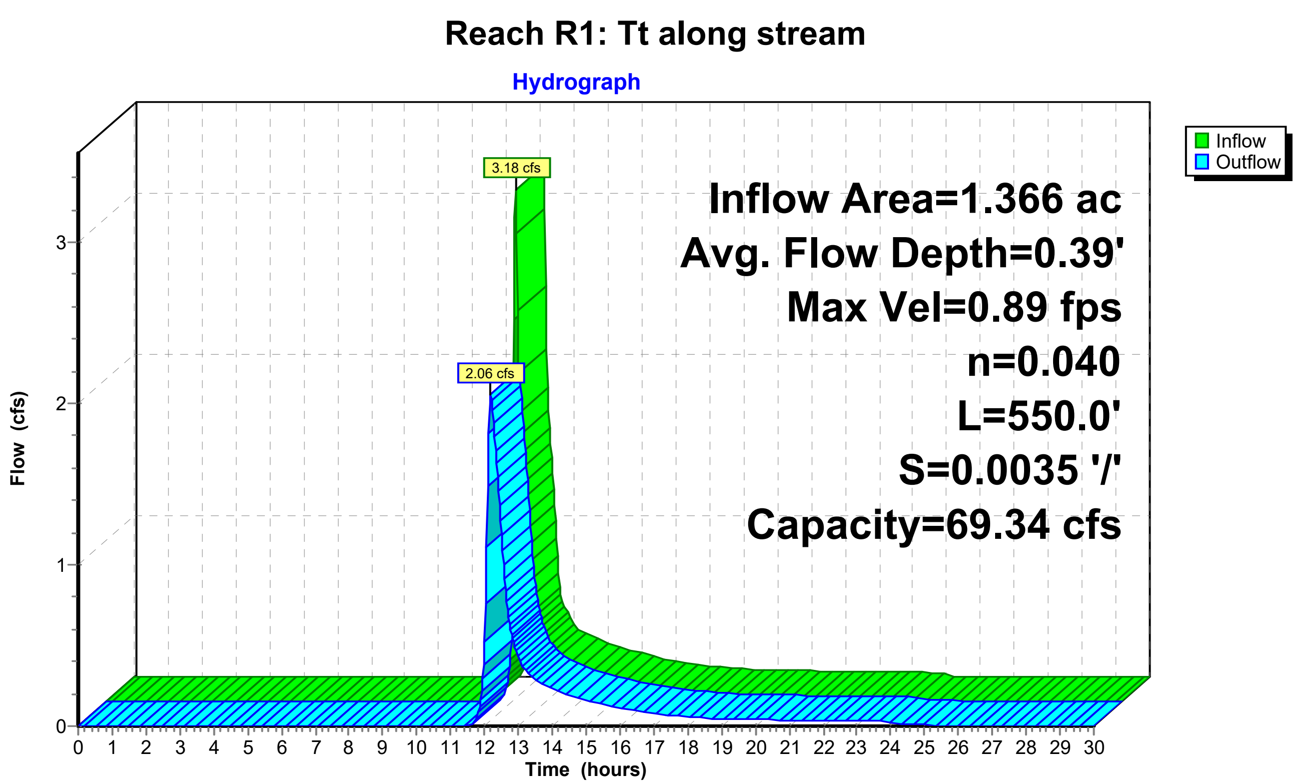

Summary for Reach R1A: Tt thru bogs

Inflow Area = 7.256 ac, 33.70% Impervious, Inflow Depth > 1.37" for 100-YR MASHPEE ALTAS event
Inflow = 1.29 cfs @ 13.68 hrs, Volume= 0.829 af
Outflow = 1.29 cfs @ 13.81 hrs, Volume= 0.826 af, Atten= 0%, Lag= 7.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 0.78 fps, Min. Travel Time= 11.1 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 16.4 min

Peak Storage= 862 cf @ 13.81 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 2.00' Flow Area= 22.0 sf, Capacity= 50.84 cfs

5.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/' Top Width= 17.00'
Length= 520.0' Slope= 0.0029 '/'
Inlet Invert= 14.20', Outlet Invert= 12.70'

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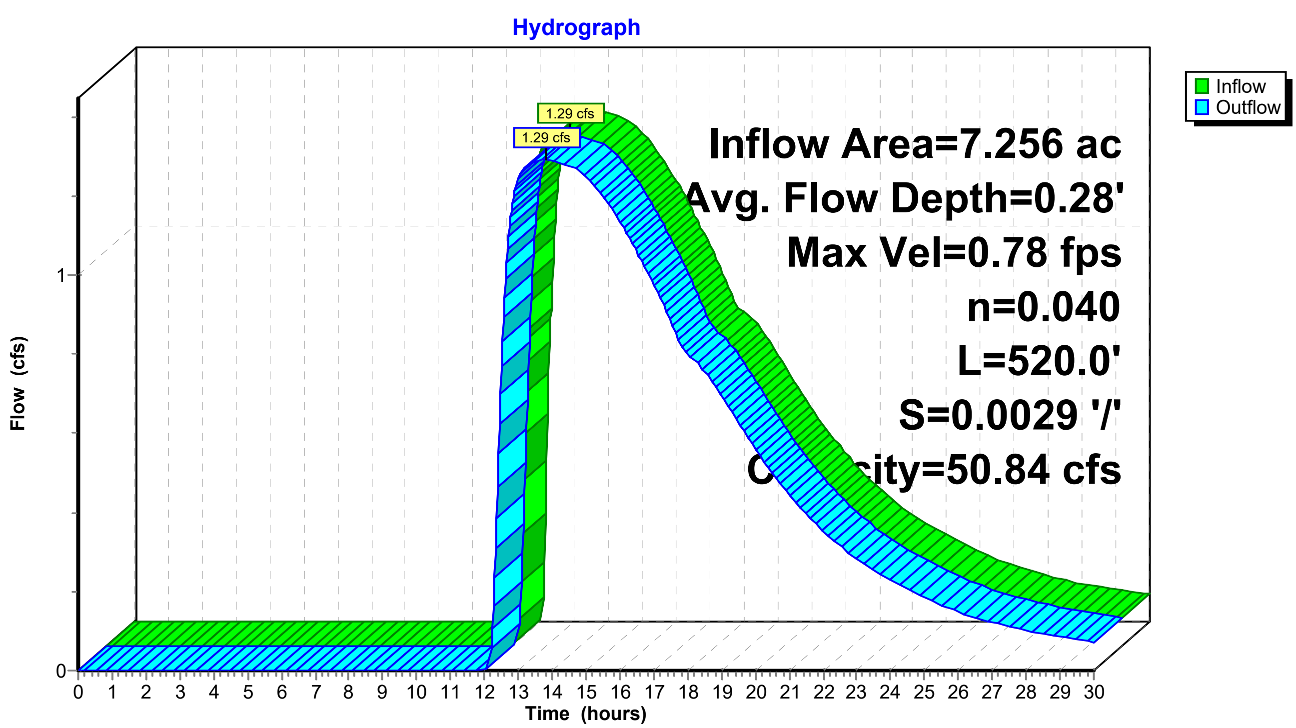
Reach R1A: Tt thru bogs



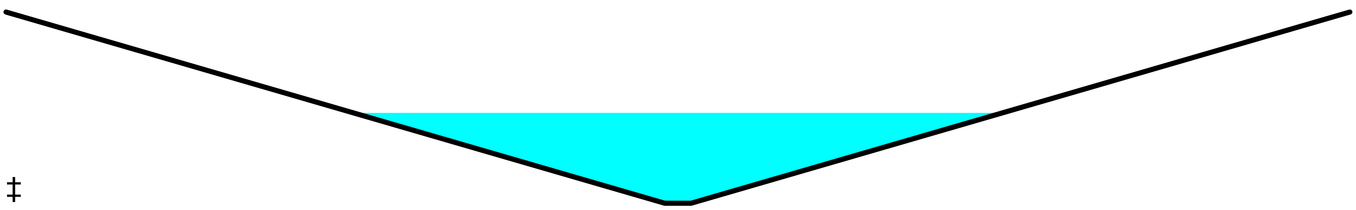
Summary for Reach R2: Tt thru da77

Inflow Area = 2.817 ac, 32.13% Impervious, Inflow Depth = 2.34" for 100-YR MASHPEE ALTAS event
Inflow = 7.71 cfs @ 12.12 hrs, Volume= 0.550 af
Outflow = 7.21 cfs @ 12.16 hrs, Volume= 0.550 af, Atten= 6%, Lag= 2.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 1.19 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 8.0 min

Peak Storage= 1,269 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 0.50' Flow Area= 26.0 sf, Capacity= 50.53 cfs

2.00' x 0.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 100.0 '/' Top Width= 102.00'
Length= 210.0' Slope= 0.0095 '/'
Inlet Invert= 17.00', Outlet Invert= 15.00'



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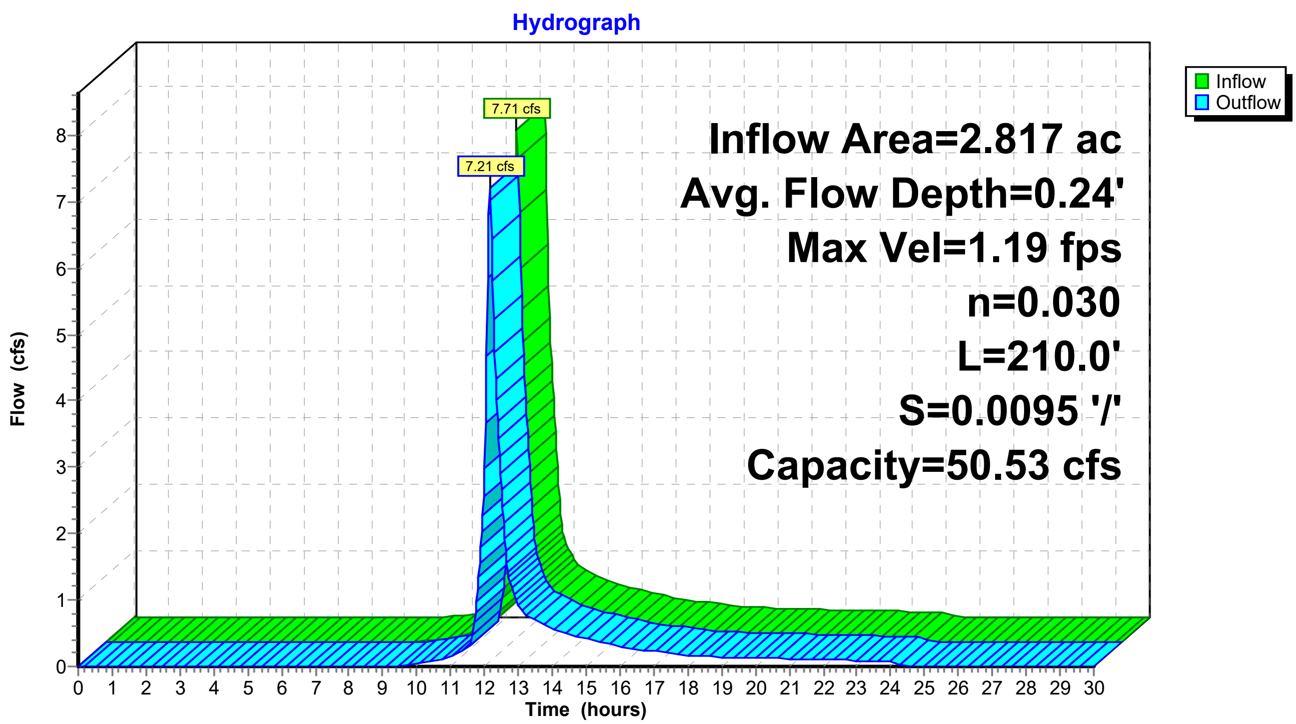
Reach R2: Tt thru da77



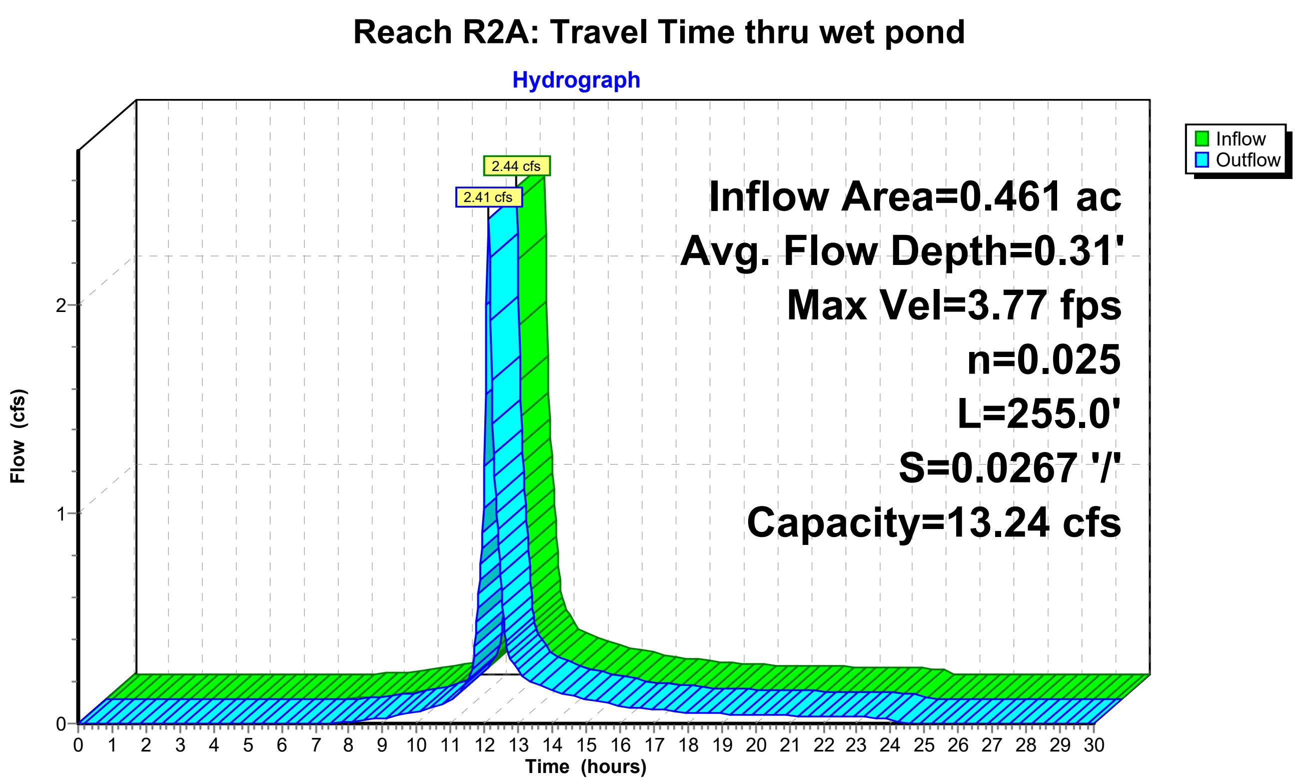
Summary for Reach R2A: Travel Time thru wet pond

Inflow Area = 0.461 ac, 63.56% Impervious, Inflow Depth = 4.70" for 100-YR MASHPEE ALTAS event
Inflow = 2.44 cfs @ 12.10 hrs, Volume= 0.180 af
Outflow = 2.41 cfs @ 12.11 hrs, Volume= 0.180 af, Atten= 1%, Lag= 0.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 3.77 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.02 fps, Avg. Travel Time= 4.2 min

Peak Storage= 163 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.31'
Bank-Full Depth= 1.00' Flow Area= 2.1 sf, Capacity= 13.24 cfs

2.00' x 1.00' deep channel, n= 0.025 Earth, clean & winding
Side Slope Z-value= 0.1 '/' Top Width= 2.20'
Length= 255.0' Slope= 0.0267 '/'
Inlet Invert= 21.00', Outlet Invert= 14.20'



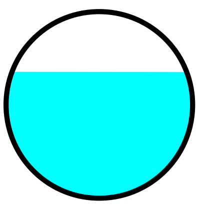
Summary for Reach R3: 18" CPP

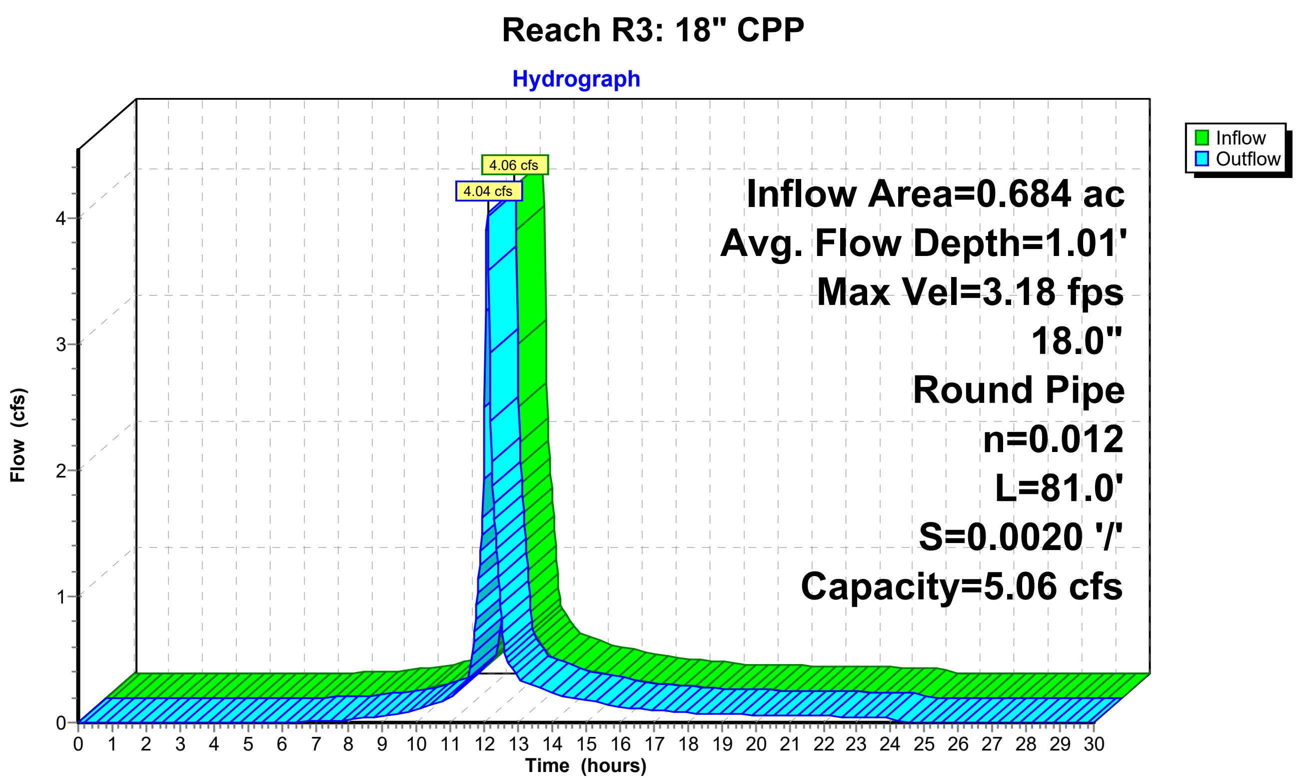
Inflow Area = 0.684 ac, 66.67% Impervious, Inflow Depth = 4.97" for 100-YR MASHPEE ALTAS event
Inflow = 4.06 cfs @ 12.07 hrs, Volume= 0.283 af
Outflow = 4.04 cfs @ 12.08 hrs, Volume= 0.283 af, Atten= 0%, Lag= 0.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 3.18 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.10 fps, Avg. Travel Time= 1.2 min

Peak Storage= 103 cf @ 12.08 hrs
Average Depth at Peak Storage= 1.01'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 5.06 cfs

18.0" Round Pipe
n= 0.012
Length= 81.0' Slope= 0.0020 '/'
Inlet Invert= 15.06', Outlet Invert= 14.90'





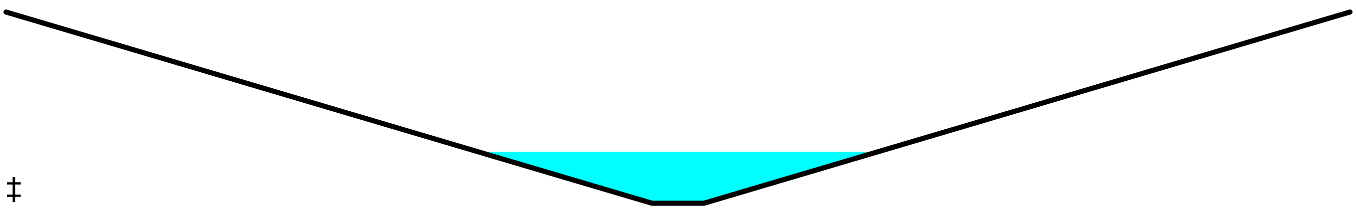
Summary for Reach R5: Tt thru da22B

Inflow Area = 0.641 ac, 50.86% Impervious, Inflow Depth = 3.04" for 100-YR MASHPEE ALTAS event
Inflow = 2.97 cfs @ 12.08 hrs, Volume= 0.162 af
Outflow = 2.88 cfs @ 12.10 hrs, Volume= 0.162 af, Atten= 3%, Lag= 1.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Max. Velocity= 2.46 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 0.87 fps, Avg. Travel Time= 4.7 min

Peak Storage= 287 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 0.50' Flow Area= 13.5 sf, Capacity= 75.75 cfs

2.00' x 0.50' deep channel, n= 0.013 Asphalt, smooth
Side Slope Z-value= 50.0 '/' Top Width= 52.00'
Length= 246.0' Slope= 0.0146 '/'
Inlet Invert= 20.58', Outlet Invert= 17.00'



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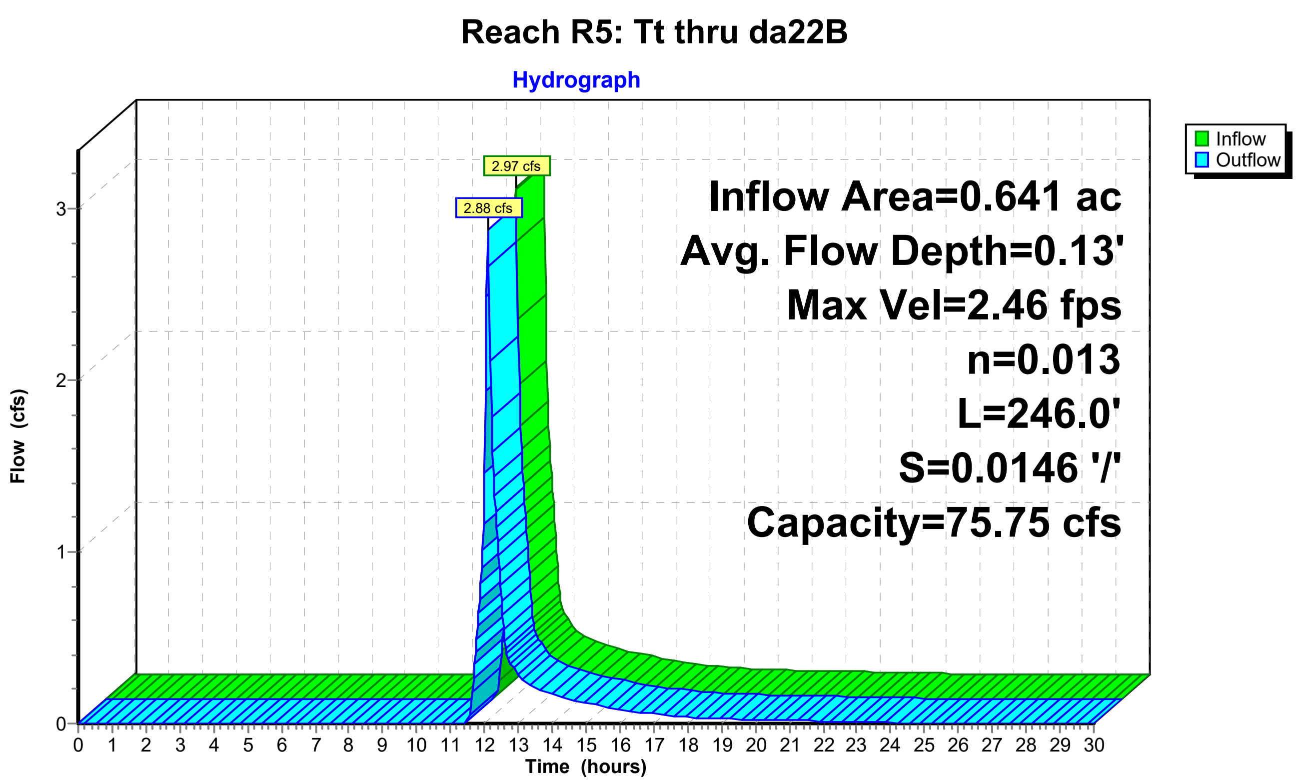
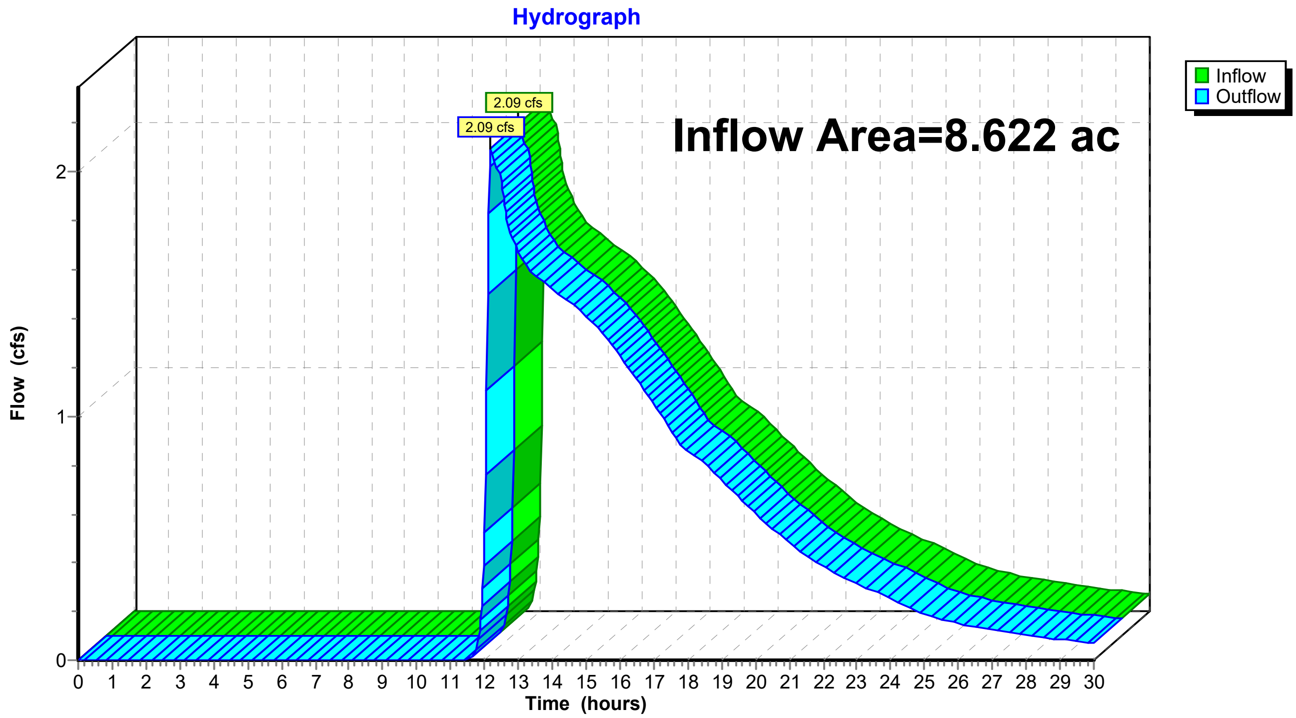


Summary for Reach SP#1: Study Point Combined Flows

Inflow Area = 8.622 ac, 31.29% Impervious, Inflow Depth > 1.41" for 100-YR MASHPEE ALTAS event
Inflow = 2.09 cfs @ 12.19 hrs, Volume= 1.010 af
Outflow = 2.09 cfs @ 12.19 hrs, Volume= 1.010 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3

Reach SP#1: Study Point Combined Flows



Summary for Pond 1P: LB's

Inflow Area = 0.641 ac, 50.86% Impervious, Inflow Depth = 3.92" for 100-YR MASHPEE ALTAS event
Inflow = 3.02 cfs @ 12.08 hrs, Volume= 0.209 af
Outflow = 3.00 cfs @ 12.08 hrs, Volume= 0.209 af, Atten= 1%, Lag= 0.3 min
Discarded = 0.03 cfs @ 9.90 hrs, Volume= 0.047 af
Primary = 2.97 cfs @ 12.08 hrs, Volume= 0.162 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 20.74' @ 12.09 hrs Surf.Area= 888 sf Storage= 508 cf

Plug-Flow detention time= 43.0 min calculated for 0.209 af (100% of inflow)
Center-of-Mass det. time= 43.2 min (872.2 - 829.0)

Volume	Invert	Avail.Storage	Storage Description
#1	13.50'	192 cf	**10.00'D x 4.50'H Vertical Cone/Cylinder** x 2 707 cf Overall - 226 cf Embedded = 481 cf x 40.0% Voids
#2	14.00'	226 cf	**6.00'D x 4.00'H Vertical Cone/Cylinder** x 2 Inside #1
#3	20.50'	376 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		794 cf	Total Available Storage

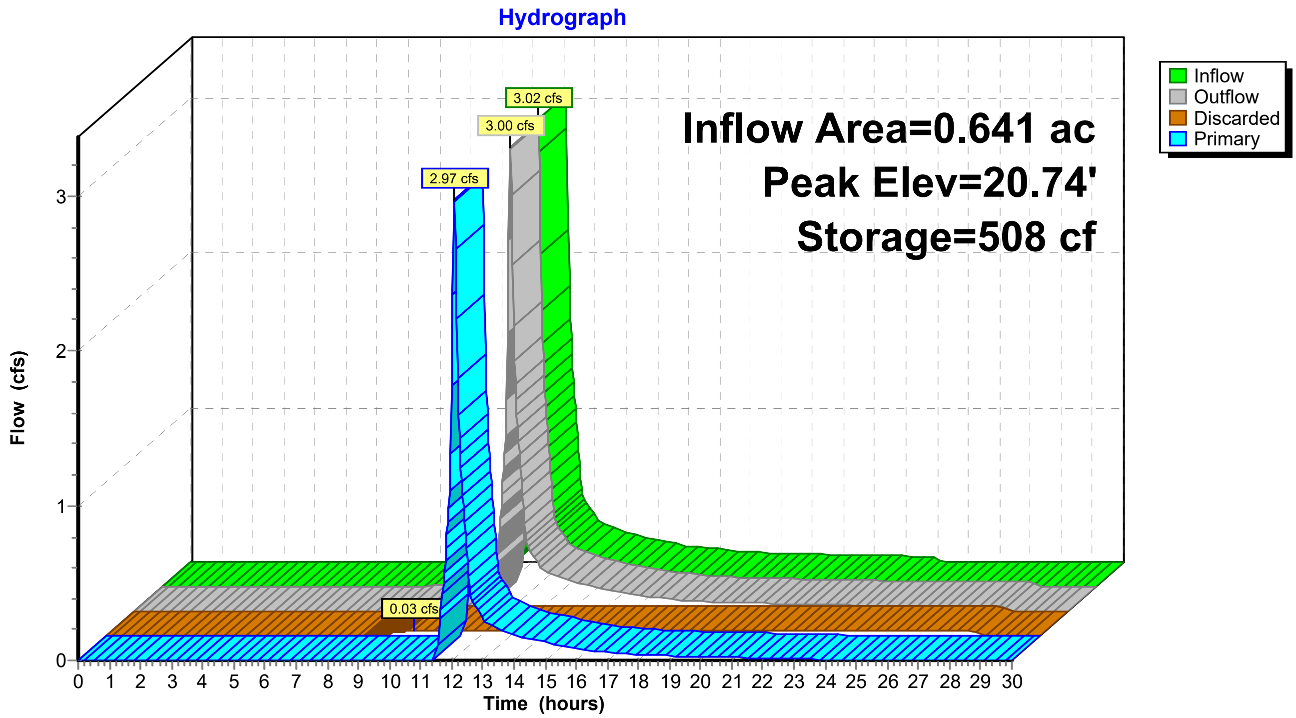
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
20.50	4	0	0
21.00	1,500	376	376

Device	Routing	Invert	Outlet Devices
#1	Discarded	13.50'	**8.270 in/hr Exfiltration over Surface area from 13.49' - 18.00'** Excluded Surface area = 0 sf
#2	Primary	20.58'	**179.0 deg x 6.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.46 (C= 3.08)

Discarded OutFlow Max=0.03 cfs @ 9.90 hrs HW=13.58' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=2.94 cfs @ 12.08 hrs HW=20.74' TW=20.71' (Dynamic Tailwater)
└─**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 2.94 cfs @ 0.74 fps)

Pond 1P: LB's


Hydrograph
3.02 cfs
3.00 cfs
2.97 cfs
0.03 cfs
Inflow Area=0.641 ac
Peak Elev=20.74'
Storage=508 cf
Inflow
Outflow
Discarded
Primary
Flow (cfs)
0
1
2
3
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Time (hours)

Summary for Pond 2P: Natural Low Area

Inflow Area =	0.841 ac,	0.00% Impervious, Inflow Depth = 0.43"	for 100-YR MASHPEE ALTAS event	
Inflow =	0.11 cfs @	12.38 hrs, Volume=	0.030 af	
Outflow =	0.04 cfs @	15.61 hrs, Volume=	0.030 af,	Atten= 68%, Lag= 193.5 min
Discarded =	0.04 cfs @	15.61 hrs, Volume=	0.030 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 16.90' @ 15.61 hrs Surf.Area= 661 sf Storage= 293 cf

Plug-Flow detention time= 105.3 min calculated for 0.030 af (100% of inflow)
Center-of-Mass det. time= 105.3 min (1,084.6 - 979.3)

Volume	Invert	Avail.Storage	Storage Description
#1	16.01'	4,469 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

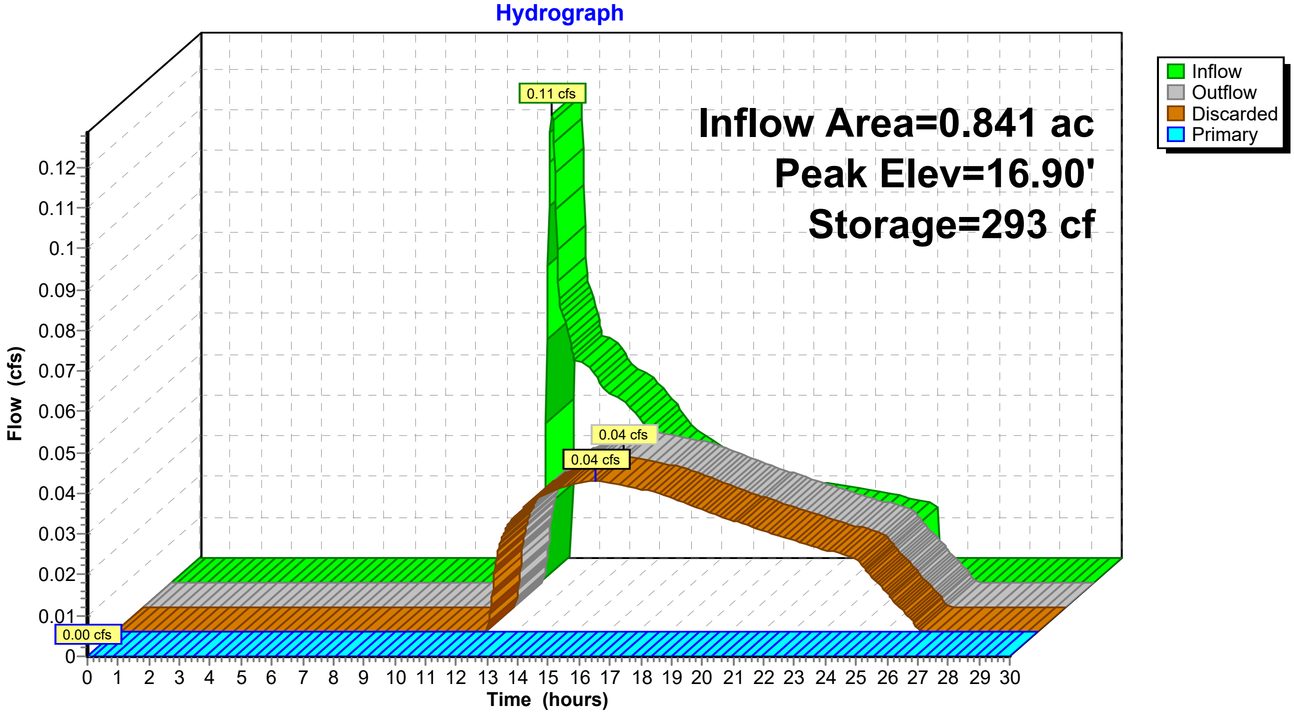
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
16.01	1	0	0
17.00	739	366	366
18.00	7,467	4,103	4,469

Device	Routing	Invert	Outlet Devices
#1	Discarded	16.01'	**2.410 in/hr Exfiltration over Surface area from 15.90' - 17.70'** Excluded Surface area = 0 sf
#2	Primary	17.58'	**50.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.04 cfs @ 15.61 hrs HW=16.90' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=16.01' TW=17.00' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: Natural Low Area



Summary for Pond 3A-P: Pond 3A

Inflow Area = 0.109 ac, 21.10% Impervious, Inflow Depth = 3.49" for 100-YR MASHPEE ALTAS event
Inflow = 0.45 cfs @ 12.08 hrs, Volume= 0.032 af
Outflow = 0.45 cfs @ 12.09 hrs, Volume= 0.032 af, Atten= 1%, Lag= 1.0 min
Discarded = 0.01 cfs @ 12.09 hrs, Volume= 0.016 af
Primary = 0.43 cfs @ 12.09 hrs, Volume= 0.016 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 17.56' @ 12.09 hrs Surf.Area= 611 sf Storage= 218 cf

Plug-Flow detention time= 92.4 min calculated for 0.032 af (100% of inflow)
Center-of-Mass det. time= 92.5 min (930.1 - 837.6)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	520 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

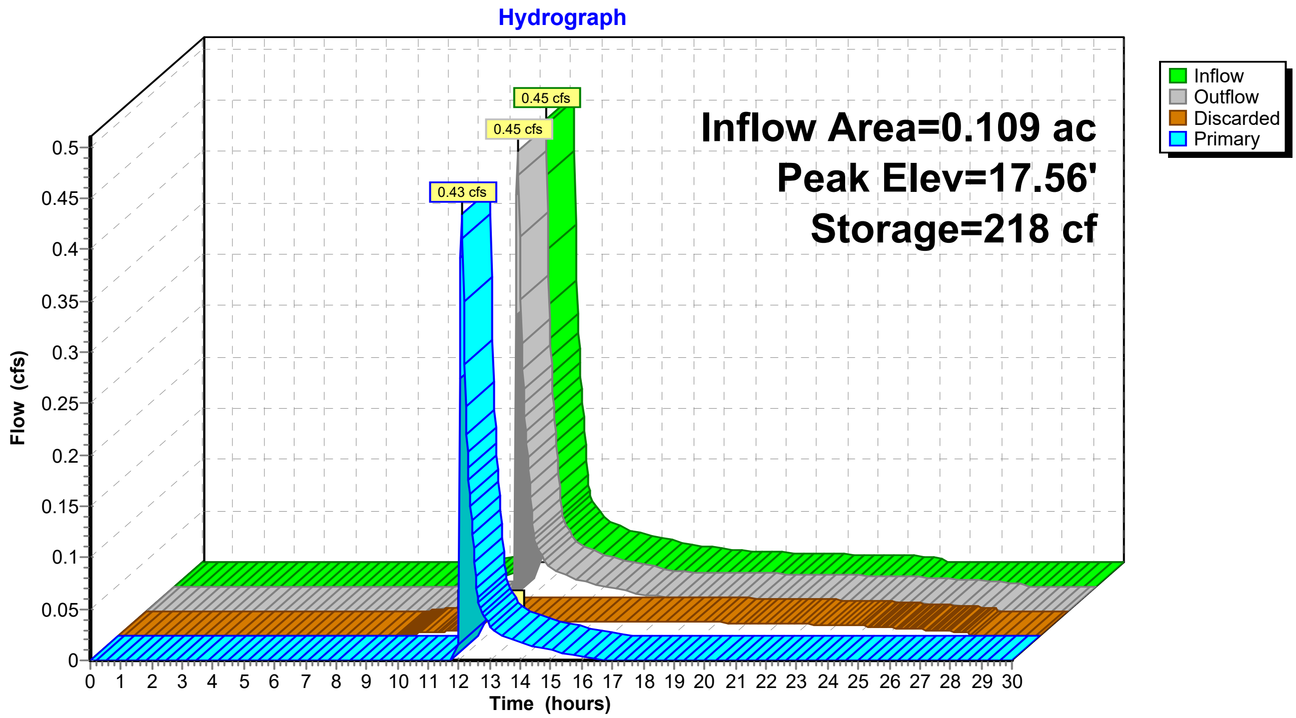
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	144	0	0
17.50	594	185	185
18.00	749	336	520

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**1.020 in/hr Exfiltration over Surface area from 16.90' - 18.00'** Excluded Surface area = 0 sf
#2	Primary	17.50'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.01 cfs @ 12.09 hrs HW=17.56' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.43 cfs @ 12.09 hrs HW=17.56' TW=14.94' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.43 cfs @ 0.78 fps)

Pond 3A-P: Pond 3A



Summary for Pond 3P: Wet Pond

Inflow Area = 7.256 ac, 33.70% Impervious, Inflow Depth = 1.55" for 100-YR MASHPEE ALTAS event
Inflow = 18.30 cfs @ 12.14 hrs, Volume= 0.934 af
Outflow = 1.29 cfs @ 13.68 hrs, Volume= 0.829 af, Atten= 93%, Lag= 92.4 min
Primary = 1.29 cfs @ 13.68 hrs, Volume= 0.829 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 15.48' @ 13.68 hrs Surf.Area= 23,032 sf Storage= 25,458 cf

Plug-Flow detention time= 280.0 min calculated for 0.829 af (89% of inflow)
Center-of-Mass det. time= 251.6 min (1,037.0 - 785.3)

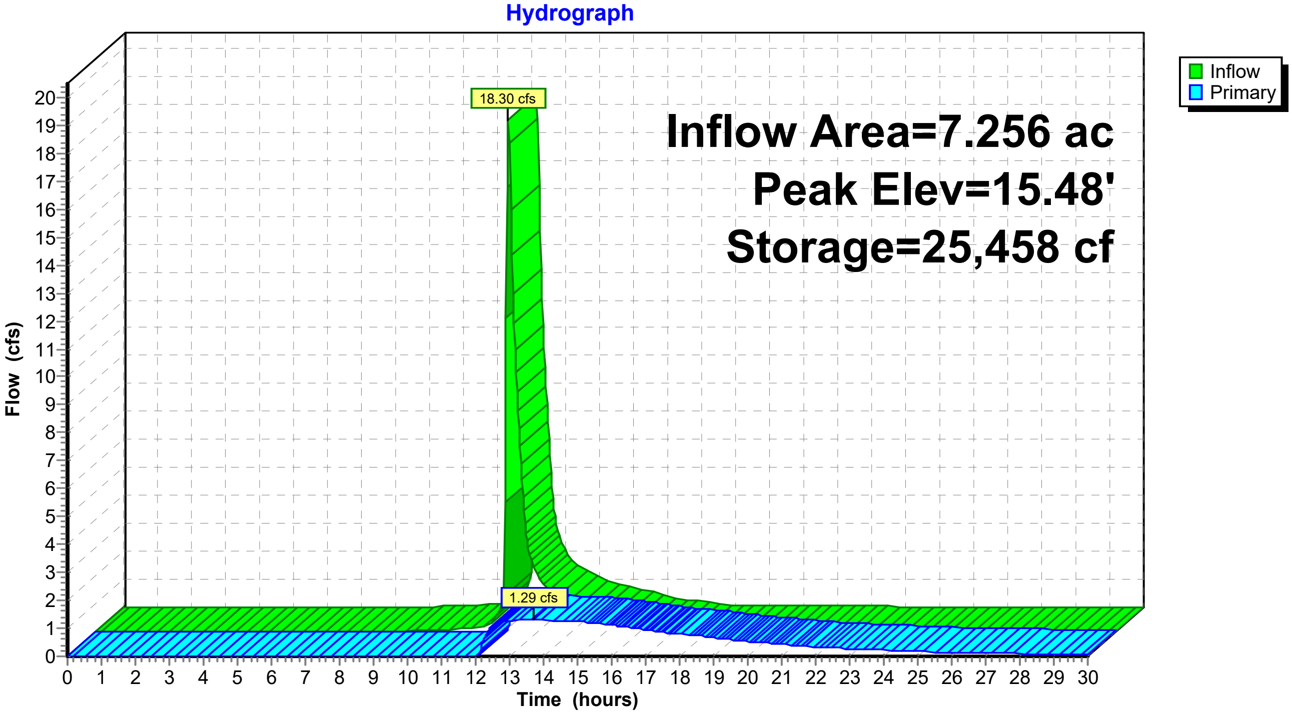
Volume	Invert	Avail.Storage	Storage Description
#1	13.97'	38,017 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
13.97	1	0	0
14.00	56	1	1
14.20	13,319	1,337	1,338
15.00	20,594	13,565	14,904
16.00	25,633	23,114	38,017

Device	Routing	Invert	Outlet Devices
#1	Primary	14.20'	**8.0" Round Culvert** L= 20.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 14.20' / 14.20' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#2	Primary	15.75'	**30.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.29 cfs @ 13.68 hrs HW=15.48' TW=14.48' (Dynamic Tailwater)
├─**1=Culvert** (Inlet Controls 1.29 cfs @ 3.71 fps)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Wet Pond



Summary for Pond 4P: Pond 4

Inflow Area = 0.132 ac, 50.76% Impervious, Inflow Depth = 5.15" for 100-YR MASHPEE ALTAS event
Inflow = 0.81 cfs @ 12.07 hrs, Volume= 0.057 af
Outflow = 0.81 cfs @ 12.08 hrs, Volume= 0.055 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.01 cfs @ 12.08 hrs, Volume= 0.017 af
Primary = 0.80 cfs @ 12.08 hrs, Volume= 0.039 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 18.03' @ 12.08 hrs Surf.Area= 469 sf Storage= 245 cf

Plug-Flow detention time= 88.8 min calculated for 0.055 af (98% of inflow)
Center-of-Mass det. time= 75.9 min (880.3 - 804.5)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	253 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

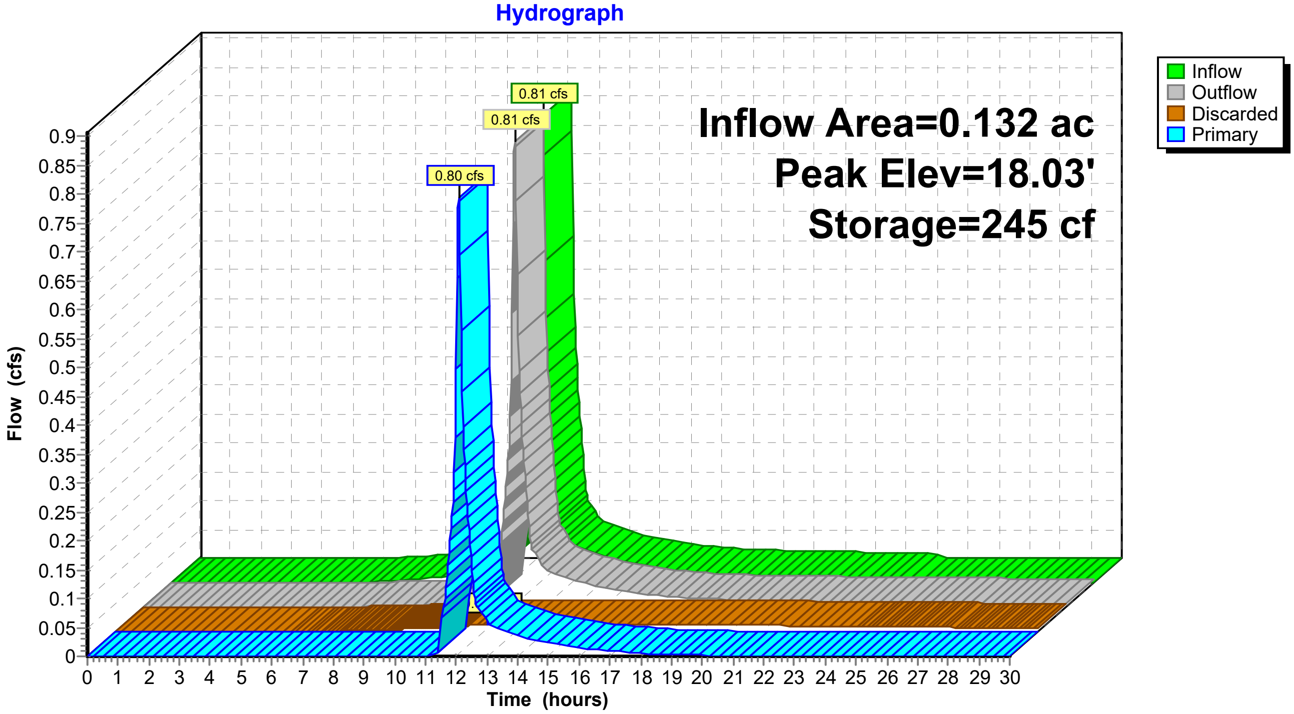
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	10	0	0
18.00	450	230	230
18.05	478	23	253

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**1.020 in/hr Exfiltration over Surface area from 16.90' - 18.05'** Excluded Surface area = 0 sf
#2	Primary	18.00'	**40.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.01 cfs @ 12.08 hrs HW=18.03' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.78 cfs @ 12.08 hrs HW=18.03' TW=14.92' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.78 cfs @ 0.60 fps)

Pond 4P: Pond 4



Summary for Pond 5P: Pond 5

Inflow Area = 0.124 ac, 58.87% Impervious, Inflow Depth = 4.47" for 100-YR MASHPEE ALTAS event
Inflow = 0.67 cfs @ 12.07 hrs, Volume= 0.046 af
Outflow = 0.67 cfs @ 12.08 hrs, Volume= 0.046 af, Atten= 0%, Lag= 0.2 min
Discarded = 0.02 cfs @ 12.08 hrs, Volume= 0.020 af
Primary = 0.65 cfs @ 12.08 hrs, Volume= 0.026 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 19.03' @ 12.08 hrs Surf.Area= 331 sf Storage= 236 cf

Plug-Flow detention time= 89.8 min calculated for 0.046 af (100% of inflow)
Center-of-Mass det. time= 87.2 min (905.3 - 818.1)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	244 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

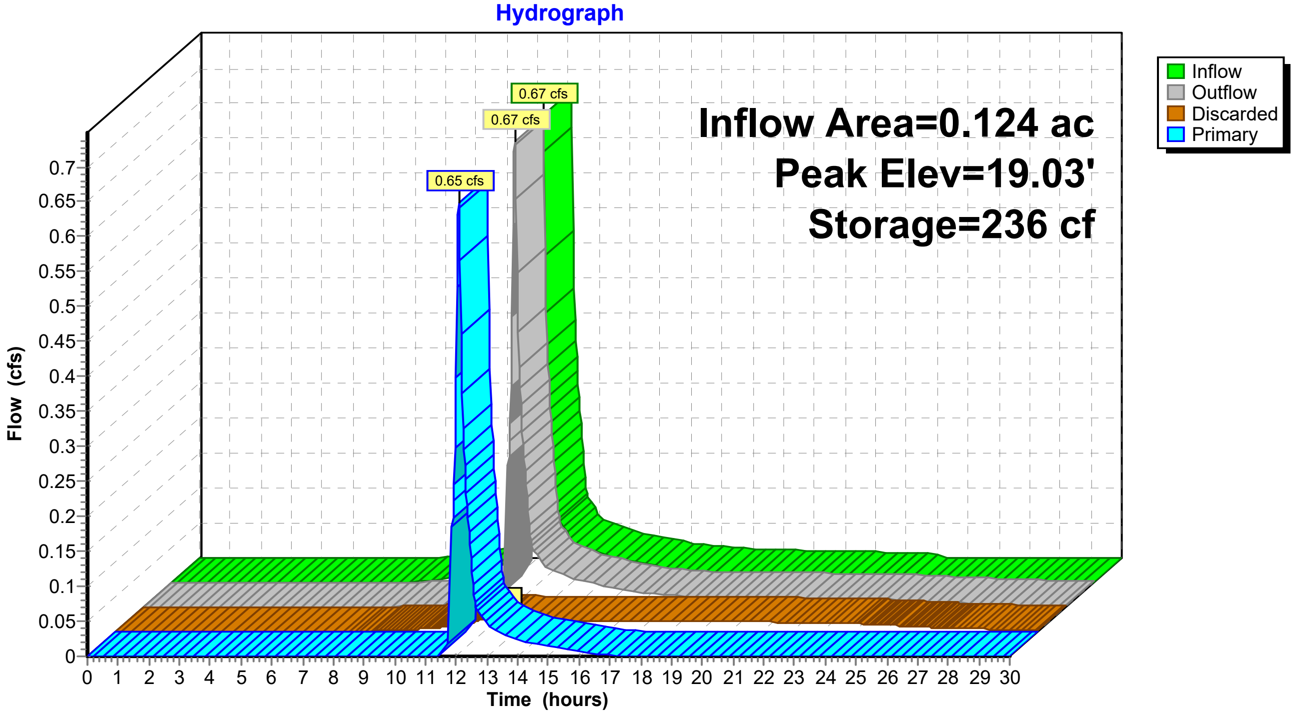
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	1	0	0
18.00	86	44	44
19.00	282	184	228
19.05	366	16	244

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**2.410 in/hr Exfiltration over Surface area from 16.90' - 19.05'** Excluded Surface area = 0 sf
#2	Primary	19.00'	**40.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.02 cfs @ 12.08 hrs HW=19.03' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.64 cfs @ 12.08 hrs HW=19.03' TW=14.92' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Weir Controls 0.64 cfs @ 0.56 fps)

Pond 5P: Pond 5



Summary for Pond 6P: Pond 6

Inflow Area = 0.088 ac, 17.05% Impervious, Inflow Depth = 1.57" for 100-YR MASHPEE ALTAS event
Inflow = 0.14 cfs @ 12.09 hrs, Volume= 0.011 af
Outflow = 0.02 cfs @ 13.24 hrs, Volume= 0.011 af, Atten= 87%, Lag= 68.6 min
Discarded = 0.02 cfs @ 13.24 hrs, Volume= 0.011 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 19.00' @ 13.24 hrs Surf.Area= 326 sf Storage= 163 cf

Plug-Flow detention time= 110.0 min calculated for 0.011 af (100% of inflow)
Center-of-Mass det. time= 110.0 min (997.7 - 887.7)

Volume	Invert	Avail.Storage	Storage Description
#1	18.00'	182 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

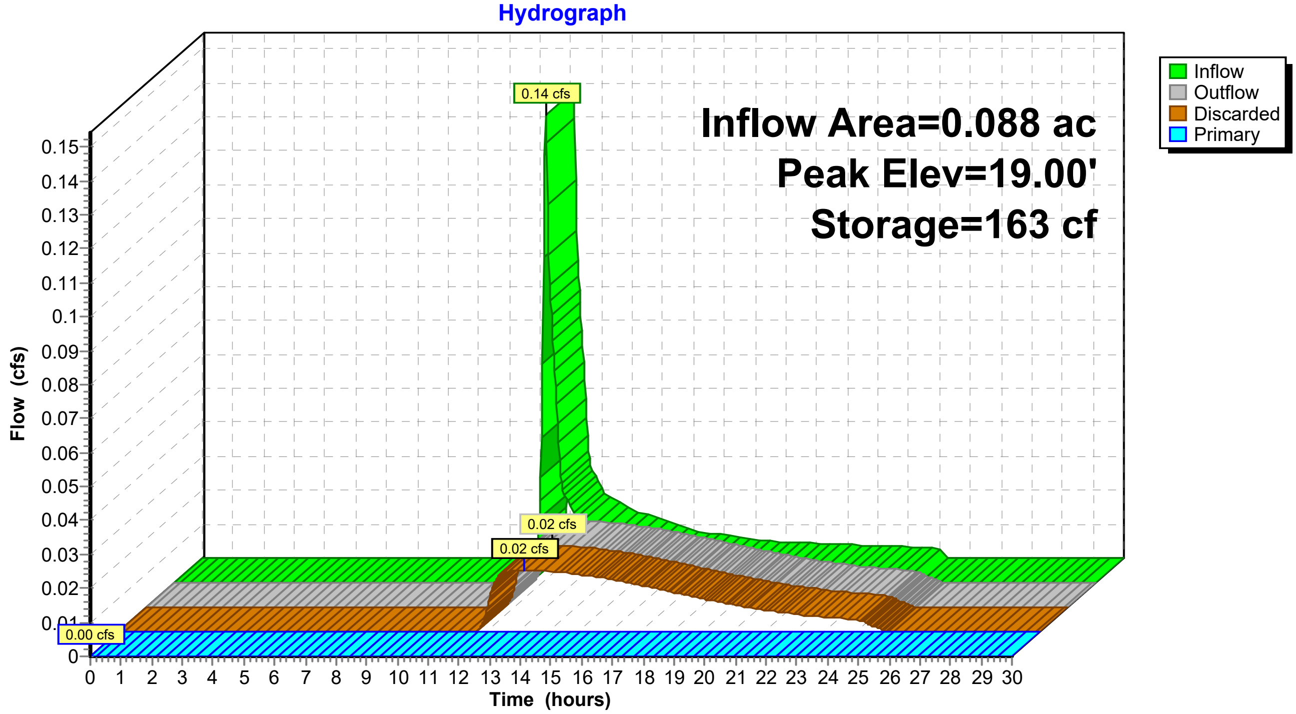
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
18.00	1	0	0
19.00	326	164	164
19.05	394	18	182

Device	Routing	Invert	Outlet Devices
#1	Discarded	18.00'	**2.410 in/hr Exfiltration over Surface area from 17.90' - 19.05'** Excluded Surface area = 0 sf
#2	Primary	19.00'	**40.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.02 cfs @ 13.24 hrs HW=19.00' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=18.00' TW=14.60' (Dynamic Tailwater)
↑—**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 6P: Pond 6



Summary for Pond 7P: Pond 7

Inflow Area = 0.033 ac, 63.64% Impervious, Inflow Depth = 4.81" for 100-YR MASHPEE ALTAS event
Inflow = 0.19 cfs @ 12.07 hrs, Volume= 0.013 af
Outflow = 0.19 cfs @ 12.07 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.1 min
Discarded = 0.01 cfs @ 12.07 hrs, Volume= 0.008 af
Primary = 0.18 cfs @ 12.07 hrs, Volume= 0.006 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 18.02' @ 12.07 hrs Surf.Area= 146 sf Storage= 83 cf

Plug-Flow detention time= 75.6 min calculated for 0.013 af (100% of inflow)
Center-of-Mass det. time= 75.6 min (887.0 - 811.4)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	87 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

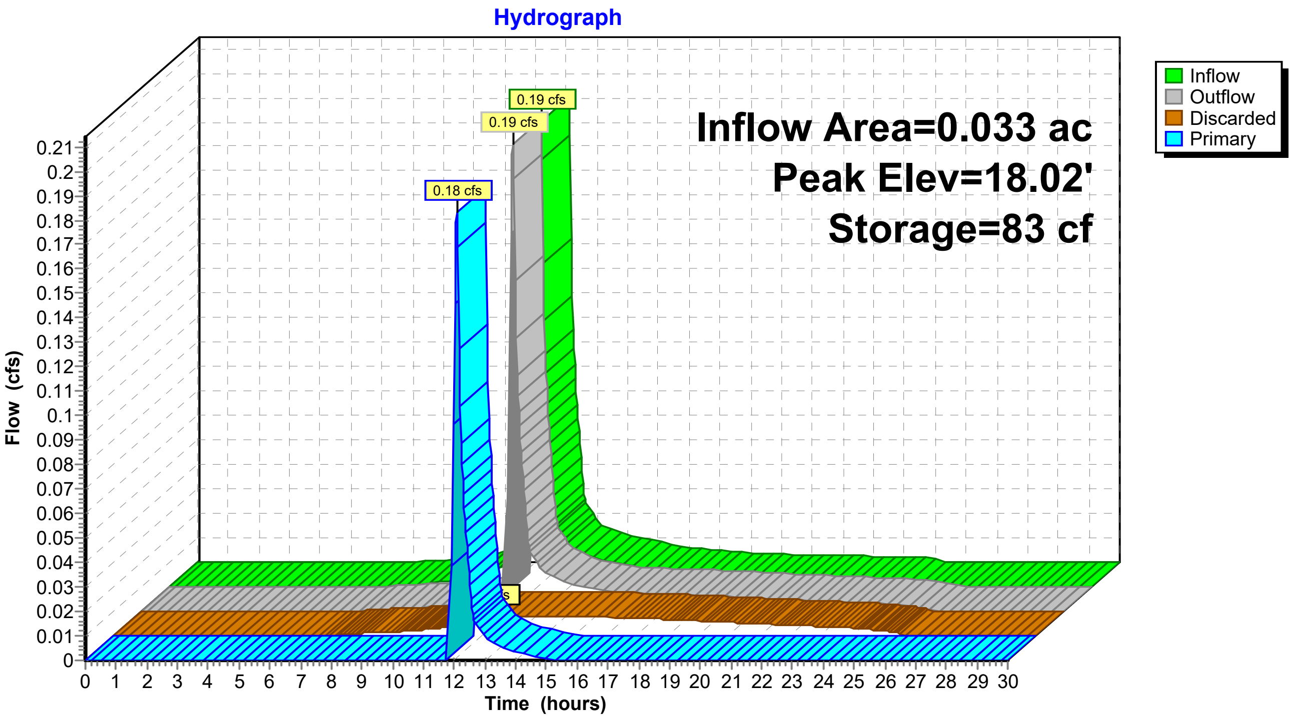
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	23	0	0
18.00	137	80	80
18.05	159	7	87

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**2.410 in/hr Exfiltration over Surface area from 16.90' - 18.05'** Excluded Surface area = 0 sf
#2	Primary	18.00'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.01 cfs @ 12.07 hrs HW=18.02' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.18 cfs @ 12.07 hrs HW=18.02' TW=14.92' (Dynamic Tailwater)
2=Sharp-Crested Rectangular Weir (Weir Controls 0.18 cfs @ 0.46 fps)

Pond 7P: Pond 7



Summary for Pond 8P: Pond 8

Inflow Area =	0.087 ac, 35.63% Impervious,	Inflow Depth = 2.96"	for 100-YR MASHPEE ALTAS event	
Inflow =	0.30 cfs @	12.08 hrs, Volume=	0.021 af	
Outflow =	0.03 cfs @	12.95 hrs, Volume=	0.021 af,	Atten= 89%, Lag= 52.0 min
Discarded =	0.03 cfs @	12.95 hrs, Volume=	0.021 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 17.63' @ 12.95 hrs Surf.Area= 624 sf Storage= 331 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 88.4 min (937.2 - 848.8)

Volume	Invert	Avail.Storage	Storage Description
#1	17.00'	622 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

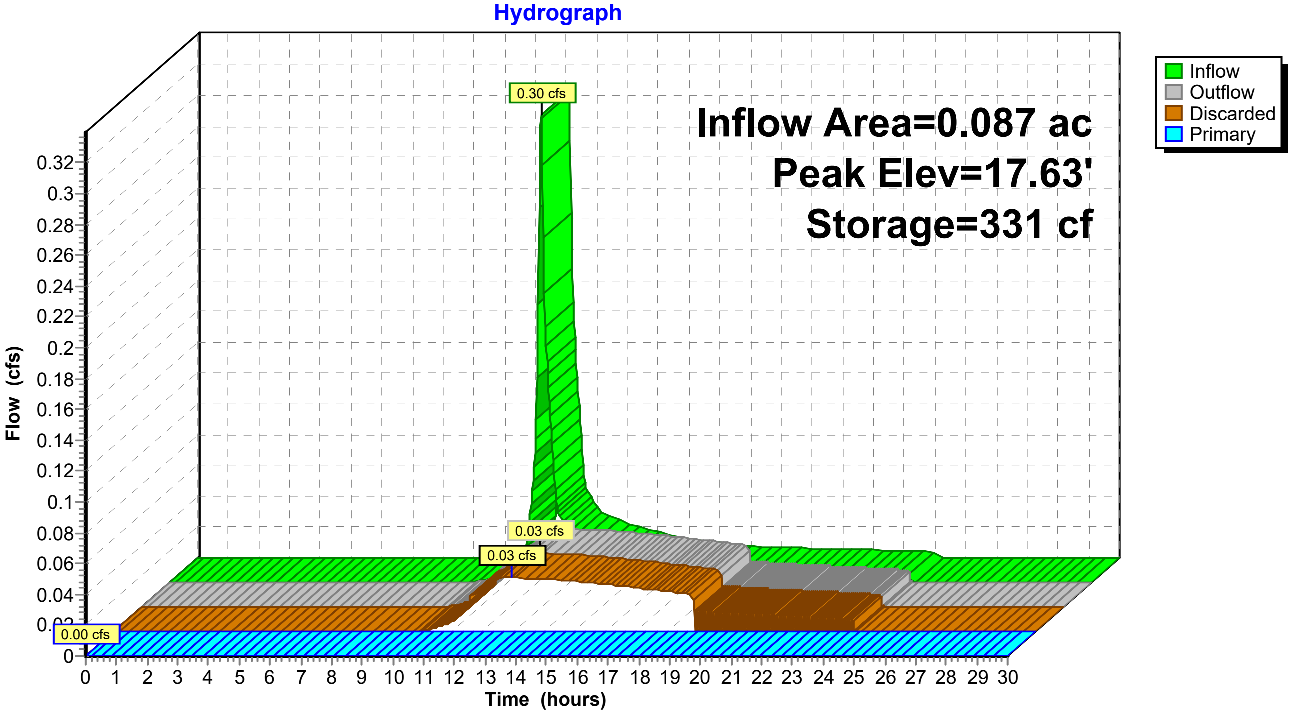
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
17.00	426	0	0
18.00	741	584	584
18.05	791	38	622

Device	Routing	Invert	Outlet Devices
#1	Discarded	17.00'	**2.410 in/hr Exfiltration over Surface area from 16.90' - 18.00'** Excluded Surface area = 0 sf
#2	Primary	18.00'	**20.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.03 cfs @ 12.95 hrs HW=17.63' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=17.00' TW=14.60' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 8P: Pond 8



Summary for Pond FB1: Forebay 1

Inflow Area = 1.040 ac, 55.00% Impervious, Inflow Depth = 4.21" for 100-YR MASHPEE ALTAS event
Inflow = 5.18 cfs @ 12.08 hrs, Volume= 0.365 af
Outflow = 4.98 cfs @ 12.10 hrs, Volume= 0.360 af, Atten= 4%, Lag= 1.4 min
Discarded = 0.09 cfs @ 11.91 hrs, Volume= 0.146 af
Primary = 4.89 cfs @ 12.10 hrs, Volume= 0.214 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 16.77' @ 12.10 hrs Surf.Area= 2,316 sf Storage= 2,579 cf

Plug-Flow detention time= 115.6 min calculated for 0.359 af (98% of inflow)
Center-of-Mass det. time= 107.3 min (925.6 - 818.3)

Volume	Invert	Avail.Storage	Storage Description
#1	14.90'	3,175 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

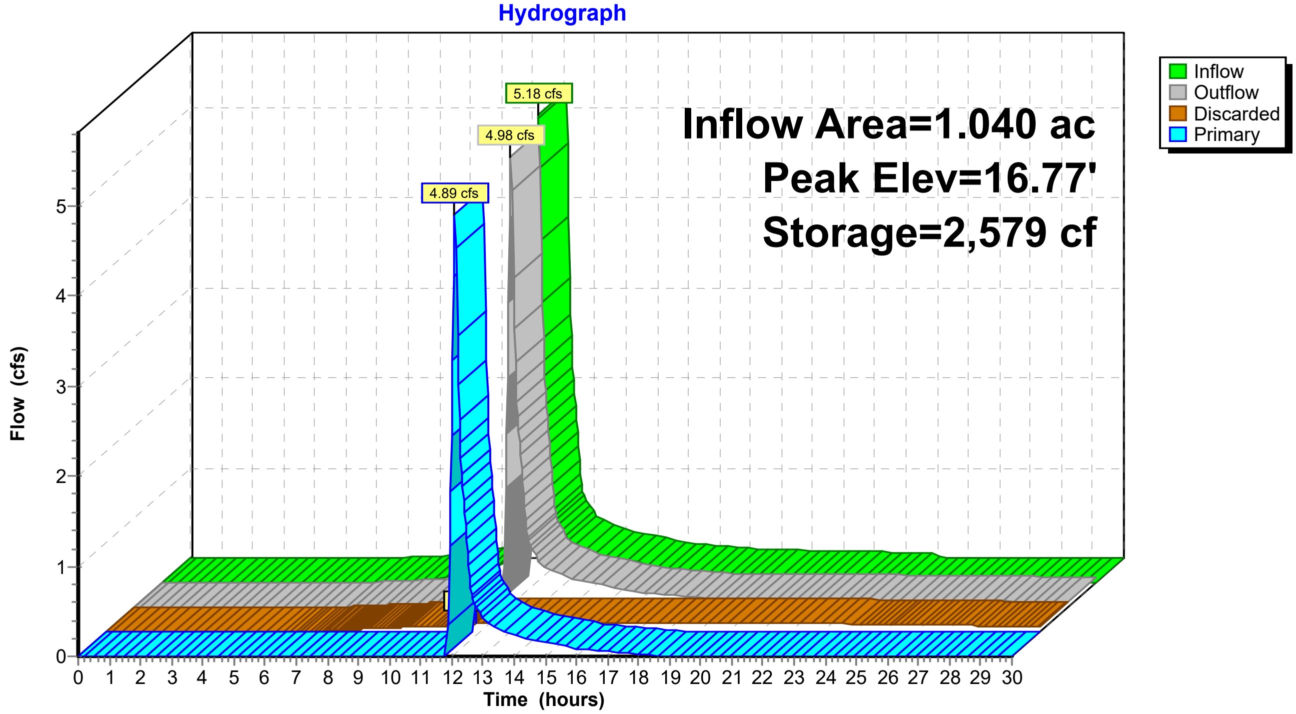
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
14.90	661	0	0
15.00	996	83	83
16.00	1,406	1,201	1,284
16.50	1,633	760	2,044
17.00	2,893	1,132	3,175

Device	Routing	Invert	Outlet Devices
#1	Discarded	14.90'	**2.410 in/hr Exfiltration over Surface area from 14.80' - 16.50'** Excluded Surface area = 0 sf
#2	Primary	16.50'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 0.5' Crest Height

Discarded OutFlow Max=0.09 cfs @ 11.91 hrs HW=16.55' (Free Discharge)
└—**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=4.81 cfs @ 12.10 hrs HW=16.77' TW=16.27' (Dynamic Tailwater)
└—**2=Sharp-Crested Rectangular Weir** (Weir Controls 4.81 cfs @ 1.80 fps)

Pond FB1: Forebay 1



Summary for Pond FB3: Forebay 3

Inflow Area = 6.795 ac, 31.67% Impervious, Inflow Depth = 2.20" for 100-YR MASHPEE ALTAS event
Inflow = 16.96 cfs @ 12.11 hrs, Volume= 1.248 af
Outflow = 16.40 cfs @ 12.14 hrs, Volume= 1.248 af, Atten= 3%, Lag= 1.7 min
Discarded = 0.40 cfs @ 12.14 hrs, Volume= 0.494 af
Primary = 16.00 cfs @ 12.14 hrs, Volume= 0.754 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs / 3
Peak Elev= 16.29' @ 12.14 hrs Surf.Area= 7,127 sf Storage= 7,519 cf

Plug-Flow detention time= 76.2 min calculated for 1.247 af (100% of inflow)
Center-of-Mass det. time= 76.3 min (903.7 - 827.4)

Volume	Invert	Avail.Storage	Storage Description
#1	15.00'	10,961 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

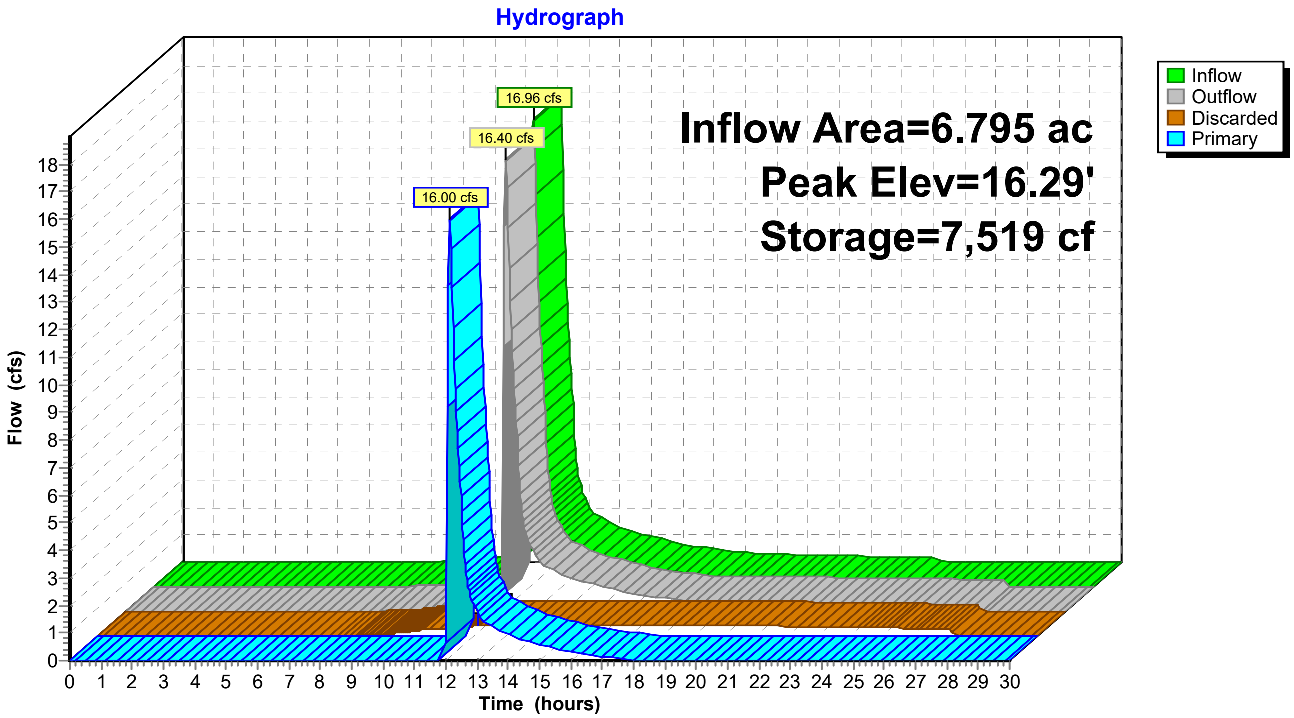
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
15.00	4,358	0	0
16.00	6,677	5,518	5,518
16.75	7,840	5,444	10,961

Device	Routing	Invert	Outlet Devices
#1	Discarded	15.00'	**2.410 in/hr Exfiltration over Surface area from 14.90' - 16.75'** Excluded Surface area = 0 sf
#2	Primary	16.00'	**10.0' long Sharp-Crested Rectangular Weir X 3.00** 2 End Contraction(s) 0.7' Crest Height

Discarded OutFlow Max=0.40 cfs @ 12.14 hrs HW=16.29' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.40 cfs)

Primary OutFlow Max=15.87 cfs @ 12.14 hrs HW=16.29' TW=14.61' (Dynamic Tailwater)
└─**2=Sharp-Crested Rectangular Weir** (Weir Controls 15.87 cfs @ 1.84 fps)

Pond FB3: Forebay 3



APPENDIX E

GROUNDWATER RECHARGE & WATER QUALITY

- GROUNDWATER RECHARGE VOLUME CALCULATIONS
- WATER QUALITY TREATMENT VOLUME CALCULATIONS
- TSS REMOVAL CALCULATION WORKSHEET

GROUNDWATER RECHARGE VOLUME CALCULATIONS

(MADEP Standard 3)

Most site soils within area of proposed impervious cover are HSG B. Therefore, the volume to recharge is 0.35 inches x impervious areas.

The northwestern quarter of the site soils within area of proposed impervious cover are HSG D. Therefore, the volume to recharge is 0.10 inches x impervious areas.

Note: The proposed building roof areas are considered clean under MDEP SWM Policy and are not included in the recharge calculations

For A soils areas in subcatchments 5, 6, 7, 8, and 9, the impervious area is 35,241 sf total.

Recharge Volume = 0.60” x total impervious area

= 0.60” x 35,241 sf x 1/12 ft/in.

= 1,762 cf

For B soils areas in subcatchments 1A, 1B, 1C, and 4, the impervious area is 14,560 sf total.

Recharge Volume = 0.35” x total impervious area

= 0.35” x 14,560 sf x 1/12 ft/in.

= 425 cf

Total required Recharge Volume = 2,027 cf

The BMPs used for recharge and quantity control for post-development site runoff are Forebays 1 and 3, as well as SWM basins 3 through 8.

For A soils, using Basins 5, 6, 7, and 8 and Forebay 3, the total area for recharge is 8147 sf.

Using Rawls Rate of 2.41 in/hour for A soils, the recharge volume is:

8147 sf x 2.41 in/hour x 12 hours = 19634 cf.

For B soils, using Basins 3A and 4, and Forebay 1, the total area for recharge = 2,303 sf

Using Rawls Rate of 1.02 in/hour for B soils, the recharge volume is:

2303 sf x 1.02 in/hour x 12 hours = 207 cf

Therefore, total Volume of Recharge which is provided:

= 21661 cf > 2,187 cf/ Design Reqmts met

The Volume of Recharge well exceeds the required amount of recharge.

WATER QUALITY TREATMENT VOLUME CALCULATIONS

(MADEP Standard 4-6)

The site is in an area defined as a Critical Area. Therefore, the Water Quality Treatment must address the first one (1) inch of runoff over the total impervious area. The following table identifies the impervious areas in each Drainage Area, the required Water Quality Volume (WQV), and the proposed WQV. The proposed building roof areas are considered clean under MDEP SWM Policy and are not included in the WQV calculations.

The combined BMP treatments are designed in accordance with the MDEP sizing requirements and provide the Water Quality Volume requirements.

WATER QUALITY VOLUME CALCULATIONS
CRANBERRY POINT, 275 QUINAQUISSET AVE, MASHPEE MA
1/16/2023
BAXTER NYE ENGINEERING

VOLUME CALCULATIONS PREPARED IN ACCORDANCE WITH THE
MASSACHUSETTS DEP STORMWATER MANAGEMENT POLICY

WATER QUALITY VOLUME (WQV) TO BE TREATED:
USING 1.0" OVER IMPERVIOUS AREA RULE:
1.O INCHES OF RUNOFF x TOTAL IMPERVIOUS AREA OF POST-DEVELOPED
SITE FOR DISCHARGE TO CRITICAL AREAS (NOT INCLUDING NON-METAL ROOF AREAS)

WATER QUALITY VOLUME (WQV) TO BE TREATED:

SUBAREA	AREA (SF)	1" WQV (FT)	WQV VOL REQD (CF)	WQV VOL PROVIDED (CF)	AT ELEVATION
DA-1A, B, C	11,825	0.083	985	2,044	16.5 (FOREBAY 1)
DA-3	993	0.083	83	185	17.5 (POND 3A)
DA-4	1,742	0.083	145	230	18 (POND 4)
DA-5	2,380	0.083	198	228	19 (POND 5)
DA-6	819	0.083	68	164	19 (POND 6)
DA-7	753	0.083	63	80	18 (POND 7)
DA-8	1,281	0.083	107	584	18 (POND 8)
DA-9, 22B	48,086	0.083	4007	5,518	16 (FOREBAY 3) *

* Forebay 3 is sized to treat additional offsite runoff from a portion of Quinaquisset Ave (DA22B).
This additional volume treats an additional 3/4" of runoff from Quinaquisset Ave.

DA-22B	25,221	0.060		1,511	

TSS REMOVAL CALCULATION WORKSHEET

Cranberry Point at Willowbend
275 Quinaquisset Avenue, Mashpee MA
Project # 2014-009 Quin
1/16/2023

TSS REMOVAL CALCULATION WORKSHEET

A BMP	B TSS Removal Rate	C Starting TSS Load *	D Amount Removed (BxC)	E Remaining Load (C-D)
Deep Sump Catch Basins	25%	1.00	0.25	0.75
Sediment Forebay	25%	0.75	0.19	0.56
				(44% pre-treatment TSS)
Wet Basin	80%	0.56	0.45	0.11
		Total TSS Removed =	**0.89**	89%

*Equals remaining load from previous BMP (E)

APPENDIX F

REFERENCES:

1) MASSACHUSETTS HIGHWAY DRAINAGE MANUAL – DOT
2) MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION – Stormwater Management (MDEP SWM) Volumes One and Two
3) SCS TR55 – URBAN HYDROLOGY FOR SMALL WATERSHEDS – 2^{nd} Edition, June 1986
4) "CONTROLLING URBAN RUNOFF"; By Department of Environmental Programs – Metropolitan Washington Council of Governments (MWCOG); 1987
5) STANDARD HANDBOOK FOR CIVIL ENGINEERS - Merritt; Third Edition
6) SOIL SURVEY OF BARNSTABLE COUNTY, MASSACHUSETTS

SOURCES OF FIELD DATA:

1) Survey of existing conditions from a plan prepared by Baxter Nye Engineering & Surveying.

APPENDIX G

EQUATIONS:

1. RATIONAL METHOD: $Q = c(i \bullet i_f)A$

   Q is quantity of flow (cfs)
   c is the runoff coefficient
   i is the rainfall intensity (in/hr)
   i_f is the rainfall intensity factor
   for: $0 < tc < 10$ min, $i_f = 1.02$
   for: $10 < tc < 40$ min, $i_f = 1.06$
   for: $40 < tc < 150$ min, $i_f = 0.99$
   A is the drainage area (acres)

2. MANNINGS EQUATION: $Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$

   Q is quantity of flow (cfs)
   R is the hydraulic radius (ft)
   S is the slope (ft/ft)
   A is the cross sectional area (sq. ft.)

3. CONTINUITY EQUATION: $Q = VA$

   Q is quantity of flow (cfs)
   V is the velocity (fps)
   A is the cross sectional area (sq. ft.)

4. CULVERT INLET CONTROL: $HW = d_n + \left(\frac{(1 + k_e)(V_u^2)}{2g} \right)$

5. CULVERT OUTLET CONTROL: $HW = H + h_0 - LS_0$

$$H = S_f L + \left(\frac{(1 + k_e)(V_f^2)}{2g} \right)$$

$$h_0 = TW \text{ or } \frac{(D + d_c)}{2} \quad \text{(whichever is greater)}$$

6. HYDRAULIC GRADE LINE:

Structure loss coefficients:

	0d	45d	90d
Inlet	.50	1.10	1.50
Manhole	.15	.75	1.00

7. INLET CAPACITY: Weir Eq.: $H = \left[\frac{Q}{3P} \right]^{2/3}$

Q is quantity of flow (cfs)

P is the perimeter (ft)

- use only the perimeter of the grate subject to flow
- if inlet is a sump and there is no curb opening then reduce the available perimeter by 25% for clogging

H is the discharge head (ft)

H is taken at a distance from the curb of ½ of inlet width

GENERAL NOTES:

1. VERIFY ALL LOCAL CODES, ENERGY TYPES, AND SITE CONDITIONS PRIOR TO CONSTRUCTION.
2. REVIEW SELECTED MECHANICAL SYSTEMS WITH OWNER PRIOR TO CONSTRUCTION
REVIEW SUB-CONTRACTORS LOCATIONS OF WATER HEATER AND HVAC UNIT(S) WITH THE OWNER PRIOR TO CONSTRUCTION.
VERIFY LOCAL BUILDING CODE REQUIREMENTS AND MANUFACTURER REQUIREMENTS FOR ATTIC AND GARAGE LOCATIONS.
HVAC EQUIPMENT IN THE ATTIC SPACE SHALL BE ACCESSIBLE BY AN OPENING LARGER THAN THE LARGEST PIECE OF EQUIPMENT (TO ALLOW REMOVAL OF THE EQUIPMENT) AND IN NO CASE LESS THAN 22"x30"
3. REFER TO SUBMITTALS FOR STRUCTURAL ELEMENTS.
4. DIMENSIONS ARE TO FACE OF STUD U.N.O.
5. REFER TO ELEVATION DRAWINGS FOR EXTERIOR MATERIAL LOCATIONS.
6. REFER TO INTERIOR DESIGN DRAWINGS FOR DIMENSIONS AND CONFIGURATION OF CABINETRY AND MILLWORK.
7. INSULATE AROUND ALL BATHS AND UTILITY ROOMS
8. PROVIDE SMOKE DETECTORS AS REQUIRED BY CODE.
9. PROVIDE DOORBELLS, TRANSFORMER, AND CHIME.
10. ALL CLOSETS TO HAVE SOLID-WOOD SHELVING WITH ROD

DOOR SCHEDULE

MARK	PR	SIZE W	SIZE H	QTY	NOTES
01		3' - 0"	8' - 0"	2	
03			8' - 0"	1	
04		2' - 6"	7' - 0"	4	
05		2' - 8"	7' - 0"	2	
06	Pair	1' - 6"	8' - 0"	1	
10	Pair	1' - 4"	7' - 0"	1	
11		4' - 0"	8' - 0"	1	
26		2' - 6"	8' - 0"	5	
27		2' - 8"	8' - 0"	4	

WINDOW SCHEDULE

MARK	SIZE W	SIZE H	QTY	NOTES
A	1' - 8"	4' - 6"	1	DOUBLE HUNG
B	2' - 0"	4' - 6"	2	DOUBLE HUNG
C	2' - 0"	6' - 0"	5	DOUBLE HUNG
D	3' - 6"	5' - 6"	7	DOUBLE-HUNG W/ MUNTINS
DD	1' - 6"	5' - 6"	2	CASEMENT WINDOW W/ MUNTINS
E	3' - 0"	6' - 0"	2	DOUBLE HUNG
G	2' - 0"	3' - 0"	3	CASEMENT WINDOW W/ MUNTINS

HEATED AREAS	
LEVEL 1	1,525 SF
LEVEL 2	1,037 SF
TOTAL	2,562 SF

OTHER AREAS	
BACK PORCH	314 SF
BASEMENT	1,546 SF
CART GARAGE	78 SF
FRONT PORCH	285 SF
GARAGE	264 SF

DOOR NOTES:

DOOR BASIS OF DESIGN:
SIMPSON DOOR CO.

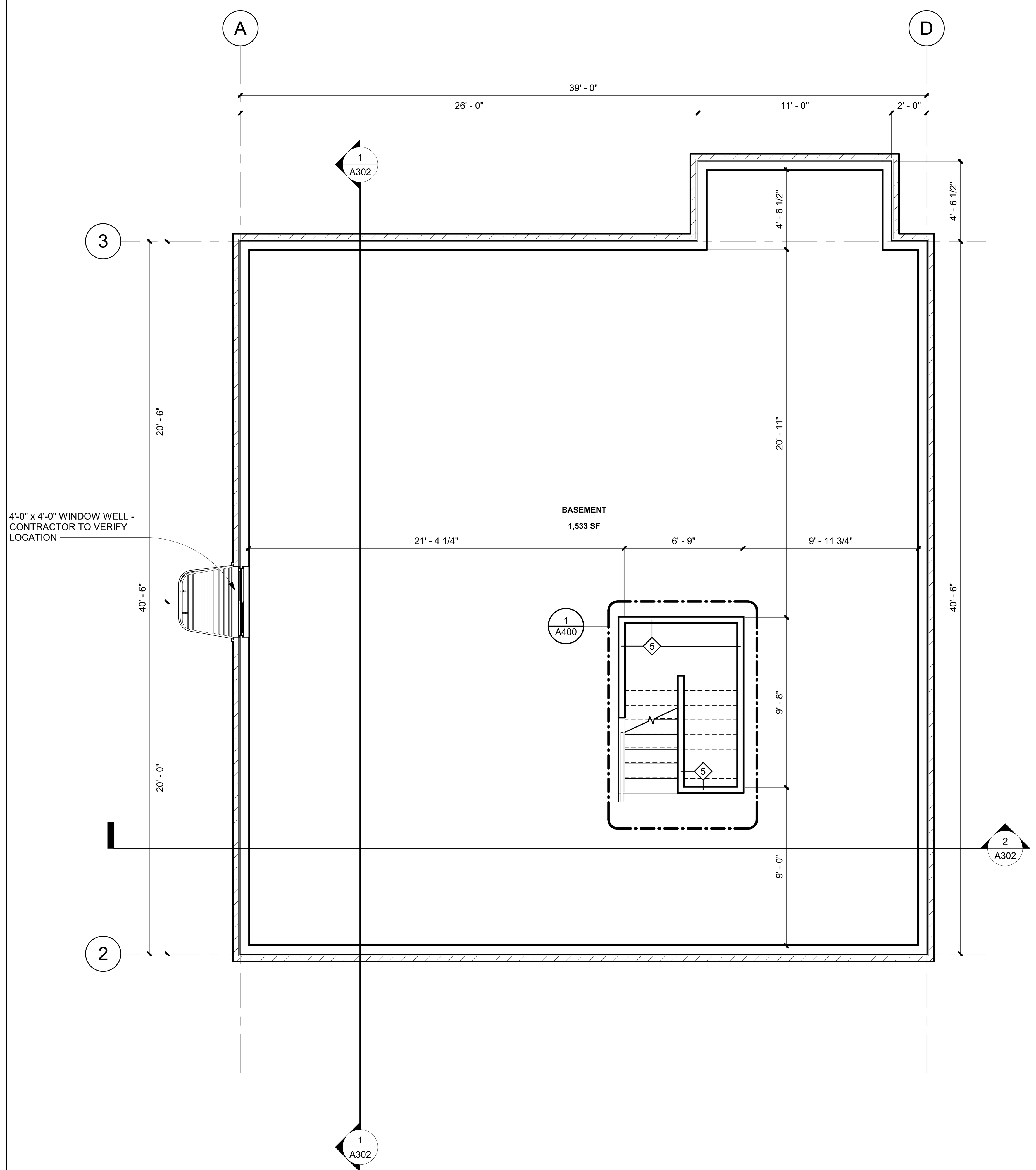
REFER TO ELEVATIONS FOR EXTERIOR CONDITIONS AT HEAD, JAMB, AND SILL

WINDOW NOTES:

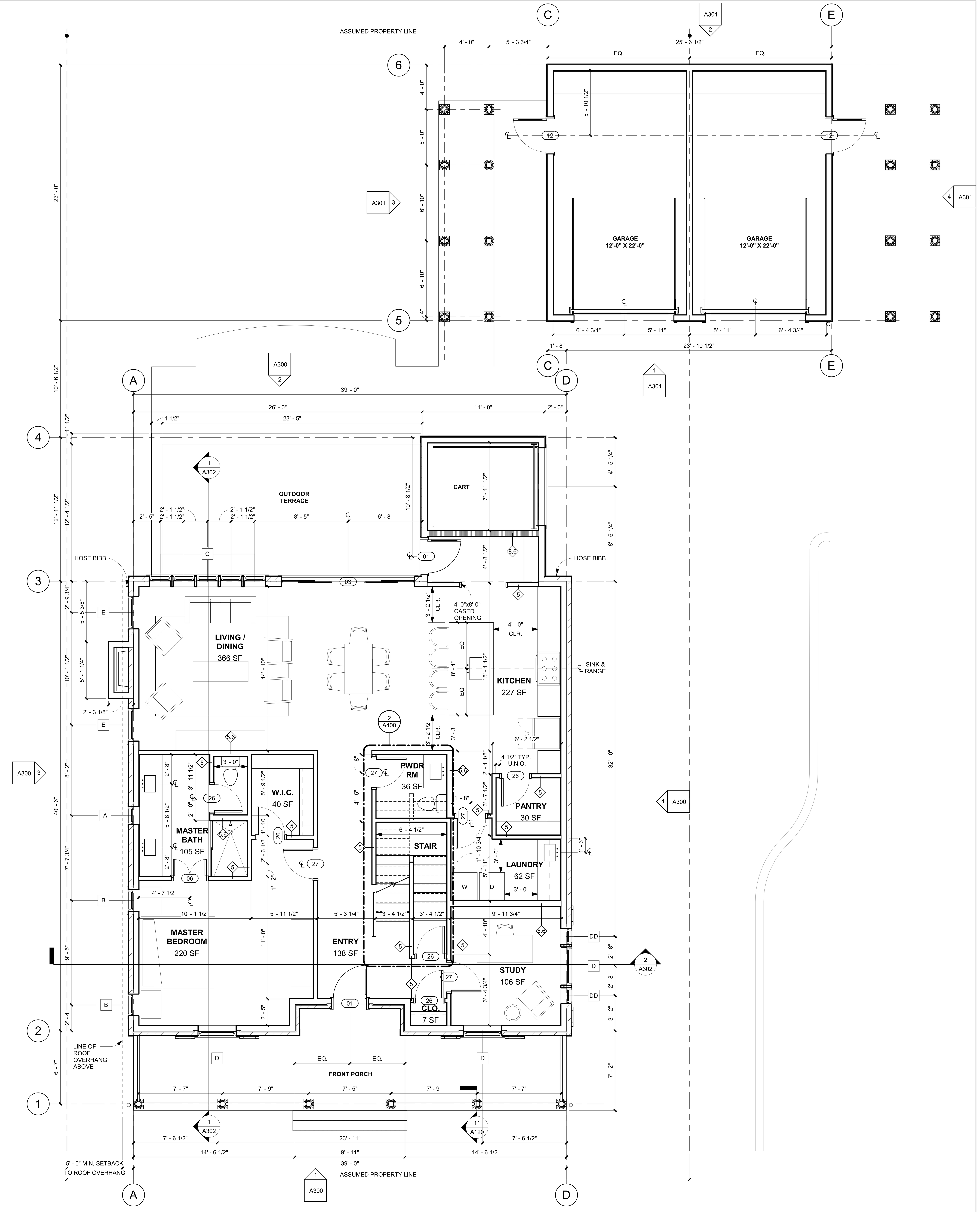
WINDOW BASIS OF DESIGN:
MATHEWS BROTHERS - SPENCER WALCOTT SERIES
MUST MAINTAIN MIN. R. VALUE OF 0.19

REFER TO ELEVATIONS FOR EXTERIOR CONDITIONS AT HEAD, JAMB, AND SILL

WINDOW SILL SHALL BE MIN. 2'-0" A.F.F.



1 BASEMENT LEVEL
A111 1/4" = 1'-0"



2 LEVEL 1
A111 1/4" = 1'-0"

RABUN ARCHITECTS
260 Peachtree St. NW, Suite 600
Atlanta, Georgia 30303
Ph: 404-522-9455

UNIT OPTION - 1

CRANBERRY POINT
QUINAQUISSET AVE, MASHPEE, MA

NOT FOR CONSTRUCTION

REVISIONS

No	Date	Description

DRAWING TITLE

FLOOR PLAN - BASEMENT & LEVEL 1

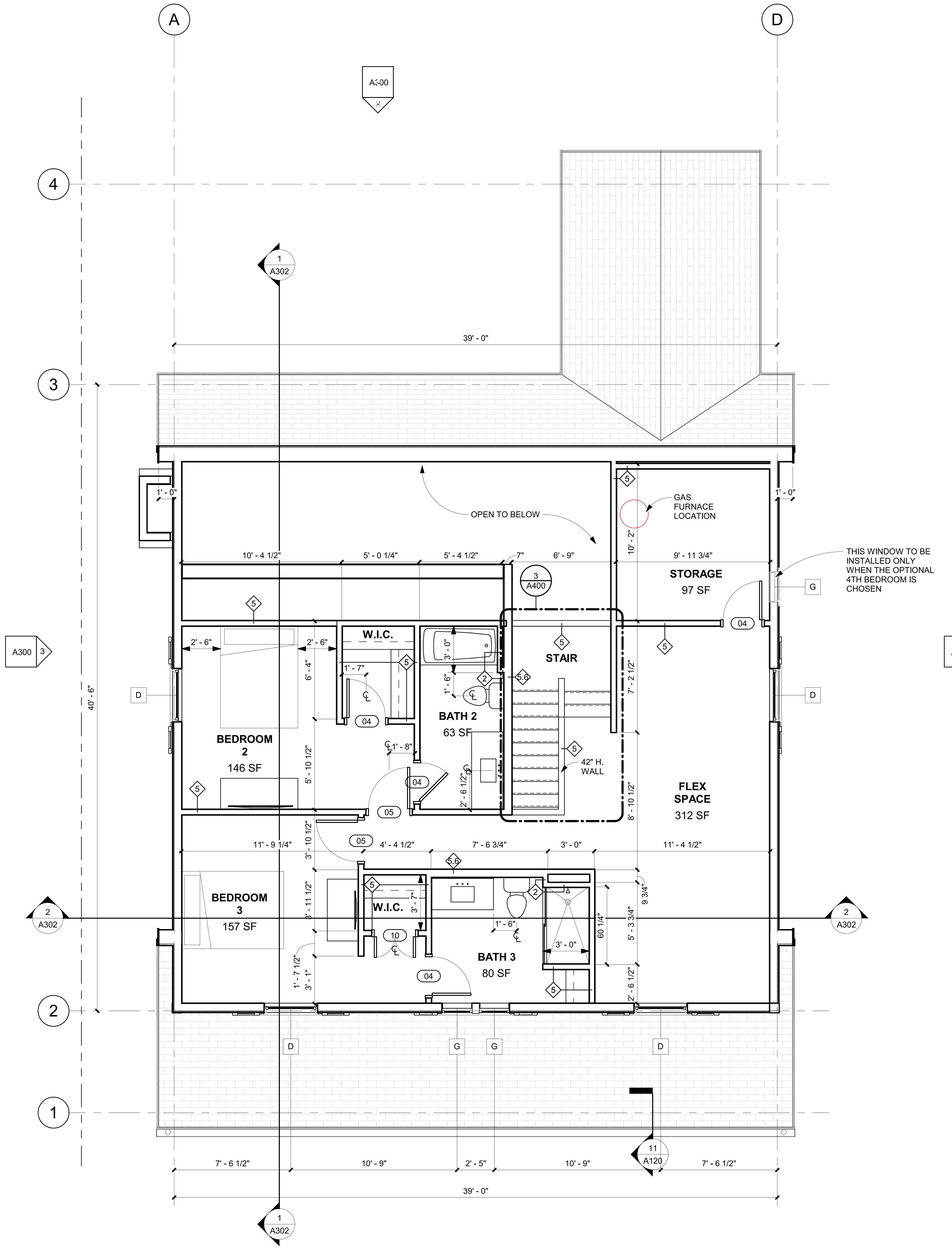
PROJECT NUMBER

21140

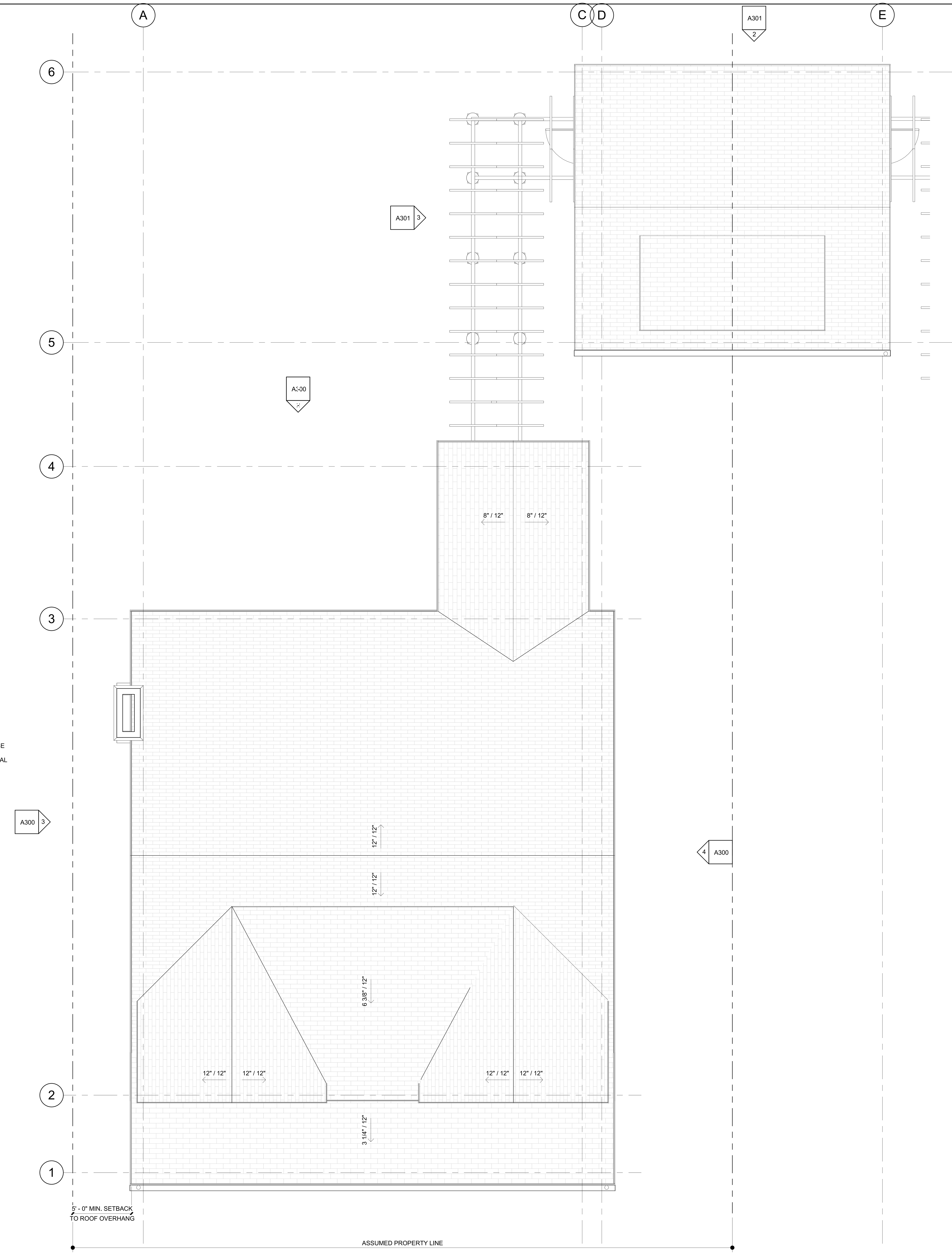
DATE

01/03/23

A111



LEVEL 2
1/4" = 1'-0"



ROOF PLAN
1/4" = 1'-0"

RABUN ARCHITECTS
260 Peachtree St. NW, Suite 600
Atlanta, Georgia 30303
Ph: 404-522-9455

UNIT OPTION - 1

CRANBERRY POINT
QUINAQUISSET AVE, MASHPEE, MA

NOT FOR CONSTRUCTION

REVISIONS

No	Date	Description

DRAWING TITLE

FLOOR PLAN - LEVEL 2 & ROOF

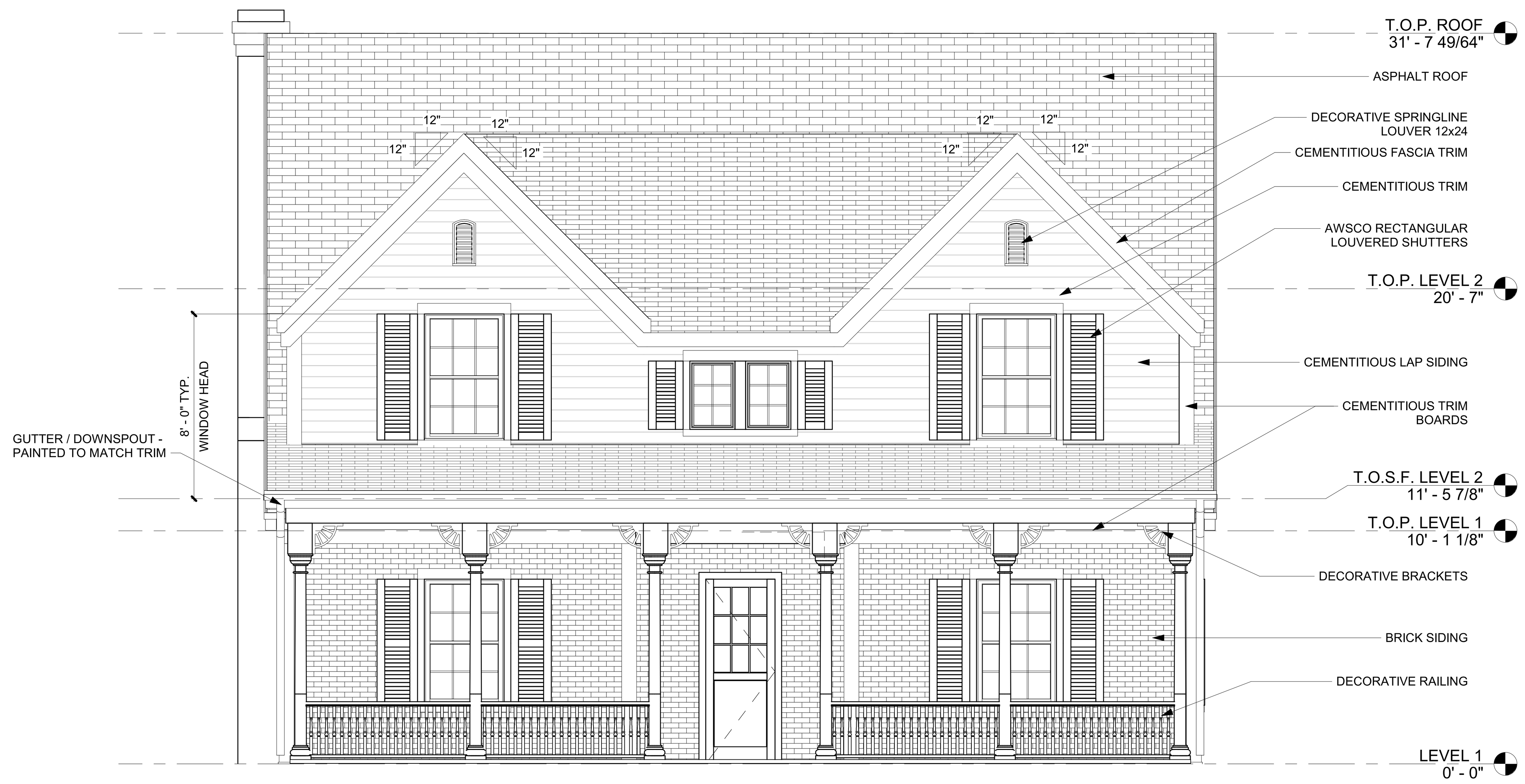
PROJECT NUMBER

21140

DATE

01/03/23

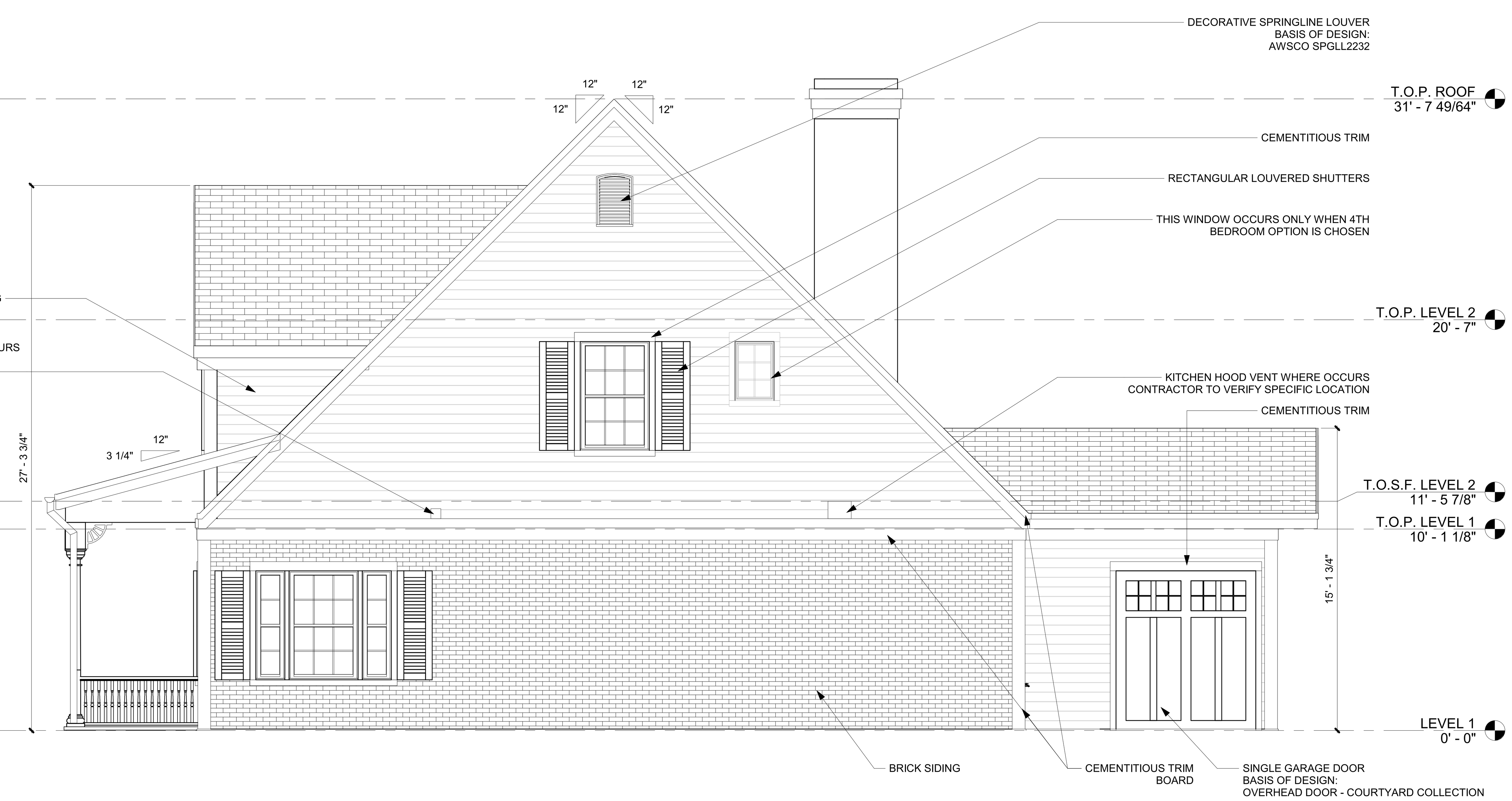
A112



1 A300 FRONT ELEVATION
1/4" = 1'-0"

2 A300 REAR ELEVATION
1/4" = 1'-0"

3 A300 LEFT SIDE ELEVATION
1/4" = 1'-0"



4 A300 RIGHT SIDE ELEVATION
1/4" = 1'-0"

RABUN ARCHITECTS

260 Peachtree St. NW, Suite 600
Atlanta, Georgia 30303
Ph: 404-522-9455

UNIT OPTION - 1

CRANBERRY POINT
QUINAQUISSET AVE, MASHPEE, MA

NOT FOR CONSTRUCTION

REVISIONS

No	Date	Description

DRAWING TITLE

EXTERIOR ELEVATIONS

PROJECT NUMBER

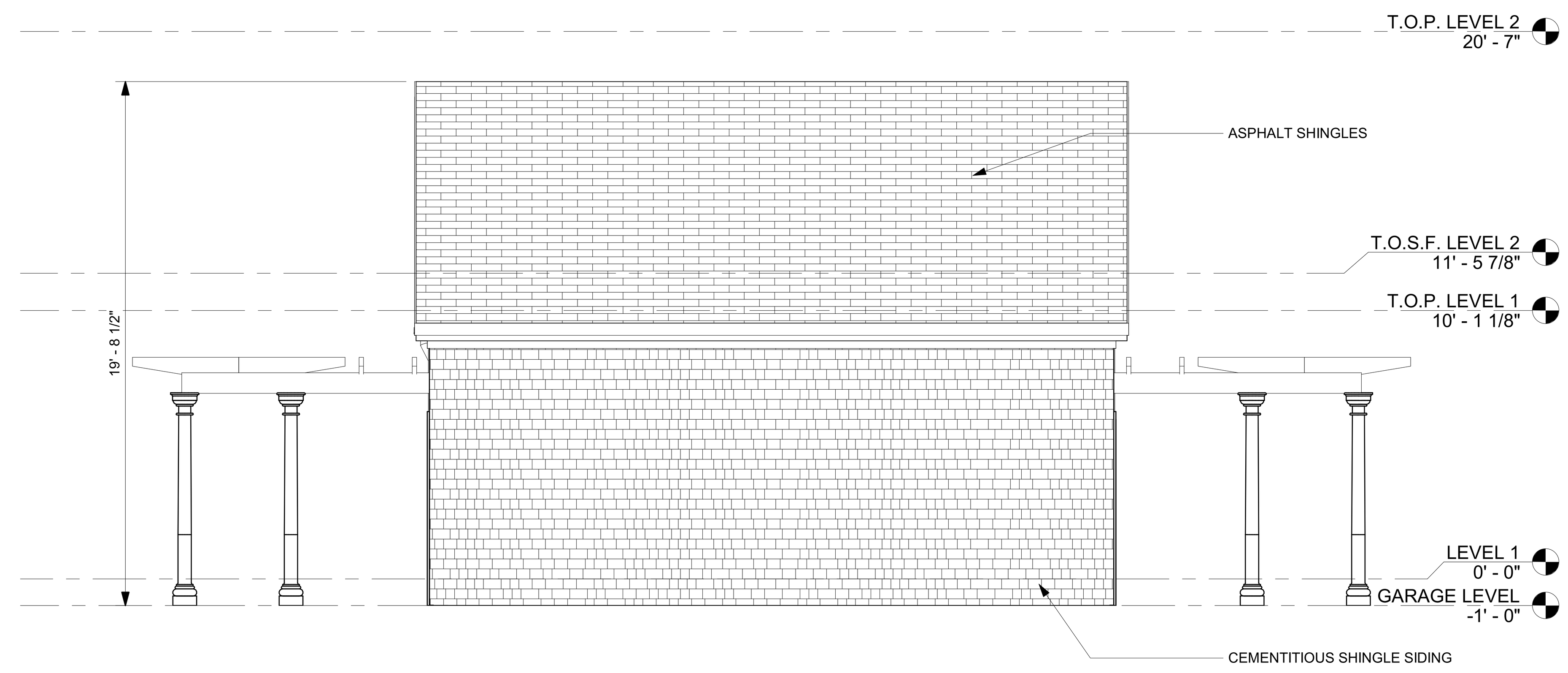
21140

DATE

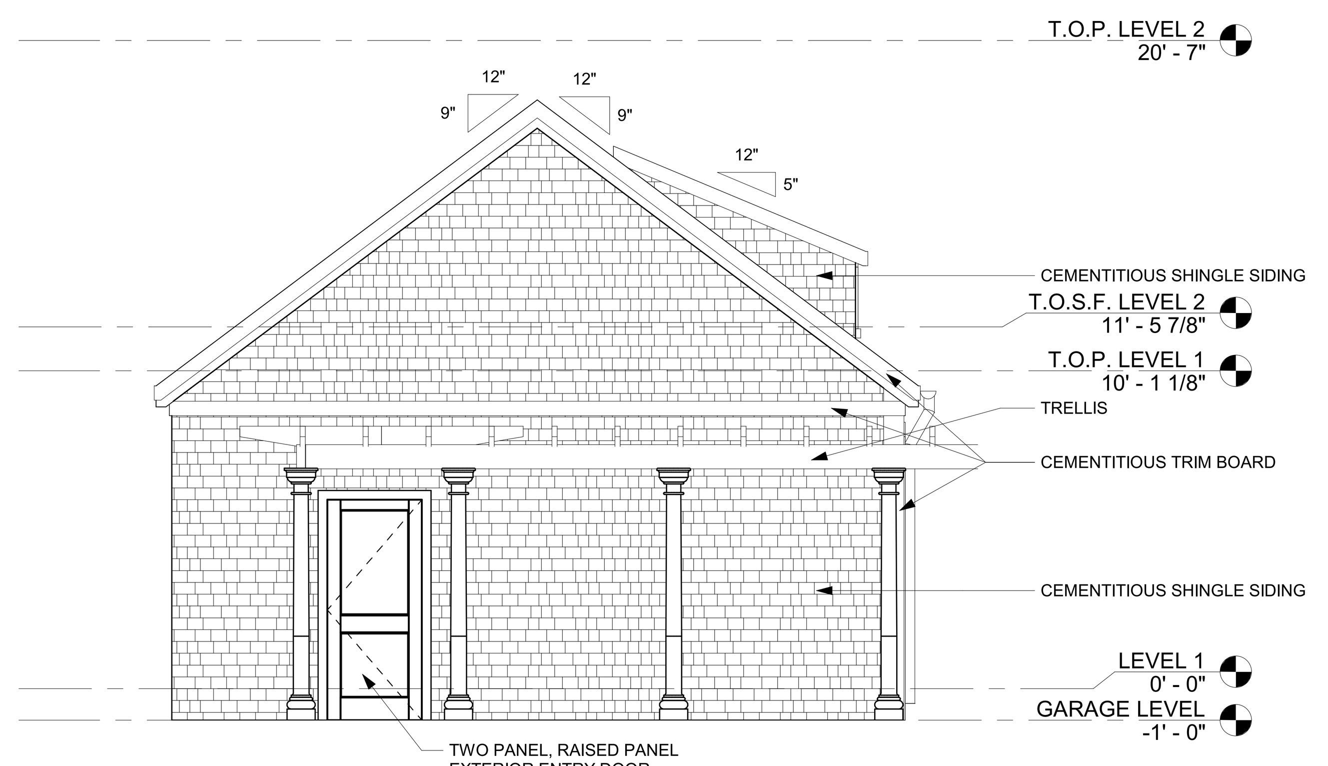
01/03/23

A300

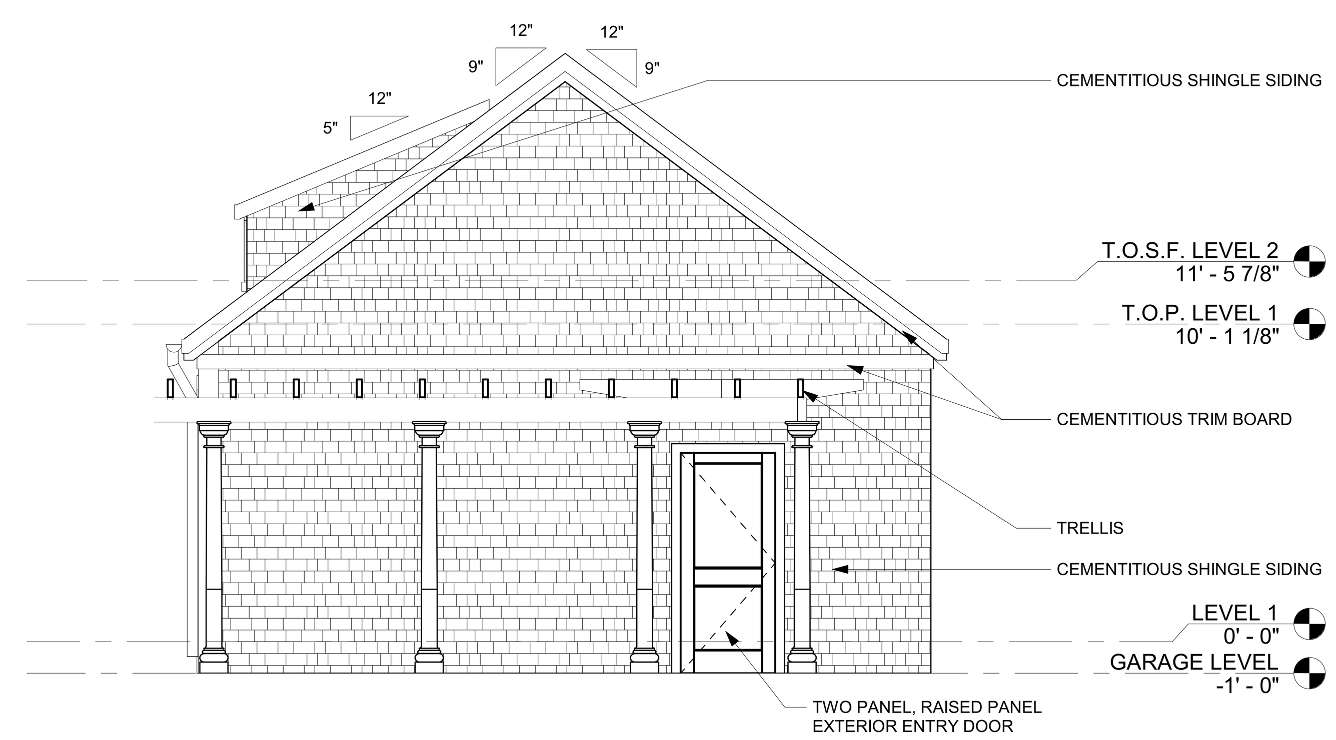
1 A301 FRONT ELEVATION
1/4" = 1'-0"



2 A301 REAR ELEVATION
1/4" = 1'-0"



3 A301 LEFT SIDE ELEVATION
1/4" = 1'-0"



4 A301 RIGHT SIDE ELEVATION
1/4" = 1'-0"

R
RABUN
ARCHITECTS
260 Peachtree St. NW, Suite 600
Atlanta, Georgia 30303
Ph: 404-522-9455

UNIT OPTION - 1

CRANBERRY POINT
QUINAQUISSET AVE, MASHPEE, MA

NOT FOR CONSTRUCTION

REVISIONS

No	Date	Description

DRAWING TITLE

EXTERIOR ELEVATIONS - GARAGE

PROJECT NUMBER

21140

DATE

01/03/23

A301

Article____:

To see if the Town will vote to amend §174-31, Landspace Requirements Table by adding new footnote 15 to read as follows:

[15] Minimum lot frontage required for the development of solar energy systems shall be twenty-five (25) feet.

Submitted by Planning Board

Explanation

This article would allow the development of solar energy systems on lots that have a minimum of twenty-five (25) feet by amending the footnotes of the Landspace Requirements table in the Zoning Bylaw. 150 feet of frontage is the minimum requirement for other uses in the Town. The Town may consider reducing frontage to encourage solar energy on otherwise unbuildable lots. Solar Energy systems require only one access driveway for maintenance.

Article _____:

To see if the Town will vote to add new section 174-45.7: Solar Energy Systems to the Mashpee Zoning Bylaws as follows:

Solar Energy Systems

Purpose and Intent

This section promotes the creation of new small, medium and large-scale, ground-mounted solar energy systems by providing standards for the placement, design, construction, operation, monitoring, modification and removal of such installations that address public safety, minimize impacts on scenic, natural and historic resources and for providing adequate financial assurance for the eventual decommissioning of such installations. This section ordinance is adopted pursuant to the Commonwealth of Massachusetts Green Communities Act and Massachusetts General Laws Chapter 40A Section 3.

General Provisions

A. Small scale ground mounted solar energy systems and roof mounted solar energy systems shall be considered an accessory use allowed as-of-right in the R-3, R-5, C-1, C-2, C-3, and I-1 districts. In issuing such building permit, the Building Inspector shall ensure that neighboring properties are effectively protected from any adverse impacts from glare.

B. Any medium or large scale solar energy system shall be allowed in the C-1 and C-2 Zoning Districts only after the issuance of a Special Permit by the Planning Board. In issuing such Special Permit, the Board shall ensure that neighboring properties are effectively protected from any significant adverse impacts from glare, that any such systems are properly fenced or otherwise secured, and that no hazardous materials are stored in quantities greater than permitted by other sections of this bylaw.

C. Any medium or large scale solar energy system in the I-1 Industrial Zoning District shall be allowed after review and approval by the Plan Review Committee.

D. The construction and operation of all ground-mounted solar energy systems shall be consistent with all applicable local, state and federal requirements, including but not limited to all applicable safety, construction, electrical, and communications requirements. All buildings and fixtures forming part of a ground-mounted solar energy system shall be constructed in accordance with the Massachusetts State Building Code.

D. The solar energy system's owner or operator shall maintain the facility in good condition. Maintenance shall include, but not be limited to, painting, structural repairs, and integrity of security measures. Site access shall be maintained to a level acceptable to the local Fire Chief and Emergency Management Director. The owner or operator shall be responsible for the cost of maintaining the ground-mounted solar energy system and any access road(s).

E. No solar energy system may use panel's manufactured with per-and polyfluoroalkyl substances (PFAS).

E. Dimensional Criteria

1. Small Scale Solar Energy Systems
   a) Small scale ground mounted systems shall comply with the setback requirements typical of the zoning district and shall not exceed fifteen (15') feet in height.

   b) Small scale ground mounted systems shall be exempt from the performance standards defined in Section G of this chapter.

2. Medium and Large Scale Solar Energy Systems
   a. Medium and Large Scale Solar energy systems may be accessory to another principal structure or use provided that they satisfy the dimensional criteria and performance standards contained in this section.

   b. Ground-mounted solar energy systems shall be set back a distance of at least 100 feet from a public or private way. The Planning Board may reduce the minimum setback distance as appropriate based on site-specific considerations.

   c. Ground-mounted solar energy systems shall be set back a distance of at least 125 feet from any inhabited Residence, and 100 feet from any property in residential use. For the purposes of this section, a Residence is defined as the primary living structure and not accessory structures. The Planning Board may reduce the minimum setback distance as appropriate based on site-specific considerations.

   d. Ground-mounted solar energy systems shall be set back a distance of at least 50 feet from any commercial property or use, and 25 feet from any industrial property or use notwithstanding the provisions of paragraph 2 above (relative to medium and large scale solar energy systems). The Planning Board may reduce the minimum setback distance as appropriate based on site-specific considerations.

   e. Ground-mounted solar energy systems shall be set back a distance of at least 50 feet from abutting conservation land and any property not included in the Ground-mounted solar array application. The Planning Board may reduce the minimum setback distance as appropriate based on site-specific considerations.

   f. Ground-mounted systems (medium and large) shall be set back a distance of at least 200 feet from any river and set back a distance of at least 100 feet from any water and wetlands.

g. Fixed tilt Ground-mounted solar energy systems shall have a maximum height of 15 feet above grade. In the case of single or dual axis tracking Ground-mounted solar energy systems, the Planning Board may increase the maximum height as appropriate based on site-specific considerations.

h. Inverters, energy storage systems, and transmission system substations shall be set back a distance of at least 200 feet from any residence. The Planning Board may reduce the minimum setback distance as appropriate based on site-specific considerations.

F. Special Permits Rules and Application Requirements

A Solar Energy System Special Permit shall not be granted unless each of the following requirements, in addition to the requirements in §174-24 C Special Permit use, are satisfied:

1. A properly completed and executed application form and application fee
2. Any requested waivers
3. Name, address, phone number and signature of the project proponent, as well as all co-proponents or property owners, if any
4. Name, contact information and signature of any agents representing the project proponent
5. Name, address, and contact information for proposed system installer
6. Documentation of actual or prospective access and control of the project site sufficient to allow for construction and operation of the proposed solar energy system
7. Proposed hours of operation and construction activity
8. Blueprints or drawings of the solar energy system signed by a Massachusetts licensed Registered Professional Engineer showing the proposed layout of the system and any potential shading from nearby structures
9. Utility Notification - evidence that the utility company that operates the electrical grid where a grid-intertie solar energy system is to be located has been informed of the system owner or operator's intent to install an interconnected facility and acknowledges receipt of such notification, and a copy of an Interconnection Application filed with the utility including a one or three line electrical diagram detailing the solar electric installation, associated components, and electrical interconnection methods, with all Massachusetts Electrical Code (527 CMR § 12.00) compliant disconnects and overcurrent devices. Off-grid solar energy systems shall be exempt from this requirement.
10. Documentation of the major system components to be used, including the electric generating components, battery or other electric storage systems, transmission systems, mounting system, inverter, etc.
11. Preliminary Operation & Maintenance Plan for the solar energy system, which shall include measures for maintaining safe access to the installation, storm water management, vegetation controls, and general procedures for operational maintenance of the installation
12. Abandonment & Decommissioning Plan - Any ground-mounted solar energy system which has reached the end of its useful life or has been abandoned (i.e., when it fails to

operate for more than one year without the written consent of the Planning Board) shall be removed. The owner or operator shall physically remove the installation within 150 days of abandonment or the proposed date of decommissioning. The owner or operator shall notify the Planning Board by certified mail of the proposed date of discontinued operations and plans for removal. The Abandonment & Decommissioning Plan shall include a detailed description of how all of the following will be addressed:

a. Physical removal of all structures; equipment, building, security barriers and transmission lines from the site, including any materials used to limit vegetation.
b. Disposal of all solid and hazardous waste in accordance with local, state, and federal waste disposal regulations.
c. Stabilization or re-vegetation of the site as necessary to minimize erosion. The Planning Board may allow landscaping or below-grade foundations left *in situ* in order to minimize erosion and disturbance of the site.
d. Description of financial surety for decommissioning - Proponents of ground-mounted solar energy systems shall provide a form of surety, either through escrow account, bond or other form of surety approved by the Planning Board to cover the cost of removal in the event the Town must remove the installation and remediate the landscape, in an amount and form determined to be commercially reasonable by the Planning Board, but in no event to exceed more than 125 percent of the cost of removal and compliance with the additional requirements set forth herein, as determined by the project proponent and the Town. Such surety will not be required for municipal or state-owned facilities. The project proponent shall submit a fully inclusive estimate of the costs associated with removal, prepared by a qualified engineer. The amount shall include a mechanism for calculating increased removal costs due to inflation.
e. It shall be a condition of any special permit that all legal documents required to enable the Town to exercise its rights and responsibilities under the plan to decommission the site, enter the property and physically remove the installation shall be provided prior to the issuance of a building permit.

13. Proof of liability insurance
14. A storm water management plan prepared by a Massachusetts licensed Registered Professional Engineer
15. A Site Plan, with stamp and signature of the Massachusetts licensed Registered Professional Engineer that prepared the plan, including the following:
    a. Everything required under this bylaw and Site Plan Approval
    b. Existing Conditions Plan, showing property lines, map and lot from the Assessor's records, and physical features, including roads and topography, for the entire project site, signed and sealed by a Massachusetts licensed Registered Land Surveyor
    c. Proposed changes to the landscape of the site, grading, vegetation clearing and planting, exterior lighting, screening vegetation, fencing or structures including their height, and placement of system components, including solar arrays and related structures and equipment

d. An estimate of earthwork operations including the volume of cut and fill and the amount of soil material to be imported or exported from the site
e. Locations of wetlands, vernal pools, and Priority Habitat Areas defined by the Natural Heritage & Endangered Species Program (NHESP)
f. Locations of floodplain area(s)
g. Zoning district designation for the parcel(s) of land comprising the project site (submission of a copy of a zoning map with the parcel(s) identified is suitable for this purpose)
h. Materials storage and delivery and equipment staging area(s)
i. Location of screening vegetation or structures

G. Required Performance Standards – Medium and Large Scale Solar Energy Systems

1. Visual Impact Mitigation – The site plan for a ground-mounted solar energy system shall be designed to screen the array to the maximum extent practicable year round from adjacent properties in residential use and from all roadways.

2. All required setbacks shall be left in their undisturbed natural vegetated condition for the duration of the solar energy system's installation. In situations where the naturally vegetated condition within required setbacks is not wooded and does provide adequate screening of the solar array, the Planning Board may require additional intervention including, but not limited to:

   a. A landscaping plan showing sufficient trees and understory vegetation, of a type common in natural areas of Mashpee, to replicate a naturally wooded area and to constitute a visual barrier between the proposed array and neighboring properties and roadways
   b. Berms along property lines and roadways with suitable plantings to provide adequate screening to neighboring properties and roadways.

3. Lighting – Lighting of ground-mounted solar energy systems shall be limited to that required for safety and operational purposes, and shall be reasonably shielded from abutting properties. Lighting shall be directed downward and shall incorporate full cut-off fixtures to reduce light pollution.

4. Signage – Signs on ground-mounted solar energy systems shall comply with all applicable regulations of this bylaw and/or any Town sign bylaw. A sign shall be required to identify the owner, operator and interconnected utility and provide a 24-hour emergency contact

phone number. Ground-mounted solar energy systems shall not be used for displaying any advertising signage.

5. Utility Connections – Within setback distances and except where soil conditions, location, property shape, and topography of the site or requirements of the utility provider prevent it, all utility connections from grid-intertie solar energy systems shall be placed underground. Electrical transformers for utility interconnections may be above ground if required by the utility provider.

6. Vegetation Management – All land associated with the ground-mounted solar energy system shall be covered and grown in natural vegetation. The height of vegetation must be managed by regular mowing or grazing so as to minimize the amount and height of combustible material available in case of fire. Herbicides, pesticides, or chemical fertilizers shall not be used to manage vegetation. To the greatest extent practicable, a diversity of plant species shall be used, with preference given to species that are native to New England. Use of plants identified by the most recent copy of the "Massachusetts Prohibited Plant List" maintained by the Massachusetts Department of Agricultural Resources is prohibited. Management of all vegetated areas shall be maintained throughout the duration of the solar energy system's installation through mechanical means without the use of chemical herbicides.

7. Noise Generation – Noise generated by ground-mounted solar energy systems and associated equipment and machinery shall conform to applicable state and local noise regulations, including the DEP's Division of Air Quality noise regulations, 310 CMR 7.10.

8. Fencing – Fencing around solar arrays shall provide 6 inches of clearance between the fence bottom and the ground to allow passage of small wildlife. Clearance shall not exceed 6 inches unless otherwise approved by the Planning Board in its written decision for good cause. The Planning Board shall require residential style fencing where necessary to screen the solar energy systems year round from adjacent residences.

9. Land Clearing and Soil Erosion – Clearing of natural vegetation and topsoil shall be limited to what is necessary for the construction, operation and maintenance of the ground-mounted solar energy system. No topsoil removed during construction shall be exported from the site.

10. Erosion Control and Stormwater – Erosion Control and Stormwater Management notation shall be included to show that adequate provisions against erosion and adverse impacts of runoff are appropriately mitigated.

11. Emergency Services – The ground-mounted solar energy system owner or operator shall provide a copy of the project summary, electrical schematic, and site plan to the Mashpee Fire Department, and any other neighboring Fire Department upon request. Upon

request the owner or operator shall cooperate with local emergency services in developing an emergency response plan. All means of shutting down the solar energy system shall be clearly marked. The owner or operator shall identify a responsible person for public inquiries throughout the life of the installation.

H. The Planning Board may, upon the prior written request of the applicant, waive any of the requirements of this Section, but must state their reasons for doing so in writing as part of their decision.

Submitted by Planning Board

EXPLANATION

This article would expand solar energy system uses for medium scale (up to 40,000 square feet) and large scale (greater than 40,000 square feet) into the C-1 and C-2 Commercial Zoning Districts. Any medium and large scale solar energy system proposed in either of those zoning distructs would require an application to the Planning Board for a special permit outlining compliance with the minimum required performance standards of this article.

Article _____:

To see if the Town will vote to add new section 174-45.7: Solar Energy Systems to the Mashpee Zoning Bylaws as follows:

Solar Energy Systems

Purpose and Intent

This section promotes the creation of new small, medium and large-scale, ground-mounted solar energy systems by providing standards for the placement, design, construction, operation, monitoring, modification and removal of such installations that address public safety, minimize impacts on scenic, natural and historic resources and for providing adequate financial assurance for the eventual decommissioning of such installations. This section ordinance is adopted pursuant to the Commonwealth of Massachusetts Green Communities Act and Massachusetts General Laws Chapter 40A Section 3.

General Provisions

A. Small scale ground mounted solar energy systems and roof mounted solar energy systems shall be considered an accessory use allowed as-of-right in the R-3, R-5, C-1, C-2, C-3, and I-1 districts. In issuing such building permit, the Building Inspector shall ensure that neighboring properties are effectively protected from any adverse impacts from glare.

B. Any medium or large scale solar energy system shall be allowed in the C-1 and C-2 Zoning Districts only after the issuance of a Special Permit by the Planning Board. In issuing such Special Permit, the Board shall ensure that neighboring properties are effectively protected from any significant adverse impacts from glare, that any such systems are properly fenced or otherwise secured, and that no hazardous materials are stored in quantities greater than permitted by other sections of this bylaw.

C. Any medium or large scale solar energy system in the I-1 Industrial Zoning District shall be allowed after review and approval by the Plan Review Committee.

D. The construction and operation of all ground-mounted solar energy systems shall be consistent with all applicable local, state and federal requirements, including but not limited to all applicable safety, construction, electrical, and communications requirements. All buildings and fixtures forming part of a ground-mounted solar energy system shall be constructed in accordance with the Massachusetts State Building Code.

D. The solar energy system's owner or operator shall maintain the facility in good condition. Maintenance shall include, but not be limited to, painting, structural repairs, and integrity of security measures. Site access shall be maintained to a level acceptable to the local Fire Chief and Emergency Management Director. The owner or operator shall be responsible for the cost of maintaining the ground-mounted solar energy system and any access road(s).

E. No solar energy system may use panel's manufactured with per-and polyfluoroalkyl substances (PFAS).

E. Dimensional Criteria

1. Small Scale Solar Energy Systems
   a) Small scale ground mounted systems shall comply with the setback requirements typical of the zoning district and shall not exceed fifteen (15') feet in height.

   b) Small scale ground mounted systems shall be exempt from the performance standards defined in Section G of this chapter.

2. Medium and Large Scale Solar Energy Systems
   a. Medium and Large Scale Solar energy systems may be accessory to another principal structure or use provided that they satisfy the dimensional criteria and performance standards contained in this section.

   b. Ground-mounted solar energy systems shall be set back a distance of at least 100 feet from a public or private way. The Planning Board may reduce the minimum setback distance as appropriate based on site-specific considerations.

   c. Ground-mounted solar energy systems shall be set back a distance of at least 125 feet from any inhabited Residence, and 100 feet from any property in residential use. For the purposes of this section, a Residence is defined as the primary living structure and not accessory structures. The Planning Board may reduce the minimum setback distance as appropriate based on site-specific considerations.

   d. Ground-mounted solar energy systems shall be set back a distance of at least 50 feet from any commercial property or use, and 25 feet from any industrial property or use notwithstanding the provisions of paragraph 2 above (relative to medium and large scale solar energy systems). The Planning Board may reduce the minimum setback distance as appropriate based on site-specific considerations.

   e. Ground-mounted solar energy systems shall be set back a distance of at least 50 feet from abutting conservation land and any property not included in the Ground-mounted solar array application. The Planning Board may reduce the minimum setback distance as appropriate based on site-specific considerations.

   f. Ground-mounted systems (medium and large) shall be set back a distance of at least 200 feet from any river and set back a distance of at least 100 feet from any water and wetlands.

g. Fixed tilt Ground-mounted solar energy systems shall have a maximum height of 15 feet above grade. In the case of single or dual axis tracking Ground-mounted solar energy systems, the Planning Board may increase the maximum height as appropriate based on site-specific considerations.

h. Inverters, energy storage systems, and transmission system substations shall be set back a distance of at least 200 feet from any residence. The Planning Board may reduce the minimum setback distance as appropriate based on site-specific considerations.

F. Special Permits Rules and Application Requirements

A Solar Energy System Special Permit shall not be granted unless each of the following requirements, in addition to the requirements in §174-24 C Special Permit use, are satisfied:

1. A properly completed and executed application form and application fee
2. Any requested waivers
3. Name, address, phone number and signature of the project proponent, as well as all co-proponents or property owners, if any
4. Name, contact information and signature of any agents representing the project proponent
5. Name, address, and contact information for proposed system installer
6. Documentation of actual or prospective access and control of the project site sufficient to allow for construction and operation of the proposed solar energy system
7. Proposed hours of operation and construction activity
8. Blueprints or drawings of the solar energy system signed by a Massachusetts licensed Registered Professional Engineer showing the proposed layout of the system and any potential shading from nearby structures
9. Utility Notification - evidence that the utility company that operates the electrical grid where a grid-intertie solar energy system is to be located has been informed of the system owner or operator's intent to install an interconnected facility and acknowledges receipt of such notification, and a copy of an Interconnection Application filed with the utility including a one or three line electrical diagram detailing the solar electric installation, associated components, and electrical interconnection methods, with all Massachusetts Electrical Code (527 CMR § 12.00) compliant disconnects and overcurrent devices. Off-grid solar energy systems shall be exempt from this requirement.
10. Documentation of the major system components to be used, including the electric generating components, battery or other electric storage systems, transmission systems, mounting system, inverter, etc.
11. Preliminary Operation & Maintenance Plan for the solar energy system, which shall include measures for maintaining safe access to the installation, storm water management, vegetation controls, and general procedures for operational maintenance of the installation
12. Abandonment & Decommissioning Plan - Any ground-mounted solar energy system which has reached the end of its useful life or has been abandoned (i.e., when it fails to

operate for more than one year without the written consent of the Planning Board) shall be removed. The owner or operator shall physically remove the installation within 150 days of abandonment or the proposed date of decommissioning. The owner or operator shall notify the Planning Board by certified mail of the proposed date of discontinued operations and plans for removal. The Abandonment & Decommissioning Plan shall include a detailed description of how all of the following will be addressed:

a. Physical removal of all structures; equipment, building, security barriers and transmission lines from the site, including any materials used to limit vegetation.
b. Disposal of all solid and hazardous waste in accordance with local, state, and federal waste disposal regulations.
c. Stabilization or re-vegetation of the site as necessary to minimize erosion. The Planning Board may allow landscaping or below-grade foundations left *in situ* in order to minimize erosion and disturbance of the site.
d. Description of financial surety for decommissioning - Proponents of ground-mounted solar energy systems shall provide a form of surety, either through escrow account, bond or other form of surety approved by the Planning Board to cover the cost of removal in the event the Town must remove the installation and remediate the landscape, in an amount and form determined to be commercially reasonable by the Planning Board, but in no event to exceed more than 125 percent of the cost of removal and compliance with the additional requirements set forth herein, as determined by the project proponent and the Town. Such surety will not be required for municipal or state-owned facilities. The project proponent shall submit a fully inclusive estimate of the costs associated with removal, prepared by a qualified engineer. The amount shall include a mechanism for calculating increased removal costs due to inflation.
e. It shall be a condition of any special permit that all legal documents required to enable the Town to exercise its rights and responsibilities under the plan to decommission the site, enter the property and physically remove the installation shall be provided prior to the issuance of a building permit.

13. Proof of liability insurance
14. A storm water management plan prepared by a Massachusetts licensed Registered Professional Engineer
15. A Site Plan, with stamp and signature of the Massachusetts licensed Registered Professional Engineer that prepared the plan, including the following:
    a. Everything required under this bylaw and Site Plan Approval
    b. Existing Conditions Plan, showing property lines, map and lot from the Assessor's records, and physical features, including roads and topography, for the entire project site, signed and sealed by a Massachusetts licensed Registered Land Surveyor
    c. Proposed changes to the landscape of the site, grading, vegetation clearing and planting, exterior lighting, screening vegetation, fencing or structures including their height, and placement of system components, including solar arrays and related structures and equipment

d. An estimate of earthwork operations including the volume of cut and fill and the amount of soil material to be imported or exported from the site
e. Locations of wetlands, vernal pools, and Priority Habitat Areas defined by the Natural Heritage & Endangered Species Program (NHESP)
f. Locations of floodplain area(s)
g. Zoning district designation for the parcel(s) of land comprising the project site (submission of a copy of a zoning map with the parcel(s) identified is suitable for this purpose)
h. Materials storage and delivery and equipment staging area(s)
i. Location of screening vegetation or structures

G. Required Performance Standards – Medium and Large Scale Solar Energy Systems

1. Visual Impact Mitigation – The site plan for a ground-mounted solar energy system shall be designed to screen the array to the maximum extent practicable year round from adjacent properties in residential use and from all roadways.

2. All required setbacks shall be left in their undisturbed natural vegetated condition for the duration of the solar energy system's installation. In situations where the naturally vegetated condition within required setbacks is not wooded and does provide adequate screening of the solar array, the Planning Board may require additional intervention including, but not limited to:

    a. A landscaping plan showing sufficient trees and understory vegetation, of a type common in natural areas of Mashpee, to replicate a naturally wooded area and to constitute a visual barrier between the proposed array and neighboring properties and roadways
    b. Berms along property lines and roadways with suitable plantings to provide adequate screening to neighboring properties and roadways.

3. Lighting – Lighting of ground-mounted solar energy systems shall be limited to that required for safety and operational purposes, and shall be reasonably shielded from abutting properties. Lighting shall be directed downward and shall incorporate full cut-off fixtures to reduce light pollution.

4. Signage – Signs on ground-mounted solar energy systems shall comply with all applicable regulations of this bylaw and/or any Town sign bylaw. A sign shall be required to identify the owner, operator and interconnected utility and provide a 24-hour emergency contact

phone number. Ground-mounted solar energy systems shall not be used for displaying any advertising signage.

5. Utility Connections – Within setback distances and except where soil conditions, location, property shape, and topography of the site or requirements of the utility provider prevent it, all utility connections from grid-intertie solar energy systems shall be placed underground. Electrical transformers for utility interconnections may be above ground if required by the utility provider.

6. Vegetation Management – All land associated with the ground-mounted solar energy system shall be covered and grown in natural vegetation. The height of vegetation must be managed by regular mowing or grazing so as to minimize the amount and height of combustible material available in case of fire. Herbicides, pesticides, or chemical fertilizers shall not be used to manage vegetation. To the greatest extent practicable, a diversity of plant species shall be used, with preference given to species that are native to New England. Use of plants identified by the most recent copy of the “Massachusetts Prohibited Plant List” maintained by the Massachusetts Department of Agricultural Resources is prohibited. Management of all vegetated areas shall be maintained throughout the duration of the solar energy system’s installation through mechanical means without the use of chemical herbicides.

7. Noise Generation – Noise generated by ground-mounted solar energy systems and associated equipment and machinery shall conform to applicable state and local noise regulations, including the DEP's Division of Air Quality noise regulations, 310 CMR 7.10.

8. Fencing – Fencing around solar arrays shall provide 6 inches of clearance between the fence bottom and the ground to allow passage of small wildlife. Clearance shall not exceed 6 inches unless otherwise approved by the Planning Board in its written decision for good cause. The Planning Board shall require residential style fencing where necessary to screen the solar energy systems year round from adjacent residences.

9. Land Clearing and Soil Erosion – Clearing of natural vegetation and topsoil shall be limited to what is necessary for the construction, operation and maintenance of the ground-mounted solar energy system. No topsoil removed during construction shall be exported from the site.

10. Erosion Control and Stormwater – Erosion Control and Stormwater Management notation shall be included to show that adequate provisions against erosion and adverse impacts of runoff are appropriately mitigated.

11. Emergency Services – The ground-mounted solar energy system owner or operator shall provide a copy of the project summary, electrical schematic, and site plan to the Mashpee Fire Department, and any other neighboring Fire Department upon request. Upon

request the owner or operator shall cooperate with local emergency services in developing an emergency response plan. All means of shutting down the solar energy system shall be clearly marked. The owner or operator shall identify a responsible person for public inquiries throughout the life of the installation.

H. The Planning Board may, upon the prior written request of the applicant, waive any of the requirements of this Section, but must state their reasons for doing so in writing as part of their decision.

Submitted by Planning Board

EXPLANATION

This article would expand solar energy system uses for medium scale (up to 40,000 square feet) and large scale (greater than 40,000 square feet) into the C-1 and C-2 Commercial Zoning Districts. Any medium and large scale solar energy system proposed in either of those zoning distructs would require an application to the Planning Board for a special permit outlining compliance with the minimum required performance standards of this article.