10 Main Street, Lakeville, MA 02347 | T (508) 923-1010 | F (508) 923-6309
allenmajor.com

ALLEN & MAJOR ASSOCIATES, INC.

December 23, 2024

Hingham Conservation Commission
c/o Shannon Palmer
Conservation Officer
Town of Hingham
210 Central Street
Hingham, MA 02043

A&M Project #: 1179-20A
Re: Response to Comments
55 Industrial Park Road
Notice of Intent

Dear Ms. Palmer and members of the Commission,

On behalf of our client, Saxon Partners, Allen & Major Associates, Inc. (A&M) is providing the following responses to an email dated 12/03/2024 from the Conservation Officer. These comments also reflect comments received my MassDEP as part of the completeness review and issuance of a project file number. Changes to these drawings may be found through the attached Revision 2 of the Site Development Drawings as dated December 23, 2024. These drawings also reflect changes made as a result of the engineering peer review conducted by PGB Engineering, Inc. in a letter dated December 5, 2024. The response to the individual comments to PGB are contained within a separate letter as dated December 23, 2024 to the Hingham Planning Board by A&M. Also, attached hereto is the NOI Supplemental dated November 12, 2024. This information was issued electronically to MassDEP as part of their initial review. The responses contained within also address the initial comments received by the Conservation Officer below.

Please also note that the applicant is requesting the use of land banked parking in conformance with Section V-A.5.o of the Town of Hingham Zoning Bylaws. For compliance with zoning, 70 parking spaces are required. The applicant is requesting to construct only 59 spaces as shown but has provided an allocation that 70 spaces could be constructed if required based on tenancy. It is the applicant's opinion that 59 spaces are adequate for this use and as such are depicting the land banked parking as fully landscaping and likely to not be constructed. The plans depict this as necessity for conformance with zoning. However, noting that the impacts under the Wetlands Protection Act are separate and distinct, we ask the Commission to consider the land banked spaces as a condition of approval and that if they are to be constructed, the applicant should consult with the Conservation Officer prior to construction.

The response to comments is shown below in **bold** preceded by the original comment shown in *italics*.

Key Issues/Concerns:

Comment 1: *As indicated in the DEP Comment letter, there is a mapped perennial stream offsite along the western property boundary as shown on the most recent USGS map. Therefore, the NOI should be updated to reflect the Riverfront Area (RA) impact calculations (on page 3) and the narrative should be revised to include a performance standards analysis under 310 CMR 10.58 (4) or (5) and the HWR Section 21.1.*

Response 1: **Noted. The applicability of the Riverfront Area has been discussed in the attached narrative. This includes meeting the required performance standards.**

Comment 2: As the work is within the RA, the filing fee should be recalculated accordingly and a supplemental check provided to the office and DEP.

Response 2: The fee has been recalculated to include the Riverfront multiplier. Checks were issued to the MassDEP PO Box and to the Hingham Commission in November.

Comment 3: The project is not Buffer Zone only as work will take place with BLSF and RA, therefore please check "Inland Resource Areas" on page 2 of the NOI.

Response 3: The NOI form has been revised as noted.

Comment 4: Please include impact calculations for work in BLSF on page 3 of the NOI. Also, the narrative and/or plan should include an impact summary table documenting the proposed alterations and compensatory storage volume proposed at each incremental elevation in accordance with 310 CMR 10.57(4)(a)1. The narrative states the "work… proposed within the resource area of the BLSF is minor" and "compensatory flood storage is provided" however no volume calculations are provided.

Response 4: The FEMA flood boundary was revised in July 2024. The site was removed from FEMA jurisdiction. As a result, no BLSF resource areas exist onsite.

Comment 5: The narrative should also include performance standards analyses documenting compliance with applicable sections of the HWR- Sections 19.1, 22.0, and 24.0 (Buffer Zone, BLSF and Special Flood Hazard Area-FEMA Flood Zone A).

Response 5: See Response 4 above. The BLSF is no longer an onsite resource area.

Comment 6: The plan includes a note that invasive species removal will be "coordinated with the conservation department". All proposed vegetation removal associated with the project should be detailed in the NOI/project plan.

Response 6: Environmental Consulting & Restoration, LLC. has prepared the attached Vegetation Management Proposal to address invasive species onsite.

Comment 7: The proposal includes removal of 40 trees that have been identified by Arborist Daniel Cathcart as "dead, having significant defects, or in such poor condition that they should not be considered for mitigation". It is not clear where the identified trees are located in the buffer zone (0-50' or 50-100' buffer) or if the trees are within the RA. Staff agrees the dead and invasive trees do not require mitigation however disagrees other trees do not require replacement in accordance with the Commission's tree removal policy. Also, unless deemed a safety hazard, staff recommends trees identified as having vines, cankers, or in poor condition be left as well as dead trees/snags, particularly in the 0-50 foot buffer, as they provide valuable habitat and nutrients for soils. Please clarify the tree locations, consider preserving trees and dead trees as practical in the 0-50', and propose replacements for the trees which are not an imminent hazard (e.g. red maple, black birch, eastern white pine and hemlock) at ratios included in the tree removal policy.

Response 7: **As discussed with the conservation officer, the landscaping plan has been revised to denote the trees. A summary of the trees to be removed, and the appropriate mitigation, is attached hereto.**

Comment 8: *The proposal includes alterations (which may be pervious or impervious) within the Buffer Zone therefore compliance with the Commission's Buffer Zone Mitigation Policy is required. Please provide a summary table on the plan or in the narrative documenting existing and proposed conditions in the 0-50 and 50-100' foot Buffer Zone so staff may determine if mitigation is required.*

Response 8: **The requested alteration summary is provided on the attached SK-1 and SK-2 figures.**

As determined by the site survey, the areas of existing impact are:

Riverfront Area	Area onsite (s.f.)	Area disturbed (s.f.)	% of onsite area affected	Area degraded/ impervious (s.f.)	% of onsite area affected	Total % of Riverfront modified from its natural state
0 - 100	44,894	4,010	8.93	18,670	41.6	50.5
100 - 200	59,021	5,916	10.0	19,841	33.6	43.6

Under proposed conditions, the impacts become:

Riverfront Area	Area onsite (s.f.)	Area disturbed (s.f.)	% of onsite area affected	Area degraded/ impervious (s.f.)	% of onsite area affected	Total % of Riverfront modified from its natural state
0 - 100	44,894	5,533	12.3	16,601	37.0	49.3
100 - 200	59,021	18,212	30.9	19,947	33.8	64.7

Comment 9: *The Stormwater Report will require a peer review. It is my understanding a Site Plan has been filed with the PB which will necessitate a review by the board's consulting engineer. Once completed, the review will be provided to the Commission for consideration.*

Response 9: **Noted. PGB Engineering, Inc. has conducted the peer review. The responses to their comments are reflected in the revised drawings with a copy of the letter being provided to the Commission.**

Comment 10: *The project proposes a stormwater basin within the 0-50 foot buffer (and the inner riverfront area) in close proximity the wetland boundary. Were alternative locations considered for the*

basin to avoid impacts in this area? Please consider moving the basin and include discussion in the narrative.

Response 10: The intent of this basin was to provide improved stormwater but was proposed at a time when it would have been buffer zone only work. The upgrade to Riverfront renders this basin less desirable and the benefit of keeping the existing vegetation and minimizing disturbances has resulted in the deletion of the basin. The stormwater is still properly managed onsite and the catch basin proposed will be upgraded to a water quality treatment device resulting in an improvement over existing conditions and conformance with the stormwater management standards to the maximum extent practicable.

Comment 11: Please relocate the designated snow storage area, as shown on sheet C-103, out of the 50' buffer zone.

Response 11: Snow storage locations have been adjusted as suggested.

Comment 12: The project proposes a robust landscape plan with a variety of native species that will result in a significant improvement over existing conditions. Staff will review the landscape plan and provide comments upon submittal of the above requested documentation.

Response 12: Noted. No response required..

Comment 13: There is a mapped potential CVP at the southern portion of the property as identified by ECR in the wetland delineation memo. Mr. Holmes states the pond is "significantly deep" and does not function as a "seasonal vernal pool". However no other details are provided therefore it is not clear if the area was surveyed for potential vernal pool activity. Additionally, the area was reviewed on May 7th which is outside vernal pool breeding season. Some vernal pools may hold water year round and as such, staff recommends additional documentation be provided to support the conclusion that the pond does not function as a vernal pool.

Response 13: The applicant requests a condition of approval to review the potential CVP in the springtime when conditions allow for the proper review. The scope of work within the vicinity of the potential CVP falls within previously altered or degraded areas. Approval of the project would not derogate from the area surrounding the potential CVP.

A&M believes these responses will provide sufficient information for the continued review of this application. If you require additional information, please feel free to contact me.

Very Truly Yours,

ALLEN & MAJOR ASSOCIATES, INC.

Digitally signed by Philip Cordeiro
Date: 2024.12.30 10:16:42-05'00'

Phil Cordeiro, P.E.
Branch Manager

Copy: Fifty-Five Saxon LLC. (by email)

Enclosure
Notice of Intent Supplemental dated November 12, 2024
Site Development Drawings, Revision 2 dated December 23, 2024
Response to comments letter to Planning Board
Vegetation Management Proposal
Tree Removal Summary
Proposed Riverfront Area alteration graphics, sheets SK-1 and SK-2

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ALLEN & MAJOR ASSOCIATES, INC.

November 11, 2024

Hingham Conservation Commission
c/o Shannon Palmer
Conservation Officer
210 Central Street
Hingham, MA 02043

A&M Project #: 1179-20A
Re: MassDEP Deficiency Notification
55 Industrial Park Road

Dear Ms. Palmer and members of the Commission,

On behalf of our Client, Fifty Five Saxon Hingham LLC, Allen & Major Associates, Inc. (A&M) is providing this supplemental to the Notice of Intent filed for a proposed office building to be located at 55 Industrial Park Road in Hingham. This supplemental is intended to address review notices issued by Peter J. Backhaus of MassDEP Southeast Regional Office.

Mr. Backhaus' email centered on two matters which are each discussed further below.

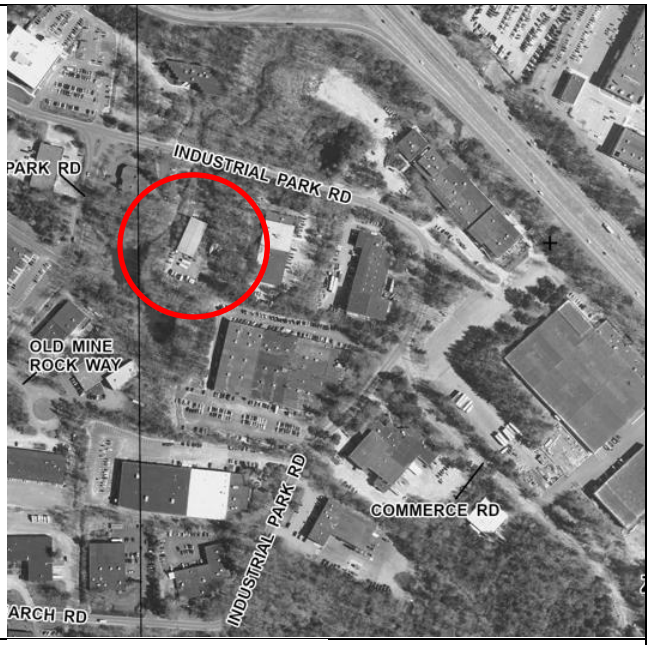
- Though the project is filed as Buffer Zone only, proposed work occurs within the FEMA 100-year (Zone A) floodplain.
    - Calculations of the area and volume of proposed alteration and replacement (i.e., compensatory storage) within this floodplain should be included in the WPA Form 3 under Item B.2.d. (Page 3).
- The most recent USGS mapping for the property (2024, https://apps.nationalmap.gov/viewer/) depicts a perennial stream on the west side of the property.
    - Was the stream assessed per 310 CMR 10.58(2)(a)1.d. to determine an intermittent status? If so, please provide documentation.
        - Please be advised that the Boston Harbor Basin has been in a declared drought since September 1, 2024, and that any field observations made after this date are not admissible to find a stream to be intermittent.
    - If determined to be perennial, please provide a calculation of Riverfront Area impacts on the WPA Form 3 (Item B.2.f, Page 3) and any associated materials required for the performance standards under 310 CMR 10.58.

BORDERING LAND SUBJECT TO FLOODING

At the time of the review of the site, a portion of the property lied within a Zone A as designated under the Federal Emergency Management Act (FEMA) Map 25023C0091K with an effective date of July 6, 2021. The area of Zone A followed the waterway along the westerly portion of the site. This resource area was also

identified on the environmental review of the site conducted by Brad Holmes of Environmental Consulting & Restoration, LLC. in the report submitted with the Notice of Intent. Subsequent to the environmental review by Mr. Holmes, but prior to the filing of the Notice of Intent, FEMA revised the maps for the Town of Hingham and removed this area from Zone A inclusion. The updated map is identified as Map 25023C0091L with a revised date of July 3, 2024. The MassMapper/GIS site which depicts the FEMA National Flood Hazard Layer for this area has not yet been updated and depicts mapped areas current as of July 2023, but these appear to be invalid. Snapshots of the former and current FEMA maps are shown below. The project locus has been emphasized. No changes to the WPA Form 3 have been made as a result of this information. The lack of a confirmed FEMA boundary/Bordering Land Subject to Flooding is also indicated by the Exhibit 4 of the Notice of Intent as prepared by A&M.

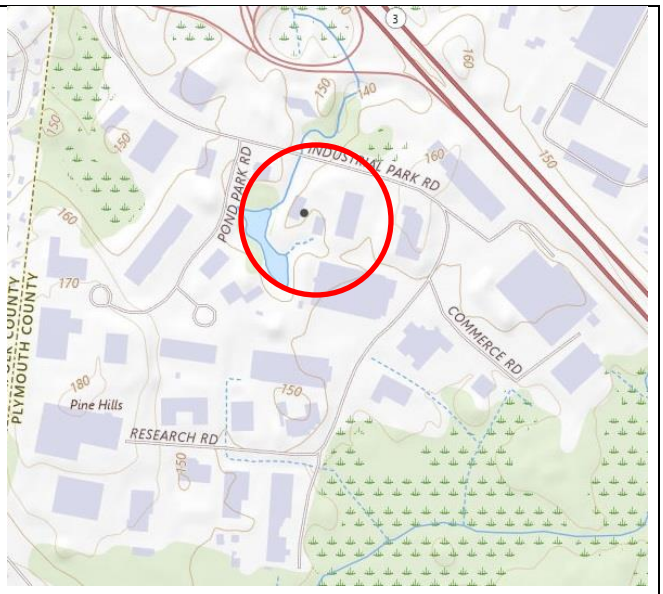
FEMA Map with effective date of July 6, 2021.



FEMA Map with effective date of July 3, 2024.

RIVERFRONT ASSESSMENT

As reported by Mr. Brad Holmes, the assessment on the intermittent stream classification was rendered through review of the USGS online viewer where the waterway shows as a 'light blue' line indicative of an intermittent classification. The stream does not shown on the Massachusetts Streamstats Program website. The summary report was prepared on May 8, 2024. Just after preparation of the report, the Department has implemented a newer policy to rely on the National Map Viewer USGS site for classification of streams. The stream is depicted in 'dark blue' which would be perennial for permitting purposes. A comparison of the imagery is shown below.

	
USGS/MassGIS stream image.	National Map View.

Given the presence of a perennial stream meeting the classification standards of the Wetlands Protection Act, review against the performance standards of 310 CMR 10.58 are required. Riverfront Area: As defined at 310 CMR 10.58(a)(3), *Riverfront Area is the area of land between a river's mean annual high-water line measured horizontally outward from the river and a parallel line located 200 feet away*.

Work is proposed within the Riverfront Area and it will be demonstrated that the development in the Riverfront Area will conform to the Performance Standards under 310 CMR 10.58(4)(c) and (d) and 310 CMR 10.58(5)(a) through (h). A comprehensive description of the proposed alteration within the Riverfront Area is provided below.

Riverfront Area Existing Conditions

The Riverfront area extends from the mean annual water line as established by ECR and extends landward 200 horizontal feet as depicted on the attached supplemental graphics. Nearly the entire site is located within Riverfront with a calculated area of 103,915 square feet where approximately 44,894 square feet is located within a distance of 100 feet to the River and 59,021 square feet is located from 100 to 200 feet. The project overall is considered a mix of redevelopment and new development and therefore the applicable regulations are 310 CMR 10.58(4).

Regulatory Compliance with Wetlands Protection Act Regulations

General Performance Standard

Where the presumption set forth in 310 CMR 10.58(3) is not overcome, the applicant shall prove by a preponderance of the evidence that there are no practicable and substantially equivalent economic alternatives to the proposed project with less adverse effects on the interests identified in M.G.L. c131 § 40 and that the work, including proposed mitigation, will have no significant adverse impact on the riverfront area to protect the interests identified in M.G.L. c131 § 40. In the event that the presumption is partially overcome, the issuing authority shall make a written determination setting forth its grounds in the Order of Conditions and the partial

rebuttal shall be taken into account in the application of 310 CMR 10.58(4)(d)1.a. and c.; the issuing authority shall impose conditions in the Order that contribute to the protection interests for which the riverfront area is significant.

(c) Practicable & Substantially Equivalent Economic Alternatives. There must be no practicable and substantially equivalent economic alternative to the proposed project with less adverse effects on the interested identified in M.G.L. c131 § 40.

(d) No Significant Adverse Impact. The work, including proposed mitigation measures, must have no significant adverse impact on the riverfront area to protect the interests identified in M.G.L. c131 § 40.

The following are statements regarding project conformance to applicable criteria of items (c) and (d).

10.58(4)(c) – Alternatives Analysis

As a result of the Riverfront, A&M has reviewed practicable or substantially equivalent economic alternatives considered. Below is a summary of a few of these alternatives:

1. *"No-build" alternative.*

In this alternative, the 'no work' premise is for the site to remain as currently situation on the property. The building and parking area would lay within the 0 – 100 foot Riverfront Area with the following general setbacks as the closest areas of disturbance/degrade:

Parking lot to flag A-3	23.9± feet
Parking lot to flag A-5	21.1± feet
Building to flag A-8	33.8± feet
Rear concrete pad to flag A-11	52.2± feet
Rear concrete pad to flag A-14	59.7± feet

The site contains structural stormwater management areas enlarged in 2013 that would remain in place for mitigation of runoff.

In leaving the site in its present condition, the site elements would remain close to the River where less adverse conditions could exist (10.58 (4)).

The overall improvement of the site would be lost as well as the economic impacts to the Town of Hingham for a by-right use subject to local Site plan Review.

2. *Alternative #2 – Redevelop in place Scenario*

In this scenario, the applicant would seek to replace the existing building in kind. The existing building has a footprint area of 7,488 square feet. The parking areas to the north and south of the building are unstriped and as laid out may not provide adequate parking in compliance with the Hingham Zoning By-laws. The proposed footprint of the building is approximately 10,913 square feet and was designed to allow for interaction with the surrounding landscape by recessing the first floor of the building with a balcony overhang for the second. Each floor is store front glass that allows for direct view into the site. Rebuilding in place is not feasible without reduction to the build program square footage which is a necessary minimum for this office project. Extending the building footprint landward to meet the square footage is feasible, however, not without a further extension of the asphalt to allow for adequate parking and circulation of emergency response vehicles.

The existing office building, detached storage building and asphalt parking and circulation areas meet the definition of degraded as being degraded prior to August 7, 1996 by impervious surfaces from existing structures or pavement and absent of topsoil. Presently, the degraded area between 0 -100 feet of the Riverfront is 18,670 square feet and from 100 – 200 feet is 19,841 square feet for a total of 38,511 square feet, or 41.6% and 33.6% degraded of the existing Riverfront area respectively. The total degraded area onsite is approximately 37.1% of total Riverfront.

> *Within 200 foot riverfront areas, the issuing authority may allow the alteration of up to 5000 square feet or 10% of the riverfront areas within the lot, whichever is greater, on a lot recorded on or before October 6, 1997 or lots recorded after October 6, 1997 subject to the restrictions of 310 CMR 10.58(4)(c)2.b.vi., or up to 10% of the riverfront area within a lot recorded after October 6, 1997…*

As well as CMR 10.55(4)(b), which states,

> *Notwithstanding the provisions of 310 CMR 10.55(4)(a), the issuing authority may issue an Order of Conditions permitting work which results in the loss of up to 5000 square feet of Bordering Vegetated Wetlands…*

3. *Alternative #3 – Proposed site plan.*

The preferred alternative is the plan proffered to the Department and the Town of Hingham. This plan is predicated on achieving the following: 1. Consolidation of the existing buildings onsite (by way of square footages) and relocation as far from the resource area(s) as feasible including the former presence of the FEMA Zone A boundary; 2. Relocate the building in such a manner that it create an attractively landscaped entry experience while maintaining as much of the existing driveways and parking as feasible; and 3. Improve the onsite stormwater management. The proposed plan achieves these three objectives. The plans redevelopment aspects rely on constructing within the existing asphalt limits as shown on the existing conditions plan. The existing asphalt shall be removed and replaced in kind to address age cracking. New development is the single footprint building shifted easterly, away from the resource area as contemplated by 10.58 (5)(d)

This alternative was selected as it provides a project in full conformance with the Town of Hingham's needs within an area previously degraded in a market sector that may otherwise by in decline.

Overall, the project lessens the amount of disturbance within the Riverfront to 35.2% (or 36,548 square feet). Through this, the degraded area within 100 feet of the River is reduced from 41.6% to 37.0% (or 2,069 square feet). This area will be restored to a vegetated condition as outlined on the proposed landscape plan using species native and compatible with the environment. It should be noted that within this area a structural stormwater basin is proposed to further improve stormwater management handling and is 1,922 square feet in area. From 100-200 of the River, the degraded area is increased from 33.6% to 33.8% (or 106 square feet).

Regulatory Compliance with Wetlands Protection Act Regulations

310 CMR 10.58; Subsection 5

Redevelopment Within Previously Developed Riverfront Areas; Restoration and Mitigation

Notwithstanding the provisions of 310 CMR 10.58(4)(c) and (d), the issuing authority may allow work to redevelop a previously developed riverfront area, provided the proposed work improves existing conditions. Redevelopment means replaces, rehabilitation or expansion of existing structures, improvement of existing roads, or reuse of degraded or previous developed areas. A previously developed riverfront area contains areas degraded prior to

August 7, 1996 by impervious surfaces from existing structures or pavements, absence of topsoil, junkyards, or abandoned dumping grounds. Work to redevelop previously developed riverfront areas shall conform to the following criteria:

a) *At a minimum, proposed work shall result in an improvement over existing conditions of the capacity of the riverfront area to protect the interests identified in M.G.L. c131 § 40. When a lot is previously developed but no portion of the riverfront area is degraded, the requirements of 310 CMR 10.58(4) shall be met.*

b) *Stormwater management is provided according to standards established by the Department.*

c) *Within 200 foot riverfront areas, proposed work shall not be located closer to the river than existing conditions or 100 feet, whichever is less, or not closer than existing conditions within 25 foot riverfront areas, except in accordance with 310 CMR 10.58(5) (f) or (g).*

d) *Proposed work, including expansion of existing structures, shall be located outside the riverfront area or toward the riverfront area boundary and away from the river, except in accordance with 310 CMR 10.58(5) (f) or (g).*

e) *The area of proposed work shall not exceed the amount of degraded area, provided that the proposed work may alter up to 10% if the degraded area is less than 10% of the riverfront area, except in accordance with 310 CMR 10.58(5)(f) or (g).*

f) *When an applicant proposes restoration on-site of degraded riverfront area, alteration may be allowed notwithstanding the criteria of 310 CMR 10.58(5)(c), (d), and (e) at a ratio in square feet of at least 1:1 of restored area to area of alteration not conforming to the criteria. Areas immediately along the river shall be selected for restoration. Alteration not conforming to the criteria shall begin at the riverfront area boundary. Restoration shall include:*

    1. *Removal of all debris, but retaining any trees or other mature vegetation;*
    2. *Grading to a topography which reduces runoff and increases infiltration;*
    3. *Coverage by topsoil at a depth consistent with natural conditions at the site; and*
    4. *Seeding and planting with an erosion control seed mixture, followed by plantings of herbaceous and woody species appropriate to the site;*

g) *When an applicant proposes mitigation either on-site or in the riverfront area within the same general area of the river basin, alteration may be allowed notwithstanding the criteria of 310 CMR 10.58(5)(c), (d), or (e) at a ratio in square feet of at least 2:1 of mitigation area to area of alteration not conforming to the criteria or an equivalent level of environmental protection where square footage is not a relevant measure. Alteration not conforming to the criteria shall begin at the riverfront area boundary. Mitigation may include off-site restoration of riverfront areas, conservation restrictions under M.G.L. c184 § 31 through 33 to preserve undisturbed riverfront areas that could be otherwise altered under 310 CMR 10.00, the purchase of development rights within the riverfront area, the restoration of bordering vegetated wetland, projects to remedy an existing adverse impact on the interests identified in M.G.L. c. 131§ 40 for which the applicant is not legally responsible, or similar activities undertaken voluntarily by the applicant which will support a determination by the issuing authority of no significant adverse impact. Preference shall be given to potential mitigation projects, if any, identified in a River Basin Plan approved by the Secretary of the Executive Office of Energy and Environmental Affairs.*

h) The issuing authority shall include a continuing condition in the Certificate of Compliance for projects under 310 CMR 10.58(5)(f) or (g) prohibiting further alteration within the restoration or mitigation area, except as may be required to maintain the area in its restored or mitigated condition. Prior to requesting the issuance of the Certificate of Compliance, the applicant shall demonstrate the restoration or mitigation has been successfully completed for at least two growing seasons.

The following are statements regarding project conformance to applicable criteria of items (a) through (h).

10.58(5)(a)

The existing riverfront area onsite is approximately 103,915 square feet. The project proposes reallocation of the degraded areas between the inner and outer riparian zones but overall reduce the degraded areas onsite. The proposed development will not encroach closer to the bank than present conditions With the proposed development, stormwater management system improvements are being implemented to improve the quality of stormwater runoff through the introduction of additional surface basin storage and subsurface infiltration.

10.58(5)(b)

The proposed development includes an expansion to the stormwater management system. Under existing conditions, the stormwater runoff enters the resource area through existing controls. In the proposed condition, the runoff will be further mitigated with additional storage volume provided for infiltration and detention. A copy of the Drainage Report for the site, detailing the stormwater management system and how it meets the MA Stormwater Standards, has been included with the Notice of Intent submission.

10.58(5)(c)

Proposed work within the Riverfront Area shall not be located closer to the river than existing conditions.

10.58(5)(d)

Proposed work as an expansion of the site is located toward the Riverfront Area boundary as far from the edge of the river bank as feasible recognizing that nearly the entirety of the site is in Riverfront Area

10.58(5)(e)

The proposed project reduced the existing degraded area onsite by approximately 1.9% in total and 4.6% within the 0-100 foot inner riparian zone and will use best practices to mitigate this condition through increased stormwater controls and invasive species management to uplift the entirety of the Riverfront area onsite.

All disturbed areas onsite will receive topsoil and plantings in accordance with the proposed planting plan.

The applicant, acting through its consultant, ECR, can also provide an Invasive Species Management Plan to address species incongruent with the Riverfront. The plan will define in detail how invasive species are to be addressed during construction and how proposed vegetation shall be managed to prevent introduction of invasive species. The management plan shall be provided prior to construction for review by the Commission/Commission's Agent assuming approval through an Order of Conditions for the project.

10.58(5)(f)

No restoration of Riverfront Area is proposed. Proposed work within the Riverfront Area will only occur in the area outside of the 100' riparian zone and no work shall disturb the bank of the riverfront.

10.58(5)(g)

No off-site mitigation is proposed within the Riverfront Area. On-site mitigation is proposed as described above.

10.58(5)(h)

Restoration/mitigation areas are proposed within the Riverfront Area as areas are reclaimed. This work shall be in accordance with the proposed planting plan.

RIVERFRONT AREA IMPROVEMENTS

Riverfront Area at the project site will be improved by the proposed site development. Features of the project that will improve the Riverfront Area will include the reduction of degraded area, increased structural stormwater management, and plantings and invasive species management of the disturbed areas onsite. These improvements and enhancements to the Riverfront Area will contribute to protection of the interests of the Act including:

- Protection of public and private water supply: Compliance with the stormwater management standards will manage and treat stormwater runoff improving water quality.
- Prevention of pollution: The proposed stormwater management system will manage and treat on site runoff prior to discharge to the river.

CONCLUSION

It is the design team's opinion that work on this project can be completed as proposed without adverse impacts on the resource areas and with adequate precautions and mitigation as suggested herein. This project would have been reviewed as a Buffer Zone Only project if not for the change in Department policy in 2024. However, all facets of the Performance Standards of 310 CMR 10.58 can be achieved.

Given the location within Riverfront, the application fees are increased by 50% requiring an application fee in the amount of $1,575.00 with $775 issued to the Commonwealth of Massachusetts and $800.00 issued to the Town of Hingham. Checks in the corresponding fee delta amounts of $262.50 shall be issued to both the MassDEP lock box and the Hingham Conservation Commission.

A&M notes that a file number has not been issued by the Department until receipt of the above information is confirmed. Please contact this office if you have any questions.

Very Truly Yours,

ALLEN & MAJOR ASSOCIATES, INC.

Phil Cordeiro, P.E.
Branch Manager

Enclosures: Existing Degraded Areas SK-1
Proposed Degraded Areas SK-2
Revised WPA Form 3

cc: MassDEP Southeast Regional Office (via e-mail)
Client

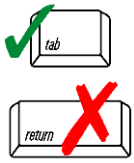
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40
And the City of Peabody-Wetlands & Rivers Protection Ordinance Ch 32

Provided by MassDEP:
MassDEP File Number
Document Transaction Number
Hingham
City/Town

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



Note:
Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

A. General Information

1. Project Location (**Note:** electronic filers will click on button to locate project site):

55 Industrial Park Road — a. Street Address
Hingham — b. City/Town
02043 — c. Zip Code

Latitude and Longitude:
42.175273 — d. Latitude
-70.916817 — e. Longitude

201 — f. Assessors Map/Plat Number
007 — g. Parcel /Lot Number

2. Applicant:

Sylvia — a. First Name
Driver — b. Last Name
Fifty-Five Saxon Hingham LLC — c. Organization
25 Recreation Park Drive — d. Street Address
Hingham — e. City/Town
MA — f. State
02043 — g. Zip Code
(570) 412-1800 — h. Phone Number
i. Fax Number
SDriver@saxon-partners.com — j. Email Address

3. Property owner (required if different from applicant): ☐ Check if more than one owner

a. First Name
b. Last Name
c. Organization
d. Street Address
e. City/Town
f. State
g. Zip Code
h. Phone Number
i. Fax Number
j. Email address

4. Representative (if any):

Phil — a. First Name
Cordeiro — b. Last Name
Allen & Major Associates Inc. — c. Company
100 Commerce Way — d. Street Address
Woburn — e. City/Town
MA — f. State
01801 — g. Zip Code
508.509.5222 — h. Phone Number
i. Fax Number
pcordeiro@allenmajor.com — j. Email address

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

$1,575.00 — a. Total Fee Paid
$775.00 — b. State Fee Paid
$800.00 — c. City/Town Fee Paid

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40
And the City of Peabody-Wetlands & Rivers Protection Ordinance Ch 32

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Hingham
City/Town

A. General Information (continued)

6. General Project Description:

The project includes the razing of two existing structures (office building and storage building) and construction of a single two-story office building and alteration of the parking to meet zoning requirements. The existing stormwater management systems will be enlarged to address current runoff standards and mitigate peak rate and volume. New utility services shall be underground.

7a. Project Type Checklist: (Limited Project Types see Section A. 7b.)

1. ☐ Single Family Home
2. ☐ Residential Subdivision
3. ☒ Commercial/Industrial
4. ☐ Dock/Pier
5. ☐ Utilities
6. ☐ Coastal engineering Structure
7. ☐ Agriculture (e.g., cranberries, forestry)
8. ☐ Transportation
9. ☐ Other

7b. Is any portion of the proposed activity eligible to be treated as a limited project (including Ecological Restoration Limited Project) subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

1. ☐ Yes ☒ No

If yes, describe which limited project applies to this project. (See 310 CMR 10.24 and 10.53 for a complete list and description of limited project types)

2. Limited Project Type

If the proposed activity is eligible to be treated as an Ecological Restoration Limited Project (310 CMR10.24(8), 310 CMR 10.53(4)), complete and attach Appendix A: Ecological Restoration Limited Project Checklist and Signed Certification.

8. Property recorded at the Registry of Deeds for:

a. County	b. Certificate # (if registered land)
Plymouth	
c. Book	d. Page Number
0418	0131

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

1. ☐ Buffer Zone Only – Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.
2. ☒ Inland Resource Areas (see 310 CMR 10.54-10.58; if not applicable, go to Section B.3, Coastal Resource Areas).

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Massachusetts Department of Environmental Protection
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Provided by MassDEP:
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Document Transaction Number
Hingham
City/Town

B. Buffer Zone & Resource Area Impacts (temporary & permanent) (cont'd)

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Bank	1. linear feet	2. linear feet
b. ☐ Bordering Vegetated Wetland	1. square feet	2. square feet
c. ☐ Land Under Waterbodies and Waterways	1. square feet 3. cubic yards dredged	2. square feet

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
d. ☐ Bordering Land Subject to Flooding	1. square feet	2. square feet
	3. cubic feet of flood storage lost	4. cubic feet replaced
e. ☐ Isolated Land Subject to Flooding	1. square feet	
	2. cubic feet of flood storage lost	3. cubic feet replaced
f. ☒ Riverfront Area	1. Name of Waterway (if available) - **specify coastal or inland** **Not named. Inland waterway.**	

2. Width of Riverfront Area (check one):

☐ 25 ft. - Designated Densely Developed Areas only

☐ 100 ft. - New agricultural projects only

☒ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project: 103,915 square feet

4. Proposed alteration of the Riverfront Area:

a. total square feet	b. square feet within 100 ft.	c. square feet between 100 ft. and 200 ft.
38,511 (existing degraded)	18,670 (existing degraded)	19,841 (existing degraded)

5. Has an alternatives analysis been done and is it attached to this NOI? ☒ Yes ☐ No

6. Was the lot where the activity is proposed created prior to August 1, 1996? ☒ Yes ☐ No

3. ☐ Coastal Resource Areas: (See 310 CMR 10.25-10.35)

Note: for coastal riverfront areas, please complete **Section B.2.f**. above.

Massachusetts Department of Environmental Protection
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Massachusetts Wetlands Protection Act M.G.L. c. 131, §40
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Provided by MassDEP:
MassDEP File Number
Document Transaction Number
Hingham
City/Town

B. Buffer Zone & Resource Area Impacts **(temporary & permanent)** (cont'd)

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. ☐ Land Under the Ocean	1. square feet 2. cubic yards dredged	
c. ☐ Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. ☐ Coastal Beaches	1. square feet	2. cubic yards beach nourishment
e. ☐ Coastal Dunes	1. square feet	2. cubic yards dune nourishment

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
f. ☐ Coastal Banks	1. linear feet	
g. ☐ Rocky Intertidal Shores	1. square feet	
h. ☐ Salt Marshes	1. square feet	2. sq ft restoration, rehab., creation
i. ☐ Land Under Salt Ponds	1. square feet 2. cubic yards dredged	
j. ☐ Land Containing Shellfish	1. square feet	
k. ☐ Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above 1. cubic yards dredged	
l. ☐ Land Subject to Coastal Storm Flowage	1. square feet	

4. ☐ Restoration/Enhancement
If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.2.b or B.3.h above, please enter the additional amount here.

a. square feet of BVW | b. square feet of Salt Marsh

5. ☐ Project Involves Stream Crossings

a. number of new stream crossings | b. number of replacement stream crossings

Massachusetts Department of Environmental Protection
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WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40
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Provided by MassDEP:

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Hingham
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C. Other Applicable Standards and Requirements

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section C and complete Appendix A: Ecological Restoration Limited Project Checklists – Required Actions (310 CMR 10.11).

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program (NHESP)? To view habitat maps, see the *Massachusetts Natural Heritage Atlas* or go to http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm.

   a. ☐ Yes ☒ No

   If yes, include proof of mailing or hand delivery of NOI to:

   Natural Heritage and Endangered Species Program
   Division of Fisheries and Wildlife
   1 Rabbit Hill Road
   Westborough, MA 01581

   August 01, 2021
   b. Date of map

   If *yes*, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18). To qualify for a streamlined, 30-day, MESA/Wetlands Protection Act review, please complete Section C.1.c, and include requested materials with this Notice of Intent (NOI); *OR* complete Section C.2.f, if applicable. *If MESA supplemental information is not included with the NOI, by completing Section 1 of this form, the NHESP will require a separate MESA filing which may take up to 90 days to review (unless noted exceptions in Section 2 apply, see below).*

   c. Submit Supplemental Information for Endangered Species Review*

      1. ☐ Percentage/acreage of property to be altered:

         (a) within wetland Resource Area _____ percentage/acreage

         (b) outside Resource Area _____ percentage/acreage

      2. ☐ Assessor's Map or right-of-way plan of site

2. ☐ Project plans for entire project site, including wetland resource areas and areas outside of wetlands jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **

   (a) ☐ Project description (including description of impacts outside of wetland resource area & buffer zone)

   (b) ☐ Photographs representative of the site

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review (see https://www.mass.gov/ma-endangered-species-act-mesa-regulatory-review).
Priority Habitat includes habitat for state-listed plants and strictly upland species not protected by the Wetlands Protection Act.

** MESA projects may not be segmented (321 CMR 10.16). The applicant must disclose full development plans even if such plans are not required as part of the Notice of Intent process.

Massachusetts Department of Environmental Protection
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WPA Form 3 – Notice of Intent

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C. Other Applicable Standards and Requirements (cont'd)

(c) ☐ MESA filing fee (fee information available at https://www.mass.gov/how-to/how-to-file-for-a-mesa-project-review).
Make check payable to "Commonwealth of Massachusetts - NHESP" and ***mail to NHESP*** at above address

*Projects altering **10 or more acres** of land, also submit:*

(d) ☐ Vegetation cover type map of site

(e) ☐ Project plans showing Priority & Estimated Habitat boundaries

(f) OR Check One of the Following

1. ☐ Project is exempt from MESA review.
Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, https://www.mass.gov/service-details/exemptions-from-review-for-projectsactivities-in-priority-habitat; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

2. ☐ Separate MESA review ongoing. a. NHESP Tracking # b. Date submitted to NHESP

3. ☐ Separate MESA review completed.
Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

3. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?

a. ☐ Not applicable – project is in inland resource area only b. ☐ Yes ☐ No

If yes, include proof of mailing, hand delivery, or electronic delivery of NOI to either:

South Shore - Cohasset to Rhode Island border, and the Cape & Islands:

Division of Marine Fisheries -
Southeast Marine Fisheries Station
Attn: Environmental Reviewer
836 South Rodney French Blvd.
New Bedford, MA 02744
Email: dmf.envreview-south@mass.gov

North Shore - Hull to New Hampshire border:

Division of Marine Fisheries -
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
Email: dmf.envreview-north@mass.gov

Also if yes, the project may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional Office.

c. ☐ Is this an aquaculture project? d. ☐ Yes ☐ No

If yes, include a copy of the Division of Marine Fisheries Certification Letter (M.G.L. c. 130, § 57).

Massachusetts Department of Environmental Protection
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WPA Form 3 – Notice of Intent

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Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Hingham
City/Town

C. Other Applicable Standards and Requirements (cont'd)

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

4. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?

   a. ☐ Yes ☒ No If yes, provide name of ACEC (see instructions to WPA Form 3 or MassDEP Website for ACEC locations). **Note:** electronic filers click on Website.

   b. ACEC

5. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?

   a. ☐ Yes ☒ No

6. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?

   a. ☐ Yes ☒ No

7. Is this project subject to provisions of the MassDEP Stormwater Management Standards?

   a. ☒ Yes. Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:

      1. ☐ Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol. 2, Chapter 3)

      2. ☒ A portion of the site constitutes redevelopment

      3. ☐ Proprietary BMPs are included in the Stormwater Management System.

   b. ☐ No. Check why the project is exempt:

      1. ☐ Single-family house

      2. ☐ Emergency road repair

      3. ☐ Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

☐ This is a proposal for an Ecological Restoration Limited Project. Skip Section D and complete Appendix A: Ecological Restoration Notice of Intent – Minimum Required Documents (310 CMR 10.12).

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

1. ☐ USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)

2. ☐ Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

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Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Hingham
City/Town

D. Additional Information (cont'd)

3. ☒ Identify the method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s), Determination of Applicability, Order of Resource Area Delineation, etc.), and attach documentation of the methodology.

4. ☒ List the titles and dates for all plans and other materials submitted with this NOI.

Office Building
a. Plan Title

Allen & Major Associates, Inc.
b. Prepared By

Phil Corderio, PE
c. Signed and Stamped by

October 17, 2024
d. Final Revision Date

1"=30'
e. Scale

f. Additional Plan or Document Title

g. Date

5. ☐ If there is more than one property owner, please attach a list of these property owners not listed on this form.

6. ☐ Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.

7. ☐ Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.

8. ☒ Attach NOI Wetland Fee Transmittal Form

9. ☒ Attach Stormwater Report, if needed.

E. Fees

1. ☐ Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

2. Municipal Check Number

3. Check date

4. State Check Number

5. Check date

6. Payor name on check: First Name

7. Payor name on check: Last Name

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40
And the City of Peabody-Wetlands & Rivers Protection Ordinance Ch 32

Provided by MassDEP:

MassDEP File Number

Document Transaction Number

Hingham
City/Town

F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

1. Signature of Applicant	2. Date
3. Signature of Property Owner (if different)	4. Date
5. Signature of Representative (if any)	6. Date

For Conservation Commission:
Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:
One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:
If the applicant has checked the “yes” box in any part of Section C, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

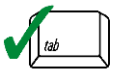
The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

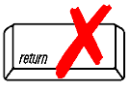
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

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





A. Applicant Information

1. Location of Project:

55 Industrial Park Road a. Street Address	Hingham b. City/Town
 c. Check number	$1050 d. Fee amount

2. Applicant Mailing Address:

Sylvia a. First Name		Driver b. Last Name
Fifty-Five Saxon Hingham LLC c. Organization		
25 Recreation Park Drive d. Mailing Address		
Hingham e. City/Town	MA f. State	02043 g. Zip Code
(781) -875-3300 h. Phone Number	 i. Fax Number	Dcalhoun@saxon-partners.com j. Email Address

3. Property Owner (if different):

 a. First Name		 b. Last Name
 c. Organization		
 d. Mailing Address		
 e. City/Town	 f. State	 g. Zip Code
 h. Phone Number	 i. Fax Number	 j. Email Address

B. Fees

To calculate filing fees, refer to the category fee list and examples in the instructions for filling out WPA Form 3 (Notice of Intent).

Fee should be calculated using the following process & worksheet. ***Please see Instructions before filling out worksheet.***

Step 1/Type of Activity: Describe each type of activity that will occur in wetland resource area and buffer zone.

Step 2/Number of Activities: Identify the number of each type of activity.

Step 3/Individual Activity Fee: Identify each activity fee from the six project categories listed in the instructions.

Step 4/Subtotal Activity Fee: Multiply the number of activities (identified in Step 2) times the fee per category (identified in Step 3) to reach a subtotal fee amount. Note: If any of these activities are in a Riverfront Area in addition to another Resource Area or the Buffer Zone, the fee per activity should be multiplied by 1.5 and then added to the subtotal amount.

Step 5/Total Project Fee: Determine the total project fee by adding the subtotal amounts from Step 4.

Step 6/Fee Payments: To calculate the state share of the fee, divide the total fee in half and subtract $12.50. To calculate the city/town share of the fee, divide the total fee in half and add $12.50.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

NOI Wetland Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

B. Fees (continued)

Step 1/Type of Activity	Step 2/Number of Activities	Step 3/Individual Activity Fee	Step 4/Subtotal Activity Fee
Cat. 3b.	1	$1,050.00	$1,575.00 (with riverfront multiplier)

Step 5/Total Project Fee: $1,575.00

Step 6/Fee Payments:

Total Project Fee:	$1,575.00 (a. Total Fee from Step 5)
State share of filing Fee:	$775.00 (b. 1/2 Total Fee **less $**12.50)
City/Town share of filling Fee:	$800.00 (c. 1/2 Total Fee **plus** $12.50)

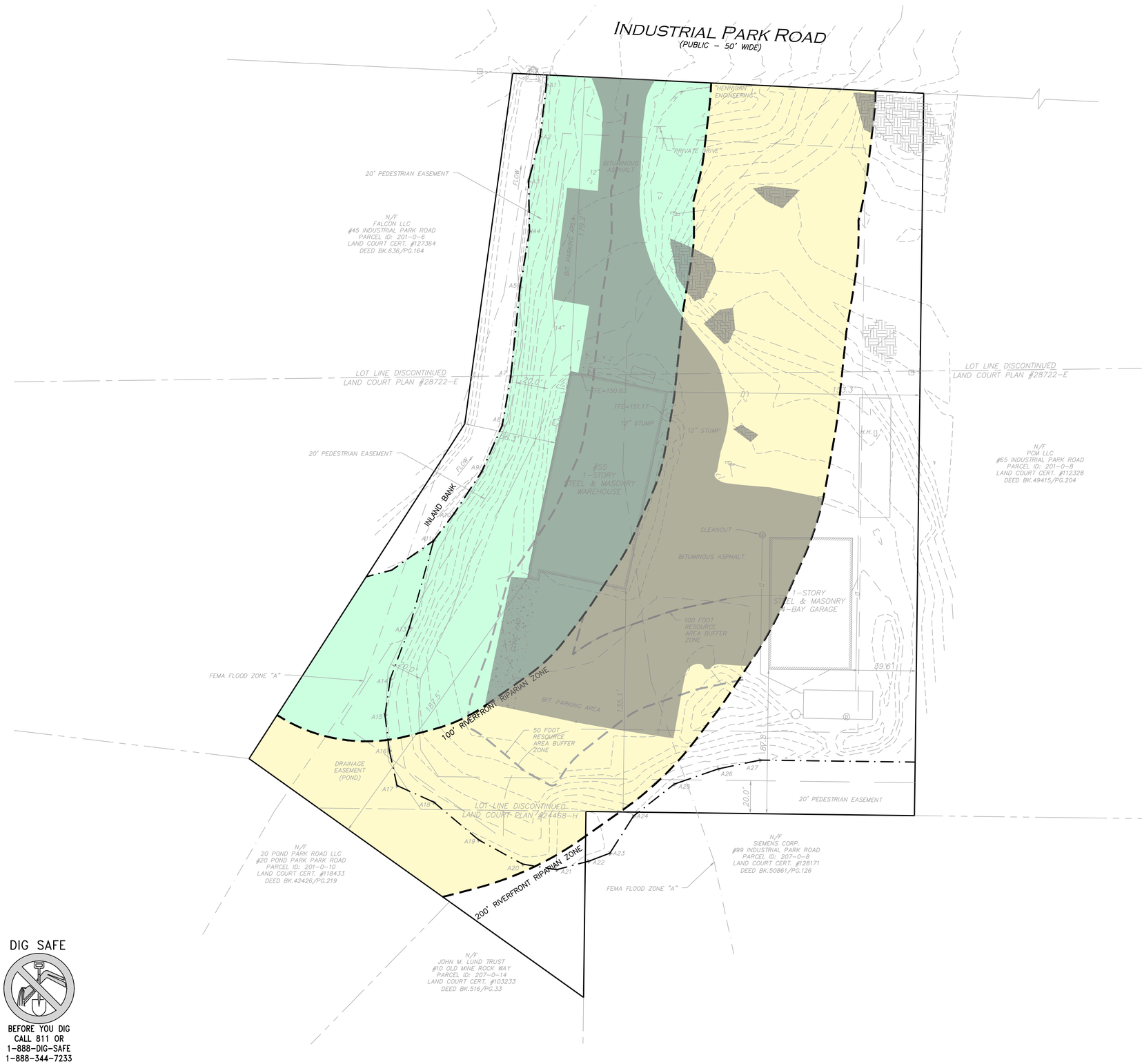
C. Submittal Requirements

a.) Complete pages 1 and 2 and send with a check or money order for the state share of the fee, payable to the Commonwealth of Massachusetts.

Department of Environmental Protection
Box 4062
Boston, MA 02211

b.) **To the Conservation Commission:** Send the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and the city/town fee payment.

To MassDEP Regional Office (see Instructions): Send a copy of the Notice of Intent or Abbreviated Notice of Intent; a **copy** of this form; and a **copy** of the state fee payment. (E-filers of Notices of Intent may submit these electronically.)



LEGEND

RIVERFRONT	
RIVERFRONT OFFSET	
DEGRADED AREA WITHIN RIVERFRONT	
100 RIVERFRONT AREA	
200 RIVERFRONT AREA	

EXISTING DEGRADED AREA WITHIN 100' AND 200' RIVER FRONT BUFFER

TOTAL AREA WITHIN 0'–100' BUFFER	44,894 S.F
DEGRADED AREA WITHIN 0–100' BUFFER	18,670 S.F (41.6%)
TOTAL AREA WITHIN 100'–200' BUFFER	59,021 S.F
DEGRADED AREA WITHIN 100'–200' BUFFER	19,841 S.F (33.6%)

TOTAL AREA WITHIN BUFFER	103,915 S.F
DEGRADED AREA WITHIN BUFFERS	38,511 S.F (37.1%)

NOTES:

1. ALL ELEVATIONS REFER TO NAVD 88.
2. THE INFORMATION SHOWN ON THIS PLAN IS THE SOLE PROPERTY OF ALLEN & MAJOR ASSOCIATES, INC. IT'S INTENDED USE IS TO PROVIDE INFORMATION. ANY ALTERATION, MISUSE, OR RECALCULATION OF INFORMATION OR DATA WITHOUT THE EXPRESSED, WRITTEN CONSENT OF ALLEN & MAJOR ASSOCIATES, INC. IS STRICTLY PROHIBITED.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

DIG SAFE

BEFORE YOU DIG
CALL 811 OR
1-888-DIG-SAFE
1-888-344-7233

M:\PROJECTS\1179-20A\CIVIL\DRAWINGS\CURRENT\C-1179-20A_FLOOD STORAGE CALCS.DWG

ISSUED FOR
NOTICE OF INTENT
OCTOBER 17, 2024 -
REV. 1 - NOV. 12, 2024

PHILIP L. CORDEIRO
CIVIL
NO. 47583
COMMONWEALTH OF MASSACHUSETTS
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION
1	11-12-2024	PER MASSDEP INITIAL REVIEW

APPLICANT\OWNER:

FIFTY-FIVE SAXON HINGHAM LLC
25 RECREATION PARK DRIVE, SUITE 204
HINGHAM, MA 02043

PROJECT:

OFFICE BUILDING
55 INDUSTRIAL
PARK ROAD
HINGHAM, MA

PROJECT NO.	1179-20A	DATE:	10-17-2024
SCALE:	1" = 30'	DWG. NAME:	C-1179-20
DESIGNED BY:	PLC	CHECKED BY:	PLC

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
10 MAIN STREET
LAKEVILLE, MA 02347
TEL: (508) 923-1010
FAX: (508) 923-6309
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:

EXISTING DEGRADED AREAS

SHEET No.

SK-1

LEGEND

RIVERFRONT	
RIVERFRONT OFFSET	
DEGRADED AREA WITHIN RIVERFRONT	
100 RIVERFRONT AREA	
200 RIVERFRONT AREA	

PROPOSED DEGRADED AREA WITHIN 100' AND 200' RIVER FRONT BUFFER

TOTAL AREA WITHIN 0'–100' BUFFER	44,894 S.F
DEGRADED AREA WITHIN 0–100' BUFFER	16,601 S.F (37.0%)
TOTAL AREA WITHIN 100'–200' BUFFER	59,021 S.F
DEGRADED AREA WITHIN 100'–200' BUFFER	19,947 S.F (33.8%)

TOTAL AREA WITHIN BUFFER	103,915 S.F
DEGRADED AREA WITHIN BUFFERS	36,548 S.F (35.2%)

POTENTIAL MITIGATION REQUIRED INCREASED DISTURBANCE WITHIN THE 100 –200 FOOT RIPARIAN ZONE:
106 S.F. x 2 = 212 S.F,

NOTES:

1. ALL ELEVATIONS REFER TO NAVD 88.
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GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

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M:\PROJECTS\1179-20A\CIVIL\DRAWINGS\CURRENT\C-1179-20A_FLOOD STORAGE CALCS.DWG

ISSUED FOR
NOTICE OF INTENT
OCTOBER 17, 2024 -
REV. 1 - NOV. 12, 2024

COMMONWEALTH OF MASSACHUSETTS
PHILIP L. CORDEIRO
CIVIL
NO. 47083
REGISTERED PROFESSIONAL ENGINEER

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION
1	11-12-2024	PER MASSDEP INITIAL REVIEW

APPLICANT\OWNER:

FIFTY-FIVE SAXON HINGHAM LLC
25 RECREATION PARK DRIVE, SUITE 204
HINGHAM, MA 02043

PROJECT:

OFFICE BUILDING
55 INDUSTRIAL
PARK ROAD
HINGHAM, MA

PROJECT NO.	1179-20A	DATE:	10-17-2024
SCALE:	1" = 30'	DWG. NAME:	C-1179-20
DESIGNED BY:	PLC	CHECKED BY:	PLC

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
10 MAIN STREET
LAKEVILLE, MA 02347
TEL: (508) 923-1010
FAX: (508) 923-6309
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:

PROPOSED DEGRADED AREAS

SHEET No.

SK-2

10 Main Street, Lakeville, MA 02347 | T (508) 923-1010 | F (508) 923-6309
allenmajor.com

ALLEN & MAJOR ASSOCIATES, INC.

December 23, 2024

Hingham Planning Board
c/o Michael Silveira
Senior Planner
210 Central Street
Hingham, MA 02043

A&M Project #: 1179-20A
Re: Response to Comments
55 Industrial Park Road
Site Plan Review

Dear Mr. Silveira and members of the Planning Board,

On behalf of our client, Saxon Partners, Allen & Major Associates, Inc. (A&M) is providing the following responses to a letter dated December 5, 2024 from PGB Engineering, LLC acting as the Board's peer review consultant for the Site Plan Review application. Revisions to the site development plans may be found in the plans dated December 23, 2024 noted as Revision 2. These plans are also being submitted simultaneously to the Hingham Conservation Commission to address comments received from their review as the stormwater review is germane to their decision.

Also included below is an itemized response to questions raised by Senior Planner Michael Silveira in an e-mail dated November 7, 2024.

The response to comments is shown below in **bold** preceded by the original comment shown in *italics.*

PGB Engineering Comments

General

Comment 1: *Much of the site design was based on locating the proposed building so that it is not within the FEMA regulatory flood zone and the flood zone limits are shown on the plans. However, the current FEMA flood map, issued July 3, 20241, show that there is no FEMA flood zone on or near the property. This removes the 'bordering land subject to flooding' from the property as well. The flood zone line and references to the regulatory flood zone should be removed from the plans.*

Response 1: **Noted. The FEMA flood zone was revised and noted and the lines have been removed from the revised plans.**

Comment 2: *The Zoning Summary Chart on Sheet C-103 has the incorrect proposed front, side and rear setbacks. The chart should include a column for existing conditions.*

Response 2: **The proposed setbacks have been correlated to the zoning table. A column for existing conditions has also been added based on the two buildings constructed onsite.**

Comment 3: *There should be an inventory of the trees proposed for removal so that the Board may determine whether the proposed trees are sufficient to mitigate Protected Trees to be removed.*

Response 3: **The revised landscape plan has included an inventory of trees to be removed and trees to be planted to allow for proper mitigation of removal. Site grading has been minimized to reduce the required amount of trees to be removed.**

Comment 4: *ZBL §V-A.3 requires parking spaces to be 20-feet long, or 18-feet long with a two-foot overhang. All proposed parking spaces are specified to be 18 feet long. The required overhang would not be provided at the ten parking spaces on the south side of the parking lot south of the building due to a proposed guardrail along those spaces. Also, twenty two spaces are proposed along the proposed walks, and the overhang may not extend over a walk per ZBL §V-A.5.f.*

Response 4: **The site plans have been revised to ensure that the overhang of spaces is provided as noted on the revised site drawings. Where the parking abuts a sidewalk, a deeper sidewalk is proposed so as not to reduce the clear width necessary for a compliant sidewalk of 4' in width as outlined by ZBL §V-A.5.f. There is no guard rail proposed along the southerly spaces and the overhang clearance is noted on the plans.**

Comment 5: *A loading space, if required, should be identified on the plans in accordance with ZBL §V-A.5.c.*

Response 5: **The site does not depict the use of a dedicated loading space that would may be unnecessary to this use after occupancy. It is the intent that a delivery would utilize the south parking trays as a temporary offload area. Necessary deliveries shall be coordinated with management to not impede parking. The loading areas are shown in a general manner on the revised Layout and Materials Plan.**

Comment 6: *A lighting plan should be provided to document compliance with ZBL §V-A.5.h and §II. 5.l.b.*

Response 6: **A lighting plan has been included in the revised drawings. All fixtures shall be LED, shielded, and are dark sky compliant to prevent incidental light trespass.**

Comment 7: *ZBL §V-A.5.l limits parking lot grades to a maximum of four percent. Some areas of the parking lot are at five percent.*

Response 7: **Noted. The southerly tray had a cross slope of 4.5%. This has been reduced to 4.0% to be in compliance with V-A.5.1.**

Comment 8: *ZBL §V-A.5.m requires one tree per ten parking spaces and the trees are to be within landscaped areas and islands in and around the parking area. The required number of trees are shown, however, five of the trees are shown within landscaped islands that are also specified to be future banked parking spaces. Trees should not be planted in the banked parking spaces.*

Response 8: **The applicant notes this condition and defers to the Board on whether the trees should be relocated. Based on empirical data and the applicant's familiarity of office accommodations, we believe the reserve spaces would never be utilized and the trees planted within the islands add additional value to the development and shade to the parking lot. The trees can be relocated if desired by the Board.**

Comment 9: We recommend that the binder course of pavement be a minimum of two-inches thick.

Response 9: Noted. This suggestion has been incorporated into the revised drawings.

Stormwater, Utilities & Erosion Control:

Comment 1: The required setback from an infiltration facility to a surface water (wetlands are considered surface waters) is fifty feet. The proposed infiltration basin near Industrial Park Road is only ten feet from the adjacent wetland.

Response 1: Noted. The proposed basin was provided to improve the overall stormwater handling onsite. However, the benefit of tree retention and elimination of potential new impact within the Riverfront resource area outweighed the benefits of the basin and has been removed. PCB-1 has been converted to a water quality Stormceptor 450i to improve Total Suspended Solids and the outfall is a constructed rip-rap swale to prevent scour.

Comment 2: The pre-development HydroCAD analysis needs to be revised. There are no woods modeled in the pre-development analysis, yet there are 46,034 s.f. of woods modeled in the post-development analysis. Woods are shown to be cleared so there should be less woods in the post-development analysis than the pre-development analysis.

Response 2: The HydroCAD has been corrected to reflect the Woods condition under existing conditions. The corrected runoff condition (pre-development), becomes:

STUDY POINT #1 (Flow to Wetlands)			
	2-Year	10-Year	100-Year
Existing Flow (CFS)	1.65	5.00	10.72
Existing Volume (CF)	7,787	18,321	38,648

Comment 3: Pre-development subcatchment area A3 is modeled with no time of concentration. The time of concentration needs to be included in the model.

Response 3: The Subcatchment area has been revised to include a minimum time of concentration of 6 minutes. This is the sheet runoff from the metal storage building.

Comment 4: The modified subsurface infiltration system should be modeled to be routed directly to design point DP and not the L pond.

Response 4: Noted. The infiltration system is routed directly to the design point. The corrected design point runoff values become:

STUDY POINT #1 (Flow to Wetlands)			
	2-Year	10-Year	100-Year
Proposed Flow (CFS)	1.24	3.17	9.42

Proposed Volume (CF)	6,235	15,864	36,496

Comment 5: *There should be a concrete curb or some other type of cut-off wall at each of the proposed stone spillways to prevent water from flowing through the stone, out of the BMP's prior to reaching the design elevation. This includes the stone check dam at the L pond and the stone spillway at the triangle pond.*

Response 5: **Noted. Concrete cut-off curb has been added as suggested.**

Comment 6: *Proposed flared end PFES-2 discharges into the triangle pond. The bottom of the pond is El. 146, and the invert of PFES-2, at El. 145.89, is below the bottom of the pond. We question why there is a rim elevation specified for this flared end.*

Response 6: **The flared end invert has been corrected to discharge at the bottom of the basin. The erroneous rim elevation has been removed.**

Comment 7: *The triangle pond is modeled with a six-inch culvert outlet at El. 147.0 in both the existing and proposed models. This culvert should be shown on the plans.*

Response 7: **The outlet pipe has been added to the plans. It is plotted based on record data as the pipe was not readily visible in the field at the time of survey due to vegetation overgrowth. The pipe shall be verified and cleared during any construction activities.**

Comment 8: *The Drainage Report indicates that there are proprietary treatment units proposed. However, none are shown on the plans. Proposed catch basins PCB-1 and PCB-2 should be treatment units and a detail should be included in the plans.*

Response 8: **Noted. The labels have been added as well as a detail on sheet C-505.**

Comment 9: *The contour elevations of the triangle pond in the post-development HydroCAD analysis should be adjusted to reflect the proposed grading (contours 147, 148 & 149).*

Response 9: **The adjust contour areas have been added to the HydroCAD at 681, 1,293, and 2,254 square feet respectively.**

Comment 10: *The proposed contour 150 at the 'L' pond should be revised. The eastern side of the proposed contour should terminate at the northern tip of the pond.*

Response 10: **The proposed 150 contour has been corrected.**

Comment 11: *The storage volumes in the ponds/basins and subsurface infiltration system should be calculated to be the volume below the lowest outlet (i.e. 1,974 c.f. for Pond #1; 458 c.f. for Pond #2; 1,929 c.f. for the subsurface system; and 1,040 for Pond #3). We note that Pond #2 at 458 c.f. does not provide the required recharge volume of 543 c.f. nor the required water quality volume of 1,551 c.f. The other three BMP's do provide the required recharge and water quality volumes for their*

respective drainage areas. However, there will be changes to Pond #3 due to is being within fifty feet of the wetland.

Response 11: The 6" outlet pipe from the basin shall be reset to 147.20 providing sufficient required recharge volume of 604 c.f. Given the Riverfront coverage, the applicant seeks to meet the required water quality volume to the maximum extent practical under Redevelopment Standard #7 to avoid a reconstruction of the stormwater basin. The proposed Stormceptor is capable of achieving TSS removal rates of greater than 90% under empirical data. For this application, A&M limits the removal efficiency to 50% based on NJCAT data recommendations. It is anticipated that the performance will exceed that value.

Comment 12: The total suspended solids (TSS) removal calculation should have the sediment forebay before the infiltration basin.

Response 12: Noted: The corrected chart becomes:

Location: 55 Industrial Park RD, Hingham, MA

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Sediment Forebay	0.25	1.00	0.25	0.75
Deep Sump and Hooded Catch Basin	0.25	0.75	0.19	0.56
Infiltration Basin	0.80	0.56	0.45	0.11
	0.00	0.11	0.00	0.11
	0.00	0.11	0.00	0.11

Total TSS Removal = 89%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Office Building/Office Park
Prepared By: SMF
Date: 23-Dec-24

*Equals remaining load from previous BMP (E) which enters the BMP

Comment 13: The location of the proposed construction entrance should be shown on the Erosion Control Plan (Sheet C-101) and the length of the entrance should be specified on the detail on Sheet C-501.

Response 13: The construction entrance has been added to the erosion sheet as suggested. The length has been noted on the detail.

Comment 14: In the Site Plan Review Application Checklist – Attachment 5, it is stated that there are no proposed slopes greater than 3:1. The proposed grading at the triangle pond is 2:1. We note that Grading & Drainage Note 14 on Sheet C-001 and Erosion Control Note 22 on Sheet C-002 specify

erosion control blankets on all proposed slopes greater than 3:1, which is in compliance with ZBL §I-I.6.f.

Response 14: Noted. The application shall be clarified to the Planning Board.

Comment 15: A note on Sheet C-102 specifies that the existing septic system leaching area is to remain, yet Sheet C-105 appears to show a new proposed septic leaching area. This should be clarified.

Response 15: The erroneous note has been corrected. The septic system shall be replaced.

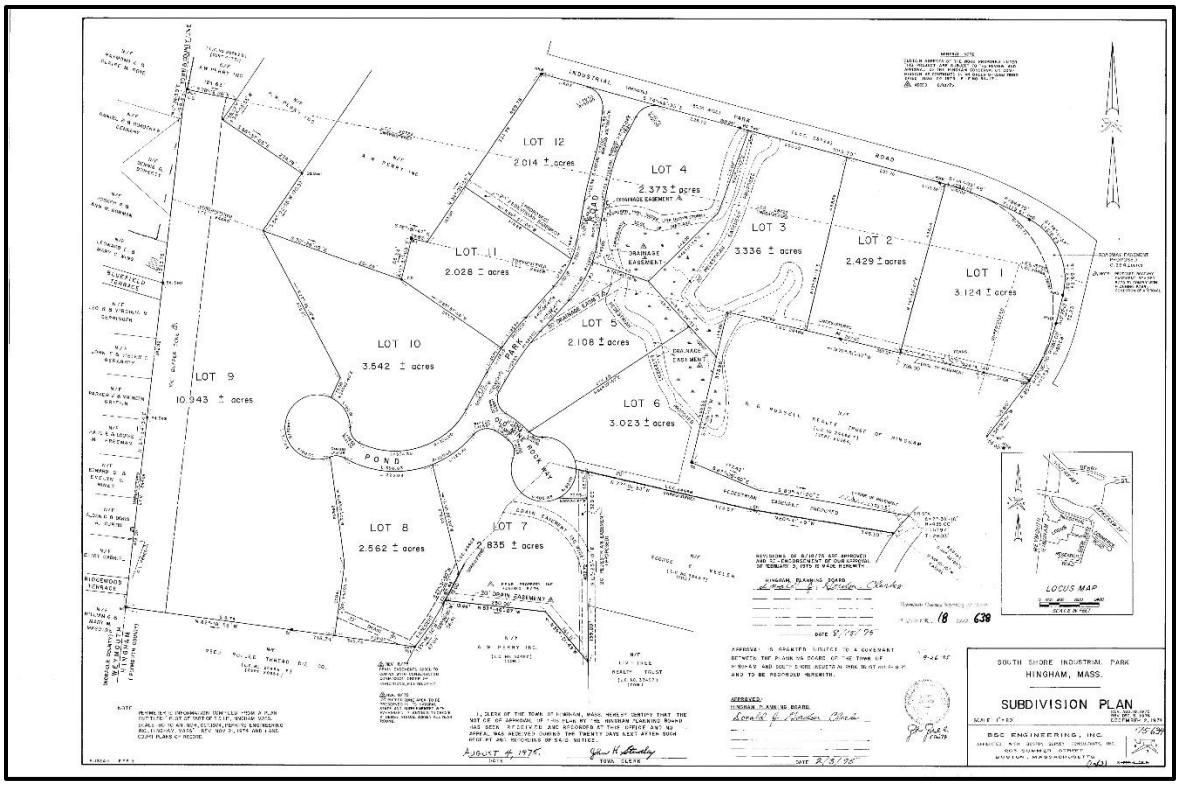
Town of Hingham Senior Planner Comments

Comment 1: Please add the Land Court Certificate # to the application cover sheets, as the deed book/page are inaccurate.

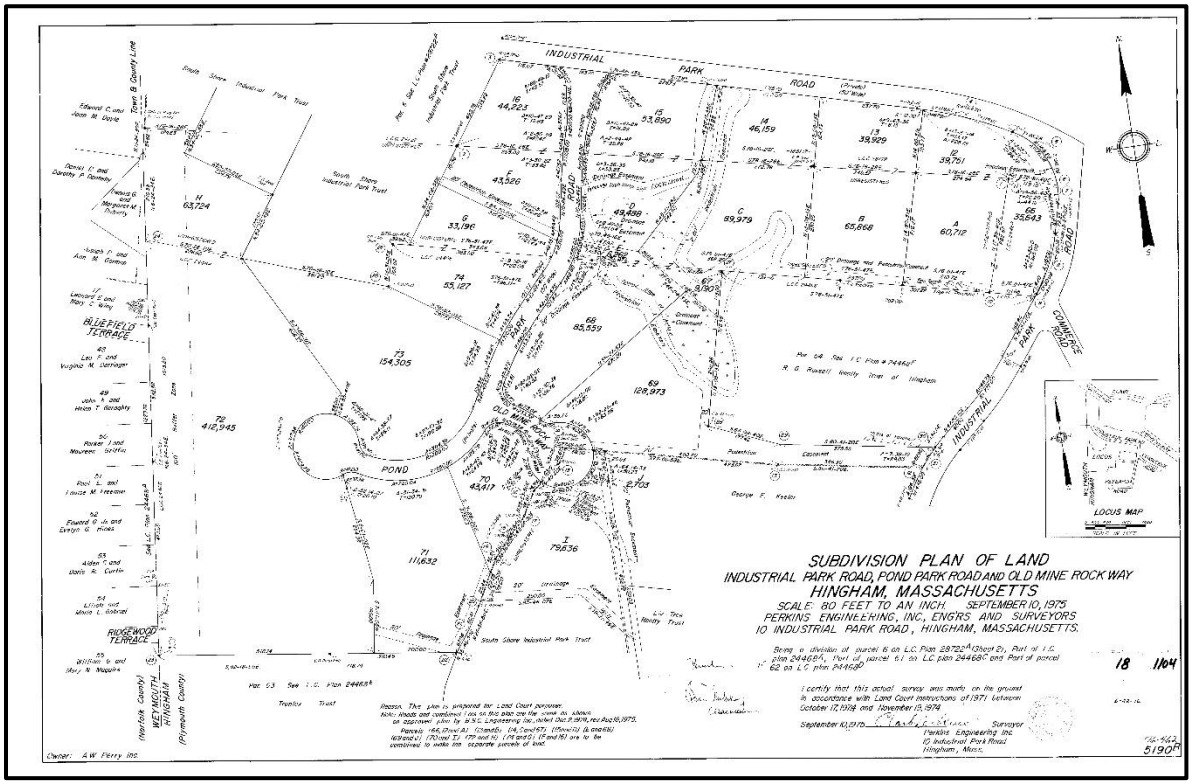
Response 1: The Land Court Certificate # and deed book and page references have been corrected as noted.

Comment 2: What is the 20' pedestrian easement? Please provide recording information for this.

Response 2: The 20' pedestrian easement is shown as taken from the record subdivision plan prepared by BSC Engineering, inc. as dated December 2, 1974 and revised through August 18, 1975 and recorded in the Registry as Plan 634 of 1975. It is unclear the original intent of the easement and who maintains rights within the easement. Similarly, there is no record of the easement having been extinguished. It also appears again on Plan 462 of 1976 prepared by Perkins Engineering, Inc. as dated September 10, 1975.



Plan 634 of 1975



Plan 462 of 1976

Comment 3: Plan #462 of 1967 listed under "Locus References" on sheet V-101 should be of 1976 instead of 1967.

Response 3: The plan reference has been corrected.

Comment 4: Please move the 20' light post out of the front yard setback.

Response 4: The light pole has been relocated out of the front yard as noted.

Comment 5: Please provide a detail for the proposed monument sign.

Response 5: The sign detail shall be submitted under separate cover by the applicant.

Comment 6: Please either reduce the driveway curb cut to 24' in width or request a waiver of this requirement due to existing conditions.

Response 6: On behalf of the applicant, A&M requests a waiver from the requirements of a 24' curb cut to allow for reuse of the existing driveway opening. A waiver note has been added to the cover sheet of the plans.

Comment 7: Electrical/communication wires should connect underground from the street. Please confirm this with the Engineering Manager, Steve Girardi, at HMLP.

Response 7: Noted. The applicant has been working with HMLP on the routing of new services and the installation of a riser pole as shown on the utility drawings. All services from the riser pole shall be underground.

Comment 8: Please identify all the trees 6" in caliper or greater to be removed. Please include their size and species, as well as their health/safety if applicable.

Response 8: A detailed tree survey was prepared for the site which indicates the existing trees, species, and current condition. The site landscape plan prepared by Sean Papich outlines the trees to be removed and the replacement.

Comment 9: Are there any areas with a slope greater than 3:1? If so, please provide an erosion control blanket.

Response 9: There is an area noted on the easterly portion of the site that may have slopes exceeding 3:1. An erosion blanket is specified. However, it is possible that this area may be stabilized with exposed ledge face during excavation and the blanket may not be necessary.

Comment 10: Please provide a site lighting plan.

Response 10: A site lighting plan is included in the revised drawings.

Comment 11: Please request a waiver of the Transportation Impact Assessment submittal requirement.

Response 11: On behalf of the applicant, A&M requests a waiver from the requirement to prepare a traffic and impact study for this use. The existing use of the property is office and manufacturing. The continued use as an office building will have a de minimus impact on traffic along Industrial Park Road. A waiver note has been added to the cover sheet of the plans.

Comment 12: Do the parking spaces have an overhang? If no, please provide the additional 2' required or provide 20' spaces without an overhang.

Response 12: The areas directly adjacent to each parking space have been revised to allow for the overhang. Where a space abuts a sidewalk, the sidewalk is large enough to allow for a potential vehicle overhang and still provide a minimum four feet of clear distance for pedestrian movements as contemplated by standard V-A 5.f.

Comment 13: Are there any retaining walls? It is difficult to decipher the difference between curbing and any retaining walls on the plan.

Response 13: There are no retaining walls provided onsite.

Comment 14: 3 accessible parking spaces are required, one of which must be van accessible.

Response 14: Three accessible spaces are provided. All of which can accommodate a van.

Comment 15: Please provide dimensions for the accessible spaces and accessible aisle. The accessible spaces must be at least 8' in width with a 5'-wide access aisle. The access aisle for the van accessible space must be 8' in width. Van accessible spaces do not have to be separately provided if all accessible spaces are 11' in width with a 5'-wide access aisle.

Response 15: Dimensions for the accessible spaces have been added to the Layout and Materials Plan. All spaces are a minimum of 8 feet clear (inside of stripe to inside of stripe) in conformance with the ADA and MAAB codes.

Comment 16: Please confirm compliance with Section V-A.5.l of the By-Law.

Response 16: Confirmed. The spaces are denoted as white on the detailing on sheet C-502.

Comment 17: EV charging requirements are calculated from the number of spaces proposed to be on the ground (59 spaces). Therefore, 15 spaces should be identified to be EV ready and 6 spaces should be equipped with chargers (3 chargers if 2 ports per charger).

Response 17: Noted. 15 total EV spaces are noted with 6 available at occupancy. The physical charger is not determined yet.

Comment 18: Please demonstrate compliance with Section III-E.9 of the By-Law.

Response 18: The text of Section III-E.9 requires:

For all properties subject to the regulations of the South Hingham Development Overlay District a screening plan shall be required as part of the Site Plan Review process, Section I-I. At a minimum if the development's at-grade parking areas are visible at normal eye level from a public way or from any point abutting a residential district that is less than five hundred (500) feet away, they shall be screened by an ornamental lattice, planted berm, opaque fence, or sight-obscuring planting or screenings which are comprised of at least seventy-five percent (75%) evergreen shrubs or trees. Plantings shall be maintained in healthy growing condition, and fencing shall be maintained in good repair by the land owner.

The proposed surface parking is located approximately 130 linear feet from the intersection with Industrial Park Road. To meet the requirements of the SHDO, the easterly side of the existing drive aisle is being retained in its natural woodland state which is elevated (bermed) above the adjacent grade of the driveway. This will provide permanent screening to the spaces from the primary lines of site of cars travelling easterly along Industrial Park Road. For the westerly parking tray, the existing tree line is also being maintained. However in this area it is being supplemented with plantings appropriate to the Riverfront zone jurisdictional to conservation. These include River Birch and Serviceberry. While not in strict compliance with the evergreen shrubs noted by E.9, these plants are more appropriate for the site. To the extent required, on behalf of the applicant, A&M requests a waiver to allow for the plants as depicted on the landscaping plan as being more suited for Riverfront area.

A&M believes these responses will provide sufficient information for the continued review of this application. If you require additional information, please feel free to contact me.

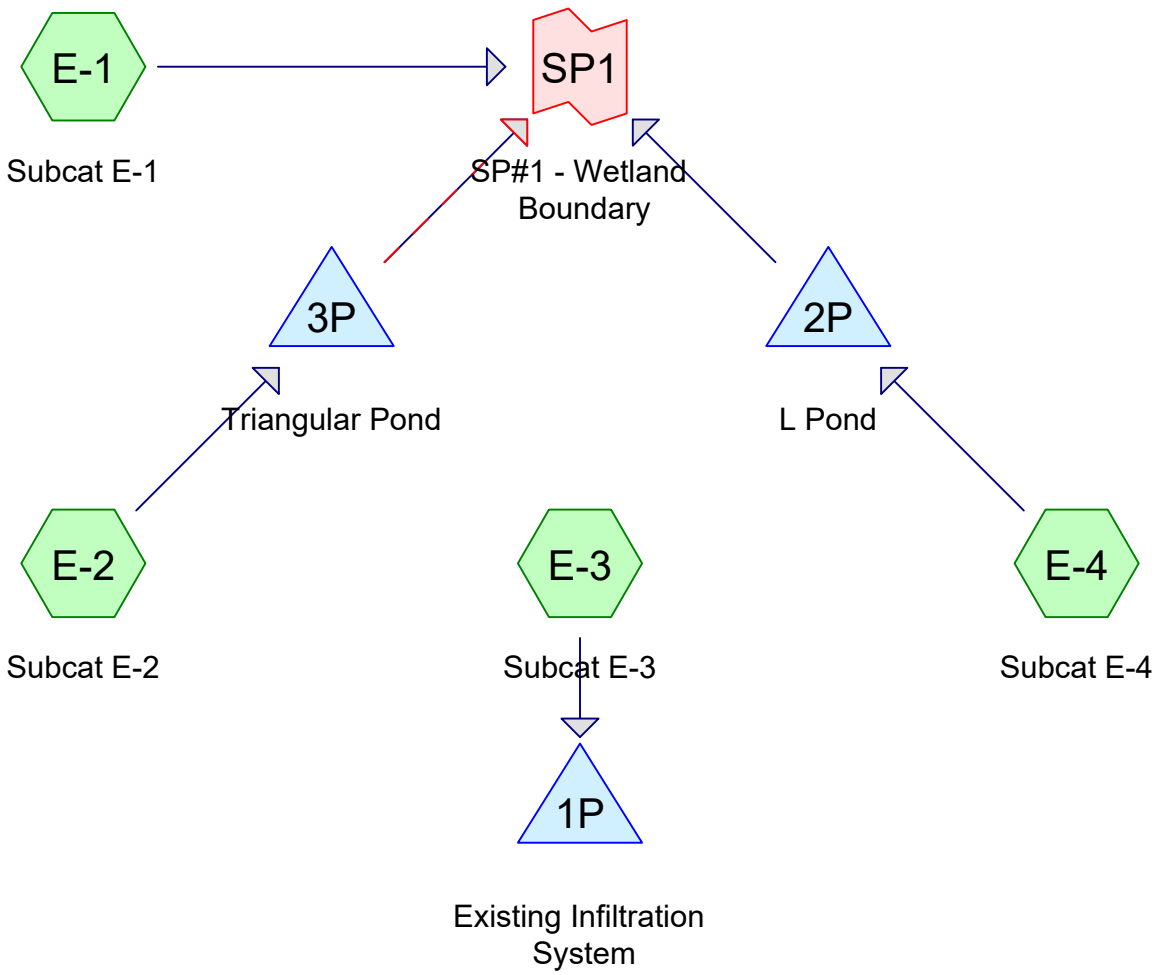
Very Truly Yours,

ALLEN & MAJOR ASSOCIATES, INC.

Phil Cordeiro, P.E.
Branch Manager

Copy: Hingham Conservation Commission
Fifty-Five Saxon LLC. (by email)

Enclosure Site Development Drawings, Revision 2 dated December 23, 2024
HydroCAD drainage worksheets



Subcat Reach Pond Link

Routing Diagram for 1179-20A - Existing HydroCAD
Prepared by Allen & Major Associates, Inc, Printed 12/23/2024

Project Notes

Rainfall events imported from "Atlas-14-Rain.txt" for 447 MA Plymouth

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.36	2
2	10-Year	Type III 24-hr		Default	24.00	1	5.12	2
3	100-Year	Type III 24-hr		Default	24.00	1	7.93	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
16,675	61	>75% Grass cover, Good, HSG B (E-1, E-2, E-4)
32,452	98	Paved parking, HSG B (E-1, E-2, E-4)
11,479	98	Roofs, HSG B (E-1, E-2, E-3)
57,780	55	Woods, Good, HSG B (E-1, E-2, E-4)
118,387	**72**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
118,387	HSG B	E-1, E-2, E-3, E-4
0	HSG C	
0	HSG D	
0	Other	
118,387		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
0	16,675	0	0	0	16,675	>75% Grass cover, Good	
0	32,452	0	0	0	32,452	Paved parking	
0	11,479	0	0	0	11,479	Roofs	
0	57,780	0	0	0	57,780	Woods, Good	
0	**118,387**	**0**	**0**	**0**	**118,387**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	E-2	0.00	0.00	15.0	0.0200	0.013	0.0	12.0	0.0	
2	3P	147.00	145.00	30.0	0.0667	0.013	0.0	6.0	0.0	

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: Subcat E-1 Runoff Area=72,274 sf 29.43% Impervious Runoff Depth=0.87"
Flow Length=291' Tc=12.6 min CN=69 Runoff=1.20 cfs 5,247 cf

Subcatchment E-2: Subcat E-2 Runoff Area=28,760 sf 60.45% Impervious Runoff Depth=1.67"
Flow Length=328' Tc=11.0 min CN=82 Runoff=1.08 cfs 3,997 cf

Subcatchment E-3: Subcat E-3 Runoff Area=4,031 sf 100.00% Impervious Runoff Depth=3.13"
Tc=6.0 min CN=98 Runoff=0.30 cfs 1,050 cf

Subcatchment E-4: Subcat E-4 Runoff Area=13,322 sf 9.33% Impervious Runoff Depth=0.47"
Flow Length=200' Tc=8.2 min CN=60 Runoff=0.10 cfs 525 cf

Pond 1P: Existing Infiltration System Peak Elev=148.24' Storage=422 cf Inflow=0.30 cfs 1,050 cf
Outflow=0.02 cfs 1,050 cf

Pond 2P: L Pond Peak Elev=148.32' Storage=163 cf Inflow=0.10 cfs 525 cf
Discarded=0.02 cfs 525 cf Primary=0.00 cfs 0 cf Outflow=0.02 cfs 525 cf

Pond 3P: Triangular Pond Peak Elev=147.66' Storage=1,190 cf Inflow=1.08 cfs 3,997 cf
Discarded=0.03 cfs 1,350 cf Primary=0.53 cfs 2,540 cf Secondary=0.00 cfs 0 cf Outflow=0.56 cfs 3,890 cf

Link SP1: SP#1 - Wetland Boundary Inflow=1.65 cfs 7,787 cf
Primary=1.65 cfs 7,787 cf

Total Runoff Area = 118,387 sf Runoff Volume = 10,819 cf Average Runoff Depth = 1.10"
62.89% Pervious = 74,456 sf 37.11% Impervious = 43,931 sf

Summary for Subcatchment E-1: Subcat E-1

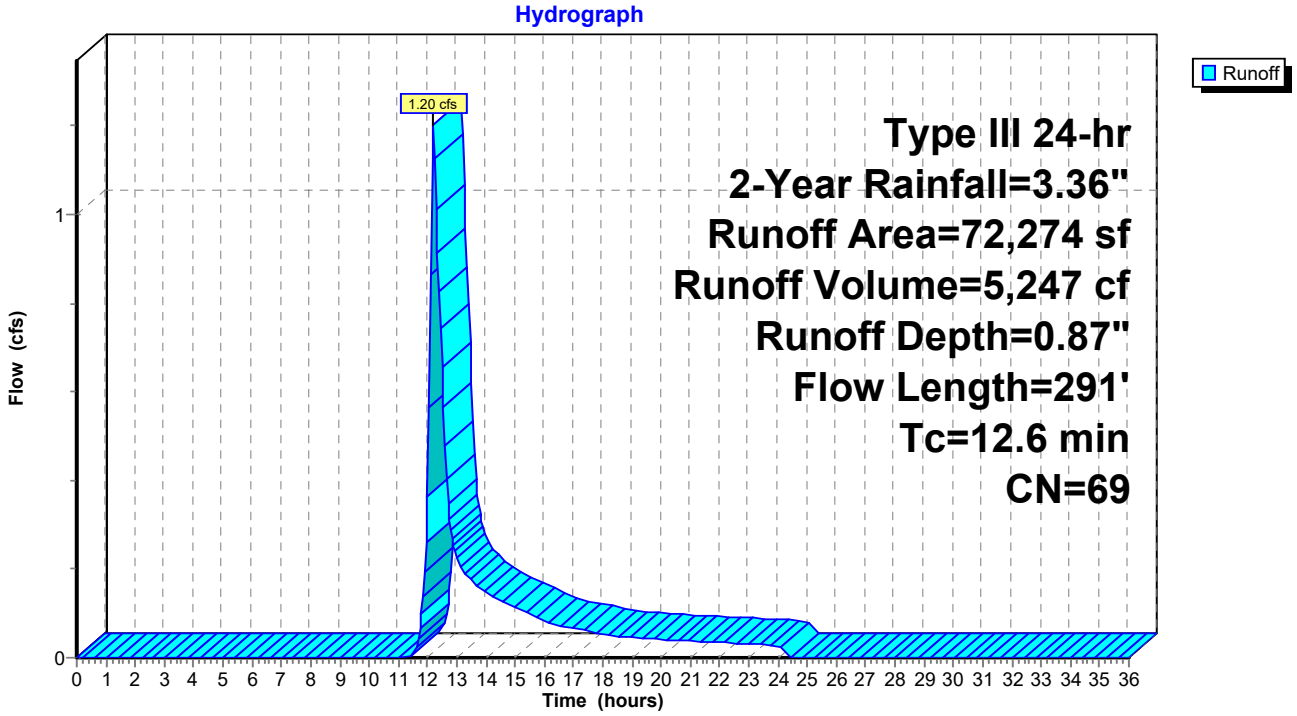
Runoff = 1.20 cfs @ 12.20 hrs, Volume= 5,247 cf, Depth= 0.87"
Routed to Link SP1 : SP#1 - Wetland Boundary

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
11,374	61	>75% Grass cover, Good, HSG B
17,153	98	Paved parking, HSG B
4,119	98	Roofs, HSG B
39,628	55	Woods, Good, HSG B
72,274	69	Weighted Average
51,002		70.57% Pervious Area
21,272		29.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.28"
3.0	178	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	36	0.0300	3.52		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.2	27	0.1000	2.21		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
12.6	291	Total			

Subcatchment E-1: Subcat E-1



Summary for Subcatchment E-2: Subcat E-2

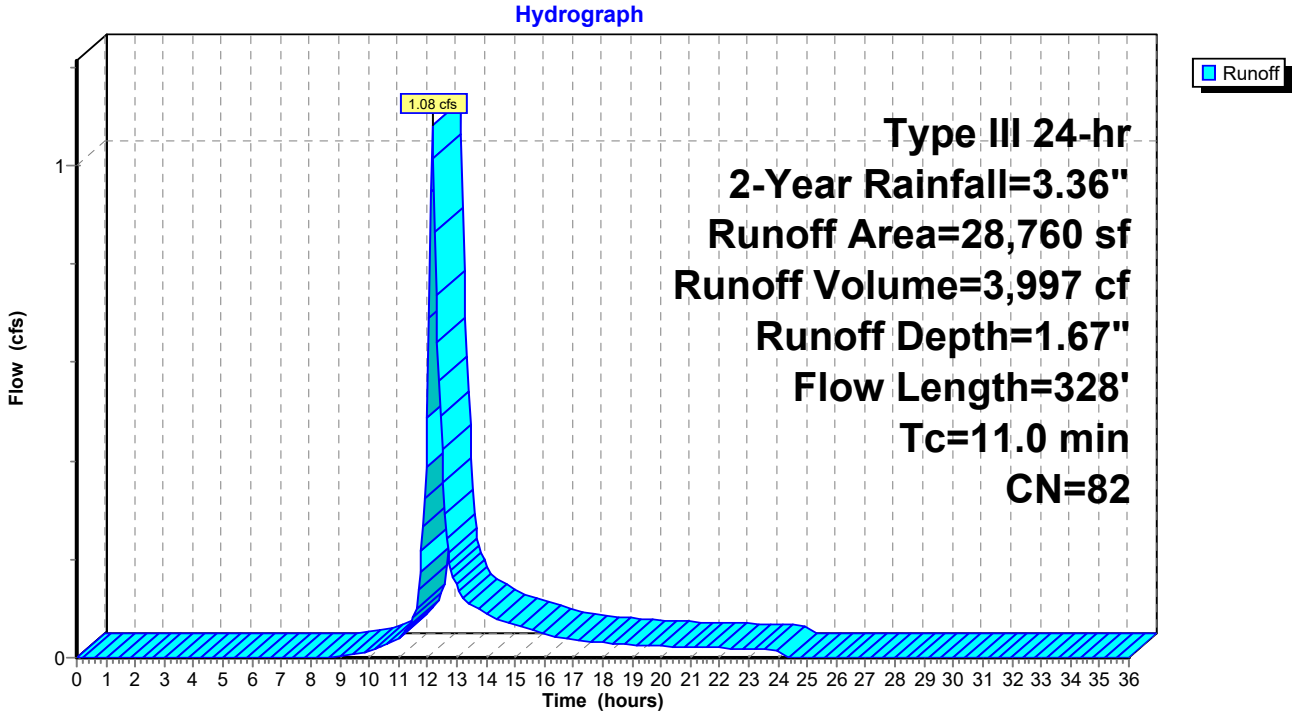
Runoff = 1.08 cfs @ 12.16 hrs, Volume= 3,997 cf, Depth= 1.67"
Routed to Pond 3P : Triangular Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
2,960	61	>75% Grass cover, Good, HSG B
14,056	98	Paved parking, HSG B
3,329	98	Roofs, HSG B
8,415	55	Woods, Good, HSG B
28,760	82	Weighted Average
11,375		39.55% Pervious Area
17,385		60.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.28"
1.2	83	0.0500	1.12		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.4	172	0.0100	2.03		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.0	15	0.0200	6.42	5.04	**Pipe Channel, D-E** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
0.0	8	0.0500	3.35		**Shallow Concentrated Flow, E-F** Grassed Waterway Kv= 15.0 fps
11.0	328	Total			

Subcatchment E-2: Subcat E-2



Summary for Subcatchment E-3: Subcat E-3

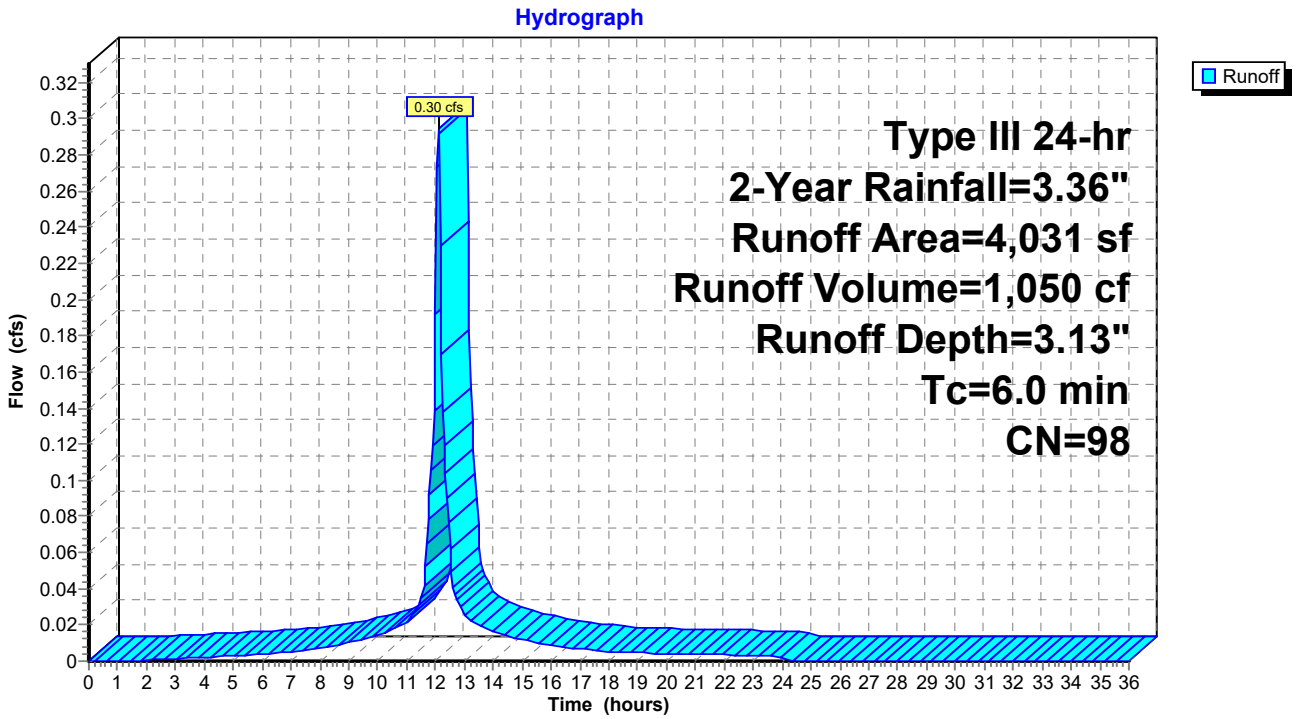
Runoff = 0.30 cfs @ 12.09 hrs, Volume= 1,050 cf, Depth= 3.13"
Routed to Pond 1P : Existing Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
4,031	98	Roofs, HSG B
4,031		100.00% Impervious Area

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

Subcatchment E-3: Subcat E-3



Summary for Subcatchment E-4: Subcat E-4

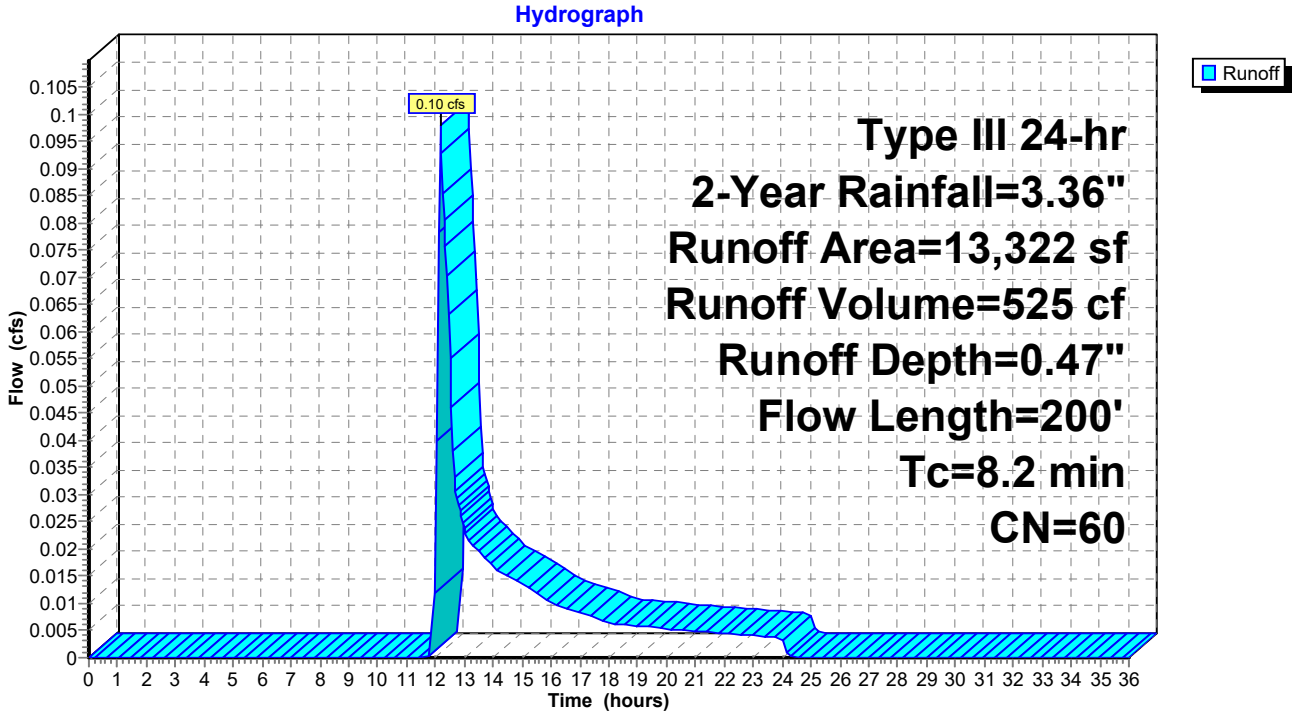
Runoff = 0.10 cfs @ 12.17 hrs, Volume= 525 cf, Depth= 0.47"
Routed to Pond 2P : L Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
2,342	61	>75% Grass cover, Good, HSG B
1,243	98	Paved parking, HSG B
9,737	55	Woods, Good, HSG B
13,322	60	Weighted Average
12,079		90.67% Pervious Area
1,243		9.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.1200	0.14		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.28"
0.5	30	0.0333	0.91		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.2	20	0.0500	1.57		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.5	20	0.0010	0.64		**Shallow Concentrated Flow, D-E** Paved Kv= 20.3 fps
1.1	80	0.0300	1.21		**Shallow Concentrated Flow, E-F** Short Grass Pasture Kv= 7.0 fps
8.2	200	Total			

Subcatchment E-4: Subcat E-4



Summary for Pond 1P: Existing Infiltration System

Inflow Area = 4,031 sf,100.00% Impervious, Inflow Depth = 3.13" for 2-Year event
Inflow = 0.30 cfs @ 12.09 hrs, Volume= 1,050 cf
Outflow = 0.02 cfs @ 11.05 hrs, Volume= 1,050 cf, Atten= 93%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.05 hrs, Volume= 1,050 cf

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 148.24' @ 13.41 hrs Surf.Area= 863 sf Storage= 422 cf

Plug-Flow detention time= 161.8 min calculated for 1,049 cf (100% of inflow)
Center-of-Mass det. time= 161.6 min (917.0 - 755.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	147.40'	689 cf	**19.17'W x 45.00'L x 3.21'H Field A** 2,767 cf Overall - 1,044 cf Embedded = 1,723 cf x 40.0% Voids
#2A	147.90'	1,044 cf	**Cultec R-280HD** x 24 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 4 rows
		1,733 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	147.40'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 11.05 hrs HW=147.43' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Pond 1P: Existing Infiltration System - Chamber Wizard Field A

Chamber Model = Cultec R-280HD (Cultec Recharger®280HD)
Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf
Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap
Row Length Adjustment= +1.00' x 6.07 sf x 4 rows

47.0" Wide + 6.0" Spacing = 53.0" C-C Row Spacing

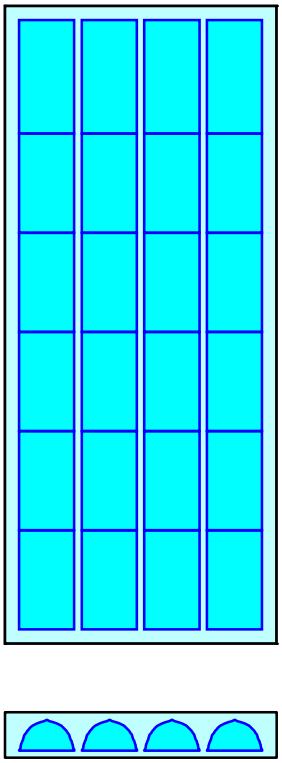
6 Chambers/Row x 7.00' Long +1.00' Row Adjustment = 43.00' Row Length +12.0" End Stone x 2 = 45.00' Base Length
4 Rows x 47.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 19.17' Base Width
6.0" Stone Base + 26.5" Chamber Height + 6.0" Stone Cover = 3.21' Field Height

24 Chambers x 42.5 cf +1.00' Row Adjustment x 6.07 sf x 4 Rows = 1,044.3 cf Chamber Storage

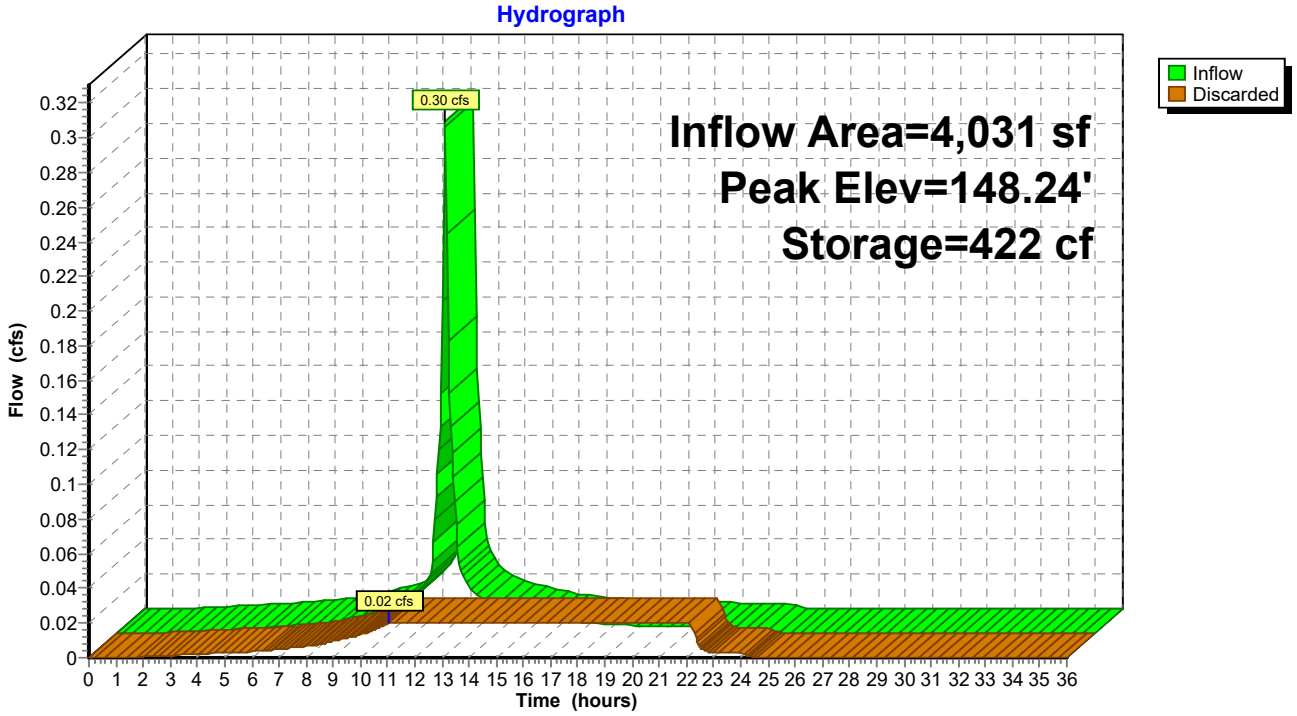
2,767.2 cf Field - 1,044.3 cf Chambers = 1,722.8 cf Stone x 40.0% Voids = 689.1 cf Stone Storage

Chamber Storage + Stone Storage = 1,733.5 cf = 0.040 af
Overall Storage Efficiency = 62.6%
Overall System Size = 45.00' x 19.17' x 3.21'

24 Chambers
102.5 cy Field
63.8 cy Stone



Pond 1P: Existing Infiltration System



Summary for Pond 2P: L Pond

Inflow Area = 13,322 sf, 9.33% Impervious, Inflow Depth = 0.47" for 2-Year event
Inflow = 0.10 cfs @ 12.17 hrs, Volume= 525 cf
Outflow = 0.02 cfs @ 14.51 hrs, Volume= 525 cf, Atten= 85%, Lag= 140.9 min
Discarded = 0.02 cfs @ 14.51 hrs, Volume= 525 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link SP1 : SP#1 - Wetland Boundary

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 148.32' @ 14.51 hrs Surf.Area= 637 sf Storage= 163 cf

Plug-Flow detention time= 125.5 min calculated for 525 cf (100% of inflow)
Center-of-Mass det. time= 125.4 min (1,041.3 - 915.9)

Volume	Invert	Avail.Storage	Storage Description
#1	148.00'	1,674 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

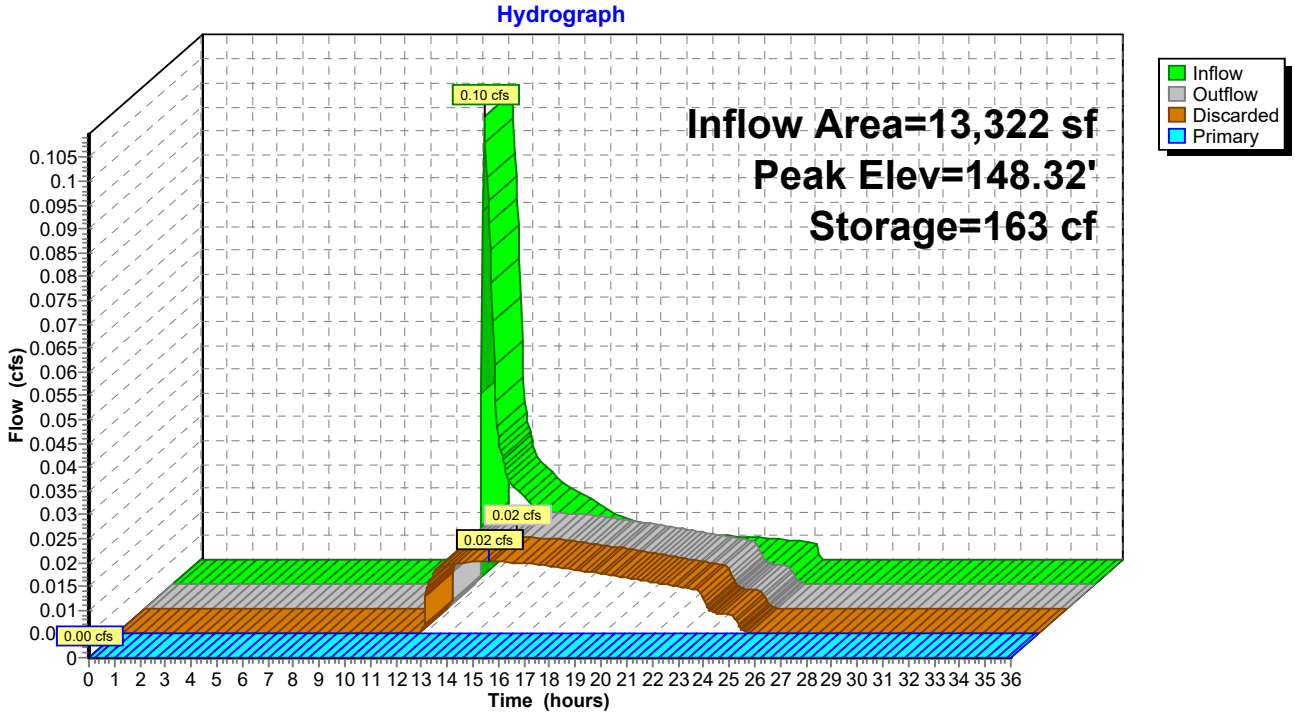
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
148.00	369	0	0
149.00	1,197	783	783
149.50	1,667	716	1,499
149.60	1,837	175	1,674

Device	Routing	Invert	Outlet Devices
#1	Discarded	148.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	149.50'	**5.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.02 cfs @ 14.51 hrs HW=148.32' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=148.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: L Pond



Summary for Pond 3P: Triangular Pond

Inflow Area = 28,760 sf, 60.45% Impervious, Inflow Depth = 1.67" for 2-Year event
Inflow = 1.08 cfs @ 12.16 hrs, Volume= 3,997 cf
Outflow = 0.56 cfs @ 12.40 hrs, Volume= 3,890 cf, Atten= 48%, Lag= 14.7 min
Discarded = 0.03 cfs @ 12.40 hrs, Volume= 1,350 cf
Primary = 0.53 cfs @ 12.40 hrs, Volume= 2,540 cf
Routed to Link SP1 : SP#1 - Wetland Boundary
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link SP1 : SP#1 - Wetland Boundary

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 147.66' @ 12.40 hrs Surf.Area= 1,156 sf Storage= 1,190 cf

Plug-Flow detention time= 165.4 min calculated for 3,890 cf (97% of inflow)
Center-of-Mass det. time= 150.1 min (988.6 - 838.5)

Volume	Invert	Avail.Storage	Storage Description
#1	145.10'	1,767 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
145.10	1	0	0
146.00	232	105	105
147.00	709	471	575
148.00	1,388	1,049	1,624
148.10	1,467	143	1,767

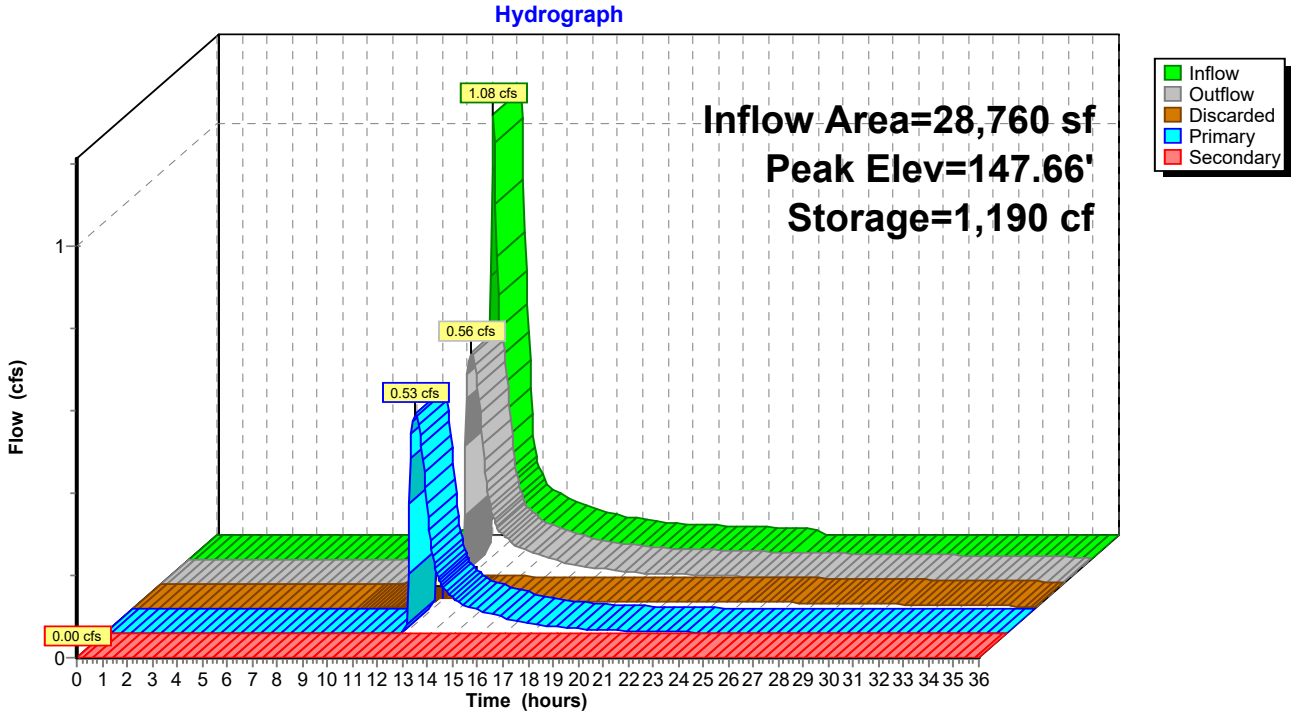
Device	Routing	Invert	Outlet Devices
#1	Discarded	145.10'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	147.00'	**6.0" Round Culvert** L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 147.00' / 145.00' S= 0.0667 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Secondary	148.00'	**5.0' 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

Discarded OutFlow Max=0.03 cfs @ 12.40 hrs HW=147.66' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.53 cfs @ 12.40 hrs HW=147.66' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 0.53 cfs @ 2.72 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=145.10' (Free Discharge)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: Triangular Pond

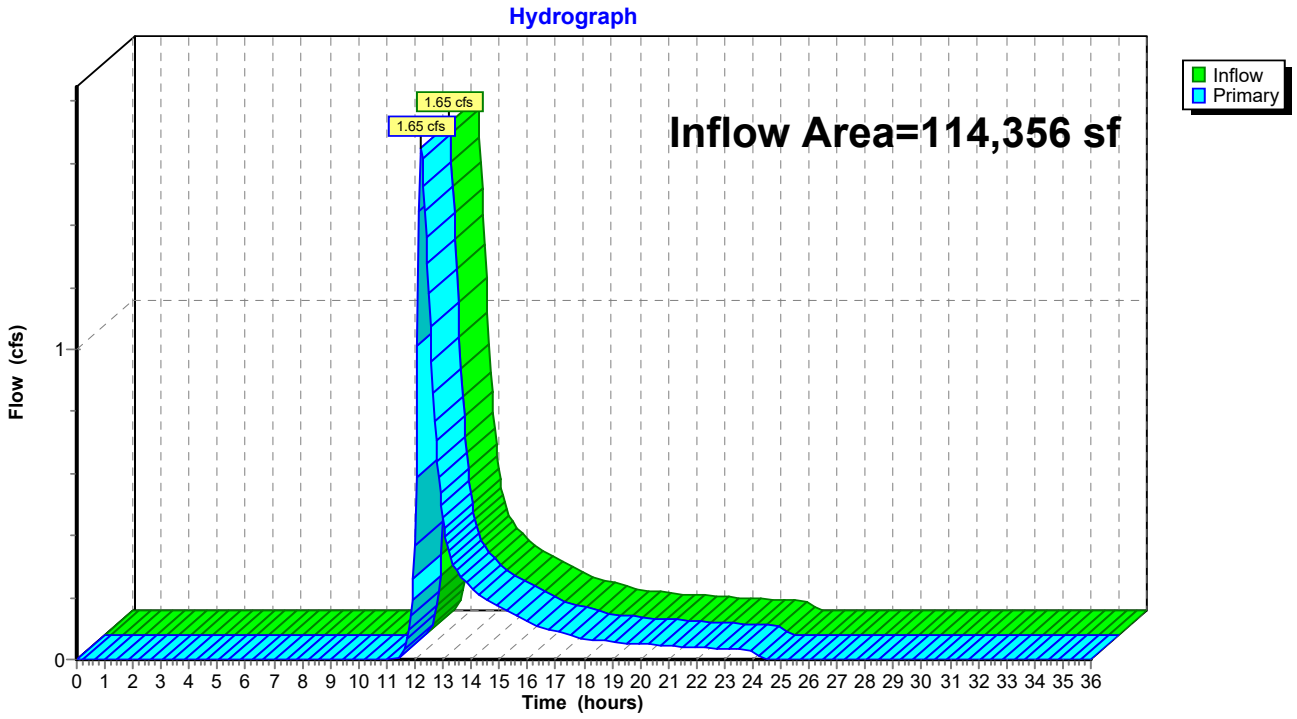


Summary for Link SP1: SP#1 - Wetland Boundary

Inflow Area = 114,356 sf, 34.89% Impervious, Inflow Depth = 0.82" for 2-Year event
Inflow = 1.65 cfs @ 12.22 hrs, Volume= 7,787 cf
Primary = 1.65 cfs @ 12.22 hrs, Volume= 7,787 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link SP1: SP#1 - Wetland Boundary



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: Subcat E-1 Runoff Area=72,274 sf 29.43% Impervious Runoff Depth=2.05"
Flow Length=291' Tc=12.6 min CN=69 Runoff=3.10 cfs 12,317 cf

Subcatchment E-2: Subcat E-2 Runoff Area=28,760 sf 60.45% Impervious Runoff Depth=3.19"
Flow Length=328' Tc=11.0 min CN=82 Runoff=2.07 cfs 7,637 cf

Subcatchment E-3: Subcat E-3 Runoff Area=4,031 sf 100.00% Impervious Runoff Depth=4.88"
Tc=6.0 min CN=98 Runoff=0.45 cfs 1,640 cf

Subcatchment E-4: Subcat E-4 Runoff Area=13,322 sf 9.33% Impervious Runoff Depth=1.37"
Flow Length=200' Tc=8.2 min CN=60 Runoff=0.40 cfs 1,523 cf

Pond 1P: Existing Infiltration System Peak Elev=148.75' Storage=783 cf Inflow=0.45 cfs 1,640 cf
Outflow=0.02 cfs 1,640 cf

Pond 2P: L Pond Peak Elev=148.98' Storage=757 cf Inflow=0.40 cfs 1,523 cf
Discarded=0.03 cfs 1,523 cf Primary=0.00 cfs 0 cf Outflow=0.03 cfs 1,523 cf

Pond 3P: Triangular Pond Peak Elev=148.23' Storage=1,767 cf Inflow=2.07 cfs 7,637 cf
Discarded=0.03 cfs 1,518 cf Primary=0.83 cfs 5,410 cf Secondary=1.34 cfs 594 cf Outflow=2.20 cfs 7,522 cf

Link SP1: SP#1 - Wetland Boundary Inflow=5.00 cfs 18,321 cf
Primary=5.00 cfs 18,321 cf

Total Runoff Area = 118,387 sf Runoff Volume = 23,117 cf Average Runoff Depth = 2.34"
62.89% Pervious = 74,456 sf 37.11% Impervious = 43,931 sf

Summary for Subcatchment E-1: Subcat E-1

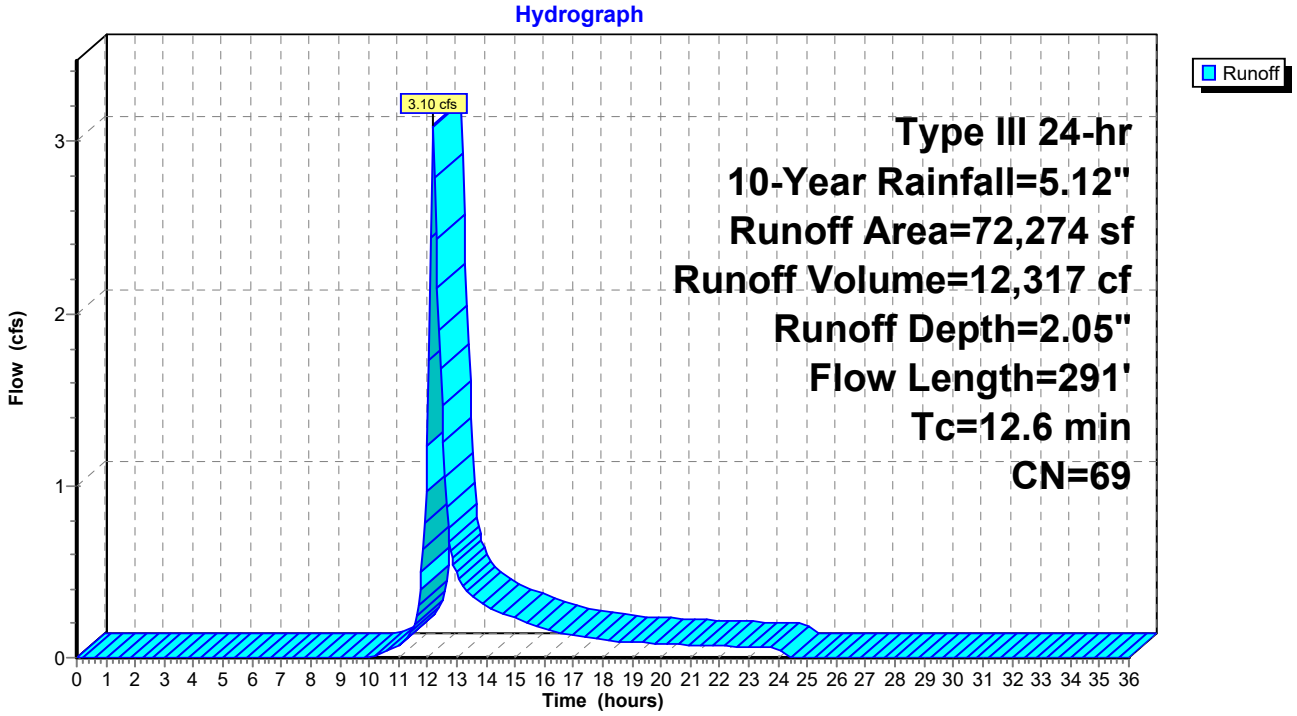
Runoff = 3.10 cfs @ 12.19 hrs, Volume= 12,317 cf, Depth= 2.05"
Routed to Link SP1 : SP#1 - Wetland Boundary

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.12"

Area (sf)	CN	Description
11,374	61	>75% Grass cover, Good, HSG B
17,153	98	Paved parking, HSG B
4,119	98	Roofs, HSG B
39,628	55	Woods, Good, HSG B
72,274	69	Weighted Average
51,002		70.57% Pervious Area
21,272		29.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.28"
3.0	178	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	36	0.0300	3.52		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.2	27	0.1000	2.21		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
12.6	291	Total			

Subcatchment E-1: Subcat E-1



Summary for Subcatchment E-2: Subcat E-2

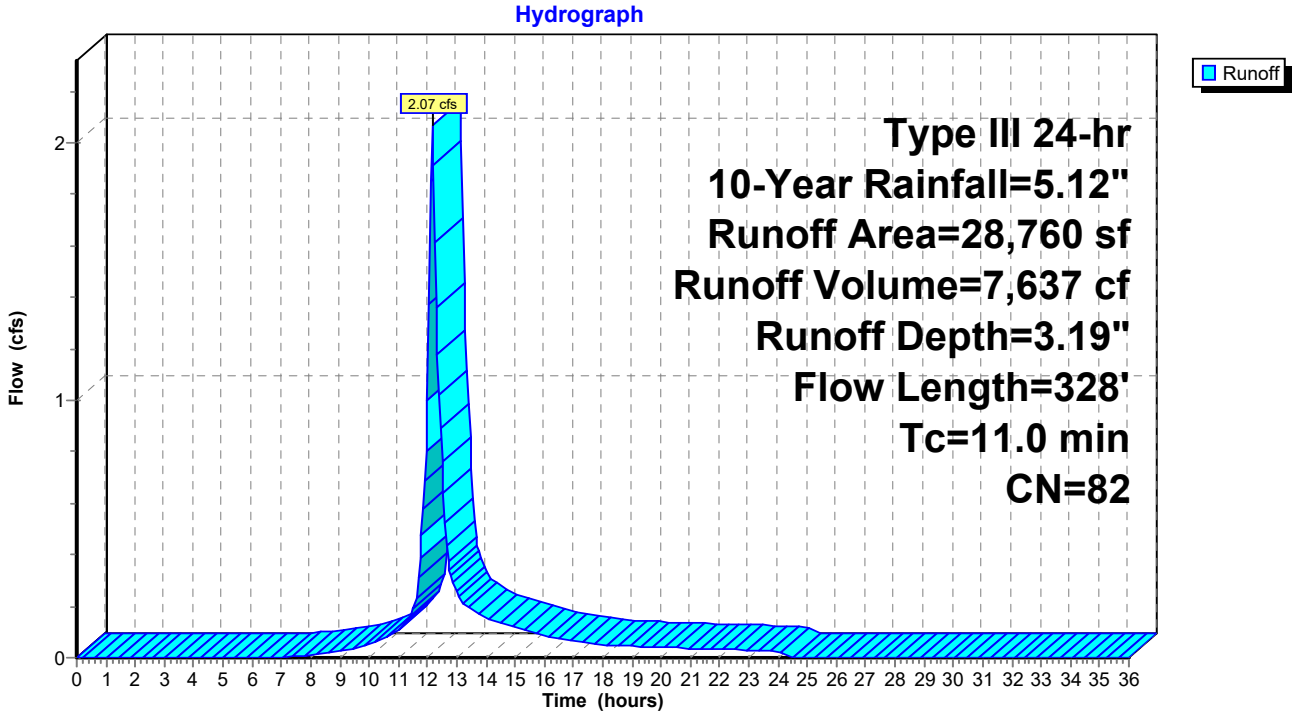
Runoff = 2.07 cfs @ 12.15 hrs, Volume= 7,637 cf, Depth= 3.19"
Routed to Pond 3P : Triangular Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.12"

Area (sf)	CN	Description
2,960	61	>75% Grass cover, Good, HSG B
14,056	98	Paved parking, HSG B
3,329	98	Roofs, HSG B
8,415	55	Woods, Good, HSG B
28,760	82	Weighted Average
11,375		39.55% Pervious Area
17,385		60.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.28"
1.2	83	0.0500	1.12		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.4	172	0.0100	2.03		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.0	15	0.0200	6.42	5.04	**Pipe Channel, D-E** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
0.0	8	0.0500	3.35		**Shallow Concentrated Flow, E-F** Grassed Waterway Kv= 15.0 fps
11.0	328	Total			

Subcatchment E-2: Subcat E-2



Summary for Subcatchment E-3: Subcat E-3

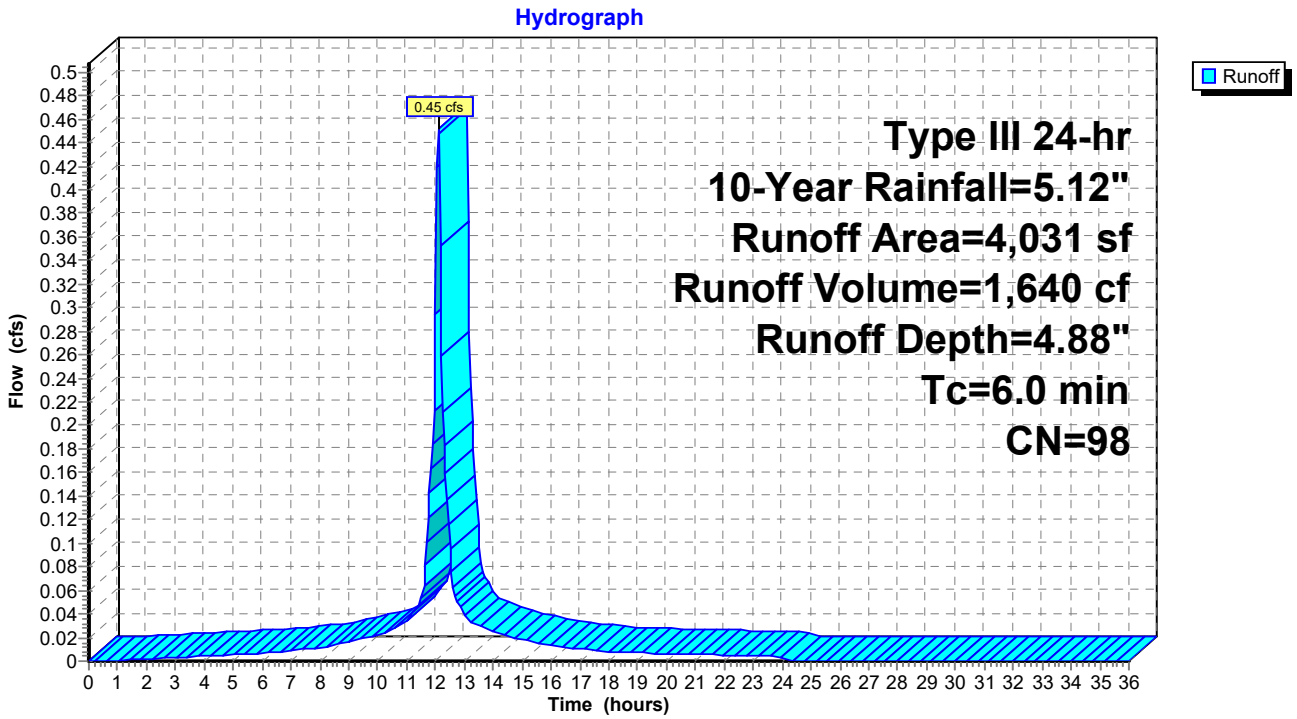
Runoff = 0.45 cfs @ 12.09 hrs, Volume= 1,640 cf, Depth= 4.88"
Routed to Pond 1P : Existing Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.12"

Area (sf)	CN	Description
4,031	98	Roofs, HSG B
4,031		100.00% Impervious Area

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

Subcatchment E-3: Subcat E-3



Summary for Subcatchment E-4: Subcat E-4

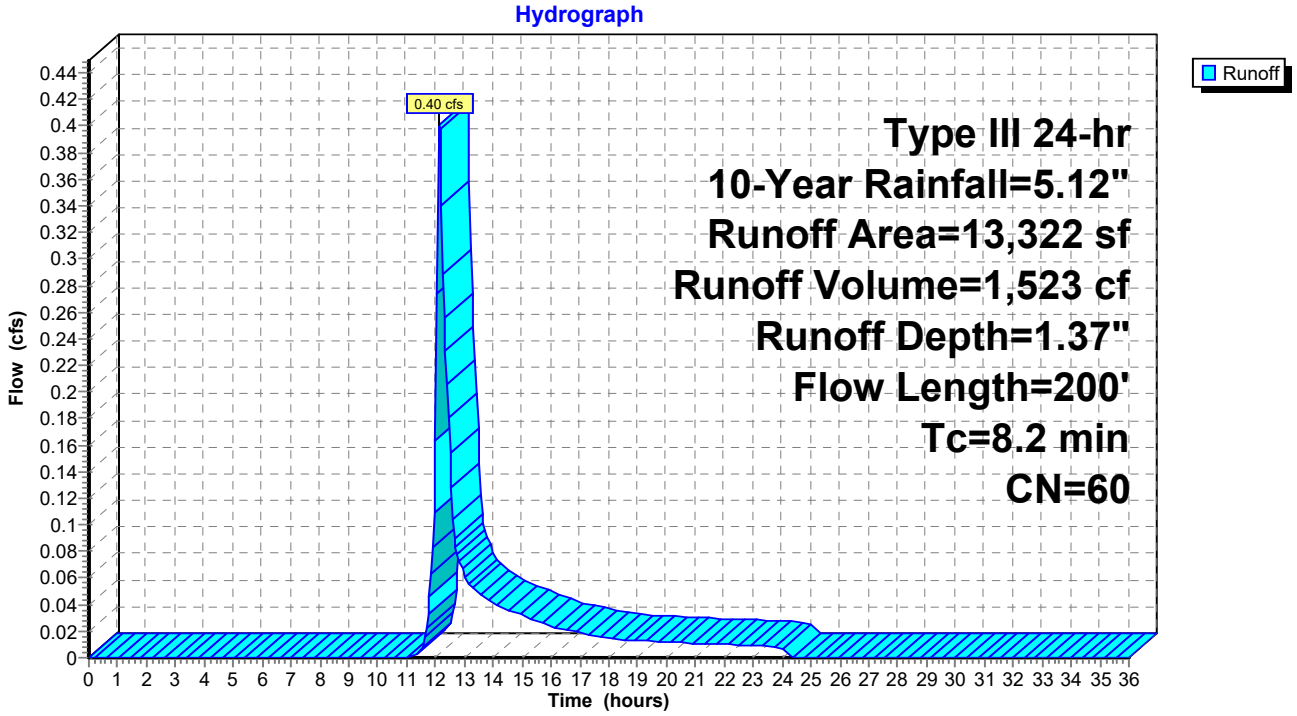
Runoff = 0.40 cfs @ 12.13 hrs, Volume= 1,523 cf, Depth= 1.37"
Routed to Pond 2P : L Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.12"

Area (sf)	CN	Description
2,342	61	>75% Grass cover, Good, HSG B
1,243	98	Paved parking, HSG B
9,737	55	Woods, Good, HSG B
13,322	60	Weighted Average
12,079		90.67% Pervious Area
1,243		9.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.1200	0.14		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.28"
0.5	30	0.0333	0.91		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.2	20	0.0500	1.57		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.5	20	0.0010	0.64		**Shallow Concentrated Flow, D-E** Paved Kv= 20.3 fps
1.1	80	0.0300	1.21		**Shallow Concentrated Flow, E-F** Short Grass Pasture Kv= 7.0 fps
8.2	200	Total			

Subcatchment E-4: Subcat E-4



Summary for Pond 1P: Existing Infiltration System

Inflow Area = 4,031 sf,100.00% Impervious, Inflow Depth = 4.88" for 10-Year event
Inflow = 0.45 cfs @ 12.09 hrs, Volume= 1,640 cf
Outflow = 0.02 cfs @ 9.85 hrs, Volume= 1,640 cf, Atten= 96%, Lag= 0.0 min
Discarded = 0.02 cfs @ 9.85 hrs, Volume= 1,640 cf

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 148.75' @ 14.64 hrs Surf.Area= 863 sf Storage= 783 cf

Plug-Flow detention time= 321.2 min calculated for 1,638 cf (100% of inflow)
Center-of-Mass det. time= 321.2 min (1,068.8 - 747.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	147.40'	689 cf	**19.17'W x 45.00'L x 3.21'H Field A** 2,767 cf Overall - 1,044 cf Embedded = 1,723 cf x 40.0% Voids
#2A	147.90'	1,044 cf	**Cultec R-280HD** x 24 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 4 rows
		1,733 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	147.40'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 9.85 hrs HW=147.43' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Pond 1P: Existing Infiltration System - Chamber Wizard Field A

Chamber Model = Cultec R-280HD (Cultec Recharger®280HD)
Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf
Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap
Row Length Adjustment= +1.00' x 6.07 sf x 4 rows

47.0" Wide + 6.0" Spacing = 53.0" C-C Row Spacing

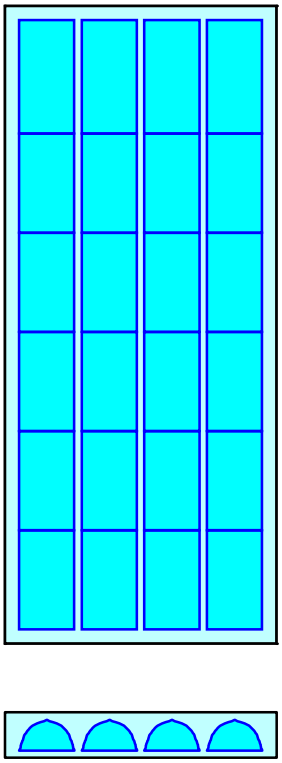
6 Chambers/Row x 7.00' Long +1.00' Row Adjustment = 43.00' Row Length +12.0" End Stone x 2 = 45.00' Base Length
4 Rows x 47.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 19.17' Base Width
6.0" Stone Base + 26.5" Chamber Height + 6.0" Stone Cover = 3.21' Field Height

24 Chambers x 42.5 cf +1.00' Row Adjustment x 6.07 sf x 4 Rows = 1,044.3 cf Chamber Storage

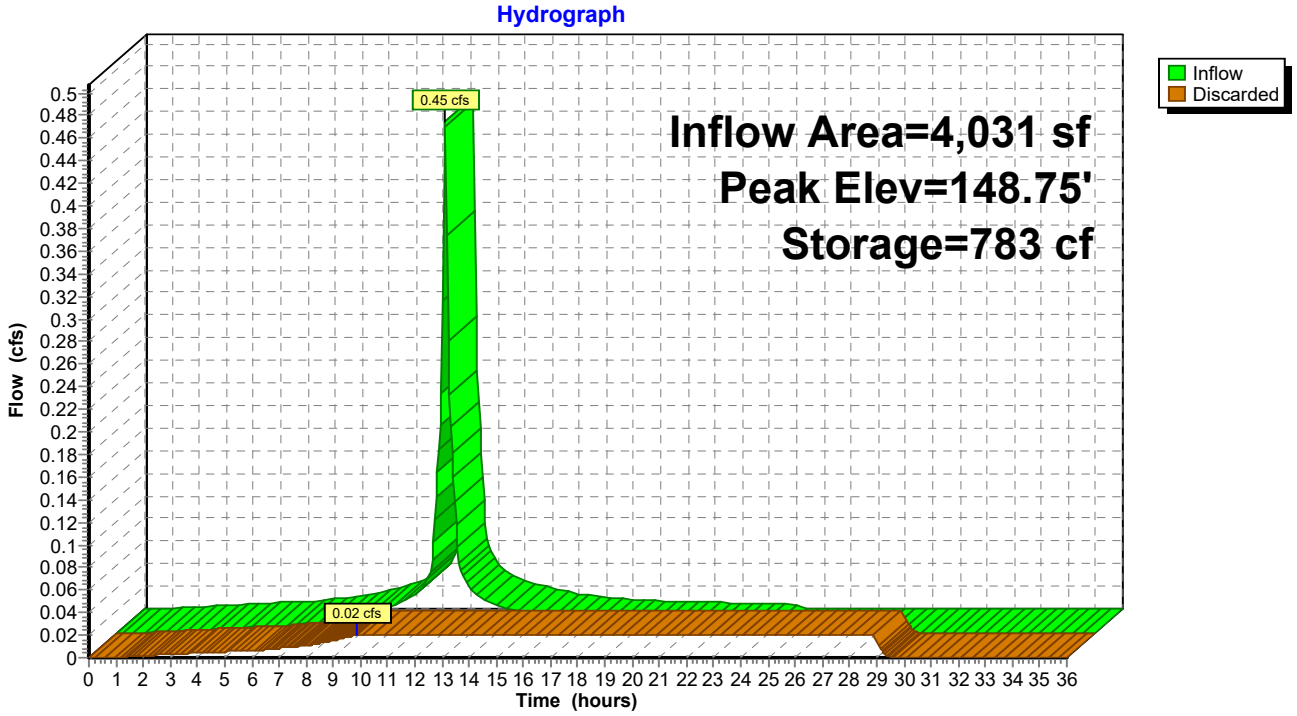
2,767.2 cf Field - 1,044.3 cf Chambers = 1,722.8 cf Stone x 40.0% Voids = 689.1 cf Stone Storage

Chamber Storage + Stone Storage = 1,733.5 cf = 0.040 af
Overall Storage Efficiency = 62.6%
Overall System Size = 45.00' x 19.17' x 3.21'

24 Chambers
102.5 cy Field
63.8 cy Stone



Pond 1P: Existing Infiltration System



Summary for Pond 2P: L Pond

Inflow Area = 13,322 sf, 9.33% Impervious, Inflow Depth = 1.37" for 10-Year event
Inflow = 0.40 cfs @ 12.13 hrs, Volume= 1,523 cf
Outflow = 0.03 cfs @ 15.52 hrs, Volume= 1,523 cf, Atten= 93%, Lag= 203.3 min
Discarded = 0.03 cfs @ 15.52 hrs, Volume= 1,523 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link SP1 : SP#1 - Wetland Boundary

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 148.98' @ 15.52 hrs Surf.Area= 1,179 sf Storage= 757 cf

Plug-Flow detention time= 346.2 min calculated for 1,523 cf (100% of inflow)
Center-of-Mass det. time= 346.0 min (1,221.7 - 875.7)

Volume	Invert	Avail.Storage	Storage Description
#1	148.00'	1,674 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

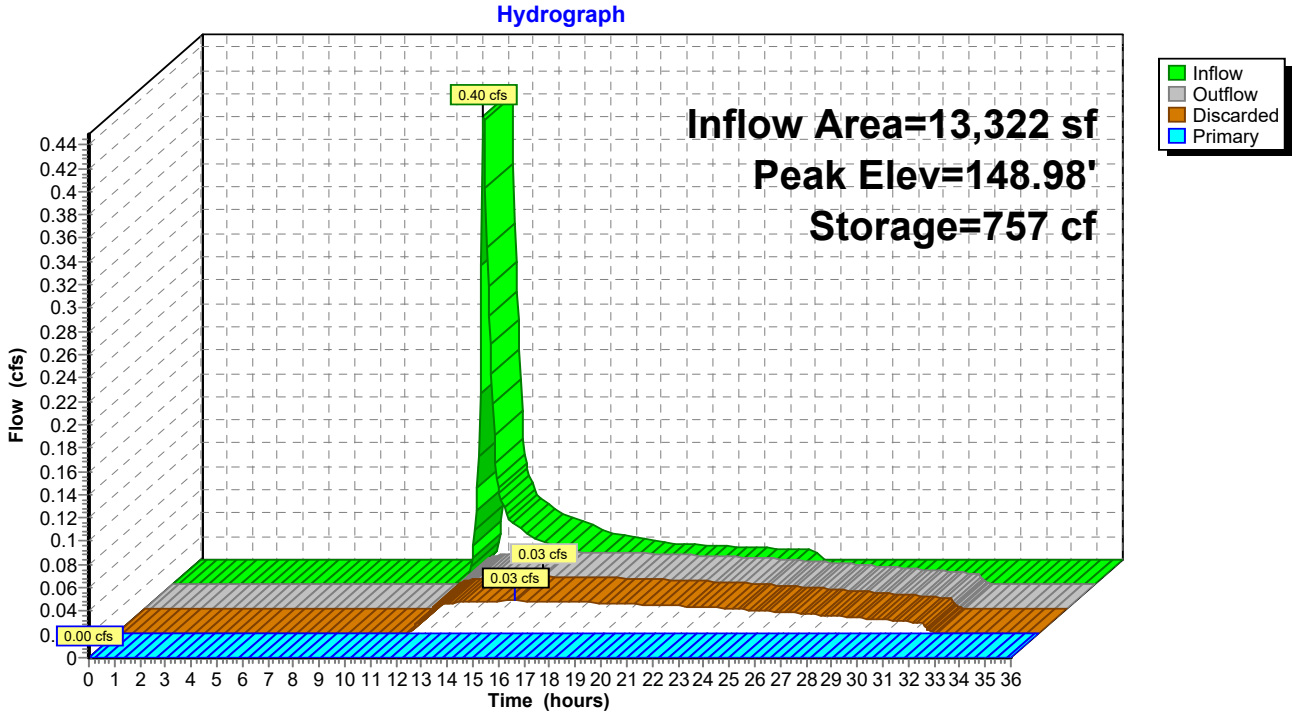
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
148.00	369	0	0
149.00	1,197	783	783
149.50	1,667	716	1,499
149.60	1,837	175	1,674

Device	Routing	Invert	Outlet Devices
#1	Discarded	148.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	149.50'	**5.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.03 cfs @ 15.52 hrs HW=148.98' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=148.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: L Pond



Summary for Pond 3P: Triangular Pond

[93] Warning: Storage range exceeded by 0.13'
[88] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area = 28,760 sf, 60.45% Impervious, Inflow Depth = 3.19" for 10-Year event
Inflow = 2.07 cfs @ 12.15 hrs, Volume= 7,637 cf
Outflow = 2.20 cfs @ 12.25 hrs, Volume= 7,522 cf, Atten= 0%, Lag= 5.5 min
Discarded = 0.03 cfs @ 12.23 hrs, Volume= 1,518 cf
Primary = 0.83 cfs @ 12.25 hrs, Volume= 5,410 cf
Routed to Link SP1 : SP#1 - Wetland Boundary
Secondary = 1.34 cfs @ 12.25 hrs, Volume= 594 cf
Routed to Link SP1 : SP#1 - Wetland Boundary

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 148.23' @ 12.25 hrs Surf.Area= 1,467 sf Storage= 1,767 cf

Plug-Flow detention time= 100.3 min calculated for 7,511 cf (98% of inflow)
Center-of-Mass det. time= 92.1 min (912.0 - 819.9)

Volume	Invert	Avail.Storage	Storage Description
#1	145.10'	1,767 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
145.10	1	0	0
146.00	232	105	105
147.00	709	471	575
148.00	1,388	1,049	1,624
148.10	1,467	143	1,767

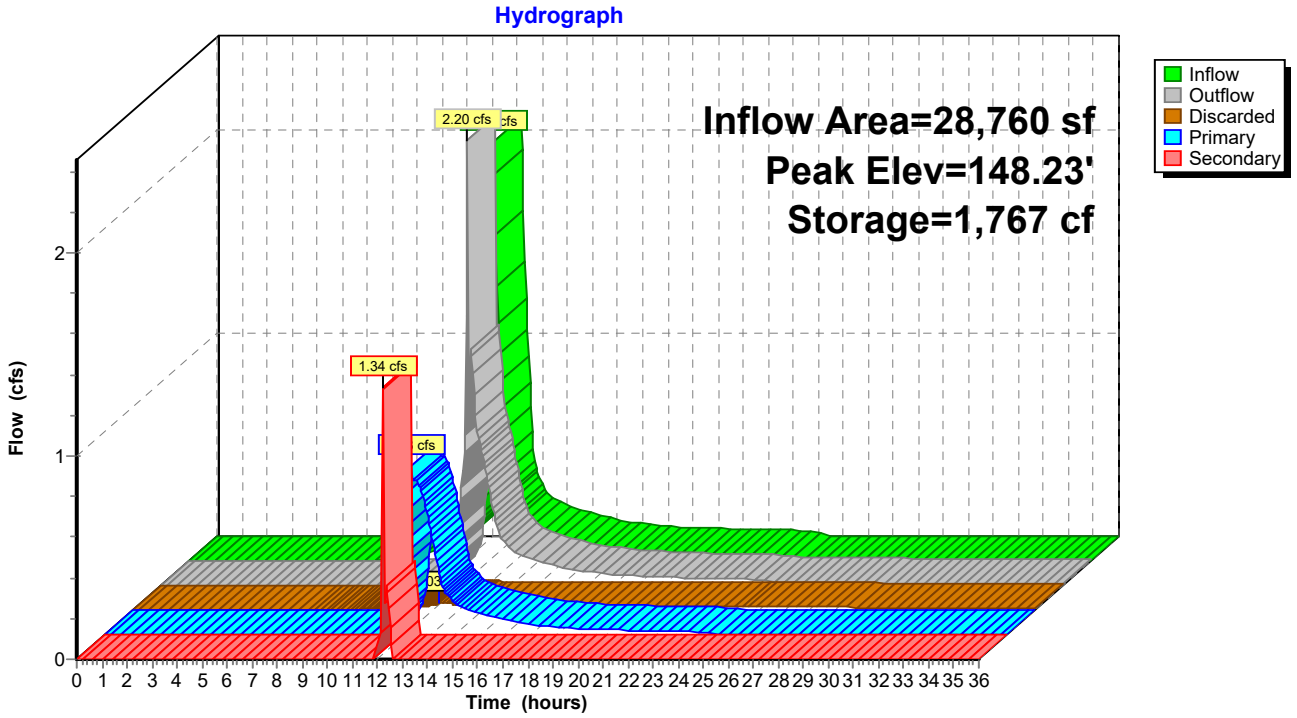
Device	Routing	Invert	Outlet Devices
#1	Discarded	145.10'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	147.00'	**6.0" Round Culvert** L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 147.00' / 145.00' S= 0.0667 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Secondary	148.00'	**5.0' 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

Discarded OutFlow Max=0.03 cfs @ 12.23 hrs HW=148.18' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.82 cfs @ 12.25 hrs HW=148.22' (Free Discharge)
└**2=Culvert** (Inlet Controls 0.82 cfs @ 4.19 fps)

Secondary OutFlow Max=1.27 cfs @ 12.25 hrs HW=148.23' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 1.27 cfs @ 1.12 fps)

Pond 3P: Triangular Pond

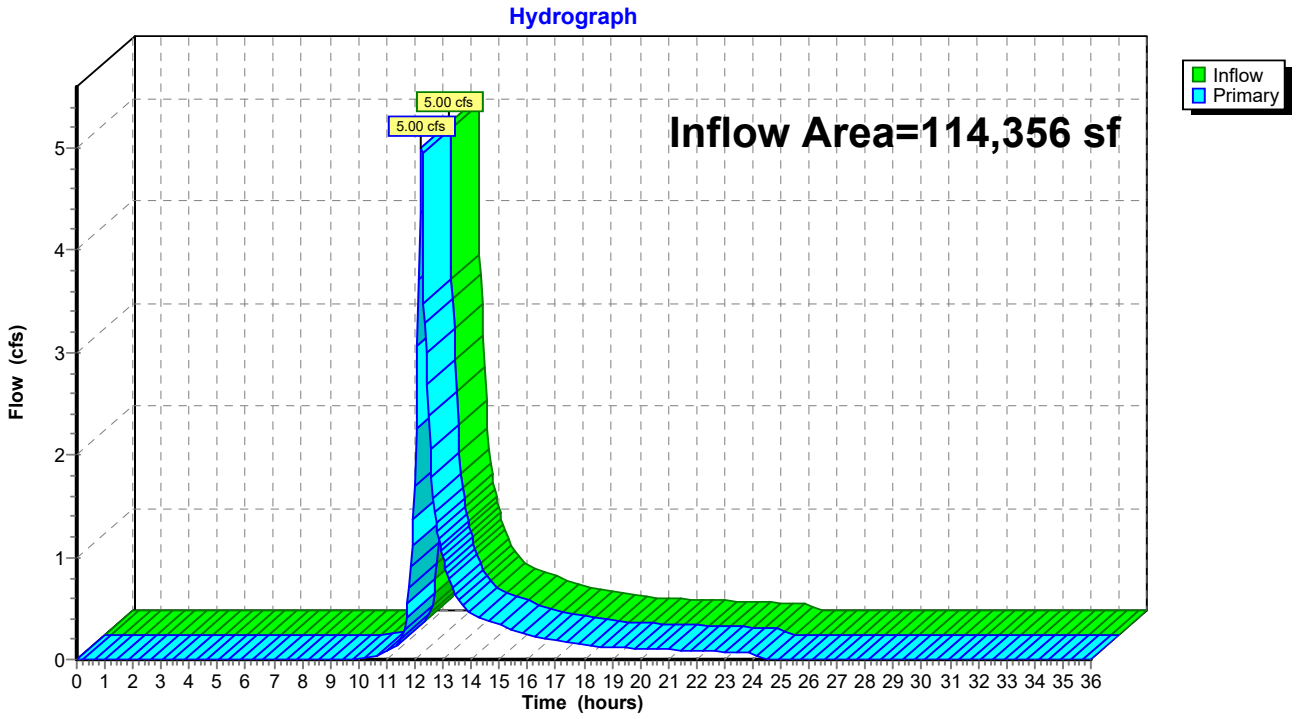


Summary for Link SP1: SP#1 - Wetland Boundary

Inflow Area = 114,356 sf, 34.89% Impervious, Inflow Depth = 1.92" for 10-Year event
Inflow = 5.00 cfs @ 12.24 hrs, Volume= 18,321 cf
Primary = 5.00 cfs @ 12.24 hrs, Volume= 18,321 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link SP1: SP#1 - Wetland Boundary



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: Subcat E-1 Runoff Area=72,274 sf 29.43% Impervious Runoff Depth=4.29"
Flow Length=291' Tc=12.6 min CN=69 Runoff=6.65 cfs 25,839 cf

Subcatchment E-2: Subcat E-2 Runoff Area=28,760 sf 60.45% Impervious Runoff Depth=5.79"
Flow Length=328' Tc=11.0 min CN=82 Runoff=3.69 cfs 13,885 cf

Subcatchment E-3: Subcat E-3 Runoff Area=4,031 sf 100.00% Impervious Runoff Depth=7.69"
Tc=6.0 min CN=98 Runoff=0.70 cfs 2,583 cf

Subcatchment E-4: Subcat E-4 Runoff Area=13,322 sf 9.33% Impervious Runoff Depth=3.28"
Flow Length=200' Tc=8.2 min CN=60 Runoff=1.06 cfs 3,642 cf

Pond 1P: Existing Infiltration System Peak Elev=149.87' Storage=1,470 cf Inflow=0.70 cfs 2,583 cf
Outflow=0.02 cfs 2,271 cf

Pond 2P: L Pond Peak Elev=149.56' Storage=1,595 cf Inflow=1.06 cfs 3,642 cf
Discarded=0.04 cfs 2,762 cf Primary=0.17 cfs 755 cf Outflow=0.21 cfs 3,517 cf

Pond 3P: Triangular Pond Peak Elev=148.40' Storage=1,767 cf Inflow=3.69 cfs 13,885 cf
Discarded=0.03 cfs 1,710 cf Primary=0.89 cfs 9,067 cf Secondary=3.17 cfs 2,986 cf Outflow=4.10 cfs 13,764 cf

Link SP1: SP#1 - Wetland Boundary Inflow=10.72 cfs 38,648 cf
Primary=10.72 cfs 38,648 cf

Total Runoff Area = 118,387 sf Runoff Volume = 45,950 cf Average Runoff Depth = 4.66"
62.89% Pervious = 74,456 sf 37.11% Impervious = 43,931 sf

Summary for Subcatchment E-1: Subcat E-1

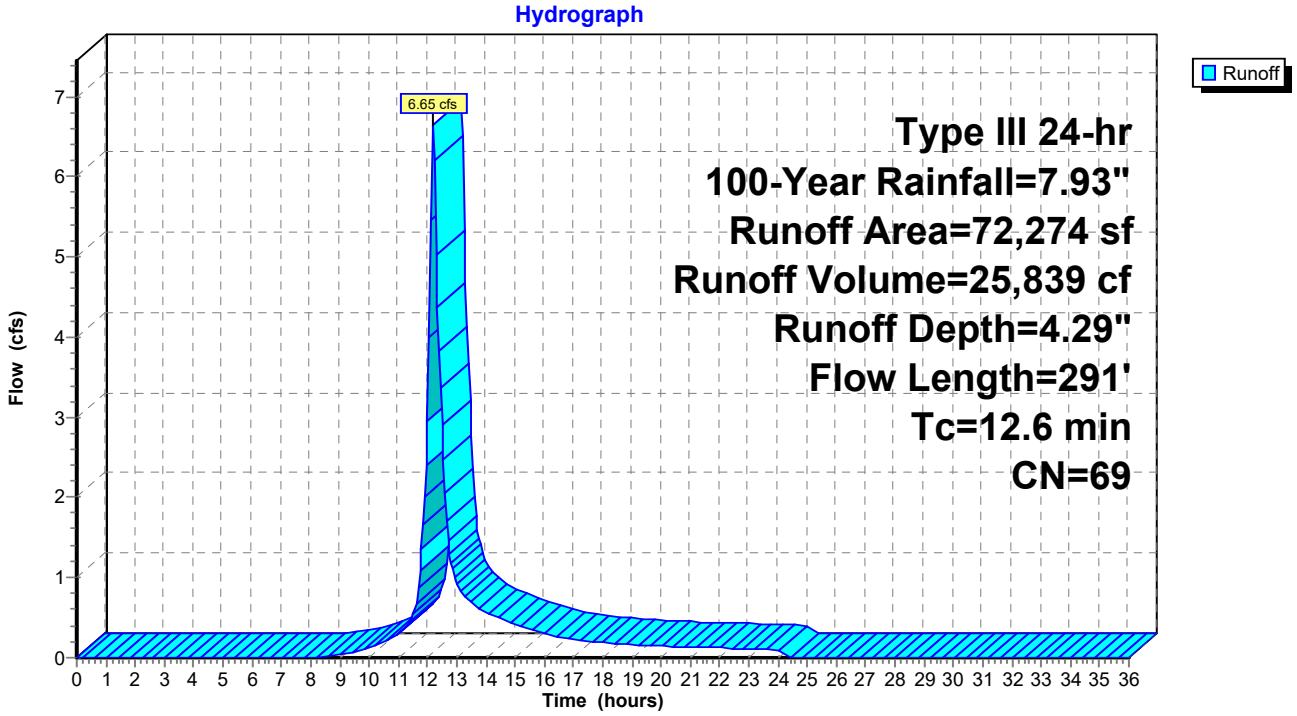
Runoff = 6.65 cfs @ 12.18 hrs, Volume= 25,839 cf, Depth= 4.29"
Routed to Link SP1 : SP#1 - Wetland Boundary

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.93"

Area (sf)	CN	Description
11,374	61	>75% Grass cover, Good, HSG B
17,153	98	Paved parking, HSG B
4,119	98	Roofs, HSG B
39,628	55	Woods, Good, HSG B
72,274	69	Weighted Average
51,002		70.57% Pervious Area
21,272		29.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.28"
3.0	178	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.2	36	0.0300	3.52		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.2	27	0.1000	2.21		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
12.6	291	Total			

Subcatchment E-1: Subcat E-1



Summary for Subcatchment E-2: Subcat E-2

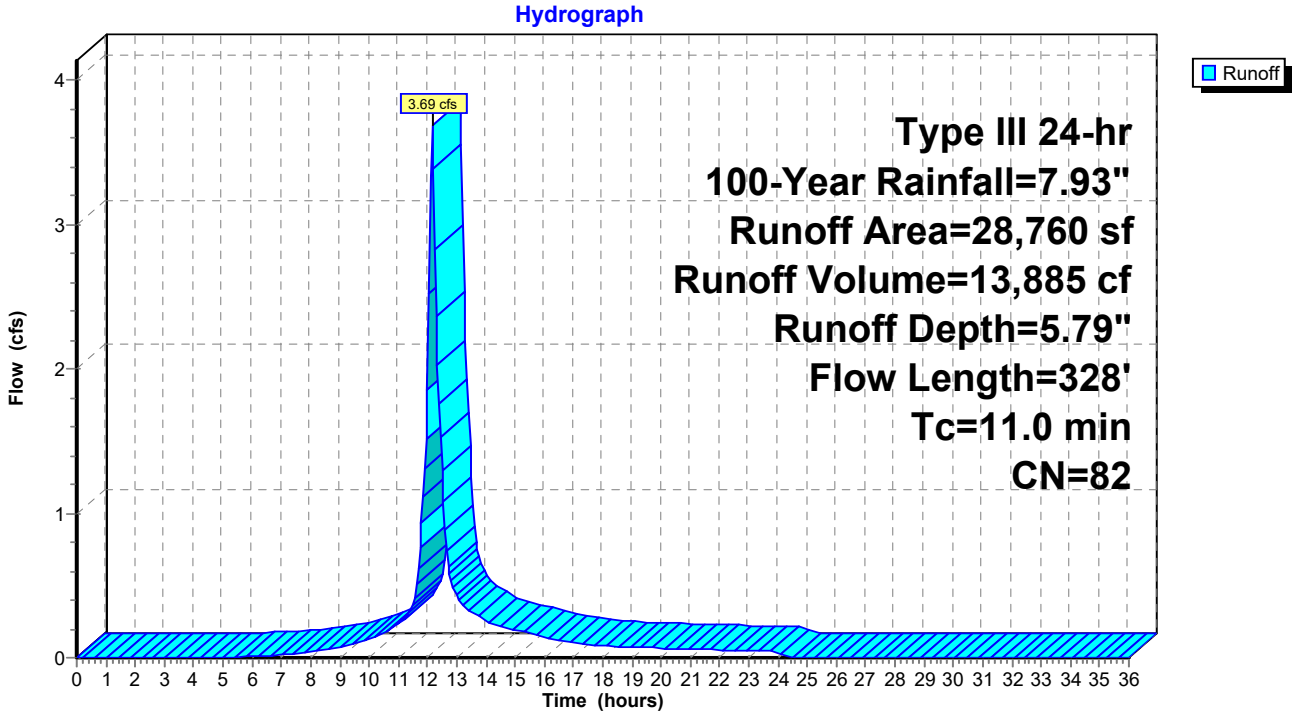
Runoff = 3.69 cfs @ 12.15 hrs, Volume= 13,885 cf, Depth= 5.79"
Routed to Pond 3P : Triangular Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.93"

Area (sf)	CN	Description
2,960	61	>75% Grass cover, Good, HSG B
14,056	98	Paved parking, HSG B
3,329	98	Roofs, HSG B
8,415	55	Woods, Good, HSG B
28,760	82	Weighted Average
11,375		39.55% Pervious Area
17,385		60.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.28"
1.2	83	0.0500	1.12		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.4	172	0.0100	2.03		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.0	15	0.0200	6.42	5.04	**Pipe Channel, D-E** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
0.0	8	0.0500	3.35		**Shallow Concentrated Flow, E-F** Grassed Waterway Kv= 15.0 fps
11.0	328	Total			

Subcatchment E-2: Subcat E-2



Summary for Subcatchment E-3: Subcat E-3

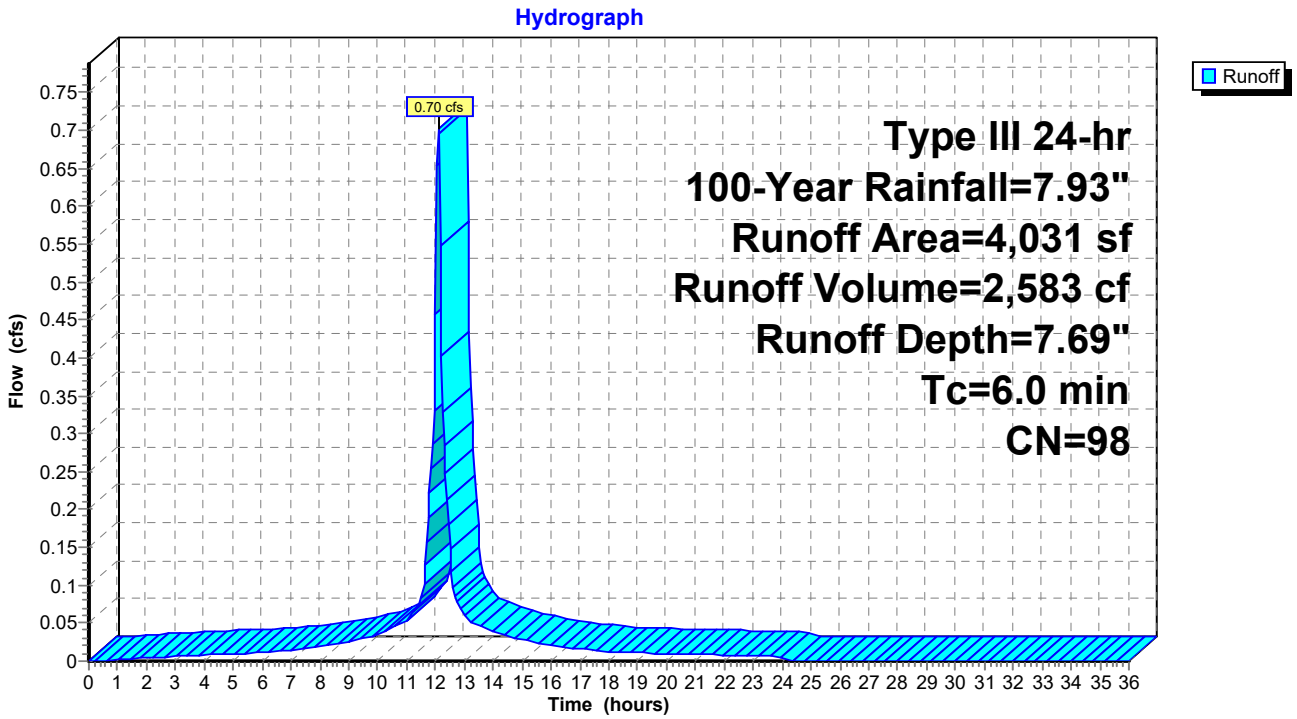
Runoff = 0.70 cfs @ 12.09 hrs, Volume= 2,583 cf, Depth= 7.69"
Routed to Pond 1P : Existing Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.93"

Area (sf)	CN	Description
4,031	98	Roofs, HSG B
4,031		100.00% Impervious Area

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

Subcatchment E-3: Subcat E-3



Summary for Subcatchment E-4: Subcat E-4

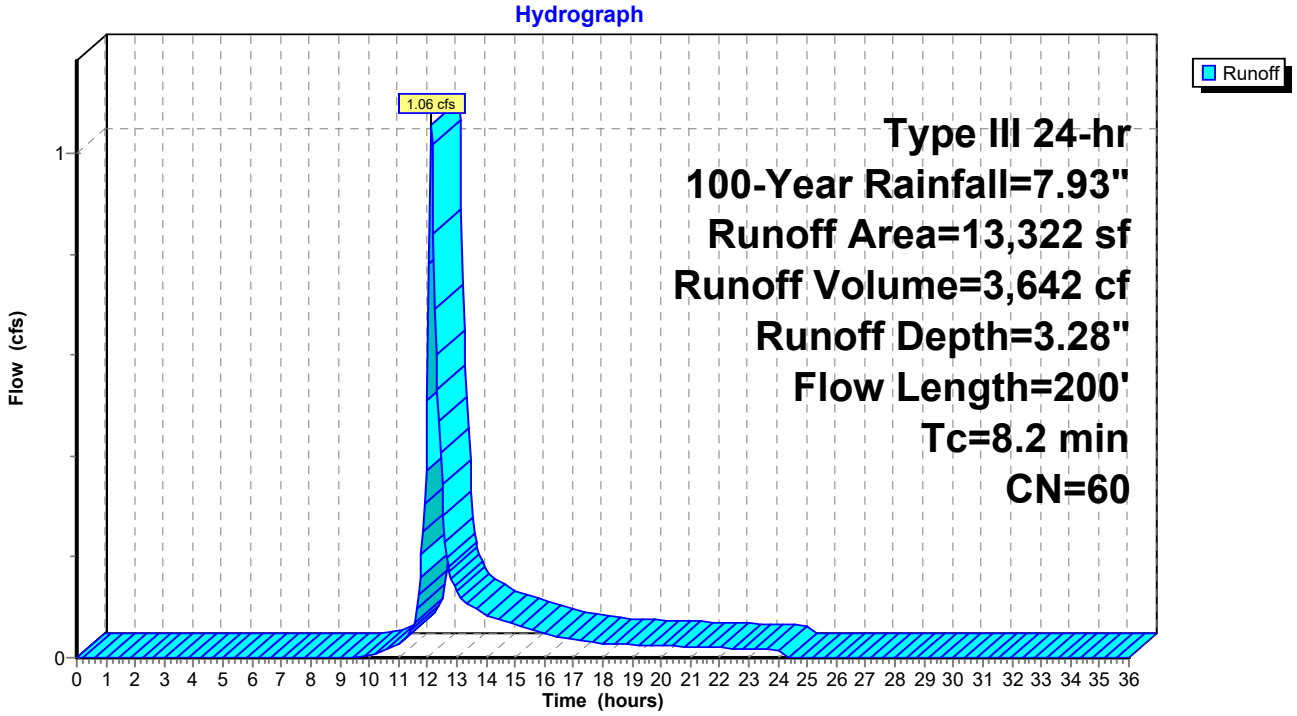
Runoff = 1.06 cfs @ 12.12 hrs, Volume= 3,642 cf, Depth= 3.28"
Routed to Pond 2P : L Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.93"

Area (sf)	CN	Description
2,342	61	>75% Grass cover, Good, HSG B
1,243	98	Paved parking, HSG B
9,737	55	Woods, Good, HSG B
13,322	60	Weighted Average
12,079		90.67% Pervious Area
1,243		9.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	50	0.1200	0.14		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.28"
0.5	30	0.0333	0.91		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.2	20	0.0500	1.57		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.5	20	0.0010	0.64		**Shallow Concentrated Flow, D-E** Paved Kv= 20.3 fps
1.1	80	0.0300	1.21		**Shallow Concentrated Flow, E-F** Short Grass Pasture Kv= 7.0 fps
8.2	200	Total			

Subcatchment E-4: Subcat E-4



Summary for Pond 1P: Existing Infiltration System

Inflow Area = 4,031 sf,100.00% Impervious, Inflow Depth = 7.69" for 100-Year event
Inflow = 0.70 cfs @ 12.09 hrs, Volume= 2,583 cf
Outflow = 0.02 cfs @ 8.50 hrs, Volume= 2,271 cf, Atten= 97%, Lag= 0.0 min
Discarded = 0.02 cfs @ 8.50 hrs, Volume= 2,271 cf

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 149.87' @ 15.96 hrs Surf.Area= 863 sf Storage= 1,470 cf

Plug-Flow detention time= 541.8 min calculated for 2,271 cf (88% of inflow)
Center-of-Mass det. time= 484.5 min (1,225.8 - 741.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	147.40'	689 cf	**19.17'W x 45.00'L x 3.21'H Field A** 2,767 cf Overall - 1,044 cf Embedded = 1,723 cf x 40.0% Voids
#2A	147.90'	1,044 cf	**Cultec R-280HD** x 24 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 4 rows
		1,733 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	147.40'	**1.020 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 8.50 hrs HW=147.43' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Pond 1P: Existing Infiltration System - Chamber Wizard Field A

Chamber Model = Cultec R-280HD (Cultec Recharger®280HD)
Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf
Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap
Row Length Adjustment= +1.00' x 6.07 sf x 4 rows

47.0" Wide + 6.0" Spacing = 53.0" C-C Row Spacing

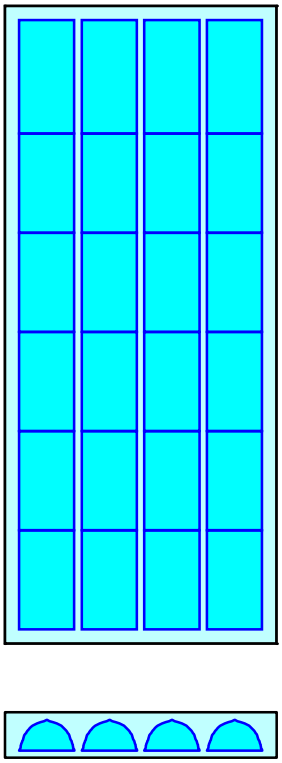
6 Chambers/Row x 7.00' Long +1.00' Row Adjustment = 43.00' Row Length +12.0" End Stone x 2 = 45.00' Base Length
4 Rows x 47.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 19.17' Base Width
6.0" Stone Base + 26.5" Chamber Height + 6.0" Stone Cover = 3.21' Field Height

24 Chambers x 42.5 cf +1.00' Row Adjustment x 6.07 sf x 4 Rows = 1,044.3 cf Chamber Storage

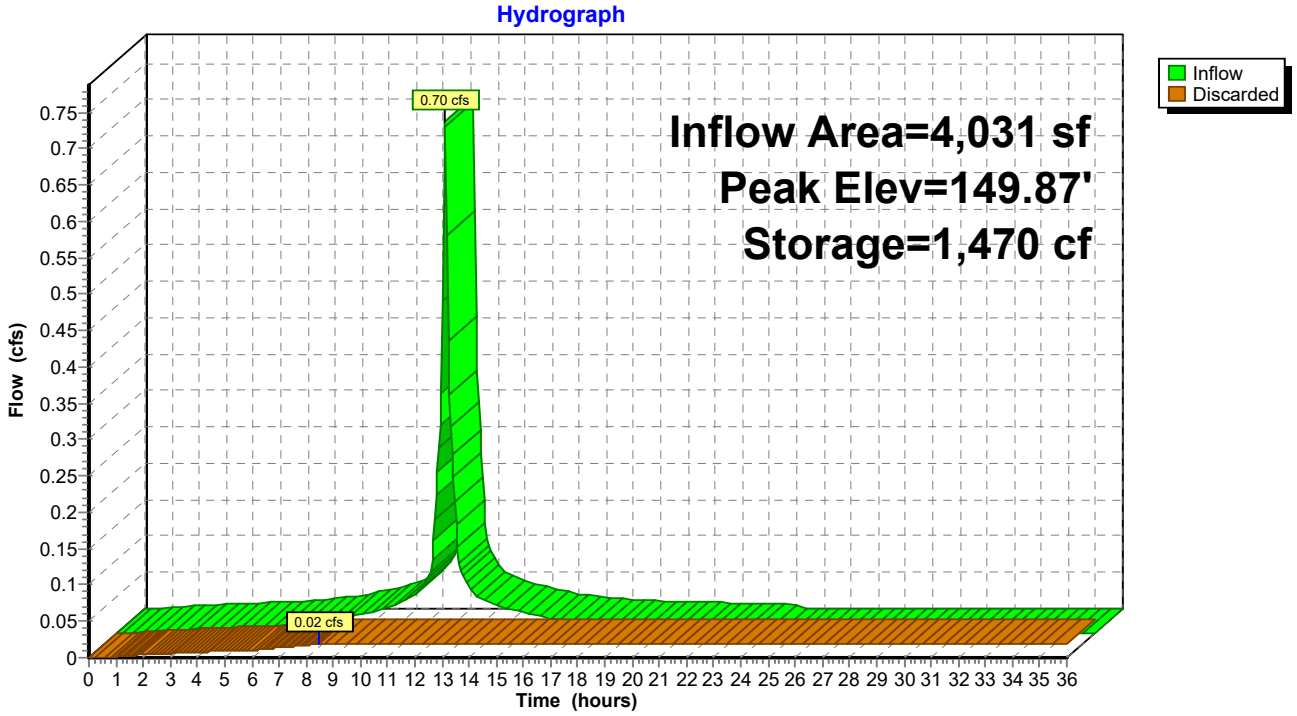
2,767.2 cf Field - 1,044.3 cf Chambers = 1,722.8 cf Stone x 40.0% Voids = 689.1 cf Stone Storage

Chamber Storage + Stone Storage = 1,733.5 cf = 0.040 af
Overall Storage Efficiency = 62.6%
Overall System Size = 45.00' x 19.17' x 3.21'

24 Chambers
102.5 cy Field
63.8 cy Stone



Pond 1P: Existing Infiltration System



Summary for Pond 2P: L Pond

Inflow Area = 13,322 sf, 9.33% Impervious, Inflow Depth = 3.28" for 100-Year event
Inflow = 1.06 cfs @ 12.12 hrs, Volume= 3,642 cf
Outflow = 0.21 cfs @ 12.63 hrs, Volume= 3,517 cf, Atten= 80%, Lag= 30.6 min
Discarded = 0.04 cfs @ 12.63 hrs, Volume= 2,762 cf
Primary = 0.17 cfs @ 12.63 hrs, Volume= 755 cf
Routed to Link SP1 : SP#1 - Wetland Boundary

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 149.56' @ 12.63 hrs Surf.Area= 1,763 sf Storage= 1,595 cf

Plug-Flow detention time= 379.3 min calculated for 3,512 cf (96% of inflow)
Center-of-Mass det. time= 360.8 min (1,209.5 - 848.7)

Volume	Invert	Avail.Storage	Storage Description
#1	148.00'	1,674 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

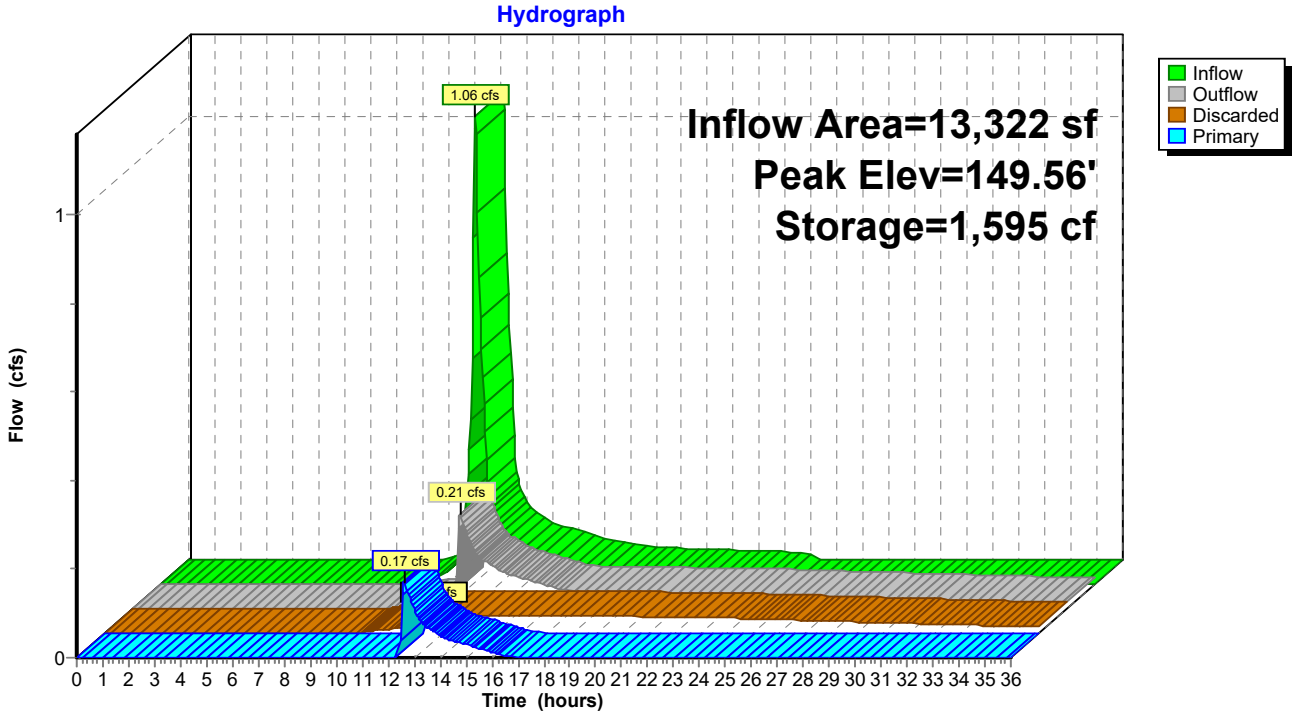
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
148.00	369	0	0
149.00	1,197	783	783
149.50	1,667	716	1,499
149.60	1,837	175	1,674

Device	Routing	Invert	Outlet Devices
#1	Discarded	148.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	149.50'	**5.0' long x 2.0' 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 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.04 cfs @ 12.63 hrs HW=149.56' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.17 cfs @ 12.63 hrs HW=149.56' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.17 cfs @ 0.60 fps)

Pond 2P: L Pond



Summary for Pond 3P: Triangular Pond

[93] Warning: Storage range exceeded by 0.30'
[88] Warning: Qout>Qin may require smaller dt or Finer Routing
[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=2)

Inflow Area = 28,760 sf, 60.45% Impervious, Inflow Depth = 5.79" for 100-Year event
Inflow = 3.69 cfs @ 12.15 hrs, Volume= 13,885 cf
Outflow = 4.10 cfs @ 12.20 hrs, Volume= 13,764 cf, Atten= 0%, Lag= 2.9 min
Discarded = 0.03 cfs @ 12.05 hrs, Volume= 1,710 cf
Primary = 0.89 cfs @ 12.20 hrs, Volume= 9,067 cf
Routed to Link SP1 : SP#1 - Wetland Boundary
Secondary = 3.17 cfs @ 12.20 hrs, Volume= 2,986 cf
Routed to Link SP1 : SP#1 - Wetland Boundary

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 148.40' @ 12.20 hrs Surf.Area= 1,467 sf Storage= 1,767 cf

Plug-Flow detention time= 64.3 min calculated for 13,745 cf (99% of inflow)
Center-of-Mass det. time= 59.8 min (862.8 - 803.1)

Volume	Invert	Avail.Storage	Storage Description
#1	145.10'	1,767 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
145.10	1	0	0
146.00	232	105	105
147.00	709	471	575
148.00	1,388	1,049	1,624
148.10	1,467	143	1,767

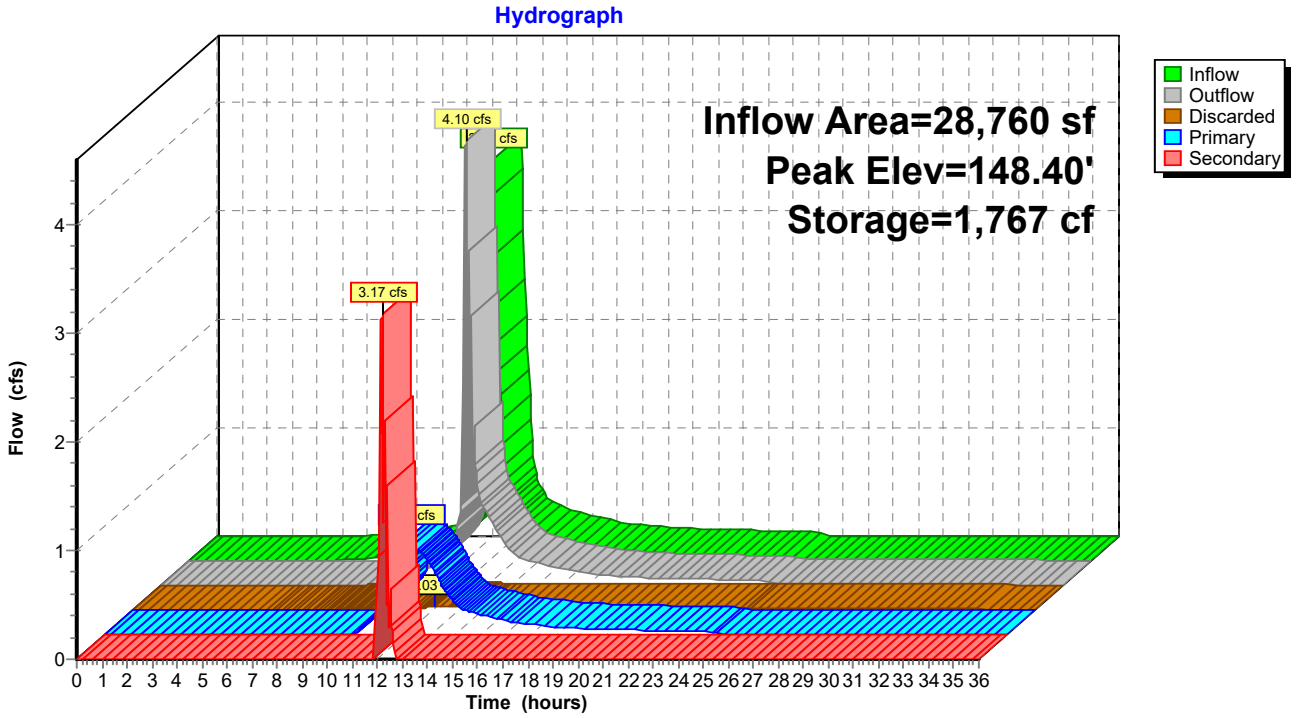
Device	Routing	Invert	Outlet Devices
#1	Discarded	145.10'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	147.00'	**6.0" Round Culvert** L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 147.00' / 145.00' S= 0.0667 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Secondary	148.00'	**5.0' 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

Discarded OutFlow Max=0.03 cfs @ 12.05 hrs HW=148.19' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.89 cfs @ 12.20 hrs HW=148.40' (Free Discharge)
└**2=Culvert** (Inlet Controls 0.89 cfs @ 4.56 fps)

Secondary OutFlow Max=3.17 cfs @ 12.20 hrs HW=148.40' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 3.17 cfs @ 1.58 fps)

Pond 3P: Triangular Pond

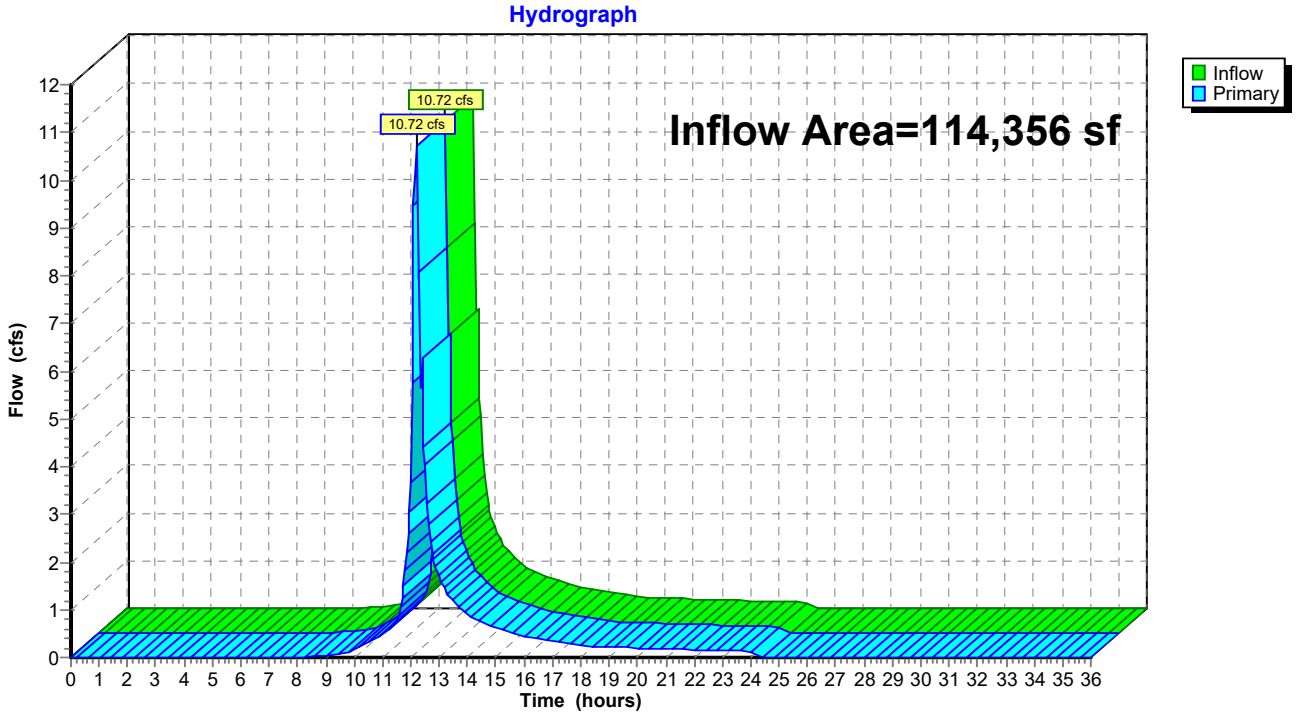


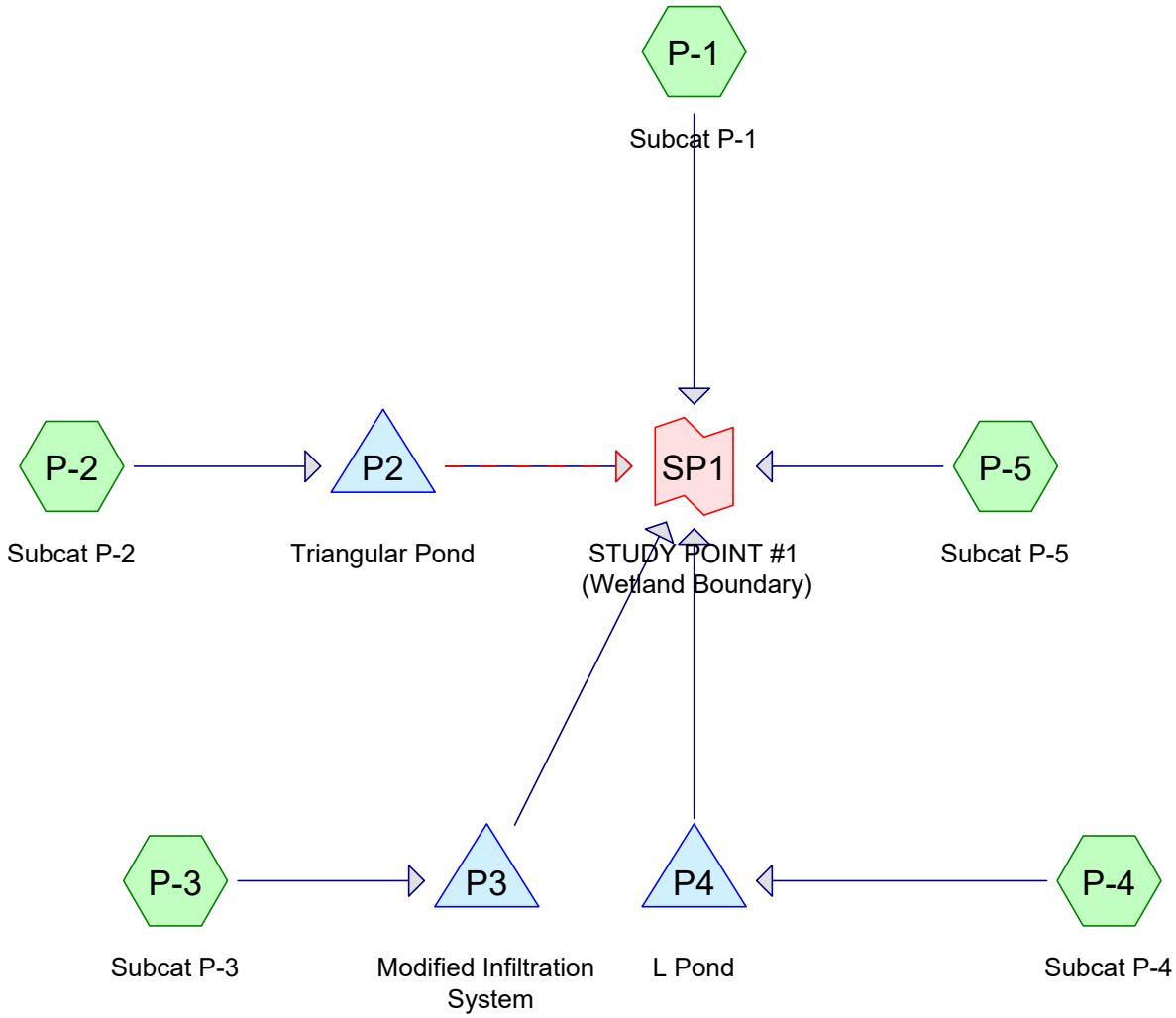
Summary for Link SP1: SP#1 - Wetland Boundary

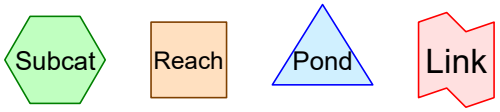
Inflow Area = 114,356 sf, 34.89% Impervious, Inflow Depth = 4.06" for 100-Year event
Inflow = 10.72 cfs @ 12.19 hrs, Volume= 38,648 cf
Primary = 10.72 cfs @ 12.19 hrs, Volume= 38,648 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link SP1: SP#1 - Wetland Boundary







Routing Diagram for 1179-20A - Proposed HydroCAD
Prepared by Allen & Major Associates, Inc, Printed 12/23/2024

Project Notes

Rainfall events imported from "1179-20A - Existing HydroCAD.hcp"

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.36	2
2	10-Year	Type III 24-hr		Default	24.00	1	5.12	2
3	100-Year	Type III 24-hr		Default	24.00	1	7.93	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
34,355	61	>75% Grass cover, Good, HSG B (P-1, P-2, P-4, P-5)
26,558	98	Paved parking, HSG B (P-1, P-2, P-5)
11,440	98	Roofs, HSG B (P-3)
46,035	55	Woods, Good, HSG B (P-1, P-2, P-4, P-5)
118,387	**71**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
118,387	HSG B	P-1, P-2, P-3, P-4, P-5
0	HSG C	
0	HSG D	
0	Other	
118,387		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
0	34,355	0	0	0	34,355	>75% Grass cover, Good	
0	26,558	0	0	0	26,558	Paved parking	
0	11,440	0	0	0	11,440	Roofs	
0	46,035	0	0	0	46,035	Woods, Good	
0	**118,387**	**0**	**0**	**0**	**118,387**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	P-1	0.00	0.00	24.0	0.5100	0.013	0.0	12.0	0.0	
2	P-2	0.00	0.00	90.0	0.0040	0.013	0.0	15.0	0.0	
3	P-3	0.00	0.00	146.0	0.0050	0.013	0.0	10.0	0.0	
4	P-3	0.00	0.00	69.0	0.0160	0.013	0.0	10.0	0.0	
5	P2	147.20	145.00	30.0	0.0733	0.013	0.0	6.0	0.0	
6	P3	147.90	147.80	10.0	0.0100	0.012	0.0	12.0	0.0	

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1: Subcat P-1 Runoff Area=35,486 sf 22.39% Impervious Runoff Depth=0.77"
Flow Length=267' Tc=14.8 min CN=67 Runoff=0.47 cfs 2,285 cf

Subcatchment P-2: Subcat P-2 Runoff Area=26,257 sf 70.89% Impervious Runoff Depth=2.06"
Flow Length=296' Tc=6.0 min CN=87 Runoff=1.42 cfs 4,501 cf

Subcatchment P-3: Subcat P-3 Runoff Area=11,440 sf 100.00% Impervious Runoff Depth=3.13"
Flow Length=215' Tc=6.0 min CN=98 Runoff=0.84 cfs 2,981 cf

Subcatchment P-4: Subcat P-4 Runoff Area=17,559 sf 0.00% Impervious Runoff Depth=0.40"
Flow Length=250' Tc=7.0 min CN=58 Runoff=0.10 cfs 584 cf

Subcatchment P-5: Subcat P-5 Runoff Area=27,645 sf 0.00% Impervious Runoff Depth=0.36"
Flow Length=100' Tc=7.6 min CN=57 Runoff=0.12 cfs 840 cf

Pond P2: Triangular Pond Peak Elev=147.98' Storage=1,416 cf Inflow=1.42 cfs 4,501 cf
Discarded=0.03 cfs 1,597 cf Primary=0.61 cfs 2,853 cf Secondary=0.00 cfs 0 cf Outflow=0.64 cfs 4,450 cf

Pond P3: Modified Infiltration System Peak Elev=149.69' Storage=1,710 cf Inflow=0.84 cfs 2,981 cf
Discarded=0.03 cfs 2,706 cf Primary=0.00 cfs 0 cf Outflow=0.03 cfs 2,706 cf

Pond P4: L Pond Peak Elev=148.35' Storage=181 cf Inflow=0.10 cfs 584 cf
Discarded=0.02 cfs 584 cf Primary=0.00 cfs 0 cf Outflow=0.02 cfs 584 cf

Link SP1: STUDY POINT #1 (Wetland Boundary) Inflow=1.19 cfs 5,978 cf
Primary=1.19 cfs 5,978 cf

Total Runoff Area = 118,387 sf Runoff Volume = 11,191 cf Average Runoff Depth = 1.13"
67.90% Pervious = 80,389 sf 32.10% Impervious = 37,998 sf

Summary for Subcatchment P-1: Subcat P-1

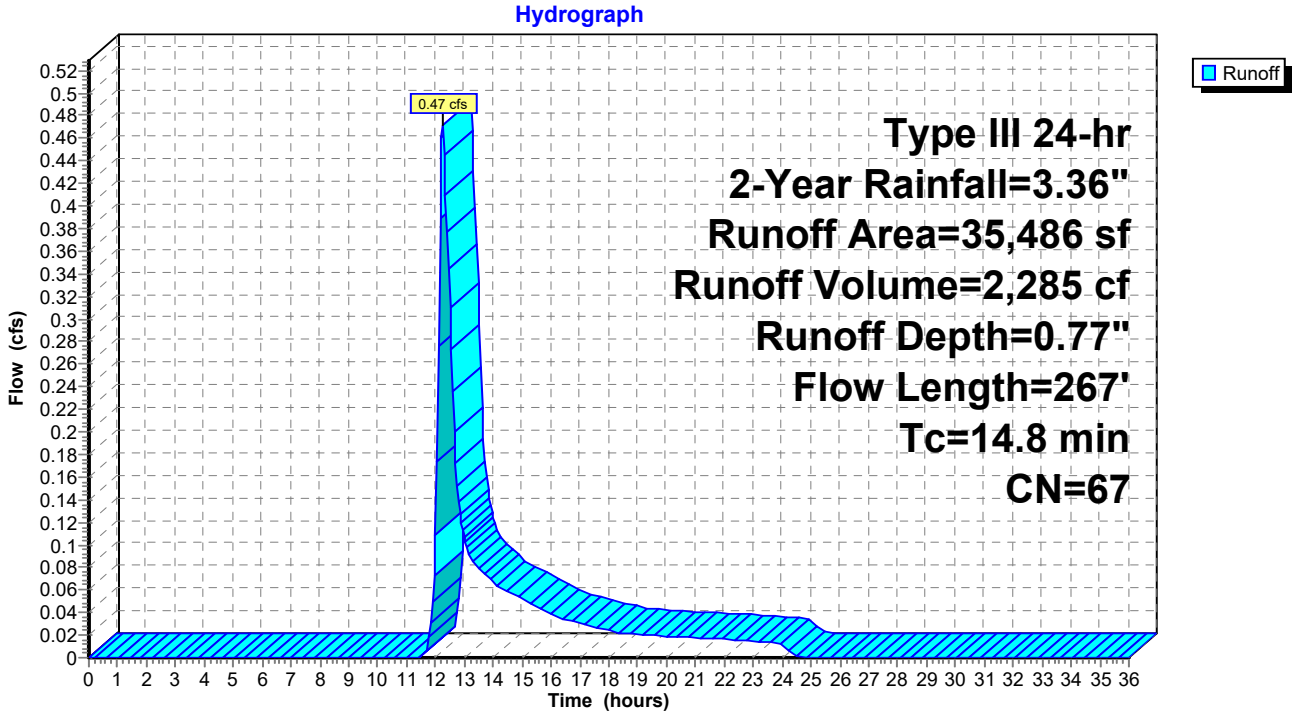
Runoff = 0.47 cfs @ 12.24 hrs, Volume= 2,285 cf, Depth= 0.77"
Routed to Link SP1 : STUDY POINT #1 (Wetland Boundary)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
11,518	61	>75% Grass cover, Good, HSG B
7,944	98	Paved parking, HSG B
16,024	55	Woods, Good, HSG B
35,486	67	Weighted Average
27,542		77.61% Pervious Area
7,944		22.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.28"
2.4	158	0.0500	1.12		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.2	35	0.0200	2.87		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.0	24	0.5100	32.40	25.44	**Pipe Channel, C-D** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
14.8	267	Total			

Subcatchment P-1: Subcat P-1



Summary for Subcatchment P-2: Subcat P-2

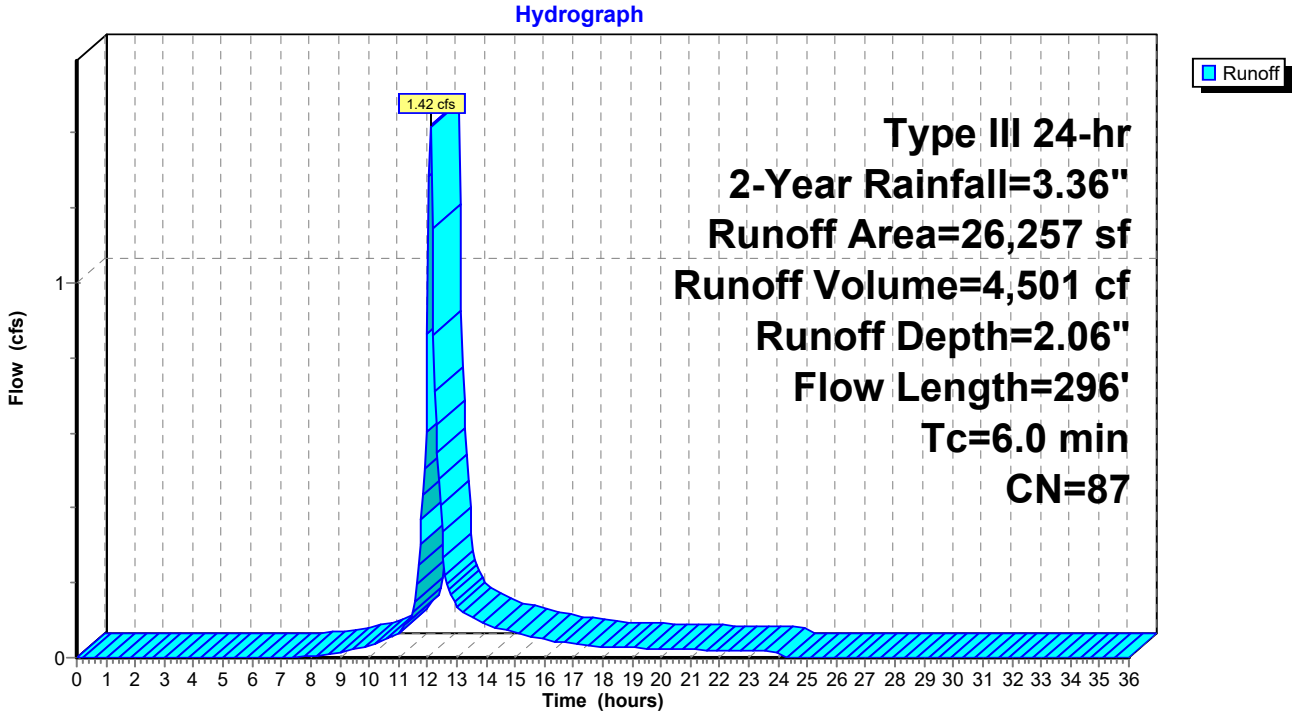
Runoff = 1.42 cfs @ 12.09 hrs, Volume= 4,501 cf, Depth= 2.06"
Routed to Pond P2 : Triangular Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
5,778	61	>75% Grass cover, Good, HSG B
18,613	98	Paved parking, HSG B
1,865	55	Woods, Good, HSG B
26,257	87	Weighted Average
7,644		29.11% Pervious Area
18,613		70.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	20	0.0150	0.11		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.28"
0.5	30	0.0150	0.98		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.28"
1.4	156	0.0090	1.93		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.5	90	0.0040	3.33	4.09	**Pipe Channel, D-E** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
5.4	296	Total, Increased to minimum Tc = 6.0 min			

Subcatchment P-2: Subcat P-2



Summary for Subcatchment P-3: Subcat P-3

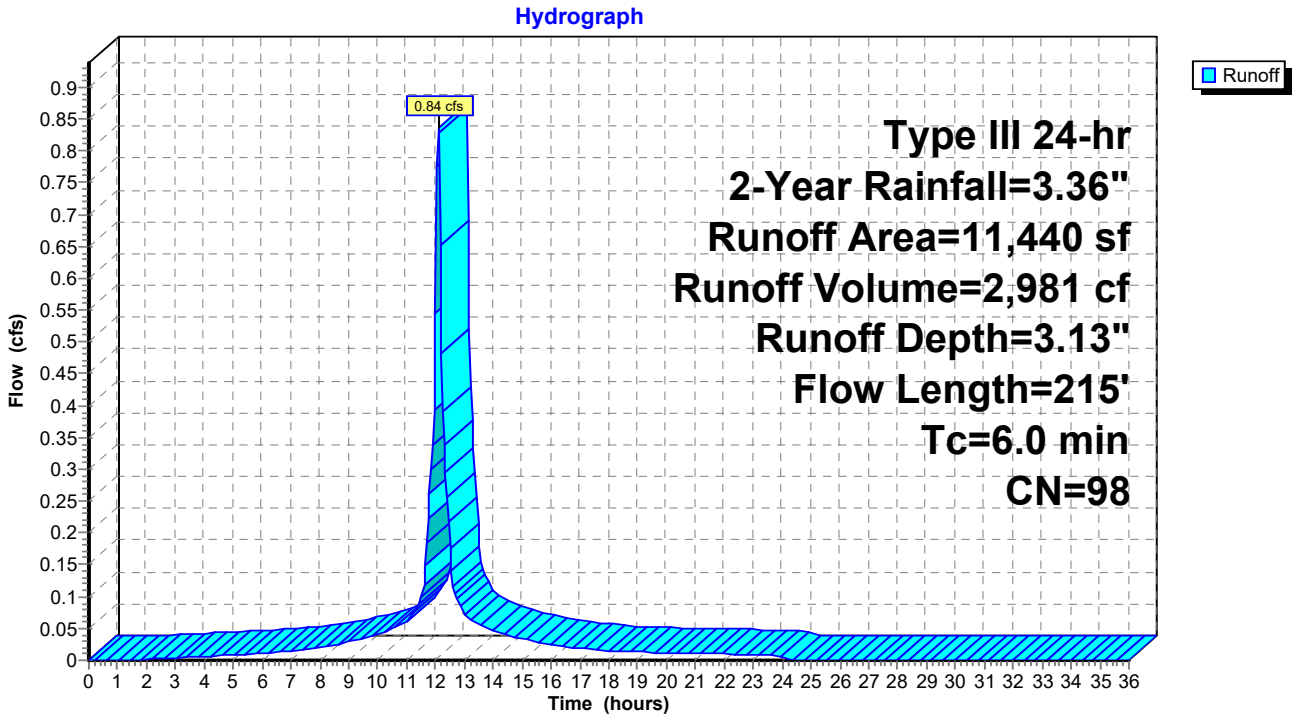
Runoff = 0.84 cfs @ 12.09 hrs, Volume= 2,981 cf, Depth= 3.13"
Routed to Pond P3 : Modified Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
11,440	98	Roofs, HSG B
11,440		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	146	0.0050	2.84	1.55	**Pipe Channel,** 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.013 Corrugated PE, smooth interior
0.2	69	0.0160	5.08	2.77	**Pipe Channel,** 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.013 Corrugated PE, smooth interior
1.1	215	Total, Increased to minimum Tc = 6.0 min			

Subcatchment P-3: Subcat P-3



Summary for Subcatchment P-4: Subcat P-4

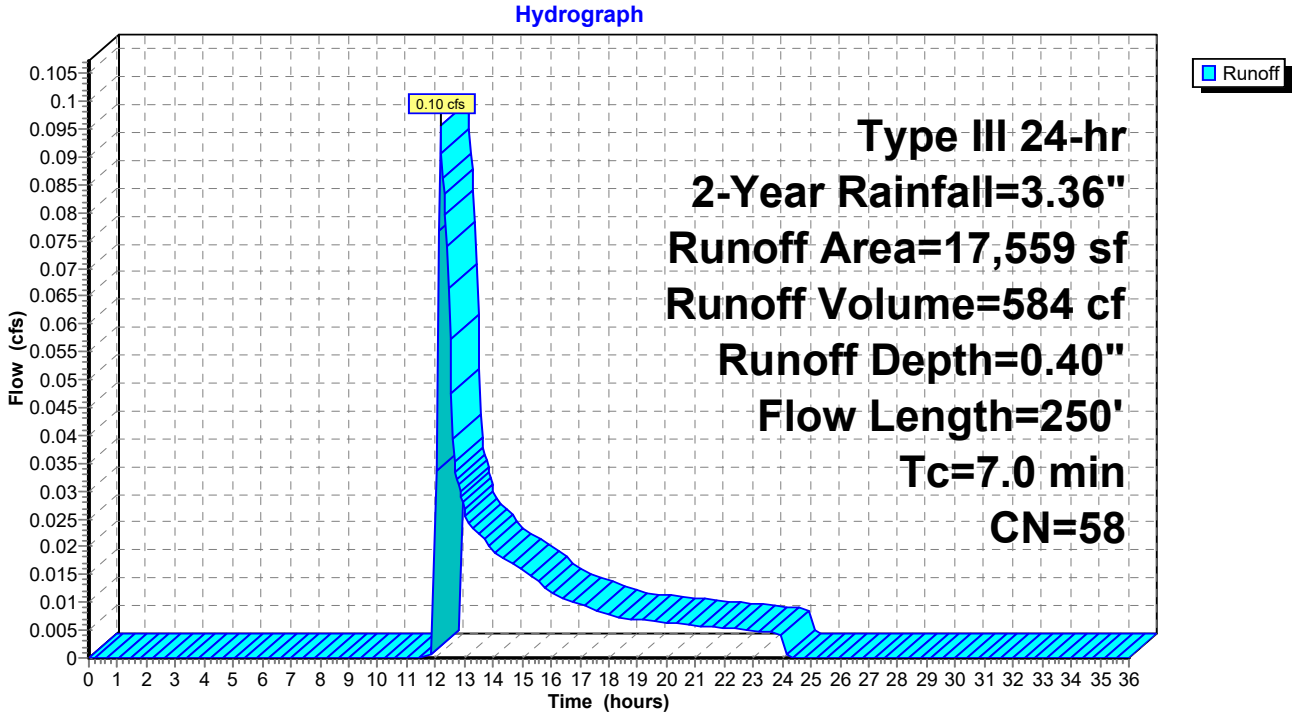
Runoff = 0.10 cfs @ 12.17 hrs, Volume= 584 cf, Depth= 0.40"
Routed to Pond P4 : L Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
9,858	61	>75% Grass cover, Good, HSG B
7,701	55	Woods, Good, HSG B
17,559	58	Weighted Average
17,559		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	50	0.1200	0.31		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.28"
3.2	135	0.0100	0.70		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.1	65	0.0380	0.97		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
7.0	250	Total			

Subcatchment P-4: Subcat P-4



Summary for Subcatchment P-5: Subcat P-5

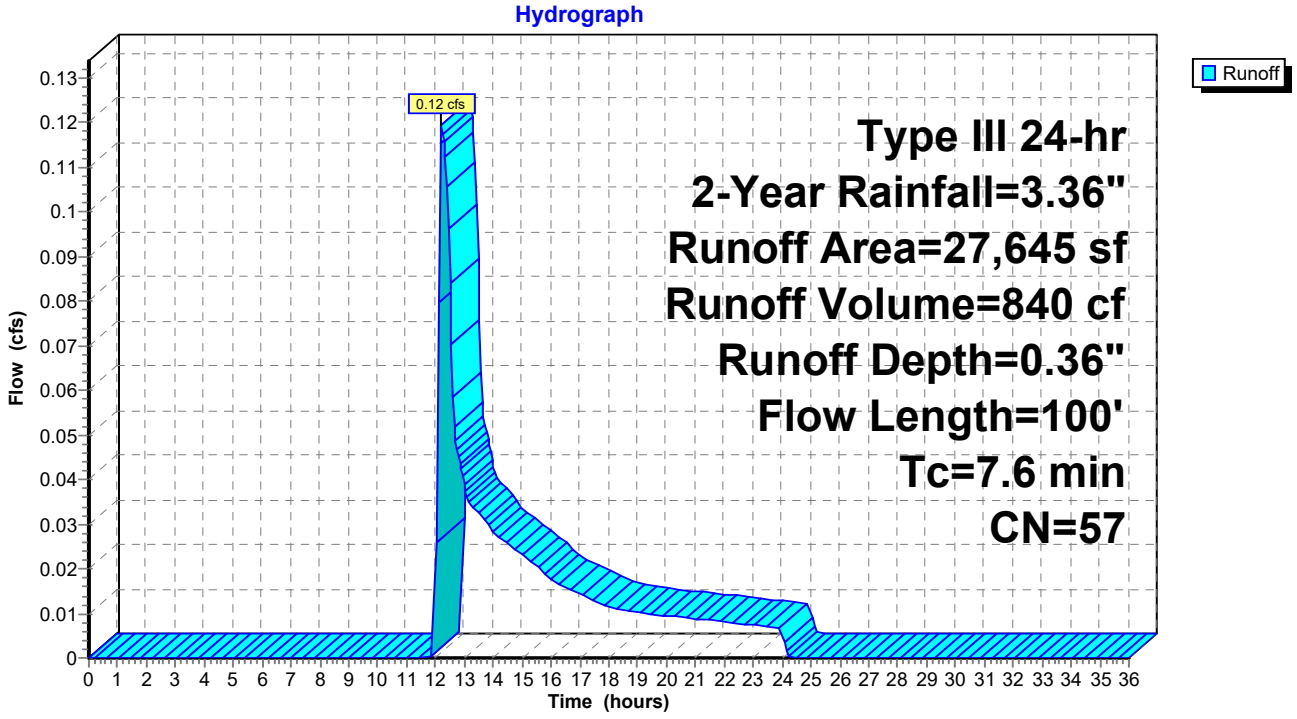
Runoff = 0.12 cfs @ 12.21 hrs, Volume= 840 cf, Depth= 0.36"
Routed to Link SP1 : STUDY POINT #1 (Wetland Boundary)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
7,201	61	>75% Grass cover, Good, HSG B
0	98	Paved parking, HSG B
20,444	55	Woods, Good, HSG B
27,645	57	Weighted Average
27,645		100.00% Pervious Area
0		0.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0810	0.12		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.28"
0.6	50	0.0820	1.43		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
7.6	100	Total			

Subcatchment P-5: Subcat P-5



Summary for Pond P2: Triangular Pond

Inflow Area = 26,257 sf, 70.89% Impervious, Inflow Depth = 2.06" for 2-Year event
Inflow = 1.42 cfs @ 12.09 hrs, Volume= 4,501 cf
Outflow = 0.64 cfs @ 12.29 hrs, Volume= 4,450 cf, Atten= 55%, Lag= 12.1 min
Discarded = 0.03 cfs @ 12.29 hrs, Volume= 1,597 cf
Primary = 0.61 cfs @ 12.29 hrs, Volume= 2,853 cf
Routed to Link SP1 : STUDY POINT #1 (Wetland Boundary)
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link SP1 : STUDY POINT #1 (Wetland Boundary)

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 147.98' @ 12.29 hrs Surf.Area= 1,281 sf Storage= 1,416 cf

Plug-Flow detention time= 161.8 min calculated for 4,444 cf (99% of inflow)
Center-of-Mass det. time= 155.7 min (972.5 - 816.8)

Volume	Invert	Avail.Storage	Storage Description
#1	146.00'	3,171 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
146.00	230	0	0
147.00	681	456	456
148.00	1,293	987	1,443
148.10	1,300	130	1,572
149.00	2,254	1,599	3,171

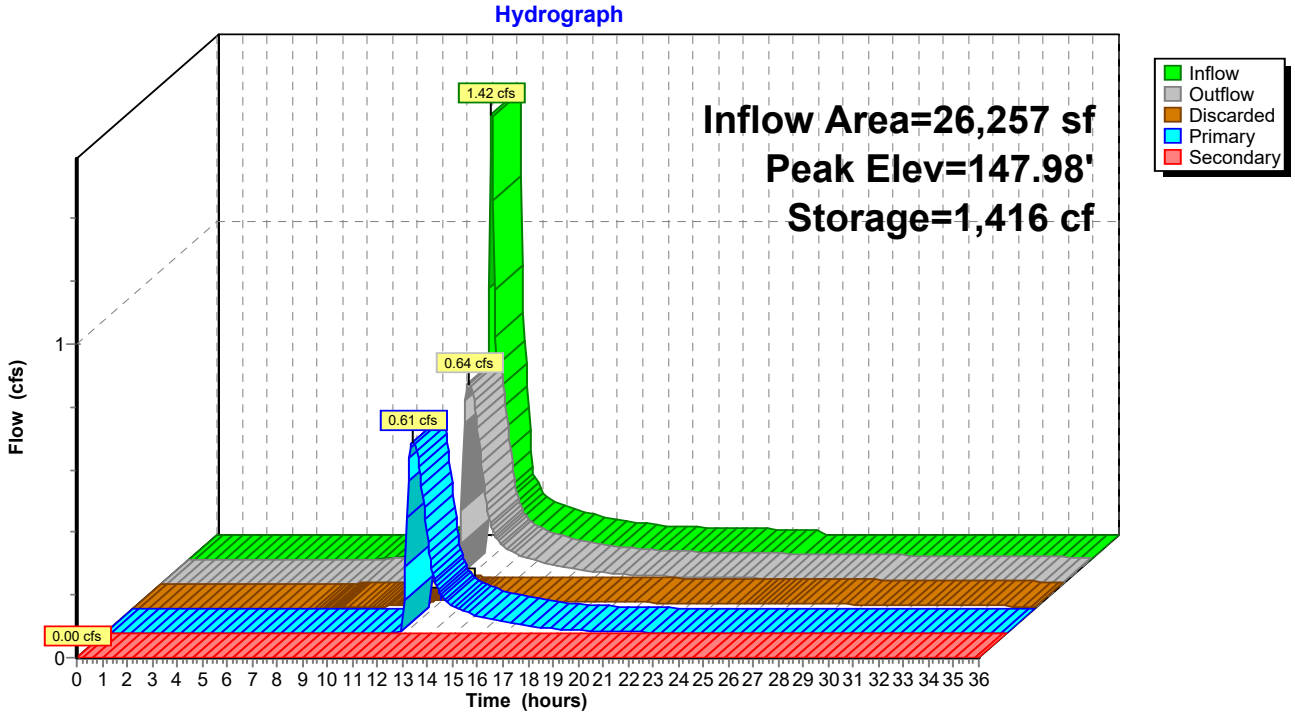
Device	Routing	Invert	Outlet Devices
#1	Discarded	146.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	147.20'	**6.0" Round Culvert** L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 147.20' / 145.00' S= 0.0733 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Secondary	148.75'	**10.0' long x 7.0' 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) 2.40 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65 2.65 2.66 2.65 2.66 2.68 2.70 2.73 2.78

Discarded OutFlow Max=0.03 cfs @ 12.29 hrs HW=147.98' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.61 cfs @ 12.29 hrs HW=147.98' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 0.61 cfs @ 3.09 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=146.00' (Free Discharge)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P2: Triangular Pond



Summary for Pond P3: Modified Infiltration System

Inflow Area = 11,440 sf,100.00% Impervious, Inflow Depth = 3.13" for 2-Year event
Inflow = 0.84 cfs @ 12.09 hrs, Volume= 2,981 cf
Outflow = 0.03 cfs @ 8.80 hrs, Volume= 2,706 cf, Atten= 97%, Lag= 0.0 min
Discarded = 0.03 cfs @ 8.80 hrs, Volume= 2,706 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link SP1 : STUDY POINT #1 (Wetland Boundary)

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 149.69' @ 15.89 hrs Surf.Area= 1,061 sf Storage= 1,710 cf

Plug-Flow detention time= 547.3 min calculated for 2,702 cf (91% of inflow)
Center-of-Mass det. time= 501.2 min (1,256.6 - 755.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	147.40'	840 cf	**23.58'W x 45.00'L x 3.21'H Field A** 3,405 cf Overall - 1,305 cf Embedded = 2,099 cf x 40.0% Voids
#2A	147.90'	1,305 cf	**Cultec R-280HD** x 30 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 5 rows
		2,145 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	147.40'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	147.90'	**12.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 147.90' / 147.80' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#3	Device 2	150.10'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.03 cfs @ 8.80 hrs HW=147.43' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=147.40' (Free Discharge)
└**2=Culvert** (Controls 0.00 cfs)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P3: Modified Infiltration System - Chamber Wizard Field A

Chamber Model = Cultec R-280HD (Cultec Recharger®280HD)
Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf
Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap
Row Length Adjustment= +1.00' x 6.07 sf x 5 rows

47.0" Wide + 6.0" Spacing = 53.0" C-C Row Spacing

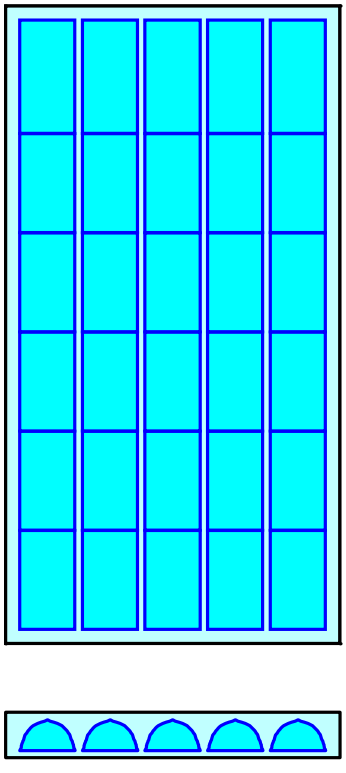
6 Chambers/Row x 7.00' Long +1.00' Row Adjustment = 43.00' Row Length +12.0" End Stone x 2 = 45.00' Base Length
5 Rows x 47.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 23.58' Base Width
6.0" Stone Base + 26.5" Chamber Height + 6.0" Stone Cover = 3.21' Field Height

30 Chambers x 42.5 cf +1.00' Row Adjustment x 6.07 sf x 5 Rows = 1,305.4 cf Chamber Storage

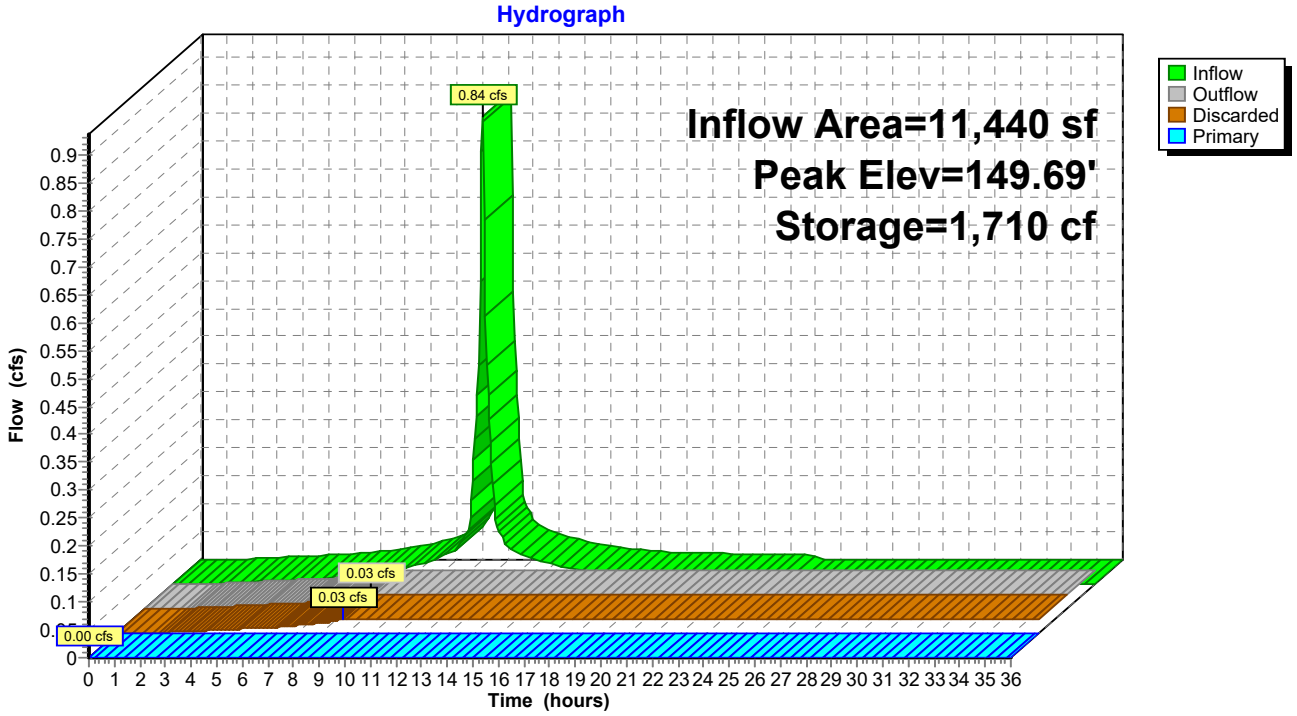
3,404.8 cf Field - 1,305.4 cf Chambers = 2,099.4 cf Stone x 40.0% Voids = 839.8 cf Stone Storage

Chamber Storage + Stone Storage = 2,145.2 cf = 0.049 af
Overall Storage Efficiency = 63.0%
Overall System Size = 45.00' x 23.58' x 3.21'

30 Chambers
126.1 cy Field
77.8 cy Stone



Pond P3: Modified Infiltration System



Summary for Pond P4: L Pond

Inflow Area = 17,559 sf, 0.00% Impervious, Inflow Depth = 0.40" for 2-Year event
Inflow = 0.10 cfs @ 12.17 hrs, Volume= 584 cf
Outflow = 0.02 cfs @ 15.06 hrs, Volume= 584 cf, Atten= 84%, Lag= 173.8 min
Discarded = 0.02 cfs @ 15.06 hrs, Volume= 584 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link SP1 : STUDY POINT #1 (Wetland Boundary)

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 148.35' @ 15.06 hrs Surf.Area= 661 sf Storage= 181 cf

Plug-Flow detention time= 139.6 min calculated for 583 cf (100% of inflow)
Center-of-Mass det. time= 139.4 min (1,065.6 - 926.2)

Volume	Invert	Avail.Storage	Storage Description
#1	148.00'	1,674 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

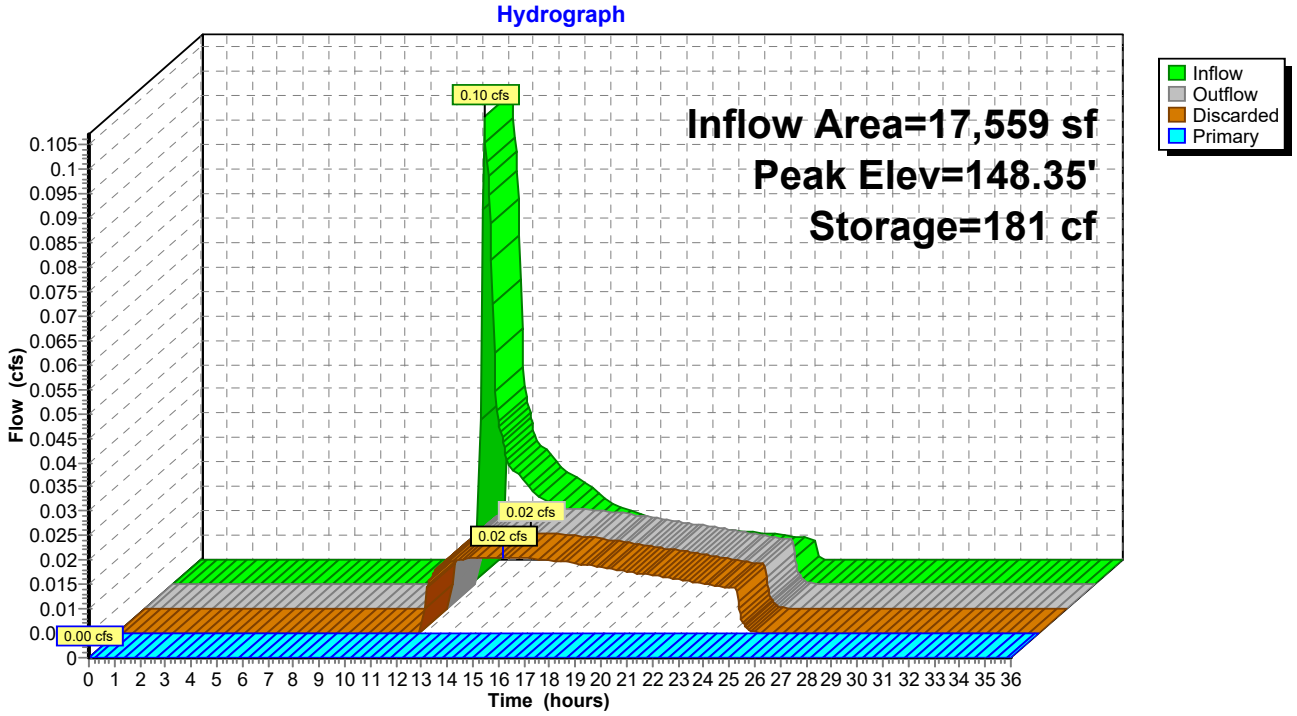
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
148.00	369	0	0
149.00	1,197	783	783
149.50	1,667	716	1,499
149.60	1,837	175	1,674

Device	Routing	Invert	Outlet Devices
#1	Discarded	148.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	149.20'	**5.0' long x 2.5' 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 Coef. (English) 2.48 2.60 2.60 2.60 2.64 2.65 2.68 2.75 2.74 2.76 2.89 3.05 3.19 3.32

Discarded OutFlow Max=0.02 cfs @ 15.06 hrs HW=148.35' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=148.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P4: L Pond

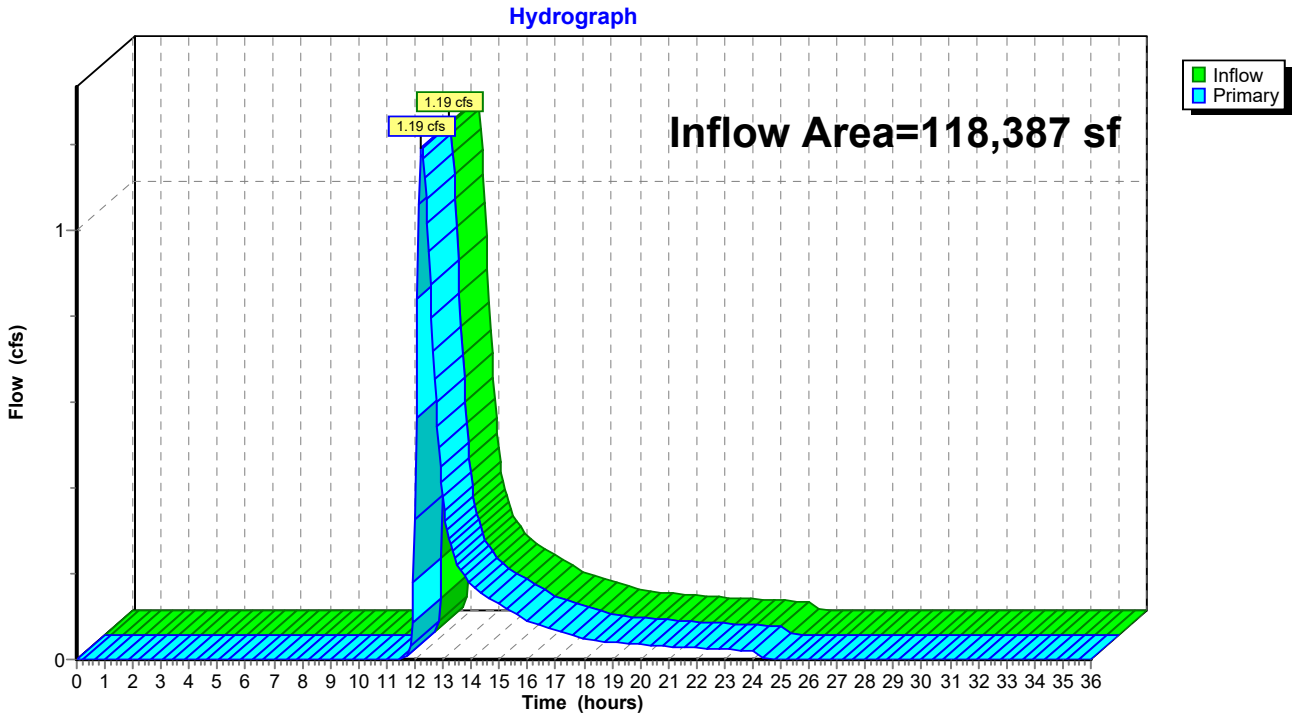


Summary for Link SP1: STUDY POINT #1 (Wetland Boundary)

Inflow Area = 118,387 sf, 32.10% Impervious, Inflow Depth = 0.61" for 2-Year event
Inflow = 1.19 cfs @ 12.25 hrs, Volume= 5,978 cf
Primary = 1.19 cfs @ 12.25 hrs, Volume= 5,978 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link SP1: STUDY POINT #1 (Wetland Boundary)



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1: Subcat P-1 Runoff Area=35,486 sf 22.39% Impervious Runoff Depth=1.89"
Flow Length=267' Tc=14.8 min CN=67 Runoff=1.32 cfs 5,580 cf

Subcatchment P-2: Subcat P-2 Runoff Area=26,257 sf 70.89% Impervious Runoff Depth=3.68"
Flow Length=296' Tc=6.0 min CN=87 Runoff=2.49 cfs 8,053 cf

Subcatchment P-3: Subcat P-3 Runoff Area=11,440 sf 100.00% Impervious Runoff Depth=4.88"
Flow Length=215' Tc=6.0 min CN=98 Runoff=1.28 cfs 4,655 cf

Subcatchment P-4: Subcat P-4 Runoff Area=17,559 sf 0.00% Impervious Runoff Depth=1.24"
Flow Length=250' Tc=7.0 min CN=58 Runoff=0.49 cfs 1,808 cf

Subcatchment P-5: Subcat P-5 Runoff Area=27,645 sf 0.00% Impervious Runoff Depth=1.17"
Flow Length=100' Tc=7.6 min CN=57 Runoff=0.68 cfs 2,693 cf

Pond P2: Triangular Pond Peak Elev=148.62' Storage=2,396 cf Inflow=2.49 cfs 8,053 cf
Discarded=0.04 cfs 1,809 cf Primary=0.90 cfs 6,179 cf Secondary=0.00 cfs 0 cf Outflow=0.95 cfs 7,988 cf

Pond P3: Modified Infiltration System Peak Elev=150.23' Storage=1,986 cf Inflow=1.28 cfs 4,655 cf
Discarded=0.03 cfs 2,868 cf Primary=0.54 cfs 1,127 cf Outflow=0.57 cfs 3,995 cf

Pond P4: L Pond Peak Elev=149.11' Storage=922 cf Inflow=0.49 cfs 1,808 cf
Discarded=0.03 cfs 1,808 cf Primary=0.00 cfs 0 cf Outflow=0.03 cfs 1,808 cf

Link SP1: STUDY POINT #1 (Wetland Boundary) Inflow=3.14 cfs 15,580 cf
Primary=3.14 cfs 15,580 cf

Total Runoff Area = 118,387 sf Runoff Volume = 22,789 cf Average Runoff Depth = 2.31"
67.90% Pervious = 80,389 sf 32.10% Impervious = 37,998 sf

Summary for Subcatchment P-1: Subcat P-1

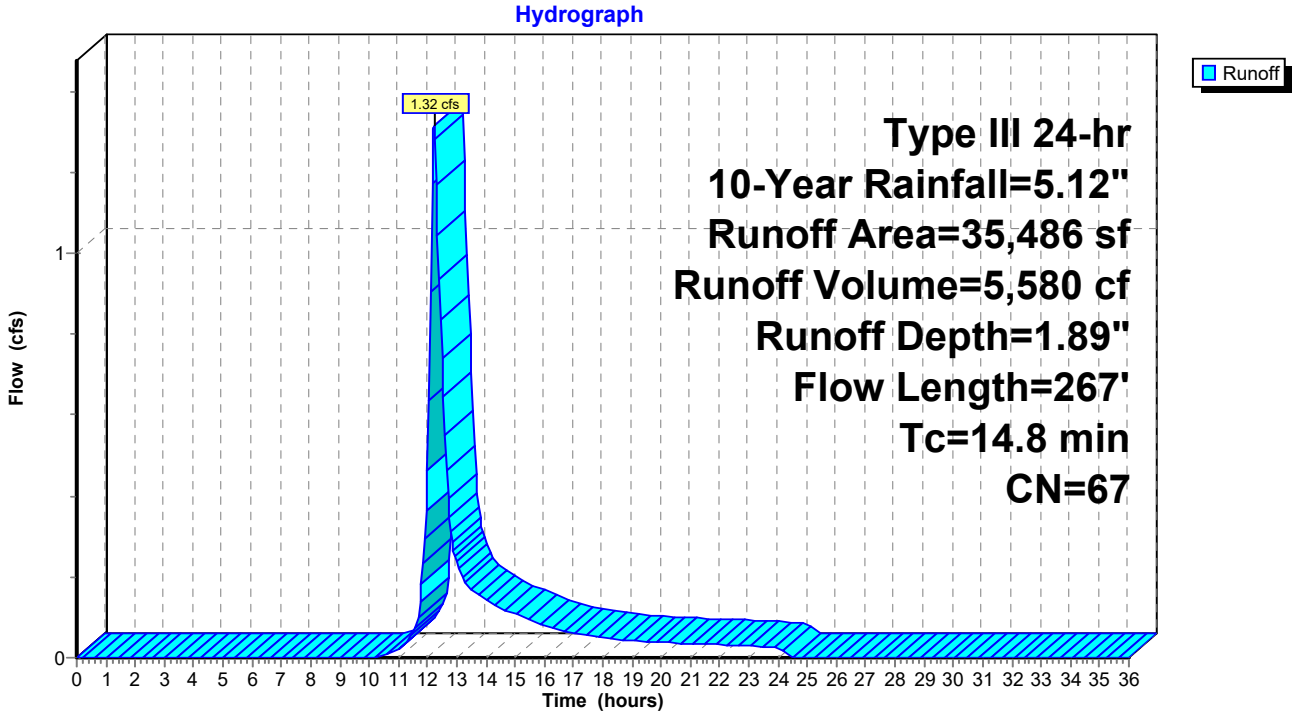
Runoff = 1.32 cfs @ 12.22 hrs, Volume= 5,580 cf, Depth= 1.89"
Routed to Link SP1 : STUDY POINT #1 (Wetland Boundary)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.12"

Area (sf)	CN	Description
11,518	61	>75% Grass cover, Good, HSG B
7,944	98	Paved parking, HSG B
16,024	55	Woods, Good, HSG B
35,486	67	Weighted Average
27,542		77.61% Pervious Area
7,944		22.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.28"
2.4	158	0.0500	1.12		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.2	35	0.0200	2.87		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.0	24	0.5100	32.40	25.44	**Pipe Channel, C-D** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
14.8	267	Total			

Subcatchment P-1: Subcat P-1



Summary for Subcatchment P-2: Subcat P-2

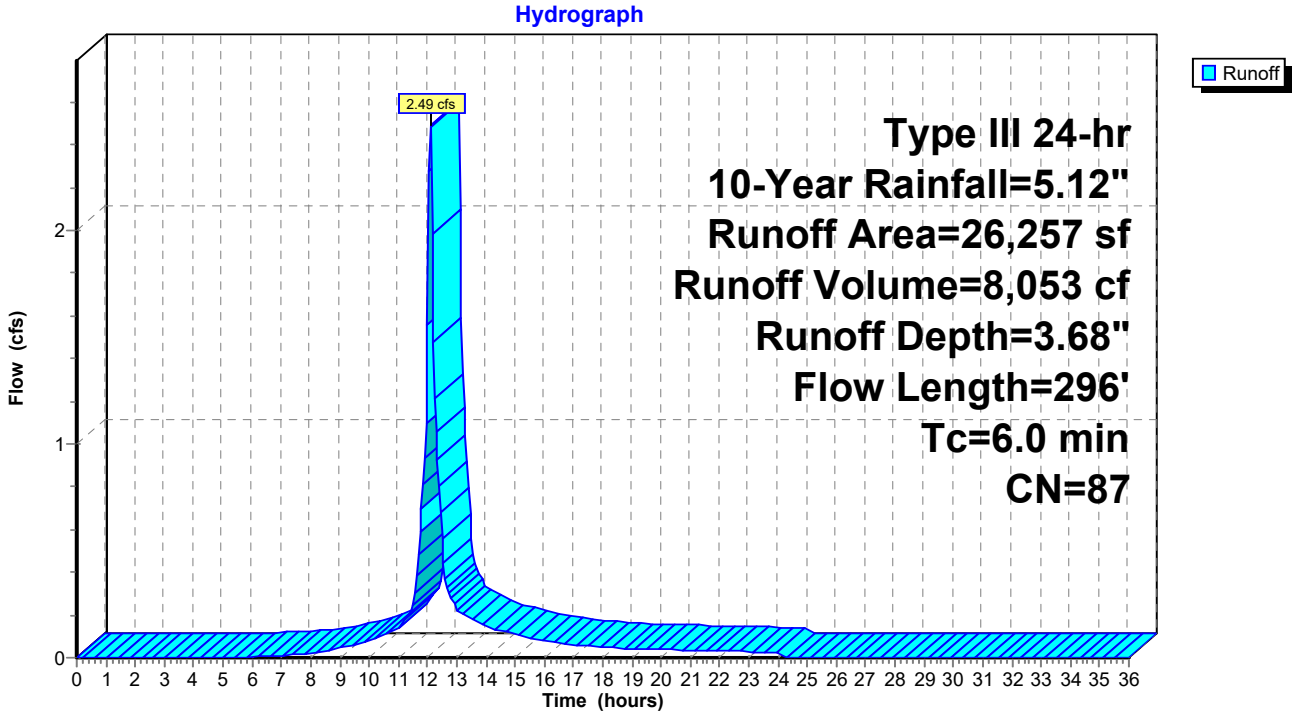
Runoff = 2.49 cfs @ 12.09 hrs, Volume= 8,053 cf, Depth= 3.68"
Routed to Pond P2 : Triangular Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.12"

Area (sf)	CN	Description
5,778	61	>75% Grass cover, Good, HSG B
18,613	98	Paved parking, HSG B
1,865	55	Woods, Good, HSG B
26,257	87	Weighted Average
7,644		29.11% Pervious Area
18,613		70.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	20	0.0150	0.11		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.28"
0.5	30	0.0150	0.98		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.28"
1.4	156	0.0090	1.93		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.5	90	0.0040	3.33	4.09	**Pipe Channel, D-E** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
5.4	296	Total, Increased to minimum Tc = 6.0 min			

Subcatchment P-2: Subcat P-2



Summary for Subcatchment P-3: Subcat P-3

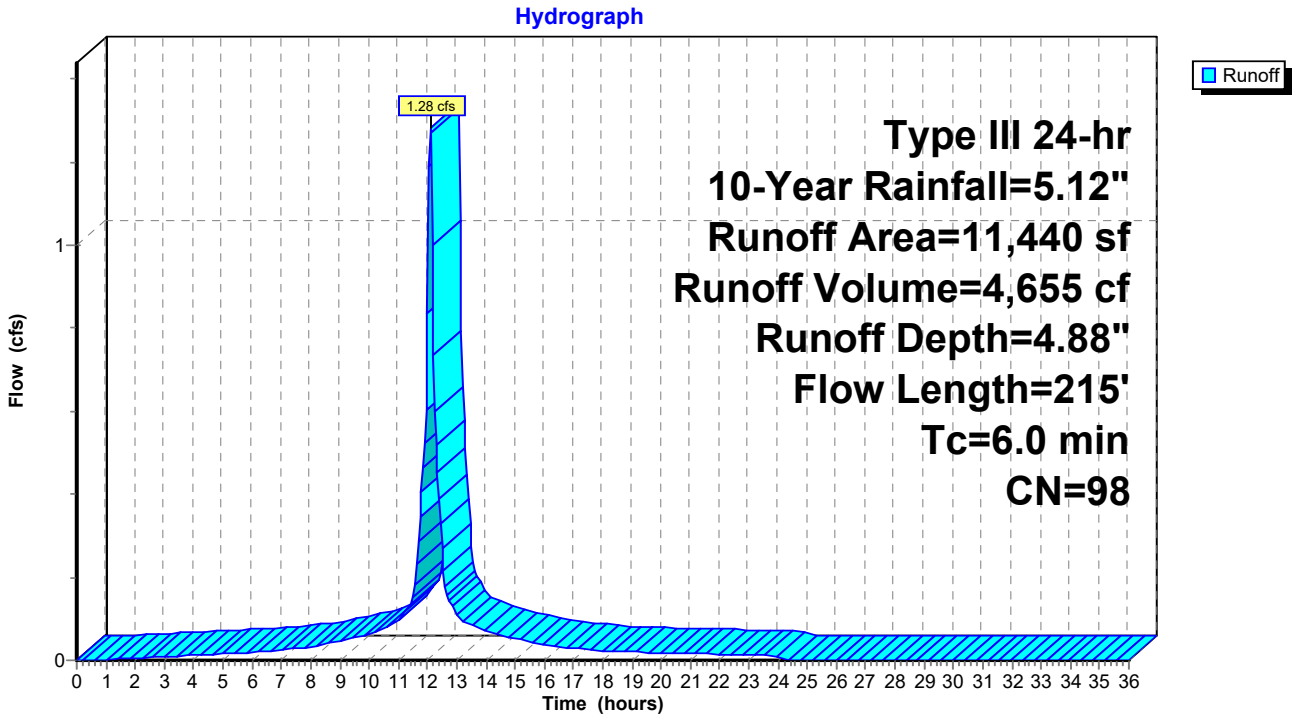
Runoff = 1.28 cfs @ 12.09 hrs, Volume= 4,655 cf, Depth= 4.88"
Routed to Pond P3 : Modified Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.12"

Area (sf)	CN	Description
11,440	98	Roofs, HSG B
11,440		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	146	0.0050	2.84	1.55	**Pipe Channel,** 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.013 Corrugated PE, smooth interior
0.2	69	0.0160	5.08	2.77	**Pipe Channel,** 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.013 Corrugated PE, smooth interior
1.1	215	Total, Increased to minimum Tc = 6.0 min			

Subcatchment P-3: Subcat P-3



Summary for Subcatchment P-4: Subcat P-4

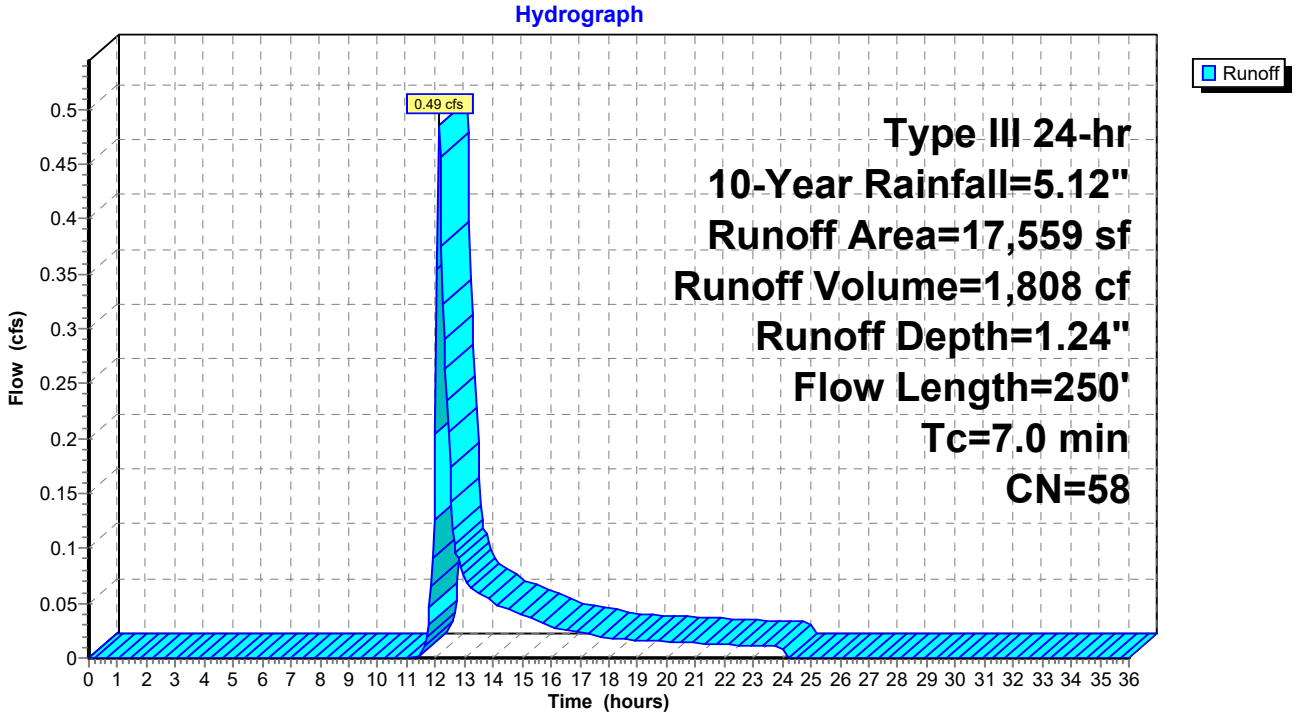
Runoff = 0.49 cfs @ 12.12 hrs, Volume= 1,808 cf, Depth= 1.24"
Routed to Pond P4 : L Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.12"

Area (sf)	CN	Description
9,858	61	>75% Grass cover, Good, HSG B
7,701	55	Woods, Good, HSG B
17,559	58	Weighted Average
17,559		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	50	0.1200	0.31		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.28"
3.2	135	0.0100	0.70		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.1	65	0.0380	0.97		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
7.0	250	Total			

Subcatchment P-4: Subcat P-4



Summary for Subcatchment P-5: Subcat P-5

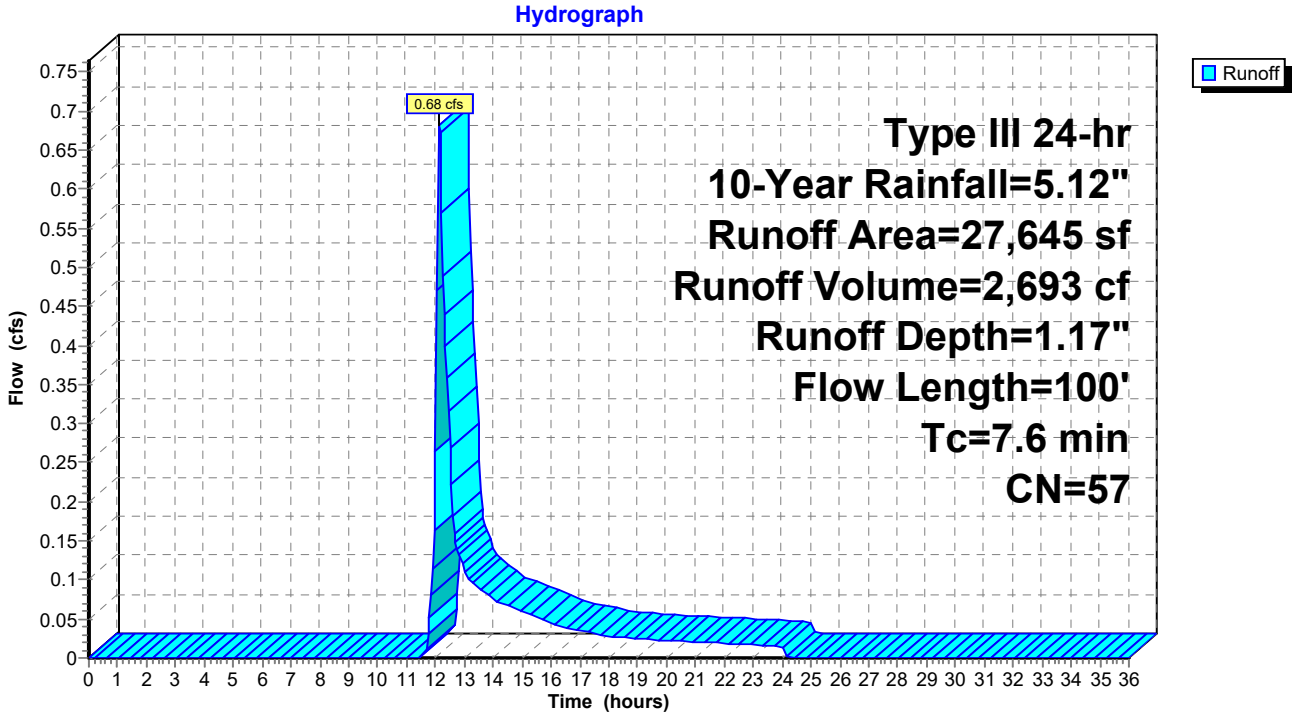
Runoff = 0.68 cfs @ 12.13 hrs, Volume= 2,693 cf, Depth= 1.17"
Routed to Link SP1 : STUDY POINT #1 (Wetland Boundary)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.12"

Area (sf)	CN	Description
7,201	61	>75% Grass cover, Good, HSG B
0	98	Paved parking, HSG B
20,444	55	Woods, Good, HSG B
27,645	57	Weighted Average
27,645		100.00% Pervious Area
0		0.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0810	0.12		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.28"
0.6	50	0.0820	1.43		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
7.6	100	Total			

Subcatchment P-5: Subcat P-5



Summary for Pond P2: Triangular Pond

Inflow Area = 26,257 sf, 70.89% Impervious, Inflow Depth = 3.68" for 10-Year event
Inflow = 2.49 cfs @ 12.09 hrs, Volume= 8,053 cf
Outflow = 0.95 cfs @ 12.34 hrs, Volume= 7,988 cf, Atten= 62%, Lag= 15.2 min
Discarded = 0.04 cfs @ 12.34 hrs, Volume= 1,809 cf
Primary = 0.90 cfs @ 12.34 hrs, Volume= 6,179 cf
Routed to Link SP1 : STUDY POINT #1 (Wetland Boundary)
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link SP1 : STUDY POINT #1 (Wetland Boundary)

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 148.62' @ 12.34 hrs Surf.Area= 1,854 sf Storage= 2,396 cf

Plug-Flow detention time= 110.1 min calculated for 7,988 cf (99% of inflow)
Center-of-Mass det. time= 105.0 min (905.4 - 800.4)

Volume	Invert	Avail.Storage	Storage Description
#1	146.00'	3,171 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
146.00	230	0	0
147.00	681	456	456
148.00	1,293	987	1,443
148.10	1,300	130	1,572
149.00	2,254	1,599	3,171

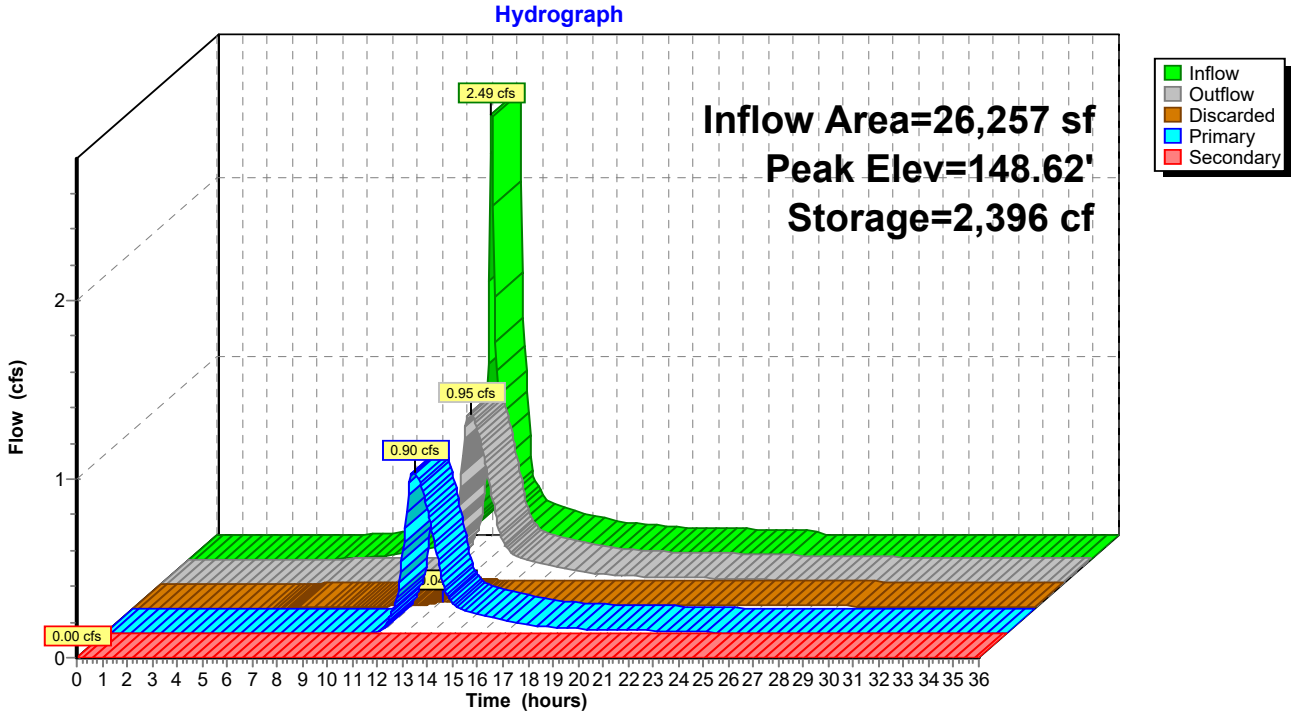
Device	Routing	Invert	Outlet Devices
#1	Discarded	146.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	147.20'	**6.0" Round Culvert** L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 147.20' / 145.00' S= 0.0733 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Secondary	148.75'	**10.0' long x 7.0' 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) 2.40 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65 2.65 2.66 2.65 2.66 2.68 2.70 2.73 2.78

Discarded OutFlow Max=0.04 cfs @ 12.34 hrs HW=148.62' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.90 cfs @ 12.34 hrs HW=148.62' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 0.90 cfs @ 4.60 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=146.00' (Free Discharge)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P2: Triangular Pond



Summary for Pond P3: Modified Infiltration System

Inflow Area = 11,440 sf,100.00% Impervious, Inflow Depth = 4.88" for 10-Year event
Inflow = 1.28 cfs @ 12.09 hrs, Volume= 4,655 cf
Outflow = 0.57 cfs @ 12.30 hrs, Volume= 3,995 cf, Atten= 56%, Lag= 12.8 min
Discarded = 0.03 cfs @ 7.20 hrs, Volume= 2,868 cf
Primary = 0.54 cfs @ 12.30 hrs, Volume= 1,127 cf
Routed to Link SP1 : STUDY POINT #1 (Wetland Boundary)

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 150.23' @ 12.30 hrs Surf.Area= 1,061 sf Storage= 1,986 cf

Plug-Flow detention time= 402.2 min calculated for 3,990 cf (86% of inflow)
Center-of-Mass det. time= 340.4 min (1,088.0 - 747.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	147.40'	840 cf	**23.58'W x 45.00'L x 3.21'H Field A** 3,405 cf Overall - 1,305 cf Embedded = 2,099 cf x 40.0% Voids
#2A	147.90'	1,305 cf	**Cultec R-280HD** x 30 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 5 rows
		2,145 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	147.40'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	147.90'	**12.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 147.90' / 147.80' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#3	Device 2	150.10'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.03 cfs @ 7.20 hrs HW=147.43' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.54 cfs @ 12.30 hrs HW=150.23' (Free Discharge)
└**2=Culvert** (Passes 0.54 cfs of 4.04 cfs potential flow)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 0.54 cfs @ 1.02 fps)

Pond P3: Modified Infiltration System - Chamber Wizard Field A

Chamber Model = Cultec R-280HD (Cultec Recharger®280HD)
Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf
Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap
Row Length Adjustment= +1.00' x 6.07 sf x 5 rows

47.0" Wide + 6.0" Spacing = 53.0" C-C Row Spacing

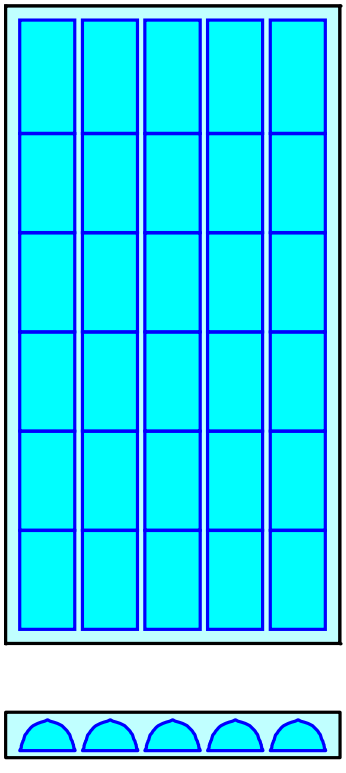
6 Chambers/Row x 7.00' Long +1.00' Row Adjustment = 43.00' Row Length +12.0" End Stone x 2 = 45.00' Base Length
5 Rows x 47.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 23.58' Base Width
6.0" Stone Base + 26.5" Chamber Height + 6.0" Stone Cover = 3.21' Field Height

30 Chambers x 42.5 cf +1.00' Row Adjustment x 6.07 sf x 5 Rows = 1,305.4 cf Chamber Storage

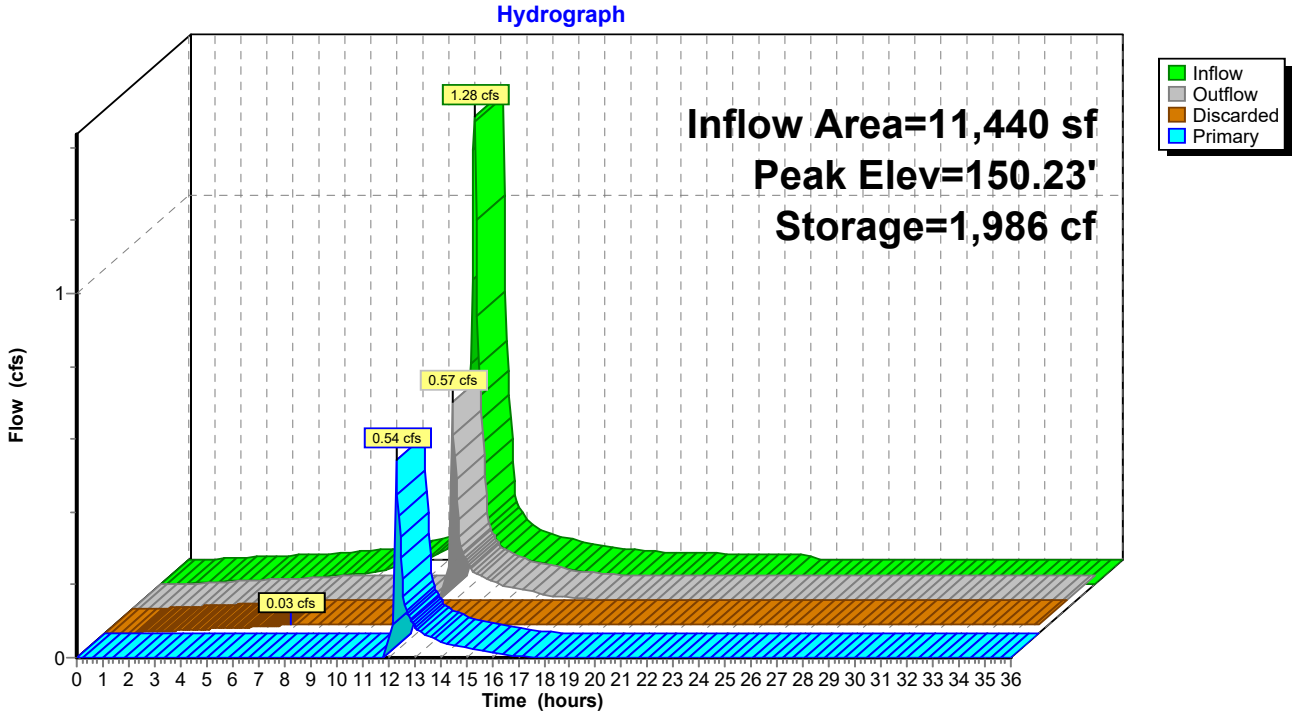
3,404.8 cf Field - 1,305.4 cf Chambers = 2,099.4 cf Stone x 40.0% Voids = 839.8 cf Stone Storage

Chamber Storage + Stone Storage = 2,145.2 cf = 0.049 af
Overall Storage Efficiency = 63.0%
Overall System Size = 45.00' x 23.58' x 3.21'

30 Chambers
126.1 cy Field
77.8 cy Stone



Pond P3: Modified Infiltration System



Summary for Pond P4: L Pond

Inflow Area = 17,559 sf, 0.00% Impervious, Inflow Depth = 1.24" for 10-Year event
Inflow = 0.49 cfs @ 12.12 hrs, Volume= 1,808 cf
Outflow = 0.03 cfs @ 15.83 hrs, Volume= 1,808 cf, Atten= 94%, Lag= 222.4 min
Discarded = 0.03 cfs @ 15.83 hrs, Volume= 1,808 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link SP1 : STUDY POINT #1 (Wetland Boundary)

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 149.11' @ 15.83 hrs Surf.Area= 1,301 sf Storage= 922 cf

Plug-Flow detention time= 387.3 min calculated for 1,808 cf (100% of inflow)
Center-of-Mass det. time= 387.3 min (1,268.2 - 880.9)

Volume	Invert	Avail.Storage	Storage Description
#1	148.00'	1,674 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

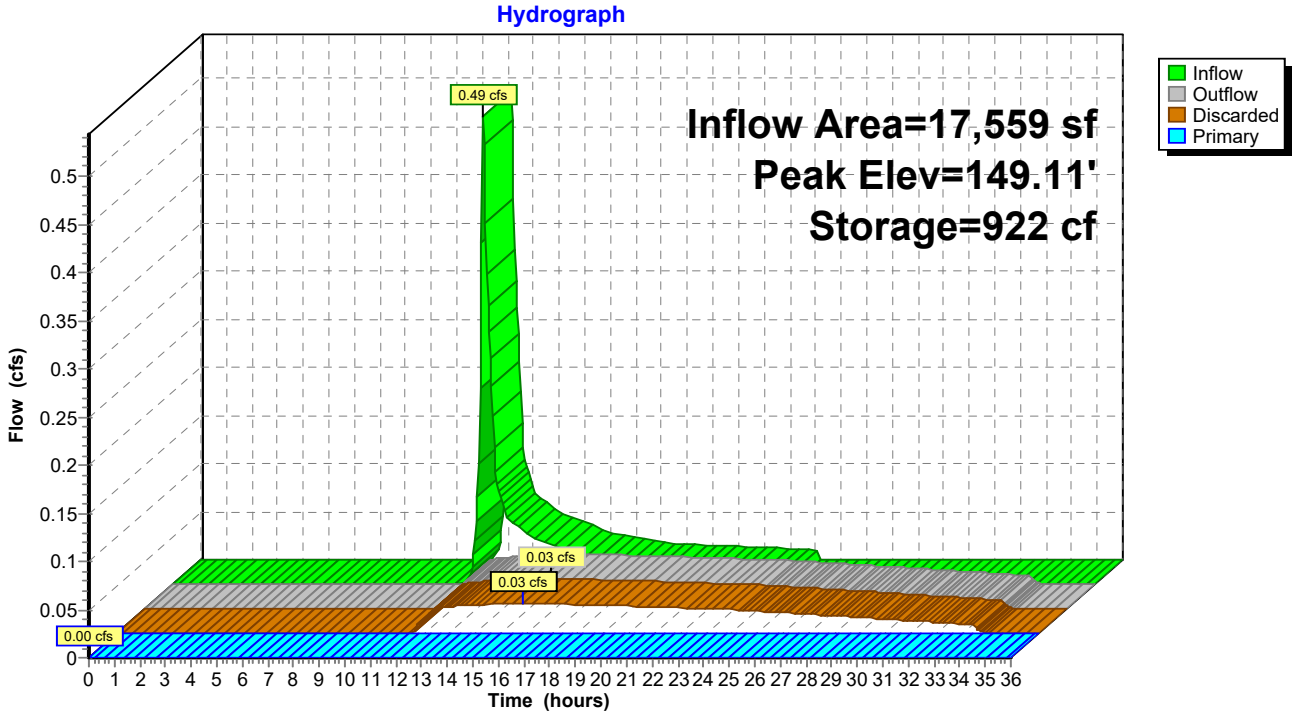
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
148.00	369	0	0
149.00	1,197	783	783
149.50	1,667	716	1,499
149.60	1,837	175	1,674

Device	Routing	Invert	Outlet Devices
#1	Discarded	148.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	149.20'	**5.0' long x 2.5' 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 Coef. (English) 2.48 2.60 2.60 2.60 2.64 2.65 2.68 2.75 2.74 2.76 2.89 3.05 3.19 3.32

Discarded OutFlow Max=0.03 cfs @ 15.83 hrs HW=149.11' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=148.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P4: L Pond

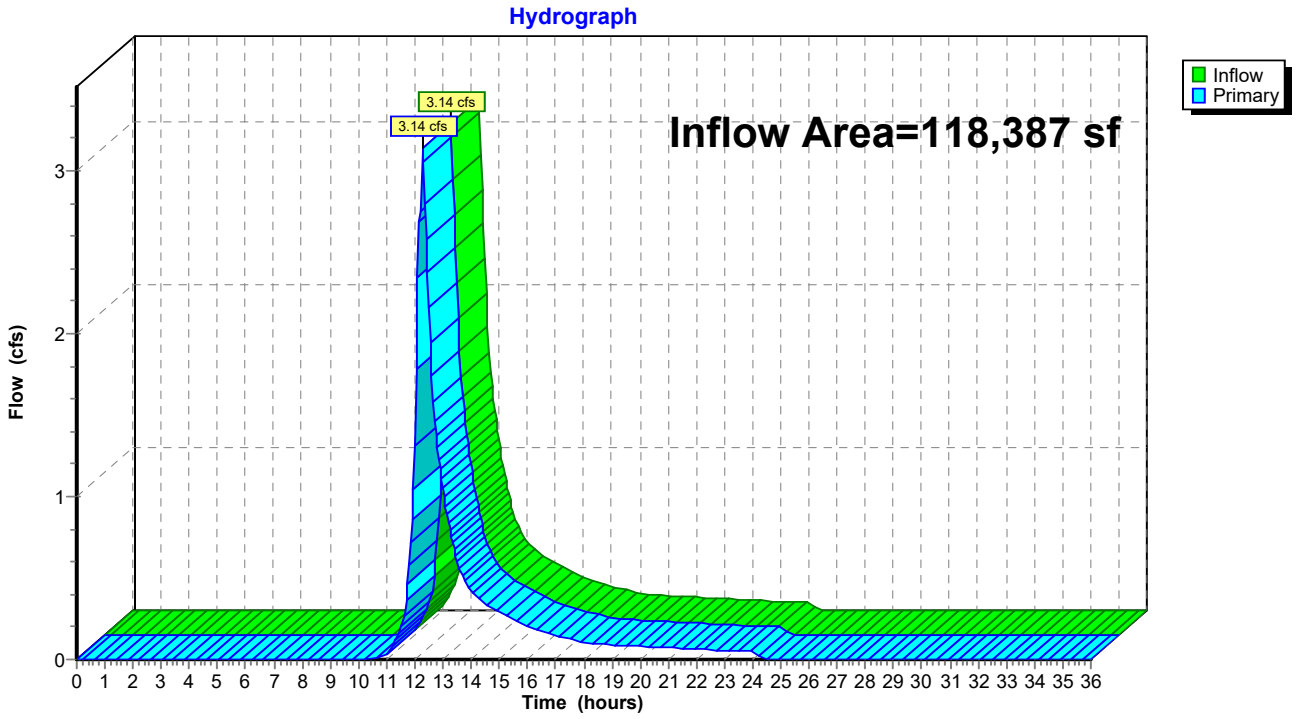


Summary for Link SP1: STUDY POINT #1 (Wetland Boundary)

Inflow Area = 118,387 sf, 32.10% Impervious, Inflow Depth = 1.58" for 10-Year event
Inflow = 3.14 cfs @ 12.27 hrs, Volume= 15,580 cf
Primary = 3.14 cfs @ 12.27 hrs, Volume= 15,580 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link SP1: STUDY POINT #1 (Wetland Boundary)



Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1: Subcat P-1 Runoff Area=35,486 sf 22.39% Impervious Runoff Depth=4.06"
Flow Length=267' Tc=14.8 min CN=67 Runoff=2.93 cfs 12,016 cf

Subcatchment P-2: Subcat P-2 Runoff Area=26,257 sf 70.89% Impervious Runoff Depth=6.38"
Flow Length=296' Tc=6.0 min CN=87 Runoff=4.21 cfs 13,963 cf

Subcatchment P-3: Subcat P-3 Runoff Area=11,440 sf 100.00% Impervious Runoff Depth=7.69"
Flow Length=215' Tc=6.0 min CN=98 Runoff=2.00 cfs 7,331 cf

Subcatchment P-4: Subcat P-4 Runoff Area=17,559 sf 0.00% Impervious Runoff Depth=3.06"
Flow Length=250' Tc=7.0 min CN=58 Runoff=1.35 cfs 4,480 cf

Subcatchment P-5: Subcat P-5 Runoff Area=27,645 sf 0.00% Impervious Runoff Depth=2.95"
Flow Length=100' Tc=7.6 min CN=57 Runoff=1.99 cfs 6,802 cf

Pond P2: Triangular Pond Peak Elev=148.96' Storage=3,089 cf Inflow=4.21 cfs 13,963 cf
Discarded=0.05 cfs 2,040 cf Primary=1.03 cfs 10,155 cf Secondary=2.36 cfs 1,695 cf Outflow=3.44 cfs 13,890 cf

Pond P3: Modified Infiltration System Peak Elev=150.41' Storage=2,060 cf Inflow=2.00 cfs 7,331 cf
Discarded=0.03 cfs 3,035 cf Primary=1.96 cfs 3,483 cf Outflow=1.99 cfs 6,518 cf

Pond P4: L Pond Peak Elev=149.35' Storage=1,259 cf Inflow=1.35 cfs 4,480 cf
Discarded=0.04 cfs 2,386 cf Primary=0.72 cfs 2,050 cf Outflow=0.75 cfs 4,436 cf

Link SP1: STUDY POINT #1 (Wetland Boundary) Inflow=9.67 cfs 36,200 cf
Primary=9.67 cfs 36,200 cf

Total Runoff Area = 118,387 sf Runoff Volume = 44,592 cf Average Runoff Depth = 4.52"
67.90% Pervious = 80,389 sf 32.10% Impervious = 37,998 sf

Summary for Subcatchment P-1: Subcat P-1

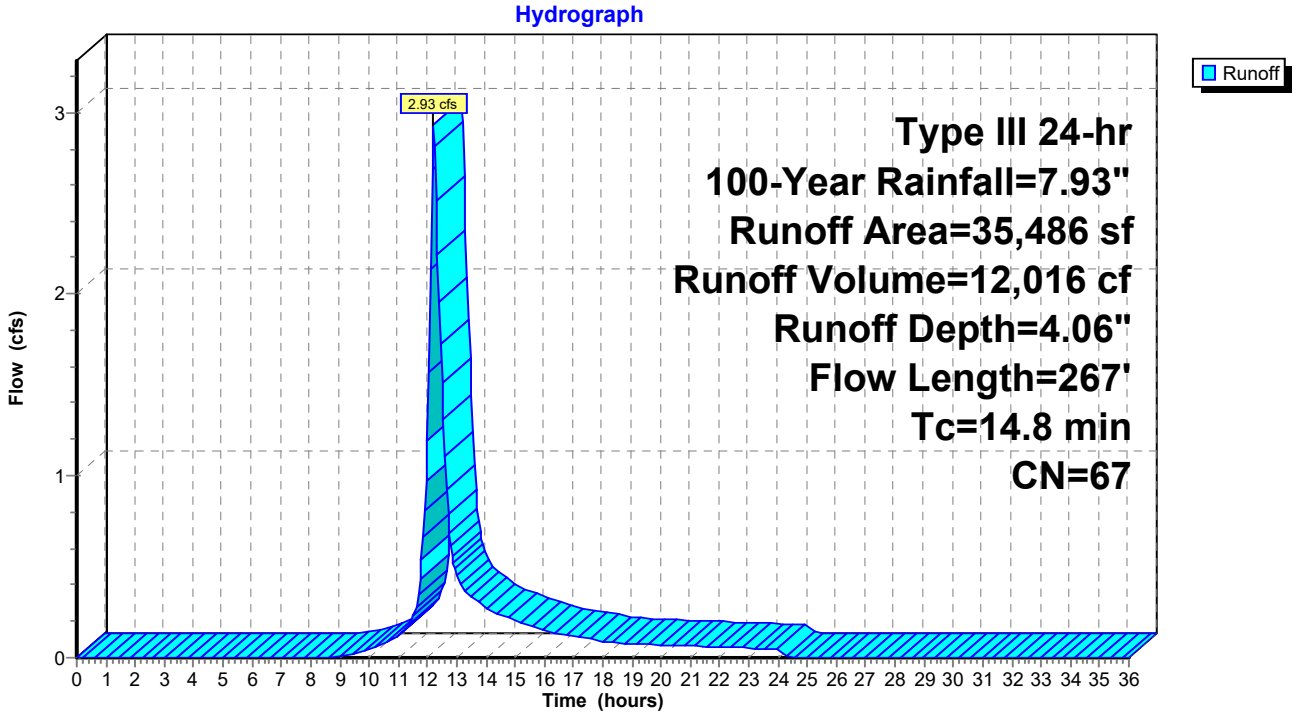
Runoff = 2.93 cfs @ 12.21 hrs, Volume= 12,016 cf, Depth= 4.06"
Routed to Link SP1 : STUDY POINT #1 (Wetland Boundary)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.93"

Area (sf)	CN	Description
11,518	61	>75% Grass cover, Good, HSG B
7,944	98	Paved parking, HSG B
16,024	55	Woods, Good, HSG B
35,486	67	Weighted Average
27,542		77.61% Pervious Area
7,944		22.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	50	0.0200	0.07		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.28"
2.4	158	0.0500	1.12		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.2	35	0.0200	2.87		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.0	24	0.5100	32.40	25.44	**Pipe Channel, C-D** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
14.8	267	Total			

Subcatchment P-1: Subcat P-1



Summary for Subcatchment P-2: Subcat P-2

[47] Hint: Peak is 103% of capacity of segment #4

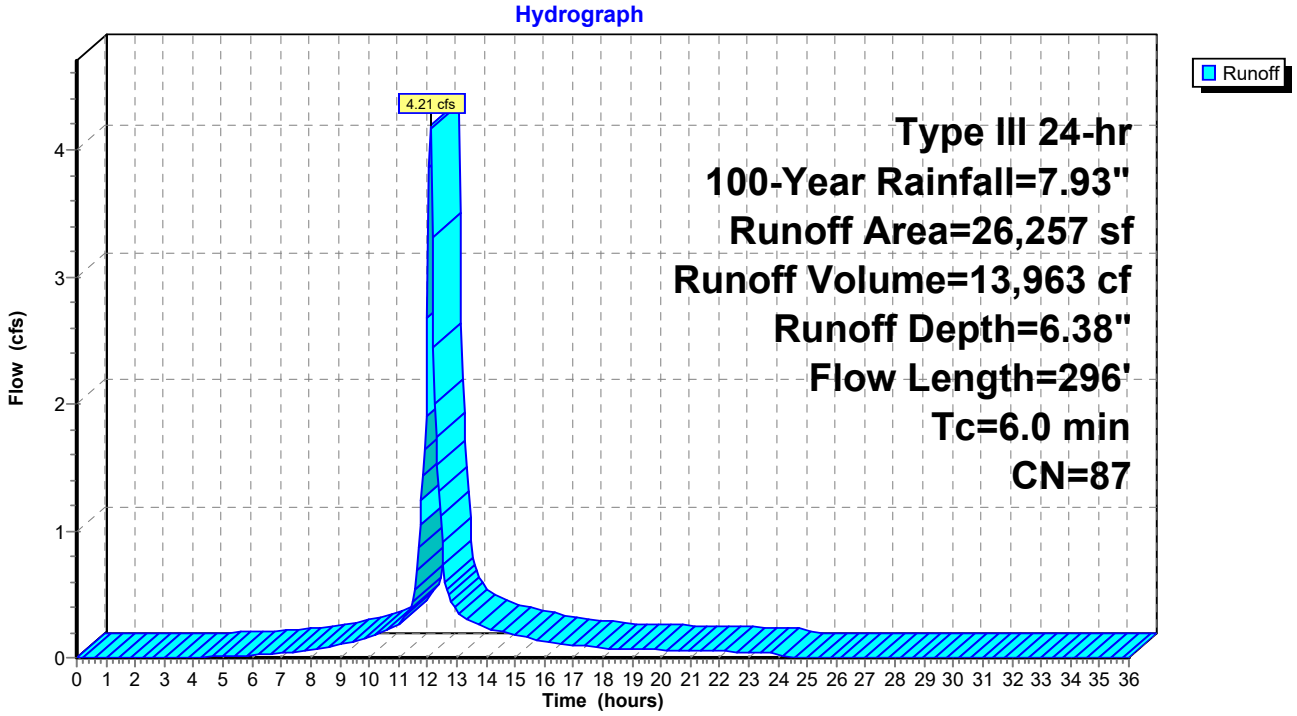
Runoff = 4.21 cfs @ 12.09 hrs, Volume= 13,963 cf, Depth= 6.38"
Routed to Pond P2 : Triangular Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.93"

Area (sf)	CN	Description
5,778	61	>75% Grass cover, Good, HSG B
18,613	98	Paved parking, HSG B
1,865	55	Woods, Good, HSG B
26,257	87	Weighted Average
7,644		29.11% Pervious Area
18,613		70.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	20	0.0150	0.11		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.28"
0.5	30	0.0150	0.98		**Sheet Flow, B-C** Smooth surfaces n= 0.011 P2= 3.28"
1.4	156	0.0090	1.93		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
0.5	90	0.0040	3.33	4.09	**Pipe Channel, D-E** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Corrugated PE, smooth interior
5.4	296	Total, Increased to minimum Tc = 6.0 min			

Subcatchment P-2: Subcat P-2



Summary for Subcatchment P-3: Subcat P-3

[47] Hint: Peak is 129% of capacity of segment #1

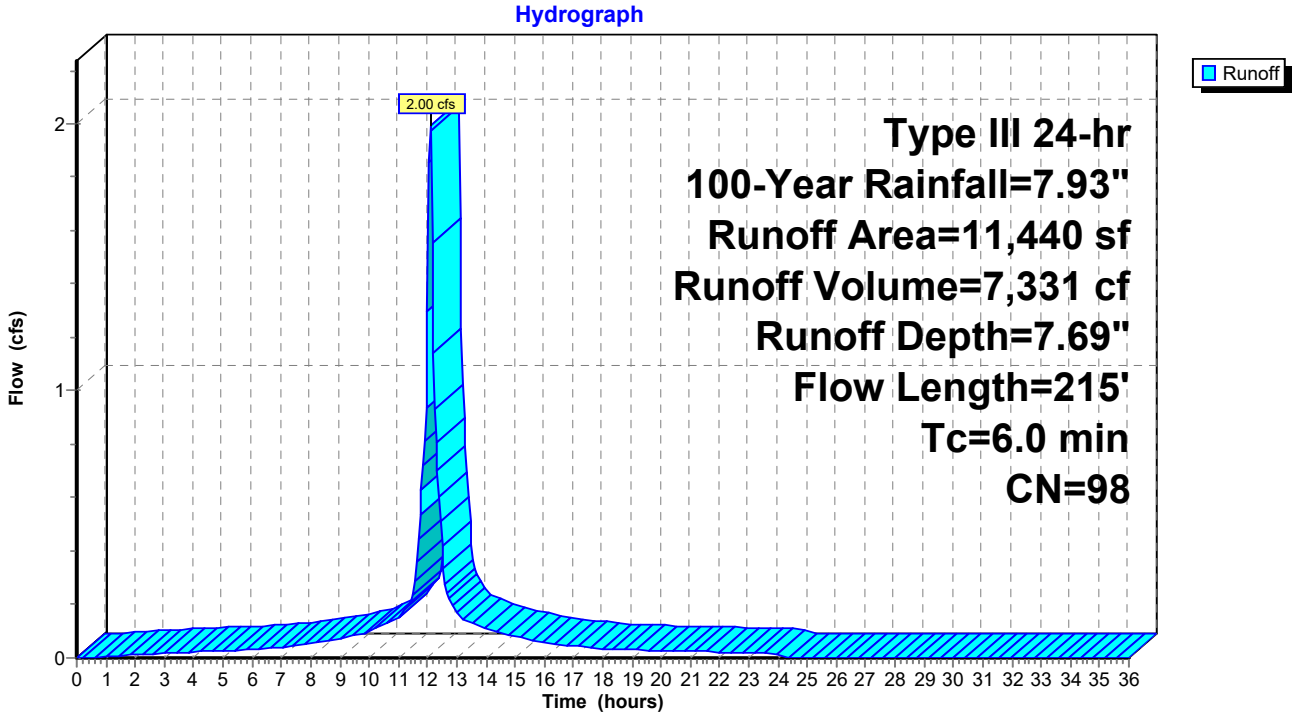
Runoff = 2.00 cfs @ 12.09 hrs, Volume= 7,331 cf, Depth= 7.69"
Routed to Pond P3 : Modified Infiltration System

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.93"

Area (sf)	CN	Description
11,440	98	Roofs, HSG B
11,440		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	146	0.0050	2.84	1.55	**Pipe Channel,** 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.013 Corrugated PE, smooth interior
0.2	69	0.0160	5.08	2.77	**Pipe Channel,** 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21' n= 0.013 Corrugated PE, smooth interior
1.1	215	Total, Increased to minimum Tc = 6.0 min			

Subcatchment P-3: Subcat P-3



Summary for Subcatchment P-4: Subcat P-4

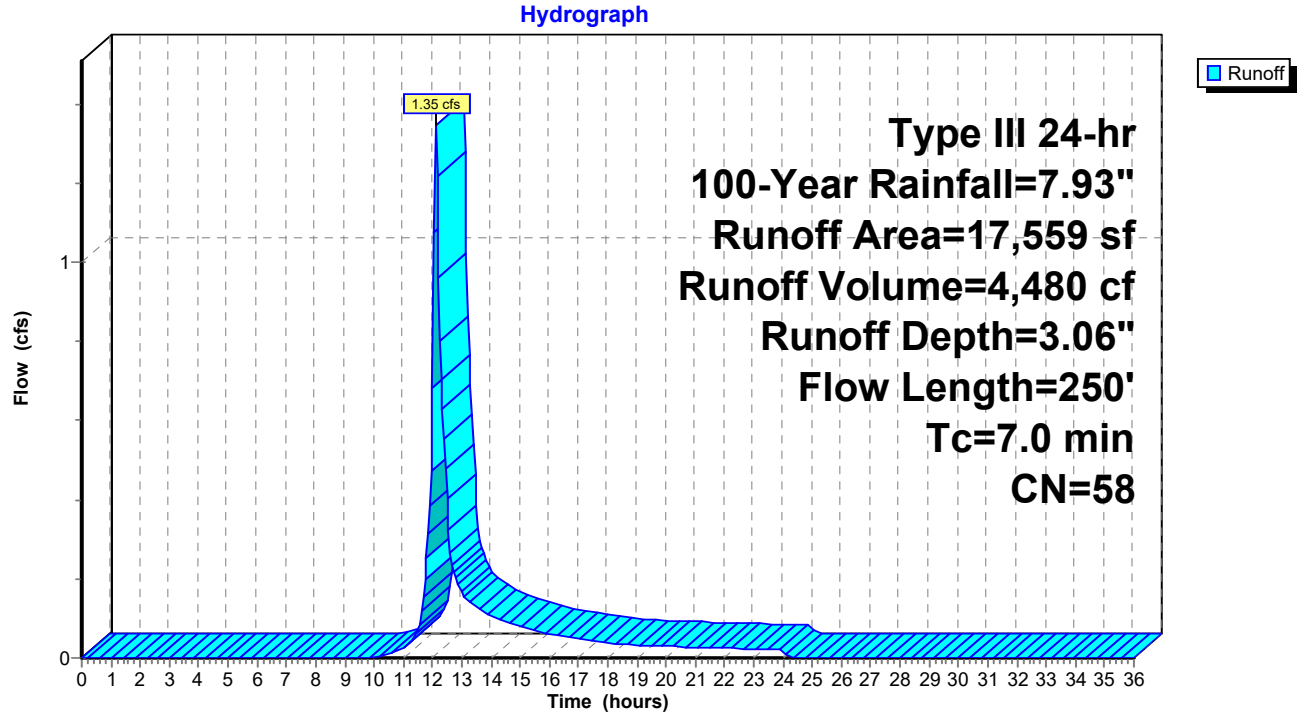
Runoff = 1.35 cfs @ 12.11 hrs, Volume= 4,480 cf, Depth= 3.06"
Routed to Pond P4 : L Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.93"

Area (sf)	CN	Description
9,858	61	>75% Grass cover, Good, HSG B
7,701	55	Woods, Good, HSG B
17,559	58	Weighted Average
17,559		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	50	0.1200	0.31		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.28"
3.2	135	0.0100	0.70		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.1	65	0.0380	0.97		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
7.0	250	Total			

Subcatchment P-4: Subcat P-4



Summary for Subcatchment P-5: Subcat P-5

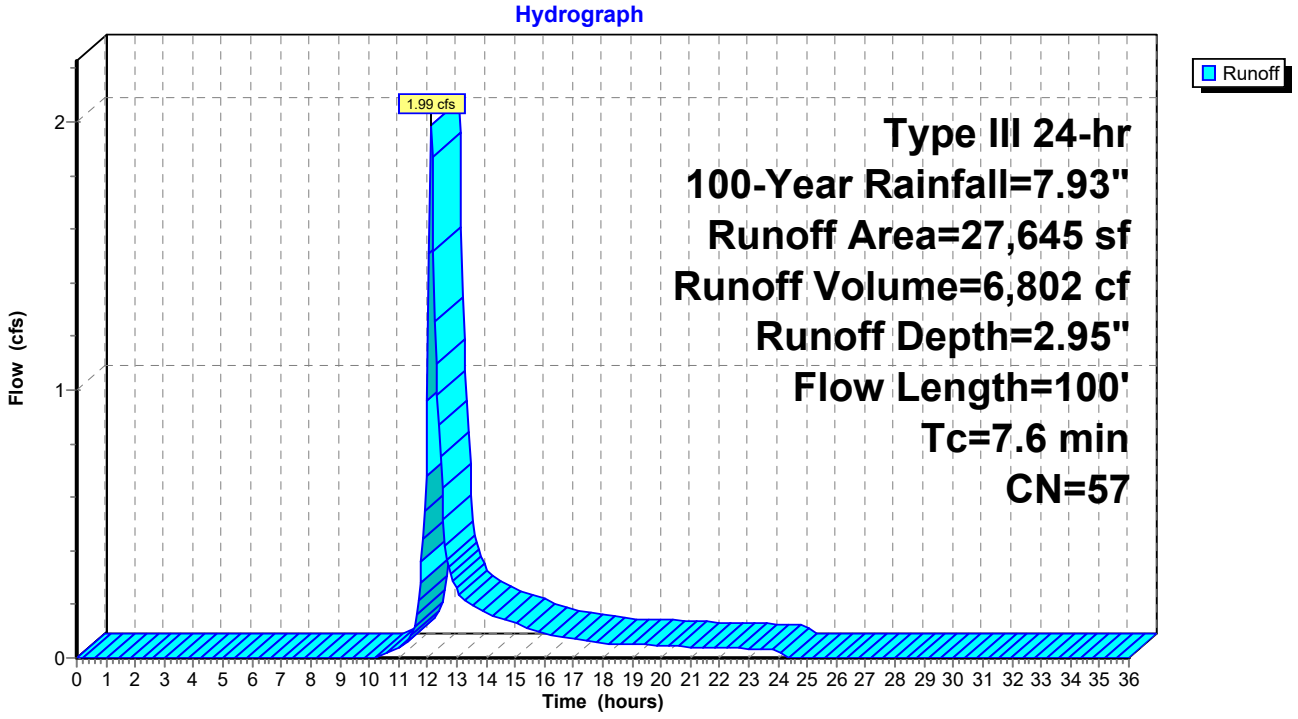
Runoff = 1.99 cfs @ 12.12 hrs, Volume= 6,802 cf, Depth= 2.95"
Routed to Link SP1 : STUDY POINT #1 (Wetland Boundary)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.93"

Area (sf)	CN	Description
7,201	61	>75% Grass cover, Good, HSG B
0	98	Paved parking, HSG B
20,444	55	Woods, Good, HSG B
27,645	57	Weighted Average
27,645		100.00% Pervious Area
0		0.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	50	0.0810	0.12		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.28"
0.6	50	0.0820	1.43		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
7.6	100	Total			

Subcatchment P-5: Subcat P-5



Summary for Pond P2: Triangular Pond

Inflow Area = 26,257 sf, 70.89% Impervious, Inflow Depth = 6.38" for 100-Year event
Inflow = 4.21 cfs @ 12.09 hrs, Volume= 13,963 cf
Outflow = 3.44 cfs @ 12.16 hrs, Volume= 13,890 cf, Atten= 18%, Lag= 4.5 min
Discarded = 0.05 cfs @ 12.16 hrs, Volume= 2,040 cf
Primary = 1.03 cfs @ 12.16 hrs, Volume= 10,155 cf
Routed to Link SP1 : STUDY POINT #1 (Wetland Boundary)
Secondary = 2.36 cfs @ 12.16 hrs, Volume= 1,695 cf
Routed to Link SP1 : STUDY POINT #1 (Wetland Boundary)

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 148.96' @ 12.16 hrs Surf.Area= 2,215 sf Storage= 3,089 cf

Plug-Flow detention time= 76.4 min calculated for 13,890 cf (99% of inflow)
Center-of-Mass det. time= 73.0 min (858.2 - 785.3)

Volume	Invert	Avail.Storage	Storage Description
#1	146.00'	3,171 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
146.00	230	0	0
147.00	681	456	456
148.00	1,293	987	1,443
148.10	1,300	130	1,572
149.00	2,254	1,599	3,171

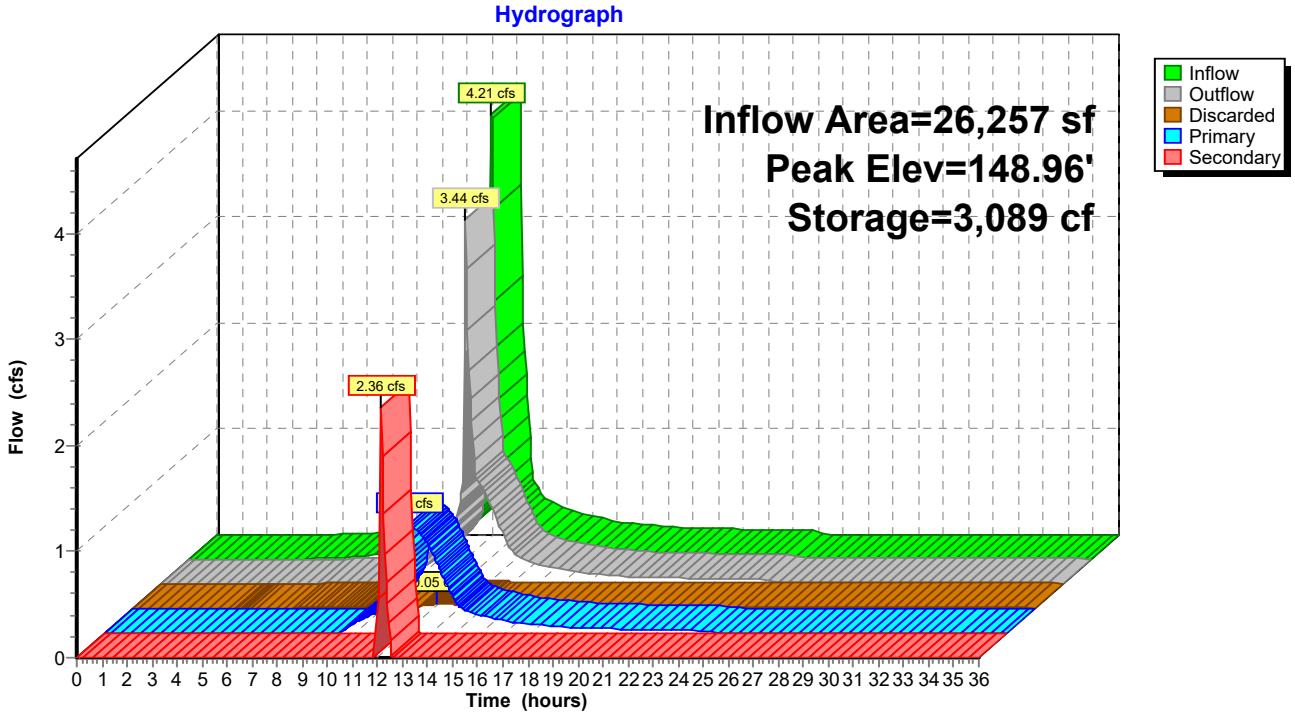
Device	Routing	Invert	Outlet Devices
#1	Discarded	146.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	147.20'	**6.0" Round Culvert** L= 30.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 147.20' / 145.00' S= 0.0733 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Secondary	148.75'	**10.0' long x 7.0' 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) 2.40 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65 2.65 2.66 2.65 2.66 2.68 2.70 2.73 2.78

Discarded OutFlow Max=0.05 cfs @ 12.16 hrs HW=148.95' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=1.02 cfs @ 12.16 hrs HW=148.95' (Free Discharge)
↑—**2=Culvert** (Inlet Controls 1.02 cfs @ 5.21 fps)

Secondary OutFlow Max=2.20 cfs @ 12.16 hrs HW=148.95' (Free Discharge)
↑—**3=Broad-Crested Rectangular Weir** (Weir Controls 2.20 cfs @ 1.08 fps)

Pond P2: Triangular Pond



Summary for Pond P3: Modified Infiltration System

Inflow Area = 11,440 sf,100.00% Impervious, Inflow Depth = 7.69" for 100-Year event
Inflow = 2.00 cfs @ 12.09 hrs, Volume= 7,331 cf
Outflow = 1.99 cfs @ 12.10 hrs, Volume= 6,518 cf, Atten= 0%, Lag= 0.8 min
Discarded = 0.03 cfs @ 4.80 hrs, Volume= 3,035 cf
Primary = 1.96 cfs @ 12.10 hrs, Volume= 3,483 cf
Routed to Link SP1 : STUDY POINT #1 (Wetland Boundary)

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 150.41' @ 12.10 hrs Surf.Area= 1,061 sf Storage= 2,060 cf

Plug-Flow detention time= 264.1 min calculated for 6,509 cf (89% of inflow)
Center-of-Mass det. time= 211.3 min (952.6 - 741.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	147.40'	840 cf	**23.58'W x 45.00'L x 3.21'H Field A** 3,405 cf Overall - 1,305 cf Embedded = 2,099 cf x 40.0% Voids
#2A	147.90'	1,305 cf	**Cultec R-280HD** x 30 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap Row Length Adjustment= +1.00' x 6.07 sf x 5 rows
		2,145 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	147.40'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	147.90'	**12.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 147.90' / 147.80' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#3	Device 2	150.10'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.03 cfs @ 4.80 hrs HW=147.43' (Free Discharge)
↑└**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.96 cfs @ 12.10 hrs HW=150.41' (Free Discharge)
↑└**2=Culvert** (Passes 1.96 cfs of 4.23 cfs potential flow)
↑└**3=Broad-Crested Rectangular Weir** (Weir Controls 1.96 cfs @ 1.59 fps)

Pond P3: Modified Infiltration System - Chamber Wizard Field A

Chamber Model = Cultec R-280HD (Cultec Recharger®280HD)
Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf
Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap
Row Length Adjustment= +1.00' x 6.07 sf x 5 rows

47.0" Wide + 6.0" Spacing = 53.0" C-C Row Spacing

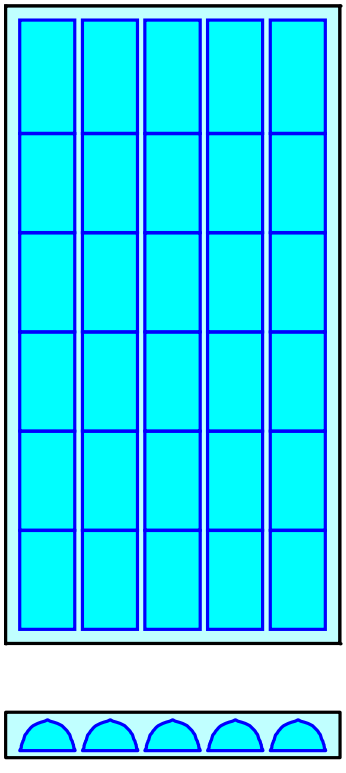
6 Chambers/Row x 7.00' Long +1.00' Row Adjustment = 43.00' Row Length +12.0" End Stone x 2 = 45.00' Base Length
5 Rows x 47.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 23.58' Base Width
6.0" Stone Base + 26.5" Chamber Height + 6.0" Stone Cover = 3.21' Field Height

30 Chambers x 42.5 cf +1.00' Row Adjustment x 6.07 sf x 5 Rows = 1,305.4 cf Chamber Storage

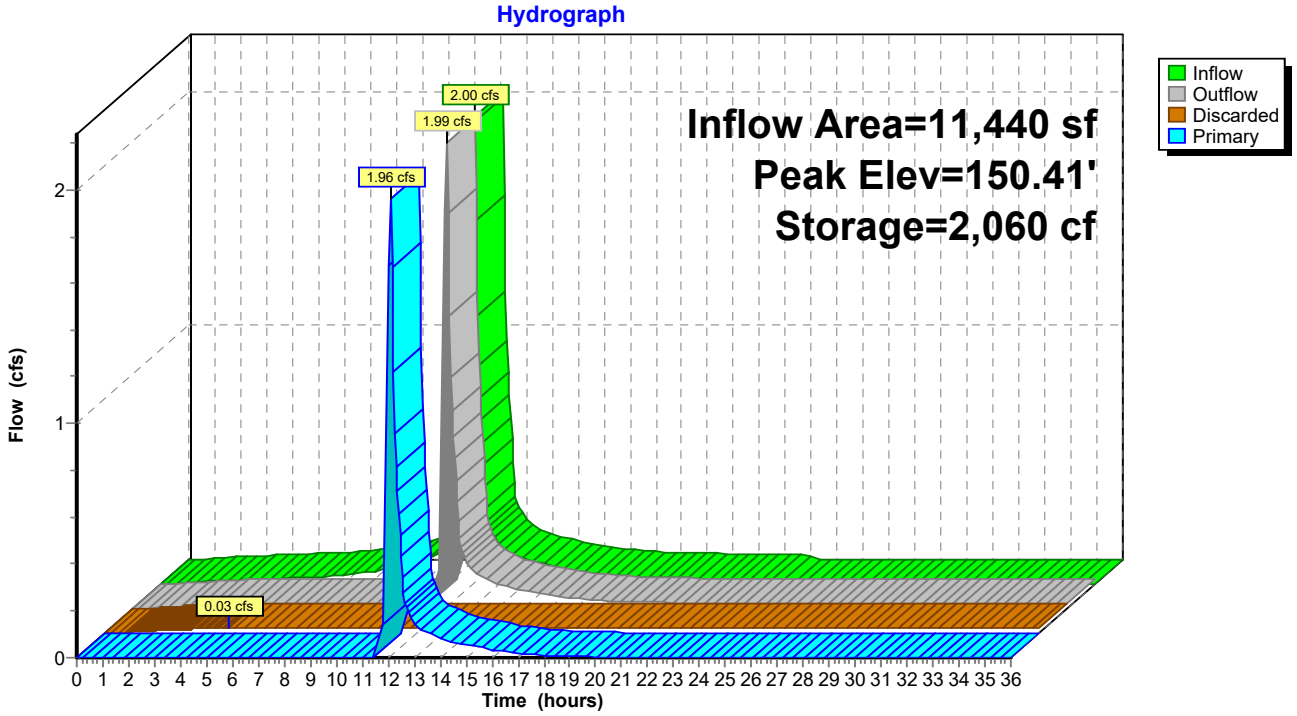
3,404.8 cf Field - 1,305.4 cf Chambers = 2,099.4 cf Stone x 40.0% Voids = 839.8 cf Stone Storage

Chamber Storage + Stone Storage = 2,145.2 cf = 0.049 af
Overall Storage Efficiency = 63.0%
Overall System Size = 45.00' x 23.58' x 3.21'

30 Chambers
126.1 cy Field
77.8 cy Stone



Pond P3: Modified Infiltration System



Summary for Pond P4: L Pond

Inflow Area = 17,559 sf, 0.00% Impervious, Inflow Depth = 3.06" for 100-Year event
Inflow = 1.35 cfs @ 12.11 hrs, Volume= 4,480 cf
Outflow = 0.75 cfs @ 12.28 hrs, Volume= 4,436 cf, Atten= 44%, Lag= 10.3 min
Discarded = 0.04 cfs @ 12.28 hrs, Volume= 2,386 cf
Primary = 0.72 cfs @ 12.28 hrs, Volume= 2,050 cf
Routed to Link SP1 : STUDY POINT #1 (Wetland Boundary)

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 149.35' @ 12.28 hrs Surf.Area= 1,525 sf Storage= 1,259 cf

Plug-Flow detention time= 233.0 min calculated for 4,436 cf (99% of inflow)
Center-of-Mass det. time= 227.2 min (1,079.3 - 852.1)

Volume	Invert	Avail.Storage	Storage Description
#1	148.00'	1,674 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

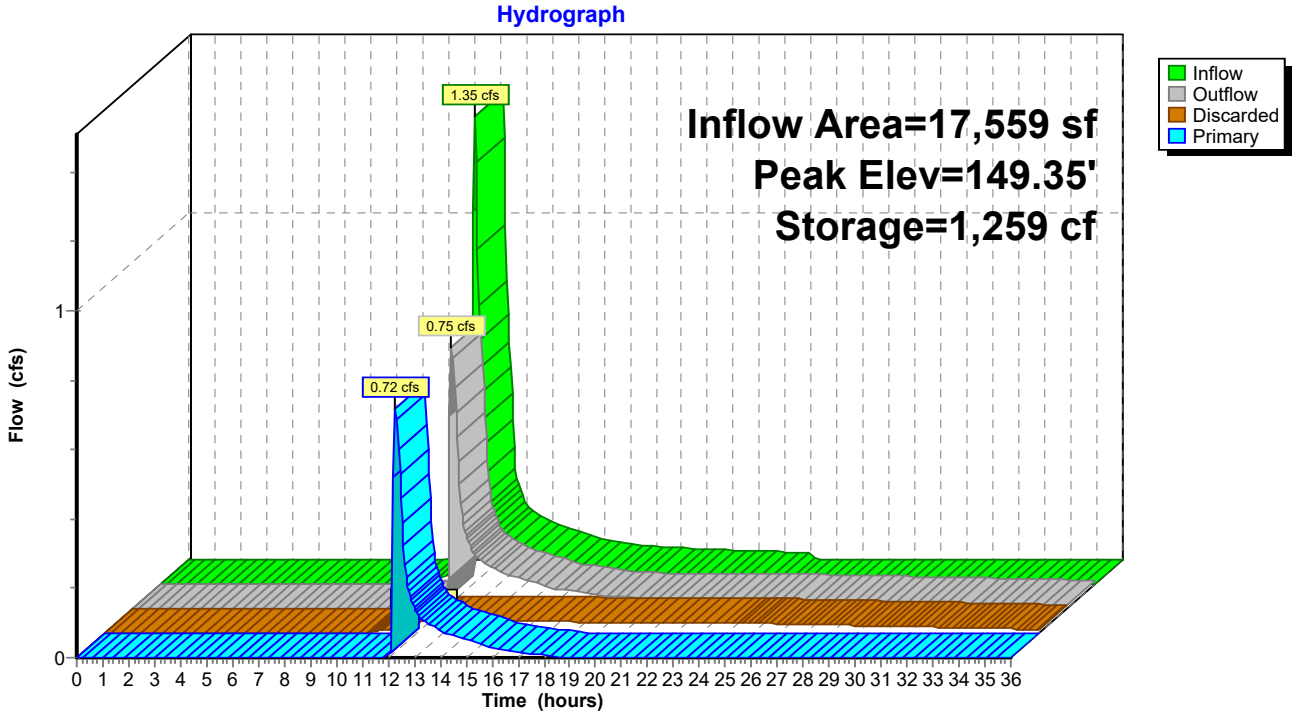
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
148.00	369	0	0
149.00	1,197	783	783
149.50	1,667	716	1,499
149.60	1,837	175	1,674

Device	Routing	Invert	Outlet Devices
#1	Discarded	148.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	149.20'	**5.0' long x 2.5' 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 Coef. (English) 2.48 2.60 2.60 2.60 2.64 2.65 2.68 2.75 2.74 2.76 2.89 3.05 3.19 3.32

Discarded OutFlow Max=0.04 cfs @ 12.28 hrs HW=149.35' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.71 cfs @ 12.28 hrs HW=149.35' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.71 cfs @ 0.96 fps)

Pond P4: L Pond

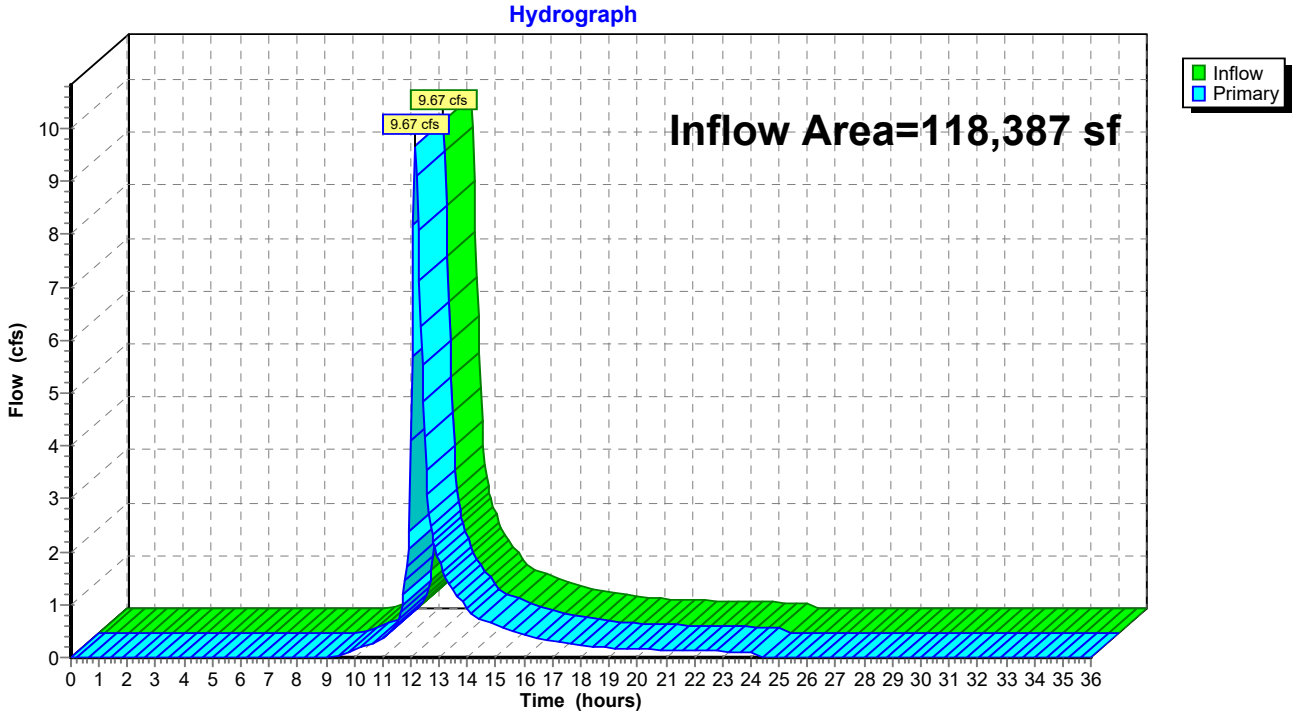


Summary for Link SP1: STUDY POINT #1 (Wetland Boundary)

Inflow Area = 118,387 sf, 32.10% Impervious, Inflow Depth = 3.67" for 100-Year event
Inflow = 9.67 cfs @ 12.16 hrs, Volume= 36,200 cf
Primary = 9.67 cfs @ 12.16 hrs, Volume= 36,200 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Link SP1: STUDY POINT #1 (Wetland Boundary)



ECR

Environmental Consulting & Restoration, LLC

VEGETATION MANAGEMENT PROPOSAL

TO: Hingham Conservation Commission

FROM: Brad Holmes

DATE: December 16, 2024

RE: 55 Industrial Park Road, Hingham, DEP File #SE034-1516

Environmental Consulting & Restoration, LLC (ECR) has prepared this Vegetation Management Proposal to accompany the Notice of Intent (NOI) application under review for the property located at 55 Industrial Park Road in Hingham (the Site). Portions of the site contain non-native invasive plant species. More specifically, portions of the site within the 100-foot buffer zone and 200-foot Riverfront Area contain Japanese Knotweed (*Polygonum cuspidatum*), which is a highly aggressive non-native invasive plant species. Japanese Knotweed is an invasive plant that was brought from Asia in the 1800s. It grows in dense stands and reaches incredible heights very quickly. It also outcompetes native vegetation, provides little by way of wildlife habitat value, and significantly degrades the environment. This proposal is designed to treat, remove, and manage Japanese Knotweed at the site.

The majority of the site is proposed for redevelopment as identified in the NOI application. This project includes reconstruction of a building, reconstruction of parking areas, re-landscaping to include new landscape areas, new plantings, etc. These areas where redevelopment is proposed will be managed so the management of Japanese Knotweed will be minimal and will be maintained during normal site operations. The areas beyond redevelopment at the site are the focus areas for this proposal. More specifically, the focus area is between the redevelopment footprint and the Bordering Vegetated Wetland (BVW). The areas of Japanese Knotweed at the site are generally located closer to the existing parking area, closer to the west side of the existing building, and landward of the BVW at the site. For more information, please refer to the attached Photograph Pages and Vegetation Management Plan (VMP) Focus Map attached.

The control of Japanese Knotweed would be performed by licensed herbicide applicators. The methods to control Japanese Knotweed are listed below:

1. Foliar Treatment - Japanese knotweed will be foliar-treated with sensitive area-approved herbicide applied by licensed applicators using low-volume hand-pumped backpack sprayers.

2. Targeted Herbicide Application Methods - Targeted methods are used to ensure that herbicide is applied carefully only to Japanese Knotweed. A brief description of each method may be found below.

    - Stem injection: Using the JK Injection System®, the licensed herbicide applicator injects each individual Knotweed cane with 5 cc/ml of the wetland approved glyphosate-based herbicide. The herbicide is injected at a 100% concentration, as recommended in the literature and on the supplemental herbicide label.

    - Glove technique (hand wipe): A licensed herbicide applicator puts on an absorbent cotton glove under a chemical-resistant glove. The applicator moistens the cotton glove with herbicide dispensed from a hand-pumped low-volume backpack sprayer equipped with specialized ultra-low-volume nozzles and then wipes each stem and leaf of the individual

Knotweed plants. A solution of herbicide, wetland nonionic surfactant and blue indicator dye is used.

- The Side Swipe® Pro method: The licensed herbicide applicator handles the Side Swipe Pro like a hockey stick to precisely and selectively apply herbicide to the target plants. The wipe-on applicator pad assures no drift or overspray. The protective shield over the top of the applicator pad permits safe herbicide application around desirable plants and shrubs.

The successful management of Japanese Knotweed requires ongoing maintenance over several years. More specifically, the management is proposed over three years with success goals as noted below:

Year One
Option 1
Task 1. (Spring 2025). Japanese knotweed will be cut and removed from the focus area. By cutting the plants early in the growing season, they will be stressed, and the regrown plants will be smaller and require less herbicide when treated in late summer after it flowers (August).

Task 2. Herbicide treatment (August). Japanese Knotweed will be foliar-sprayed with a sensitive area-approved herbicide applied by licensed technicians using low-volume hand-pumped backpack sprayers.

Option 2
Task 1. Herbicide treatment (August). Stem inject individual Japanese Knotweed stems > ½" diameter with JK Injection System®. Stems < ½" diameter will be hand wiped or foliar sprayed with specialized backpack sprayers fitted with ultralow volume nozzles for targeted application procedure. Herbicide will be used for both procedures.

Task 2. Follow-up herbicide application (Late August – 2 weeks after Task 1). The licensed herbicide applicators will return to the site to look for any Knotweed that appears unaffected by the earlier treatment using the same methods described in Task 1.

Task 3. Removal in late fall (October/November). Dead Knotweed plant material will be cut and hauled for off-site for disposal. Disposal will be at a facility familiar with processing non-native invasive plant species. Since these plants will be dead from the herbicide applications, it is unlikely that the spread of this invasive species onto the disposal site will occur.

Task 4. Seeding (October/November). A seed mix will be broadcast throughout the Knotweed management area, followed by the installation of a light, weed-free straw mulch. Selected seed mix will consist of a mix of native buffer zone species such as New England Conservation/Wildlife Seed Mix from New England Wetland Plants, Inc.

Year Two
Task 5. Follow-up herbicide application (Late August/September). Any regrowth of Knotweed within the focus area will be hand-wiped using the glove technique described above or wiped with a Side Swipe Pro Applicator. Sparsely vegetated areas will be scratched and seeded again as noted in Task 4.

Year Three
Task 6. Follow-up herbicide application (Late August/September). Any regrowth Knotweed will be hand-wiped using the glove technique or wiped with a Side Swipe Pro Applicator. Sparsely vegetated areas will be scratched and seeded again as noted in Task 4.

Success Criteria - Objective: 80% (or better) Knotweed control resulting from Year One treatments; 95% Knotweed control resulting from Year Two follow-up work; and 99% Knotweed control resulting from Year Three follow-up work. Photo monitoring plots will be set up prior to the start of management work to monitor the results of treatments each year over the course of the project. Please note that these success goals may vary based on unique site characteristics and persistence of Japanese Knotweed.

Stewardship & Maintenance - Successful Japanese Knotweed management requires a long-term commitment and will need to be ongoing in order to protect the investment in the three-year management program. 99% control within the focus area can be achieved; however, attention will need to be paid to the 1% of plants that will reemerge every season and try to reestablish themselves on the site. This small amount of reemerging Knotweed should be able to be handled by the landscape contractor that will manage the landscaped areas of the site. Options for managing Knotweed after the initial three years usually consist of hand pulling, spot herbicide wiping, and/or cutting.

Once the Japanese Knotweed is under control at the site, additional control of non-native invasive woody shrubs could be pursued at the site such as removal of Privet (*Ligustrum vulgare*), Honeysuckle (*Lonicera morowii),* etc. The control of these invasive woody plants will involve flagging the shrubs in the field and then cutting the plant at the base of the stem and then removing the cut shrubs from the site. Upon cutting, the cut stems would be painted with herbicide by a licensed herbicide applicator to prevent stump sprouting. Though labor intensive, the technique prevents herbicide exposure to non-target plants.

Included in this proposal are the following:

1. Photograph Pages
2. VMP focus map
3. Japanese Knotweed information sheet

Upon review of this proposal, please contact me at (617) 529 – 3792 or brad@ecrwetlands.com with any questions or requests for additional information.

Thank you,
Brad Holmes, Professional Wetland Scientist #1464
Manager

SITE PHOTOGRAPHS

Photograph #1 – Example of Japanese Knotweed located along the west side of the existing building.

Photograph #2 – Example of Japanese Knotweed located along the parking area in the southern portion of the site.

Photograph #3 – Another example of Japanese Knotweed located along the parking area in the southern portion of the site.

Photograph #4 – Example of Japanese Knotweed along the east side of the existing building and parking area. These areas where Japanese Knotweed exists within the redevelopment construction area will be removed and managed as part of the redevelopment project.

55 INDUSTRIAL PARK ROAD, HINGHAM

Vegetation Management Plan Focus Map

LEGEND

Proposed Japanese Knotweed Management Area (approximate)

HERB
STATUS: INVASIVE

Japanese Knotweed; Mexican Bamboo; Japanese Fleece Flower

Polygonum cuspidatum
Synonyms: *Fallopia japonica, Reynoutria japonica*

Photos by Paul Somers, NHESP

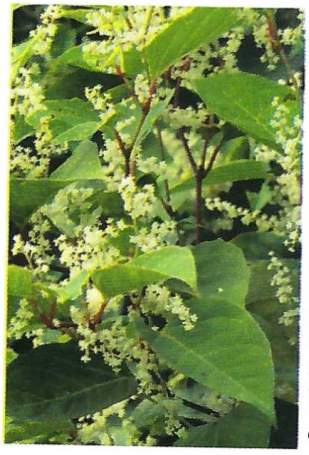
Family: Smartweed (Polygonaceae)

Regulated: Importation and propagation/sale prohibited (January 1, 2006)

Identification: An **upright perennial herb with multiple, dense shoots** that can grow up to 3 m (10′) in height. **Like a bamboo, stems are stout, round and hollow, with swollen joints at leaf nodes.** Shoots grow from stout subterranean rhizomes that may spread horizontally as far as 20 m (65′). **Broad leaves**, measuring up to 18 cm long and 10 cm wide, have truncate bases, **abruptly acute tips**, and veins below are roughened with minute, swollen knobs. White or **greenish-white flowers** appear August-September in numerous branched clusters. Fruits are small, shiny, black triangular seed-like achenes enclosed by papery thin and angled flower remnants (sepals).

Habitat: Japanese Knotweed grows in full sun to full shade, but is hardier in full sun environments. It is tolerant of drought, high temperatures and high salinity levels, and intolerant of frost. Often found near water sources, this plant may be observed in wetlands and other riparian areas. It commonly grows along streams, riverbanks, and in disturbed areas, roadsides and waste places.

Threat: It spreads vegetatively and by seed, forming dense thickets that threaten native plant communities in wetlands and riparian areas. It has the ability to survive severe flooding and readily colonizes island habitats and shorelines. Once established, its populations are highly persistent and difficult to eradicate.



Distribution: It occurs in all regions of Massachusetts and throughout New England. **Origin:** East Asia.

Similar Species: Giant Knotweed (*Polygonum sachalinense*) is a similar non-native weed that resembles Japanese Knotweed. Giant Knotweed leaves are considerably larger, up to 36 cm long, and the mid-stem leaves have deeply cordate bases and under-surface veins with multicellular hairs (seen with a handlens). Hybrids between Japanese and Giant knotweed (*P. x bohemicum*) and backcrosses also exist; they typically have slightly cordate leaves ranging from 20-36 cm long.

55 INDUSTRIAL PARK ROAD HINGHAM, MA

Tree Inventory and Removal Summary 23-Dec-24

Sean Papich Landscape Architecture & Daniel Cathcart Arborist

Tree#	Tag#	Note/Condition	Mitigation required	Tree Removal	Mitigation	DBH/Cal.	to be mitigated	Common name	Latin Name	X Coordinate	Y Coordinate
1	1			Y	Y	9	9	Pear	*Pyrus calleryana*	-70.91683218	42.1760456
2	2					7		Red Maple	*Acer rubrum*	-70.91691615	42.1760843
3	3	Multi				20		Red Maple	*Acer rubrum*	-70.91692956	42.17604504
4	4					13		Red Maple	*Acer rubrum*	-70.91694498	42.17598342
5	5	Multi				16		Crabapple	*Malus ssp.*	-70.91694987	42.17595503
6	6	7' Stem		Y	Y	8	8	Pear	*Pyrus calleryana*	-70.91687141	42.17593962
7	7	Multi - Dead -	N	Y	N	28		Hemlock	*Tsuga canadensis*	-70.91692439	42.17588844
8	8					13		Red Maple	*Acer rubrum*	-70.9169787	42.17592919
9	9					13		Red Maple	*Acer rubrum*	-70.91700754	42.17587303
10	10	Multi - Dead -	N	Y	N	18		Hemlock	*Tsuga canadensis*	-70.91693579	42.17584769
11	11	Multi - Dead -	N	Y	N	30		Hemlock	*Tsuga canadensis*	-70.9169606	42.17579004
12	12					20		Red Maple	*Acer rubrum*	-70.9170243	42.17582571
13	13					18		Red Maple	*Acer rubrum*	-70.91704039	42.17578247
14	14					9		Black Birch	*Betula lenta*	-70.9170813	42.17575105
15	15	Decay on trunk	N	Y	N	19		Japanese Maple	*Acer palmatum*	-70.91696261	42.17569341
16	16					30		Red Maple	*Acer rubrum*	-70.91707702	42.17569907
17	17	Invasive	N			13		Norway Maple	*Acer platanoides*	-70.91708574	42.17555595
18	18					15		American Beech	*Fagus grandifolia*	-70.91717291	42.17560167
19	19	Invasive	N			24		Norway Maple	*Acer platanoides*	-70.91713938	42.17549433
20	20	Invasive/Canker	N	Y	N	20		Norway Maple	*Acer platanoides*	-70.9171823	42.17547644
21	21	Invasive	N			14		Norway Maple	*Acer platanoides*	-70.9171595	42.17542774
22	22	Invasive	N			13		Norway Maple	*Acer platanoides*	-70.91719705	42.17537109
23	23	Invasive	N			8		Norway Maple	*Acer platanoides*	-70.91721985	42.17531742
24	24					16		Eastern Red Cedar	*Juniperus virginiana*	-70.91727215	42.1753045
25	25					10		Red Maple	*Acer rubrum*	-70.91734323	42.17533332
26	26	Dual				22		Red Maple	*Acer rubrum*	-70.91738078	42.17531643
27	27					14		Red Maple	*Acer rubrum*	-70.91735262	42.17528561
28	28					7		Red Maple	*Acer rubrum*	-70.91740895	42.17529058
29	29					10		Red Maple	*Acer rubrum*	-70.91744382	42.17526872
30	30					23		Northern Red Oak	*Quercus rubra*	-70.91741297	42.17525977
31	31					7		Eastern White	*Pinus strobus*	-70.91736067	42.17526176
32	32					7		Red Maple	*Acer rubrum*	-70.91746393	42.17524288
33	33	Multi				22		Red Maple	*Acer rubrum*	-70.91741029	42.17522996
34	34					16		Red Maple	*Acer rubrum*	-70.91750148	42.17521406
35	35					12		Red Maple	*Acer rubrum*	-70.91751624	42.17520312
36	36					11		Red Maple	*Acer rubrum*	-70.9174507	42.17521269
37	37					12		Red Maple	*Acer rubrum*	-70.91745657	42.17519268
38	38					10		Red Maple	*Acer rubrum*	-70.91748273	42.17519765
39	39					11		Red Maple	*Acer rubrum*	-70.91744316	42.17517081
40	40					6		Red Maple	*Acer rubrum*	-70.91747468	42.17517628
41	41					10		Red Maple	*Acer rubrum*	-70.91749547	42.17516982
42	42					16		Red Maple	*Acer rubrum*	-70.91747602	42.17515591
43	43					9		Red Maple	*Acer rubrum*	-70.91751759	42.17517578
44	44					7		Red Maple	*Acer rubrum*	-70.91755649	42.17518721
45	45					10		Red Maple	*Acer rubrum*	-70.91750955	42.17515392
46	46					6		Eastern White	*Pinus strobus*	-70.9175471	42.17515839
47	47					12		Red Maple	*Acer rubrum*	-70.91757124	42.1751569
48	48					15		Red Maple	*Acer rubrum*	-70.91753503	42.17513901
49	49					11		Red Maple	*Acer rubrum*	-70.91749815	42.17513553
50	50					15		Red Maple	*Acer rubrum*	-70.91751961	42.17512659
51	51					12		Red Maple	*Acer rubrum*	-70.91759538	42.17516634
52	52					14		Red Maple	*Acer rubrum*	-70.91760745	42.17514945
53	53					11		Red Maple	*Acer rubrum*	-70.91761684	42.17513255
54	54	Dead	N	Y	N	12		Crabapple	*Malus ssp.*	-70.91757325	42.17512311
55	55					8		Tupelo	*Nyssa Sylvatica*	-70.91761952	42.17511565
56	56					13		Red Maple	*Acer rubrum*	-70.91760678	42.17510224
57	57	Multi				33		Red Maple	*Acer rubrum*	-70.91760812	42.17508484
58	58					14		Red Maple	*Acer rubrum*	-70.91758599	42.17508335
59	59	Multi				26		Red Maple	*Acer rubrum*	-70.91755984	42.17508286
60	60	Multi				28		Red Maple	*Acer rubrum*	-70.91761684	42.17506248
61	61					14		Red Maple	*Acer rubrum*	-70.91759739	42.17506546

Tree#	Tag#	Note/Condition	Mitigation required	Tree Removal	Mitigation	DBH/Cal.	to be mitigated	Common name	Latin Name	X Coordinate	Y Coordinate
62	62	Dual				20		Red Maple	*Acer rubrum*	-70.91762958	42.17504409
63	63	Dead	N	Y	N	20		Crabapple	*Malus ssp.*	-70.91759605	42.17505304
64	64					18		Red Maple	*Acer rubrum*	-70.91760879	42.17503465
65	65	Dead	N	Y	N	16		Crabapple	*Malus ssp.*	-70.91762622	42.17501726
66	66					10		Tupelo	*Nyssa Sylvatica*	-70.91762421	42.1749785
67	67					12		Red Maple	*Acer rubrum*	-70.91762756	42.17494172
68	68					6		Red Maple	*Acer rubrum*	-70.91755649	42.17490793
69	69					9		Red Maple	*Acer rubrum*	-70.91756654	42.17494471
70	70					15		Red Maple	*Acer rubrum*	-70.91753302	42.17495266
71	71					10		Red Maple	*Acer rubrum*	-70.91751558	42.17497055
72	72					7		Red Maple	*Acer rubrum*	-70.91750217	42.17500384
73	73					7		Crabapple	*Malus ssp.*	-70.91750284	42.17500235
74	74					18		Red Maple	*Acer rubrum*	-70.91749077	42.1749621
75	75					17		Red Maple	*Acer rubrum*	-70.91742975	42.17498645
76	76					9		Red Maple	*Acer rubrum*	-70.91748742	42.17491439
77	77					9		Red Maple	*Acer rubrum*	-70.91745389	42.17493725
78	78					13		Red Maple	*Acer rubrum*	-70.9174378	42.17495713
79	79	Dead	N	Y	N	8		Red Maple	*Acer rubrum*	-70.91752327	42.17489131
80	80					12		Red Maple	*Acer rubrum*	-70.91750687	42.17487116
81	81					36		Red Maple	*Acer rubrum*	-70.91739019	42.17492383
82	82					27		Red Maple	*Acer rubrum*	-70.91742171	42.1748965
83	83					12		Red Maple	*Acer rubrum*	-70.91747704	42.17485026
84	84					10		Red Maple	*Acer rubrum*	-70.91744955	42.1748269
85	85					10		Black Cherry	*Prunus serotina*	-70.91739859	42.17485523
86	86					10		Red Maple	*Acer rubrum*	-70.91742072	42.17480603
87	87	Invasive/Multi	N			12		Norway Maple	*Acer platanoides*	-70.91728527	42.17493325
88	88					7		Red Maple	*Acer rubrum*	-70.91730538	42.17489747
89	89					7		Red Maple	*Acer rubrum*	-70.9173255	42.17488256
90	90					6		Red Maple	*Acer rubrum*	-70.91734562	42.1748607
91	91					15		Red Maple	*Acer rubrum*	-70.91724637	42.17489946
92	92					7		Red Maple	*Acer rubrum*	-70.91726381	42.1748607
93	93					12		Red Maple	*Acer rubrum*	-70.91720346	42.1748766
94	94					10		Red Maple	*Acer rubrum*	-70.91723028	42.17484778
95	95					11		Red Maple	*Acer rubrum*	-70.91728527	42.17483684
96	96					6		Red Maple	*Acer rubrum*	-70.91731611	42.17482492
97	97					8		Red Maple	*Acer rubrum*	-70.91736573	42.17481498
98	98					28		Red Maple	*Acer rubrum*	-70.91733623	42.17480504
99	99					7		Black Cherry	*Prunus serotina*	-70.91736439	42.17474839
100	100					10		Red Maple	*Acer rubrum*	-70.91740597	42.17476826
101	2601					8		Red Maple	*Acer rubrum*	-70.91733086	42.17473447
102	2602	Very poor	N	Y	N	10		Crabapple	*Malus ssp.*	-70.9173027	42.17475932
103	2603					8		Red Maple	*Acer rubrum*	-70.91727551	42.17470608
104	2604					7		Red Maple	*Acer rubrum*	-70.91717761	42.17468769
105	2605					7		Red Maple	*Acer rubrum*	-70.91721114	42.17473291
106	2606	Multi				12		Red Maple	*Acer rubrum*	-70.91714073	42.17472148
107	2607					14		Red Maple	*Acer rubrum*	-70.91712665	42.17474136
108	2608	Multi				20		Red Maple	*Acer rubrum*	-70.91723729	42.17477466
109	2609					8		Red Maple	*Acer rubrum*	-70.91718633	42.17479155
110	2610					22		Red Maple	*Acer rubrum*	-70.91721583	42.17481739
111	2611					10		Red Maple	*Acer rubrum*	-70.91715816	42.17481839
112	2612					7		Red Maple	*Acer rubrum*	-70.91717828	42.17484622
113	2613					10		Red Maple	*Acer rubrum*	-70.9171595	42.17489194
114	2614					15		Red Maple	*Acer rubrum*	-70.91713805	42.17486113
115	2615					7		Black Cherry	*Prunus serotina*	-70.9171072	42.17483429
116	2616					8		Red Maple	*Acer rubrum*	-70.91712329	42.17480447
117	2617					7		Red Maple	*Acer rubrum*	-70.91709245	42.17476124
118	2617					13		Northern Red Oak	*Quercus rubra*	-70.91646392	42.17588083
119	2618					8		Red Maple	*Acer rubrum*	-70.91707434	42.17477764
120	2619					6		Red Maple	*Acer rubrum*	-70.91706563	42.17479553
121	2620					14		Red Maple	*Acer rubrum*	-70.91703746	42.17480249
122	2621					7		Red Maple	*Acer rubrum*	-70.91701265	42.17480696
123	2622					14		Red Maple	*Acer rubrum*	-70.91706429	42.17485168
124	2623					12		Red Maple	*Acer rubrum*	-70.91705154	42.17488796
125	2624					34		Eastern White	*Pinus strobus*	-70.91699857	42.1748487
126	2625					8		Red Maple	*Acer rubrum*	-70.91698717	42.17482783

Tree#	Tag#	Note/Condition	Mitigation required	Tree Removal	Mitigation	DBH/Cal.	to be mitigated	Common name	Latin Name	X Coordinate	Y Coordinate
127	2626					19		Black Birch	*Betula lenta*	-70.91694761	42.17484473
128	2627					7		Black Birch	*Betula lenta*	-70.91691542	42.17488051
129	2628					7		Black Birch	*Betula lenta*	-70.91686848	42.17489144
130	2629					8		Black Birch	*Betula lenta*	-70.91683546	42.17488647
131	2630	Vines OBS	N	Y	N	22		Red Maple	*Acer rubrum*	-70.91681484	42.17493219
132	2631	Vines - OBS	N	Y	N	22		Red Maple	*Acer rubrum*	-70.91680679	42.17489939
133	2632					6		Black Birch	*Betula lenta*	-70.91678685	42.17487715
134	2633					22		Black Cherry	*Prunus serotina*	-70.91677344	42.17490051
135	2634					6		Black Birch	*Betula lenta*	-70.91675809	42.17488794
136	2635					11		Black Birch	*Betula lenta*	-70.91675541	42.17487999
137	2636					7		Crabapple	*Malus ssp.*	-70.91670914	42.17487899
138	2637					19		Red Maple	*Acer rubrum*	-70.91669104	42.1748785
139	2638					17		Red Maple	*Acer rubrum*	-70.91665415	42.17488744
140	2639					8		Crabapple	*Malus ssp.*	-70.91664477	42.17487303
141	2640					7		Grey Birch	*Betula populifolia*	-70.91662264	42.1748785
142	2641					7		Crabapple	*Malus ssp.*	-70.91659448	42.17487552
143	2642					9		Black Cherry	*Prunus serotina*	-70.91658844	42.17487452
144	2643					14		Eastern White	*Pinus strobus*	-70.91656564	42.17487104
145	2644					7		Eastern White	*Pinus strobus*	-70.91652742	42.1748616
146	2645					20		Red Maple	*Acer rubrum*	-70.91651803	42.17488744
147	2646					11		White Oak	*Quercus alba*	-70.91650328	42.17487104
148	2647					8		Eastern White	*Pinus strobus*	-70.91648451	42.17485763
149	2648					14		Swamp White Oak	*Quercus bicolor*	-70.91645969	42.17485514
150	2649					8		Eastern White	*Pinus strobus*	-70.91643623	42.17486061
151	2650					9		Eastern White	*Pinus strobus*	-70.91642189	42.17484578
152	2651	Invasive	N			25		Norway Maple	*Acer platanoides*	-70.91719998	42.1749913
153	2652					6		Pear	*Pyrus calleryana*	-70.91731934	42.17503205
154	2653	Invasive	N			9		Norway Maple	*Acer platanoides*	-70.91728984	42.17506187
155	2654	Invasive	N			22		Norway Maple	*Acer platanoides*	-70.91733812	42.17515033
156	2655	Invasive	N			20		Norway Maple	*Acer platanoides*	-70.91729697	42.17522412
157	2656					7		Red Maple	*Acer rubrum*	-70.91604799	42.17596015
158	2657					10		Northern Red Oak	*Quercus rubra*	-70.91612412	42.17597835
159	2658					9		Black Oak	*Quercus velutina*	-70.91619251	42.17599773
160	2659					10		Black Birch	*Betula lenta*	-70.91625487	42.17600717
161	2660					10		Black Birch	*Betula lenta*	-70.91631268	42.17602094
162	2661					10		Black Birch	*Betula lenta*	-70.91644545	42.17604132
163	2662					22		Black Birch	*Betula lenta*	-70.91650177	42.17605722
164	2663					26		Northern Red Oak	*Quercus rubra*	-70.91652712	42.17603649
165	2664					7		Red Maple	*Acer rubrum*	-70.91649627	42.17602904
166	2665	Bad Canker	N	Y	N	18		Black Birch	*Betula lenta*	-70.91652041	42.17600568
167	2666					18		Black Birch	*Betula lenta*	-70.91648856	42.17601438
168	2667			Y	Y	20	20	Eastern White	*Pinus strobus*	-70.9164956	42.17599127
169	2668	Dead	N	Y	N	7		Eastern White	*Pinus strobus*	-70.91652745	42.17597984
170	2669			Y	Y	20	20	Eastern White	*Pinus strobus*	-70.91641748	42.17596121
171	2670			Y	Y	16	16	Eastern White	*Pinus strobus*	-70.91635764	42.17593773
172	2671	Dead	N	Y	N	10		Red Maple	*Acer rubrum*	-70.91648202	42.17596406
173	2672					13		Black Birch	*Betula lenta*	-70.91645654	42.17601376
174	2673					9		Black Birch	*Betula lenta*	-70.9164143	42.17597897
175	2674					8		Black Birch	*Betula lenta*	-70.91637943	42.17599711
176	2675					6		Black Birch	*Betula lenta*	-70.91640055	42.17602146
177	2676					14		White Oak	*Quercus alba*	-70.91636635	42.17601823
178	2677	Multi				29		Northern Red Oak	*Quercus rubra*	-70.91624532	42.17597475
179	2678	Dead	N	Y	N	11		Hemlock	*Tsuga canadensis*	-70.91630265	42.17597102
180	2679			Y	Y	12	12	Eastern White	*Pinus strobus*	-70.91620911	42.1759663
181	2680					6		Black Birch	*Betula lenta*	-70.91616284	42.17596034
182	2681					10		Eastern White	*Pinus strobus*	-70.91609512	42.17595587
183	2682					14		Northern Red Oak	*Quercus rubra*	-70.91607366	42.17594742
184	2683	Multi				30		Black Cherry	*Prunus serotina*	-70.91604214	42.17593897
185	2684					12		Black Cherry	*Prunus serotina*	-70.91605153	42.17592009
186	2685	Multi				26		Black Cherry	*Prunus serotina*	-70.916075	42.17593251
187	2686					21		Black Oak	*Quercus velutina*	-70.91612529	42.1758535
188	2687	Multi				20		Black Birch	*Betula lenta*	-70.91611456	42.17588381
189	2688			Y	Y	16	16	Eastern White	*Pinus strobus*	-70.91611859	42.17591213
190	2689	Multi				22		Northern Red Oak	*Quercus rubra*	-70.91622118	42.17592555
191	2690	Multi				27		Black Birch	*Betula lenta*	-70.91627013	42.1759335

Tree#	Tag#	Note/Condition	Mitigation required	Tree Removal	Mitigation	DBH/Cal.	to be mitigated	Common name	Latin Name	X Coordinate	Y Coordinate
192	2691					7		Hemlock	*Tsuga canadensis*	-70.9164438	42.17593102
193	2692					12		Red Maple	*Acer rubrum*	-70.91650549	42.17593947
194	2693					10		Black Birch	*Betula lenta*	-70.91654707	42.1759509
195	2694					28		Red Maple	*Acer rubrum*	-70.91661077	42.17597127
196	2695					24		Red Maple	*Acer rubrum*	-70.91659937	42.17594096
197	2696					33		Northern Red Oak	*Quercus rubra*	-70.91665637	42.17593301
198	2697	Multi				40		Red Maple	*Acer rubrum*	-70.91667179	42.17590518
199	2698					10		Black Birch	*Betula lenta*	-70.91661681	42.17592058
200	2699					8		Northern Red Oak	*Quercus rubra*	-70.91657791	42.1759171
201	2903					13		Black Birch	*Betula lenta*	-70.91675575	42.17585897
202	2904					16		Northern Red Oak	*Quercus rubra*	-70.91675373	42.17583064
203	2906					22		Northern Red Oak	*Quercus rubra*	-70.91676849	42.17580282
204	2910			Y	Y	10	10	Eastern White	*Pinus strobus*	-70.91676245	42.17577449
205	2911					24		Northern Red Oak	*Quercus rubra*	-70.91658537	42.17588565
206	2912					12		Black Birch	*Betula lenta*	-70.91662686	42.17588629
207	2913	Dead	N	Y	N	7		Hemlock	*Tsuga canadensis*	-70.9165692	42.17587437
208	2914					11		Black Birch	*Betula lenta*	-70.91649409	42.17590766
209	2915			Y	Y	14	14	Eastern White	*Pinus strobus*	-70.91651421	42.1758848
210	2916			Y	Y	11	11	Eastern White	*Pinus strobus*	-70.91645051	42.17590369
211	2918	Dead	N	Y	N	10		Eastern White	*Pinus strobus*	-70.91642436	42.17588431
212	2919	Poor	N	Y	N	10		Eastern White	*Pinus strobus*	-70.9164029	42.17590816
213	2920	Multi				22		White Oak	*Quercus alba*	-70.91635864	42.17590816
214	2921	Multi				20		Black Birch	*Betula lenta*	-70.91631774	42.17588679
215	2922	Poor	N	Y	N	14		Hemlock	*Tsuga canadensis*	-70.91626208	42.17590269
216	2923					18		Northern Red Oak	*Quercus rubra*	-70.91622185	42.17589027
217	2924					22		Northern Red Oak	*Quercus rubra*	-70.91615748	42.17588679
218	2925	Multi				22		Red Maple	*Acer rubrum*	-70.91617156	42.17585747
219	2926					17		Swamp White Oak	*Quercus bicolor*	-70.91624666	42.175853
220	2927					24		Northern Red Oak	*Quercus rubra*	-70.91632243	42.17585051
221	2928					13		Black Birch	*Betula lenta*	-70.91636736	42.17587586
222	2929			Y	Y	14	14	Eastern White	*Pinus strobus*	-70.91641095	42.17586592
223	2930					18		Black Oak	*Quercus velutina*	-70.91646325	42.175853
224	2931			Y	Y	6	6	Eastern White	*Pinus strobus*	-70.91650549	42.17584008
225	2932			Y	Y	10	10	Eastern White	*Pinus strobus*	-70.91654237	42.1758371
226	2933	Multi				11		Black Birch	*Betula lenta*	-70.916592	42.17584952
227	2934			Y	Y	9	9	Eastern White	*Pinus strobus*	-70.9166443	42.17585499
228	2935					9		Black Birch	*Betula lenta*	-70.91668721	42.17585051
229	2936					25		Black Oak	*Quercus velutina*	-70.91665771	42.1758202
230	2937					13		Black Oak	*Quercus velutina*	-70.91658529	42.17580827
231	2938			Y	Y	13	13	Eastern White	*Pinus strobus*	-70.91666173	42.17577647
232	2938					14		Eastern White	*Pinus strobus*	-70.91619379	42.17553494
233	2939					7		Black Birch	*Betula lenta*	-70.91660943	42.17578542
234	2940					7		White Oak	*Quercus alba*	-70.91637205	42.17583511
235	2941			Y	Y	14	14	Eastern White	*Pinus strobus*	-70.91619503	42.1758202
236	2942					20		Black Birch	*Betula lenta*	-70.91614071	42.17578989
237	2943			Y	Y	11	11	Eastern White	*Pinus strobus*	-70.91627952	42.17582418
238	2944					20		Black Oak	*Quercus velutina*	-70.91626477	42.17580032
239	2945					14		Swamp White Oak	*Quercus bicolor*	-70.91638546	42.17580728
240	2946			Y	Y	10	10	Eastern White	*Pinus strobus*	-70.91645386	42.17580231
241	2947	Multi				10		Red Maple	*Acer rubrum*	-70.91644984	42.17577846
242	2948					16		Northern Red Oak	*Quercus rubra*	-70.91652628	42.1757874
243	2949	Multi				14		Black Birch	*Betula lenta*	-70.91663491	42.17575461
244	2950					8		Eastern White	*Pinus strobus*	-70.91668855	42.17575659
245	2951			Y	Y	18	18	Black Oak	*Quercus velutina*	-70.91668855	42.17573473
246	2952			Y	Y	8	8	Eastern White	*Pinus strobus*	-70.91672141	42.17573274
247	2953			Y	Y	10	10	Eastern White	*Pinus strobus*	-70.91668084	42.17571858
248	2954			Y	Y	9	9	Eastern White	*Pinus strobus*	-70.91671471	42.17570392
249	2955			Y	Y	30	30	Northern Red Oak	*Quercus rubra*	-70.9166328	42.1757179
250	2956			Y	Y	11	11	Northern Red Oak	*Quercus rubra*	-70.91659793	42.17573232
251	2957			Y	Y	6	6	Eastern White	*Pinus strobus*	-70.91656575	42.17575667
252	2958			Y	Y	18	18	Northern Red Oak	*Quercus rubra*	-70.91649668	42.17575915
253	2959			Y	Y	22	22	Black Oak	*Quercus velutina*	-70.91639475	42.17575766
254	2960			Y	Y	20	20	Northern Red Oak	*Quercus rubra*	-70.91631965	42.17577008
255	2961			Y	Y	8	8	Tupelo	*Nyssa Sylvatica*	-70.91625461	42.17577903
256	2962			Y	Y	8	8	Black Birch	*Betula lenta*	-70.91621572	42.17576164

Tree#	Tag#	Note/Condition	Mitigation required	Tree Removal	Mitigation	DBH/Cal.	to be mitigated	Common name	Latin Name	X Coordinate	Y Coordinate
257	2963			Y	Y	6	6	Eastern White	*Pinus strobus*	-70.91614397	42.17576114
258	2964			Y	Y	9	9	Black Birch	*Betula lenta*	-70.91616744	42.17574375
259	2965			Y	Y	18	18	White Oak	*Quercus alba*	-70.91624589	42.17574225
260	2966			Y	Y	6	6	White Oak	*Quercus alba*	-70.91615704	42.17571294
261	2967			Y	Y	10	10	Black Birch	*Betula lenta*	-70.91624723	42.17570399
262	2968			Y	Y	10	10	Eastern White	*Pinus strobus*	-70.91630423	42.17570747
263	2969	Dead	N	Y	N	10		Eastern White	*Pinus strobus*	-70.91632032	42.17575219
264	2970			Y	Y	16	16	Swamp White Oak	*Quercus bicolor*	-70.91635385	42.17572387
265	2971			Y	Y	7	7	Eastern White	*Pinus strobus*	-70.91641539	42.17572232
266	2972			Y	Y	11	11	Eastern White	*Pinus strobus*	-70.91646704	42.17572545
267	2973			Y	Y	18	18	Eastern White	*Pinus strobus*	-70.91651054	42.17569677
268	2974			Y	Y	20	20	Eastern White	*Pinus strobus*	-70.91656558	42.17569279
269	2975	Dual		Y	Y	19	19	Black Birch	*Betula lenta*	-70.91663854	42.1756777
270	2976	Dead	N	Y	N	8		Northern Red Oak	*Quercus rubra*	-70.9167074	42.17567764
271	2977			Y	Y	14	14	White Oak	*Quercus alba*	-70.91661898	42.1756444
272	2978			Y	Y	8	8	Eastern White	*Pinus strobus*	-70.91657597	42.17564286
273	2979			Y	Y	9	9	Black Birch	*Betula lenta*	-70.91667352	42.17563756
274	2980			Y	Y	16	16	Black Oak	*Quercus velutina*	-70.9165639	42.17559962
275	2981			Y	Y	11	11	White Oak	*Quercus alba*	-70.91662247	42.17560994
276	2982			Y	Y	14	14	Eastern White	*Pinus strobus*	-70.916706	42.17563168
277	2983			Y	Y	12	12	Black Birch	*Betula lenta*	-70.91673691	42.17562098
278	2984			Y	Y	10	10	White Oak	*Quercus alba*	-70.91672345	42.17565226
279	2985			Y	Y	12	12	Red Maple	*Acer rubrum*	-70.91670266	42.17560455
280	2986			Y	Y	19	19	Eastern White	*Pinus strobus*	-70.91671741	42.17557722
281	2987			Y	Y	22	22	White Oak	*Quercus alba*	-70.91665908	42.17556281
282	2988			Y	Y	20	20	Black Oak	*Quercus velutina*	-70.9165833	42.17555138
283	2989			Y	Y	10	10	Eastern White	*Pinus strobus*	-70.9164652	42.17565545
284	2990			Y	Y	12	12	Eastern White	*Pinus strobus*	-70.91642095	42.17567632
285	2991	Multi		Y	Y	40	40	Black Oak	*Quercus velutina*	-70.9163378	42.17565048
286	2992			Y	Y	6	6	Eastern White	*Pinus strobus*	-70.91626404	42.17565197
287	2993					6		Black Birch	*Betula lenta*	-70.91620972	42.17565744
288	2994					12		White Oak	*Quercus alba*	-70.91615809	42.17567831
289	2995					12		Eastern White	*Pinus strobus*	-70.91615943	42.17563159
290	2996	Dead	N	Y	N	16		Northern Red Oak	*Quercus rubra*	-70.91627343	42.17560178
291	2997			Y	Y		0	Black Birch	*Betula lenta*	-70.9163445	42.17557892
292	2998			Y	Y	7	7	Eastern White	*Pinus strobus*	-70.9164357	42.17552127
293	2999			Y	Y	20	20	White Oak	*Quercus alba*	-70.91651751	42.17552426
294	3000			Y	Y	32	32	Northern Red Oak	*Quercus rubra*	-70.91661486	42.17548911
295	2537	Multi				40		Black Oak	*Quercus velutina*	-70.91617501	42.17555979
296	2539	Dead	N	Y	N	12		Northern Red Oak	*Quercus rubra*	-70.91620854	42.17550711
297	2540					12		White Oak	*Quercus alba*	-70.91624877	42.17553096
298	2541					14		Eastern White	*Pinus strobus*	-70.9162367	42.17556973
299	2542					13		White Oak	*Quercus alba*	-70.91631047	42.17554885
300	2543			Y	Y	14	14	Northern Red Oak	*Quercus rubra*	-70.91636411	42.17548823
301	2544			Y	Y	13	13	Eastern White	*Pinus strobus*	-70.91634265	42.17551109
302	2545			Y	Y	20	20	White Oak	*Quercus alba*	-70.91651029	42.17548823
303	2546			Y	Y	14	14	Eastern White	*Pinus strobus*	-70.91642982	42.17545941
304	2547			Y	Y	24	24	Northern Red Oak	*Quercus rubra*	-70.91636545	42.17544549
305	2548			Y	Y	14	14	Eastern White	*Pinus strobus*	-70.91642862	42.1755821
306	2548					14		Eastern White	*Pinus strobus*	-70.91640568	42.17540971
307	2549					22		Black Oak	*Quercus velutina*	-70.91618843	42.17546139
308	2550					9		Eastern White	*Pinus strobus*	-70.91624073	42.17546239
309	2551					13		White Oak	*Quercus alba*	-70.91626152	42.17542363
310	2552	Multi				32		White Oak	*Quercus alba*	-70.91620519	42.17539778
311	2553					8		Black Birch	*Betula lenta*	-70.91631918	42.17539281
312	2554					22		Northern Red Oak	*Quercus rubra*	-70.91625213	42.175363
313	2555					18		Eastern White	*Pinus strobus*	-70.91632589	42.17535008
314	2556					20		White Oak	*Quercus alba*	-70.91621592	42.17531132
315	2557					11		Eastern White	*Pinus strobus*	-70.91622262	42.17527752
316	2558	Invasive	N			8		Norway Maple	*Acer platanoides*	-70.91627761	42.17531132
317	2559	Dead	N	Y	N	12		Black Birch	*Betula lenta*	-70.91631114	42.17529939
318	2560	Dead	N	Y	N	12		Black Birch	*Betula lenta*	-70.91632052	42.1752646
319	2561	Excess deacy	N	Y	N	30		Eastern White	*Pinus strobus*	-70.91635106	42.17528578
320	2562					15		Eastern White	*Pinus strobus*	-70.91625458	42.1752406
321	2563	Multi				48		Northern Red Oak	*Quercus rubra*	-70.91630554	42.17521675

Tree#	Tag#	Note/Condition	Mitigation required	Tree Removal	Mitigation	DBH/Cal.	to be mitigated	Common name	Latin Name	X Coordinate	Y Coordinate
322	2564					16		Black Birch	*Betula lenta*	-70.91634443	42.17519886
323	2565					14		Eastern White	*Pinus strobus*	-70.91623044	42.17520283
324	2566					22		Eastern White	*Pinus strobus*	-70.91625055	42.17517898
325	2567					9		White Oak	*Quercus alba*	-70.916327	42.17517103
326	2568					14		Eastern White	*Pinus strobus*	-70.91627738	42.17515711
327	2569					16		White Oak	*Quercus alba*	-70.91631359	42.17514022
328	2570					16		Eastern White	*Pinus strobus*	-70.9162358	42.17513525
329	2571					13		Black Birch	*Betula lenta*	-70.9162814	42.17512233
330	2572					15		White Oak	*Quercus alba*	-70.9163109	42.1751104
331	2573					30		Eastern White	*Pinus strobus*	-70.91624653	42.17509648
332	2574					12		Northern Red Oak	*Quercus rubra*	-70.91628676	42.17507462
333	2575					13		Eastern White	*Pinus strobus*	-70.91623714	42.17507661
334	2576					22		Eastern White	*Pinus strobus*	-70.91633639	42.17509549
335	2577					12		White Oak	*Quercus alba*	-70.91624519	42.17504878
336	2578					7		Red Maple	*Acer rubrum*	-70.91628542	42.1750448
337	2579					13		Eastern White	*Pinus strobus*	-70.91631493	42.17504281
338	2580	Invasive/Multi	N			15		Black Locust	*Robinia pseudoacacia*	-70.91636076	42.17507676
339	2581	Invasive/Multi	N			8		Black Locust	*Robinia pseudoacacia*	-70.91637149	42.17505638
340	2582					22		Eastern White	*Pinus strobus*	-70.91636321	42.17501384
341	2583					7		Eastern White	*Pinus strobus*	-70.91635918	42.17497806
342	2584	Multi				40		White Oak	*Quercus alba*	-70.91635382	42.17491346
343	2585					12		Eastern White	*Pinus strobus*	-70.91640826	42.17491052
344	2586					12		Eastern White	*Pinus strobus*	-70.91638136	42.17488296
345	2587					9		Eastern White	*Pinus strobus*	-70.9163539	42.17482974
346	2588					11		Eastern White	*Pinus strobus*	-70.91643314	42.17493953

346 Total Trees

Caliper inches requiring mitigation	934
Caliper inches/2 =	467
Number of 3 inch trees	156

LEGEND

RIVERFRONT	
RIVERFRONT OFFSET	
DEGRADED AREA WITHIN RIVERFRONT	
ALTERED AREA WITHIN RIVERFRONT	
100 RIVERFRONT AREA	
200 RIVERFRONT AREA	

EXISTING DEGRADED AREA WITHIN 100' AND 200' RIVER FRONT BUFFER

TOTAL AREA WITHIN 0'–100' BUFFER	44,894 S.F
DEGRADED AREA WITHIN 0–100' BUFFER	18,670 S.F (41.6%)
TOTAL AREA WITHIN 100'–200' BUFFER	59,021 S.F
DEGRADED AREA WITHIN 100'–200' BUFFER	19,841 S.F (33.6%)
TOTAL AREA WITHIN BUFFER	103,915 S.F
DEGRADED AREA WITHIN BUFFERS	38,511 S.F (37.1%)

EXISTING ALTERED AREA WITHIN 100' AND 200' RIVER FRONT BUFFER

TOTAL AREA WITHIN 0'–100' BUFFER	44,894 S.F
ALTERED AREA WITHIN 0–100' BUFFER	4,010 S.F (8.93%)
TOTAL AREA WITHIN 100'–200' BUFFER	59,021 S.F
ALTERED AREA WITHIN 100'–200' BUFFER	5,916.7 S.F (10.0%)
TOTAL AREA WITHIN BUFFER	103,915 S.F
ALTERED AREA WITHIN BUFFERS	17,485 S.F (16.8%)

THE AREAS LISTED ABOVE ARE BASED ON AREAS THAT ARE NOT COVERED BY IMPERVIOUS SURFACE BUT HAVE BEEN ALTERED FROM ITS NATIVE STATE FOR THE PURPOSES OF INSTALLATION OF STORMWATER FACILITIES, LANDSCAPING, OR OTHER BASIC GRADING AND INFRASTRUCTURE.

NOTES:

1. ALL ELEVATIONS REFER TO NAVD 88.
2. THE INFORMATION SHOWN ON THIS PLAN IS THE SOLE PROPERTY OF ALLEN & MAJOR ASSOCIATES, INC. IT'S INTENDED USE IS TO PROVIDE INFORMATION. ANY ALTERATION, MISUSE, OR RECALCULATION OF INFORMATION OR DATA WITHOUT THE EXPRESSED, WRITTEN CONSENT OF ALLEN & MAJOR ASSOCIATES, INC. IS STRICTLY PROHIBITED.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

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M:\PROJECTS\1179-20A\CIVIL\DRAWINGS\CURRENT\C-1179-20A_FLOOD STORAGE CALCS.DWG

ISSUED FOR
SITE PLAN REVIEW
NOVEMBER 4, 2024
REV. 2 - DEC. 23, 2024

ISSUED FOR
NOTICE OF INTENT
OCTOBER 17, 2024 -
REV. 2 - DEC. 23, 2024

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION
2	12-23-2024	PER REVIEW COMMENTS
1	11-12-2024	PER MASSDEP INITIAL REVIEW

APPLICANT\OWNER:
FIFTY-FIVE SAXON HINGHAM LLC
25 RECREATION PARK DRIVE, SUITE 204
HINGHAM, MA 02043

PROJECT:
OFFICE BUILDING
55 INDUSTRIAL
PARK ROAD
HINGHAM, MA

PROJECT NO.	1179-20A	DATE:	10-17-2024
SCALE:	1" = 30'	DWG. NAME:	C-1179-20
DESIGNED BY:	PLC	CHECKED BY:	PLC

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil engineering ◆ land surveying
environmental consulting ◆ landscape architecture
www.allenmajor.com
10 MAIN STREET
LAKEVILLE, MA 02347
TEL: (508) 923-1010
FAX: (508) 923-6309
WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

DRAWING TITLE:
EXISTING DEGRADED AREAS

SHEET No.
SK-1

LEGEND

- RIVERFRONT
- RIVERFRONT OFFSET
- DEGRADED AREA WITHIN RIVERFRONT
- ALTERED AREA WITHIN RIVERFRONT
- 100 RIVERFRONT AREA
- 200 RIVERFRONT AREA

PROPOSED DEGRADED AREA WITHIN 100' AND 200' RIVER FRONT BUFFER

TOTAL AREA WITHIN 0'–100' BUFFER	44,894 S.F
DEGRADED AREA WITHIN 0–100' BUFFER	16,601 S.F (37.0%)
TOTAL AREA WITHIN 100'–200' BUFFER	59,021 S.F
DEGRADED AREA WITHIN 100'–200' BUFFER	19,947 S.F (33.8%)

TOTAL AREA WITHIN BUFFER	103,915 S.F
DEGRADED AREA WITHIN BUFFERS	36,548 S.F (35.2%)

POTENTIAL MITIGATION REQUIRED INCREASED DISTURBANCE WITHIN THE 100 –200 FOOT RIPARIAN ZONE:
106 S.F. x 2 = 212 S,F,

PROPOSED ALTERED AREA WITHIN 100' AND 200' RIVER FRONT BUFFER

TOTAL AREA WITHIN 0'–100' BUFFER	44,894 S.F
ALTERED AREA WITHIN 0–100' BUFFER	5,532.8 S.F (12.3%)
TOTAL AREA WITHIN 100'–200' BUFFER	59,021 S.F
ALTERED AREA WITHIN 100'–200' BUFFER	18,212.2 S.F (30.9%)

TOTAL AREA WITHIN BUFFER	103,915 S.F
ALTERED AREA WITHIN BUFFERS	23,745 S.F (22.9%)

THE AREAS LISTED ABOVE ARE BASED ON AREAS THAT WOULD NOT BE COVERED BY IMPERVIOUS SURFACE BUT HAVE BEEN ALTERED FROM ITS NATIVE STATE FOR THE PURPOSES OF INSTALLATION OF STORMWATER FACILITIES, LANDSCAPING, OR OTHER BASIC GRADING AND INFRASTRUCTURE.

NOTES:

1. ALL ELEVATIONS REFER TO NAVD 88.
2. THE INFORMATION SHOWN ON THIS PLAN IS THE SOLE PROPERTY OF ALLEN & MAJOR ASSOCIATES, INC. IT'S INTENDED USE IS TO PROVIDE INFORMATION. ANY ALTERATION, MISUSE, OR RECALCULATION OF INFORMATION OR DATA WITHOUT THE EXPRESSED, WRITTEN CONSENT OF ALLEN & MAJOR ASSOCIATES, INC. IS STRICTLY PROHIBITED.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

DIG SAFE

BEFORE YOU DIG
CALL 811 OR
1-888-DIG-SAFE
1-888-344-7233

M:\PROJECTS\1179-20A\CIVIL\DRAWINGS\CURRENT\C-1179-20A_FLOOD STORAGE CALCS.DWG

ISSUED FOR
SITE PLAN REVIEW
NOVEMBER 4, 2024
REV. 2 - DEC. 23, 2024

ISSUED FOR
NOTICE OF INTENT
OCTOBER 17, 2024 -
REV. 2 - DEC. 23, 2024

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV	DATE	DESCRIPTION
2	12-23-2024	PER REVIEW COMMENTS
1	11-12-2024	PER MASSDEP INITIAL REVIEW

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DRAWING TITLE:
PROPOSED DEGRADED AREAS

SHEET No.
SK-2